



[insert WRIA 15 photo]

# Watershed Restoration and Enhancement Draft Plan

**WRIA 15  
Kitsap Watershed**

December 11, 2020 [insert final date once approved]

## Publication Information

This document is available on the Department of Ecology's website at:  
<https://ecology.wa.gov/Water-Shorelines/Water-supply/Streamflow-restoration/Streamflow-restoration-planning>

### Cover photo credit

- [tbd]

## Contact Information

### Water Resources Program

Address: 3190 160th Ave SE, Bellevue, WA 98008

Phone: 425-649-7000

**Website<sup>1</sup>:** [Washington State Department of Ecology](http://Washington State Department of Ecology)

## 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 360-407-6872 or email at [WRpubs@ecy.wa.gov](mailto:WRpubs@ecy.wa.gov). For Washington Relay Service or TTY call 711 or 877-833-6341.

## Language Access

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 Coordinators by phone at 360-407-6177 or email at [millie.piazza@ecy.wa.gov](mailto:millie.piazza@ecy.wa.gov). When you call, please allow a few moments for us to contact an interpreter. Visit Ecology's website for more information.

[insert Spanish translation]

---

<sup>1</sup> [www.ecology.wa.gov/contact](http://www.ecology.wa.gov/contact)

## Table of Contents

<b>List of Figures and Tables .....</b>	<b>iv</b>
Figures.....	iv
Tables.....	iv
<b>Acknowledgements.....</b>	<b>vi</b>
<b>Executive Summary.....</b>	<b>ii</b>
<b>Chapter 1 – Plan Overview .....</b>	<b>1</b>
1.1 WRIA 15 Watershed Plan Purpose and Structure.....	1
1.2 Requirements of the WRIA 15 Watershed Restoration and Enhancement Plan.....	3
1.3 Overview of the WRIA 15 Committee.....	5
<b>Chapter Two: Watershed Overview .....</b>	<b>9</b>
2.1 Brief Introduction to WRIA 15 .....	9
2.2 Watershed Planning in WRIA 15.....	19
2.3 Description of the Watershed – Geology, Hydrogeology, Hydrology, and Streamflow .....	21
<b>Chapter Three: Subbasin Delineation .....</b>	<b>28</b>
3.1 Introduction .....	28
3.2 Approach to Develop Subbasins .....	28
3.3 WRIA 15 Subbasins .....	29
<b>Chapter Four: New Consumptive Water Use Impacts.....</b>	<b>32</b>
4.1 Introduction to Consumptive Use.....	32
4.2 Projection of Permit-Exempt Well Connections (2018–2038).....	32
4.3 Impacts of New Consumptive Water Use .....	38
<b>Chapter Five: WRIA 15 Projects .....</b>	<b>52</b>
5.1 Description and assessment .....	52
5.2 Category I Projects .....	54
5.3 Category II-IV Projects.....	72
5.3 Project Implementation Summary.....	74
<b>Chapter 6. Additional Plan Recommendations.....</b>	<b>75</b>
6.1 Policy and Regulatory Recommendations .....	75
6.2 Adaptive Management Recommendations .....	80

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

<b>Chapter Seven: Net Ecological Benefit Evaluation</b> .....	<b>89</b>
7.1 Water Offsets.....	89
7.2 Habitat Benefits .....	94
7.3 Adaptive Management .....	110
7.4 NEB Evaluation Findings.....	110
<b>References</b> .....	<b>111</b>
<b>Glossary</b> .....	<b>115</b>
<b>Appendices</b> .....	<b>124</b>
Appendix A – Committee Roster.....	125
Appendix B – Operating Principles .....	126
Appendix C – Aquifer Units within WRIA 15 .....	136
Appendix D – Surface Water Quality Assessments Category 4 and 5 Listings in WRIA 15 .....	137
Appendix E – TMDL Table for WRIA 15 .....	144
Appendix F – Subbasin Delineation Memo .....	146
Appendix G – Growth Projections and Consumptive Use Memo .....	151
Appendix H – Project Inventory.....	168
Appendix I – Detailed Project Descriptions .....	191

DRAFT

## List of Figures and Tables

### Figures

<i>Figure 1: Water Resource Inventory Area 15 Overview</i>	10
<i>Figure 2: Chico Creek Flow Exceedance.</i>	25
<i>Figure 3: WRIA 15 Subbasin Delineation for the Watershed Restoration and Enhancement Plan</i>	30
<i>Figure 4: WRIA 15 Projected New Permit-Exempt Wells (number and likely area) Under the Moderate Estimate Growth Scenario 2018-2038.</i>	37
<i>Figure 5: WRIA 15 Estimated Consumptive Use based on Moderate Estimate for Growth Projections and Irrigated Area Method, 2018-2038</i>	51
<i>Figure 6. Place holder for MAR diagram.</i>	55

### Tables

<i>Table 1: WRIA 15 Committee Participating Entities</i>	6
<i>Table 2: Salmonid Species and Status in WRIA 15</i>	12
<i>Table 3: Salmonid Presence and Life History Timing in Kitsap Basin</i>	14
<i>Table 4: WRIA 15 Subbasins</i>	31
<i>Table 5: Number of Permit-Exempt Connections Projected between 2018 and 2038</i>	35
<i>Table 6. Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate Estimate for Growth Projection and Metered Data Method</i>	44
<i>Table 7. Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower- and Higher-Estimates for Growth Projections and Metered Data Method.</i>	45
<i>Table 8: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate Estimate for Growth Projection and USGS Groundwater Model Method</i>	46
<i>Table 9: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower and Higher Estimates for Growth Projections and USGS Groundwater Model Method</i>	47
<i>Table 10: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate Estimate for Growth Projection and Irrigated Area Method</i>	48
<i>Table 11: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower and Higher Estimates for Growth Projections and Irrigated Area Method</i>	49
<i>Table 12. Managed Aquifer Recharge Package</i>	55
<i>Table 13. Water Offsets from MAR Package</i>	57
<i>Table 14. Package of Community Forest Type Projects in WRIA 15</i>	57
<i>Table 15. [Placeholder] Target Number of Raingarden and LID Projects</i>	59
<i>Table 16. West Sound Subbasin Category I Projects.</i>	61
<i>Table 17. Bainbridge Island Subbasin Category I Projects.</i>	63
<i>Table 18. North Hood Canal Subbasin Category I Projects.</i>	65
<i>Table 19. South Hood Canal Subbasin Category I Projects.</i>	67
<i>Table 20. Vashon Maury Subbasin Category I Projects.</i>	68
<i>Table 21. South Sound Subbasin Category I Projects.</i>	69
<i>Table 22. South Sound Islands Subbasin Category I Projects.</i>	71
<i>Table 23. Summary of habitat benefits from Category II-IV projects.</i>	72
<i>Table 24. Implementation of Tracking and Monitoring Recommendation</i>	82
<i>Table 25. Implementation of Reporting and Adaptation Recommendation</i>	84
<i>Table 26. Summary of WRIA 15 Adaptive Management Funding Recommendation.</i>	86

## Acronyms

Acronym	Definition
AE	Application Efficiency
AF/yr	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

## Acknowledgements

This watershed plan was written as a collaboration between the Department of Ecology, the WRIA 15 Committee, and the technical consultants. We express our sincere gratitude to those that supported the development of the plan and supplemental materials.

### **WRIA 15 Committee Members – Primary Representatives and Alternates**

Dave Ward, Kitsap County

David Nash<sup>1</sup>, Kitsap County

Kathy Peters, Kitsap County

Commissioner Randy Neatherlin, Mason County

David Windom, Mason County

Dan Cardwell, Pierce County

Austin Jennings, Pierce County

Greg Rabourn, King County

Joe Hovencotter, King County

Eric Ferguson, King County

David Winfrey, Puyallup Tribe

Seth Book, Skokomish Tribe

Dana Sarff, Skokomish Tribe

Jeff Dickison, Squaxin Island Tribe

Paul Pickett, Squaxin Island Tribe

Erica Marbet, Squaxin Island Tribe

Leonard Forsman, Suquamish Tribe

Alison O’Sullivan, Suquamish Tribe

Sam Phillips, Port Gamble S’Klallam Tribe

Paul McCollum, Port Gamble S’Klallam Tribe

Jacki Brown, City of Port Orchard

Thomas Hunter<sup>2</sup>, City of Port Orchard

Zach Holt, City of Port Orchard

Trent Ward, City of Gig Harbor

Brienn Ellis, City of Gig Harbor

Michael Michael, City of Bainbridge Island

Christian Berg, City of Bainbridge Island

Christy Carr<sup>2</sup>, City of Bainbridge Island

Teresa Smith, City of Bremerton

Allison Satter, City of Bremerton

Mayor Becky Erikson<sup>3</sup>, City of Poulsbo

Joel Purdy, Kitsap Public Utility District

Mark Morgan, Kitsap Public Utility District

Bob Hunter, Kitsap Public Utility District

Brittany Gordon, Department of Fish and Wildlife

Nam Siu, Department of Fish and Wildlife

Stacy Vynne McKinstry, Department of Ecology

Russ Shiplet, Kitsap Building Association

Josie Cummings<sup>2</sup>, Building Industry Association of Washington

Joy Garitone, Kitsap Conservation District

Nathan Daniel, Great Peninsula Conservancy

Sandra Staples-Bortner, Great Peninsula Conservancy<sup>2</sup>

Larry Boltz, Mason Kitsap Farm Bureau (ex officio)

Shawn O’Dell, Washington Water Service (ex officio)

### **WRIA 15 Technical Consultant Team**

Bob Montgomery, Anchor QEA

Burt Clothier, Pacific Groundwater Group

Chad Wiseman, HDR

HDR, PGG and Anchor QEA Support Staff

### **Facilitation Team**

Susan Gulick, Sound Resolutions

Angela Pietschmann, Cascadia Consulting

Additional support from Cascadia Consulting Staff

## WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

### Department of Ecology Staff

Stacy Vynne McKinstry, Chair

John Covert, Lead Technical Support

Paulina Levy, Committee and Plan Development Support

Stephanie Potts, WRIA 15 Alternate Chair

Ria Berns, Regional Section Manager

Bennett Weinstein, Streamflow Section Manager

Mugdha Flores, Streamflow Communications Lead

Streamflow Section Technical Staff

Northwest Region Water Resources Section

Jon Turk, Aspect (Consultant to Skokomish Tribe)

Joel Massman, Keta Waters (Consultant to Suquamish Tribe)

Suquamish Tribe rep

Alison O’Sullivan and John O’Leary<sup>2</sup>, Suquamish Tribe

Austin Jennings and Dan Cardwell, Pierce County

Brittany Gordon and Nam Siu, WDFW

David Nash<sup>1</sup>, Kitsap County

David Windom, Mason County

Paul Pickett, Squaxin Island Tribe

Sam Phillips, Port Gamble S’Klallam Tribe

Thomas Hunter<sup>2</sup> and Zach Holt, City of Port Orchard

Joel Purdy and Bob Hunter, KPUD

Bob Montgomery, Anchor QEA

Burt Clothier, PGG

Stacy Vynne McKinstry, Ecology

### Project Workgroup

Joy Garitone and Brian Stahl, Kitsap Conservation District

Jon Turk, Aspect (Consultant to Skokomish Tribe)

Joel Massman, Keta Waters (Consultant to Suquamish Tribe)

Alison O’Sullivan and John O’Leary<sup>2</sup>, Suquamish Tribe

Austin Jennings and Dan Cardwell, Pierce County

Brittany Gordon and Nam Siu, WDFW

David Nash<sup>1</sup> and Kathy Peters, Kitsap County

David Windom, Mason County

Paul Pickett, Squaxin Island Tribe

Sam Phillips, Port Gamble S’Klallam Tribe

Thomas Hunter<sup>2</sup> and Zach Holt, City of Port Orchard

Brenda Padgham, Bainbridge Island Land Trust

Greg Rabourn, King County

Seth Book and Dana Sarff, Skokomish Tribe

Bob Montgomery, Anchor QEA

Burt Clothier, PGG

Stacy Vynne McKinstry, Ecology

Erik Steffens, GPC

Thank you to the Committee members that participated in short-term, ad hoc workgroups.

Thank you also to Tribal, city and county staff, Kitsap Public Health District, and USGS for providing resources and presentations throughout this process.

<sup>1</sup>David Nash, formerly with Kitsap County, is now deceased.

<sup>2</sup>No longer at entity.

<sup>3</sup>Withdrew from Committee.

### Technical Workgroup

Eric Ferguson, King County



## Executive Summary

**Commented [VMSJ(1):** Please note that we are continuing to work on the following for the final plan:

1. Formatting of headings
2. Formatting of captions
3. Confirming in-text table and figure citations.
4. Consistency with format of in-text references.
5. Cross-referencing in-text references with final reference list.
6. Consistent formatting of final reference list.

1  
2  
3 In January 2018, the Washington State Legislature passed the Streamflow Restoration law (RCW  
4 90.94) to help support robust, healthy, and sustainable salmon populations while ensuring rural  
5 communities have access to water. The law directs the Department of Ecology to lead local  
6 planning Committees to develop Watershed Restoration and Enhancement Plans that identify  
7 projects to offset potential consumptive impacts of new permit-exempt domestic groundwater  
8 withdrawals on instream flows over the next 20 years (2018 – 2038) and provide a net  
9 ecological benefit to the watershed. The WRIA 15 Committee believes that this Watershed  
10 Restoration and Enhancement Plan meets the requirements of the law.

11  
12 The Department of Ecology (Ecology) established the Watershed Restoration and Enhancement  
13 Committee to collaborate with tribes, counties, cities, state agencies, and special interest  
14 groups in the Kitsap watershed, also known as Water Resource Inventory Area (WRIA) 15. The  
15 WRIA 15 Committee met for over 2 years to develop a watershed plan.

16  
17 As required by the law, and to allow for meaningful analysis of the relationship between new  
18 consumptive use and offsets, the WRIA 15 Committee divided the watershed into seven  
19 subbasins. Subbasins help describe the location and timing of projected new consumptive  
20 water use, the location and timing of impacts to instream resources, and the necessary scope,  
21 scale, and anticipated benefits of projects.

22  
23 This watershed plan projects 5,568 permit exempt (PE) well connections over the 20-year  
24 planning horizon. The projects and actions in this watershed plan will address and offset the  
25 consumptive water use from those 5,568 PE well connections. The projected new consumptive  
26 water use associated with the new PE well connections is 766.4 acre-feet per year (1.06 cubic  
27 feet per second [cfs] or 684,150 gallons per day [gpd]) in WRIA 15. This watershed plan also  
28 presents a higher goal for project implementation of 1,218 acre-feet per year (1.68 cfs or 1.087  
29 million gallons per day) in order to support streamflows.

30  
31 This watershed plan includes projects that provide an anticipated offset of xx acre-feet per year  
32 to benefit streamflows and enhance the watershed. Additional projects in the plan include  
33 benefits to fish and wildlife habitat, such several thousand feet of streambed improvements,  
34 dozens of acres of restoration and protection, and many miles of riparian restoration across  
35 WRIA 15.

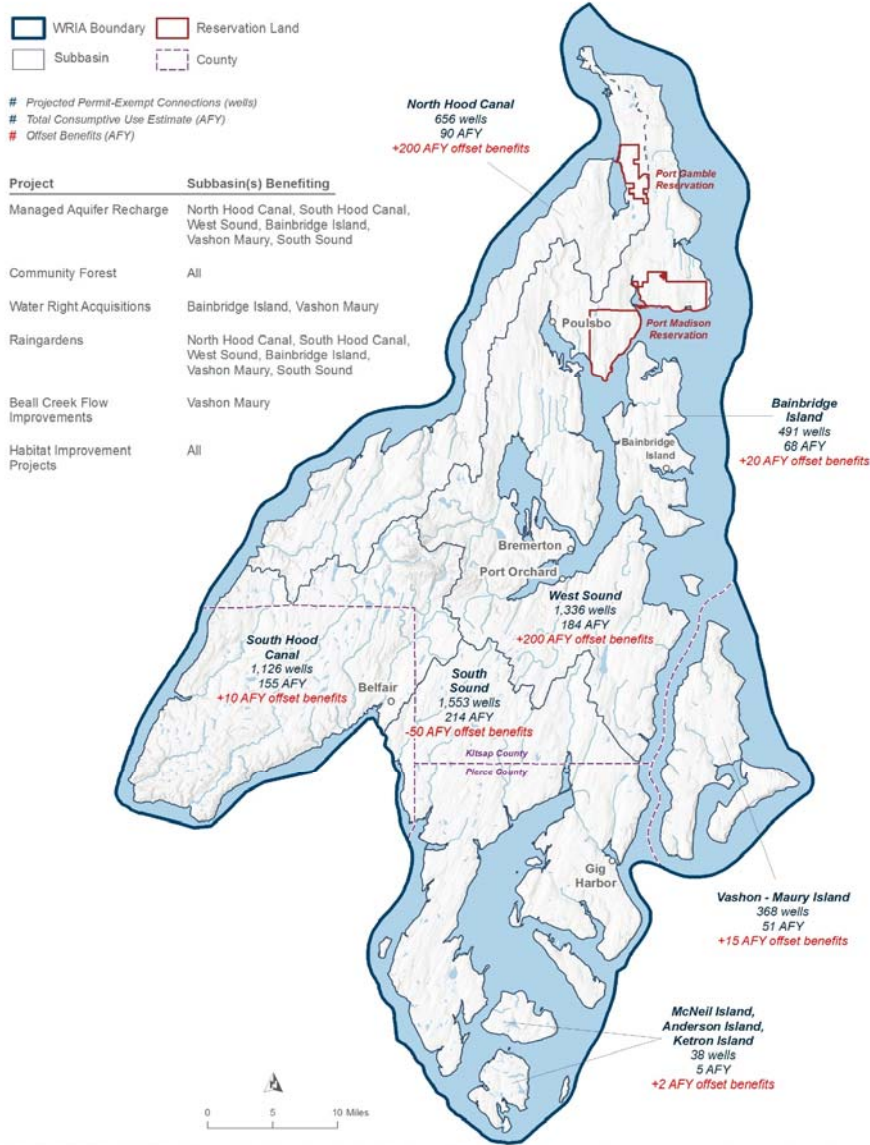
36  
37 To increase the reasonable assurance for plan implementation and tracking progress, this  
38 watershed plan includes policy and regulatory recommendations and an adaptive management  
39 process. The eleven policy and regulatory recommendations are included to contribute to the  
40 goals of this watershed plan, including streamflow restoration and meeting net ecological  
41 benefit. These recommendations enhance water conservation efforts; improve research,  
42 monitoring, and data collection; support beaver habitat conservation; plan for better drought  
43 response; and finance plan implementation. The watershed plan describes an adaptive

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

44 management approach, which identifies a lead organization to coordinate an ongoing  
45 implementation group to support implementation, a tracking and reporting structure to assess  
46 progress and make adjustments as needed, and a funding mechanism to adaptively manage  
47 implementation.

48  
49 Based on the information and analyses summarized in this plan, the WRIA 15 Committee finds  
50 that the suite of projects in this plan, if successfully implemented, would achieve a net  
51 ecological benefit, as required by RCW 90.94.030 and defined by the Final NEB Guidance.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee



52  
 53 Figure ES 1: Summary of findings of the WRIA 15 Watershed Restoration and Enhancement  
 54 Plan, including estimates for new domestic permit exempt well growth, consumptive use  
 55 estimates, and project offset benefits.

**Commented [VMSJ(2):** This is a MOCK UP figure to include in the Executive Summary. Seeking feedback.

56

## Chapter 1 – Plan Overview

### 57 1.1 WRIA 15 Watershed Plan Purpose and Structure

58 The purpose of the Water Resource Inventory Area (WRIA) 15 Watershed Restoration and  
59 Enhancement Plan is to identify projects and actions intended to offset the impacts of new  
60 domestic permit-exempt wells to streamflows. The Watershed Restoration and Enhancement  
61 Plan is one requirement of RCW 90.94.030. Watershed Restoration and Enhancement Plans  
62 must identify projects to offset the projected consumptive impacts of new permit-exempt  
63 domestic groundwater withdrawals on instream flows over 20 years (2018-2038) and provide a  
64 net ecological benefit to the WRIA. The WRIA 15 Watershed Restoration and Enhancement Plan  
65 (watershed plan) considers priorities for salmon recovery and watershed recovery, while  
66 ensuring it meets the intent of the law.

67 Pumping from wells can reduce groundwater discharge to springs and streams by capturing  
68 water that would otherwise have discharged naturally, reducing flows (Barlow and Leake,  
69 2012). Consumptive water use (the portion not returned to the aquifer) reduces streamflow,  
70 both seasonally and as average annual recharge. A well pumping from an aquifer connected to  
71 a surface water body can either reduce the quantity of water discharging to the river or  
72 increase the quantity of water leaking out of the river (Barlow and Leake, 2012).

73 While this watershed plan is narrow in scope and not intended to address all water uses or  
74 related issues within the watershed, it may provide a path forward for future water resource  
75 planning.

76 [Language to be included when appropriate]: The WRIA 15 Committee, by completing the  
77 watershed plan, has developed, and come to agreement on, a technically and politically  
78 complex issue in water resource management. That success may set the stage for improved  
79 coordination of water resources and overall watershed health in our WRIA.

80 This watershed plan includes Seven Chapters:

- 81 1. Plan overview;
- 82 2. Overview of the watershed’s hydrology, hydrogeology, and streamflow;
- 83 3. Summary of the subbasins;
- 84 4. Growth projections and consumptive use estimates;
- 85 5. Description of the recommended projects identified to offset the future permit-exempt  
86 domestic water use in WRIA 15;
- 87 6. Explanation of recommended policy, monitoring, adaptive management, and  
88 implementation measures; and
- 89 7. Evaluation and consideration of the net ecological benefits.

90 **1.1.1 Legal and Regulatory Background for the WRIA 15 Watershed**  
91 **Restoration and Enhancement Plan**

92 In January 2018, the Washington State Legislature passed Engrossed Substitute Senate Bill  
93 (ESSB) 6091 (session law 2018 c 1). This law was enacted in response to the State Supreme  
94 Court’s 2016 decision in Whatcom County vs. Hirst, Futurewise, et al. (commonly referred to as  
95 the “Hirst decision”). As it relates to this Committee’s work, the law, now primarily codified as  
96 RCW 90.94, clarifies how local governments can issue building permits or approve subdivisions  
97 for homes intending to use a permit-exempt well for their domestic water supply. The law also  
98 requires local watershed planning in fifteen WRIsAs across the state, including WRIA 15.<sup>2</sup>

99 **1.1.2 Domestic Permit-Exempt Wells**

100 This Watershed Restoration and Enhancement Plan, the law that calls for it, and the Hirst  
101 decision are all concerned with the effects of new domestic permit-exempt water use on  
102 streamflows. Several laws pertain to the management of groundwater permit-exempt wells in  
103 WRIA 15 and are summarized in brief here for the purpose of providing context for the WRIA 15  
104 watershed plan.

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

114 RCW 90.94.030 adds to the management regime for new homes using domestic permit-exempt  
115 well withdrawals in WRIA 15 and elsewhere. For example, local governments must, among  
116 other responsibilities relating to new permit-exempt domestic wells, collect a \$500 fee for each  
117 building permit and record withdrawal restrictions on the title of the affected properties.  
118 Additionally, this law restricts new permit-exempt domestic withdrawals in WRIA 15 to a  
119 maximum annual average of up to 950 gallons per days per connection, subject to the five  
120 thousand gallons per day and ½-acre outdoor irrigation of non-commercial lawn/garden limits  
121 established in RCW 90.44.050. Ecology has published its interpretation and implementation of  
122 RCW 19.27.097 and RCW 90.94 in Water Resources POL 2094 (Ecology, 2019a). For additional

**Commented [VMSJ(3):** See footnote below. This is directly from ESSB 6091 to identify the other laws that were modified. Inserted per Squaxin Island Tribe’s request and approved by management.

---

<sup>2</sup> [ESSB 6091](#) includes the following: “AN ACT Relating to ensuring that water is available to support development; amending RCW 19.27.097, 58.17.110, 90.03.247, and 90.03.290; adding a new section to chapter 36.70A RCW; adding a new section to chapter 36.70 RCW; adding a new chapter to Title 90 RCW; creating a new section; providing an expiration date; and declaring an emergency.” (p. 1)

123 information, readers can review those laws and policy for comprehensive details and agency  
124 interpretations.

### 125 **1.1.3 Planning Requirements Under RCW 90.94.030**

126 While supplementing the local building permit requirements, RCW 90.94.030(3) goes on to  
127 establish the planning criteria for WRIA 15. In doing so, it sets the minimum standard of  
128 Ecology’s collaboration with the WRIA 15 Committee in the preparation of this watershed plan.  
129 In practice, the process of plan development was one of broad integration, collectively shared  
130 work, and a striving for consensus described in the WRIA 15 Committee’s adopted operating  
131 principles, which are further discussed below.

132 In addition to these procedural requirements, the law and consequently this watershed plan, is  
133 concerned with the identification of projects and actions intended to offset the anticipated  
134 impacts from new permit-exempt domestic groundwater withdrawals over the next 20 years  
135 and provide a net ecological benefit.<sup>3</sup> In establishing the primary purpose of this watershed  
136 plan, RCW 90.94.030 (3) also details both the required and recommended plan elements.  
137 Regarding the WRIA 15 Committee’s approach to selecting projects and actions, the law also  
138 speaks to “high and lower priority projects.” The WRIA 15 Committee understands that, as  
139 provided in the Final Guidance on Determining Net Ecological Benefit (Ecology, 2019b), “use of  
140 these terms is not the sole critical factor in determining whether a plan achieves a NEB... and  
141 that plan development should be focused on developing projects that provide the most  
142 benefits... regardless of how they align with [these] labels” (page 12). For WRIA 15, this  
143 watershed plan recognizes the goal of protecting fish stocks and aquatic life, regardless of  
144 listing status. In order to provide a benefit to the greatest length of stream channel, the highest  
145 priority projects are those in that provide protection or restoration of headwater streamflows.  
146 It is the perspective of the WRIA 15 Committee that this watershed plan satisfies the  
147 requirements of RCW 90.94.030.

## 148 **1.2 Requirements of the WRIA 15 Watershed Restoration and** 149 **Enhancement Plan**

150

---

<sup>3</sup> The planning horizon for planning to achieve a NEB is the 20 year period beginning with January 19, 2018 and ending on January 18, 2038. The planning horizon only applies to determining which new consumptive water uses the plan must address under the law. The projects and actions required to offset the new uses must continue beyond the 20-year period and for as long as new well pumping continues. (Ecology, 2019b; page 7)

151 RCW 90.94.030 of the Streamflow Restoration law  
152 directs Ecology to establish a Watershed Restoration  
153 and Enhancement Committee in the Kitsap watershed  
154 and develop a watershed plan in collaboration with the  
155 WRIA 15 Committee. Ecology determined that the  
156 intent was best served through collective development  
157 of the watershed plan, using an open and transparent  
158 setting and process that builds on local needs.

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

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

- 178 1. Clear and Systemic Logic. Watershed plans must  
179 be prepared with implementation in mind.
- 180 2. Delineate Subbasins. [The Committee] must  
181 divide the WRIA into suitably sized subbasins to  
182 allow meaningful analysis of the relationship  
183 between new consumptive use and offsets.
- 184 3. Estimate New Consumptive Water Uses.  
185 Watershed plans must include a new  
186 consumptive water use estimate for each  
187 subbasins, and the technical basis for such  
188 estimate.

[Streamflow Restoration law RCW  
90.94.030\(3\)](#)

(b) At a minimum, the plan must include those actions that the committee determines to be necessary to offset potential impacts to instream flows associated with permit-exempt domestic water use. The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary. Lower priority projects include projects not in the same basin or tributary and projects that replace consumptive water supply impacts only during critical flow periods. The plan may include projects that protect or improve instream resources without replacing the consumptive quantity of water where such projects are in addition to those actions that the committee determines to be necessary to offset potential consumptive impacts to instream flows associated with permit-exempt domestic water use.

(c) Prior to adoption of the watershed restoration and enhancement plan, the department must determine that actions identified in the plan, after accounting for new projected uses of water over the subsequent twenty years, will result in a net ecological benefit to instream resources within the water resource inventory area.

(d) The watershed restoration and enhancement plan must include an evaluation or estimation of the cost of offsetting new domestic water uses over the subsequent twenty years, including withdrawals exempt from permitting under RCW 90.44.050.

(e) The watershed restoration and enhancement plan must include estimates of the cumulative consumptive water use impacts over the subsequent twenty years, including withdrawals exempt from permitting under RCW 90.44.050.

189 4. Evaluate Impacts from New Consumptive Water Use. Watershed plans must consider  
190 both the estimated quantity of new consumptive water use from new domestic permit-  
191 exempt wells initiated within the planning horizon and how those impacts will be  
192 distributed.

193 5. Describe and Evaluate Projects and Actions for Their Offset Potential. Watershed plans  
194 must, at a minimum, identify projects and actions intended to offset impacts associated  
195 with new consumptive water use. Offset benefits must continue as long as the  
196 anticipated consumptive use impacts, which are assumed to be in perpetuity.

197 It is the WRIA 15 Committee’s intent that the WRIA 15 watershed plan is prepared to ensure  
198 full implementation. The law requires that all members of the WRIA 15 Committee approve the  
199 plan prior to submission to Ecology for review. Ecology must then determine that the plan’s  
200 recommended streamflow restoration projects and actions will result in a NEB to instream  
201 resources within the WRIA after accounting for projected use of new permit-exempt domestic  
202 wells over the 20-year period of 2018-2038.

203 **RCW 90.94.030 (6)**. This section [90.94.030] only applies to new domestic groundwater  
204 withdrawals exempt from permitting under RCW [90.44.050](#) in the following water resource  
205 inventory areas with instream flow rules adopted under chapters [90.22](#) and [90.54](#) RCW that do  
206 not explicitly regulate permit-exempt groundwater withdrawals: 7 (Snohomish); 8 (Cedar-  
207 Sammamish); 9 (Duwamish-Green); 10 (Puyallup-White); 12 (Chambers-Clover); 13 (Deschutes);  
208 14 (Kennedy Goldsborough); and 15 (Kitsap) and does not restrict the withdrawal of  
209 groundwater for other uses that are exempt from permitting under RCW [90.44.050](#).

210

## 211 1.3 Overview of the WRIA 15 Committee

### 212 1.3.1 Formation

213 The Streamflow Restoration law instructed Ecology to chair the WRIA 15 Committee, and invite  
214 representatives from the following entities in the watershed to participate in the development  
215 of the watershed plan:

- 216 • Each federally recognized tribal government with reservation land or usual and  
217 accustomed harvest area within the WRIA.
- 218 • Each county government within the WRIA.
- 219 • Each city government within the WRIA.
- 220 • Washington State Department of Fish and Wildlife.
- 221 • The largest publicly owned water purveyor providing water within the WRIA that is not a  
222 municipality.
- 223 • The largest irrigation district within the WRIA.



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

224 Ecology sent invitation letters to each of the entities named in the law in September of 2018.  
 225 Note that WRIA 15 does not have an irrigation district.

226 The law also required Ecology to invite local organizations representing agricultural interests,  
 227 environmental interests, and the residential construction industry. Businesses, environmental  
 228 groups, agricultural organizations, conservation districts, and local governments nominated  
 229 interest group representatives. Local governments on the WRIA 15 Committee voted on the  
 230 nominees in order to select local organizations to represent agricultural interests,  
 231 environmental interests, and the residential construction industry. Ecology invited the selected  
 232 entities to participate on the WRIA 15 Committee.

233 The WRIA 15 Committee members are included in Table 1. This list includes all of the members  
 234 identified by the Legislature that agreed to participate on the WRIA 15 Committee.<sup>4</sup>

235 Table 1: WRIA 15 Committee Participating Entities

Entity Name	Representing
Kitsap County	County government
King County	County government
Mason County	County government
Pierce County	County government
Puyallup Tribe	Tribal government
Skokomish Tribe	Tribal government
Squaxin Island Tribe	Tribal government
Suquamish Tribe	Tribal government
Port Gamble S'Klallam Tribe	Tribal government
City of Port Orchard	City government
City of Bremerton	City government
City of Gig Harbor	City government
City of Bainbridge	City government
Kitsap Public Utility District	Water utility
Department of Fish and Wildlife	State agency
Department of Ecology	State agency
Kitsap Building Association	Residential construction industry
Kitsap Conservation District	Agricultural interest group
Great Peninsula Conservancy	Environmental interest group
Mason-Kitsap Farm Bureau - ex officio	Not applicable
Washington Water Service - ex officio	Not applicable

236

---

<sup>4</sup> All participating entities committed to participate in the process and designated representatives and alternates to sit on the WRIA 15 Committee. A roster with the names of the representatives is available in Appendix A. The City of Poulsbo originally participated in the process but withdrew from the Committee in October 2020.

237 The WRIA 15 Committee invited the Mason-Kitsap Farm Bureau and the Washington Water  
238 Service to participate as “ex-officio” members. Although not identified in the law, the ex-officio  
239 members provide valuable information and perspective as subject matter experts. The ex-  
240 officio members are active but non-voting participants of the WRIA 15 Committee.

241 The law does not identify a role for the Committee following development of the watershed  
242 plan.

### 243 1.3.2 Committee Structure and Decision Making

244 The WRIA 15 Committee held its first meeting in October 2018. Between October 2018 and  
245 January 2021 [insert appropriate end date], the WRIA 15 Committee held 26 Committee  
246 meetings.<sup>5</sup> All Committee and workgroup meetings were open to the public. The WRIA 15  
247 Committee met monthly, and as needed, to meet deadlines.

248 The two and a half years of planning consisted of training, research, and developing plan  
249 components. Ecology technical staff, WRIA 15 Committee members, and partners presented on  
250 topics to provide context for components of the plan, such as an overview of WRIA 15  
251 hydrogeology, water law, tribal treaty rights, salmon recovery, and local planning processes.

252 Ecology staff chaired the WRIA 15 Committee and provided administrative support and  
253 technical assistance. Ecology contracted with consultants to provide facilitation and technical  
254 support for the WRIA 15 Committee. The facilitator supported the WRIA 15 Committee’s  
255 discussions and decision-making and coordinated recommendations for policy change and  
256 adaptive management. The technical consultants developed products that informed WRIA 15  
257 Committee decisions and development of the plan. Examples include working with counties on  
258 growth projections, calculating consumptive use based on multiple methods, preparing maps  
259 and other tools to support decisions, and researching project ideas. The technical consultants  
260 brought a range of expertise to the Committee including hydrogeology, GIS analysis, fish  
261 biology, engineering, and planning. The technical consultants developed the technical  
262 memorandums referenced throughout this plan.

263 The WRIA 15 Committee established two workgroups to support planning efforts and to  
264 achieve specific tasks. The Technical Workgroup focused on preparing recommendations for  
265 permit-exempt well projections and consumptive use estimates. The Project Workgroup  
266 focused on developing and reviewing projects within the Committee’s project inventory  
267 (additional workgroups that met only one time covered topics such as beaver management,  
268 policies, and adaptive management). The workgroups were open to all WRIA 15 Committee  
269 members as well as non-Committee members that brought capacity or expertise not available  
270 on the Committee. The workgroups made no binding decisions but presented information to  
271 the Committee as either recommendations or findings. The WRIA 15 Committee acted on  
272 workgroup recommendations, as it deemed appropriate.

Commented [VMSJ(4)]: Through Jan 7. Update as needed for mtgs after 1/7

---

<sup>5</sup> This includes regular Committee meetings and special Committee meetings where most representatives attended. This does not include project workgroup, technical workgroup, or one-time workgroup meetings.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

273 During the initial WRIA 15 Committee meetings, members developed and agreed to operating  
274 principles.<sup>6</sup> The operating principles set forward a process for meeting, participation  
275 expectations, procedures for voting, structure of the WRIA 15 Committee, communication, and  
276 other needs in order to support the WRIA 15 Committee in reaching agreement on a final plan.

277 This planning process, by statutory design, brought a diversity of perspectives to the table.  
278 Therefore, it was important for the Committee to identify a clear process for how it made  
279 decisions. The WRIA 15 Committee strived for consensus, and when consensus could not be  
280 reached, the chair and facilitator documented the Committee members' positions. All  
281 agreements and dissenting opinions were documented in meeting summaries that were  
282 reviewed and agreed upon by the Committee. The Committee recognized that flexibility was  
283 needed in terms of timeline, and if a compromise failed to reach consensus within the  
284 identified timeline, the Committee agreed to allow the process for developing the plan to move  
285 forward while the work towards consensus continued. The Committee agreed to revisit  
286 decisions where consensus was not reached. The reason why the Committee strived for  
287 consensus is that the authorizing legislation requires that final plan itself must be approved by  
288 all members of the Committee prior to Ecology's review (RCW 90.94.030[3] "...all members of a  
289 Watershed Restoration and Enhancement Committee must approve the plan prior to  
290 adoption"). Therefore, consensus on the foundational decisions during plan development  
291 served as the best indicators of the Committee's progress toward an approved plan.

292 The WRIA 15 Committee reviewed components of the watershed plan iteratively throughout  
293 the process in addition to reviewing the draft plan as a whole. **[Language to be included when  
294 appropriate]:** The WRIA 15 Committee reached final agreement on the Watershed Restoration  
295 and Enhancement Plan on THIS DATE 2021.

---

<sup>6</sup> Complete operating principles can be found on the WRIA 15 Committee EZ View webpage and in Appendix B:  
[https://www.ezview.wa.gov/site/alias\\_1962/37327/watershed\\_restoration\\_and\\_enhancement\\_-\\_wria\\_15.aspx](https://www.ezview.wa.gov/site/alias_1962/37327/watershed_restoration_and_enhancement_-_wria_15.aspx)

296

## Chapter Two: Watershed Overview

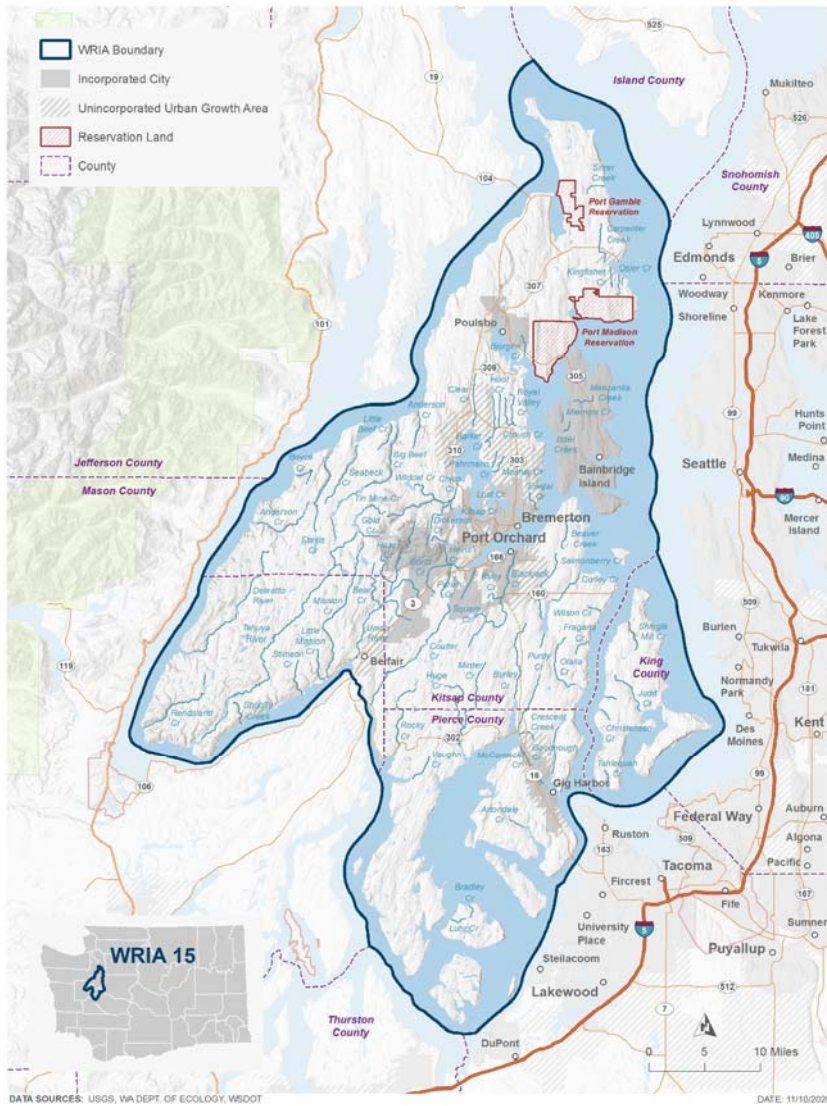
### 297 2.1 Brief Introduction to WRIA 15

298 Water Resource Inventory Areas (WRIAs) are large watershed areas formalized under  
299 Washington Administrative Code (Water Resources Code of 1971) for the purpose of  
300 administrative management and planning. WRIAs encompass multiple landscapes,  
301 hydrogeological regimes, levels of development, and variable natural resources. WRIA 15, also  
302 referred to as the Kitsap Watershed, is one of the 62 designated major watersheds in  
303 Washington State. WRIA 15 encompasses the entire Kitsap peninsula and surrounding islands,  
304 is 676 square miles, and includes Kitsap County and portions of Pierce, Mason, and King  
305 Counties (Figure 1). Major rivers of WRIA 15 include Union River, Tahuya River, and Dewatto  
306 River. All of these major rivers are located in the western part of the watershed and drain to  
307 Hood Canal. These rivers are home to Chinook, Summer Chum, and Steelhead, which are listed  
308 under the Endangered Species Act. Most of the area is drained by short streams that discharge  
309 directly into the surrounding marine waters of Puget Sound and Hood Canal.

#### 310 2.1.1 Land Use in WRIA 15

311 Approximately 10 percent of the watershed is within a designated urban growth area. Major  
312 cities in WRIA 15 include Bremerton, Port Orchard, Bainbridge Island, Gig Harbor, Poulsbo,  
313 Silverdale (unincorporated), Belfair, and Kingston (unincorporated). The area's port districts are  
314 important as centers for commerce and military installations and as critical hubs for marine  
315 transportation (West Central LIO, 2017). The area connects to Seattle by several ferry routes,  
316 and local jurisdictions anticipate increased growth with the designation of several high capacity  
317 transit communities (Puget Sound Regional Council, 2019). Many people move to the area for  
318 its rural feel and choose to live outside of the incorporated areas (West Central LIO, 2017).

319 Federal ownership makes up approximately two percent of the watershed. A number of naval  
320 installations occur in WRIA 15, including the active Puget Sound Naval Shipyard (part of the  
321 Naval Base Kitsap) at Bremerton. Approximately 12 percent of the watershed is under state  
322 ownership, primarily by Washington Department of Natural Resources and Washington  
323 Department of Fish and Wildlife. The largest areas of forestland use are in the southern and  
324 western Tahuya Peninsula in Mason County.



325

326 Figure 1: Water Resource Inventory Area 15 Overview

### 2.1.2 Tribal Reservations and Usual and Accustomed Fishing Areas

The Port Gamble S’Klallam Tribe Reservation occupies approximately 1,200 acres and the Port Madison Indian Reservation (Suquamish Tribe) occupies approximately 7,458 acres within WRIA 15. Tribes with usual and accustomed fishing areas within WRIA 15 include the Suquamish, Port Gamble S’Klallam, Squaxin Island, Skokomish, Nisqually, and Puyallup Tribes (NWIFC, 2019). Within WRIA 15, these Tribes hold Treaty reserved senior water rights and fishing rights under the federal government (Treaty of Medicine Creek, Treaty of Point No Point, Treaty of Point Elliot).

**Commented [VMSJ(5):** Separate review path with ECY management and WRIA 15 Tribes.

The Tribes hold Treaty-reserved federal water rights in WRIA 15 in quantities that are necessary to support healthy salmon populations. These water rights are necessary to carry out the purposes of their Treaties, which include the guarantee of a self-sustaining homeland and sufficient water to support the fishing right. These rights operate outside of the state water rights system and have the most senior priority date. While these water rights have not yet been quantified by a court, they likely exceed the amounts that are established by state instream flow rules. Indian water rights are property rights held in trust by the United States for the benefit of Indian Tribes.

**Commented [VMSJ(6):** This format is proposed for Tribal Review

*Language provided by WRIA 15 Tribes.*

### 2.1.3 Salmon Distribution and Limiting Factors

WRIA 15 includes numerous small lowland stream systems draining to both Puget Sound and Hood Canal. The subbasins (further described in Chapter 3) that drain to Puget Sound are West Sound, South Sound, Bainbridge Island, Vashon-Maury Island, and McNeil-Anderson-Ketron Islands (also referred to as South Sound Islands). The North Hood Canal and South Hood Canal subbasins drain to Hood Canal. Primary streams in the West Sound subbasin include Olalla, Blackjack, Chico, and Grovers creeks. Primary streams in the South Sound subbasin include Coulter, Rocky, Burley, Purdy, Minter, and Crescent creeks. Primary streams in the North Hood Canal subbasin include Big Beef, Anderson, Gamble, and Stavis creeks. Primary rivers in the South Hood Canal subbasin include Dewatto River, Union River, and Tahuya River and Mission Creek (a more complete list of rivers and streams by subbasin is available in Chapter 3). The island subbasins generally have very small streams with only minor salmonid presence or use. The Puget Sound and Hood Canal drainages are described separately as different salmonid populations occupy the two areas.

The Puget Sound subbasins within WRIA 15 have anadromous salmon runs that include three of the five Pacific salmon species (WDF 1975, WDFW 2020); Chinook (*Oncorhynchus tshawytscha*), Coho (*Oncorhynchus kisutch*), and Chum salmon (*Oncorhynchus keta*). Chinook Salmon have been documented in Coulter, Rocky, Burley, Purdy, Curley, Crescent, Minter, Olalla, Blackjack, Gorst, Clear, Chico, Royal Valley, Barker, and Dogfish creeks (WDFW 2020), although spawning is only known in Burley, Purdy, Olalla, Curley, Blackjack and Gorst creeks. Both summer and fall-run Chum Salmon are present, with summer Chum Salmon occurring in Rocky, Coulter, Burley,

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

366 Curley, and Blackjack creeks (WDFW 2020). Puget Sound subbasins are also inhabited by  
 367 Steelhead Trout (*Oncorhynchus mykiss*) and Cutthroat Trout (*Oncorhynchus clarki clarki*).

368 The Hood Canal subbasins have anadromous salmon runs that include Chinook, Coho, Chum,  
 369 and Pink (*Oncorhynchus gorbuscha*) salmon and Steelhead and Cutthroat trout. Both summer  
 370 and fall-run Chum Salmon are present. Pink Salmon are only present in the Dewatto River and  
 371 Union River (WDFW 2020).

372 Of these populations, three are federally listed as threatened species, Puget Sound Chinook  
 373 Salmon, Puget Sound Steelhead Trout, and Hood Canal Summer Chum Salmon. Table 2 below  
 374 lists the species present in WRIA 15 and their regulatory status.

375 Table 2: Salmonid Species and Status in WRIA 15

Common Name	Scientific Name	Population <sup>1</sup>	Critical Habitat	Regulatory Agency Status
<b>Puget Sound</b>				
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Puget Sound Chinook	Designated in 2005; does not include Kitsap Basin	NMFS/Threatened/1999
Chum Salmon	<i>Oncoryhnchus keta</i>	Puget Sound Chum	No	Not listed
Coho Salmon	<i>Oncorhynchus kisutch</i>	Puget Sound/Strait of Georgia Coho	No	NMFS/Species of Concern/1997
Steelhead Trout	<i>Oncorhynchus mykiss</i>	Puget Sound Steelhead	Yes/2016	NMFS/Threatened/2007
Coastal Cutthroat Trout	<i>Oncorhynchus clarki</i>	No listing	No listing	No listing
<b>Hood Canal</b>				
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Puget Sound Chinook	Designated in 2005; does not include Kitsap Basin	NMFS/Threatened/1999
Chum Salmon	<i>Oncoryhnchus keta</i>	Hood Canal Chum	Yes/2005	NMFS/Threatened/1999
Coho Salmon	<i>Oncorhynchus kisutch</i>	Puget Sound/Strait of Georgia Coho	No	NMFS/Species of Concern/1997
Steelhead Trout	<i>Oncorhynchus mykiss</i>	Puget Sound Steelhead	Yes/2016	NMFS/Threatened/2007
Coastal Cutthroat Trout	<i>Oncorhynchus clarki</i>	No listing	No listing	No listing

376 Note: 1. Population indicates Evolutionary Significant Unit.

377

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

378 Table 3 below lists the run timing and life stages of anadromous salmon and trout present  
379 throughout WRIA 15.



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

380 Table 3: Salmonid Presence and Life History Timing in Kitsap Basin

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Presence
Chinook (fall)	Upstream migration									■	■			Puget Sound -- Coulter, Rocky, Burley, Purdy, McCormick, Curley, Crescent, Judd, Minter, Olalla, Blackjack, Gorst, Clear, Crouch, Chico, Royal Valley, Barker, and Dogfish creeks  Hood Canal -- Dewatto, Tahuya, and Union rivers, Mission, Anderson, Boyce, Big Beef creeks
	Spawning									■	■	■		
	Incubation	■	■							■	■	■	■	
	Juvenile rearing	■	■	■	■	■	■							
	Juvenile outmigration		■	■	■	■	■	■						
Coho	Upstream migration									■	■	■	■	All
	Spawning	■									■	■	■	
	Incubation	■	■	■							■	■	■	
	Juvenile rearing	■	■	■	■	■	■	■	■	■	■	■	■	
	Smolt outmigration			■	■	■	■							
Chum (summer)	Upstream migration								■	■	■			Puget Sound -- Rocky, Coulter, Burley, Curley, and Blackjack creeks  Hood Canal --
	Spawning								■	■	■	■		

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Presence
	Incubation	■	■							■	■	■	■	Dewatto, Tahuya and Union rivers; Anderson and Big Beef creeks
	Juvenile rearing		■	■	■	■								
	Juvenile outmigration		■	■	■	■	■							
Chum (fall)	Upstream migration										■	■	■	All
	Spawning	■	■									■	■	
	Incubation	■	■	■	■							■	■	
	Juvenile rearing			■	■	■								
	Juvenile outmigration			■	■	■	■							
Pink	Upstream migration								■	■				Hood Canal - Dewatto and Union rivers
	Spawning								■	■				
	Incubation	■	■								■	■	■	
	Juvenile rearing		■	■										
	Juvenile outmigration			■	■	■								
Coastal Cutthroat	Upstream migration											■	■	All
	Spawning	■	■	■	■								■	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Species	Freshwater Life Phase	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Presence			
	Incubation																
	Juvenile rearing																
	Smolt outmigration																
Steelhead (winter)	Upstream migration													All			
	Spawning														All		
	Incubation															All	
	Juvenile rearing																All
	Smolt outmigration																

381 Table Data Sources: Heard 1998; Johnson 1999; Wydoski & Whitney 2003; HCCC 2005; NSD & ICF 2014; WDFW 2020

382 **Limiting Factors**

383 Development and population growth in the Puget Sound lowlands region has substantially  
384 altered WRIA 15 from its historic conditions and natural stream habitat forming processes. These  
385 lowland stream systems are rainfall dominated systems and many were historically sustained  
386 throughout the year by extensive wetland systems or lakes in their headwaters. Development has  
387 resulted in the removal of forest canopy cover, filling and draining of wetlands, channelization of  
388 streams, numerous road crossing and fish passage barriers, and created substantial areas of  
389 impervious surfaces, resulting in habitat loss and degradation.

390 In general, the primary limiting factors in freshwaters of WRIA 15 include the following (Kuttel,  
391 2003; May & Peterson, 2003):

- 392 • Channel and streambed degradation
- 393 • Increased peak flows
- 394 • Low streamflow
- 395 • Loss of upland forest cover
- 396 • Loss of riparian forest
- 397 • Loss of floodplain connectivity and habitats
- 398 • Degradation of wetland and shoreline habitats
- 399 • Conversion of wetlands to open water habitats
- 400 • Fish passage barriers
- 401 • Lack of large wood
- 402 • Fine sediment

403 Past timber harvest and ongoing residential and commercial development have removed forest  
404 and riparian cover and increased impervious surfaces in most areas of the Kitsap Basin. This  
405 reduces infiltration and storage of groundwater and can contribute to reduced streamflow and  
406 increases runoff during storms that can scour streambeds and contribute to bank erosion and  
407 instability. Loss of functioning riparian corridors combined with low flows in summer results in  
408 high water temperatures that can reduce habitat suitability and cause sublethal physiological  
409 changes in adult and juvenile salmonids or even cause mortality at high temperatures (Shared  
410 Strategy, 2007).

411 Roads and various land uses have straightened and constrained many streams leading to a loss of  
412 floodplain connectivity and off-channel habitats and simplification of in-stream habitats. Road  
413 crossings create fish passage barriers in many locations.

**Commented [VMSJ(7)]:** Outstanding Comment from Alison: Add discussion regarding hydrologic maturity and the effects on evapotranspiration and streamflows. We know that young forests use more water than mature forests.

**Commented [VMSJ(8R7)]:** Emailed to seek feedback on the edit.

414 To address low streamflow, the Instream Resources Protection Program (IRPP) for WRIA 15  
415 (Ecology, 1981) through WAC173-515 set minimum instream flows for 21 streams and closed 54  
416 streams and their tributaries including lakes to further appropriation of surface water. An  
417 additional 14 streams and their tributaries are closed to further appropriation of surface water  
418 for part of the year. A discussion of instream flows is contained in Section 2.3.3.

419 The *East Kitsap Salmon Habitat Restoration Strategy Summary* (Kitsap County, 2005) identifies  
420 protection and/or restoration of hydrologic and riparian functional integrity as the highest  
421 priority for freshwater areas. Tier 1 streams of focus include Chico, Minter, and Rocky creeks. The  
422 *East Kitsap Steelhead Recovery Plan* (ESA and Suquamish Tribe, 2020) prioritizes Blackjack, Chico,  
423 Clear, Curley, Gorst and Grovers creeks for water quantity and quality protection and restoration.  
424 The *Kitsap Salmonid Refugia Report* (May & Peterson, 2003) identify Chico and Stavis creeks and  
425 the Dewatto River and Tahuya River as the highest quality refugia for salmonids that should be  
426 protected, especially for hydrologic functions. The *Hood Canal Summer Chum Salmon Recovery*  
427 *Plan* (HCCC, 2005) identifies loss of channel complexity, lack of riparian forest, and high water  
428 temperatures as primary limiting factors in the Union River and Tahuya River. The Union River is  
429 home to ESA listed Chinook, Summer Chum, and Steelhead. Coho are a species of concern, and  
430 also spawn in this river. For the Dewatto River, Anderson, and Big Beef creeks the significant  
431 change in hydrology (increased peak flows, reduced low flows), channel instability and erosion,  
432 loss of channel complexity, and loss of floodplain habitats are primary limiting factors. Salmon  
433 recovery lead entities provide additional information on limiting factors and priorities for WRIA  
434 15.<sup>7</sup>

435

#### 436 **2.1.4 Water System Distribution and Impacts in WRIA 15**

437 Groundwater is the primary source of drinking water for most of the population of the Kitsap  
438 Watershed and demand for groundwater increases with population growth (Frans and Olsen,  
439 2016). According to the USGS, the quantity of usable groundwater is likely limited, mostly  
440 because of the geography and the potential for declines in water levels, decreases in  
441 groundwater discharge to streams, and seawater intrusion as groundwater usage increases  
442 (Frans and Olsen, 2016).

443 The USGS estimates 14 percent of the population (43,400 people) on the Kitsap Peninsula are  
444 supplied by permit-exempt wells and the remainder (268,800 people) by water purveyors  
445 under Group A and Group B systems (Welch, et. al., 2014). No estimates are available for WRIA  
446 15 areas outside of the Kitsap Peninsula. Casad Dam, located above McKenna Falls on the Union  
447 River, is the only major surface water diversion structure in Kitsap County. The Union River  
448 Reservoir, behind the dam, provides approximately 65 percent of Bremerton’s drinking water  
449 (City of Bremerton, 2020).

---

<sup>7</sup> More information on salmon recovery planning in Puget Sound, watershed plans, and limiting factors available here: <https://www.psp.wa.gov/salmon-recovery-watersheds.php>.

450 Pumping from wells can reduce groundwater discharge to springs and streams by capturing  
451 water that would otherwise have discharged naturally. Surface water may be influenced by  
452 groundwater pumping such that flows are diminished. Consumptive water use (the portion not  
453 returned to the aquifer) potentially reduces streamflow, both seasonally and as average annual  
454 recharge. A well pumping from an aquifer connected to a surface water body can either reduce  
455 the quantity of water discharging to the river or increase the quantity of water lost to the river  
456 (Barlow and Leake, 2012).

## 457 **2.2 Watershed Planning in WRIA 15**

458 Citizens and local, state, federal, and tribal governments have collaborated on watershed and  
459 water resource management issues in WRIA 15 for decades. A brief summary of broad  
460 watershed planning efforts as they relate to the past, present, and future water availability in  
461 the Kitsap Watershed is provided in Section 2.2.1.

### 462 **2.2.1 Current watershed planning efforts in WRIA 15**

463 The WRIA 15 watershed plan builds on many previous and current watershed planning efforts,  
464 including previous watershed planning efforts under RCW 90.82. Other efforts include  
465 ecosystem recovery planning by local integrating organizations (LIOs) and salmon recovery  
466 planning by salmon recovery lead entities. WRIA 15 crosses boundaries with the West Central  
467 LIO (now merged with the West Sound Lead Entity and referred to as the West Sound Partners  
468 for Ecosystem Recovery), the Alliance for a Healthy South Sound, South Central LIO and the  
469 Hood Canal Coordinating Council. The LIOs have completed ecosystem recovery plans as part of  
470 the Action Agenda for Puget Sound Recovery and are actively working to implement holistic  
471 approaches to recovery including projects on salmon and orca recovery, stormwater runoff,  
472 shellfish protection, and forest conservation.<sup>8</sup>

473 Several salmon recovery lead entities<sup>9</sup> cross boundaries with WRIA 15, including the West  
474 Sound Partners for Ecosystem Recovery (previously known as West Sound Lead Entity), Hood  
475 Canal Lead Entity and Regional Organization, WRIA 9 Lead Entity (Green Duwamish), Puyallup  
476 Lead Entity, Nisqually Lead Entity, and South Sound Lead Entity. Each of the salmon recovery  
477 lead entities facilitates implementation of their watershed recovery chapter as part of the  
478 Puget Sound Salmon Recovery Plan and the Puget Sound Steelhead Recovery Plan. The Hood  
479 Canal Lead Entity and Regional Organization is also responsible for facilitating implementation  
480 of the Hood Canal Summer Chum Recovery Plan. The salmon recovery lead entities are activity  
481 working with local governments, tribal governments, and other partners to implement salmon  
482 recovery actions across WRIA 15.

---

<sup>8</sup> More information on local integrating organizations and their efforts to recovery Puget Sound is available here:  
<https://www.psp.wa.gov/LIO-overview.php>.

<sup>9</sup> Salmon recovery lead entities in Puget Sound were established under RCW 77.85.050. More information on their  
roles as well as links to the recovery plan and watershed chapters is available here:  
<https://www.psp.wa.gov/salmon-recovery-overview.php>.

**Commented [VMSJ(9):** Paul working on additional GMA/CAO language for review by Ecology and counties. May be covered by footnote above quoting ESSB 6091 but need to confirm.

483 The LIOs and salmon recovery lead entities include many of the same organizations and  
484 individuals that participated in the WRIA 15 Committee.<sup>10</sup> Because the WRIA 15 Committee was  
485 a newly established committee and brought in entities involved in many other planning efforts,  
486 the Committee invested time in developing relationships and understanding priorities of the  
487 various entities participating in the watershed planning process.

488 The Public Water System Coordination Act of 1977 created Critical Water Supply Service Areas  
489 (CWSSA).<sup>11</sup> This Act requires each water purveyor in a CWSSA to develop a water system plan  
490 for their service area, with boundaries in compliance with the provision of the Act. The  
491 Washington State Department of Health is primarily responsible for the water system plan  
492 approval; however, local governments ensure consistency with local growth management plans  
493 and development policies. Pierce County, Kitsap County, and King County have adopted water  
494 system plans that focus on the Group A water systems. This Act and the water system plans are  
495 important for the WRIA 15 watershed planning process as water system service areas and  
496 related laws and policies can set stipulations regarding timely and reasonable service as to  
497 whether new homes connect to water systems or rely on new permit-exempt domestic wells.<sup>12</sup>

## 498 2.2.2 Coordination with existing plans

499 Throughout the development of the watershed plan, Ecology streamflow restoration staff have  
500 engaged with staff from the salmon recovery lead entities and the Puget Sound Partnership,  
501 providing briefings on the streamflow restoration law, scope of the watershed plan, and plan  
502 development status updates. The Committee chair conducted outreach to the lead entities in  
503 WRIA 15 regarding coordination with the Committee to ensure alignment of salmon recovery  
504 priorities and the streamflow planning process. While none of the lead entities participated as  
505 ex-officio members of the Committee, they reviewed project lists and provided feedback to the  
506 Committee.

507 County comprehensive planning under the Growth Management Act of 1990 identifies where  
508 and how future population, housing, and job growth is planned. The comprehensive plans set  
509 policy for development, housing, public services and facilities, and environmentally sensitive  
510 areas, among other topics. In WRIA 15 counties, comprehensive plans identify Kitsap, Pierce,  
511 Mason, and King counties' urban growth areas, set forth standards for urban and rural  
512 development, and provide the basis for zoning districts. Because of the overlap in planning for  
513 twenty years of growth, the WRIA 15 county representatives helped ensure content of the

**Commented [VMSJ(10)]:** Add language about legal requirements for critical areas and the Counties' adoption of critical area ordinances. Stacy needs to work with counties on this – there are other recommendations that need to be addressed in upcoming comm mtgs.

**Commented [VMSJ(11R10)]:** Paul working on draft language; Stacy added footnote language from ESSB 6091 in the introduction.

---

<sup>10</sup> See map of the LIO and lead entities here: xxx [is this necessary? If so, I can ask PSP for a map]

<sup>11</sup> RCW 70.116.070

<sup>12</sup> Water system planning information for each county is available.

Kitsap County: <https://kitsappublichealth.org/environment/files/regulations/CWSP2005.pdf>

Pierce County: <https://www.co.pierce.wa.us/951/Coordinated-Water-System-Planning>

Mason County: <https://www.co.mason.wa.us/health/environmental/drinking-water/public-water-systems.php>

King County: <https://www.kingcounty.gov/depts/dnrp/utilities-technical-review-committee/coordinated-water-system-plans.aspx>

514 WRIA 15 watershed plan was coordinated with the Kitsap, Pierce, Mason and King counties’  
515 comprehensive plans.<sup>13</sup>

## 516 **2.3 Description of the Watershed – Geology, Hydrogeology,** 517 **Hydrology, and Streamflow**

### 518 **2.3.1 Geologic setting**

519 Pleistocene glaciation (2.6 million to 11,700 years ago) played an important role in sculpting the  
520 landscape of the Puget Sound Lowlands. Reaching a maximum extent during the Vashon stage  
521 of the Fraser Glaciation approximately 16,000 years ago, an ice sheet advanced southward into  
522 present day Puget Sound (Pringle, 2008). Multiple advances and retreats of the ice sheet  
523 formed the Puget Sound Lowlands, depositing a complex sequence of glacial and inter-glacial  
524 sediments on top of older sediments.

525 The landforms and subsurface area of WRIA 15 are dominated by a sequence of unconsolidated  
526 glacial and interglacial deposits. Depth to bedrock ranges from exposed at ground surface near  
527 the center of the WRIA to more than 2,000 feet below land surface (Welch et al., 2014).

528 Understanding the geologic setting allows characterization of surface and groundwater flow  
529 through the basin. Defining the relationships between surface water flow and deeper  
530 groundwater are important to understanding how to manage surface water resources and can  
531 be helpful in identifying strategies to offset the impacts of pumping from permit-exempt wells.

### 532 **2.3.2 Hydrogeologic setting**

533 The U.S. Geological Survey (USGS) described the hydrogeology of WRIA 15 in a hydrogeologic  
534 framework report for the Kitsap Peninsula titled *Hydrogeologic Framework, Groundwater*  
535 *Movement, and Water Budget of the Kitsap Peninsula, West-Central Washington* (Welch et al.,  
536 2014). The study area covered all of WRIA 15, except for the southern Key Peninsula; Anderson,  
537 McNeil, and Ketron Islands; and Vashon-Maury Island. The hydrogeologic units of the area are  
538 described as being either water-bearing (“aquifer”) or non-water-bearing (“aquitard” or  
539 “confining layer”) sediments, without regard to geologic origin or age. Major groundwater  
540 aquifers are found in the unconsolidated glacial and interglacial sediments. Building on the  
541 hydrogeologic framework, USGS developed a numerical groundwater flow model to further  
542 understanding of water resources on the Kitsap Peninsula (Frans and Olsen, 2016).

---

<sup>13</sup> Comprehensive planning under GMA is available from each county:

King County: <https://www.kingcounty.gov/depts/executive/performance-strategy-budget/regional-planning/king-county-comprehensive-plan/2020-Executive-Recommended-Plan.aspx> [see Chapter 5, p. 5-42; Chapter 9, p 9-19]

Kitsap County: <http://compplan.kitsapgov.com/Pages/home.aspx>

Pierce County: <https://www.co.pierce.wa.us/950/Comprehensive-Plan>

Mason County: <https://www.co.mason.wa.us/community-services/planning/2036-comp-plan-update/index.php>



543 Groundwater in the aquifers generally flows radially outward from the peninsula to Puget  
544 Sound or Hood Canal. These generalized flow patterns are complicated by the presence of low  
545 permeability confining units and bedrock that separate discontinuous bodies of aquifer material  
546 and act as local groundwater-flow barriers (Welsh, et al, 2014). Summer base flows in the  
547 watershed are sustained by groundwater.

548 The USGS describes the hydrogeology of the watershed as 12 hydrogeologic units, typically  
549 alternating between aquifer and non-aquifer layers. All aquifer and confining units other than  
550 the Vashon Recessional Aquifer (Qvr) are present throughout the area, except in the center of  
551 the WRIA where bedrock is at or near ground surface. The five aquifer units defined by the  
552 USGS are summarized in Appendix C: Aquifer Units within WRIA 15. Of these, the relatively  
553 shallow and laterally extensive Vashon Advance Aquifer (Qva) and Sea Level Aquifer (QA1) are  
554 the most heavily used and most likely sources for new permit-exempt wells. The upper three  
555 aquifer units (Qvr, Qva, QC1) are also the main source of direct recharge or baseflow to the  
556 surface water system.

557 Given the proximity to Puget Sound or Hood Canal for much of the watershed, saltwater (or  
558 seawater) intrusion has been raised as a potential issue (Economic and Engineering Services,  
559 Inc., 1997). Kitsap County has not noted specific areas where saltwater impacts are known, but  
560 manages coastal areas with this issue in mind. Likewise, Tacoma Pierce County Health  
561 Department manages a program focused on the Key Peninsula and the Gig Harbor areas where  
562 risks of saltwater intrusion may be higher. The largest risks are found on small, privately-owned  
563 housing lots found along many coastal areas. Individual wells in such areas may be closely  
564 spaced and are often shallow, tapping water table aquifers that could be subject to saltwater  
565 intrusion if over used or impacted by drought conditions. A summary of water resources  
566 (Suquamish Tribe, 2016) noted that thus far no widespread or serious saltwater intrusion  
567 problems have been recognized.

568 The potential risks of saltwater intrusion due to municipal withdrawals on Bainbridge Island  
569 were modeled by the U.S. Geological Survey in 2011 (Frans, L.M. et al., 2011). The study found  
570 no risk of saltwater intrusion to the aquifers of interest through the year 2035. A more recent  
571 study (Kitsap PUD, et al., 2018) on the Seabold Water Association on Bainbridge Island  
572 concludes that elevated chloride levels measured at a well (an early warning indicator of  
573 saltwater intrusion) is localized and not a regional problem. The elevated chloride levels may  
574 have been caused by disposal of water treatment brine.

### 575 2.3.3 Hydrology and Streamflow

576 Due to its irregular configuration, relatively small size, and geologic and topographic  
577 characteristics, the Kitsap Peninsula is drained by hundreds of relatively small lowland stream  
578 and river systems. Most of the area is drained by short streams that discharge directly into  
579 surrounding marine waters. Over 580 streams and 180 lakes, reservoirs, ponds, and marshes  
580 have been inventoried in WRIA 15 (Garling, et al, 1965). WRIA 15 is unique hydrologically, as

**Commented [VMSJ(12):** We received a lot of comments on this section. Bob did some further research and provided some edits. Please review and provide specific, additional revisions if necessary.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

581 only 12 streams in the area have surface drainage areas that exceed 10 square miles, and most  
582 are less than one square mile.

583 Addressing the complexity of groundwater and surface water systems in WRIA 15 requires  
584 analysis at many different hydrologic scales depending on the needs of the studies. Examples  
585 include the subbasins (discussed in Chapter 3), and USGS Hydrologic Units, such as Hydrologic  
586 Unit Code 12 (HUC-12) boundaries. In addition, there is evidence that some aquifers are  
587 continuous beneath several drainage basins (Ecology, 1981; Kitsap Public Utility District, 1997).  
588 At the time of writing, a City of Port Orchard modeling project is underway and demonstrates  
589 xxx

Commented [VMSJ(13)]: Currently no results to share (per conversation with City and consultant). May be able to add information in January if appropriate.

590 Temperatures rarely drop below freezing in WRIA 15; therefore, snowfall accumulation is  
591 minimal. There is no contribution from upstream watersheds because WRIA 15 is surrounded  
592 by marine waters. Because all streams are contained in the WRIA, upstream sources, snow, and  
593 snowpack are not influencing factors in the watershed, precipitation as rainfall is the dominant  
594 natural input of fresh water to the basin and streamflows are extremely sensitive to areal and  
595 seasonal variation in precipitation (Golder Associates, 2004).

596 Annual precipitation varies considerably, ranging from an average of less than 30 inches in the  
597 northern tip of the peninsula to more than 80 inches along Hood Canal in the southwest  
598 portion of the WRIA. Most of the WRIA receives an average of 40 to 60 inches of precipitation  
599 annually (Kitsap PUD, 2020). In general, precipitation increases by one inch for every mile  
600 southward from the northern tip of the Peninsula. On average, July is the driest month and  
601 December is the wettest month (Golder Associates and EES, 2002).

602 In addition to directly contributing to streamflow maintenance, precipitation also contributes to  
603 storage in lakes and groundwater aquifers that serve as natural reservoirs, helping to moderate  
604 extreme high and low flows. Groundwater provides the majority of late summer flow to area  
605 streams. Practically all streams in WRIA 15 are augmented by groundwater discharge and many  
606 would go dry if groundwater recharge during precipitation became insufficient to maintain  
607 streamflow during dry periods (Ecology, 1981). Small streams draining the east shore of Hood  
608 Canal typically originate in lakes and wetlands, have moderate gradients, and exhibit low flows  
609 in late summer and early fall (Kuttel, 2003).

610 WAC173-515 set minimum instream flows for 21 streams and closed 54 streams and their  
611 tributaries including lakes to further appropriation of surface water. An additional 14 streams  
612 and their tributaries are closed to further appropriation of surface water for part of the year.  
613 Some of the streams with partial closures are in basins which also have minimum instream  
614 flows set (Ecology, 1981). Streams subject to minimum instream flows are Union River, Tahuya  
615 River, Rendland Creek, Dewatto River, Anderson Creek, Stavis Creek, Big Beef Creek, Anderson  
616 Creek (different creek than previously listed), Grover's Creek, Steel Creek,  
617 Strawberry/Kochs/Cooks Creek, Dickerson Creek, Chico Creek, Gorst Creek, Curley Creek, Ollala  
618 Creek, Crescent Creek, Purdy Creek, Lackey Creek, Rocky Creek, and Coulter Creek.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

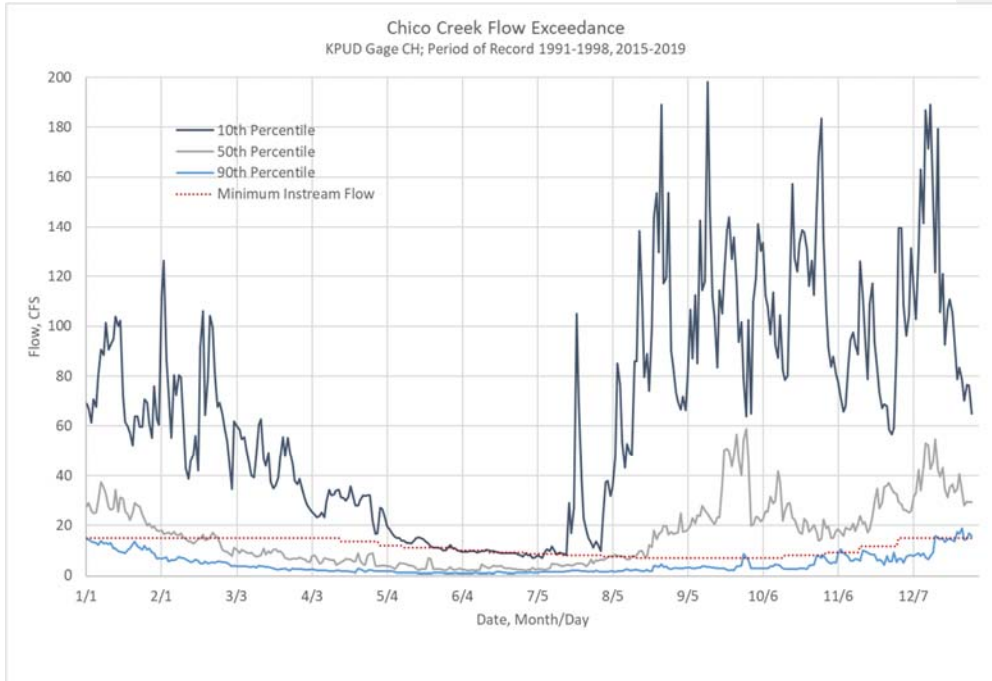
619 The background of how instream flows and closures were set are described in the Instream  
620 Resources Protection Program (IRPP) for WRIA 15 (Ecology, 1981). Instream flows were set for  
621 streams where continuous flow records existed or correlations of flow to other stream gages  
622 were possible and where average annual flows exceeded five cfs. Streams closed by the WAC  
623 were previously closed pursuant to water right recommendations or had average annual flows  
624 less than five cfs and a known high value for fish production, aesthetics, and other  
625 environmental values.

626 The IRPP does not describe the instream flow setting technique; instream flows are believed to  
627 have been set using a combination of Physical Habitat Simulation (PHABSIM), which is a suite of  
628 hydraulic and habitat models that compute an index to habitat suitability and discharge, and  
629 the toe-width method to determine a habitat based instream flow recommendation. The  
630 instream flow recommendations tended to use the 40-50 percent exceedance as a hydrologic  
631 limit to the habitat-based instream flow recommendation (Pacheco, 2020).

632 In establishing instream flows by regulation, Ecology recognized that the recommended  
633 regulatory flows have not, and probably have never been met, 100 percent of the time.  
634 However, the intent of the regulation was to protect streams from further depletion (e.g.,  
635 through subsequent appropriations) when flows approach or fall below the recommended  
636 discharges (Ecology, 1981). In Chico Creek, for example, minimum instream flows are often not  
637 met. Figure 2 shows the flow exceedance for Chico Creek plotted against the regulatory  
638 minimum instream flow. Minimum instream flows are greater than the median flow (50  
639 percent exceedance) from March until September and exceed dry year (90 percent exceedance)  
640 flows for most of the year. Since Chico watershed has one of the largest salmon runs in Kitsap  
641 County, not meeting minimum flows during migration periods can negatively impact many fish  
642 species and result in massive pre-spawn mortalities of salmon.<sup>14</sup> The inability to meet minimum  
643 instream flows similarly impacts Grovers Creek (Suquamish Tribe, 2016).

---

<sup>14</sup> Several species of fish migrate through the Chico Watershed, including chum and coho salmon, steelhead, and sea-run cutthroat trout.



644

645 Figure 2. Chico Creek Flow Exceedance.

646 Due to the sensitivity of the watershed to precipitation, the salmonid habitat in the streams of  
 647 WRIA 15 are highly susceptible to hydrologic changes resulting from stormwater runoff (West  
 648 Sound Watershed Council, 2005). The increase in impervious surfaces associated with  
 649 residential and commercial development increases surface runoff and the frequency, duration,  
 650 and magnitude of peak stream flows.<sup>15</sup> The result is that less water is available to sustain flows  
 651 through the dry months, and the increased peak flows result in increased bank and streambed  
 652 instability, channel scour, and loss of instream habitat diversity, which may adversely affect  
 653 salmonid production (West Sound Watershed Council, 2005).

654 Predictions of change in climate are available from The Climate Toolbox (climatetoolbox.org).  
 655 The Climate Mapper on the website was used to obtain forecasts of changes in temperature  
 656 and precipitation over WRIA 15 under future conditions. The Climate Mapper allows a  
 657 comparison of future conditions to present conditions under assumptions of which  
 658 Representative Concentration Pathway (RCP) greenhouse gas concentration trajectory is  
 659 assumed, and which future time frame is selected. Assuming the RCP 8.5 pathway and a

**Commented [VMSJ(14):** We worked on some language here to recognize potential limitations, but need feedback to see if addressed concerns from Suquamish Tribe.

<sup>15</sup> Note that RCW 90.94.030 does require developments associated with new building permits to have stormwater management and LID.

660 baseline of 1971-2000, mean annual precipitation is projected to increase by 2.2-2.6 percent for  
661 the 2010-2039 timeframe and 3.7-5.6 percent for the 2040-2069 timeframe. Precipitation is  
662 projected to increase in fall, winter and spring and decrease in summer. Mean annual  
663 temperatures will increase by 2-2.6° F in the 2010-2039 timeframe and 4.6-6° F in the 2040-  
664 2069 timeframe. Temperatures will increase in all seasons. In addition, heavy rainfall events are  
665 projected to become more severe and occur more frequently (Mauger et. al. 2015).

666 The Climate Impacts Group prepared climate forecasts for streamflow in the Puget Sound basin  
667 (Krosby et. Al, 2018). No streams in WRIA 15 had forecasts; the closest stream with forecasts is  
668 the North Fork Skokomish River (located in WRIA 16).<sup>16</sup> Comparison of July through September  
669 streamflows between 1992 and 2011 with projections of streamflow for climate forecasts for  
670 2070 – 2099 project a decline of 30 to 40 percent in streamflow during the low flow season  
671 (Krosby et. al., 2018). It is likely with a reduction in summer precipitation and increases in  
672 temperature, streams in WRIA 15 will also experience declines in streamflow during summer  
673 although the extent of decline has not been predicted. Water temperatures are also expected  
674 to rise which will impact salmonid survival, growth, and fitness.

**Commented [RM15]:** Can add in reference to chico creek study here except I didn't find one – just a GIS site that will show results in the future  
<https://www.arcgis.com/home/item.html?id=b9643df0269545b4ae9ca67b963dc382>

### 675 **2.3.4 Water Quality**

**Commented [VMSJ(16):**  
Waiting on feedback from Alison on what revisions or footnotes she wants

676 Ecology evaluates surface waters in WRIA 15 every two years with a water quality assessment.  
677 The assessment evaluates existing water quality data and classified waterbodies into the  
678 following categories:

- 679 • Category 1: Meets tested standards for clean waters.
- 680 • Category 2: Waters of concern; waters in this category have some evidence of a water  
681 quality problem, but not enough to show persistent impairment.
- 682 • Category 3: Insufficient Data.
- 683 • Category 4: Impaired waters that do not require a total maximum daily load (TMDL):
  - 684 ○ Category 4a: already has an EPA-approved TMDL plan in place and implemented.
  - 685 ○ Category 4b: has a pollution control program, similar to a TMDL plan, that is  
686 expected to solve the pollution problems.
  - 687 ○ Category 4c: is impaired by causes that cannot be addressed through a TMDL  
688 plan. Impairments in these water bodies include low water flow, stream  
689 channelization, and dams.
- 690 • Category 5: Polluted waters that require a water improvement project.

---

<sup>16</sup> Modeling has not been completed for the smaller stream systems in WRIA 15, and therefore the projections for larger river systems may have limited applicability.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

691 The latest water quality assessment classified many waterbodies in WRIA 15 (Ecology 2020a).  
692 Category 4 and 5 assessment results are listed in Appendix D. Category 5 listings are based on  
693 exceedance of water temperature, dissolved oxygen, pH, bacteria, copper, lead, and total  
694 phosphorus water quality standards. Of the Category 4 and 5 results, 62 waterbodies are listed  
695 for either temperature, dissolved oxygen, total phosphorus, or pH. These parameters are  
696 sensitive to low flows and could be improved with streamflow restoration.

697 Three TMDL studies have been prepared in WRIA 15 to address water quality impairments. All  
698 of the TMDLs address fecal coliform and are 1) Liberty Bay Tributaries, 2) Sinclair and Dyes  
699 Inlets, and 3) Union River Tributaries (Ecology 2002, 2012, 2014). The table is available in  
700 Appendix E.

701

## Chapter Three: Subbasin Delineation

### 702 3.1 Introduction

703 To allow for meaningful analysis of the relationship between new consumptive use and offsets,  
704 and per Ecology’s Final NEB Guidance (Ecology, 2019b), the WRIA 15 Committee divided WRIA  
705 15 into subbasins.<sup>17</sup> This division was helpful in describing the location and timing of projected  
706 new consumptive water use, the location and timing of impacts to instream resources, and the  
707 necessary scope, scale, and anticipated benefits of projects. In some instances, subbasins may  
708 not correspond with hydrologic or geologic basin delineations (e.g., watershed divides). This  
709 chapter is based on the Subbasin Delineation Technical Memorandum (Appendix F), which was  
710 finalized by the WRIA 15 Committee at the June 4, 2020 meeting.

### 711 3.2 Approach to Develop Subbasins

712 The WRIA 15 Committee divided WRIA 15 into seven subbasins for purposes of assessing  
713 projections for new permit-exempt wells, consumptive use, and project offsets.<sup>18</sup> The basic  
714 considerations of the WRIA 15 Committee in delineating subbasin boundaries for this planning  
715 process were:

- 716 • WRIA 15 was initially divided into seven “regions” as an early delineation of subbasins.  
717 The Committee later agreed to accept the region delineations as subbasin boundaries.
- 718 • The subbasins are part of a nested approach –with further subdivision at the HUC12 and  
719 Puget Sound Watershed Assessment Unit scales—where projects will be placed as close  
720 to impacts as possible.
- 721 • Subbasin boundaries were used for generating growth projections and consumptive use  
722 estimates.
- 723 • Isolated areas like islands without connectivity should be included as their own  
724 subbasins.

725 Other considerations were:

- 726 • Right-sizing subbasins such that offset projects have some geographic relevance to the  
727 location of withdrawal (e.g., an offset project in Seabeck bears little relevance to  
728 withdrawals in Longbranch).

---

<sup>17</sup> The term “subbasin” is used by the WRIA 15 Committee for planning purposes only and to meet the requirements of RCW 90.94.030 (3)(b).

<sup>18</sup> 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).

- 729 • Surface water flows and rain flow patterns should be included.
- 730 • Rural growth pattern projections will likely drive project and impact locations.
- 731 • Priority areas for salmon recovery should be included.

732 For some Committee members, it was also important to consider alignment of subbasins with  
733 Tribal Usual and Accustomed fishing areas and county jurisdiction. A more detailed description  
734 of the subbasin delineation is in the WRIA 15 Subbasin Delineation Technical Memorandum  
735 available in Appendix F.

### 736 3.3 WRIA 15 Subbasins

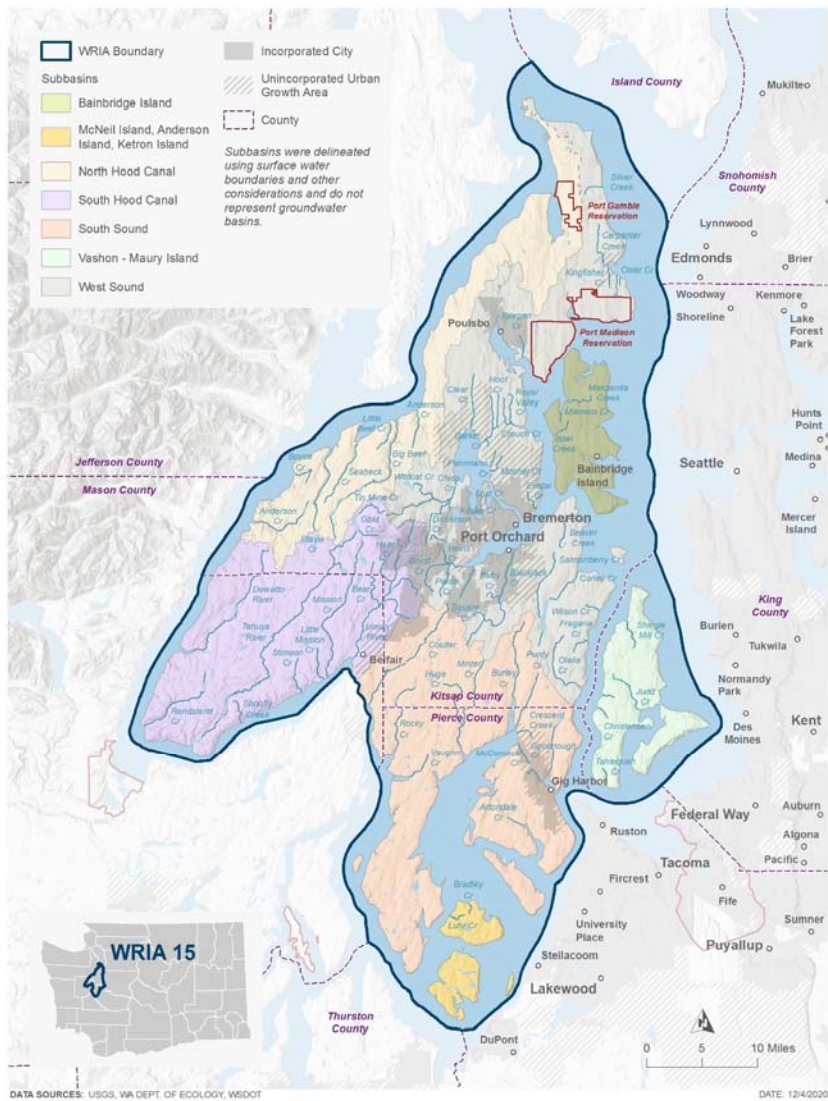
737 The WRIA 15 subbasin delineations are shown on Figure 3 and summarized below in Table 4.

**Commented [AP17]:** PGST: The Port Gamble S'Klallam Tribe was uncomfortable with an administrative watershed boundary along its reservation, as it exists on a narrow peninsula with limited available groundwater resources. However, for the purposes of the plan, the delineation presents a workable framework to meet the needs of the statute.

**Commented [VMSJ(18R17):** Is a revision requested?



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee



738

739 Figure 3: WRIA 15 Subbasin Delineation for the Watershed Restoration and Enhancement Plan.

740 Table 4: WRIA 15 Subbasins

Subbasin Name	Primary Rivers and Tributaries	County
Bainbridge Island	Manzanita Creek, Issei Creek, Miemois Creek, Springbrook Creek, Murden Creek, Macs Dam Creek	Kitsap
McNeil Island, Anderson Island, Ketron Island	Luhr Creek, Bradley Creek, Schoolhouse Creek	Pierce
North Hood Canal	Boyce Creek, Anderson Creek, Stavis Creek, Seabeck Creek, Big Beef Creek, Little Beef Creek, Port Gamble Creek, Martha John Creek, Kinman Creek	Kitsap
South Hood Canal	Rendsland Creek, Dewatto River, Tahuya River, Stimson Creek, Mission Creek, Union River, Bear Creek, Hazel Creek, Tin Mine Creek	Kitsap and Mason
South Sound	Vaughn Creek, Rocky Creek, Coulter Creek, Huge Creek, Artondale Creek, Crescent Creek, Burley Creek, Purdy Creek	Pierce and Kitsap
Vashon - Maury Island	Judd Creek, Tahlequah Creek, Christensen Creek, Green Valley Creek, Shingle Mill Creek	King
West Sound	Olalla Creek, Fragaria Creek, Curley Creek, Wilson Creek, Salmonberry Creek, Beaver Creek, Black Jack Creek, Ruby Creek, Parish Creek, Lost Creek, Kitsap Creek, Wildcat Creek, Chico Creek, Mosher Creek, Enetai Creek, Pahrman Creek, Silver Creek, Carpenter Creek, Osier Creek, Clear Creek, Crouch Creek, Barker Creek, Salmon Creek, Grovers Creek, Clear Creek, Crouch Creek, Illahee Creek, Steele Creek, Big Scandia Creek, Johnson Creek, Dogfish Creek, Bjorgen Creek, Klebeal Creek, Sam Snyder Creek, Gorst Creek	Kitsap

## 741 Chapter Four: New Consumptive Water Use Impacts

### 742 4.1 Introduction to Consumptive Use

743 The Final NEB Guidance states, “watershed plans must include a new consumptive water use  
744 estimate for each subbasin, and the technical basis for such estimate” (Ecology, 2019b, page  
745 7).<sup>19</sup> This chapter provides the WRIA 15 Committee’s projections of new domestic permit-  
746 exempt well connections (hereafter referred to as PE wells) and their associated consumptive  
747 use (CU) for the 20-year planning horizon. This chapter summarizes information from the  
748 technical memorandums prepared for and approved by the WRIA 15 Committee on June 4,  
749 2020 and included in Appendix G.

### 750 4.2 Projection of Permit-Exempt Well Connections (2018– 751 2038)

752 The watershed plan addresses new consumptive water use from projected new homes  
753 connected to PE wells. Generally, new homes are associated with wells drilled during the  
754 planning horizon. However, new uses can occur where new homes are added to existing wells  
755 serving group systems under RCW 90.44.050. The well use addressed in this plan refers to both  
756 these types of new well use. PE wells are used to supply houses and, in some cases, other  
757 equivalent residential units (ERUs) such as small apartments. For the purposes of this  
758 document, the terms “house” or “home” refer to any permit-exempt domestic groundwater  
759 use, including other ERUs.

760 To estimate new consumptive water use, the counties or technical consultants (depending on  
761 the county) developed projections for the number of new PE wells over the planning horizon in  
762 WRIA 15. The methods for projections were based on recommendations from Appendix A of  
763 the Final NEB Guidance. The Committee accepted the recommendations for projections from  
764 the counties or technical consultants. The WRIA 15 Committee chose to include projections for  
765 low, moderate, and high numbers of PE wells, for select counties. WRIA 15 is predominantly  
766 rural and projections demonstrate a wide distribution of PE wells throughout the watershed.

---

<sup>19</sup> 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 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. RCW 90.94.020 and 90.94.030 have various references to how watershed plans are to project, offset, or account for “water use.” Ecology interprets these subsections of the law (RCW 90.94.020(4)(b), 90.94.020(4)(c), 90.94.030(3)(b), 90.94.030(3)(c), 90.94.030(3)(d), and 90.94.030(3)(e)) to relate to the consumptive water use of new permit-exempt domestic withdrawals that come online during the planning horizon. (Ecology, 2019a, page 7)

767 The following sections provide the 20-year projections of new PE wells for each subbasin within  
768 WRIA 15, the methods used to develop the projections, and the uncertainties associated with  
769 the projections.

770 **Addressing Uncertainties, Assumptions, and Limitations Associated with Projections for**  
771 **Growth and Consumptive Use.** Uncertainties and limitations are inherent with any planning  
772 process. Understanding the limitations of the available data (and analyses that use that data)  
773 are important, as well as acknowledging the uncertainties associated with the analysis. The  
774 WRIA 15 Committee recognized and discussed uncertainties associated with projecting new PE  
775 well connections, models and methods used to calculate consumptive use associated with the  
776 PE well connections, as well with project implementation. Chapter 4 presents projections based  
777 on the best information available at the time. The WRIA 15 Committee recommends that if new  
778 information, modeling, or data becomes available, adjustments are made through adaptive  
779 management to provide greater certainty that this plan continues to meet NEB. The Committee  
780 has aimed to understand uncertainty in order to be protective of the resources and to help  
781 meet the goals of streamflow restoration. Uncertainty is offset through the development of an  
782 extensive project list and robust adaptive management and implementation plan. This chapter  
783 does not describe uncertainty in detail, but instead identifies the assumptions used in making  
784 the projections to better inform adaptive management in the future.

**Commented [VMSJ(19):** Added language based on conversation at December 3 meeting. Please provide feedback/revisions.

#### 785 **4.2.1 Projections of Permit-Exempt Well Connections by Subbasin**

786 The WRIA 15 watershed plan compiles the growth projection data both at the WRIA scale and  
787 by subbasin. This section presents WRIA 15 growth projection data for Kitsap, King, Mason, and  
788 Pierce counties. Table 5 and Figure 4 show the projected number of new PE wells per subbasin  
789 and their distribution across WRIA 15. To capture the various projections for PE wells, this  
790 watershed plan refers to lower estimates, moderate estimates, and higher estimates of growth.

791 The moderate estimate for the number of new PE wells in unincorporated areas of the four  
792 counties:

- 793 • 2,921 new PE wells are projected in the unincorporated portions of Kitsap County in  
794 WRIA 15 over the planning horizon.
- 795 • 368 new PE wells are projected in the unincorporated portions of King County in WRIA  
796 15 over the planning horizon.
- 797 • 1,301 new PE wells are projected in the unincorporated portions of Mason County in  
798 WRIA 15 over the planning horizon.
- 799 • 978 new PE wells are projected in the unincorporated portions of Pierce County in WRIA  
800 15 over the planning horizon.

801 The total moderate estimate is 5,568 PE wells over the planning horizon, the lower estimate is  
802 4,861 PE wells, and the higher estimate is 6,152 PE wells.

803

804 **4.2.2 Methodology**

805 The WRIA 15 Committee gave deference to each county for identifying the most appropriate  
806 method of projecting PE wells. Different methods were used for calculating the projections for  
807 each county:

- 808 • Kitsap County’s method is based upon a land capacity analysis, using the OFM 2040  
809 moderate growth projections, and historical wells. Kitsap County and Kitsap Public  
810 Utility District developed the projections. The high and low projections are based on a  
811 five percent estimated margin of error.
- 812 • King County’s method is based upon historical building permit data. King County  
813 developed the projections.
- 814 • Mason County’s method is based upon Office of Financial Management (OFM) 2040  
815 moderate growth population forecasts.<sup>20</sup> The technical consultant team developed the  
816 projections.
- 817 • Pierce County projections are based on historical well permit data. The technical  
818 consultant team developed the projections. The high and low projections are based on  
819 different historical periods.

820 The WRIA 15 Permit-Exempt Growth and Consumptive Use Summary (HDR 2020) provides  
821 more detail on each of the growth projection methods.

---

<sup>20</sup> Note that some Committee members requested a high growth projection for Mason County, but that projection was not included as part of this watershed plan.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

822 Table 5: Number of Permit-Exempt Connections Projected between 2018 and 2038

Subbasin	Moderate Estimate					Higher Estimate					Lower Estimate				
	Kitsap	Pierce	Mason	King	Total	Kitsap	Pierce	Mason	King	Total	Kitsap	Pierce	Mason	King	Total
<b>West Sound</b>	1,336				1,336	1,403				1,403	1,142				1,142
<b>North Hood Canal</b>	656				656	689				689	561				561
<b>South Hood Canal</b>	49		1,077		1,126	52		1,077		1,128	42		1,077		1,119
<b>Bainbridge Island</b>	491				491	516				516	491				491
<b>South Sound</b>	389	940	224		1,553	406	1,360	224		1,992	332	602	224		1,158
<b>Vashon-Maury Island</b>				368	368				368	368				368	368
<b>South Sound Islands</b>		38			38		56			56		22			22
<b>Total</b>	<b>2,921</b>	<b>978</b>	<b>1,301</b>	<b>368</b>	<b>5,568</b>	<b>3,066</b>	<b>1,416</b>	<b>1,301</b>	<b>368</b>	<b>6,152</b>	<b>2,568</b>	<b>624</b>	<b>1,301</b>	<b>368</b>	<b>4,861</b>

823

824 **4.2.3 Distribution of New PE Wells**

825 The WRIA 15 Committee mapped potential locations of new PE wells in the watershed based on  
826 parcels available for residential development dependent on PE wells. The resulting heat map  
827 (Figure 4) shows the most likely areas where new residential development dependent on PE  
828 wells will occur.

829 **4.2.4 Summary of Assumptions**

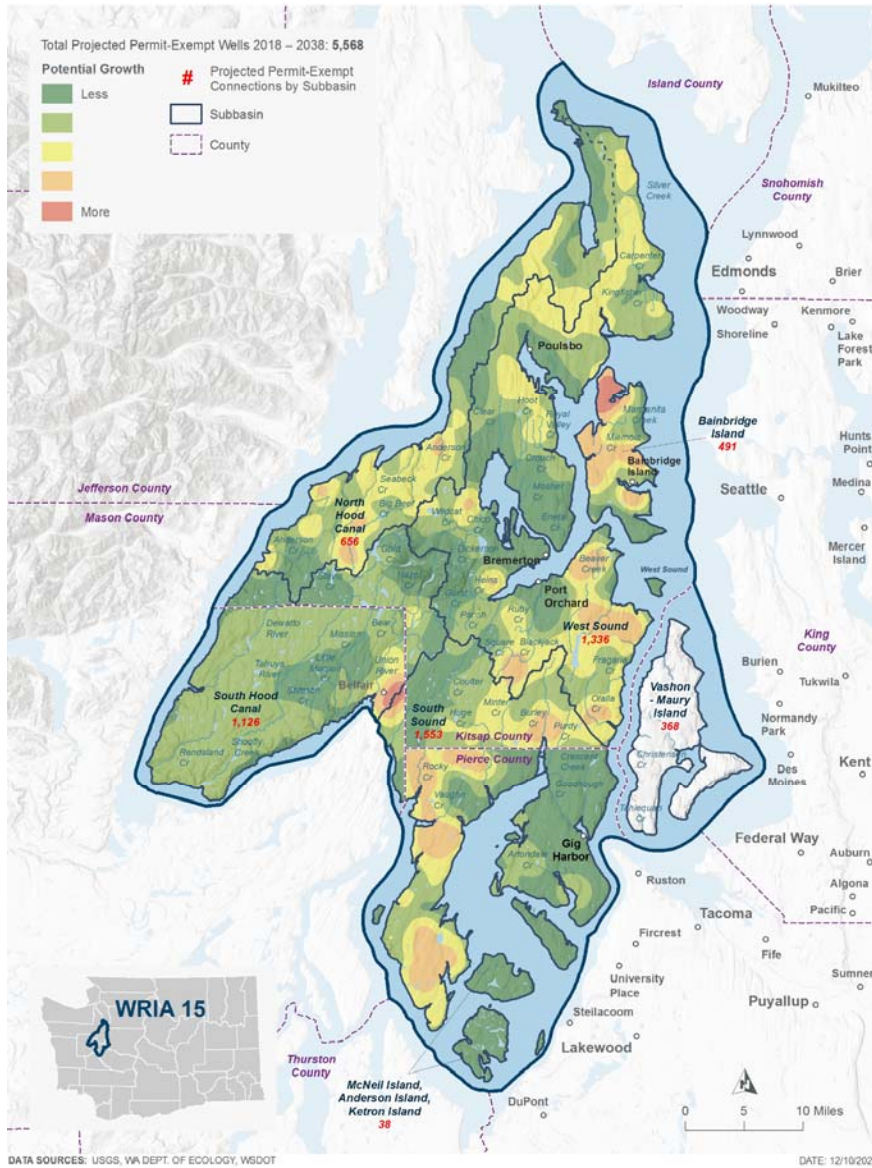
830 The methods described in Appendix A of the Final NEB Guidance for projecting new PE wells  
831 include several assumptions. The assumptions shared here provide transparency in the  
832 planning process and deliberations of the Committee to support any future adaptive  
833 management undertaken by entities implementing the plan. The WRIA 15 Permit-Exempt  
834 Growth and Consumptive Use Summary (HDR 2020) provides a detailed listing of the  
835 assumptions used to project new PE wells.

836 Kitsap, King, and Pierce counties relied on historical data, and assumed that these historical  
837 trends will continue into the future. To provide greater certainty in the assumption, this  
838 watershed plan includes additional PE well scenarios using different periods in the historical  
839 Tacoma-Pierce County Health Department (TPCHD) well database. The high-growth scenario  
840 uses the 1999–2008 data, which was a time of relatively healthy economic growth resulting in  
841 more rapid rural development. The low-growth scenario uses the 2009–2018 data, which was a  
842 time of relatively slower rural development and corresponds with the recession and housing  
843 downturn. The technical consultants applied a plus or minus five percent to calculate the high-  
844 and low-growth scenarios for Kitsap County. Five percent is the assumed margin of error in the  
845 County’s land capacity analysis. Mason and King County requested no high- or low-growth  
846 scenarios calculations. All three growth scenarios were used in the deliberations by the  
847 Committee to determine the most likely consumptive use estimate for the planning horizon.

848 To estimate the distribution of PE wells in Kitsap County, it was assumed growth in each  
849 subbasin is based upon the proportion of the historical number of building permits for each  
850 subbasin for the period of 2002-2019. Assumptions were made as to the developable parcels  
851 that would use PE wells by only counting parcels greater than 0.75 acre that are outside a 200-  
852 foot water or sewerline buffer. Within King County, the percentage of houses with PE wells was  
853 assumed to be equal to the time period of 2000-2017. Within Mason County it was assumed  
854 the proportion of houses with PE wells is equal to the proportion of buildout capacity in rural  
855 areas compared to urban growth areas. In Pierce County, it was assumed that the same historic  
856 growth rate in PE wells by subbasin would occur in the future.

857 **4.2.5 Projected Growth Map**

858 Below are figures representing the distribution of new PE wells under the moderate estimate  
859 (Figure 4).



860  
861 Figure 4. WRIA 15 Projected New Permit-Exempt Wells (number and likely area) Under the Moderate  
862 Estimate Growth Scenario 2018-2038. The “heat” map is generated based on modeled growth projections  
863 that considers zoning, land use, and distance from existing water lines. The results are highly generalized  
864 but help illustrate the approximate location and relative growth of new domestic permit exempt wells.

**Commented [VMSJ(20):** We are confirming accuracy of heat map with HDR.



865 **4.3 Impacts of New Consumptive Water Use**

866 The watershed plan used the 20-year projections of new PE wells to estimate the consumptive  
867 water use that this watershed plan must address and offset. As above, this section uses “new  
868 PE wells” as a shorthand for new domestic permit-exempt well connections unless otherwise  
869 described. This section includes an overview of the methods to estimate new consumptive  
870 water use (consumptive use), an overview of the anticipated impacts of new consumptive use  
871 in WRIA 15 over the planning horizon, and other considerations by the WRIA 15 Committee,  
872 such as assumptions. The WRIA 15 Permit-Exempt Growth and Consumptive Use Summary  
873 provides a more detailed description of the analysis and alternative scenarios considered  
874 (Appendix G).

875 The Committee considered all three growth scenarios (lower estimate, moderate estimate, and  
876 higher estimate) as well as three methods for estimating consumptive use. Based on the  
877 deliberations of the Committee, this watershed plan recommends a consumptive use estimate  
878 of 766.4 acre feet per year (684,150 gallons per day [gpd]). This estimate is based on the  
879 moderate growth projection for the irrigated area method and is viewed as the most likely  
880 consumptive use. Based on data presented, some members of the Committee supported a  
881 lower consumptive use estimate and others supported a higher number, but the Committee  
882 ultimately agreed that 766.4 acre-feet per year (AF/yr) should be the consumptive use  
883 estimate. Section 4.3.4 provides additional information on the consumptive use estimate as  
884 well as considerations for a higher offset goal of 1,218 AF/yr (1.087 million gallons per day  
885 [mgd]) to achieve through project implementation. This section provides an overview and  
886 results from the various methods used to estimate consumptive use.

887 **4.3.1 Methodology to Estimate Indoor and Outdoor Consumptive**  
888 **Water Use**

889 To calculate indoor and outdoor consumptive use, the technical consultants presented three  
890 different methods to the Committee for consideration: Metered Data Method, USGS  
891 Groundwater Model Method, and the Irrigated Area Method. This section presents an overview  
892 and results on the three methods. While the consumptive use estimate presented in this plan  
893 relies on the irrigated area method, some members of the Committee preferred the alternative  
894 methods. All three methods are presented here to provide transparency and for future  
895 considerations around adaptive management. Additional information is available in Appendix  
896 G.

897 **Metered Data Method**

898 HDR estimated consumptive use using metered connections from water systems. HDR  
899 requested data from Committee members for water systems that use (or have used) a flat rate  
900 billing structure and were similar in character to the rural environments in which households  
901 may connect to PE wells. In WRIA 15, Kitsap PUD provided consumption data for all Kitsap PUD  
902 water systems for years 2017 and 2018.

903 This method assumed that average daily use in December, January, and February is  
904 representative of year-round daily indoor use. Average daily system-wide use was divided by the

**Commented [VMSJ(21):** Please continue to provide feedback on the framing of the CU estimate and higher offset goal.

**Commented [VMSJ(22):** Please provide feedback on justification for including all three methods in the body of the plan.

905 number of connections (assuming all connections are residential), to estimate average daily  
906 indoor use per connection. It was also assumed that 10 percent of the indoor use is  
907 consumptively used. That factor was applied to the average daily use in the winter months to  
908 determine the consumptive portion of indoor water use per connection.

909 Average daily indoor use was multiplied by the number of days in a year to estimate total annual  
910 indoor use. Total annual indoor use was subtracted from total annual use by a water system to  
911 estimate total annual outdoor use. It was assumed 80 percent of the outdoor use is  
912 consumptively used. That factor was applied to estimate the consumptive portion of outdoor use.

913 Outdoor consumptive use was also estimated on a seasonal basis. The Washington Irrigation  
914 Guide reports irrigation requirements between the months of April and September for  
915 representative weather stations in WRIA 15. Therefore, seasonal outdoor water use was assumed  
916 to occur over a period of six months. Average daily indoor use was multiplied by the number of  
917 days in the irrigation season to calculate total indoor use for the irrigation season. Total irrigation  
918 season indoor use was then subtracted from total season use to determine total outdoor use for  
919 the irrigation season. The value was proportionally allocated to each month in the irrigation  
920 season using the requirements from the Washington Irrigation Guide.

921 The annual average consumptive use values are 0.0138 acre-foot (AF)<sup>21</sup> (0.000019 cubic foot  
922 per second [cfs]) for indoor use per well and 0.0233 AF (0.000032 cfs)<sup>22</sup> for outdoor use per  
923 well. The corresponding values in gallons are 4,470 gallons for indoor consumptive use and  
924 7,590 gallons for outdoor consumptive use per well per year.

#### 925 **USGS Groundwater Model Method**

926 The USGS Groundwater Model method refers to water use data collected for a groundwater-  
927 flow model of the Kitsap Peninsula.<sup>23</sup> A report prepared by the USGS (Welch, Frans, and Olsen,  
928 2014) provides a survey of consumption from select water utilities serving more than 221,700  
929 people with more than 88,500 residential connections on the Kitsap Peninsula. The USGS study  
930 differentiated between the indoor and outdoor portions of use. Estimated indoor use (based on  
931 November–April pumping values) was 66 gallons per person per day. Outdoor use was  
932 estimated for the outdoor growing season and varied by month from four gallons per person  
933 per day in May to 97 gallons per person per day in September. Estimates for average annual  
934 outdoor use are 26 gallons per person per day. For the purposes of groundwater modeling  
935 USGS assumed the consumptive use rate for indoor domestic use is 10 percent in non-sewered  
936 areas, and the consumptive use rate for outdoor use is 90 percent.

---

<sup>21</sup> Acre-foot (AF) 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. One acre-foot per year (AF/yr) is equal to 893 gallons per day (gpd).

<sup>22</sup> 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. One cubic foot per second is equal to 646,317 gallons per day.

<sup>23</sup> Note that the water use data is from water system data which is metered with a fee structure based on water use. PE wells in WRIA 15 are not metered and have no associated fee structure.

937 The annual average consumptive use values are 0.0185 acre-foot (AF) (0.000026 cubic foot per  
938 second [cfs]) for indoor use per well and 0.0262 AF (0.000036 cfs) for outdoor use per well. The  
939 corresponding values in gallons are 6,023 gallons for indoor consumptive use and 8,540 gallons  
940 for outdoor consumptive use per well. These are annual averages, and the Committee expects  
941 that outdoor use will occur mainly in summer.

#### 942 **Irrigated Area Method**

943 Appendix A of the Final NEB Guidance describes the Irrigated Area method that assumes  
944 average indoor use per person per day, and reviews aerial imagery to provide a basis to  
945 estimate irrigated area of outdoor lawn and garden areas. Use patterns for indoor uses versus  
946 outdoor uses are different. Indoor use is generally constant throughout the year, while outdoor  
947 use occurs primarily in the summer months. In addition, the portion of water use that is  
948 consumptive varies for indoor and outdoor water uses. The Irrigated Area method accounts for  
949 indoor and outdoor consumptive use variances by using separate approaches to estimate  
950 indoor and outdoor consumptive use.

951 To develop the consumptive use estimate, the WRIA 15 Committee used the Irrigated Area  
952 method and relied on assumptions for indoor use and outdoor use from Appendix A of the Final  
953 NEB Guidance. This chapter provides a summary of the technical memo, which is available in  
954 Appendix G of the watershed plan.

955 Consistent with the Final NEB Guidance (Final NEB Guidance Appendix B), the Committee  
956 assumed that impacts from consumptive use on surface water are steady-state, meaning  
957 impacts to the stream from pumping do not change over time. The wide distribution of future  
958 well locations and depths across varying hydrogeological conditions led to this assumption.

#### 959 **New Indoor Consumptive Water Use**

960 Indoor water use refers to the water that households use (such as in kitchens, bathrooms, and  
961 laundry) and that leave the house as wastewater (USGS, 2012). The Technical Consultants used  
962 Ecology’s recommended assumptions for indoor daily water use per person and local data to  
963 estimate the average number of people per household, and applied Ecology’s recommended  
964 consumptive use factor (CUF) to estimate new indoor consumptive water use (Ecology, 2019b):

- 965 • 60 gpd per person, as recommended by Ecology.
- 966 • 2.5 persons per household assumed for rural portions of WRIA 15, based on the Office  
967 of Financial Management and County data.
- 968 • 10 percent of indoor use is consumptively used (or a CUF of 0.10), based on the  
969 assumption that homes on PE wells are served by onsite sewage systems. Onsite sewage  
970 systems percolate back to groundwater; a fraction of that water is lost to the  
971 atmosphere through evaporation in the drain field.

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

973  $60 \text{ gpd} \times 2.5 \text{ people per house} \times 365 \text{ days} \times 0.10 \text{ CUF}$

974 This results in an annual average of 0.0168 AF (0.000023 cfs, 5,475 gallons) indoor consumptive  
975 water use per year per well.

976 [New Outdoor Consumptive Water Uses](#)

977 Most outdoor water is used to irrigate lawns, gardens, and landscaping. To a lesser extent,  
978 households use outdoor water for car and pet washing, exterior home maintenance, pools, and  
979 other water-based activities. Water from outdoor use does not enter onsite sewage systems,  
980 but instead infiltrates into the ground or is lost to the atmosphere through evapotranspiration  
981 (Ecology, 2019b, page 19).

982 The WRIA 15 Committee used aerial imagery to measure the irrigated areas of 80 randomly  
983 selected parcels served by PE wells to develop an average outdoor irrigated area. This analysis  
984 returned more than one-half of the parcels with no visible irrigation, resulting in irrigated area  
985 values of zero. The average irrigated area for the 80 randomly selected parcels was 0.08 acre.  
986 The Committee believes that 0.08 acre represents the irrigated areas for PE wells in WRIA 15  
987 and adopted that value for consumptive use calculations. This decision is based on the  
988 understanding that the consumptive use calculation likely overestimates water use and the  
989 independent analyses performed to confirm the measurements of irrigated acreage.

990 The WRIA 15 Committee used the following assumptions, recommended in Appendix A of the  
991 Final NEB Guidance, to estimate outdoor consumptive water use:

- 992 • Crop irrigation requirements (IR) for turf grass according to Washington Irrigation Guide  
993 (WAIG) (NRCS-USDA 1997): 16.84 inches per year for the Bremerton WAIG station. This  
994 value was rounded up to 17 inches (1.42 feet) per year and used to estimate the amount  
995 of water needed for outdoor irrigation.
- 996 • An irrigation application efficiency (AE) to account for water that does not reach the  
997 turf: 75 percent. This increases the amount of water used to meet the crop's IR by 25  
998 percent.
- 999 • CUF of 0.8, reflecting 80 percent consumption for outdoor use. This means a return of  
1000 20 percent of outdoor water to the immediate water environment.
- 1001 • Outdoor irrigated area based on existing homes using PE wells: 0.08 acre.

1002 The equation used to estimate household consumptive outdoor water use is:

1003 
$$\text{Household Outdoor CU} = \left( \frac{1.42 \text{ feet}}{0.75 \text{ AE}} \right) \times 0.08 \text{ acre} \times 0.8 \text{ CUF}$$

1004 First, water loss is accounted for by dividing the IR by the AE. Next, the total water volume used  
1005 to maintain turf is multiplied by the area that is irrigated. Finally, the volume of water is  
1006 multiplied by 80 percent to produce the outdoor consumptive water use.

1007 This results in 0.121 AF/yr (0.00017 cfs, 39,400 gallons) average outdoor consumptive water  
1008 use per PE well for the WRIA. This is an average for the year; however, the Committee expects  
1009 that more water use will occur in the summer and less in winter as outdoor water use will occur

1010 mainly in summer. The outdoor consumptive use will vary by subbasin because of differences in  
1011 temperature and precipitation across the watershed. The same IR for turf grass is used to  
1012 simplify the calculations. The outdoor consumptive use equals 43.2 gpd per person.<sup>24</sup>

### 1013 **4.3.2 Assumptions with Calculating Consumptive Use**

1014 The law calls for an estimate of “consumptive water use impacts” (RCW 90.94.030(3)(e).  
1015 However, the process of estimating impacts is complex, and therefore the Committee agreed to  
1016 use the estimated amount of new consumptive use for the offset amount and the impacts of  
1017 that use. This approach is consistent with Appendix A of the Final NEB Guidance (Ecology,  
1018 2019b).

1019 Below is a discussion of assumptions for each method. An assumption used in all three methods  
1020 is an average household size of 2.5 people. The household size may vary across the WRIA and  
1021 may change over time. In addition, all three methods considered future indoor and outdoor  
1022 water use per household to be the same as estimated for current conditions. While the  
1023 Committee recognized that climate change may lead to more frequent hotter and drier  
1024 summers, calculations of consumptive use were based on data available.<sup>25</sup> More information on  
1025 uncertainties and limitations is presented in the technical memo available in Appendix G.

#### 1026 **Metered Data Method**

1027 This method uses data collected by Kitsap PUD for all connections (about 15,700) within their  
1028 service area in Kitsap County. Use of this method in calculating consumptive use for PE wells  
1029 assumes that water use data for metered connections is comparable to PE wells with no meter.  
1030 As the KPUD data covers Kitsap County, it is assumed the data are applicable to Pierce and  
1031 Mason County areas in WRIA 15. The Metered Data Method uses an assumption that the  
1032 indoor water use is consistent throughout the year in order to estimate outdoor water use.  
1033 Assumptions on the consumptive portion of water use (10 percent for indoor, 80 percent for  
1034 outdoor) are also used.

**Commented [VMSJ(23):** We worked on a number of revisions to this section and above based on comments and discussion at the December meeting. Bob also did some additional research.

---

<sup>24</sup> The estimated outdoor consumptive use equals 43.2 gpd per person, or 108 gpd per household. The outdoor non-consumptive use is 27 gpd (using 80 percent consumptive use factor), giving a total outdoor water use of 135 gpd per household. Washington Department of Ecology compiled information on existing PE well metering programs across the state for the purpose of policy and project discussions at Committee meetings (Ecology, 2020c). Six different well metering programs are described. The average water use amongst the six programs varied from 114 to 241 gpd per household. That value includes outdoor and indoor water use. The highest values were for a small group of eight wells in King County. Data from Lummi Peninsula, Dungeness and Kittitas represented over 90 percent of the metered data obtained. The range of water use in those areas was 114 – 124 gpd. The total outdoor water use estimate using the irrigated area method of 135 gpd per household exceeds the average water use in the metered areas. Adding indoor use of 150 gpd per household the irrigated area method may predict twice the average water use of other areas in Washington State with PE wells with metering data.

<sup>25</sup> The Squaxin Island Tribe calculation of increased evapotranspiration (and therefore water use) due to temperature increases suggested eight percent more water demand in 20 years.

1035 **USGS Groundwater Model Method**

1036 USGS collected data from select water utilities serving more than 221,700 people with more  
1037 than 88,500 residential connections on the Kitsap Peninsula. Use of this method in calculating  
1038 consumptive use for PE wells assumes that water use data for metered connections is  
1039 comparable to PE wells with no meter. As the USGS study did not include the Key Peninsula or  
1040 the islands of Vashon Maury, Fox, Anderson, McNeil and Ketron, this method also assumes the  
1041 data from Kitsap Peninsula is relevant to those areas. Assumptions on the consumptive portion  
1042 of water use (10 percent for indoor, 90 percent for outdoor) are also used.

1043 **Irrigated Area Method**

1044 The irrigated area method relies on a measured factor and assumed values from literature or  
1045 research to estimate consumptive water use, as described in Section 4.3.1. The measured factor  
1046 is the average outdoor irrigated area per parcel. The average outdoor irrigated area estimate  
1047 relies on a sample size of 80 parcels distributed by location and property values. The WRIA 15  
1048 Committee recognized the small sample size and to further test the assumption that the 80  
1049 parcels was fairly representative of outdoor irrigation in WRIA 15, Kitsap Public Utility District  
1050 (PUD) and the Suquamish Tribe performed independent analyses on the list of parcels to  
1051 confirm the findings of the irrigated area analysis. HDR compared the results of the analysis  
1052 with similar analyses undertaken by other Watershed Restoration and Enhancement  
1053 Committees (GeoEngineers and HDR, 2020). While the results showed that on average, HDR's  
1054 methods resulted in a lower outdoor irrigation estimate, the Committee concluded that the  
1055 results were in line with its knowledge of water use in the WRIA.

1056 The outdoor consumptive use calculation uses assumptions about irrigation amounts and  
1057 irrigation efficiencies. The outdoor consumptive use calculation for the Irrigated Area method  
1058 assumes that homeowners water their lawns and gardens at the rate needed for commercial  
1059 turf grass (i.e., watering at rates that meet crop IR per the WAIG). This assumption likely results  
1060 in an overestimate, as the irrigated area analysis demonstrated that many people irrigate their  
1061 lawns enough to keep the grass alive through the dry summers, but not at the levels that  
1062 commercial turf grass requires. The method also assumes that residential pop-up sprinkler  
1063 systems irrigate lawns with an efficiency of 75 percent. In reality, households apply water to  
1064 their lawns and gardens in many different ways, some more efficient than a 25 percent water  
1065 loss, and some less efficient. Assumptions on the consumptive portion of water use (10 percent  
1066 for indoor, 80 percent for outdoor) are also used. Members of the WRIA 15 Committee  
1067 conducted their own analysis to evaluate assumptions and uncertainties with the consumptive  
1068 use methods.<sup>26</sup>

**Commented [VMSJ(24):** Skokomish and Squaxin Island Tribes – please review footnote below and provide edits. Materials can be included in Compendium.

---

<sup>26</sup> In order to help reduce consumptive use uncertainty when considering both the USGS Groundwater Model and the Irrigated Area Methods, some members of the Committee developed their own analyses. The Skokomish Tribe and Aspect Consulting conducted an assessment of how, or if, precipitation variability across geography and time would affect outdoor irrigation consumptive use estimates in WRIA 15. The study used up to date climatological data from AgWeatherNet and PRISM to compare to values using the Irrigated Area Method. This was undertaken to address concerns that these methodologies may be not conservative enough or too conservative (respectively) and whether or not a “safety factor” needed to be factored in. This assessment can be found in the

1069 **4.3.3 Summary of Consumptive Use Estimates**

1070 Below is a summary of consumptive use estimates by method.

1071 **Metered Data Method**

1072 The total consumptive use estimate for WRIA 15 is the number of PE wells projected (see Section  
 1073 4.2) multiplied by the total indoor and outdoor consumptive use per PE well. The combined  
 1074 indoor and outdoor consumptive use per PE well for the baseline growth projection is .072 AF/yr  
 1075 (.0001 cfs, 64 gpd). The total consumptive use estimate for WRIA 15 for the medium-growth  
 1076 projection using the Metered Data Method is 401 AF/yr (0.55 cfs, 357,700 gpd). The total  
 1077 consumptive use for the low-growth projection is 350 AF/yr (0.48 cfs, 312,300 gpd) and for the  
 1078 high-growth projection is 443 AF/yr (0.61 cfs, 395,300 gpd). Table 6 summarizes the estimated  
 1079 indoor and outdoor consumptive use by subbasin for the moderate estimate of growth  
 1080 projection. Table 7 summarizes the consumptive use by subbasin for the lower and higher  
 1081 estimates for growth projections. The Committee expects the highest consumptive use to occur  
 1082 in the South Sound subbasin, which has the most projected new PE wells, as presented in Table 7.

1083

1084 Table 6. Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate  
 1085 Estimate for Growth Projection and Metered Data Method

Subbasin	Projected PE wells	Indoor CU		Outdoor CU		Total CU in 2038	
		(AF/yr)	GPD	AF/yr	GPD	AF/yr	GPD
West Sound	1,336	18.3	16,366	77.8	69,472	96.2	85,838
North Hood Canal	656	9.0	8,036	38.2	34,112	47.2	42,148
South Hood Canal	1,126	15.5	13,794	65.6	58,552	81.0	72,346
Bainbridge Island	491	6.7	6,015	28.6	25,532	35.3	31,547
South Sound	1,553	21.3	19,024	90.5	80,756	111.8	99,780
Vashon-Maury Island	368	5.0	4,508	21.4	19,136	26.5	23,644
South Sound Islands	38	0.5	466	2.2	1,976	2.7	2,442
<b>Total</b>	<b>5,568</b>	<b>76.4</b>	<b>68,208</b>	<b>324.3</b>	<b>289,536</b>	<b>400.8</b>	<b>357,744</b>

1086

---

Compendium. The analysis provided similar results to the Irrigated Area method. The study also suggests that water use in dry years is substantially higher, pointing to the likelihood of increased water use as climate change makes the dry season longer, hotter, and drier. The Squaxin Island Tribe also evaluated evapotranspiration rates under hotter and drier conditions.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1087 Table 7. Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower- and Higher-Estimates for Growth Projections  
 1088 and Metered Data Method.

Subbasin	Lower Estimate					Higher Estimate				
	Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038		Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038	
				(AF/yr)	GPD				(AF/yr)	GPD
West Sound	1,142	15.7	66.5	82.2	73,374	1,403	19.3	81.7	101.0	90,143
North Hood Canal	561	7.7	32.7	40.4	36,044	689	9.5	40.1	49.6	44,268
South Hood Canal	1,119	15.4	65.2	80.5	71,896	1,128	15.5	65.7	81.2	72,474
Bainbridge Island	491	6.7	28.6	35.3	31,547	516	7.1	30.1	37.1	33,153
South Sound	1,158	15.9	67.5	83.3	74,402	1,992	27.3	116.0	143.4	127,986
Vashon-Maury Island	368	5.0	21.4	26.5	23,644	368	5.0	21.4	26.5	23,644
South Sound Islands	22	0.3	1.3	1.6	1,414	56	0.8	3.3	4.0	3,598
Total	4,861	66.7	283.2	349.9	312,319	6,152	84.4	358.4	442.8	395,266

1089



1090 **USGS Groundwater Model Method**

1091 The total consumptive use estimate for WRIA 15 is the number of PE wells projected (see  
 1092 Section 4.2) multiplied by the total indoor and outdoor consumptive use per PE well. The  
 1093 combined indoor and outdoor consumptive use per PE well is .084 AF/yr (.000116 cfs, 75 gpd).  
 1094 The total consumptive use estimate for WRIA 15 for the medium-growth projection using the  
 1095 USGS Groundwater Model Method is 468 AF/yr (0.65 cfs, 417,600 gpd). The total consumptive  
 1096 use for the lower estimate for growth projection is 408 AF/yr (0.57 cfs, 364,600 gpd) and for the  
 1097 higher estimate for growth projection is 517 AF/yr (0.72 cfs, 461,400 gpd). Table 8 summarizes  
 1098 the estimated indoor and outdoor consumptive use by subbasin for the moderate estimate for  
 1099 growth projection. Table 9 summarizes the consumptive use by subbasin for the lower and  
 1100 higher estimates. The Committee expects the highest consumptive use to occur in the South  
 1101 Sound subbasin, which has the most projected new PE wells, as presented in Table 6.

1102

1103 Table 8: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate  
 1104 Estimate for Growth Projection and USGS Groundwater Model Method

Subbasin	Projected PE wells	Indoor CU		Outdoor CU		Total CU in 2038	
		(AF/yr)	GPD	AF/yr	GPD	AF/yr	GPD
West Sound	1,336	24.7	22,044	87.6	78,156	112.2	100,200
North Hood Canal	656	12.1	10,824	43.0	38,376	55.1	49,200
South Hood Canal	1,126	20.8	18,579	73.8	65,871	94.6	84,450
Bainbridge Island	491	9.1	8,102	32.2	28,724	41.3	36,825
South Sound	1,553	28.7	25,625	101.8	90,851	130.5	116,475
Vashon-Maury Island	368	6.8	6,072	24.1	21,528	30.9	27,600
South Sound Islands	38	0.7	627	2.5	2,223	3.2	2,850
<b>Total</b>	<b>5,568</b>	<b>102.9</b>	<b>91,872</b>	<b>364.9</b>	<b>325,728</b>	<b>467.8</b>	<b>417,600</b>

1105

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1106 Table 9: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower and Higher Estimates for Growth Projections  
 1107 and USGS Groundwater Model Method

Subbasin	Lower Estimates					Higher Estimates				
	Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038		Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038	
				(AF/yr)	GPD				(AF/yr)	GPD
West Sound	1,142	21.1	74.8	95.9	85,650	1,403	25.9	91.9	117.9	105,225
North Hood Canal	561	10.4	36.8	47.1	42,075	689	12.7	45.2	57.9	51,675
South Hood Canal	1,119	20.7	73.3	94.0	83,925	1,128	20.8	73.9	94.8	84,600
Bainbridge Island	491	9.1	32.2	41.3	36,825	516	9.5	33.8	43.4	38,700
South Sound	1,158	21.4	75.9	97.3	86,850	1,992	36.8	130.5	167.4	149,400
Vashon-Maury Island	368	6.8	24.1	30.9	27,600	368	6.8	24.1	30.9	27,600
South Sound Islands	22	0.4	1.4	1.8	1,650	56	1.0	3.7	4.7	4,200
Total	4,861	89.8	318.6	408.4	364,575	6,152	113.7	403.2	516.9	461,400

1108

1109 **Irrigated Area Method**

1110 The total consumptive use estimate for WRIA 15 is the number of PE wells projected (see  
 1111 Section 4.2) multiplied by the total indoor and outdoor consumptive use per PE well. The  
 1112 combined total indoor and outdoor consumptive use is 0.138 AF/yr (.00019 cfs, 123 gpd). The  
 1113 total consumptive use estimate for WRIA 15 for the medium-growth projection is 766 AF/yr  
 1114 (1.06 cfs, 684,200 gpd). The total consumptive use for the lower estimates for growth  
 1115 projection is 669 AF/yr (0.93 cfs, 597,300 gpd) and for the higher estimates for growth  
 1116 projection is 847 AF/yr (1.17 cfs, 755,900 gpd). Table 10 summarizes the estimated indoor and  
 1117 outdoor consumptive use by subbasin for the moderate estimates for growth projection. Table  
 1118 11 summarizes the consumptive use by subbasin for the lower and higher estimates. The  
 1119 Committee expects that highest consumptive use to occur in the South Sound subbasin, which  
 1120 has the most projected new PE wells, as presented in Table 11.

1121 Table 10: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Moderate  
 1122 Estimate for Growth Projection and Irrigated Area Method

Subbasin	Projected PE wells	Indoor CU		Outdoor CU		Total CU in 2038	
		(AF/yr)	GPD	AF/yr	GPD	AF/yr	GPD
West Sound	1,336	22.4	19,987	161.5	144,175	183.9	164,161
North Hood Canal	656	11.0	9,814	79.3	70,792	90.3	80,606
South Hood Canal	1,126	18.9	16,845	136.1	121,513	155.0	138,358
Bainbridge Island	491	8.2	7,345	59.4	52,986	67.6	60,332
South Sound	1,553	26.0	23,233	187.7	167,592	213.8	190,825
Vashon-Maury Island	368	6.2	5,505	44.5	39,713	50.7	45,218
South Sound Islands	38	0.6	568	4.6	4,101	5.2	4,669
<b>Total</b>	<b>5,568</b>	<b>93.3</b>	<b>83,297</b>	<b>673.1</b>	<b>600,872</b>	<b>766.4</b>	<b>684,170</b>

Commented [VMSJ(25)]: Confirm all numbers in tables below with final spreadsheets. Numbers were rounded for some tables.

1123

1124

1125 Table 11: Indoor and Outdoor Consumptive Use Estimates by Subbasin for 2038: Lower and Higher Estimates for Growth  
 1126 Projections and Irrigated Area Method

Subbasin	Lower Estimate					Higher Estimate				
	Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038		Projected PE wells	Indoor CU (AF/yr)	Outdoor CU (AF/yr)	Total CU in 2038	
				(AF/yr)	GPD				(AF/yr)	GPD
West Sound	1,142	19.1	138.1	157.2	140,324	1,403	23.5	169.6	193.1	172,394
North Hood Canal	561	9.4	67.8	77.2	68,933	689	11.5	83.3	94.8	84,661
South Hood Canal	1,119	18.8	135.3	154.0	137,497	1,128	18.9	136.4	155.3	138,603
Bainbridge Island	491	8.2	59.4	67.6	60,332	516	8.6	62.4	71.0	63,404
South Sound	1,158	19.4	140.0	159.4	142,290	1,992	33.4	240.8	274.2	244,768
Vashon-Maury Island	368	6.2	44.5	50.7	45,218	368	6.2	44.5	50.7	45,218
South Sound Islands	22	0.4	2.7	3.0	2,703	56	0.9	6.8	7.7	6,881
Total	4,861	81.5	587.6	669.1	597,297	6,152	103.1	743.7	846.8	755,929

1127

1128 **4.3.4 Summary of Consumptive Use Estimate**

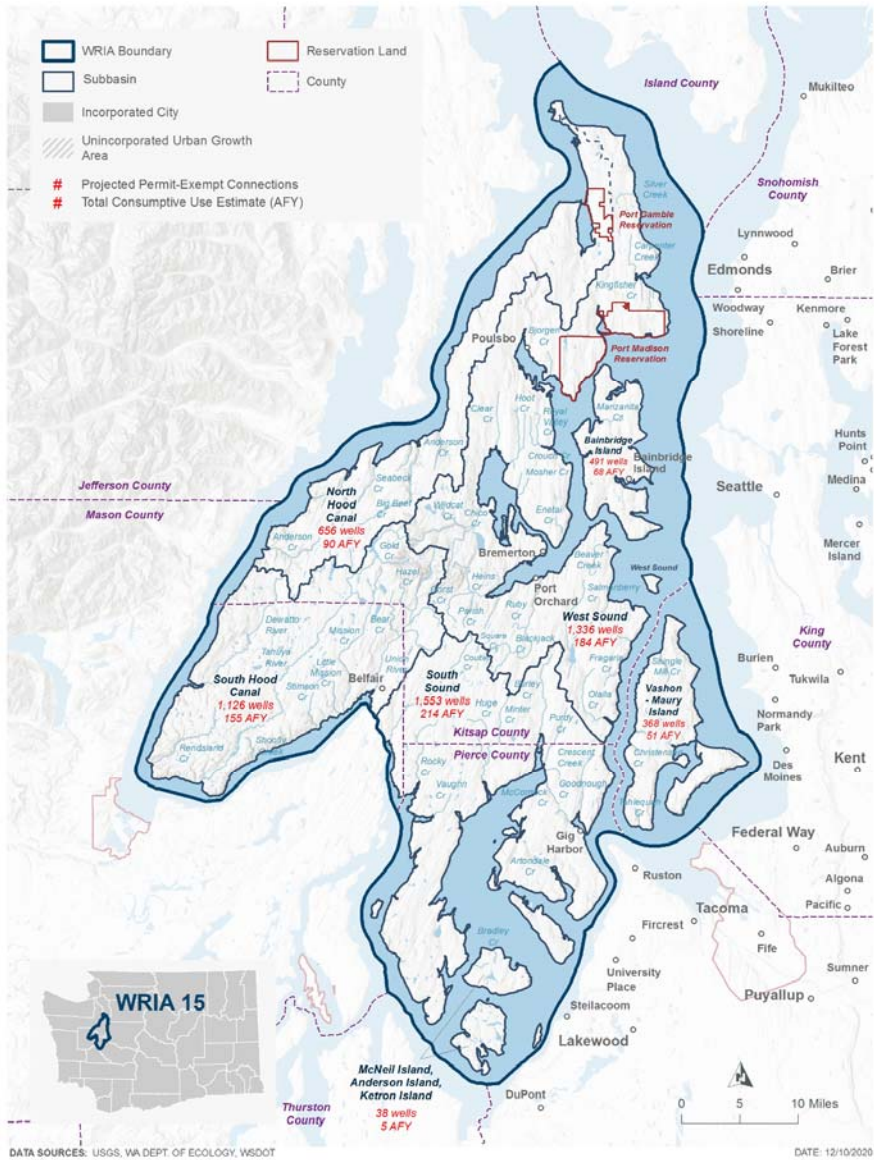
1129 This watershed plan uses a consumptive use estimate of 766.4 AF/yr. This estimate is based on  
1130 the moderate estimate for growth projection for the irrigated area method and is viewed as the  
1131 most likely consumptive use. Figure 5 shows the distribution of consumptive use across the  
1132 WRIA. The other methods used produced lower estimates of consumptive use. The metered  
1133 data method produced an estimate of 400.8 AF/yr and the USGS groundwater model method  
1134 467.8 AF/yr. Use of the irrigated area method produces consumptive use estimates that are 64–  
1135 91 percent higher than the other methods. Based on data presented, some members of the  
1136 Committee supported a lower consumptive use estimate and others supported a higher  
1137 number, but the Committee ultimately agreed that 766.4 AF/yr should be the consumptive use  
1138 estimate.

1139 Some members of the WRIA 15 Committee believed that a higher consumptive use estimate of  
1140 1,218 AF/yr is necessary to ensure that offsets are met and streams are benefited. While there  
1141 was not consensus on using the higher number for the consumptive use estimate, the  
1142 Committee did agree that reaching an offset target of 1,218 AF/yr would be beneficial to  
1143 streams. To obtain the consumptive use estimate of 766.4 AF/yr, HDR used the measured  
1144 average of 0.08 acres for the outdoor irrigated area along with the moderate growth estimate.  
1145 The area appears low due to a high number of non-irrigated parcels. The higher number of  
1146 1,218 AF/yr is based on a higher estimate for growth projections and a substitution of 0.12  
1147 acres for the average irrigated area under the irrigated area method. HDR performed statistical  
1148 analyses of the irrigated acreage to characterize the potential range in the irrigated area  
1149 measurements. The 0.12 acre number was obtained by substituting 0.05 acre for every parcel  
1150 with no irrigated acreage measured and recalculating the mean and upper confidence limits (95  
1151 percent). The 0.12 acre number is the upper confidence limit. The substitution of 0.05 acre for  
1152 parcels with no irrigated acreage measured was made to account for a minimum amount of  
1153 outdoor irrigation that might occur but not be observable on aerial photos.

1154 As data on actual growth, climate change and water use, experience with project  
1155 implementation and new information is collected over time, adaptive management of plan  
1156 implementation will need to support adjustments of the proposed approach and water offsets  
1157 in order to meet NEB.

**Commented [VMSJ(26):** Do we want to discuss how this number or the 1218 number accounted for uncertainty? Please provide feedback.

**Commented [VMSJ(27):** Added this section as a placeholder to get at adaptive management and assumptions-please provide revisions!



1158  
 1159 Figure 5. WRIA 15 Estimated Consumptive Use based on Moderate Estimate for Growth  
 1160 Projections and Irrigated Area Method, 2018-2038

1161

## Chapter Five: WRIA 15 Projects

1162

### 5.1 Description and assessment

1163 Watershed plans must identify projects that offset the potential impacts future PE wells will  
1164 have on streamflows and provide a net ecological benefit to the WRIA.<sup>27</sup> This chapter provides  
1165 recommendations for projects to offset consumptive use and meet NEB<sup>28</sup> and describes water  
1166 offset projects and habitat projects. Water offset projects have a quantified streamflow benefit  
1167 and contribute to offsetting consumptive use. Habitat projects contribute toward achieving NEB  
1168 by improving the ecosystem function and resilience of aquatic systems, supporting the recovery  
1169 of threatened or endangered salmonids, and protecting instream resources including important  
1170 native aquatic species. Habitat projects may also result in an increase in streamflow, but the  
1171 water offset benefits for these projects is difficult to quantify. Therefore, this watershed plan  
1172 does not rely on habitat projects to contribute toward offsetting consumptive use.

1173 To identify the projects summarized in this chapter, as well as the complete project inventory in  
1174 Appendix H, Committee members and WRIA 15 partners brought project suggestions forward  
1175 to the project workgroup and Committee for discussion. Ecology and the technical consultants  
1176 also identified projects with potential streamflow benefit from the Puget Sound Action Agenda  
1177 near term actions, salmon recovery lead entity four-year workplans, streamflow restoration  
1178 grant applications, and public works programs. The Committee used a project inventory to  
1179 capture and track all project ideas, no matter their phase of development, throughout the  
1180 planning process. To receive feedback on project alignment with other planning processes and  
1181 identify any projects of concern for inclusion in the watershed plan, Ecology distributed the  
1182 project inventory to conservation districts, LIOs and salmon recovery lead entities in WRIA 15.  
1183 At any point in the process, Committee members or WRIA 15 partners could identify projects of  
1184 concern for inclusion in the watershed plan and recommend removal of the project from the  
1185 project inventory. Ecology and the technical consultants reached out to all identified project  
1186 sponsors prior to including the project in the watershed plan.

1187 Based on initial information available on projects, the Committee identified a subset of offset  
1188 projects that showed promise for quantitative streamflow benefits. The technical consultants

---

<sup>27</sup> The NEB Guidance defines “projects and actions” as “General terms describing any activities in watershed plans to offset impacts from new consumptive water use and/or contribute to NEB.” (Ecology, 2019b, page 5) This watershed plan uses the term “projects” for simplicity to encompass both projects and actions as defined by the NEB guidance.

<sup>28</sup> In 2015 the State Supreme Court issued a decision on Foster v. Ecology, City of Yelm, and Washington Pollution Control Hearings Board. The decision, frequently referred to as the “Foster decision,” reaffirmed and reinforced that instream flows adopted in a rule must be protected from impairment. The Legislature established the Joint Legislative Task Force on Water Resource Mitigation (Task Force) in RCW 90.94.090 to understand impacts of the 2015 Foster decision. In that law, Ecology is authorized to issue permit decisions for up to five water mitigation pilot projects using a stepwise mitigation approach that can include out of kind mitigation. The City of Port Orchard is one of the entities undertaking a pilot project. As of January 2020, the pilot project work is still ongoing. More information about the Task Force, including their 2019 report to the legislature, can be accessed on their webpage: <http://leg.wa.gov/JointCommittees/WRM/Pages/default.aspx>. (Ecology, 2020b)

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1189 developed detailed analysis on the subset of projects and the Committee determined the offset  
1190 value to attribute to each project. This chapter presents summaries of those projects.

1191 In a separate effort, Ecology contracted with Pacific Groundwater Group (PGG) to support  
1192 identification of water right acquisition opportunities for WRIA 15. In coordination with the  
1193 Committee, PGG narrowed down the list of opportunities. The Committee provided input on  
1194 the revised list of projects for PGG to develop detailed project descriptions for water right  
1195 acquisition opportunities that appeared the most valid. For each water right acquisition project,  
1196 the Committee used the estimate generated by PGG for their consumptive use portion of the  
1197 right. Before these rights are acquired and put into Trust, they will go through a full extent and  
1198 validity analysis to determine the consumptive use offset component. As this analysis cannot  
1199 happen until the owner of the right has agreed to sell, the Committee is relying on the PGG  
1200 evaluations to estimate the offset volumes described in section 5.2.

1201 For projects that did not provide a measurable streamflow benefit, the WRIA 15 Committee  
1202 chose not to invest technical consultant resources to further develop the projects during this  
1203 planning period. Information presented on these projects is based on available information  
1204 from WRIA 15 partners. The Committee instead focused the technical resources and expertise  
1205 on finding projects that provide quantifiable offset benefits.

1206 The projects identified in this plan are consistent with the project type examples listed in the  
1207 Final NEB Guidance: (a) water right acquisition offset projects; (b) non-acquisition water offset  
1208 projects; and (c) habitat and other related projects (Ecology, 2019b). This watershed plan  
1209 presents projects in the following four categories:

- 1210 I. Water right acquisition offset projects and non-acquisition water offset projects that  
1211 are ready to proceed. These projects provide a quantitative streamflow benefit.
- 1212 II. Projects that provide habitat and streamflow benefits, but streamflow benefits are  
1213 difficult to quantify.
- 1214 III. Projects that primarily benefit habitat.
- 1215 IV. Projects that currently are not implementable (e.g., legal restriction) or are highly  
1216 conceptual.

1217 Projects in Category I are presented in this chapter. All other projects are presented in the  
1218 project inventory in Appendix H. The WRIA 15 Committee recommends implementation of  
1219 projects in this chapter as well as in Appendix I in order to meet the offset need and NEB for  
1220 WRIA 15. Many of the projects in this plan are conceptual, as Committee members and  
1221 partners brought the ideas forward during the planning process. The Committee recognizes  
1222 that once these projects are further developed, some may no longer be feasible. Through the  
1223 adaptive management process recommended in Chapter 6, an implementation group and  
1224 project sponsors may need to find alternative projects that provide the same types of benefits  
1225 in the same locations as the projects identified in this Chapter and the project inventory.

**Commented [VMSJ(28):** Suggestion to add this language, to make it clear that we know that many of the projects are conceptual, but opens up opportunity for similar projects to come forward for funding and to meet NEB. To we want to go further to state that we support these types of projects coming forward?



1226 **5.2 Category I Projects**

1227 The WRIA 15 Committee set a goal of meeting the offset target by subbasin. The projects  
1228 presented below have quantifiable streamflow benefit and the Committee identified these  
1229 projects as having the greatest potential for implementation and achieving the required offset  
1230 need. It is recognized that some of these project benefits may span across subbasins, but  
1231 detailed modeling of streamflow benefits was not completed during this planning process.  
1232 Detailed descriptions of each of the projects presented in Section 5.2. are available in Appendix  
1233 I. A summary of projects and offset benefits by subbasin are presented at the end of this  
1234 section in Tables 16-22.

1235 **COMMENT: PLEASE NOTE THAT WE ARE WORKING ON ADDITIONAL PROJECT IDEAS FOR SOUTH**  
1236 **SOUND AND SOUTH HOOD CANAL SUBBASIN. WE WILL DISTRIBUTE INFORMATION ON**  
1237 **PROJECTS SEPARATELY TO THE COMMITTEE IN DECEMBER.**

1238 **5.2.1 Managed Aquifer Recharge Package**

1239 Managed Aquifer Recharge (MAR) projects are being considered in WRIA 15 as a method to  
1240 increase infiltration to aquifers to improve streamflow and to offset the water use from future  
1241 permit exempt (PE) wells in the watershed. A detailed description of the project is available in  
1242 Appendix I.

1243 There are different types of MAR projects.<sup>29</sup> Aquifer Storage and Recovery (ASR) projects are a  
1244 type of MAR project that actively inject water into aquifers for storage and recovery through  
1245 pumping later. Passive MAR projects infiltrate water into shallow aquifers, with the intent that  
1246 water discharges from the shallow aquifer into streams on a delayed basis and improves  
1247 streamflow during low-flow periods (see Figure 6). For WRIA 15, only passive MAR projects are  
1248 being considered. The source of water for the passive MAR projects in WRIA 15 may be recycled  
1249 water (highly treated wastewater), stormwater, or diverted surface water.

**Commented [AP29]:** Suquamish Tribe: Need to be consistent with project categories in table, text and definitions.

**Commented [VMSJ(30R29)]:** Has this been addressed?

**Commented [VMSJ(31)]:** Outstanding Comment: for each project, add description on climate resiliency.

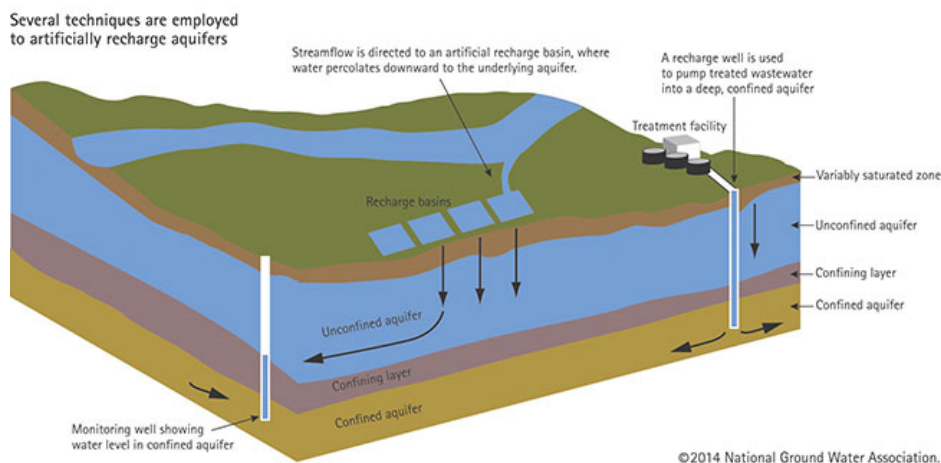
**Commented [VMSJ(32R31)]:** I believe this was addressed with the general statement supporting projects that address climate resiliency

**Commented [VMSJ(33)]:** Below is an example of how to present the “packages” of projects. Seeking feedback.

**Commented [VMSJ(34)]:** Placeholder graphic. Working with John to get new one.

---

<sup>29</sup> More information on these project types is available from Ecology: <https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-recovery-solutions/Aquifer-storage-recovery-recharge>



1250 Figure 6. Place holder for MAR diagram.  
1251

1252 The planning, implementation and operations and maintenance of MAR projects is complex,  
1253 leading to uncertainty as to their potential use as water offset projects and inclusion in the  
1254 watershed plan. This watershed plan addresses uncertainty by including a portfolio of MAR  
1255 projects that have different locations, project sponsors, water sources, and size. Uncertainty is  
1256 also addressed by qualitatively assessing the potential for implementation on a high, medium,  
1257 and low basis and then assigning a probability to the potential offset from each project. The  
1258 overall potential for MAR in WRIA 15 is the sum of the potential offsets multiplied by their  
1259 probability. MAR projects in WRIA 15 have been identified through different sources and are  
1260 estimated to have a total potential water offset of 1,424 AF/yr. The overall potential,  
1261 accounting for likelihood of implementation, is estimated to be 578 AF/yr. Considering MAR  
1262 projects that can be implemented within the next 10 years, the estimated potential offset is  
1263 520 AF/yr. The remaining MAR projects would likely take longer than 10 years to implement.  
1264 Table 12 provides a summary of the MAR projects identified in WRIA 15 and Table 13 a  
1265 summary of water offsets adjusted by probability of implementation. More detailed  
1266 descriptions of the projects are available in Appendix I. A description of the work required to  
1267 implement a MAR project is provided in the detailed project descriptions.  
1268  
1269

1270 Table 12. Managed Aquifer Recharge Package

Subbasin	MAR Project Name (sponsor, if identified)	Potential Offset (AF/yr)	Estimated Timeframe for Implementation	Relative Certainty of Implementation (High, Medium, Low)
West Sound	Kingston Treatment Plant Recycled Water (Kitsap County)	328	5 years	High

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Subbasin	MAR Project Name (sponsor, if identified)	Potential Offset (AF/yr)	Estimated Timeframe for Implementation	Relative Certainty of Implementation (High, Medium, Low)
	Grovers Creek MAR	20 <sup>1</sup>	>10 years	Low
	Central Kitsap Treatment Plant <sup>2</sup> (Silverdale Water District)	167	5 years	Medium
<b>North Hood Canal</b>	Central Kitsap Treatment Plant, includes Asbury Parcel <sup>2</sup> (Silverdale Water District)	333	5 years	Medium
<b>South Hood Canal</b>	Tahuya River MAR	200	5-10 years	Low
<b>Bainbridge Island</b>	M & E Farms Storage, MAR	17	5-10 years	Medium
	Johnson Farms Storage, MAR	90	>10 years	Low
	Miller Rd MAR	19	>10 years	Low
<b>South Sound</b>	Port Orchard Airport MAR	100	>10 years	Low
	Belfair WWTP MAR	70	>10 years	Low
	Coulter Creek Heritage Park MAR (may be multiple projects)	20 <sup>1</sup>	>10 years	Low
	Minter Creek MAR	20 <sup>1</sup>	>10 years	Low
	Rocky Creek between Wye and Koeneman Lakes MAR	20 <sup>1</sup>	>10 years	Low
<b>Vashon – Maury Island</b>	Judd Creek MAR	20 <sup>1</sup>	>10 years	Low
<b>South Sound Islands</b>	-	-	-	-
<b>Totals</b>		<b>328</b>		High Relative Certainty
		<b>517</b>		Medium Relative Certainty
		<b>579</b>		Low Relative Certainty

1271

1272 Table 13. Water Offsets from MAR Package

Relative Certainty of Implementation (High, Medium, Low)	Total Estimated Offset (acre-feet/year)	Probability	Adjusted Offset (acre-feet/year)
High Relative Certainty	328	80%	262
Medium Relative Certainty	517	50%	258
Low Relative Certainty	579	10%	58
<b>Totals</b>			<b>578</b>

1273

1274 **5.2.2 Community Forest Package**

1275 Community Forest projects entail the acquisition of forest lands or change in forest  
 1276 management practices to preserve stands or emphasize a longer harvest interval. Preserving or  
 1277 maintaining forests with stand ages more than 40 years can increase dry-season low flows.

1278 To meet the consumptive use offset for the entire WRIA, Community Forest of about 5,500 to  
 1279 8,700 acres would need to be acquired or managed to emphasize a longer harvest interval.  
 1280 Since there are other projects that will provide water offsets, that area of community forest is  
 1281 not required for the plan. Table 14 presents the acreage of potential community forest projects  
 1282 identified by sponsors by subbasin, as well as a target acreage in each subbasin that will provide  
 1283 water offsets to help meet the Watershed Plan goal of offsetting future consumptive use within  
 1284 each subbasin. The total target acreage is 1,723 acres, which will provide an estimated 241  
 1285 acre-feet of water offset. More detailed descriptions of the projects are available in Appendix I.  
 1286 The projects identified by sponsors need further confirmation to determine whether the  
 1287 projects would meet the criteria of having forest stands greater than 40 years old and subject  
 1288 to harvest.

1289

1290 Table 14. Package of Community Forest Type Projects in WRIA 15

Subbasin	Project Name (Sponsor, if known)	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
<b>Bainbridge Island</b>	Springbrook Creek Protection and Restoration (Bainbridge Island Land Trust)	22.85	3.2
<b>North Hood Canal</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>• Crabapple Creek Habitat Acquisition and Restoration</li> <li>• Little Anderson Creek Habitat Protection</li> <li>• Divide Block Habitat Acquisition and Restoration</li> </ul>	Approx. 2100 acres has been identified as potential projects by sponsors, target for Community	70

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Subbasin	Project Name (Sponsor, if known)	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
	<ul style="list-style-type: none"> <li>West Port Gamble Block Habitat Protection</li> <li>Port Gamble Heritage Park Timber Rights Acquisition</li> <li>Gamble Creek Parcel</li> <li>Boyce Anderson DNR Parcel</li> <li>Seabeck DNR Parcel</li> <li>Grovers Creek Mainstem protection and restoration</li> </ul> <p>(Sponsors may be Great Peninsula Conservancy and Port Gamble S'Klallam Tribe)</p>	Forest in this subbasin is 500 acres	
<b>South Hood Canal</b>	<p>Community Forest Projects, including:</p> <ul style="list-style-type: none"> <li>Bear Creek Protection</li> <li>Tahuya Headwaters</li> </ul> <p>(Sponsors may be Great Peninsula Conservancy and others)</p>	Target is 500 acres in South Hood Canal Subbasin	70
<b>South Sound</b>	<p>Community Forest Projects, including:</p> <ul style="list-style-type: none"> <li>Rocky Creek Preserve</li> <li>Coulter Creek Overton Lands</li> <li>Key Peninsula Forest Lands</li> </ul> <p>(Sponsors may be Great Peninsula Conservancy and others)</p>	Target is 500 acres in South Sound Subbasin	70
<b>Vashon Maury</b>	<p>Community Forest Projects, including:</p> <ul style="list-style-type: none"> <li>Judd Creek Headwaters</li> <li>Shinglemill Creek Headwaters</li> <li>Mileta Creek Headwaters</li> <li>Christiansen Creek Headwaters</li> <li>Fisher Creek Headwaters</li> <li>Tahlequah Creek Headwaters</li> </ul> <p>(Sponsors may be Vashon-Maury Island Land Trust or King County)</p>	Target is 100 acres in Vashon Maury Subbasin	14
<b>West Sound</b>	<p>Community Forest Projects, including:</p> <ul style="list-style-type: none"> <li>East Branch Ostrich Bay Creek along Skylark Drive W.</li> <li>Strawberry and L. Anderson Creek Parcel</li> </ul> <p>(Sponsors may be Great Peninsula Conservancy and others)</p>	Target is 50 acres in West Sound Subbasin	7
<b>South Sound Islands</b>	<p>Anderson Island Community Forest Projects</p> <ul style="list-style-type: none"> <li>Near Idie Ulsh Park (40 acres total)</li> <li>Near Saint Anne's Park (6.68 acres)</li> </ul>	Target is 50 acres in South Sound Islands Subbasin	7

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Subbasin	Project Name (Sponsor, if known)	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
	<ul style="list-style-type: none"> <li>Other areas (Sponsors may include Anderson Island Parks District, Great Peninsula Conservancy, Nisqually Land Trust)</li> </ul>		
<b>Totals</b>		Overall Target is 1,723 acres	241

1291

1292 **5.2.3 Rain Garden and Low Impact Development Package**

Commented [VMSJ(35)]: This description needs updating.

1293 This project entails installing Rain Garden and Low Impact Development (LID) projects at  
 1294 existing homes and driveways, roadways, parking lots and other impervious areas that generate  
 1295 stormwater. A detailed project description is available in Appendix I. The projects would focus  
 1296 on critical WRIA 15 stream basins in which permit exempt well (PEW) numbers are projected to  
 1297 be high. The techniques include rain gardens and other low impact development practices such  
 1298 as bio-infiltration swales, permeable pavement, and reductions in the footprint of roadways  
 1299 and replacement with permeable surfaces.

1300 Kitsap Conservation District (KCD) has a Rain Garden and Low Impact Development (LID)  
 1301 Program that works cooperatively with county services, landowners, and local communities to  
 1302 expand knowledge and use of LID practices throughout Kitsap County. Since 2010, the KCD Rain  
 1303 Garden and LID cost-share program has helped landowners fund and install 320 rain gardens.  
 1304 Pierce Conservation District (PCD) and Mason Conservation District (MCD) have similar  
 1305 programs but do not implement as many projects per year as KCD.

1306 KCD can implement 50 projects a year with existing staff resources provided funding for the  
 1307 program is obtained. The capacity of PCD and MCD is less, but with funding is assumed to be 25  
 1308 per year per district. The total number of projects that can be implemented per year would be  
 1309 100, if sufficient funding is available. The average offset will vary with precipitation, soils and  
 1310 other factors but is likely about 0.10 acre-foot per residential rain garden. Other LID practices  
 1311 can infiltrate more water, depending on the impervious surface treated.

1312 Table 15 presents a recommended target and distribution of rain garden projects per year and  
 1313 potential range of water offsets over the life of the plan (18 years).

1314

1315 Table 15. [Placeholder] Target Number of Raingarden and LID Projects

Subbasin	Number of Projects over 18 years	Estimated Total Water Offset, acre-feet per year
North Hood Canal	180	18
West Sound	360	36
Bainbridge Island	90	9
South Sound	720	72

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Subbasin	Number of Projects over 18 years	Estimated Total Water Offset, acre-feet per year
South Hood Canal	450	45
Totals	1,800	180

**Commented [VMSJ(36):** We are still working on calculations, this is a placeholder but do note the reduction in potential benefit.

1316

1317 **5.2.4 Vashon-Maury Island Water Right Acquisition Package**

1318 This project is the acquisition (fee and conservation easements) of sensitive habitats and water  
 1319 rights in the Vashon-Maury Island sub-basin with the intent of enhancing instream flows and  
 1320 mitigating out of stream uses (i.e., reductions in flows associated with permit-exempt wells).

1321 Assuming property acquisition is coupled with water right acquisition, associated habitat  
 1322 benefits could include removal of structures and impervious surfaces, wetland and riparian  
 1323 protection and restoration, and decommissioning permit exempt wells. A description of this  
 1324 project is included in Appendix I.

1325 The range of potential offset benefit from the water right acquisition opportunities on Vashon  
 1326 Maury is approximately 56 to 279 AF/yr. The Committee accounts for 10 percent of the total  
 1327 potential available water rights as the offset benefit, or 27.9 AF/yr (10 percent was applied for  
 1328 the water right acquisition opportunities in the Nisqually plan).

1329 **5.2.5 Beall Creek Flow Improvement**

1330 The Beall Creek project is located on Vashon Island, in the Vashon-Maury Island Subbasin. The  
 1331 outcome of this project will a more accurate measurement of the Water District 19 water  
 1332 requirements at their diversion on Beall Creek. This project will improve bypass flow at the  
 1333 diversion, resulting in flow improvements to Beall Creek at a rate of an estimated 26 AF/yr. A  
 1334 more detailed project description is provided in Appendix I.

1335 **5.2.6 Bainbridge Island Water Right Acquisitions**

1336 This project is the acquisition of two water rights on Bainbridge Island. The water rights  
 1337 identified as targets for acquisition total 75 acre-feet. This watershed plan accounts for 10  
 1338 percent of the total potentially available water rights as the offset benefit, or 7.5 AF/yr. This  
 1339 watershed plan does not present the details of the potential water rights in order to protect the  
 1340 privacy of the water right holders.

1341 Table 16. West Sound Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	Kingston Treatment Plant Recycled Water	Use recycled water for irrigation on a golf course and infiltrate groundwater to improve streamflow. Benefits Grovers Creek.	262.4	Kitsap County/Suquamish Tribe	\$13.65M	Funding and agreement on O&M needed.
	Central Kitsap Water Treatment Plant	Use recycled water to infiltrate near Newberry Road. Could benefit West Sound and North Hood Canal subbasins. Possible benefits to Johnson, Wildcat, and Chico creeks.	83.5	Silverdale Water District		Funding needed and Water Quality issues need resolution.
	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	36	Kitsap Conservation District		Ready to proceed; some additional funding may be necessary.
	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 50 acres.	7	Great Peninsula Conservancy and others		Funding needed.

**Commented [VMSJ(37):** Is this detail sufficient for committee? How much info desired for readiness to proceed? Need to add in additional information on project costs.

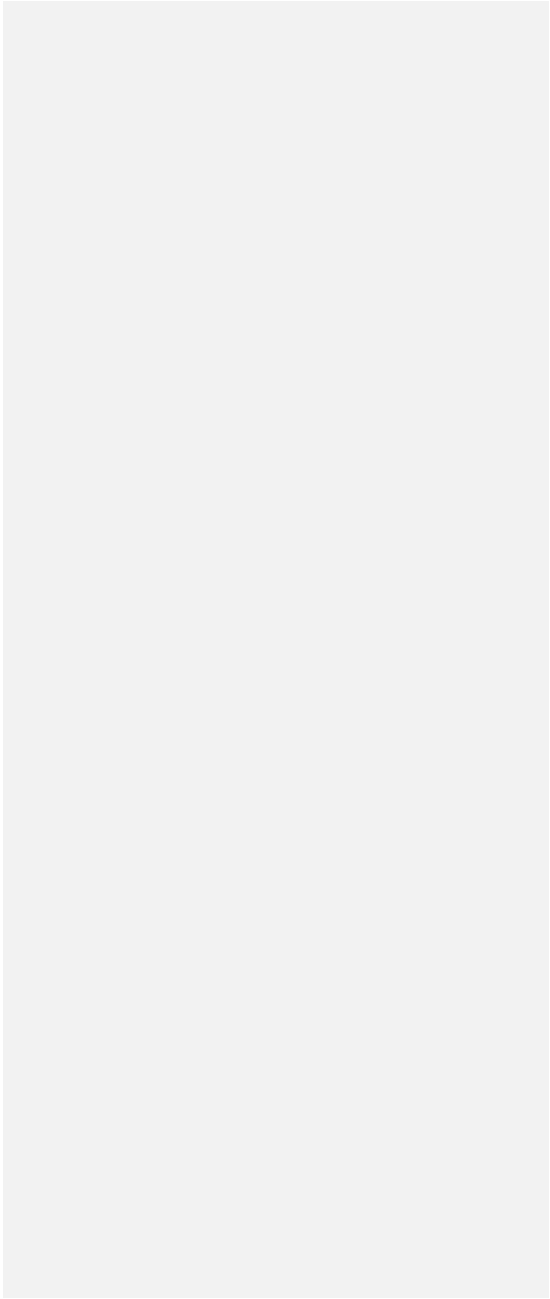


WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	WRIA 15 Total Water Offset for West Sound Subbasin		388.9			
	WRIA 15 Consumptive Use Estimate for West Sound Subbasin		183.9			

1342

1343



1344

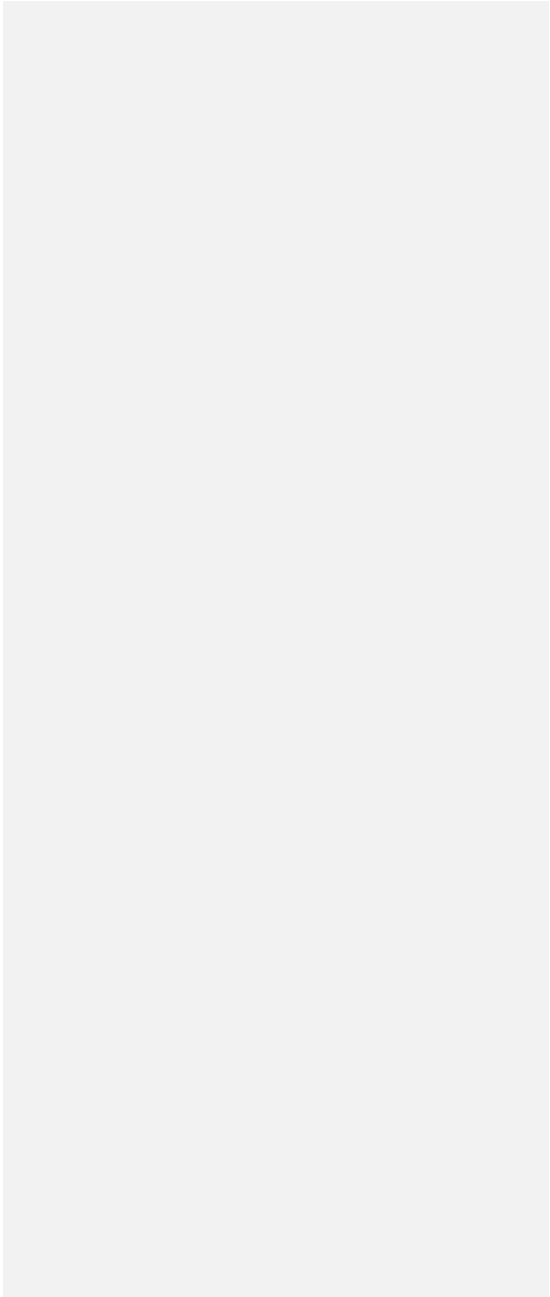
1345 Table 17. Bainbridge Island Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	M&E Farms Storage	MAR, will benefit Manzanita Creek	9	Friends of the Farm	\$270,000	Funding needed.
	Miller Road	MAR, will benefit Manzanita Creek	10	City of Bainbridge Island	\$270,000	Funding needed.
	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	9	Kitsap Conservation District		Ready to proceed; some additional funding may be needed.
	Water Rights	Acquire water rights	60	Washington Water Trust		Further analysis and water right holder agreement needed.
	Community Forest Package	Acquire forest lands to preserve stands. 22.85 acres identified.	3.2	Bainbridge Island Land Trust		Funding needed.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
		WRIA 15 Total Water Offset for Bainbridge Island Subbasin	91.2			
		WRIA 15 Consumptive Use Estimate for Bainbridge Island Subbasin	67.6			

1346



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

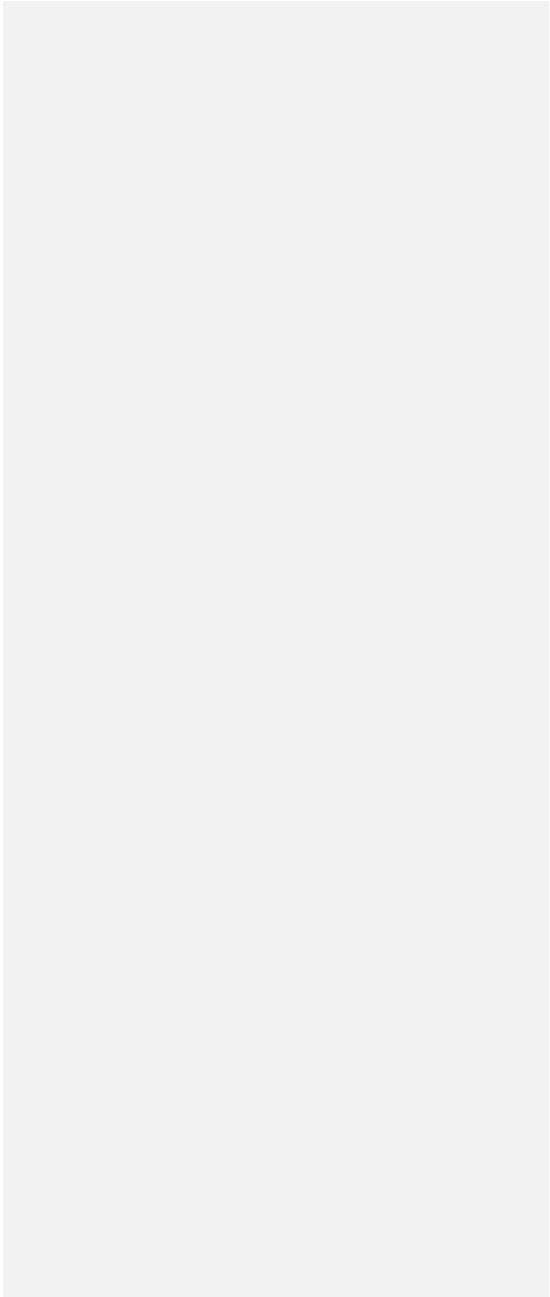
1347 Table 18. North Hood Canal Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 500 acres.	70	Great Peninsula Conservancy, Jamestown S’Klallam Tribe and others		Funding needed.
	Central Kitsap Water Treatment Plant	Use recycled water to infiltrate near Newberry Road. Could benefit West Sound and North Hood Canal subbasins. Possible benefits to Little Anderson, Anderson and Big Beef creeks.	167	Silverdale Water District		Funding needed and Water Quality issues need resolution.
	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	36	Kitsap Conservation District		Ready to proceed; some additional funding may be necessary.
<b>WRIA 15 Total Water Offset for North Hood Canal Subbasin</b>			<b>273</b>			

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
		WRIA 15 Consumptive Use Estimate for North Hood Canal Subbasin	90.3			

1348



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1349 Table 19. South Hood Canal Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	36	Mason Conservation District		Ready to proceed; some additional funding may be necessary.
	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 500 acres.	70	Great Peninsula Conservancy and others		Funding Needed.
	Tahuya River MAR	MAR, will benefit Tayuha River	20			Conceptual.
<b>WRIA 15 Total Water Offset for South Hood Canal Subbasin</b>			<b>126</b>			
<b>WRIA 15 Consumptive Use Estimate for South Hood Canal Subbasin</b>			<b>155.0</b>			

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1350 Table 20. Vashon Maury Subbasin Category I Projects.

<b>Project Number/ Priority?</b>	<b>Project Name</b>	<b>Project Type and Description</b>	<b>Estimated Water Offset AF/yr</b>	<b>Project Sponsor</b>	<b>Estimated Project Cost</b>	<b>Readiness to Proceed</b>
	Beall Creek	Water management to improve streamflow in Beall Creek	26	Water District 19		Funding needed.
	Judd Creek MAR	MAR, could benefit Judd Creek and other streams	2			Conceptual
	Water Right Acquisition Package	Acquire property and water rights, could benefit multiple streams	28	Vashon Maury Island Land Trust, King County, others		Funding needed
<b>WRIA 15 Total Water Offset for Vashon Maury Subbasin</b>			<b>56</b>			
<b>WRIA 15 Consumptive Use Estimate for Vashon Maury Subbasin</b>			<b>50.7</b>			

1351 Table 21. South Sound Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	MAR Package including <ul style="list-style-type: none"> <li>• Port Orchard Airport MAR</li> <li>• Belfair WWTP MAR</li> <li>• Coulter Creek Heritage Park MAR (may be multiple projects)</li> <li>• Minter Creek MAR</li> <li>• Rocky Creek between Wye and Koeneman Lakes MAR</li> </ul>	MAR, could benefit multiple streams	23			Conceptual
	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a	70	Great Peninsula		Funding needed.



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
		longer harvest interval. Target is 500 acres.		Conservancy and others		
	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	36	Kitsap Conservation District, Pierce Conservation District		Ready to proceed; some additional funding may be necessary.
<b>WRIA 15 Total Water Offset for South Sound Subbasin</b>			<b>129</b>			
<b>WRIA 15 Consumptive Use Estimate for South Sound Subbasin</b>			<b>213.8</b>			

1352

1353 Table 22. South Sound Islands Subbasin Category I Projects.

Project Number/ Priority?	Project Name	Project Type and Description	Estimated Water Offset AF/yr	Project Sponsor	Estimated Project Cost	Readiness to Proceed
	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 50 acres.	7	Nisqually Land Trust, Great Peninsula Conservancy and others		Funding needed.
<b>WRIA 15 Total Water Offset for South Sound Islands Subbasin</b>			<b>7</b>			
<b>WRIA 15 Consumptive Use Estimate for South Sound Islands Subbasin</b>			<b>5.2</b>			

1354

1355 **5.3 Category II-IV Projects** |

1356 The WRIA 15 watershed plan includes an inventory of additional projects to meet the offset  
 1357 needs and NEB for the watershed. The remaining categories include the following:

- 1358 II. Projects that provide habitat and streamflow benefits, but streamflow benefits are  
 1359 difficult to quantify.
- 1360 III. Projects that primarily benefit habitat.
- 1361 IV. Projects that currently are not implementable (e.g., legal restriction) or are highly  
 1362 conceptual.

1363 The projects include habitat restoration and protection, stream augmentation, riparian  
 1364 restoration, reclaimed water expansion, storage, and other project types. The projects are  
 1365 presented in the project inventory in Appendix H.

1366 Table 23 provides a summary of the number of projects per category by subbasin and  
 1367 estimated quantitative benefits provided by projects by subbasin.

1368 Table 23. Summary of habitat benefits from Category II-IV projects. Does not include habitat  
 1369 benefits of Category I projects.

Subbasin	Number of Category II-IV Projects	Contains Projects with Anticipated Streamflow Benefits	Anticipated Stream Feet Restored <sup>1</sup>	Anticipated Riparian Miles Restored <sup>1</sup>	Anticipated Acreage Protected <sup>1</sup>	Anticipated Acreage Restored <sup>1</sup>
Bainbridge Island	3	Yes	-	-	-	Yes
North Hood Canal	5	Yes	1600	-	Yes	10+
South Hood Canal	3	Yes	-	3	-	-
South Sound	27	Yes	-	9	Yes	Yes
South Sound Islands	2	No	Yes	Yes	No	Yes
Vashon Maury	4	Yes	-	-	-	-
West Sound	22	Yes	2832	Yes	106.5	141

1370

**Commented [VMSJ(38):**  
 Insert summary of the anticipated benefits from the remaining projects as well as summary tables by subbasin. Example here for review and input.

**Commented [VMSJ(39):** This is an example table. Stacy work on after okay'd by committee

1371 <sup>1</sup> Many projects are conceptual or do not currently have quantified habitat benefits. These  
1372 columns include the sum of information provided or “yes” if benefits anticipated from projects.  
1373 Anticipated to be underestimate.

### 1374 5.2.3 Prospective Projects and Actions

1375 In addition to the projects described in this chapter and the project inventory in Appendix H,  
1376 the WRIA 15 Committee supports future projects and actions in the following categories:

1377  
1378 **Climate Adaptation and Resiliency.** The WRIA 15 Committee recognizes the potential impacts  
1379 of climate change on streamflow. The WRIA 15 Committee recommends that projects and  
1380 actions themselves are resilient to the impacts of climate change and that projects include  
1381 components that help improve the resiliency of our stream systems.<sup>30</sup>

1382  
1383 **Water Right Acquisitions.** The WRIA 15 Committee supports the full and partial acquisition of  
1384 water rights to increase streamflows and offset the impacts of PE wells. Water rights should be  
1385 permanently and legally held by Ecology in the Trust Water Rights Program to ensure that the  
1386 benefits to instream resources are permanent. The WRIA 15 Committee acknowledges that all  
1387 water right transactions rely on willing sellers and willing buyers. The WRIA 15 Committee  
1388 recognizes the importance of water availability for producers and the limited available water  
1389 supply.

1390  
1391 **Land Acquisitions and Conservation Easements.** The WRIA 15 Committee supports acquisitions  
1392 and conservation easements of land to increase streamflows and offset the impacts of PE wells.  
1393 The WRIA 15 Committee recommends focusing acquisitions and easements in areas with  
1394 wetlands and headwaters, for the purposes of preventing new permit exempt wells,  
1395 decommissioning old permit exempt wells, and for extending time between harvest of timber.

1396  
1397 **Managed Aquifer Recharge and Other Storage Projects.** The WRIA 15 Committee supports  
1398 projects such as managed aquifer recharge that re-time flood-level flows to provide streamflow  
1399 benefits during low-flow periods. The WRIA 15 Committee encourages storage projects in the  
1400 headwaters or high in the system, as well as those that provide multiple benefits (e.g., flood  
1401 reduction, habitat benefits). See section 5.2.1 above on more information regarding MAR  
1402 projects.

Commented [VMSJ(40)]: Committee asked for more details and diagram. Included in project description above.

---

<sup>30</sup> For more information, see Beechie et al, 2012. Restoring Salmon Habitat for a Changing Climate. River Restoration and Application. 29: 939-960.

For more information, see Puget Sound Partnership, Adaptation International, and EcoAdapt, 2017. Planning for the Effects of Climate Change on Protection and Restoration Projects. Available at : <https://www.psp.wa.gov/salmon-recovery-overview.php> (Accessed December 2020).

1404 **5.3 Project Implementation Summary**

1405 **5.3.1 Summary of Projects and Benefits**

1406 As specified in Chapter 4, this watershed plan estimates 766.4 AF/yr of new consumptive use  
1407 from new PE wells over the planning horizon. The projects included in Tables in section 5.1  
1408 provide an estimated offset of XX AF/yr and exceed the offset need.

1409 A total of xx projects with quantified streamflow benefit, unquantified streamflow benefit, and  
1410 habitat improvement, have been identified by the Committee and are included in Chapter 5.1  
1411 Appendix H and I. The ecological and streamflow benefits from habitat projects are  
1412 supplemental to the quantified water offsets required by RCW.90.94.030.

1413 **5.3.2 Cost Estimate for offsetting new domestic water use over 20**  
1414 **Year Planning Horizon**

1415 Per RCW 90.94.030(3)(d), this watershed plan must include an evaluation or estimation of the  
1416 cost of offsetting new domestic water uses over the subsequent twenty years. To satisfy this  
1417 requirement, the technical consultants developed planning-level cost estimates for each of the  
1418 water offset projects listed in Section 5.1. The technical consultants also included costs  
1419 estimates for project inventory when that information was readily available.

1420 The estimated cost for implementing individual water offset projects range from XXX for YYY  
1421 project to AAA for BBB project. The total estimated cost for implementing the water offset  
1422 projects listed and described in this chapter is \$XXXX. Assuming xx AF/yr of water offset is  
1423 achieved through implementation of these projects, the average cost per AF/yr \$XXX.

1424 The estimated cost for implementing individual habitat projects range from XXX for YYY project  
1425 to AAA for BBB project. The total estimated cost for implementing the habitat projects listed  
1426 and described in this chapter is \$XXX. No metric has been established by the Committee to  
1427 derive a relative cost for implementing habitat projects.

1428 **5.3.3 Certainty of Implementation**

1429 The watershed plan also provides adaptive management recommendations (see Chapter 6) to  
1430 increase reasonable assurance that the projects and actions in the plan will be implemented.

**Commented [VMSJ(41):** This section needs to be completed once projects are finalized. Placeholder language pulled from WRIA 8.

1431 **Chapter 6. Additional Plan Recommendations**

1432 **6.1 Policy and Regulatory Recommendations**

1433 The Streamflow Restoration law lists optional elements Committees may consider including in  
1434 the plan to manage water resources for the WRIA or a portion of the WRIA (RCW  
1435 90.94.030(3)(f)). The WRIA 15 Committee included “policy and regulatory recommendations” in  
1436 the watershed plan to show support for programs, policies, and regulatory actions that would  
1437 contribute to the goals of this watershed plan, including streamflow restoration and meeting  
1438 NEB. All projects the WRIA 15 Committee intended to count toward the required consumptive  
1439 use offset or NEB are included in Chapter 5 and Appendix H: Project Inventory.<sup>31</sup> When similar  
1440 concepts arose from multiple Watershed Restoration and Enhancement Committees, the WRIA  
1441 15 Committee coordinated with those other Committees to put forward common language for  
1442 inclusion in the watershed plans, when appropriate. Coordination also occurred for jurisdictions  
1443 that cross multiple watersheds.

1444 As required by the NEB Guidance, the WRIA 15 Committee prepared the plan with  
1445 implementation in mind. However, as articulated in the Streamflow Restoration Policy and  
1446 Interpretive Statement (POL-2094), “RCW 90.94.020 and 90.94.030 do not create an obligation  
1447 on any party to ensure that plans, or projects and actions in those plans or associated with  
1448 rulemaking, are implemented” (Ecology 2019a). The identification and listing of these policy  
1449 and regulatory recommendations is directly from the WRIA 15 Committee members and is not  
1450 endorsed or opposed by Ecology.

1451 The WRIA 15 Committee initially identified a list of potential recommendations based on  
1452 proposals brought forward by members of the Committee. After iterative rounds of discussion  
1453 and feedback during Committee meetings, in one on one conversations, and using a survey  
1454 tool, the Committee narrowed the recommendations to those presented below. Unless  
1455 otherwise specified, the proposed implementing entity is not obligated by this plan to  
1456 implement the recommendation; however, the WRIA 15 Committee requests consideration of  
1457 each recommendation by the identified implementing entity.

1458 The WRIA 15 Committee provides the following recommendations. Please note that these are  
1459 not listed in order of priority:

---

<sup>31</sup> “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

**Commented [VMSJ(42)]:** Open to suggestions to rename.

**Commented [AP43]:** Pierce County: Edit the language to state "policy and regulatory recommendations do not contribute to the calculated consumptive use estimate." rather than stating the projects and actions are used to calculate the offset. While earlier text states that the policy recommendations "shows support" for streamflow restoration...what is the benefit of including these policy recommendations?

**Commented [VMSJ(44R43)]:** Attempted to address with edit above

1460 **1. Track the number and location of permit-exempt wells**

1461 **Proposed implementing entity:** Department of Ecology

1462 **Recommendation:** Change Department of Ecology’s well tracking system in the following ways,  
1463 in order to track the number and location of permit-exempt wells in use:

- 1464
- Collect latitude and longitude of wells on well report forms;
  - 1465 • Identify permit-exempt wells on well log form; and
  - 1466 • Provide Well ID Tag numbers to older wells, and associate well decommissioning,  
1467 replacement, or other well activities with the Well ID Tag.

1468 **Purpose:** Accurate tracking of the locations and features of permit-exempt wells will support  
1469 the WRIA 15 Committee’s desire to engage in monitoring and adaptive management after plan  
1470 adoption.

1471 **Funding source:** If Ecology does not have capacity do this work with existing staffing and  
1472 resources, the Committee recommends the legislature provide additional funding.

1473 **2. Monitoring and Research**

1474 **Proposed implementing entity:** Multiple agencies would likely be involved in monitoring.  
1475 Ecology would coordinate the development of the strategy.

1476 **Recommendation:** Develop a research and monitoring strategy for WRIA 15 that addresses the  
1477 following:

- 1478
- Streamflow monitoring
  - 1479 • Groundwater monitoring
  - 1480 • Precipitation and drought conditions
  - 1481 • Water usage and water supply data

1482 Given the cost and effort involved in developing a comprehensive strategy, this effort may need  
1483 to be phased and prioritized to address most urgent needs first.

1484 **Purpose:** The WRIA 15 Committee desires comprehensive monitoring data on the overall health  
1485 of the watershed, including status and trends.

1486 **Funding source:** Funding is needed either through legislative appropriations, grants, pooling of  
1487 resources by Committee members and other stakeholders, or other means.

1488 **3. Annual Report on Monitoring**

1489 **Proposed implementing entity:** Department of Ecology, with support from Kitsap Public Utility  
1490 District, Squaxin Island Tribe, and any other jurisdictions collecting flow data under an approved  
1491 Quality Assurance Project Plan.

1492 **Recommendation:** Annually compile monitoring data on the status of water resources and  
1493 water quality in the basin over the past year that has been collected by Ecology or provided by  
1494 Partner jurisdictions. Partner jurisdictions are encouraged to provide relevant data to Ecology  
1495 for inclusion. Monitoring of streamflows, groundwater, precipitation and drought conditions,  
1496 water usage, and water supply could be included. This information should be provided to the  
1497 WRIA 15 Committee or a new implementation group if established.

1498  
1499 **Purpose:** This provides additional information on water resources that will provide context for  
1500 addressing adaptive management.

1501 **Funding source:** It is assumed this can be completed with existing resources.

#### 1502 **4. Report on Additional Water Resource Information**

1503 **Proposed implementing entity:** Department of Ecology

1504 **Recommendation:** By September of 2026, Ecology reports the following information with the  
1505 support of the State Department of Health and local jurisdictions:

- 1506 • Estimates of:
    - 1507 ○ The total number of connections to PE wells currently in use, as described in
1508 RCW 90.94.030(3)(b).
  - 1509 ○ The number domestic and municipal water rights in use and their current
1510 quantity of use, including estimates of inchoate water remaining in municipal1511 water rights, and categorized by whether they are mitigated or not and which1512 subbasin they are in, as described in RCW 90.94.030(3)(c).  - 1513 ○ The cumulative consumptive water use impacts on instream flows from all pre-
1514 2018 PE wells and unmitigated municipal water rights, as described in RCW1515 90.94.030(3)(d)(e).
- 1516 • An evaluation of the costs of offsetting all new domestic water uses over the next 20
- 1517 years, as described in RCW 90.94.030(3)(d). The initiation of adjudication would be1518 considered an acceptable substitute for this study.

1519  
1520 **Purpose:** This provides additional information on water resources that will provide context for  
1521 addressing adaptive management.

1522 **Funding source:** Grant funding or a legislative appropriation will be necessary to hire consultant  
1523 assistance to Ecology for this effort.

#### 1524 **5. South Sound Planning Study**

1525 **Proposed implementing entity:** State, local and tribal governments in WRIA 15

1526 **Recommendation:** Prepare a study of how planning and permitting by Counties and local  
1527 governments influences water management within WIRA 15, and potential opportunities to  
1528 improve:



- 1529 1) Water management outcomes that support aquatic habitat and human needs.  
1530 2) Efficiencies and potential cost savings. and  
1531 3) Information sharing among the various governmental entities.

1532  
1533 The study should focus on how management can protect and enhance streamflows,  
1534 groundwater recharge, and other water resource management efforts that support aquatic  
1535 habitat and water supply.

1536  
1537 **Purpose:** This study could identify opportunities for improved outcomes at potentially lower  
1538 costs.

1539 **Funding source:** Grant funding or a legislative appropriation will be necessary to hire  
1540 consultants to complete this study.

## 1541 6. Drought Response Planning

1542 **Proposed implementing entity:** Local governments

1543 **Recommendation:** Local governments develop and implement a drought response plan if they  
1544 do not already have one. Local governments review existing drought response plans for  
1545 potential updates.

- 1546
  - Ecology and Department of Health provide technical assistance.
  - The plans should include an education and outreach program to educate and notify the public about water conservation and drought water use limitations and practices.

1549  
1550 **Purpose:** Drought response will be an important component of protecting streamflows. Clear  
1551 plans and education by all local governments will better prepare the watershed for droughts.

1552 **Funding source:** Grant funding or other funding may be needed by some local governments.

## 1553 7. Recycled Water

1554 **Proposed implementing entity:** Washington State Legislature and/or Department of Ecology

1555 **Recommendation:** Enact state policies that encourage the development and use of reclaimed  
1556 water.

1557  
1558 **Purpose:** Using reclaimed water will:  
1559

- Offset water that would otherwise be diverted from rivers and streams, thus preserving natural high-quality instream flow;
- Reduce the amount of treated wastewater that is discharged into receiving water bodies; and
- Create water supply options, which makes the water supply system more resilient against drought and climate change.

1565

1566 **Funding source:** Funding is needed either through legislative appropriations, grants, pooling of  
1567 resources by Committee members and other stakeholders, or other means. Individual projects  
1568 and construction components will have to be funded with a market-based approach.

## 1569 **8. Water Conservation Education**

1570 **Proposed implementing entity:** Ecology and counties; with support from conservation districts  
1571 and non-governmental organizations.

1572 **Recommendation:** Ecology should partner with counties and conservation districts to develop  
1573 and implement outreach and incentives programs that encourage rural landowners with PE  
1574 wells to (1) reduce their indoor and outdoor water use through water conservation best  
1575 practices; and (2) comply with drought and other water use restrictions.

1576 **Purpose:** Raise awareness of the impacts PE well water usage has on (1) groundwater levels and  
1577 (2) the connection to streams and rivers. Supplement water offset and restoration projects.

1578 **Funding source:** Funding is needed either through legislative appropriations, grants, pooling of  
1579 resources by Committee members and other stakeholders, or other means.

## 1580 **9. Water Conservation Statewide Policy**

1581 **Proposed implementing entity:** Ecology and/or local governments

1582 **Recommendation:** Implement mandatory water conservation measures in unincorporated  
1583 areas of the state during drought events. Measures would focus on limiting outdoor water use,  
1584 with exemptions for growing food.

1585 **Purpose:** Reduce water usage in key sub-basins, especially during drought; reduce impacts on  
1586 stream flows; and increase climate change resilience.

1587 **Funding source:** Funding is needed either through legislative appropriations, grants, pooling of  
1588 resources by Committee members and other stakeholders, or other means.

## 1589 **10. Beaver Habitat and Streamflow**

1590 **Proposed implementing entity:** Varies; see details below.

1591 **Recommendation:** The Committee recommends three elements:

- 1592 1. **Map and protect likely beaver habitat:** The Committee recommends a pilot project with  
1593 Kitsap County and Great Peninsula Conservancy to identify potential easements to purchase  
1594 and protect as beaver habitat. The Committee recommends combining mapping and  
1595 modeling to understand both the water holding potential and beaver habitat suitability of  
1596 selected areas. The Committee recognizes that easements would be purchased on a  
1597 voluntary basis and that certain areas of the WRIA need to be protected for drinking water.
- 1598 2. **Education & outreach:** The Committee recommends a partnership between local  
1599 organizations to develop and implement an education and outreach program to landowners  
1600 regarding beavers and beaver management. The partners could also reach out to entities to

1601 address known concerns (e.g., tree loss, hazard trees, encroaching on farmland, change of  
1602 vegetation, flooding) associated with beavers and discuss management options.  
1603 3. **Monitoring & research:** The Committee recommends developing a monitoring program for  
1604 beaver habitats which may including collecting information on fish passage, groundwater  
1605 levels, vegetation types, permits, BDA vs natural beaver habitat. Streamflow and habitat  
1606 benefits should be quantified where possible to help define the benefit from a surface  
1607 water / habitat perspective (e.g., temperature, streamflows, salmon, riparian vegetation,  
1608 etc.). Implementing entities could include local jurisdictions, Tribes, federal or state  
1609 agencies.

1610 **Purpose:** Beaver habitat can provide benefits to streamflows. A multi-faceted approach would  
1611 provide additional tools for jurisdictions and landowners to help manage beavers.

1612 **Funding source:** Funding is needed either through legislative appropriations, grants, pooling of  
1613 resources by Committee members and other stakeholders, or other means.

## 1614 11. Financing

1615 **Proposed implementing entity:** Legislature and/or Committee Members or other stakeholders

1616 **Recommendation:** The WRIA 15 Committee recommends the Legislature provides funding for  
1617 plan implementation, monitoring and adaptive management of the plan, including:

- 1618 • Annual tracking of new PE wells and project implementation by subbasin.
- 1619 • Staffing for the ongoing Committee.
- 1620 • Ongoing Committee member participation; and
- 1621 • Developing a process to adaptively manage implementation if NEB is not being met as  
1622 envisioned by the watershed plan (e.g., identification and development of alternative  
1623 projects, etc.).

1624 If necessary, the Committee may also recommend additional funding, including grants, fees,  
1625 shared contributions from members and other stakeholders, and other sources that may  
1626 emerge.

1627 **Purpose:** Plan implementation is key to success and it will take ongoing funding.

1628 **Funding source:** Legislature or others.

## 1629 6.2 Adaptive Management Recommendations

1630 The WRIA 15 Committee recommends an adaptive management process for implementation of  
1631 the WRIA 15 watershed plan. Adaptive Management is defined in the Final NEB Guidance as  
1632 *“an interactive and systematic decision-making process that aims to reduce uncertainty over  
1633 time and help meet project, action, and plan performance goals by learning from the  
1634 implementation and outcomes of projects and actions”* (Ecology, 2019b).

1635 Adaptive management will:

- 1636 • Help address uncertainty.
- 1637 • Ensure that the goals of this plan are being met.
- 1638 • Provide more reasonable assurance for plan implementation.
- 1639 • Provide information to improve implementation of streamflow restoration projects
- 1640 and actions.
- 1641 • Track implementation costs and developing grant funding opportunities; and
- 1642 • Adaptively manage emerging plan implementation needs.

1643 To support implementation of the watershed plan, RCW 90.94 includes a statement on the  
1644 Legislature’s intent. RCW 90.94 Intent—2018 c 1: "The legislature intends to appropriate three  
1645 hundred million dollars for projects to achieve the goals of this act until June 30, 2033. The  
1646 department of ecology is directed to implement a program to restore and enhance streamflows  
1647 by fulfilling obligations under this act to develop and implement plans to restore streamflows to  
1648 levels necessary to support robust, healthy, and sustainable salmon populations." [ 2018 c 1 §  
1649 304.]”

**Commented [VMSJ(45):** This section of the law included at the request of Skokomish Tribe, with support from the committee. Included in AM section as opposed to introduction. Please let me know if appropriate.

## 1650 1. Project, Policy, and Permit-Exempt Well Tracking

1651 The WRIA 15 Committee recommends tracking the growth of permit-exempt (PE) wells in the  
1652 watershed as well as the projects and policies that were planned to offset the impacts of these  
1653 PE wells. This data will allow the Committee to determine whether planning assumptions were  
1654 accurate and whether adjustments to plan implementation are needed.

- 1655 A. The WRIA 15 Committee recommends tracking the following information on an ongoing  
1656 basis:
- 1657 • New building permits issued that include permit-exempt wells.
  - 1658 • Status of implementation for each project included in the plan.
  - 1659 • Status of policy recommendations included in the plan.
  - 1660 • An ongoing list of new PE wells in the WRIA since the enactment of RCW 90.94.
    - 1661 ○ The lists of building permits and projects will be organized by subbasin, and if
    - 1662 feasible represented on a map that includes subbasin delineations. Counties
    - 1663 are encouraged to provide parcel or other geographic information in their
    - 1664 reports to Ecology to support mapping by subbasin.
- 1665 B. To assess the status of project implementation, the Committee recommends using the  
1666 Salmon Recovery Portal (<https://srp.rco.wa.gov/about>), managed by the Washington  
1667 State Recreation and Conservation Office (RCO), to support project tracking.
- 1668 • The Washington Department of Fish & Wildlife (WDFW), in collaboration with
  - 1669 the Washington Department of Ecology and RCO, will coordinate the
  - 1670 implementation of project tracking through the Salmon Recovery Portal.
  - 1671 • Project sponsors are expected to support project tracking efforts and data
  - 1672 sharing.
  - 1673

- 1674 • Local salmon recovery Lead Entity Coordinators will not be expected to provide
- 1675 ongoing support for project entry, maintenance, or reporting. To improve
- 1676 harmonization of streamflow restoration with ongoing salmon recovery efforts,
- 1677 local salmon recovery Lead Entity Coordinators will be consulted prior to initial
- 1678 data uploads.
- 1679 • University of Washington data stewards, contracted by WDFW, will conduct data
- 1680 entry, quality assurance, and quality control. If this approach changes, WDFW
- 1681 will propose an alternative method for completing this task.
- 1682 • Entities with representation in the WRIA 15 Committee (or an implementation
- 1683 group, if created) are encouraged to assist as needed with coordination, data
- 1684 gathering and input, and tracking.

1685 Table 24 summarizes the entities responsible for implementing the tracking and monitoring  
 1686 recommendation and associated funding needs.

1687

1688 Table 24. Implementation of Tracking and Monitoring Recommendation

Action	Entity or Entities Responsible	Funding Considerations
Track building permits issued with PE 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 sub-basin.	Ecology	Information included with data on new PE wells, provided by local governments. No additional funding is needed.
Maintain a summary of the status of implementation for each project.	Ecology via the Salmon Recovery Portal, with support from WDFW, RCO, and project sponsors	WDFW may need additional funding to support maintaining the Salmon Recovery Portal.
Maintain a summary of the status of each policy recommendation.		

Commented [VMSJ(46)]: Look for suggestions to fill out the rest of the table.

1689

## 1690 2. Reporting and Adaptation

1691 The Committee recommends that Ecology provides the data collected above to all entities  
 1692 represented on the Committee and other interested parties through annual reporting and a  
 1693 self-assessment as described below. These reports and assessments will help determine  
 1694 whether the plan’s recommendations are being implemented and whether they are having the  
 1695 intended impacts.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 1696 A. The WRIA 15 Committee recommends annual reporting as follows:  
1697  
1698     • By September of each year, Ecology will prepare an annual report that includes:  
1699         ○ A list of total building permits issued in the prior calendar year along with the  
1700             total number of associated new domestic PE wells, using the information  
1701             provided to Ecology by the local jurisdictions.  
1702         ○ A brief description of the status of WRIA 15 projects and actions included in  
1703             this plan (descriptions may be drawn from the Salmon Recovery Portal, if  
1704             available).  
1705             ▪ If the project as implemented differs significantly from the original  
1706             description and assumptions included in the plan, the annual report  
1707             will also include an estimate of changes to the offset benefit.  
1708         ○ Other implementation actions to date, including any changes in approach  
1709             since the last report and any challenges identified that  
1710             may require adaptation in plan implementation.  
1711         ○ The lists of building permits and projects will be organized by subbasin, and if  
1712             feasible represented on a map that includes subbasin delineations. Counties  
1713             are encouraged to provide parcel or other geographic information in their  
1714             reports to Ecology to support mapping by subbasin.  
1715     • The first annual report should include an estimate of expenses necessary for plan  
1716         implementation and associated funding options. Funding options could include:  
1717         ○ Local or state fees, including PE well fees  
1718         ○ Grants  
1719         ○ State funding  
1720         ○ Other options  
1721     • Ecology will share the report with Committee members and other interested  
1722         parties.
- 1723 B. The WRIA 15 Committee recommends preparing a self-assessment every five years as  
1724     follows:  
1725     • By September of 2026, and every five years thereafter during the planning  
1726         horizon period, Ecology will compile and report based on available information  
1727         from previous reports and partners:  
1728         ○ All cumulative information required in the annual report.  
1729         ○ Estimated water offset quantities, consumptive use, and instream flow  
1730             benefits, realized through implementation of projects and  
1731             actions identified in this plan.  
1732         ○ A comparison of each item above to the original assumptions included in  
1733             the plan and a summation of overall ecological benefit (i.e., greater than  
1734             expected, less than expected, or about the same as expected).
- 1735  
1736 C. The WRIA 15 Committee believes a group of engaged stakeholders and tribal  
1737     representatives are needed to continue collaboration on the implementation of this  
1738     plan. The Committee recommends continuing to meet as needed, with participation  
1739     from all interested WRIA 15 representatives.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 1740 • Interested WRIA 15 Committee members, or a new implementation group if
- 1741 established, will convene annually via telephone to:
- 1742     o Review and discuss the annual report.
- 1743     o Share updates on project and policy implementation.
- 1744     o Discuss or develop recommendations for revisions, additions, or
- 1745 deletions to planned projects or actions.
- 1746 • Every five years interested WRIA 15 Committee members, or a new
- 1747 implementation group if established, will hold a series of meetings to conduct
- 1748 the self-assessment, which includes:
- 1749     o Reviewing the five-year assessment report from Ecology.
- 1750     o Developing recommendations to adapt projects and actions to meet NEB.
- 1751     o Updating data and assumptions.
- 1752     o Other items identified by Committee members.
- 1753 • Additional meetings may be scheduled as needed.
- 1754 • The Kitsap PUD has offered to play the role of coordinating an implementation
- 1755 group for WRIA 15. Kitsap PUD will use existing capacity as well as seek funding
- 1756 opportunities to support their role, Kitsap PUD will convene interested member
- 1757 entities of the WRIA 15 Committee to form the implementation group in the
- 1758 summer of 2021. This group will consider the following activities related to plan
- 1759 implementation:
- 1760     o Redefining the WRIA 15 Committee, which could include a new name,
- 1761 charter, and supporting interlocal agreement.
- 1762     o Identifying project development lead(s) and supporting project
- 1763 development;
- 1764     o Identifying triggers for adaptive management and developing responses
- 1765 to emerging challenges;
- 1766     o Coordinating monitoring and research;
- 1767     o Coordinating reporting;
- 1768     o Identifying funding mechanisms to provide capacity for the Committee
- 1769 members and facilitator; and
- 1770     o Other tasks as needed.

Commented [VMSJ(47)]: New – based on discussion at 12/7 subgroup meeting

1772 Table 25 summarizes the entities responsible for carrying out the reporting and adaptation  
 1773 recommendation and associated funding needs.

1774  
 1775 Table 25. Implementation of Reporting and Adaptation Recommendation

Action	Entity or Entities Responsible	Funding Considerations
Annual Reports	<ul style="list-style-type: none"> <li>• Local jurisdictions provide building permit information to Ecology.</li> </ul>	<ul style="list-style-type: none"> <li>• Local jurisdictions are already required to provide building permit</li> </ul>

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Action	Entity or Entities Responsible	Funding Considerations
	<ul style="list-style-type: none"> <li>Ecology compiles information on project status, drawn from the Salmon Recovery Portal.</li> <li>Entities provide monitoring data to Ecology for inclusion in reports.</li> <li>Ecology combines monitoring data from within the agency with data provided by other entities.</li> <li>Ecology compiles information into a single report for distribution to the Committee and other interested parties.</li> </ul>	<p>information to Ecology (no additional funding needed).</p> <ul style="list-style-type: none"> <li>Ecology staff would compile reports using existing resources.</li> <li>WDFW may need additional funds to manage the Salmon Recovery Portal.</li> </ul>
<b>Five-Year Self-Assessment:</b>	<ul style="list-style-type: none"> <li>Local jurisdictions provide building permit information to Ecology.</li> <li>Ecology compiles information on project status, drawn from the Salmon Recovery Portal.</li> <li>Entities provide monitoring data to Ecology for inclusion in reports.</li> <li>Ecology combines monitoring data from within the agency with data provided by other entities.</li> <li>Ecology prepares estimates of the quantity of water, instream flow, and habitat benefits realized through implementation of projects and actions identified in this plan.</li> <li>Ecology compiles information into a single report for distribution to Committee and other interested parties.</li> <li>WRIA 15 Committee convenes to prepare adaptation recommendations on changes to planned projects or actions.</li> </ul>	<ul style="list-style-type: none"> <li>Local jurisdictions are already required to provide building permit information to Ecology (no additional funding needed).</li> <li>Ecology may need funding to complete the estimate of realized benefits.</li> <li>State funding or staff support will be needed to reconvene a group to prepare recommendations.</li> <li>Committee members who cannot participate in meetings using existing resources will need additional funding.</li> <li>KPUD may need additional funding to support their role in convening the implementation group.</li> </ul>

1776

1777

### 3. Funding

1778

The WRIA 15 Committee recommends ongoing implementation oversight and a process to adaptively manage the plan as new information emerges. The Committee recommends the

1779

Legislature provides funding for monitoring and adaptively managing the plan, including:

1780

1781

- Annual tracking of new PE wells and project implementation by subbasin.



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 1782
- Staffing for the ongoing Committee.
- 1783
- Ongoing Committee member participation; and
- 1784
- Developing a process to adaptively manage implementation if NEB is not being met as
- 1785
- envisioned by the watershed plan (e.g., identification and development of alternative
- 1786
- projects, etc.).

1787 Table 26 summarizes the entities responsible for carrying out this recommendation and  
1788 associated funding needs.

1789

1790 Table 26. Summary of WRIA 15 Adaptive Management Funding Recommendation.

Action	Entity or Entities Responsible	Funding Considerations
Funding of Adaptive Management	Legislature	The legislature should provide funding and authorize plan implementation to adaptively manage implementation if NEB is not being met as envisioned by the watershed plan.

1791

1792 **6.3 Assurance of Plan implementation**

1793 WRIA 15 Committee members and participating entities strongly advocate for implementation  
1794 of the watershed plan. Members of the Committee provided the following statements  
1795 voluntarily:

1796 *[the list below is a series of place-holders for each entity to add text]*

- 1797 • Washington Department of Ecology
  - 1798 ○ Ecology follows NEB Guidance in reviewing the watershed plan and considering  
1799 plan adoption.
  - 1800 ○ Ecology administers the streamflow restoration competitive grant program as  
1801 authorized under RCW 90.94.060 and Chapter 173-566 WAC.
  - 1802 ○ Ecology considers watershed plan recommendations where Ecology is identified  
1803 as the lead.
  - 1804 ○ Ecology reports to the legislature as required under RCW 90.94.050 in 2020 and  
1805 2027.
- 1806 • Washington Department of Fish & Wildlife
- 1807 • King County
- 1808 • Kitsap County
- 1809 • Mason County
- 1810 • Pierce County
  - 1811 ○ Pierce County adopts this watershed plan by ordinance, formalizing our support  
1812 of the plan contents.
  - 1813 ○ Watershed plan becomes one of the guiding project implementation plans for  
1814 the Surface Water Improvement Plan (SWIP).
  - 1815 ○ Pierce County evaluates and prioritizes capital projects included in this plan for  
1816 placement into the Capital Facilities Plan.
  - 1817 ○ Pierce County supports and participates in implementation activities as staff  
1818 capacity allows, including:
    - 1819 ▪ Participating in annual implementation group meetings.
    - 1820 ▪ Coordination between meetings, including:
      - 1821 ❖ Supporting project development and seeking project  
1822 opportunities;

Commented [VMSJ(48)]: DRAFT

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 1823                           ❖ Seeking and supporting funding opportunities to achieve  
1824                           implementation; and
- 1825                           ❖ Tracking implementation and identifying areas for improvement.
- 1826           • City of Bainbridge Island
- 1827           • City of Bremerton
- 1828           • City of Gig Harbor
- 1829           • City of Port Orchard
- 1830           • Kitsap Building Association
- 1831           • Kitsap Conservation District
- 1832           • Kitsap Public Utility District
- 1833           • Great Peninsula Conservancy
- 1834           • Puyallup Tribe
- 1835           • Port Gamble S’Klallam Tribe
- 1836           • Skokomish Tribe
- 1837           • Suquamish Tribe
- 1838           • Squaxin Island Tribe
- 1839           ○ Participating in implementation group meetings
- 1840           ○ Support project development and seek project opportunities
- 1841           ○ Seek and support funding opportunities that support implementation
- 1842           ○ Monitor implementation and identify areas for improvement

1843 **Chapter Seven: Net Ecological Benefit Evaluation**

**Commented [VMSJ(49):** DRAFT placeholder text. Will need further development once projects are finalized.

1844 **7.1 Water Offsets**

1845 The WRIA 15 Committee projects that a total of 5,568 new PE wells will be installed within  
1846 WRIA 15 during the planning horizon resulting in an estimated 766.4 AF/yr of new consumptive  
1847 water use in WRIA 15. However, the Committee sought projects to offset at least 1,218 AF/yr, a  
1848 conservative offset target that reflects use of the high growth projection combined with the 95  
1849 percent upper confidence limit of the average measured irrigated area with adjustments for  
1850 parcels with no discernable irrigated acreage in aerial photos (results in an average irrigated  
1851 area of 0.12 acres per well). This additional factor of safety ensures offsets are met and streams  
1852 are benefited. Although there was not consensus around the higher number, the Committee  
1853 agreed that reaching an offset target of 1218 AF/yr would be beneficial to streams.

**Commented [VMSJ(50):** Is this an appropriate framing of the numbers for the NEB chapter?

1854 The projects identified in this plan are consistent with the project type examples listed in the  
1855 Final NEB Guidance: (a) water right acquisition offset projects; (b) non-acquisition water offset  
1856 projects; and (c) habitat and other related projects (Ecology, 2019b). Chapter 5 presents  
1857 projects in the following four categories:

- 1858 I. Water right acquisition offset projects and non-acquisition water offset projects that  
1859 are ready to proceed. These projects provide a quantitative streamflow benefit.
- 1860 II. Projects that provide habitat and streamflow benefits, but streamflow benefits are  
1861 difficult to quantify.
- 1862 III. Projects that primarily benefit habitat.
- 1863 IV. Projects that currently are not implementable (e.g., legal restriction) or are highly  
1864 conceptual.

1865 Projects in Category I are described in Chapter 5 and used to estimate a total water offset For  
1866 WRIA 15. Projects in Categories II-IV are presented in the project inventory in Appendix H. The  
1867 WRIA 15 Committee recommends implementation of projects in Chapter 5 as well as in  
1868 Appendix H in order to meet the offset need and NEB for WRIA 15.

1869 The WRIA 15 Committee projects a total water offset of 1071 AF/yr from Category I water  
1870 offset projects (described in Chapter 5 and listed in Tables 16-22), a surplus offset of 304.7  
1871 AF/yr above the consumptive use estimate and 146.9 AF/yr below the higher offset target.  
1872 [Through this comparison, the WRIA 15 Committee has determined that this plan succeeds in  
1873 offsetting consumptive use impacts at the WRIA scale.]

**Commented [VMSJ(51):** We will revise these numbers and statements as project list is finalized. Is this the appropriate way to frame meeting the 1218 higher goal?

**Commented [LDW52]:** Assuming you find a few more projects to meet the 1218 number in order to meet the higher target.

1874 **Table x. Summary of WRIA 15 Water Offset Projects (Category I) included in NEB analysis**

Subbasin	Project Name	Project Short Description	Tributary Benefit	Estimated Offset Benefits (AF/YR)
West Sound	Kingston WTP Recycled Water	Use recycled water for irrigation on a golf course and infiltrate groundwater to improve streamflow.	Grovers Creek	262.4
West Sound	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 50 acres.	Varies	7
West Sound	Central Kitsap Water Treatment Plant Recycled Water	Use recycled water to infiltrate near Newberry Road. Could benefit West Sound and North Hood Canal subbasins.	Possible benefits to Johnson, Wildcat, and Chico creeks	83.5
West Sound	KCD Rain Gardens and LID Applications	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	Varies	36
North Hood Canal	Silverdale Water District Recycled Water (includes Asbury Parcel)	Use recycled water to infiltrate near Newberry Road. Could benefit West Sound and North Hood Canal subbasins.	Possible benefits to Little Anderson, Anderson, and Big Beef creeks.	167
North Hood Canal	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 500 acres.	Varies	70
North Hood Canal	KCD Rain Gardens and LID Applications	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces.	County-wide: Kitsap County	36

**Commented [VMSJ(53):** This table is pretty repetitive of Chapter 5. Do we want to just include a summary by subbasin?

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

South Hood Canal	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	County-wide: Mason County	36
South Hood Canal	Tahuya River MAR	Managed Aquifer Recharge	Tahuya	20
South Hood Canal	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 500 acres.	Bear Creek and Others	70
Bainbridge Island	M & E Farms Storage	Managed Aquifer Recharge	Manzanita Creek	9
Bainbridge Island	Miller Rd	Managed Aquifer Recharge	Manzanita Creek	10
Bainbridge Island	Water Right Acquisition Package	Acquire water rights	Manzanita Creek	75
Bainbridge Island	Community Forest Package	Acquire forest lands to preserve stands. 22.85 acres identified.	Springbrook Creek	3.2
Bainbridge Island	KCD Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	County-wide: Kitsap County	9
South Sound	MAR Package including: <ul style="list-style-type: none"> <li>• Port Orchard Airport MAR</li> <li>• Belfair WWTP MAR</li> <li>• Coulter Creek Heritage Park MAR</li> <li>• Minter Creek MAR</li> </ul>	Managed Aquifer Recharge	Multiple Streams and Creeks	23

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

	• Rocky Creek between Wye and Koeneman Lakes MAR			
South Sound	Raingarden and LID Projects	Install residential raingardens and LID projects to infiltrate water from existing impervious surfaces	County wide: Pierce, Kitsap Counties	36
South Sound	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 500 acres.		70
Vashon-Maury	Beall Creek Stream Restoration	Water management to improve streamflow in Beall Creek	Beall Creek	26
Vashon-Maury	Water Right Acquisition Package	Acquire property and water rights, could benefit multiple streams	Island Wide	28
Vashon-Maury	Judd Creek MAR	Managed Aquifer Recharge	Judd Creek	2
South Sound Islands	Community Forest Package	Acquire forest lands or change forest management practices to preserve stands or emphasize a longer harvest interval. Target is 50 acres.		7
		<b>TOTAL Project Offsets for WRIA 15</b>		1071.1
		<b>Consumptive Use Estimate for WRIA 15</b>		766.4
		<b>Higher Offset Target for WRIA 15</b>		1218

Commented [VMSJ(54)]: Is this the appropriate way to refer to this number?

1875 <sup>1</sup>All projects in Table x have a high certainty of implementation – Category I

1876

1877 Consumptive use and the higher offset target are compared to project offsets at the subbasin  
 1878 scale in Table y. Surplus water offset is achieved in a total of 2 subbasins (North Hood Canal and  
 1879 West Sound). When looking at the higher offset target, a deficit in water offset occurs in a total

1880 of 5 subbasins (Bainbridge Island, South Sound Islands, South Hood Canal, South Sound and  
 1881 Vashon-Maury Island).

1882 **Table y. Subbasin Water Offset Totals from Category I Projects Compared to Permit-Exempt**  
 1883 **Well Consumptive Use Estimates and Offset Targets**

Commented [VMSJ(55)]: Do we want to just include this table and not the one above.

Subbasin	Offset Project Totals (AF/YR)	Permit-Exempt Well Consumptive Use (AF/YR) <sup>1</sup>	CU Estimate Surplus/ Deficit (AF/YR) <sup>3</sup>	Higher Offset Target – (AF/YR) <sup>2</sup>	Higher Target Surplus/ Deficit (AF/YR) <sup>3</sup>	County
Bainbridge Island	91.2	67.9	23.3	107.9	-16.7	Kitsap
South Sound Islands	7	5.2	2.8	8.3	-1.3	Pierce
North Hood Canal	273	90.3	182.7	143.5	+129.5	Kitsap
South Hood Canal	126	155.0	-29	246.3	-120.3	Kitsap and Mason
South Sound	129	213.8	-84.8	339.8	-210.8	Pierce and Kitsap
Vashon - Maury Island	56	50.7	5.3	80.6	-24.6	King
West Sound	388.9	183.9	205	292.3	+96.6	Kitsap
<b>WRIA 15 Total</b>	<b>1071</b>	<b>766</b>	<b>305</b>	<b>1218</b>	<b>-147</b>	

1884 Notes:

1885 <sup>1</sup> Values in table have been rounded, which is why totals may differ. AF/Yr in 2038

1886 <sup>2</sup> Offset Target is equivalent to PE consumptive use associated with high growth scenario and increased irrigated  
 1887 acreage to reflect uncertainty in estimates

1888 <sup>3</sup> Surplus water offset is associated with a positive value and a deficit in water offset is associated with a negative  
 1889 value. Surplus and Deficit equal to Offset Project Totals less Offset Target.

1890

1891 The water offset projects listed in **Table x** provide additional benefits to instream resources  
 1892 beyond those necessary to offset the impacts from new consumptive water use within the



1893 WRIA. For the project types planned in WRIA 15, additional benefits could include the  
1894 following:

- 1895 • Water right acquisition projects: Aquatic habitat improvements during key seasonal  
1896 periods; reduction in groundwater withdrawals and associated benefit to aquifer  
1897 resources; and/or beneficial use of reclaimed water.
- 1898 • MAR projects: Aquatic habitat improvements during key seasonal periods; increased  
1899 groundwater recharge; reduction in summer/fall stream temperature; increased  
1900 groundwater availability to riparian and near-shore plants; and/or contribution to flood  
1901 control.
- 1902 • Community Forests Projects: - (add potential habitat benefits)
- 1903 • Recycled water infiltration projects: - (add potential habitat benefits)
- 1904 • Raingarden and LID, projects: - (add potential habitat benefits)
- 1905

Commented [LDW56]: Bob/Stacy, please address from project descriptions

## 1906 7.2 Habitat Benefits

1907 The WRIA 15 watershed plan includes an inventory of additional projects to meet the offset  
1908 needs and NEB for the watershed. The remaining categories include the following:

- 1909 II. Projects that provide habitat and streamflow benefits, but streamflow benefits are  
1910 difficult to quantify.
- 1911 III. Projects that primarily benefit habitat.
- 1912 IV. Projects that currently are not implementable (e.g., legal restriction) or are highly  
1913 conceptual.

1914 The projects include habitat restoration and protection, stream augmentation, riparian  
1915 restoration, reclaimed water expansion, storage, and other project types. **Table z** summarizes  
1916 the habitat benefits of Category II and III projects that are described in further detail in Chapter  
1917 5 and Appendix H. The number and distribution of habitat improvement projects by subbasin is  
1918 also shown in **Table w** in Chapter 5.

1919 A total of 23 Category II and III habitat improvement projects are included within the plan, as  
1920 summarized in in Chapter 5 Table 23. Habitat improvement attributes associated with these  
1921 projects include a combination of aquatic habitat restoration and protection, stream  
1922 augmentation, riparian restoration, reclaimed water expansion, managed aquifer recharge,  
1923 stormwater management and other types of projects.

1924 These projects provide additional benefits to instream resources that, together with direct  
1925 water offsets, are beyond those necessary to offset the impacts from new consumptive water  
1926 use within the WRIA. These additional benefits include increased hydraulic/aquatic habitat  
1927 diversity, restored native vegetation, restored water temperature, erosion abatement,

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

1928 improved spawning and rearing habitat, improved passage, and water quality benefits, among  
1929 others.

1930 Add Additional Text to Further Addressing Limiting factors here

1931 Highest priority for freshwater areas such as Chico, Minter, Rocky Creeks is to protect and/or  
1932 restore hydrologic and riparian functional integrity. In Hood Canal subbasins, the loss of  
1933 channel complexity, lack of riparian forest and high water temperatures in Union and Tahuya  
1934 Creeks are of most concern. While in Creeks such as Dewatto, Anderson and Big Beef, loss of  
1935 floodplain habitat and channel complexity, hydrologic regime, and channel instability and  
1936 erosion are the most limiting for species recovery.

**Commented [LDW57]:** Please review in context of projects in Table 4

**Commented [LDW58]:** Limiting factors include:

- Channel and streambed degradation
- Increased peak flows
- Low streamflow
- Loss of upland forest cover
- Loss of riparian forest
- Loss of floodplain connectivity and habitats
- Degradation of wetland and shoreline habitats
- Conversion of wetlands to open water habitats
- Fish passage barriers
- Lack of large wood
- Fine sediment

**Commented [VMSJ(59):** Tables below- need to populate final column then will further develop limiting factors section.

1937 **Table z Summary of Category II and III WRIA 15 Habitat Improvement Projects included in NEB Analysis**

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	Bainbridge Island	Fletcher Stream Restoration	Reconnect side channel habitat and minor flood plain restoration. (Part of a larger barrier removal project.)	47°38'35.0" N 122°34'02.5" W	Floodplain/Wetl and Habitat no Offset	
II	North Hood Canal	Big Beef Creek Restoration	Restore wetlands, floodplain, and riparian along this ditched segment of upper Big Beef Creek. Acquisition likely needed.	Upper Big Beef Creek - Multiple Parcels (hidden for privacy)	Habitat with Offset	

**Commented [VMSJ(60):** Do we want this full table?  
Fairly repetitive of project inventory.  
We could group the projects by type (e.g. floodplain restoration, stream channel restoration) and then describe the limiting factors they benefit.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	North Hood Canal	Grovers Creek and Leyman Wetland Restoration	Stream channel and wetland restoration are proposed on 1,600 feet of Grovers Creek and 10 acres of wetlands. Two parcels owned by the Robinson and Duncans were historically farmed, reed canary grass established and stream channel ditched. Funding for final design and construction are needed.	Robinson and Duncans parcels	Floodplain/Wetl and  Habitat with Offset  1600 ft of stream restoration; 10 acres wetland	The project will improve fish passage, establish wetland and riparian vegetation, enhance water infiltration, and improve floodplain function. BENEFITs Coho, Chum, steelhead, and cutthroat habitat.
II	North Hood Canal	Hansville Wetland Enhancement	Degraded wetland could be restored.	Hansville	Floodplain/ Wetland  Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	South Hood Canal	Tahuya Headwaters	Purchase of fee and/or easement of up to 3 miles of riparian corridor in the upper Tahuya River and tributaries. Floodplain restoration including potential for LWD placement and BDA. Currently under one timberland owner.	Tahuya River (South Kitsap) and tributaries	Conservation  Habitat with Offset  Up to 3 miles of protection  Floodplain restoration – potential for LWD placement	
II	South Sound	Coulter Creek Protection	Coulter Creek. Protection (acquisition of fee or easement) of riparian buffer and floodplain restoration of 3-5 mile riparian corridor owned by single landowner.	Coulter Creek	Preservation  Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	South Sound	Gig Harbor Golf Club Artondale Creek Habitat Improvement	A portion of Artondale Creek and approximately 2 acres of the floodplain would be restored by replacing two existing bridges to open up the floodplain and plantings to increase shade, improve instream habitat, reduce stream temperature, and improve riparian buffers and upland habitat conditions. The restoration project may also be extended downstream if needed to improve fish passage to the project site. The project is located in the South Sound subbasin of WRIA 15 on the Gig Harbor Peninsula.	Artondale Creek	Habitat with Offset	
III	South Sound	Rocky Creek Protection and Riparian Buffer	Rocky Creek. Protection (acquisition of fee or easement) of riparian buffer and floodplain restoration of ~4 mile riparian corridor owned by single landowner.	Rocky Creek	Habitat no Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	South Sound Islands	Schoolhouse Creek Restoration	The Anderson Island Parks District and Pierce County has been working on this Creek for many years. The County replaced two culverts in 2013. There are two remaining barriers on County road that the County is seeking funding from the fish barrier removal board for and one partial barrier on a private road. The Parks District has also been looking for funding to creek meandering and wetland restoration on a section of creek that was previously ditched and used for agriculture.	Anderson Island, Schoolhouse Creek	Habitat with Offset	
II	South Sound Islands	East Oro Bay Barrier Removal	There is an earthen dam that impounds the top of the estuary in East Oro Bay.	Anderson Island, East Oro Bay near Jacobs Point Park	Habitat with Offset	
II	West Sound	Mid Olalla Creek Floodplain/Wetland restoration	Restore wetlands, floodplain, and riparian along this segment of Olalla Creek that has been ditched and drained. Acquisition likely needed also.		Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	West Sound	Ruby Creek Restoration	Approximately .44 miles of stream will be enhanced by excavating reed canary grass from the channel which is also inhibiting fish passage in this stream section. Installation of LWD, excavation of planting mounds and riparian planting are also proposed. The overall project involves restoration and enhancement of 11.7 acres of stream and wetland habitat. Chum, Coho, cutthroat trout and steelhead are documented in this reach of Ruby Creek. Design is complete and funding is needed for construction. Part of a larger fish barrier removal project.		Habitat with Offset	



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	West Sound	Dogfish Creek Wetland Restoration	This project involves enhancement of 2,832 feet of Dogfish Creek and enhancement of 24 acres of mapped wetland. The 80 acres owned by Malone was historically farmed, reed canary grass established, and stream channel ditched. The project will enhance beaver activity and establish wetland and riparian vegetation. This project will also improve stream flow and floodplain function. This project will benefit Coho, Chum, steelhead, and cutthroat habitat. Funding for restoration design has been obtained and preliminary design is in progress. Funding for final design and construction are needed. Part of a larger fish barrier removal project.		Habitat no Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	West Sound	Lower Blackjack Creek Subbasin Restoration and Remediation Actions	This project proposes restoration and remediation of stream corridor habitat within the lower Blackjack Creek Subbasin as a subset of the Foster Pilot program within WRIA 15. Each restoration and remediation action has been identified and vetted by the Suquamish Tribe in their Blackjack Creek Watershed Protection and Restoration Plan composed in December 2017.		Habitat with Offset	
II	West Sound	Clear Creek Wetland and Floodplain Restoration			Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	West Sound	Lower Blackjack Creek Infrastructure Removal and Habitat Remediation	Assess the feasibility, perform due diligence, then construction/remediation of infrastructure in Blackjack Creek. This is part of the WRIA 15 Foster Pilot program. Projects include: 1. Rehabilitating an existing water main crossing over the creek by directionally drilling the water main to cross underneath the creek and removing the old infrastructure 2. Cleaning up debris from abandoned transient camps and replanting 3. Update old storm drainage to creek/tributary with LID principles		Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
II	West Sound	Blackjack Watershed Protection & Restoration Feasibility Plan	This project will build on the 2017 "Blackjack Creek Watershed Assessment, Protection, and Restoration Plan", and identify the highest priority tax parcels for protection or restoration based on a systematic evaluation of their value to salmon recovery. This evaluation will include a literature review of existing studies and GIS desktop analysis to identify the riparian and wetland habitats with the most value to salmon, highest connectivity to other salmon habitat, and greatest threat of development. The project will use this evaluation to rank parcels, and conduct outreach to landowners of the highest ranked parcels.		Habitat with Offset	
III	West Sound	Salmonberry Creek and Wetland Protection Project	Great Peninsula Conservancy (GPC) will protect 90 acres of riparian, wetland, and fish habitat through purchasing a conservation easement on property on Salmonberry Creek in Kitsap County. Salmonberry Creek is located in an ESSB 6091 prioritized basin (WRIA 15), and contains Endangered Species Act-listed steelhead trout.		Habitat no Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	West Sound	Floodplain Restoration Upstream of Navy RR Trestle	This action will aim to restore floodplain connectivity, riparian processes, and instream habitat conditions. Restoration actions should focus on removal of artificial fill along the abandoned road grade constricting the channel at RS 11100, restoring riparian forest conditions, and targeted wood placements to increase channel complexity and restore natural stream grade. Restoration of riparian processes will require negotiation of conservation easements or acquisition of the streamside parcel along the northern (left) bank. The parcel totals 6 acres and has an assessed value of \$240,000 per 2012 tax records. This action is constrained, in part, by channel confinement at the Navy RR trestle. The channel reach upstream of this segment flows through parcels that are part of the Mountaineers Foundation Rhododendron Preserve, where riparian conditions are more intact, instream wood is more abundant, and a broader floodplain exists due to the lack of bank protection.		Habitat with Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	West Sound	Curley Creek Acquisition	This project will build upon work done through the SRFB Curley Creek Estuary Acquisition and Curley Creel Feasibility study. Project will acquire highest quality remaining Chinook and steelhead habitat available on lower Curley Creek.		Habitat no Offset	
III	West Sound	Instream Habitat Enhancement at the Confluence with Chico Creek	Large wood placements to create additional complexity near the tributary confluence will improve habitat conditions in the near term while concurrent efforts to set back constraints to floodplain processes can be implemented.		Habitat no Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	West Sound	Grovers Creek Protection Phase II	Great Peninsula Conservancy's Lower Grovers Creek Habitat Protection Project aims to protect and restore 10.5 acres of riparian and wetland habitat along Grovers Creek and Miller bay in north Kitsap County for the benefit of people, salmon, and other wildlife. This project includes two properties in the Grovers Creek Watershed of north Kitsap County, including the 1.5-acre Tucker property and 9-acre Grovers Creek Durham Preserve Project owned by GPC. The Puget Sound Nearshore Ecosystem Restoration Project has prioritized the Grovers Creek Watershed as a "Protect High" watershed under its Coastal Inlet Strategy due to the fact that it remains relatively undeveloped.		Habitat no Offset	

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

Category	Subbasin	Project Name	Project Short Description	Project Location/ River Reach Benefitted	Benefits with Quantifiable Metric	Limiting Factor(s) Addressed
III	West Sound	Curley Creek prioritized restoration	In November 2017, the Suquamish Tribe released a completed watershed assessment and protection and restoration plan for Curley Creek, one of the three high priority freshwater streams in the East Kitsap shoreline. This Near Term Action proposes to use this plan to work with partners to identify which of the high priority protection and restoration actions are feasible to move forward to implementation and then to carry out that work.		Habitat no Offset	

1938



1939 **7.3 Adaptive Management**

1940 The WRIA 15 Committee has recommended adaptive management measures in the plan for the  
1941 purpose of addressing uncertainty in plan implementation (See Chapter 6.2). Adaptive  
1942 management measures include annual PE well tracking and reporting, recommended  
1943 monitoring and research, project implementation tracking, and watershed plan implementation  
1944 reporting. These measures, in addition to the surplus water offset, policy and regulatory  
1945 measures, and supplemental habitat improvement projects described above, provide  
1946 reasonable assurance that the plan will adequately offset new consumptive use from PE wells  
1947 anticipated during the planning horizon.

1948 **7.4 NEB Evaluation Findings**

1949 The WRIA 15 watershed plan is intended to provide a path forward for offsetting both an  
1950 estimated 766.4 AF/yr of new consumptive water use and a more conservative offset target of  
1951 1218 AF/yr developed to account for uncertainties in the consumptive use estimate in WRIA 15.  
1952 The plan primarily achieves this offset through a total of [redacted] water offset projects with a  
1953 cumulative offset projection of [redacted] AF/yr. This projected total water offset yields a surplus  
1954 offset of [redacted] AF/yr above the consumptive use estimate of 766 AF/yr and a surplus/deficit of  
1955 [redacted] above/below the more conservative offset target of 1218 AF/yr in WRIA 15.

1956 Within this plan, water offset projects are complimented by a total of 23 habitat improvement  
1957 projects, which provide numerous additional benefits to aquatic and nearshore habitat. While  
1958 many of these habitat improvement projects have potential streamflow benefits, the WRIA 15  
1959 Committee chose to exclude any associated water offset from the plan’s accounting due to  
1960 uncertainty in quantifying the benefit. Water offset projects are further complimented by the  
1961 policy and regulatory recommendations addressed in Chapter 6.

1962 The WRIA 15 Committee has additionally recommended adaptive management measures to  
1963 provide reasonable assurance that the plan will adequately address new consumptive use  
1964 impacts anticipated during the planning horizon, despite inevitable challenges that will arise  
1965 during project implementation, operation, and maintenance.

1966 Based on the information and analyses summarized in this plan and the assumption that  
1967 projects in the plan will be implemented, the WRIA 15 Committee finds that this plan achieves a  
1968 net ecological benefit, as required by RCW 90.94.030, and defined by the Final NEB Guidance  
1969 (Ecology, 2019b).

1970 **References**

- 1971 [Still in development and further formatting needed.]
- 1972 Barlow and Leake, 2012, Streamflow Depletion by Wells - Understanding and Managing the  
1973 Effects of Groundwater Pumping on Streamflow: U.S. Geological Survey Circular 1376, p. 83.  
1974 ([https://pubs.usgs.gov/circ/1376/pdf/circ1376\\_barlow\\_report\\_508.pdf](https://pubs.usgs.gov/circ/1376/pdf/circ1376_barlow_report_508.pdf))
- 1975 Booth, D.B., and Goldstein, B., 1994. Patterns and processes of landscape development by the  
1976 Puget lobe ice sheet. In Lasmanis, Raymond; Cheney, E.S., conveners, Regional Geology of  
1977 Washington State; Washington Division of Geology and Earth Resources Bulletin 80, p. 207-  
1978 218
- 1979 City of Bremerton. Casad Dam Fact Sheet. <https://www.bremertonwa.gov/297/Casad-Dam>.  
1980 [Accessed June 2020](#).
- 1981 Climate Impacts Group, University of Washington. The Washington Climate Change Impacts  
1982 Assessment. June 2009. Available: <http://cses.washington.edu/db/pdf/wacciareport681.pdf>
- 1983 Climate Toolbox. Available at: <https://climatetoolbox.org>. Accessed August 2020.
- 1984 Economic and Engineering Services, Inc., 1997, Seawater Intrusion Issue Paper, published in  
1985 Kitsap County Groundwater Management Plan, Volume IV, Appendix 2.ESA (Environmental  
1986 Science Associates) and Suquamish Tribe, 2020. Puget Sound Steelhead East Kitsap  
1987 Recovery Plan. May 2020.
- 1988 Evans, S.H., 1996. Geohydrologic Review of the Cedar River Ground-water Basin. Washington  
1989 Geology, vol. 24. no. 4. December.
- 1990 Frans, L.M. and Olsen, T.D., 2016, Numerical Simulation of the Groundwater-Flow System of the  
1991 Kitsap Peninsula, West-Central Washington. U.S. Geological Survey Scientific Investigations  
1992 Report 2016-5052.
- 1993 Garling, M.E., Molenaar, D.E. and others, 1965, Water Resources and Geology of the Kitsap  
1994 Peninsula and Certain Adjacent Islands. WA State Division of Water Resources, Water  
1995 Supply Bulletin No. 18, 309p., 5 plates.
- 1996 GeoEngineers and HDR, 2020. Draft Irrigated Acreage Comparability Study.
- 1997 Golder Associates and Engineering and Economic Services (EES), 2002. Kitsap Basin (WRIA 15)  
1998 Phase II – Level 1 Assessment. Data Compilation and Preliminary Assessment. Prepared for  
1999 WRIA 15, Planning Unit. Port Orchard, WA. June 21, 2002.
- 2000 Golder Associates, 2004. Draft WRIA 15 Watershed Management Plan. Prepared for the WRIA  
2001 15 Planning Unit. August 31, 2004.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2002 HDR, 2020. WRIA 15 Permit-Exempt Growth and Consumptive Use Summary, HDR 2020.
- 2003 Heard, W.R., 1998. Life History of Pink Salmon (*Oncorhynchus gorbuscha*). In Groot, C. and L.  
2004 Margolis, eds, Pacific Salmon Life Histories. University of British Columbia Press, Vancouver,  
2005 BC.
- 2006 Hood Canal Coordinating Council, 2005. Hood Canal and Eastern Strait of Juan de Fuca Summer  
2007 Chum Salmon Recovery Plan. Prepared by S. Brewer, J. Watson, D. Christensen, and R.  
2008 Brocksmith. November 2005.
- 2009 Johnson, O.W., M.H. Ruckelshaus, W.S. Grant, F.W. Waknitz, A.M. Garrett. G.J. Bryant, K. Neely,  
2010 and J.J. Hard. 1999. *Status review of coastal cutthroat trout from Washington, Oregon, and*  
2011 *California*. U.S. Dept. of Commerce., NOAA Tech Memo. NMFS-NWFSC-37, 292 p.,
- 2012 Kitsap Public Utility District, 1997. Kitsap County Initial Basin Assessment. October 1997.  
2013 <https://fortress.wa.gov/ecy/publications/documents/oftr9704a.pdf>
- 2014 Kitsap Public Utility District, 2018. Seabold Potential Seawater Intrusion Investigation.  
2015 Information available at: Kitsap Public Utility District, 2019. Seabold Potential Seawater  
2016 Intrusion Investigation. Accessed December 2020.
- 2017 Kitsap Public Utility District, 2020. Data accessed from  
2018 [http://64.146.148.103/Kitsap\\_Hybrid\\_Maps/Kitsap\\_Mean\\_Rain.pdf](http://64.146.148.103/Kitsap_Hybrid_Maps/Kitsap_Mean_Rain.pdf) Accessed Nov 19,  
2019 2020.
- 2020 Krosby, M., Hegewisch, K.C., Norheim, R., Mauger, G., Yazzie, K., H. Morgan, 2018."Tribal  
2021 Climate Tool" web tool. Climate Impacts Group ([https://cig.uw.edu/resources/tribal-](https://cig.uw.edu/resources/tribal-vulnerability-assessment-resources/)  
2022 [vulnerability-assessment-resources/](https://cig.uw.edu/resources/tribal-vulnerability-assessment-resources/)) and NW Climate Toolbox (<https://climatetoolbox.org/>)  
2023 accessed on May 25, 2020.
- 2024 Kuttel, Michael. 2003. Salmonid Habitat Limiting Factors Water Resource Inventory Area 15,  
2025 (West), Kitsap Basin and 14 (North), Kennedy-Goldsborough Basin. Washington  
2026 Conservation Commission. June 2003.
- 2027 Mauger, G.S., J.H. Casola, H.A. Morgan, R.L. Strauch, B. Jones, B. Curry, T.M. Busch Isaksen, L.  
2028 Whitely Binder, M.B. Krosby, and A.K. Snover, 2015. State of Knowledge: Climate Change in  
2029 Puget Sound. Report prepared for the Puget Sound Partnership and the National Oceanic  
2030 and Atmospheric Administration. Climate Impacts Group, University of Washington, Seattle.  
2031 doi:10.7915/CIG93777D
- 2032 Northwest Indian Fisheries Commission. Understanding Tribal Treaty Rights in Western  
2033 Washington, 2014. Available: [https://nwifc.org/w/wp-](https://nwifc.org/w/wp-content/uploads/downloads/2014/10/understanding-treaty-rights-final.pdf)  
2034 [content/uploads/downloads/2014/10/understanding-treaty-rights-final.pdf](https://nwifc.org/w/wp-content/uploads/downloads/2014/10/understanding-treaty-rights-final.pdf)
- 2035 Northwest Indian Fisheries Commission. [State of Our Watersheds Report. 2016. Available: State](https://nwifc.org/w/wp-content/uploads/downloads/2016/04/State-of-Our-Watersheds-2016.pdf)  
2036 [of Our Watersheds 2016 \(nwifc.org\)](https://nwifc.org/w/wp-content/uploads/downloads/2016/04/State-of-Our-Watersheds-2016.pdf)

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2037 NRCS (Natural Resource Conservation Service), 1997. Washington Irrigation Guide (WAIG). U.S.  
2038 Department of Agriculture.
- 2039 NSD and ICF (Natural Systems Design and ICF), 2014. Chico Creek Watershed Assessment for  
2040 the Identification of Restoration and Protection Actions. Prepared for the Suquamish Tribe.  
2041 Available at: <http://westsoundwatersheds.org/default.aspx?ID=2>
- 2042 [Pacheco, Jim. Personal Correspondence, August 21, 2020](#)
- 2043 Puget Sound Partnership, 2018. The 2018-2022 Action Agenda for Puget Sound. Available:  
2044 <https://www.govlink.org/sc-puget-sound-action-area/Index.htm>
- 2045 [Puget Sound Regional Council, 2019. Vision 2050 \(Draft\). Available at:](#)  
2046 <https://www.psrc.org/sites/default/files/draft-vision2050-mpp-rgs.pdf>
- 2047 Revised Code of Washington (RCW), 2019. Streamflow Restoration, Chapter 90.94 RCW.  
2048 Accessed on June 23, 2019. Available: <https://app.leg.wa.gov/RCW/default.aspx?cite=90.94>.
- 2049 Revised Code of Washington (RCW), 2019. Watershed Planning, Chapter 90.82 RCW. Accessed  
2050 on June 23, 2019. Available: <https://app.leg.wa.gov/rcw/default.aspx?cite=90.82>.
- 2051 Shared Strategy, 2007. Puget Sound Salmon Recovery Plan. Adopted by the National Marine  
2052 Fisheries Service, January 19, 2007.
- 2053 Suquamish Tribe, 2016. State of Our Watersheds Report, Kitsap Basin. Available:  
2054 [https://geo.nwifc.org/SOW/SOW2016\\_Report/Suquamish.pdf](https://geo.nwifc.org/SOW/SOW2016_Report/Suquamish.pdf)
- 2055 U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation  
2056 Service (USGS), 2013. Federal Standards and Procedures for the National Watershed  
2057 Boundary Dataset (WBD) (4 ed.): Techniques and Methods 11–A3, 63 p.,  
2058 <https://pubs.usgs.gov/tm/11/a3/>.
- 2059 Washington State Department of Ecology (Ecology), 1981. Instream Resources Protection  
2060 Program Kitsap
- 2061 Washington State Department of Ecology (Ecology), 2002. Union River Fecal Coliform Total  
2062 Maximum Daily Load Submittal Report. Publication Number 01-10-022.
- 2063 Washington State Department of Ecology (Ecology), 2003. Washington Water Acquisition  
2064 Program. Publication No. 03-11-005. March 2003. Available:  
2065 <https://www.whatcomcounty.us/DocumentCenter/View/4760/Exhibit-9-PDF?bidId=>
- 2066 Washington State Department of Ecology (Ecology), 2012. Sinclair and Dyes Inlets Fecal  
2067 Coliform Bacteria Total Maximum Daily Load: TMDL and Water Quality Implementation  
2068 Plan. Publication Number 11-10-051.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2069 Washington State Department of Ecology (Ecology), 2014. Liberty Bay Watershed Fecal  
2070 Coliform Bacteria Total Maximum Daily Load: TMDL and Water Quality Implementation  
2071 Plan. Publication Number 13-10-014.
- 2072 Washington State Department of Ecology (Ecology), 2019a. Streamflow Restoration Policy and  
2073 Interpretive Statement. July 31, 2019. Available:  
2074 <https://apps.wr.ecology.wa.gov/docs/WaterRights/wrwebpdf/pol-2094.pdf>
- 2075 Washington State Department of Ecology (Ecology), 2019b. Final Guidance for Determining Net  
2076 Ecological Benefit, GUID-2094 Water Resources Program Guidance. Washington State,  
2077 Department of Ecology, Publication 19-11-079.
- 2078 Washington State Department of Ecology (Ecology), 2020a. Current EPA-Approved Water  
2079 Quality Assessment. Queried on August 21, 2020. [https://ecology.wa.gov/Water-  
2080 Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d/EPA-  
2081 approved-assessment](https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d/EPA-approved-assessment).
- 2082 Washington State Department of Ecology (Ecology), 2020b. Focus on: How the Foster decision  
2083 affects our work. July, 2020. Available:  
2084 <https://fortress.wa.gov/ecy/publications/documents/2011083.pdf>
- 2085 Washington Department of Ecology, 2020c. Existing Washington State permit-exempt well  
2086 metering programs and metering data from permit-exempt wells. April 17, 2020
- 2087 Washington State Department of Ecology (Ecology). Water Availability. Copyright © 1994-2020.  
2088 Washington State Department of Ecology. All rights reserved. Web Communications  
2089 Manager, Washington State Department of Ecology, PO Box 47600, Olympia, WA 98504-  
2090 7600, 360-407-6590. Available: [https://ecology.wa.gov/Water-Shorelines/Water-  
2091 supply/Water-availability](https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability)
- 2092 Washington State Department of Fish and Wildlife, 2020. SalmonScape Web Map. Accessed  
2093 August 18, 2020. Accessed at: <http://apps.wdfw.wa.gov/salmonscape/>.
- 2094 Washington State Department of Fisheries, 1975. "A Catalog of Washington Streams and  
2095 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).
- 2096 Water Resource Inventory Area (WRIA) 15, 1981. Including Proposed Administrative Rules.  
2097 Prepared by Water Resources Policy Development Section, WA State Department of  
2098 Ecology. June 1981.
- 2099 Welch, W.B, L.M. Frans, and T.D. Olsen, 2014. *Hydrogeologic Framework, Groundwater  
2100 Movement and Water Budget of the Kitsap Peninsula, West-Central Washington*, Scientific  
2101 Investigation Report 2014-5106.
- 2102 Wydoski, R.S. and R.R. Whitney, 2003. *Inland Fishes of Washington*. American Fisheries Society  
2103 and University of Washington Press. 332 pp.

2104 **Glossary**

2105

2106 Acre-foot (AF): A unit of volume equal to the volume of a sheet of water one acre in area and  
2107 one foot in depth. ([USGS](#))

2108 Adaptive Management: An iterative and systematic decision-making process that aims to  
2109 reduce uncertainty over time and help meet project, action, and plan performance goals by  
2110 learning from the implementation and outcomes of projects and actions. ([NEB](#))

2111 Annual Average Withdrawal: [RCW 90.94.030](#) (4)(a)(vi)(B) refers to the amount of water allowed  
2112 for withdrawal per connection as the annual average withdrawal. As an example, a homeowner  
2113 could withdraw 4,000 gallons on a summer day, so long as they did not do so often enough that  
2114 their annual average exceeds the 950 gpd.

2115 Beaver Dam Analogue (BDA): BDAs are man-made structures designed to mimic the form and  
2116 function of a natural beaver dam. They can be used to increase the probability of successful  
2117 beaver translocation and function as a simple, cost-effective, non-intrusive approach to stream  
2118 restoration. ([From Anabranch Solutions](#))

2119 Critical Flow Period: The time period of low streamflow (generally described in bi-monthly or  
2120 monthly time steps) that has the greatest likelihood to negatively impact the survival and  
2121 recovery of threatened or endangered salmonids or other fish species targeted by the planning  
2122 group. The planning group should discuss with Ecology, local tribal and WDFW biologists to  
2123 determine the critical flow period in those reaches under the planning group's evaluation.  
2124 ([NEB](#))

2125 Cubic feet per second (CFS): A rate of the flow in streams and rivers. It is equal to a volume of  
2126 water one foot high and one foot wide flowing a distance of one foot in one second (about the  
2127 size of one archive file box or a basketball). ([USGS](#))

2128 Domestic Use: In the context of Chapter [90.94 RCW](#), "domestic use" and the withdrawal limits  
2129 from permit-exempt domestic wells include both indoor and outdoor household uses, and  
2130 watering of a lawn and noncommercial garden. ([NEB](#))

2131 ESSB 6091: In January 2018, the Legislature passed Engrossed Substitute Senate Bill (ESSB) 6091  
2132 in response to the Hirst decision. In the [Whatcom County vs. Hirst, Futurewise, et al. decision](#)  
2133 (often referred to as the "Hirst decision"), the court ruled that the county failed to comply with  
2134 the Growth Management Act requirements to protect water resources. The ruling required the  
2135 county to make an independent decision about legal water availability. ESSB 6091 addresses  
2136 the court's decision by allowing landowners to obtain a building permit for a new home relying  
2137 on a permit-exempt well. ESSB 6091 is codified as Chapter [90.94 RCW](#). ([ECY](#))

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2138 Evolutionarily Significant Unit (ESU): A population of organisms that is considered distinct for  
2139 purposes of conservation. For Puget Sound Chinook, the ESU includes naturally spawned  
2140 Chinook salmon originating from rivers flowing into Puget Sound from the Elwha River  
2141 (inclusive) eastward, including rivers in Hood Canal, South Sound, North Sound and the Strait of  
2142 Georgia. Also, Chinook salmon from 26 artificial propagation programs. ([NOAA](#))

2143 Foster Pilots and Foster Task Force: To address the impacts of the 2015 Foster decision, Chapter  
2144 [90.94 RCW](#) established a Task Force on Water Resource Mitigation and authorized the  
2145 Department of Ecology to issue permit decisions for up to five water mitigation pilot projects.  
2146 These pilot projects will address issues such as the treatment of surface water and groundwater  
2147 appropriations and include management strategies to monitor how these appropriations affect  
2148 instream flows and fish habitats. The joint legislative Task Force will (1) review the treatment of  
2149 surface water and groundwater appropriations as they relate to instream flows and fish habitat,  
2150 (2) develop and recommend a mitigation sequencing process and scoring system to address  
2151 such appropriations, and (3) review the Washington Supreme Court decision in Foster v.  
2152 Department of Ecology. The Task Force is responsible for overseeing the five pilot projects.  
2153 ([ECY](#))

2154 Four Year Work Plans: Four year plans are developed by salmon recovery lead entities in Puget  
2155 Sound to describe each lead entity's accomplishments during the previous year, to identify the  
2156 current status of recovery actions, any changes in recovery strategies, and to propose future  
2157 actions anticipated over the next four years. Regional experts conduct technical and policy  
2158 reviews of each watershed's four year work plan update to evaluate the consistency and  
2159 appropriate sequencing of actions with the Puget Sound Salmon Recovery Plan. ([Partnership](#))

2160 Gallons per day (GPD): An expression of the average rate of domestic and commercial water  
2161 use. 1 million gallons per day is equivalent to 1.547 cubic feet per second.

2162 Group A public water systems: Group A water systems have 15 or more service connections or  
2163 serve 25 or more people per day. Chapter [246-290 WAC](#) (Group A Public Water Supplies),  
2164 outlines the purpose, applicability, enforcement, and other policies related to Group A water  
2165 systems. (WAC)

2166 Group B public water systems: Group B public water systems serve fewer than 15 connections  
2167 and fewer than 25 people per day. Chapter [246-291 WAC](#) (Group B Public Water Systems),  
2168 outlines the purpose, applicability, enforcement, and other policies related to Group B water  
2169 systems. (WAC)

2170 Growth Management Act (GMA): Passed by the [Washington Legislature](#) and enacted in 1990,  
2171 this act guides planning for growth and development in Washington State. The act requires  
2172 local governments in fast growing and densely populated counties to develop, adopt, and  
2173 periodically update comprehensive plans.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2174 Home: A general term referring to any house, household, or other Equivalent Residential Unit.  
2175 ([Policy and Interpretive Statement](#))

2176 Hydrologic Unit Code (HUC): Hydrologic unit codes refer to the USGS's division and sub-division  
2177 of the watersheds into successively smaller hydrologic units. The units are classified into four  
2178 levels: regions, sub-regions, accounting units, and cataloging units, and are arranged within  
2179 each other from the largest geographic area to the smallest. Each unit is classified by a unit  
2180 code (HUC) composed of two to eight digits based on the four levels of the classification in the  
2181 hydrologic unit system (two digit units are largest, and eight digits are smallest). ([USGS](#))

2182 Impact: For the purpose of streamflow restoration planning, impact is the same as new  
2183 consumptive water use (see definition below). As provided in Ecology WR POL 2094 "Though  
2184 the statute requires the offset of 'consumptive impacts to instream flows associated with  
2185 permit-exempt domestic water use' (RCW 90.94.020(4)(b)) and 90.94.030(3)(b)), watershed  
2186 plans should address the consumptive use of new permit-exempt domestic well withdrawals.  
2187 Ecology recommends consumptive use as a surrogate for consumptive impact to eliminate the  
2188 need for detailed hydrogeologic modeling, which is costly and unlikely feasible to complete  
2189 within the limited planning timeframes provided in chapter [90.94 RCW](#). " ([NEB](#))

2190 Instream Flows and Instream Flow Rule (IFR): Instream flows are a specific flow level measured  
2191 at a specific location in a given stream. Seasonal changes cause natural stream flows to vary  
2192 throughout the year, so instream flows usually vary from month to month rather than one flow  
2193 rate year-round. State law requires that enough water in streams to protect and preserve  
2194 instream resources and uses. The Department of Ecology sets flow levels in administrative  
2195 rules. Once instream flow levels are established in a rule, they serve as a water right for the  
2196 stream and the resources that depend on it. Instream flow rules do not affect pre-existing, or  
2197 senior, water rights; rather, they protect the river from future withdrawals. Once an instream  
2198 flow rule is established, the Department of Ecology may not issue water rights that would  
2199 impair the instream flow level. ([ECY](#))

2200 Instream Resources Protection Program (IRPP): The IRPP was initiated by the Department of  
2201 Ecology in September 1978 with the purpose of developing and adopting instream resource  
2202 protection measures for Water Resource Inventory Areas (WRIAs) (see definition below) in  
2203 Western Washington as authorized in the Water Resources Act of 1971 (RCW 90.54), and in  
2204 accordance with the Water Resources Management Program ([WAC 175-500](#)).

2205 Instream Resources: Fish and related aquatic resources. ([NEB](#))

2206 Large woody debris (LWD): LWD refers to the fallen trees, logs and stumps, root wads, and piles  
2207 of branches along the edges of streams, rivers, lakes and Puget Sound. Wood helps stabilize  
2208 shorelines and provides vital habitat for salmon and other aquatic life. Preserving the debris  
2209 along shorelines is important for keeping aquatic ecosystems healthy and improving the  
2210 survival of native salmon. ([King County](#))



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2211 Lead Entities (LE): Lead Entities are local, citizen-based organizations in Puget Sound that  
2212 coordinate salmon recovery strategies in their local watershed. Lead entities work with local  
2213 and state agencies, tribes, citizens, and other community groups to adaptively manage their  
2214 local salmon recovery chapters and ensure recovery actions are implemented. ([Partnership](#))

2215 Listed Species: Before a species can receive the protection provided by the [Endangered Species](#)  
2216 [Act](#) (ESA), it must first be added to the federal lists of endangered and threatened wildlife and  
2217 plants. The [List of Endangered and Threatened Wildlife \(50 CFR 17.11\)](#) and the [List of](#)  
2218 [Endangered and Threatened Plants \(50 CFR 17.12\)](#) contain the names of all species that have  
2219 been determined by the U.S. Fish and Wildlife Service (Service) or the National Marine Fisheries  
2220 Service (for most marine life) to be in the greatest need of federal protection. A species is  
2221 added to the list when it is determined to be endangered or threatened because of any of the  
2222 following factors: the present or threatened destruction, modification, or curtailment of its  
2223 habitat or range; overutilization for commercial, recreational, scientific, or educational  
2224 purposes; disease or predation; the inadequacy of existing regulatory mechanisms; or other  
2225 natural or manmade factors affecting its survival. ([USFWS](#))

2226 Local Integrating Organizations (LIO): Local Integrating Organizations are local forums in Puget  
2227 Sound that collaboratively work to develop, coordinate, and implement strategies and actions  
2228 that contribute to the protection and recovery of the local ecosystem. Funded and supported  
2229 by the Puget Sound Partnership, the LIOs are recognized as the local expert bodies for  
2230 ecosystem recovery in nine unique ecosystems across Puget Sound. ([Partnership](#))

2231 Low Impact Development (LID): Low Impact Development (LID) is a stormwater and land-use  
2232 management strategy that tries to mimic natural hydrologic conditions by emphasizing  
2233 techniques including conservation, use of on-site natural features, site planning, and distributed  
2234 stormwater best management practices (BMPs) integrated into a project design. ([ECY](#))

2235 Managed Aquifer Recharge (MAR): Managed aquifer recharge projects involve the addition of  
2236 water to an aquifer through infiltration basins, injection wells, or other methods. The stored  
2237 water can then be used to benefit stream flows, especially during critical flow periods. ([NEB](#))

2238 National Pollutant Discharge Elimination System (NPDES): The NPDES permit program  
2239 addresses water pollution by regulating point sources that discharge pollutants to waters of the  
2240 United States. Created by the Clean Water Act in 1972, the EPA authorizes state governments  
2241 to perform many permitting, administrative, and enforcement aspects of the program. ([EPA](#))

2242 Net Ecological Benefit (NEB): Net Ecological Benefit is a term used in ESSB 6091 as a standard  
2243 that watershed plans (see below for definition) must meet. The outcome that is anticipated to  
2244 occur through implementation of projects and actions in a plan to yield offsets that exceed  
2245 impacts within: a) the planning horizon; and, b) the relevant WRIA boundary. See *Final*  
2246 *Guidance for Determining Net Ecological Benefit - Guid-2094 Water Resources Program*  
2247 *Guidance*. ([NEB](#))

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2248 Net Ecological Benefit Determination: Occurs solely upon Ecology’s conclusion after its review  
2249 of a watershed plan submitted to Ecology by appropriate procedures, that the plan does or  
2250 does not achieves a NEB as defined in the Net Ecological Benefit guidance. The Director of  
2251 Ecology will issue the results of that review and the NEB determination in the form of an  
2252 order. ([NEB](#))
- 2253 Net Ecological Benefit Evaluation: A planning group’s demonstration, using NEB Guidance and  
2254 as reflected in their watershed plan, that their plan has or has not achieved a NEB. ([NEB](#))
- 2255 New Consumptive Water Use: The consumptive water use from the permit-exempt domestic  
2256 groundwater withdrawals estimated to be initiated within the planning horizon. For the  
2257 purpose of RCW 90.94, consumptive water use is considered water that is evaporated,  
2258 transpired, consumed by humans, or otherwise removed from an immediate water  
2259 environment due to the use of new permit-exempt domestic wells. ([NEB](#))
- 2260 Office of Financial Management (OFM): OFM is a Washington state agency that develops official  
2261 state and local population estimates and projections for use in local growth management  
2262 planning. ([OFM](#))
- 2263 Offset: The anticipated ability of a project or action to counterbalance some amount of the new  
2264 consumptive water use over the planning horizon. Offsets need to continue beyond the  
2265 planning horizon for as long as new well pumping continues. ([NEB](#))
- 2266 Permit exempt wells: The Groundwater Code ([RCW 90.44](#)), identified four “small withdrawals”  
2267 of groundwater as exempt from the permitting process. Permit-exempt groundwater wells  
2268 often provide water where a community supply is not available, serving single homes, small  
2269 developments, irrigation of small lawns and gardens, industry, and stock watering.
- 2270 Permit-exempt uses: Groundwater permit exemptions allow four small uses of groundwater  
2271 without a water right permit: domestic uses of less than 5,000 gallons per day, industrial uses of  
2272 less than 5,000 gallons per day, irrigation of a lawn or non-commercial garden, a half-acre or  
2273 less in size, or stock water. Although exempt groundwater withdrawals don’t require a water  
2274 right permit, they are always subject to state water law. ([ECY](#))
- 2275 Planning groups: A general term that refers to either initiating governments, in consultation  
2276 with the planning unit, preparing a watershed plan update required by Chapter 90.94.020 RCW,  
2277 or a watershed restoration and enhancement committee preparing a plan required by Chapter  
2278 90.94.030 RCW. ([NEB](#))
- 2279 Planning Horizon: The 20-year period beginning on January 19, 2018 and ending on January 18,  
2280 2038, over which new consumptive water use by permit-exempt domestic withdrawals within a  
2281 WRIA must be addressed, based on the requirements set forth in Chapter 90.94 RCW. ([NEB](#))

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2282 Projects and Actions: General terms describing any activities in watershed plans to offset  
2283 impacts from new consumptive water use and/or contribute to NEB. ([NEB](#))
- 2284 Puget Sound Acquisition and Restoration (PSAR) fund: This fund supports projects that recover  
2285 salmon and protect and recover salmon habitat in Puget Sound. The state legislature  
2286 appropriates money for PSAR every 2 years in the Capital Budget. PSAR is co-managed by the  
2287 Puget Sound Partnership and the Recreation and Conservation Office, and local entities identify  
2288 and propose PSAR projects. ([Partnership](#))
- 2289 Puget Sound Partnership (Partnership): The Puget Sound Partnership is the state agency leading  
2290 the region’s collective effort to restore and protect Puget Sound and its watersheds. The  
2291 organization brings together hundreds of partners to mobilize partner action around a common  
2292 agenda, advance Sound investments, and advance priority actions by supporting partners.  
2293 ([Partnership](#))
- 2294 Puget Sound Regional Council (PSRC): PSRC develops policies and coordinates decisions about  
2295 regional growth, transportation and economic development planning within King, Pierce,  
2296 Snohomish and Kitsap counties. ([PSRC](#))
- 2297 [RCW 90.03 \(Water Code\)](#): This chapter outlines the role of the Department of Ecology in  
2298 regulating and controlling the waters within the state. The code describes policies surrounding  
2299 surface water and groundwater uses, the process of determining water rights, compliance  
2300 measures and civil penalties, and various legal procedures.
- 2301 [RCW 90.44 \(Groundwater Regulations\)](#): RCW 90.44 details regulations and policies concerning  
2302 groundwater use in Washington state, and declares that public groundwaters belong to the  
2303 public and are subject to appropriation for beneficial use under the terms of the chapter. The  
2304 rights to appropriate surface waters of the state are not affected by the provisions of this  
2305 chapter.
- 2306 [RCW 90.54 \(Groundwater permit exemption\)](#): This code states that any withdrawal of public  
2307 groundwaters after June 6, 1945 must have an associated water right from the Department of  
2308 Ecology. However, any withdrawal of public groundwaters for stock-watering purposes, or for  
2309 the watering of a lawn or of a noncommercial garden not exceeding one-half acre in area, or for  
2310 single or group domestic uses in an amount not exceeding five thousand gallons a day, or for an  
2311 industrial purpose in an amount not exceeding five thousand gallons a day, is exempt from the  
2312 provisions of this section and does not need a water right.
- 2313 [RCW 90.82 \(Watershed Planning\)](#): Watershed Planning was passed in 1997 with the purpose of  
2314 developing a more thorough and cooperative method of determining what the current water  
2315 resource situation is in each water resource inventory area of the state and to provide local  
2316 citizens with the maximum possible input concerning their goals and objectives for water  
2317 resource management and development.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2318 [RCW 90.94 \(Streamflow Restoration\)](#): This chapter of the Revised Code of Washington codifies  
2319 ESSB 6091, including watershed planning efforts, streamflow restoration funding program and  
2320 the joint legislative task force on water resource mitigation and mitigation pilot projects (Foster  
2321 task force and pilot projects).

2322 [Reasonable Assurance](#): Explicit statement(s) in a watershed plan that the plan’s content is  
2323 realistic regarding the outcomes anticipated by the plan, and that the plan content is supported  
2324 with scientifically rigorous documentation of the methods, assumptions, data, and  
2325 implementation considerations used by the planning group. ([NEB](#))

2326 [Revised Code of Washington \(RCW\)](#): The revised code is a compilation of all permanent laws  
2327 now in force for the state of Washington. The RCWs are organized by subject area into Titles,  
2328 Chapters, and Sections.

2329 [Salmon Recovery Funding Board \(SRFB\)](#): Pronounced “surfboard”, this state and federal board  
2330 provides grants to protect and restore salmon habitat. Administered by a 10-member State  
2331 Board that includes five governor-appointed citizens and five natural resource agency directors,  
2332 the board brings together the experiences and viewpoints of citizens and the major state  
2333 natural resource agencies. For watersheds planning under Section 203, the Department of  
2334 Ecology will submit final draft WRE Plans not adopted by the prescribed deadline to SRFB for a  
2335 technical review ([RCO](#) and [Policy and Interpretive Statement](#)).

2336 [Section 202 or Section 020](#): Refers to Section 202 of ESSB 6091 or [Section 020 of RCW 90.94](#)  
2337 respectively. The code provides policies and requirements for new domestic groundwater  
2338 withdrawals exempt from permitting with a potential impact on a closed water body and  
2339 potential impairment to an instream flow. This section includes WRIAs 1, 11, 22, 23, 49, 59 and  
2340 55, are required to update watershed plans completed under RCW 90.82 and to limit new  
2341 permit-exempt withdrawals to 3000 gpd annual average.

2342 [Section 203 or Section 030](#): Refers to Section 203 of ESSB 6091 or [Section 030 of RCW 90.94](#)  
2343 respectively. The section details the role of WRE committees and WRE plans (see definitions  
2344 below) in ensuring the protection and enhancement of instream resources and watershed  
2345 functions. This section includes WRIAs 7, 8, 9, 10, 12, 13, 14 and 15. New permit-exempt  
2346 withdrawals are limited to 950 gpd annual average.

2347 [SEPA and SEPA Review](#): SEPA is the State Environmental Policy Act. SEPA identifies and analyzes  
2348 environmental impacts associated with governmental decisions. These decisions may be related  
2349 to issuing permits for private projects, constructing public facilities, or adopting regulations,  
2350 policies, and plans. SEPA review is a process which helps agency decision-makers, applications,  
2351 and the public understand how the entire proposal will affect the environment. These reviews  
2352 are necessary prior to Ecology adopting a plan or plan update and may be completed by  
2353 Ecology or by a local government. ([Ecology](#))

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2354 Subbasins: A geographic subarea within a WRIA, equivalent to the words “same basin or  
2355 tributary” as used in RCW 90.94.020(4)(b) and RCW 90.94.030 (3)(b). In some instances,  
2356 subbasins may not correspond with hydrologic or geologic basin delineations (e.g. watershed  
2357 divides). ([NEB](#))

2358 Trust Water Right Program: The program allows the Department of Ecology to hold water  
2359 rights for future uses without the risk of relinquishment. Water rights held in trust contribute to  
2360 streamflows and groundwater recharge, while retaining their original priority date. Ecology uses  
2361 the Trust Water Right Program to manage acquisitions and accept temporary donations. The  
2362 program provides flexibility to enhance flows, bank or temporarily donate water rights. ([ECY](#))

2363 Urban Growth Area (UGA): UGAs are unincorporated areas outside of city limits where urban  
2364 growth is encouraged. Each city that is located in a GMA fully-planning county includes an  
2365 urban growth area where the city can grow into through annexation. An urban growth area  
2366 may include more than a single city. An urban growth area may include territory that is located  
2367 outside of a city in some cases. Urban growth areas are under county jurisdiction until they are  
2368 annexed or incorporated as a city. Zoning in UGAs generally reflect the city zoning, and public  
2369 utilities and roads are generally built to city standards with the expectation that when annexed,  
2370 the UGA will transition seamlessly into the urban fabric. Areas outside of the UGA are generally  
2371 considered rural. UGA boundaries are reviewed and sometimes adjusted during periodic  
2372 comprehensive plan updates. UGAs are further defined in [RCW 36.70](#).

2373 WAC 173-566 (Streamflow Restoration Funding Rule): On June 25, 2019 the Department of  
2374 Ecology adopted this rule for funding projects under RCW 90.94. This rule establishes processes  
2375 and criteria for prioritizing and approving grants consistent with legislative intent, thus making  
2376 Ecology’s funding decision and contracting more transparent, consistent, and defensible.

2377 Washington Administrative Code (WAC): The WAC contains the current and permanent rules  
2378 and regulations of state agencies. It is arranged by agency and new editions are published every  
2379 two years. ([Washington State Legislature](#))

2380 Washington Department of Ecology (DOE/ECY): The Washington State Department of Ecology is  
2381 an environmental regulatory agency for the State of Washington. The department administers  
2382 laws and regulations pertaining to the areas of water quality, water rights and water resources,  
2383 shoreline management, toxics clean-up, nuclear and hazardous waste, and air quality.

2384 Washington Department of Fish and Wildlife (WDFW): An agency dedicated to preserving,  
2385 protecting, and perpetuating the state’s fish, wildlife, and ecosystems while providing  
2386 sustainable fish and wildlife recreational and commercial opportunities. Headquartered in  
2387 Olympia, the department maintains six regional offices and manages dozens of wildlife areas  
2388 around the state, offering fishing, hunting, wildlife viewing, and other recreational  
2389 opportunities for the residents of Washington. With the tribes, WDFW is a co-manager of the  
2390 state salmon fishery. ([WDFW](#))

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2391 Washington Department of Natural Resources (WADNR or DNR): The department manages  
2392 over 3,000,000 acres of forest, range, agricultural, and commercial lands in the U.S. state of  
2393 Washington. The DNR also manages 2,600,000 acres of aquatic areas which include shorelines,  
2394 tidelands, lands under Puget Sound and the coast, and navigable lakes and rivers. Part of the  
2395 DNR's management responsibility includes monitoring of mining cleanup, environmental  
2396 restoration, providing scientific information about earthquakes, landslides, and ecologically  
2397 sensitive areas. ([WADNR](#))

2398 Water Resources (WR): The Water Resources program at Department of Ecology supports  
2399 sustainable water resources management to meet the present and future water needs of  
2400 people and the natural environment, in partnership with Washington communities. ([ECY](#))

2401 Water Resources Advisory Committee (WRAC): Established in 1996, the Water Resources  
2402 Advisory Committee is a forum for issues related to water resource management in Washington  
2403 State. This stakeholder group is comprised of 40 people representing state agencies, local  
2404 governments, water utilities, tribes, environmental groups, consultants, law firms, and other  
2405 water stakeholders. ([ECY](#))

2406 Watershed Plan: A general term that refers to either: a watershed plan update prepared by a  
2407 WRIA's initiating governments, in collaboration with the WRIA's planning unit, per RCW  
2408 90.94.020; or a watershed restoration and enhancement plan prepared by a watershed  
2409 restoration and enhancement committee, per RCW 90.94.030. This term does not refer to RCW  
2410 90.82.020(6). ([NEB](#))

2411 Watershed Restoration and Enhancement Plan (WRE Plan): The Watershed Restoration and  
2412 Enhancement Plan is directed by [Section 203 of ESSB 6091](#) and requires that by June 30, 2021,  
2413 the Department of Ecology will prepare and adopt a watershed restoration and enhancement  
2414 plan for WRIAs 7, 8, 9, 10, 12, 13, 14 and 15, in collaboration with the watershed restoration  
2415 and enhancement committee. The plan should, at a minimum, offset the consumptive impact  
2416 of new permit-exempt domestic water use, but may also include recommendations for projects  
2417 and actions that will measure, protect, and enhance instream resources that support the  
2418 recovery of threatened and endangered salmonids. Prior to adoption of an updated plan,  
2419 Department of Ecology must determine that the actions in the plan will result in a "net  
2420 ecological benefit" to instream resources in the WRIA. The planning group may recommend  
2421 out-of-kind projects to help achieve this standard.

2422 WRIA: Water Resource Inventory Area. WRIAs are also called basins or watersheds. There are  
2423 62 across the state and each are assigned a number and name. They were defined in 1979 for  
2424 the purpose of monitoring water availability. A complete map is available here:  
2425 <https://ecology.wa.gov/Water-Shorelines/Water-supply/Water-availability/Watershed-look-up>

2426

## Appendices

2427

Still in development and need cross referencing with text.

2428 **Appendix A – Committee Roster**

Entity Representing	Primary Representative Name	First Alternate Name
Kitsap County	Dave Ward	Kathy Peters
Mason County	Randy Neatherlin	Kevin Shutty, David Windom
Pierce County	Dan Cardwell	Austin Jennings
Puyallup Tribe	David Winfrey	
Skokomish Tribe	Alex Gouley	Seth Book, Dana Sarff
Squaxin Island Tribe	Jeff Dickison	Paul Pickett
Suquamish Tribe	Leonard Forsman	Alison O'Sullivan
Port Gamble S'Klallam Tribe	Sam Phillips	Paul McCollum
City of Port Orchard	Jacki Brown	Mark Dorsey, Zach Holt
City of Bremerton	Teresa Smith	Allison Satter
City of Gig Harbor	Trent Ward	Jeff Langhelm, Brienn Ellis
City of Bainbridge	Michael Michael	Christian Berg
Kitsap Public Utility District	Joel Purdy	Mark Morgan
Department of Fish and Wildlife	Brittany Gordon	Nam Siu
Department of Ecology	Stacy Vynne McKinstry	Stephanie Potts
King County	Greg Rabourn	
Kitsap Building Association	Russ Shiplet	Ellen Ross-Cardoso
Kitsap Conservation District	Joy Garitone	Brian Stahl
Great Peninsula Conservancy	Nathan Daniel	Erik Steffens
Mason-Kitsap Farm Bureau <i>ex officio</i>	Larry Boltz	
Washington Water Service <i>ex officio</i>	Shawn O'Dell	



2429 **Appendix B – Operating Principles**

2430 Watershed Restoration Enhancement Committee

2431 Water Resource Inventory Area (WRIA) 15

2432 Operating Principles

2433 Approved Version Sent for Signature February 12, 2019

2434 Revised and Approved August 6, 2020

---

2435 SECTION 1: PURPOSE

2436 The purpose of the operating principles is to establish the watershed restoration and enhancement  
2437 committee, as authorized under RCW 90.94.030, for the purpose of developing the watershed  
2438 restoration and enhancement plan. The document sets forward a process for meeting, participation  
2439 expectations, procedures for voting, structure of the Committee, communication and other needs in  
2440 order to support the Committee in reaching agreement on a final plan.

---

2441 SECTION 2. AGREEMENT AND AMENDMENTS TO THE OPERATING PRINCIPLES

2442 The formal establishment of an agreement to the operating principles will take place via a member  
2443 decision, with all members of the watershed restoration and enhancement committee (Committee)  
2444 approving the operating principles. Participants will work in good faith to participate productively in the  
2445 development of the operating principles. By approving the operating principles, members of the  
2446 Committee agree to uphold the principles as outlined in this document.

2447 The Committee may review the operating principles periodically. Any member of the Committee may  
2448 bring forward a recommendation for an amendment to the operating principles. Amendments will be  
2449 brought for discussion when a quorum (2/3 of the membership) is present and take effect only if  
2450 decided on unanimously by the full Committee for inclusion in the operating principles.

2451 Nothing contained herein or in any amendment developed under the Agreement shall prejudice the  
2452 legal claims of any party hereto, nor shall participation in this planning process abrogate any party's  
2453 authority or the reserved or other rights of tribal governments, except where the obligation has been  
2454 accepted in writing.

---

2455 SECTION 3. PARTICIPATION EXPECTATIONS AND GROUND RULES

2456 ***Participation expectations***

2457 Each entity invited by Ecology to participate on the Committee, and which has responded indicating  
2458 their commitment to participate, shall identify a representative and up to two alternates to participate  
2459 on the Committee. Committee members will, in good faith and using their best professional judgement:

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2460 • Actively participate in Committee meetings;
  - 2461 • Review materials in preparation for the meetings;
  - 2462 • Review materials following the meetings;
  - 2463 • Engage in workgroups (if applicable);
  - 2464 • Come prepared for discussions and decisions (when applicable); and
  - 2465 • Commit to implementing the Committee ground rules (see below).
- 2466 The chair will consult with the Committee to ensure that adequate time is given for review of materials.
- 2467 The chair will provide meeting materials at least 7 days before meetings, with additional time given for
- 2468 longer documents. The chair recognizes that members may need to discuss decisions with their
- 2469 organizations prior to bringing forward a decision to the Committee and the chair and facilitator will
- 2470 work with Committee members to establish reasonable review time for materials prior to reaching a
- 2471 decision. Members of the Committee will actively work with their decision making authorities to receive
- 2472 feedback on decisions in a timely manner as to not delay decisions coming before the Committee. When
- 2473 possible, Committee members will provide the chair reasonable notice if additional review time is
- 2474 needed prior to making a decision.
- 2475 Committee meetings will take place on a monthly basis for an initial period, with the interval of
- 2476 meetings being modified as needed to meet the deadlines (either more or less frequently). The chair will
- 2477 hold meetings at a convenient location in the watershed. Meetings are expected to last for
- 2478 approximately 4 hours, with the length modified as needed to meet deadlines.
- 2479 The chair or facilitator will contact Committee members that miss meetings. A lack of participation does
- 2480 not mean the process to develop the plan will be stalled. However, it is recognized that if a quorum is
- 2481 not present, meetings may be cancelled or decisions postponed which may impact the overall timeline
- 2482 for plan approval. If an entity misses multiple meetings, the chair or facilitator will work with the entity
- 2483 to identify reasonable accommodations to support reengagement.
- 2484 **Remote Participation**
- 2485 It is the expectation that Committee representatives shall attend all meetings in person. In person
- 2486 participation is essential to efficiency, clarity, and honest communication. Although it should not be
- 2487 routine, remote participation can be accommodated when necessary to facilitate Committee member
- 2488 participation and when possible given technology availability. Remote participants may engage in
- 2489 decision-making; however the primary purpose of remote participation is listening to the Committee
- 2490 meeting, as it may be difficult to fully participate in discussion. If there are difficulties with technology,
- 2491 the chair’s priority is to continue the meeting with the in-person participants and not delay the meeting
- 2492 to address technology challenges. Representatives are strongly encouraged to attend meetings in-
- 2493 person.
- 2494 The Committee chair will allow for remote participation (e.g. via phone, web, video conference) if:
- 2495 • Notice is provided to the chair or facilitator at least 1 week in advance of the meeting (except in
  - 2496 the case of emergencies such as illness, weather event, etc.), AND

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2497
- Representative and alternates are not available to attend in person, AND
- 2498
- Meeting room accommodates remote participation.
- 2499 If extraordinary events, such as a pandemic or natural disaster, require the committee to meet
- 2500 remotely, all meetings will be held remotely and the operating procedures will remain in force, except
- 2501 portions that assume in-person versus remote participation.

2502

2503 **Ground rules**

2504 Water management is inherently complicated and the Committee is striving for consensus on the

2505 watershed restoration and enhancement plan. Therefore, given the range of members' diverse

2506 perspectives, the Committee has established the following to ensure good faith and productive

2507 participation amongst its members:

2508 **1. Be Respectful**

- 2509
- Listen when others are speaking. Do not interrupt and do not participate in side
- 2510 conversations. One person speaks at a time.
- 2511
- Recognize the legitimacy of the concerns and interests of others, whether or not you
- 2512 agree with them.
- 2513
- Cooperate with the facilitator to ensure that everyone is given equitable time to state
- 2514 their views. Present your views succinctly and try not to repeat or rephrase what others
- 2515 have already said.
- 2516
- Silence cell phones and limit use of cell phones and laptops during the meeting.
- 2517
- Respect other communication styles and needs.
- 2518
- Assume good intent of other Committee members.

2519 **2. Be Constructive**

- 2520
- Participate in the spirit of giving the same priority to solving the problems of others as
- 2521 you do to solving your own problems.
- 2522
- Share comments that are solution focused. Avoid repeating past discussions.
- 2523
- Do not engage in personal attacks or make slanderous statements. Do not give
- 2524 ultimatums.
- 2525
- Ask for clarification if you are uncertain of what another person is saying. Ask questions
- 2526 rather than make assumptions.
- 2527
- Work towards consensus. Identify areas of common ground and be willing to
- 2528 compromise.
- 2529
- Minimize the use of jargon and acronyms. Attempt to use language observers and
- 2530 laypersons will understand.
- 2531
- It is okay to disagree, but strive to reach common ground.

2532 **3. Be Productive**

- 2533
- Adhere to the agenda. Respect time constraints and focus on the topic being discussed.

2534 **4. Bring a Sense of Humor and Have Fun.**

2535

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2536 ***Interpersonal conflict resolution***

2537 In the event a conflict arises amongst members or established workgroups of the Committee, the  
2538 following steps should be taken by individuals:

- 2539 1. Communicate directly with the person or persons whose actions are the cause of the conflict.
- 2540 2. If the circumstance is such that the person with a conflict is unable or unwilling to communicate  
2541 directly with the person or persons whose actions are the cause of the conflict, the person shall  
2542 speak with the Committee chair and facilitator.
- 2543 3. The conflict should first be brought up verbally. If this does not lead to satisfactory resolution,  
2544 the impacted parties should describe the conflict in writing to the chair.
- 2545 4. If such matters are brought to the chair and facilitator, the chair in consultation with the  
2546 facilitator, will address the conflict as appropriate and may seek outside or independent  
2547 assistance as needed.

---

2548 **SECTION 4. ALTERNATES, EX OFFICIO MEMBERSHIP AND WORKGROUPS**

2549 ***Alternates***

2550 Committee members shall provide to the chair, in writing, up to two designated alternate committee  
2551 members from their organization or government. Committee members shall inform the chair in writing  
2552 of any changes to the main representative or alternates. If the primary representative cannot attend a  
2553 meeting, they should, if possible, send the designated alternate and notify the Committee chair and the  
2554 facilitator as early as possible. It is the responsibility of the primary representative to brief the alternate  
2555 on previous meetings and key topics arising for discussion in order for the alternate to participate  
2556 productively.

2557 Representatives may call on alternates that attend the meeting at any time to speak. Only one  
2558 representative from the government or entity shall sit at the table and participate in a decision. If the  
2559 primary representative and alternates are no longer able to attend (staffing change, ongoing scheduling  
2560 conflicts), the government or organization shall work with the chair to quickly identify alternative  
2561 representation from the same government or organization. If no alternative representative is available  
2562 from the government or organization, an alternate entity that can represent the same interest is  
2563 allowed and shall be brought forward by the departing entity to the chair for approval. Replacement  
2564 members are subject to latecomer provisions.

2565 ***Latecomers***

2566 Ecology invited all entities identified in 90.94.030 to participate on the Committee and all entities in  
2567 WRIA 15 have accepted the invitation to participate. A replacement entity is allowed to join the  
2568 Committee at a later date under the following conditions:

- 2569 1. The entity cannot request to revisit items previously decided on by the Committee;
- 2570 2. The entity signs an intent to participate, provides primary and alternate Committee  
2571 representatives;
- 2572 3. The entity agrees to and abides by the operating principles; and

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2573 4. The entity joins the Committee and participates in meetings no later than six months prior  
2574 to final plan approval.

2575 **Removal from the Committee**

2576 Entities must participate in the committee process after September 1, 2020 to retain membership on  
2577 the committee. If an entity does not attend at least one committee or workgroup meeting over any  
2578 three-month period it will be assumed they have withdrawn from the committee and will be removed as  
2579 members, unless the member provides a written explanation and requests to remain on the  
2580 committee. The Chair, via electronic communication, will inform any committee member who has not  
2581 been participating for two months with this information to provide a minimum of one-month notice  
2582 before removal.

2583 **Resignation from the Committee**

2584 If an entity no longer wishes to participate in the committee process or the final plan approval, they should send  
2585 written notice (electronic or mailed notice) to the chair as early as possible prior to their resignation. Advance  
2586 notice will support the chair and facilitator in managing consensus building and voting procedures.

2587 **Ex-Officio and Ad-Hoc Members**

2588 The Committee may decide by full consensus to invite an additional entity to join the Committee as an  
2589 *ex officio* non-voting member. *Ex Officio* members are invited to sit at the Committee table and  
2590 participate actively in discussions and review of documents, but shall not make decisions on any items.<sup>32</sup>  
2591 *Ex-officio* members shall adhere to the operating procedures.

2592 The Committee may decide by consensus to invite an individual or organization to participate in select  
2593 meetings or agenda items where additional expertise or perspective is desired. Ad hoc members will be  
2594 invited by the chair to sit at the Committee table, participate actively in discussions, and review of  
2595 documents for the specified agenda items. They shall not make decisions on any items.

2596 **Workgroups and Advisory Groups**

2597 The Committee may establish workgroups or subcommittees as it sees fit. Workgroups may be  
2598 temporary, established to achieve a specific purpose within a finite time frame, or a standing workgroup  
2599 addressing the goals of the Committee. The decision to form a workgroup is not required by the  
2600 legislation and may be developed at the discretion of the Committee or the chair in order to support  
2601 Committee decision making. All Committee workgroups are workgroups of the whole, meaning their  
2602 role is to support the efforts of the Committee and all Committee members are welcome to participate  
2603 in any workgroup formed by the Committee. The chair or Committee may also engage established  
2604 workgroups in the watershed or invite non-Committee members to participate on the workgroups if  
2605 they bring capacity or expertise not available on the Committee. No binding decisions will be made by

---

<sup>32</sup> Ecology leadership has determined that additional voting members will not be invited to join the committees in order to stay true to the legislation and keep the Committee size manageable. However, the Committee may decide to include non-voting members if they choose.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2606 the workgroups; all issues discussed by workgroups shall be communicated to the Committee as either  
2607 recommendations or findings as appropriate. The Committee may, or may not, act on these workgroup  
2608 outcomes as it deems appropriate.

---

2609 SECTION 5. ROLE OF THE CHAIR AND COMMITTEE SUPPORT

2610 RCW 90.94.030 (2b) states that “The department shall chair the watershed restoration and  
2611 enhancement committee...” Ecology’s streamflow restoration implementation lead chairs the  
2612 Committee on behalf of the agency. In the event that the chair is unable to attend a scheduled meeting  
2613 due to illness or other unanticipated absence, Ecology will designate an interim chair to avoid cancelling  
2614 the meeting. The interim chair may make decisions coming before the Committee.

2615 The chair shall make decisions on all items coming before the Committee.<sup>33</sup> The role of the chair is to  
2616 help the Committee complete the plan with the goal to attain full agreement from the Committee  
2617 members. If full agreement cannot be obtained, the chair shall ensure all opinions inform future  
2618 decision making for the final plan.

2619 The chair, with assistance from Ecology technical staff, contractors, members of the Committee, and/or  
2620 workgroups, shall prepare the watershed restoration and enhancement plan for the Committee’s  
2621 review, comment, and approval.

2622 Ecology may provide the Committee a facilitator. The role of the facilitator is to focus on process and  
2623 support the Committee in productive discussions and decision-making. Ecology will provide  
2624 administrative support for the Committee as well as technical assistance through Ecology staff and  
2625 consultants.

2626 Ecology may provide the Committee with technical support in the form of Ecology staff or hired  
2627 consultants. Ecology will seek input from the Committee on consultant selection prior to entering into  
2628 contract.

---

2629 SECTION 6. DECISION MAKING

2630 This planning process, by statutory design, brings a diversity of perspectives to the table. It is therefore  
2631 important the Committee identifies a clear process for how it will make decisions. Committee members  
2632 shall always strive for consensus, and when consensus cannot be reached, the chair and facilitator will  
2633 document agreement and dissenting opinions. The reason why Committee members will strive for  
2634 consensus is that the authorizing legislation requires that final plan itself must be approved by all  
2635 members of the Committee prior to Ecology’s review (RCW 90.94.030[3] “...all members of a watershed  
2636 restoration and enhancement committee must approve the plan prior to adoption”). Therefore it

---

<sup>33</sup> RCW 90.94 (3) states that “the department shall prepare and adopt a watershed restoration and enhancement plan for each watershed listed under subsection (2)(a) of this section, in collaboration with the watershed restoration and enhancement committee. Except as described in (h) of this subsection, all members of a watershed restoration and enhancement committee must approve the plan prior to adoption.” Based on input from the Attorney General’s office, because Ecology is a member of the Committee and must ultimately vote on whether or not to approve the plan, Ecology shall vote on all items coming before the Committee.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2637 follows that consensus during the foundational decisions upon which the plan is constructed will serve  
2638 as the best indicators of the Committee’s progress toward an approved plan.

2639 **Quorum**

2640 A quorum is constituted when two-thirds of the entities represented on the Committee are present  
2641 (either in person or on the phone). A quorum must be present for decisions to occur. Each member of  
2642 the Committee may record a single formal opinion.

2643 **Decisions leading up to the final plan approval**

2644 In recognition that consensus can be difficult to achieve and in some cases decisions need to be made  
2645 within a limited period of time to stay on track to meet the plan deadline, the following process will be  
2646 used to make decisions leading up to plan approval:

- 2647 1. The Committee will strive toward consensus.<sup>34</sup> The levels of consensus include:
- 2648 • I can say an unqualified "yes"!
  - 2649 • I can accept the decision.
  - 2650 • I can live with the decision.
  - 2651 • I do not fully agree with the decision; however, I will not block it.
- 2652 2. The Committee will spend adequate time<sup>35</sup> for substantive discussion of issues prior to asking  
2653 for a decision. After substantive discussion, the chair will ask consensus.
- 2654 3. When consensus cannot be reached, the facilitator will identify the members in disagreement<sup>36</sup>  
2655 at the meeting. The chair and/or facilitator will support coordination of the following actions,  
2656 but the responsibility is on the disagreeing members. Disagreeing members agree to:
- 2657 a. meet within seven days of the meeting;
  - 2658 b. develop a summary paper on the issue and needs; and
  - 2659 c. develop a draft timeline for resolution or a recommendation back to the Committee.
- 2660 As appropriate, the chair and/or facilitator will work with the parties in disagreement to reach a  
2661 resolution using whatever means are necessary and within reason (in person meetings,  
2662 conference calls, identifying additional research needs, etc.). Members unable to reach  
2663 consensus must agree to work cooperatively with the chair and facilitator in this process. The  
2664 Committee recognizes that flexibility is needed in terms of timeline and presentation of

---

<sup>34</sup> Definition of Consensus: Consensus is a group process where the input of everyone is carefully considered and an outcome is crafted that best meets the needs of the group as a whole. The root of consensus is the word consent, which means to give permission to. When members consent to a decision, they are giving permission to the group to go ahead with the decision. Some members may disagree with all or part of the decision, but based on listening to everyone else’s input, all members agree to let the decision go forward because the decision is the best one the entire group can achieve at the current time.

<sup>35</sup> The chair will identify definitive deadlines by which decisions need to be made in order to stay on track to meet the plan deadline.

<sup>36</sup> If much of the group is in agreement and only one or two members are in disagreement, individuals may be selected to negotiate on behalf of the larger group.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2665 resolution depending on the nature of the disagreement. If requested, Ecology may provide a  
2666 facilitator to help develop the compromise language.

2667 4. If the compromise fails to reach consensus within the identified timeline, the Committee will  
2668 agree to allow the process for developing the plan to move forward while the work toward  
2669 consensus continues. The Committee agrees to revisit decisions where consensus is not reached  
2670 at a later date.

2671 5. Throughout the process, the chair and facilitator will ensure that areas of concern and  
2672 disagreement are documented within meeting summaries and other materials as necessary.

2673 **Decision process**

- 2674 • Thumbs up – approval
- 2675 • Thumbs down – disapproval
- 2676 • Thumbs sideways – (accept, can live with, will not object)
- 2677 • Five fingers – abstain

2678 The facilitator will record all decisions and, where there are dissenting or ambivalent opinions, the  
2679 meeting summary will document the concerns.

2680 **Conflict of Interest**

2681 Committee members shall abstain from making a decision if they have a vested personal financial  
2682 interest in a decision. The committee acknowledges that each entity represents stakeholders that have  
2683 an interest in the outcomes of this process.

2684 **Electronic decision making**

2685 In the case a decision is needed prior to the next Committee meeting, the chair can request a opinion or  
2686 decision via email or survey. This approach will only be used for time-critical items or when a quorum  
2687 was not present to come to a decision. The chair will allow a minimum of 3 working days for responses.  
2688 A non-response is considered an “abstention”.<sup>37</sup>

2689 The result of an electronic decision will be reported at the next Committee meeting and the chair or  
2690 facilitator may request a decision to reaffirm the electronic decision.

2691 **Straw poll**

2692 From time to time, the chair or the facilitator may ask for a straw poll to gather information on group  
2693 needs. These polls do not need to follow the formal decision-making protocols of this section. Informal  
2694 polls will be used solely for information-gathering and will not result in a decision.

---

<sup>37</sup> If an ‘out of office’ message is received for the primary representative, the alternate representative(s) will be contacted. The chair and facilitator will make at least 3 points of contact with each Committee member and alternates before marking them as an abstention (e.g. phone, email, text).



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

2695 **Letters of Support for Projects**

2696 The Committee may choose to submit a letter of support for streamflow restoration projects applying  
2697 for funding through Ecology’s Streamflow Restoration Funding program or other sources. The decision  
2698 to submit a letter of support on behalf of the Committee shall be by consensus. If the Committee does  
2699 not approve a letter of support for a project, individual Committee representatives may submit a letter  
2700 of support from their entity or government.

2701 **Final approval of the plan**

2702 RCW 90.94 (3) states that “... all members of a watershed restoration and enhancement committee  
2703 must approve the plan prior to adoption.” This means that each and all committee members get to  
2704 record their decision (quorum is not applicable for final approval) and that all committee members must  
2705 support the plan in order for it to be approved and provided to Ecology for “net ecological benefit”<sup>38</sup>  
2706 review and potential adoption by Ecology.<sup>39</sup>

2707 The final plan approval will be shown by hands:

- 2708 • Thumbs up – approval
- 2709 • Thumbs down – disapproval

2710 The final plan approval may also be given verbally or in writing when in-person participation is not  
2711 possible:

- 2712 • Approve
- 2713 • Disapprove

2714 The facilitator will record all decisions.

---

2715 **SECTION 7. PUBLIC COMMENTS AND PUBLIC MEETING NOTICE**

2716 The agenda will provide time for public comment at each meeting. Members of the public may only  
2717 speak during public comment. The chair and facilitator will determine the time and extent of the public  
2718 comment period based on the agenda for each meeting, with input from the Committee. While the  
2719 Committee is not explicitly required to follow the requirements of the Open Public Meetings Act,  
2720 reasonable efforts will be made to post information and materials on the pertinent website in a timely  
2721 manner to keep the public informed.

---

2722 **SECTION 8. COMMITTEE AND MEDIA COMMUNICATION**

2723 To support clear communication with the Committee, Ecology will:

---

<sup>38</sup> Per RCW 90.94, Ecology shall review the watershed restoration and enhancement plan to ensure it meets net ecological benefit. Ecology shall provide the Committee with a definition and guidance of net ecological benefit.

<sup>39</sup> RCW 90.94.030 does not require local jurisdiction approval prior to plan adoption.

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

- 2724 1. Operate a listserv for Committee members and interested parties;  
2725 2. Develop and manage a website for members of the Committee to access documents such as  
2726 agendas, meeting summaries, technical reports, calendar, and other items as requested by the  
2727 Committee;  
2728 3. Conduct briefing calls with the Committee ahead of each meeting; and  
2729 4. Conduct follow up calls with Committee members unable to attend meetings or with differing  
2730 opinions.

2731  
2732 The facilitator and Ecology shall prepare, distribute and post on the Committee webpage a written  
2733 meeting summary for each Committee meeting within 10 business days of the last Committee meeting.  
2734 The summary, at a minimum, will include a list of attendees, decisions, discussion points, assignments,  
2735 and action items. If comments are cited in such summaries, each speaker will be identified as  
2736 appropriate or requested. Meeting summaries will capture areas of agreement and disagreement within  
2737 the group. The Committee will approve the meeting summary at the following meeting.

2738 ***Communication with the media***

2739 When speaking to the media or other venues, the Committee members will clearly identify any opinions  
2740 expressed as their personal opinions and not necessarily those of the other Committee members or the  
2741 Committee as a whole. The Committee members will not attempt to speak for other members of the  
2742 group or to characterize the positions of other members to the media or other venues. Comments to  
2743 the media will be respectful of other Committee members.

2744 Following significant accomplishments, the Committee may request Ecology to issue formal news  
2745 releases or other media briefing materials. All releases and information given to the media will  
2746 accurately represent the work of the Committee. Ecology will make every effort to provide the  
2747 Committee with materials in advance for input, recognizing that media timelines may not allow for  
2748 adequate review by the Committee.

2749 **Appendix C – Aquifer Units within WRIA 15**

2750

Aquifer	Description	Typical Thickness
<b>Qvr – Vashon Recessional Aquifer</b>	Found at land surface where present, this aquifer consists of sand, gravel, and silt, with lenses of silt and clay derived from recessional glacial outwash. Presence is limited to former outwash channels, primarily found along major surface water drainages in the WRIA.	Thickness, where present, ranges from a few feet up to about 120 feet with an average of about 22 feet.
<b>Qva – Vashon Advance Aquifer</b>	This aquifer is mainly composed of deposits from the Vashon advance outwash (Qva). The deposits are usually well-sorted sand or sand and gravel, sometimes with lenses of silt or clay. The unit is generally unconfined, but confining conditions exist where the aquifer is fully saturated and overlain by the Vashon Till confining unit (Qvt).	The thickness typically ranges from 20 to about 240 feet, with some areas exceeding 300 feet.
<b>QA1 – Sea-Level Aquifer</b>	This aquifer consists primarily of glacial (pre-Vashon) sand and gravel with silt interbeds. This unit is generally confined by the overlying Upper Confining Unit (QC1). The upper surface of this aquifer ranges from several hundred feet below sea level to 300 feet above sea level, with an average elevation of about 20 feet.	The thickness typically ranges from 50 to about 250 feet, with an average of about 84 feet.
<b>QA2 – Glaciomarine Aquifer</b>	Composition of this aquifer ranges from sand and gravel to silt. This unit is confined by the overlying Middle Confining Unit (QC2). Few wells tap this aquifer, given its greater depth and lower productivity than the overlying Qvr and QA1 aquifers. The upper surface of this aquifer ranges from 600 feet below sea level to less than 200 feet below sea level.	The thickness typically ranges from less than 20 to more than 300 feet, with an average of about 85 feet.
<b>QA3 – Deep Aquifer</b>	This aquifer consists mostly of sand and gravel with silt interbeds. This unit is confined by the overlying Lower Confining Unit (QC3). The upper surface of this aquifer ranges from more than 900 feet below sea level to slightly more than 200 feet below sea level.	The thickness typically ranges from 50 to 350 feet, with an average of about 128 feet.

2751

2752 **Appendix D – Surface Water Quality Assessments Category 4**  
2753 **and 5 Listings in WRIA 15**  
2754  
2755

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

<b>WATERBODY</b>	<b>CURRENT CATEGORY</b>	<b>PARAMETER</b>	<b>TMDL_NAME</b>	<b>MEDIUM_NAME</b>
ANDERSON CREEK	4C	Fish And Shellfish Habitat		Habitat
ANNAPOLIS CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
BARKER CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
ARRANTES CREEK	5	Temperature		Water
	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
BEAR CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Bear, Burley, and Purdy Creeks 4b Project	Water
BEAVER CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
BELFAIR CREEK	4A	Bacteria	Union River Bacteria TMDL	Water
BIG ANDERSON CREEK	5	pH		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
BIG BEEF CREEK	5	Temperature		Water
		Dissolved Oxygen		Water
		pH		Water
BIG MISSION CREEK	5	Temperature		Water
BIG SCANDIA CREEK	5	Temperature		Water
		Dissolved Oxygen		Water
BIG SCANDIA CREEK	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
BJORGEN CREEK	5	Dissolved Oxygen		Water
		Temperature		Water
	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
BLACKJACK CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
BOYCE CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
BURLEY CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Bear, Burley, and Purdy Creeks 4b Project	Water
CARPENTER CREEK	5	Dissolved Oxygen		Water

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

WATERBODY	CURRENT CATEGORY	PARAMETER	TMDL_NAME	MEDIUM_NAME
	5	Temperature		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
CHICO CREEK	5	Dissolved Oxygen		Water
	5	Temperature		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
CLEAR CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
CLEAR CREEK, W.F.	5	Dissolved Oxygen		Water
COULTER CREEK	5	Dissolved Oxygen		Water
	5	pH		Water
COWLING CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
CURLEY CREEK	5	Dissolved Oxygen		Water
		Temperature		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
DANIELS CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
DEWATTO RIVER	4B	Bacteria	Kitsap County Bacteria 4B	Water
DICKERSON CREEK	5	Temperature		Water
		Dissolved Oxygen		Water
DOGFISH CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Dogfish Creek 4b Project	Water
DOGFISH CREEK, E.F.	5	Dissolved Oxygen		Water
	4B	Bacteria	Dogfish Creek 4b Project	Water
DOGFISH CREEK, S.F.	4B	Bacteria	Kitsap County Bacteria 4B	Water
DUNCAN CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
ENETAI CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
FISHER CREEK	5	Temperature		Water
GAMBLE CREEK	5	Temperature		Water
		Dissolved Oxygen		Water

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

<b>WATERBODY</b>	<b>CURRENT CATEGORY</b>	<b>PARAMETER</b>	<b>TMDL_NAME</b>	<b>MEDIUM_NAME</b>
GORST CREEK	5	Dissolved Oxygen		Water
GROVERS CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
HUGE CREEK	5	Dissolved Oxygen		Water
ILLAHEE CREEK	5	Dissolved Oxygen		Water
INDIANOLA CREEK	4B	Bacteria	Kitsap County Bacteria 4B	Water
JOHNSON CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
JUDD CREEK	5	Temperature		Water
JUMPOFF JOE CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
KARCHER CREEK	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
KEYPORT CREEK	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
KINMAN CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
KITSAP CREEK	5	Dissolved Oxygen		Water
		Temperature		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
KITSAP LAKE	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
LAGOON CREEK	5	pH		Water
LEMOLO CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
LITTLE MINTER CREEK	5	Bacteria		Water
LITTLE MISSION CREEK	5	Bacteria		Water
LITTLE SCANDIA CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
LOFALL CREEK	4B	Bacteria	Kitsap County Bacteria 4B	Water
LONG LAKE	5	Total Phosphorus		Water
	4C	Invasive Exotic Species		Habitat
MARTHA-JOHN CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Martha John and Gamble Creeks 4b Project	Water

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

WATERBODY	CURRENT CATEGORY	PARAMETER	TMDL_NAME	MEDIUM_NAME
MAYO CREEK	5	Bacteria		Water
		Temperature		Water
MINTER CREEK	5	Bacteria		Water
		Dissolved Oxygen		Water
MISSION LAKE	4C	Invasive Exotic Species		Habitat
MURDEN CREEK	4B	Bacteria	Kitsap County Bacteria 4B	Water
OSTRICH BAY CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria		Sinclair & Dyes Inlets Tributaries Bacteria TMDL
OSTRICH BAY CREEK, W.B.	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
PAHRMANN CREEK	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
PERRY CREEK	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
PHINNEY CREEK	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
PICNIC CREEK	5	Bacteria		Water
		pH		Water
PRIVATE CREEK	5	Bacteria		Water
		pH		Water
PURDY CREEK	5	Bacteria	Bear, Burley, and Purdy Creeks 4b Project	Water
		Dissolved Oxygen		Water
RAVINE CREEK	5	Bacteria		Water
	5	Bacteria		Water
RIDGETOP CREEK	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
ROSS CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria		Sinclair & Dyes Inlets Tributaries Bacteria TMDL
ROYAL VALLEY CREEK	4B	Bacteria	Kitsap County Bacteria 4B	Water
SACCO CREEK	5	pH		Water
	4A	Bacteria		Sinclair & Dyes Inlets Tributaries Bacteria TMDL
SALMONBERRY CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria		Kitsap County Bacteria 4B
SEABECK CREEK	5	Dissolved Oxygen		Water
SHOOFLY CREEK	5	Bacteria		Water
SPRINGBROOK CREEK	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
SQUARE LAKE	4C	Invasive Exotic Species		Habitat



WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

<b>WATERBODY</b>	<b>CURRENT CATEGORY</b>	<b>PARAMETER</b>	<b>TMDL_NAME</b>	<b>MEDIUM_NAME</b>
STATE PARK CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
STAVIS CREEK	5	Dissolved Oxygen		Water
STEELE (CROUCH) CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
STEELE CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
STRAWBERRY CREEK	5	Dissolved Oxygen		Water
	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
TAHUYA LAKE	4C	Invasive Exotic Species		Habitat
TAHUYA RIVER	5	Dissolved Oxygen		Water
		Temperature		Water
		Dissolved Oxygen		Water
UNION RIVER	5	Dissolved Oxygen		Water
		Temperature		Water
		4A	Bacteria	Union River Bacteria TMDL
UNNAMED CREEK (IN THE ANDERSON CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (IN THE BIG BEEF CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (IN THE BOYCE CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (IN THE HARDING CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (IN THE LITTLE ANDERSON CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (IN THE STAVIS CREEK SYSTEM)	4C	Fish And Shellfish Habitat		Habitat
UNNAMED CREEK (TRIB TO AMSTERDAM BAY)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO BANGOR TRIDENT LAKE OUTLET CREEK)	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water
UNNAMED CREEK (TRIB TO DOGFISH CREEK)	4B	Bacteria	Kitsap County Bacteria 4B	Water
UNNAMED CREEK (TRIB TO DUTCHER COVE)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO FILUCY BAY)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO GREAT BEND/LYNCH COVE)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO HOOD CANAL)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO KITSAP LAKE)	4A	Bacteria	Sinclair & Dyes Inlets Tributaries Bacteria TMDL	Water

WRIA 15 WRE Plan Second Draft – For Initial Review by Committee

<b>WATERBODY</b>	<b>CURRENT CATEGORY</b>	<b>PARAMETER</b>	<b>TMDL_NAME</b>	<b>MEDIUM_NAME</b>
	4B	Bacteria	Kitsap County Bacteria 4B	Water
UNNAMED CREEK (TRIB TO LIBERTY BAY)	5	Temperature		Water
UNNAMED CREEK (TRIB TO LIBERTY BAY)	4A	Bacteria	Liberty Bay Watershed Bacteria TMDL	Water
UNNAMED CREEK (TRIB TO NORTH CREEK)	5	Lead		Water
		Copper		Water
UNNAMED CREEK (TRIB TO ORO BAY)	5	Bacteria		Water
UNNAMED CREEK (TRIB TO UNION RIVER)	5	Dissolved Oxygen		Water
		Temperature		Water
UNNAMED CREEK (TRIB TO VAUGHN BAY)	5	Bacteria		Water
VAUGHN CREEK	5	Bacteria		Water
WILSON CREEK	5	Dissolved Oxygen		Water
	4B	Bacteria	Kitsap County Bacteria 4B	Water
WYE LAKE	4C	Invasive Exotic Species		Habitat

2756

2757 **Appendix E – TMDL Table for WRIA 15**

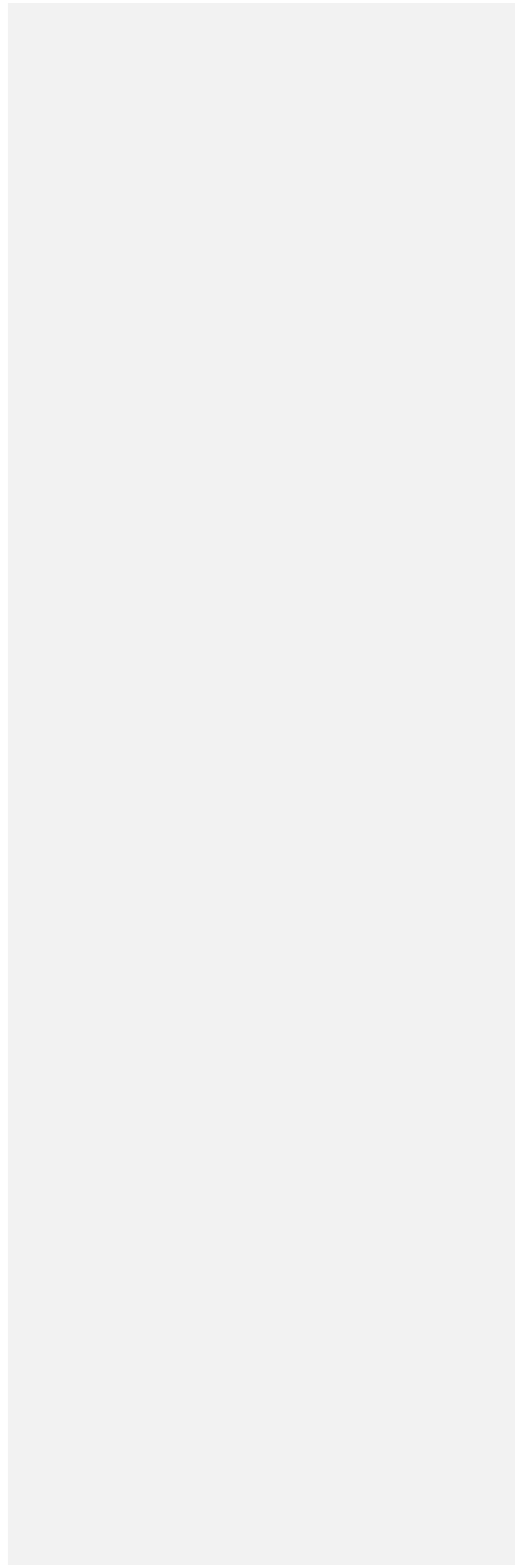
2758 Category 5, 303(d) listed streams in WRIA 15

WATERBODY_NAME	Temp	DO	pH	Bacteria	Copper	Lead	TP
ANNAPOLIS CREEK		X					
BARKER CREEK		X					
BARRANTES CREEK	X						
BEAR CREEK		X					
BEAVER CREEK		X					
BIG ANDERSON CREEK			X				
BIG BEEF CREEK	X	X	X				
BIG MISSION CREEK	X						
BIG SCANDIA CREEK	X	X					
BJORGEN CREEK	X	X					
BLACKJACK CREEK		X					
BOYCE CREEK		X					
BURLEY CREEK		X					
CARPENTER CREEK	X	X					
CHICO CREEK	X	X					
CLEAR CREEK		X					
CLEAR CREEK, W.F.		X					
COULTER CREEK		X	X				
COWLING CREEK		X					
CURLEY CREEK	X	X					
DANIELS CREEK		X					
DICKERSON CREEK	X						
DOGFISH CREEK		X					
DOGFISH CREEK, E.F.		X					
DUNCAN CREEK		X					
ENETAI CREEK		X					
FISHER CREEK	X						
GAMBLE CREEK	X	X					
GORST CREEK		X					
GROVERS CREEK		X					
HUGE CREEK		X					
ILLAHEE CREEK		X					
JOHNSON CREEK		X					
JUDD CREEK	X						
JUMPOFF JOE CREEK		X					
KINMAN CREEK		X					
KITSAP CREEK	X	X					
LAGOON CREEK			X				
LEMOLO CREEK		X					
LITTLE MINTER CREEK				X			
LITTLE MISSION CREEK				X			

WATERBODY_NAME	Temp	DO	pH	Bacteria	Copper	Lead	TP
LITTLE SCANDIA CREEK		X					
LONG LAKE							X
MARTHA-JOHN CREEK		X					
MAYO CREEK	X			X			
MINTER CREEK		X		X			
OSTRICH BAY CREEK		X					
PICNIC CREEK			X	X			
PRIVATE CREEK			X	X			
PURDY CREEK		X		X			
RAVINE CREEK				X			
ROSS CREEK		X					
SACCO CREEK			X				
SALMONBERRY CREEK		X					
SEABECK CREEK		X					
SHOOFLY CREEK				X			
STATE PARK CREEK		X					
STAVIS CREEK		X					
STEELE (CROUCH) CREEK		X					
STEELE CREEK		X					
STRAWBERRY CREEK		X					
TAHUYA RIVER	X	X					
UNION RIVER	X	X					
TRIB TO AMSTERDAM BAY				X			
TRIB TO DUTCHER COVE				X			
TRIB TO FILUCY BAY				X			
TRIB TO GREAT BEND/LYNCH COVE				X			
TRIB TO HOOD CANAL				X			
TRIB TO LIBERTY BAY	X						
TRIB TO NORTH CREEK					X	X	
TRIB TO ORO BAY				X			
TRIB TO UNION RIVER	X	X					
TRIB TO VAUGHN BAY				X			
VAUGHN CREEK				X			
WILSON CREEK		X					

2759

2760 **Appendix F – Subbasin Delineation Memo**



# Technical Memorandum

## WRE Committees Technical Support

---



To: Stacy Vynne McKinstry, Washington State Department of Ecology  
From: Bob Montgomery, Anchor QEA; Chad Wiseman, HDR  
Date: February 12, 2020 (original); May 27, 2020 (revised)  
Subject: WRIA 15 Subbasin Delineation  
(Work Assignment WA-01, Task 2)

---

## 1.0 Introduction

HDR is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) committee for Water Resource Inventory Area (WRIA) 15. The Streamflow Restoration law (Revised Code of Washington [RCW] Chapter 90.94) requires that WRE plans include actions to offset new consumptive-use impacts associated with permit-exempt domestic water use. RCW 90.94.030(3)(b) states, “The highest priority recommendations must include replacing the quantity of consumptive water use during the same time as the impact and in the same basin or tributary.” Therefore, delineations must be developed for the subbasins in WRIA 15 that will be used as a spatial framework for growth projections, consumptive-use estimates, and priority offset projects. The Net Ecological Benefit (NEB) evaluation will also be based on this framework. This technical memorandum addresses the basis for subbasin delineation in WRIA 15 (Kitsap).

## 2.0 Subbasin Delineation

This section explains the initial and final delineations for WRIA 15. The term “subbasin” is used by the WRIA 15 WRE committee for planning purposes only and to meet the requirements of RCW 90.94.030 (3)(b).

### 2.1 Initial Delineation

The WRIA 15 workgroup (a subcommittee of the WRE committee) was tasked to delineate subbasin boundaries for discussion at WRE committee meetings. An initial discussion was held at the April 4, 2019, workgroup meeting and Pierce County, the Kitsap Public Utility District (PUD), and the Squaxin Tribe subsequently developed maps of proposed subbasin boundaries and provided those to Ecology and the WRE committee.

The initial, general considerations included the following:

- Subbasins should be neither too big nor too small.
- Surface water flows and rain flow patterns should be included.
- Anticipated rural growth and where there is little growth will likely drive projects and impacts.
- Priority areas for salmon recovery should be included.

- Isolated areas like islands without streamflow connectivity to the mainland should be included as their own subbasin (for example, the South Sound Islands are grouped based on relatively low projected growth and proximity to Pierce County mainland).
- There should be recognition that the WRE committee can revise subbasins throughout the process.

The maps were further discussed at the May 2, 2019, WRE committee meeting and the workgroup meeting that immediately followed that meeting.

The result of the discussion on May 2, 2019, was a proposal that divides WRIA 15 into “regions” that are an initial delineation of subbasins that will be revisited as the watershed planning process continues. The key points discussed are as follows:

- Considerations for subbasins include starting large, using a nesting approach, and ensuring that there is justification for offset projects outside of a subbasin.
- The workgroup is committed to finding projects closest to the impact and revisiting subbasin delineations throughout the process.
- The regions map will be used for generating growth projections and consumptive use. The counties shared that they can project growth at any level but recognize that the smaller the subbasins are, the less reliable the data are. It is helpful for the counties to have the proposed size of regions for providing their growth projections.
- Some workgroup members are interested in using smaller assessment areas as well, such as Hydrologic Unit Code 12 (HUC12) boundaries, to look at particular stream impacts.
  - Workgroup members also suggesting using Assessment Units<sup>1</sup> (from Ecology’s Puget Sound Watershed Characterization Project) as a starting point for mitigation.
- The Squaxin Tribe would like to see a road map of how the subbasin delineations will be revisited throughout the process.

Further discussion of the regions approach occurred in the June 4, 2019, workgroup meeting and the June 6, 2019, WRE committee meeting. Agreement was reached on proceeding with use of the regions with the following caveats:

- The regions approach is a nested approach where regions are essentially a “do not cross” line for finding projects to offset impacts.
- Projects should be closest to the anticipated impact and provide benefit to streams. Using a nested approach, the potential for offsets will be evaluated first at the assessment unit scale, then at the HUC 14 scale, and finally at the subbasin scale. In other words, the committee will look for projects at the finest scale possible first. If the offsets are not achievable at the small or

---

<sup>1</sup> Assessments Units are described in the Puget Sound Watershed Characterization Project (Department of Ecology, 2013). Each WRIA is made up of subwatersheds, called watershed management units, which are further divided into Assessment Units. A variety of watershed assessment results are presented for each assessment unit, including: water flow (for delivery, surface storage, recharge, and discharge processes); water quality processes (for five parameters: sediment, phosphorus, nutrients, pathogens, and metals); and fish and wildlife habitats (for terrestrial, freshwater and marine habitats).

intermediate unit scale, justification will be provided (for example, there is greater relative benefit in a larger project in a stream of importance).

- The WRE committee will continue to revisit delineation of subbasins once growth projections and projects are developed.

The June proposal included three main regions: South Sound, West Sound, and Hood Canal. The boundary between the West Sound region and the Hood Canal region in the northern Kitsap Peninsula was left flexible with the recognition that projects in one region could benefit streams in the other region. The other regions are Bainbridge Island, Vashon-Maury Island, and the three south Puget Sound islands (McNeil, Anderson, and Ketron).

## 2.2 Revision to Hood Canal Region

The Skokomish Tribe proposed to revise the region delineation by dividing the Hood Canal region into North Hood Canal and South Hood Canal regions. The reason is differing precipitation amounts, development and status of fish species. The proposal was first presented to the WRIA 15 Committee in October who passed it to the workgroup for discussion. A subset of workgroup members reviewed the proposal and recommended the proposal be accepted. The proposal was further discussed at the November 7, 2019 WRIA 15 Committee meeting. There was agreement amongst all Committee members present to accept the revision to the Hood Canal region.

## 2.3 Final Delineation

Agreement was reached at the March 5, 2020 WRIA 15 committee meeting to accept the region delineations as the subbasin boundaries. Figure 1 presents the subbasins as agreed to at that meeting.

## 3.0 Conclusion

The WRIA 15 WRE committee delineation of subbasins will be used as an organizational framework for growth projection and consumptive-use scenarios. References

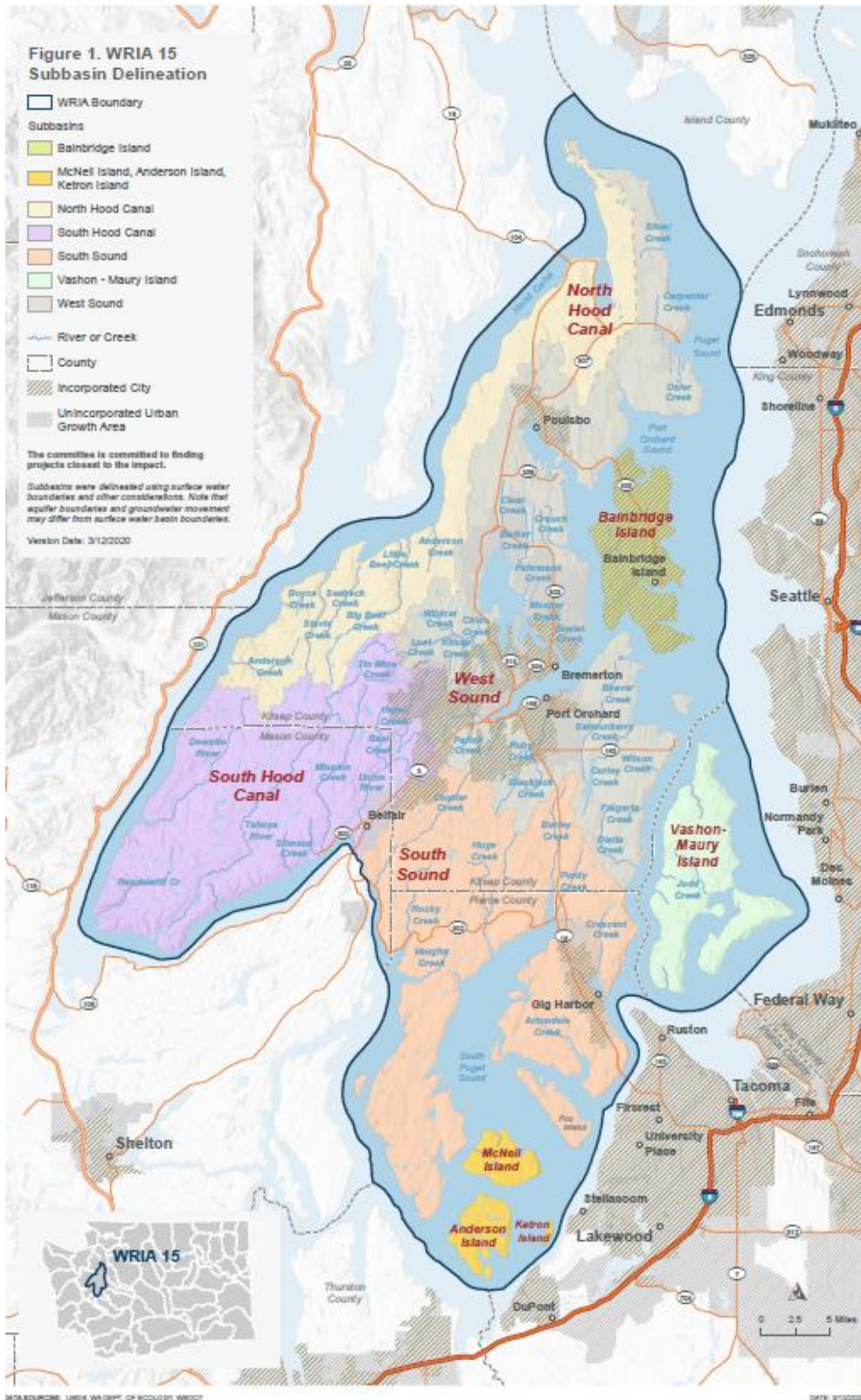
Revised Code of Washington (RCW). 2019. Watershed Planning, Chapter 90.82 RCW. Accessed on June 23, 2019, at <https://app.leg.wa.gov/rcw/default.aspx?cite=90.82>.

RCW. 2019. Streamflow Restoration, Chapter 90.94 RCW. Accessed on June 23, 2019, at <https://app.leg.wa.gov/RCW/default.aspx?cite=90.94>.

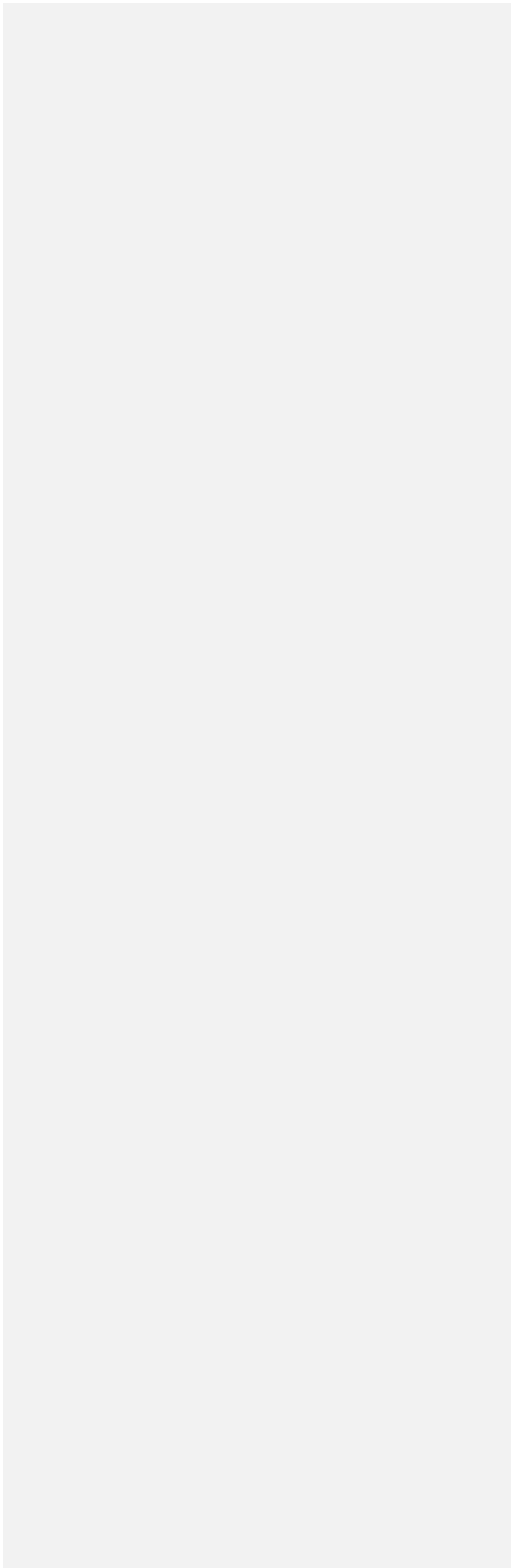
U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service (USGS). 2013. Federal Standards and Procedures for the National Watershed Boundary Dataset (WBD) (4 ed.): Techniques and Methods 11–A3, 63 p., <https://pubs.usgs.gov/tm/11/a3/>.



Figure 1. WRIA 15 subbasin delineation



2766 **Appendix G – Growth Projections and Consumptive Use**  
2767 **Memo**



To: Stacy Vynne McKinstry, Washington State Department of Ecology  
From: Chad Wiseman, HDR and Bob Montgomery, Anchor QEA  
Date: February 13, 2020 (original); May 27, 2020 (revised)  
Subject: WRIA 15 PE Growth and Consumptive Use Summary  
(Work Assignment 2, Tasks 2 and 3)

---

## 1.0 Introduction

HDR is providing technical support to the Washington State Department of Ecology (Ecology) and the Watershed Restoration and Enhancement (WRE) committees for Water Resource Inventory Areas (WRIAs) 10, 12, 13, 14, and 15.

Under RCW 90.94, consumptive water use by permit-exempt domestic wells and connections (PE wells) occurring over the 20 year period of 2018-2038 (planning horizon) must be estimated to establish the water use that watershed restoration plans and plan updates are required to address and offset. This memorandum summarizes PE wells and related consumptive use of groundwater that is projected to impact WRIA 15 over the planning horizon.

This memorandum includes:

- A summary of WRIA 15 baseline, low, and high PE growth scenarios.
- A summary of WRIA 15 baseline, low, and high scenario consumptive use using three different methods.

## 2.0 WRIA 15 PE Growth Projection Methods

Portions of Mason, Pierce, and King Counties and all of Kitsap County are located within WRIA 15. The WRIA 15 WRE committee agreed to develop high and low growth projection scenarios based on varying the Kitsap and Pierce County projections. At this time, Mason County and King County growth projections remained the same for the baseline high and low scenario projections; however the Squaxin Island Tribe has expressed interest in possibly seeing a higher growth scenario or safety factor for Mason County. Mason County wants to ensure that the adaptive management component of the plan considers the results of the census for changes in population growth (available in 2022).

### 2.1 Kitsap County

Two methods were used to project growth over the planning horizon for Kitsap County. Both the Kitsap County Land Capacity Analysis, completed by County staff, and the Historical Wells Method, completed by Kitsap Public Utility District (Kitsap PUD), result in similar numbers:

Kitsap County Land Capacity Analysis

- 1) Identify 20-year growth projections from the Kitsap Regional Coordinating Council growth projections (conversion to single-family residences based on assumed people per household and rural growth target).

- 2) Allocate growth by subbasin based on proportion of historical building permits by subbasin from 2002 to 2019.
- 3) Conduct a land capacity analysis. Determine vacant parcels within each subbasin that is within and outside of the waterline or sewerline 200-foot buffer. Assume that all parcels greater than 0.15 acre are buildable if they are within the 200-foot buffer. Buildout capacity for parcels greater than 0.75 acre outside of a 200-foot waterline buffer is assumed to be served by PE wells. Assume that that growth occurs along the waterline areas first, and that the forecasted number of PE wells is less than the forecasted number of single family residences as some wells may have multiple connections.
- 4) Multiply the growth for each subbasin (step 2) by the proportion of growth expected to be served by PE wells(step 3).
- 5) The application of this method to City of Bainbridge Island results in no new PE wells. An alternative method for City of Bainbridge Island was performed which assumes one PE well connection per parcel, regardless of parcel size. It was also assumed that growth occurs along the waterline areas first with the remaining growth occurring on parcels needing PE wells.

Kitsap County developed three iterations of growth projections in rural areas based on varying the minimum parcel size to be suitable for a PE well in the land capacity analysis (Step 3). The versions included 0.25 acre, 0.75 acre, and 1.0 acre. The final version recommended by the county assumed a minimum acreage for PE wells of 0.15 acre in their land capacity analysis and also used additional data on water lines and sewer lines (as a proxy for water lines). This version was provided to HDR on November 22, 2019. Kitsap County provided a flow chart of the land capacity analysis and heat map (HDR 2019a).

#### Historical Wells Method:

- 1) Calculate historical growth rates of PE wells using County records of wells drilled (2003-2018). Note this is all wells drilled, not just PE wells.
- 2) Forecast growth of future PE well connections for the 20-year planning horizon, based on the historical growth rate.
- 3) Allocate growth of PE wells within each subbasin spatially, based upon land capacity analysis (i.e., parcel must be outside of UGA, not in a water and wastewater system boundary, not already built upon, or must have zoning category that allows for domestic use).

## 2.2 King County

The following methods were used to project growth over the planning horizon:

- 1) Use historical building permit data (2000–2017) to project future growth.
- 2) Define if each historical building permit used for growth projections is public or private (aka PE well) water service.
- 3) Multiply the annual (projected) number of building permits per year by the percentage of permits using private water to determine a projected number of PE well connections per year to yield the annual rate of PE well connections.

- 4) Multiply the rate of annual PE well connections by 20 for the estimated total of PE well connections over a 20-year period.
- 5) Overlay subbasins to determine number of new PE well connections in each subbasin.
- 6) Remove the portion of the wells that are projected to be inside of the water district service boundaries.

The King County method is described in more detail in a technical memo provided by the county dated December 16, 2019 (HDR 2019a). King County growth projections did not change from the initial projections on July 31, 2019.

## 2.3 Mason County

The following methods were used to project growth during the planning horizon:

- 1) Develop 20-year growth projections based on the Mason County Comprehensive Plan (the Comprehensive Plan is based on Office of Financial Management medium population growth estimates, and conversion to dwelling units based on assumed people per dwelling unit).
- 2) Determine available land for single-family domestic units and determine proportion of buildout capacity by county urban growth areas (UGAs) and rural lands.
- 3) Apply growth projections to buildable lands.
- 4) Remove projected development unlikely to connect to a PE well (i.e., parcel is located within a water system service area; parcel is smaller than 1 acre).
- 5) Overlay subbasins to determine new PE connections in each subbasin.

Initial growth projections for Mason County were updated because of 1) updates to county parcel attributes and 2) a request from the WRIA 14 and WRIA 15 WRE committees to account for PE wells within water system service areas. Parcel data were updated to correct for circumstances where the zoning and land use attributes identified a parcel as buildable but were also associated with a feature that was incompatible with building (e.g., on top of a waterbody). The initial methods assumed zero PE well growth within water system service areas in both the urban growth areas (UGAs) and rural areas. HDR developed a method that allocates PE well growth in rural water systems proportional to the number of parcels in each water system not currently served by the water system.

The method is comprised of the following steps:

- 1) Assume future growth is proportional to buildable parcels with available water system hookup and parcels that would require a PE well or connection for development.
- 2) Define total buildable parcels per county buildable lands analysis that are contained within each respective water system service area. The water system service areas are defined by the Washington State Department of Health (DOH) as polygons in the Geographic Information Service (GIS) platform.
- 3) Define active and total approved (active + available) water system connections from the DOH Sentry database.

- 4) Calculate buildable parcels with an available water system hookup (total approved minus active water system connections)
- 5) Calculate buildable parcels that would require a PE well or connection for development (total buildable parcels minus total approved connections).
- 6) Calculate ratio of buildable parcels that would require a PE well or connection (step 5) to the parcels with an available water system hookup (step 4) and multiply by the number of dwellings predicted to occur in that water system service area.

## 2.4 Pierce County

The following methods were used to project growth over the planning horizon:

- 4) Calculate historical growth rates of PE wells for each subbasin using the Tacoma-Pierce County Health District (TPCHD) well database (1999–2018).
- 5) Forecast growth of future PE well connections for the planning horizon, based on the subbasin-specific historical growth rate.
- 6) Allocate growth of PE wells within each subbasin spatially, based upon a parcel assessment for PE well potential (i.e., parcel must be outside of UGA, not in a water and wastewater system boundary, not already built upon, or must have zoning category that allows for domestic use).

No changes were made to the growth projection methods or results occurred since the initial growth projection on July 31, 2019.

## 2.5 High and Low Growth Scenarios

Because of the uncertainty in the projections, the WRIA 15 Committee evaluated additional permit-exempt well scenarios using different periods in the historical TPCHD well database. The high growth scenario uses the 1999–2008 data, which was a time of relatively healthy economic growth resulting in more rapid rural development. The low growth scenario uses the 2009–2018 data, which was a time of a relatively slower rate of rural development and corresponds with the recession and housing downturn. For Kitsap County, a plus or minus five percent was used to calculate the high and low growth scenario. The five percent is based on the margin of error between the County's rural growth projections and actual growth. High and low growth scenarios were not calculated for Mason or King Counties at the Counties' request.

# 3.0 WRIA 15 Consumptive Use Methods

Consumptive use of water from projected PE well growth was estimated using three different methods; 1) the Irrigated Area Method; 2) the Water System Data Method and; 3) the USGS Groundwater Model Method

## 3.1 Irrigated Area Method

Consumptive use was calculated using Ecology's recommended assumptions for indoor and outdoor consumptive use (Ecology 2018; 2019).

### 3.1.1 Indoor Consumptive Use – Irrigated Area Method

Ecology (2018; 2019) recommends the following assumptions for estimating indoor consumptive water use:

- 60 gallons per day per person within a household
- 2.5 persons per household (or as otherwise defined by the Counties)
- 10 percent of indoor use is consumptively used
  - Most homes served by a PE well use septic systems for wastewater. This method assumes 10 percent of water entering the septic system will evaporate out of the septic drain field and the rest will be returned to the groundwater system.

The above assumptions were used to estimate indoor consumptive water use by occupants of a single dwelling unit. Assuming that there is one PE well connection per dwelling unit, a “per PE well connection” consumptive use factor was applied to the growth projections forecast in each subbasin to determine total indoor consumptive use per subbasin. This method is summarized by the following equation:

$$HCIWU (gpd) = 60 \frac{gal}{day * person} * 2.5 \frac{people}{household} * CUF$$

Where:

HCIWU = Household Consumptive Indoor Water Use (gpd)

CUF= Consumptive use factor; assumed to be 10% (factor expressed as 0.10)

This estimate of indoor per household per day can be annualized and converted to acre-feet per year or cubic feet per second.

### 3.1.2 Outdoor Consumptive Use – Irrigated Area Method

Ecology (2018; 2019) recommends estimating future outdoor water use based on an estimate of the average outdoor irrigated area for existing homes served by PE wells. To calculate the consumptive portion of total outdoor water required per parcel/connection over a single growing season, Ecology recommends:

- Estimating the average irrigated lawn area (pasture/turf grass) per parcel in each WRIA,
- Applying crop irrigation requirements,
- Correcting for application efficiency (75 percent efficiency recommended by Ecology guidance) to determine the total outdoor water required over a single growing season, and
- Applying a percentage of outdoor water that is assumed to be consumptive (80 percent outdoor consumptive use recommended).

WRE Committees were given the opportunity to adjust variables used in the analysis when applicable to the specific WRIA. WRIA 15 opted not to adjust variables.

The average irrigated area in WRIA 15 was estimated by measuring areas of visible irrigation (i.e. green lawns relative the surrounding, gardens, managed landscaping) in using aerial imagery in 80 random parcels with existing dwellings that have a PE well or connection (Figure 1). The average irrigated area was 0.08 acres (Table 1). Most parcels evaluated did not have visible signs of irrigation in the aerial imagery (Figure 2). Detailed methods and results are defined in the consumptive use methods technical memorandum and report (HDR 2019b).

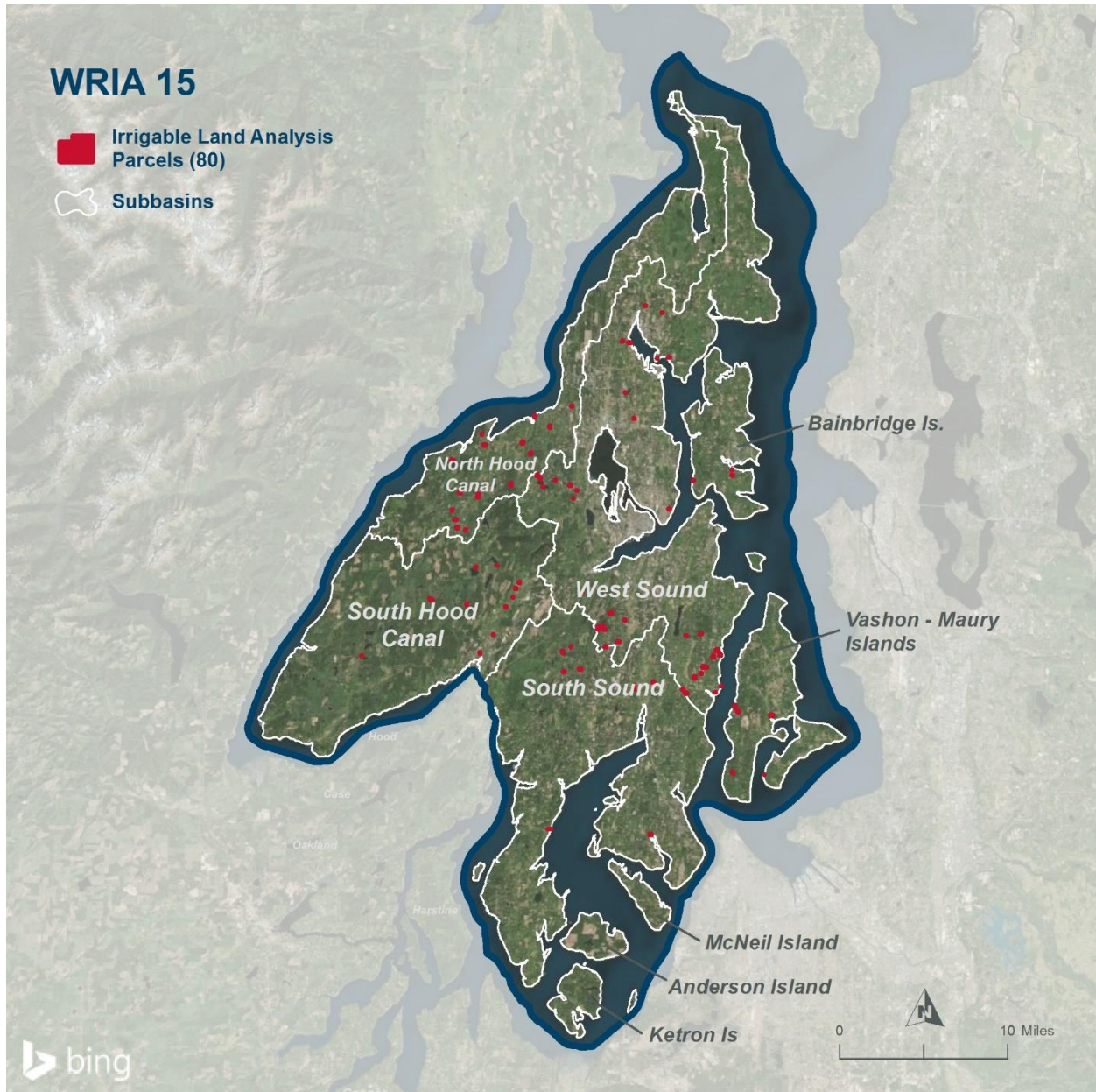


Figure 1. Parcels selected in WRIA 15 with existing PE well that were delineated for apparent irrigated areas.

Table 1. Irrigated acreage delineation results.



Statistic	WRIA 15
PE Parcel Sample Pool	8,987
Sample Size	80
Mean (acres)	0.08
Standard Deviation (acres)	0.13
95% UCL (acres)	0.14

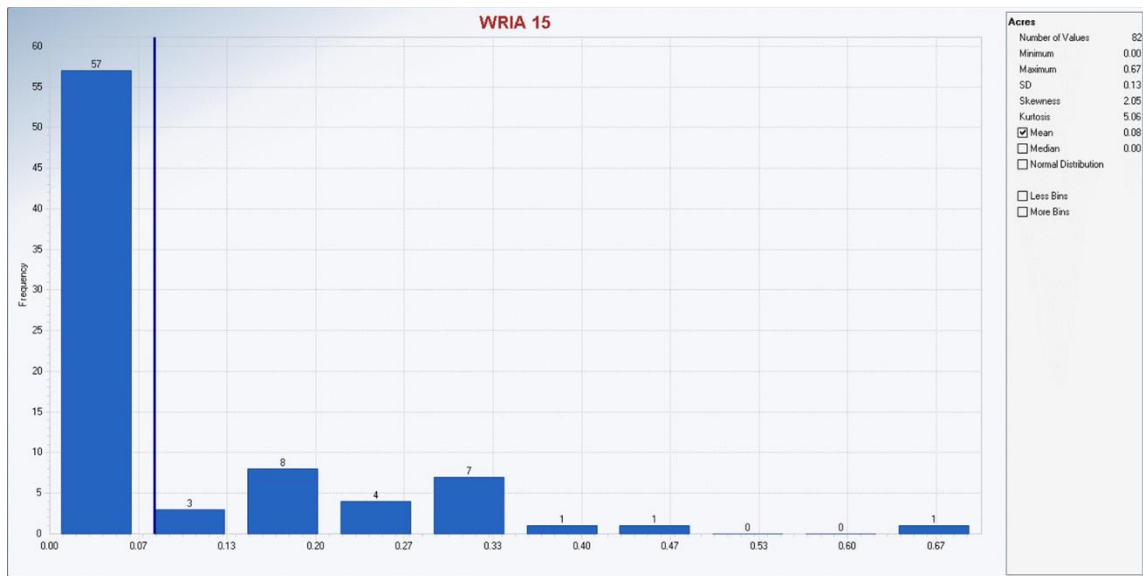


Figure 2. Histogram of WRIA 15 irrigated acreage delineation results.

Once average irrigable acreage per connection was determined for a WRIA, water use was calculated based on irrigation requirements and application efficiency. Crop irrigation requirements were estimated for pasture/turf grass from nearby stations as provided in the Washington Irrigation Guide (NRCS-USDA, 1997). An irrigation application efficiency was applied to account for water that does not reach the turf. Ecology (2018; 2019) recommends using a 75 percent application efficiency factor. The consumptive portion of total amount of water used for outdoor use was assumed to be 80 percent of the total. This method is summarized in the following equation:

$$HCOWU (gpd) = A (acres) * IR(feet) * AE * CUF * CF$$

Where:

HCOWU = Household Consumptive Outdoor Water Use (gpd)

A = Irrigated Area (acres)

IR = Irrigation Requirement over one irrigation season (feet)

AE = Application efficiency; assumed to be 75% (factor expressed as 1/0.75)

CUF= Consumptive use factor; assumed to be 80% (factor expressed as 0.80)

CF = Conversion Factor to convert afy to gpd; 1 afy = 892.742 gpd

## Uncertainty in Irrigated Area Calculations

The irrigated area measurements were performed using a set of 80 parcels distributed throughout WRIA 15. The number of parcels selected was based on the budget for this task as agreed to by HDR and Ecology. Concern was expressed by some members of the Committee that a repeatable, spatially distributed, and statistically valid subset of parcels was not used. While this concern was recognized and acknowledged, ultimately the Committee determined that the results were representative of the WRIA.

The parcels analyzed were selected using the following procedure:

- Define the available pool of parcels with existing PE wells using Tacoma-Pierce County Health Department data for Pierce County and in Mason, Kitsap and King counties using assessor's data and water system boundary data to locate existing residences not served by water systems
- Classify parcels by value (less than \$350,000, \$350-600,000, greater than \$600,000)
- From the available pool of parcels, randomly select a subset of parcels throughout WRIA 15, while ensuring the distribution of parcel values is like that of the entire WRIA 15

The parcel selection procedure provided a spatially distributed and representative sample of parcels with PE wells.

After measuring irrigated area for the subset of 80 parcels, the results were presented to a WRIA 15 workgroup. Kitsap PUD and the Suquamish Tribe performed analyses to independently verify the results. The two independent analyses confirmed the findings of the irrigated area analysis. This indicates the procedure was repeatable. The Committee, with their knowledge of the WRIA, stated that the results were in line with water use in the WRIA. In addition, the technique used to delineate irrigated area was subject to a quality assurance check by another consultant, GeoEngineers, at the request of Ecology (GeoEngineers and HDR, 2020).

**The average irrigated area measured for the 80 parcels is 0.08 acres.** The area is low due to a high number of non-irrigated parcels. HDR performed statistical analyses of the irrigated acreage to estimate the upper confidence limits and to determine the sample size of parcels required to estimate a mean value of irrigated acreage for error margins ranging from 0.01 acre to 0.06 acre. It was found the set of 80 parcels allows the mean to be calculated within a 0.03-acre error margin.

The Committee reviewed the irrigated area calculations and chose not to adjust the calculations by assuming a base amount of irrigation instead of zero for non-irrigated parcels. The Committee believes that 0.08 acres is representative of the irrigated areas for PE wells in WRIA 15 and adopted that value for consumptive use calculations. Factors in that decision are the conservative nature of the consumptive use calculation when applied to the irrigated area and the independent analyses performed to confirm the measurements of irrigated acreage.

At the request of Committee members, the consultant team considered other approaches to measuring and calculating average irrigated area. Measurement techniques using remote sensing data were considered but it was determined that it would be more costly and time-consuming than the method employed by HDR. Additional parcels for analysis were delineated and provided to Committee members for additional analysis for further verification of average irrigated area. No additional analysis was received from Committee members.

## 3.2 Water System Data Method

Consumptive use by PE wells and connections may also be estimated using metered connections from water systems. HDR requested data from WRE Committee members for water systems that use (or have used) a flat rate billing structure and were similar in character to the rural environments in which households may connect to PE wells. In WRIA 15, Kitsap PUD provided consumption data for all Kitsap PUD water systems for years 2017 and 2018.

### 3.2.1 Indoor Use

Average daily use in December, January, and February is representative of year-round daily indoor use. Average daily system-wide use is divided by the number of connections (assuming all connections are residential), to determine average daily indoor use per connection. A 10 percent consumptive use factor was applied to the average daily use in the winter months to determine the consumptive portion of indoor water use per connection.

### 3.2.2 Outdoor Water Use

Average daily indoor use was multiplied by the number of days in a year to estimate total annual indoor use. Total annual indoor use was subtracted from total annual use by a water system to estimate total annual outdoor use. An 80 percent consumptive factor was applied to determine the consumptive portion of outdoor use.

### 3.2.3 Seasonal Outdoor Water Use

Outdoor consumptive use was also estimated on a seasonal basis. The Washington Irrigation Guide reports irrigation requirements between the months of April and September for representative weather stations in WRIA 15. Therefore, seasonal outdoor water use was assumed to occur over a period of six months. Average daily indoor use was multiplied by the number of days in the irrigation season to calculate total indoor use for the irrigation season. Total irrigation season indoor use was then subtracted from total season use to determine total outdoor use for the irrigation season. The value was proportionally allocated to each month in the irrigation season using the requirements from the Washington Irrigation Guide. An 80 percent consumptive factor was applied to determine the consumptive portion of outdoor use.

## 3.3 USGS Groundwater Model Method

A groundwater-flow model was developed by the USGS to improve understanding of water resources on the Kitsap Peninsula. The study area did not include WRIA 15 areas of Key Peninsula, and Vashon, Fox, Anderson, McNeil and Ketron Islands. The first step in the modeling process was to characterize the groundwater-flow system on the Kitsap Peninsula and to prepare a water budget for the study area, which are contained in the report titled *Hydrogeologic Framework, Groundwater Movement and Water Budget of the Kitsap Peninsula, West-Central Washington* (Welch, Frans, and Olsen, 2014). The report provides a survey of consumption from select water utilities serving more than 221,700 people with more than 88,500 residential connections on the Kitsap Peninsula. The USGS study differentiated between the indoor and outdoor portions of use. Estimated indoor use (based on November–April pumping values) was 66 gallons per person per day. Outdoor use was estimated for the outdoor growing season and varied by month from 4 gallons per person per day in May to 97 gallons per person per day in September. The average annual outdoor use was estimated to be 26 gallons per person per day. For the purposes of groundwater modeling USGS set the consumptive use rate for indoor domestic use at 10 percent in nonsewered areas, and the

consumptive use rate for outdoor use at 90 percent. The water use values and consumptive use rates for the USGS study area are used in this report to develop an additional estimate of consumptive use per permit-exempt connection for the entire WRIA 15. To differentiate this method from the water system data method that uses Kitsap PUD managed water system data, it is termed the USGS groundwater model method.

## 4.0 Results

### 4.1 PE Connection Growth

Baseline PE connection growth is projected to be 5,568 connections (Table 2). The high PE growth scenario is projected to have 584 additional connections, for a total of 6,152 PE connections. The low PE growth scenario is projected to have 707 fewer connections than the baseline scenario, for a total of 4,861 PE connections. PE connection growth is expected to be greatest in the “South Sound” subbasin.

### 4.2 Consumptive Use

The irrigated area method yielded a total consumptive use per PE connection of 122.9 gpd.

The water system data method yielded a total consumptive use per PE connection of 64.3 gpd. The USGS model method yielded a total consumptive use per PE connection of 75 gpd. The estimates of consumptive use in WRIA 15 over the 20 year planning horizon using the irrigation area method was 1.06 (baseline), 0.93 (low growth), and 1.17 cfs (high growth).

The estimates of consumptive use in WRIA 15 over the planning horizon using the water system data method were 0.55 cfs (baseline), 0.48 cfs (low growth), and 0.61 cfs (high growth).

The estimates of consumptive use in WRIA 15 over the planning horizon using the USGS model method were 0.65 cfs (baseline), 0.57 (low growth), and 0.72 (high growth). For WRIA 15 scenarios, the estimates of consumptive use using the irrigation area method estimates are approximately 1.9 times higher than the water system data method. Consumptive use is 1.1 times higher in the high growth scenario than the baseline scenario, and approximately 1.7 times higher than the USGS model method. Consumptive use is approximately 1.14 times higher in the baseline scenario than the low growth scenario.

**Table 2. Annualized Average Consumptive Use Estimates for WRIA 15 – Baseline Growth**

Annualized Consumptive Use Estimates for WRIA 15 (2020–2040) – Baseline Growth Projection; 0.75 acre minimum threshold										
Subbasin	Projected PE Well Connections	Annual Consumptive Use: Water System Estimate			Annual Consumptive Use: USGS Estimates			Annual Consumptive Use: Irrigated Area Estimate (per Ecology Guidance)		
		AFY	GPM	CFS	AFY	GPM	CFS	AFY	GPM	CFS
West Sound	1,336	96.2	59.6	0.1331	112.2	69.6	0.1553	183.9	114.0	0.2545
Hood Canal	656	47.2	29.3	0.0653	55.1	34.2	0.0763	90.3	56.0	0.1249
South Hood Canal	1,126	81.0	50.2	0.1121	94.6	58.6	0.1309	155.0	96.1	0.2145
Bainbridge Island	491	35.3	21.9	0.0489	41.3	25.6	0.0571	67.6	41.9	0.0935
South Sound	1,553	111.8	69.3	0.1547	130.5	80.9	0.1805	213.8	132.5	0.2958
Vashon – Maury Island	368	26.5	16.4	0.0367	30.9	19.2	0.0428	50.7	31.4	0.0701
McNeil Island, Anderson Island, Ketron Island	38	2.7	1.7	0.0038	3.2	2.0	0.0044	5.2	3.2	0.0072
<b>Totals</b>	<b>5,568</b>	<b>400.8</b>	<b>248.4</b>	<b>0.5545</b>	<b>467.8</b>	<b>290.0</b>	<b>0.6473</b>	<b>766.4</b>	<b>475.1</b>	<b>1.0605</b>

**Table 3. Annualized Average Consumptive Use Estimates for WRIA 15 – Low Growth**

Annualized Consumptive Use Estimates for WRIA 15 (2020–2040) - Low Growth Projection; 0.75 acre minimum threshold										
Subbasin	Projected PE Well Connections	Annual Consumptive Use: Water System Estimate			Annual Consumptive Use: USGS Estimates			Annual Consumptive Use: Irrigated Area Estimate (per Ecology Guidance)		
		AFY	GPM	CFS	AFY	GPM	CFS	AFY	GPM	CFS
West Sound	1,142	82.2	51.0	0.1137	95.9	59.5	0.1328	157.2	97.4	0.2175
Hood Canal	561	40.4	25.0	0.0559	47.1	29.2	0.0652	77.2	47.9	0.1068
South Hood Canal	1,119	80.5	49.9	0.1114	94.0	58.3	0.1301	154.0	95.5	0.2131
Bainbridge Island	491	35.3	21.9	0.0489	41.3	25.6	0.0571	67.6	41.9	0.0935
South Sound	1,158	83.3	51.7	0.1153	97.3	60.3	0.1346	159.4	98.8	0.2206
Vashon – Maury Island	368	26.5	16.4	0.0367	30.9	19.2	0.0428	50.7	31.4	0.0701
McNeil Island, Anderson Island, Ketron Island	22	1.6	1.0	0.0022	1.8	1.1	0.0026	3.0	1.9	0.0042
<b>Totals</b>	<b>4,861</b>	<b>349.9</b>	<b>216.9</b>	<b>0.4841</b>	<b>408.4</b>	<b>253.2</b>	<b>0.5651</b>	<b>669.1</b>	<b>414.8</b>	<b>0.9258</b>

**Table 4. Annualized Average Consumptive Use Estimates for WRIA 15 – High Growth**

Annualized Consumptive Use Estimates for WRIA 15 (2020–2040) - High Growth Projection; 0.75 acre minimum threshold										
Subbasin	Projected PE Well Connections	Annual Consumptive Use: Water System Estimate			Annual Consumptive Use: USGS Estimates			Annual Consumptive Use: Irrigated Area Estimate (per Ecology Guidance)		
		AFY	GPM	CFS	AFY	GPM	CFS	AFY	GPM	CFS
West Sound	1,403	101.0	62.6	0.1397	117.9	73.1	0.1631	193.1	119.7	0.2672
Hood Canal	689	49.6	30.7	0.0686	57.9	35.9	0.0801	94.8	58.8	0.1312
South Hood Canal	1,128	81.2	50.3	0.1123	94.8	58.8	0.1311	155.3	96.2	0.2148
Bainbridge Island	516	37.1	23.0	0.0514	43.4	26.9	0.0600	71.0	44.0	0.0983
South Sound	1,992	143.4	88.9	0.1984	167.4	103.8	0.2316	274.2	170.0	0.3794
Vashon – Maury Island	368	26.5	16.4	0.0367	30.9	19.2	0.0428	50.7	31.4	0.0701
McNeil Island, Anderson Island, Ketron Island	56	4.0	2.5	0.0056	4.7	2.9	0.0065	7.7	4.8	0.0107
<b>Totals</b>	<b>6,152</b>	<b>442.8</b>	<b>274.5</b>	<b>0.6127</b>	<b>516.9</b>	<b>320.4</b>	<b>0.7152</b>	<b>846.8</b>	<b>524.9</b>	<b>1.1717</b>

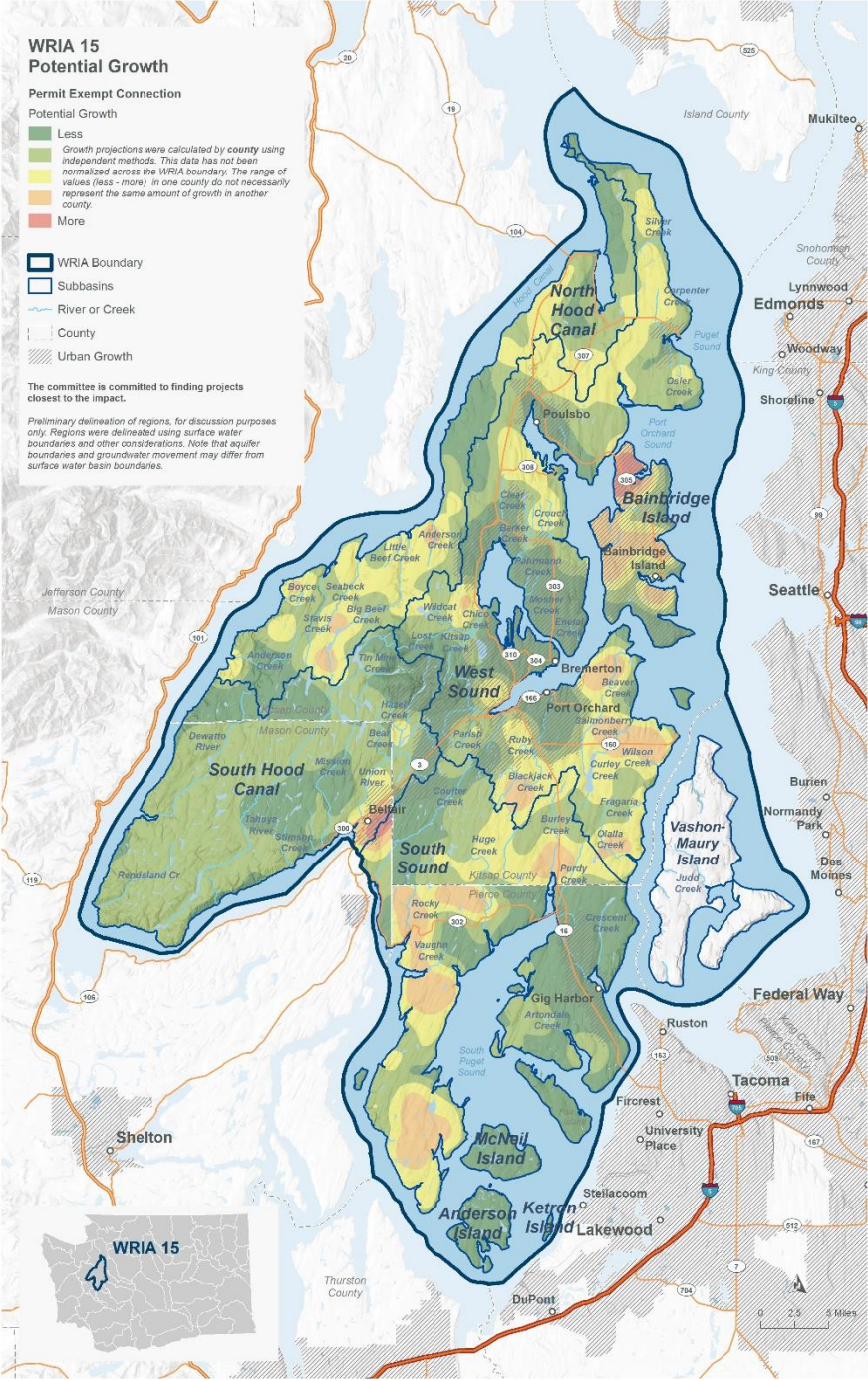


Figure 3. WRIA 15 projected PE connection growth.

## 5.0 Seasonal Use

Monthly outdoor water use was calculated as part of the consumptive use analysis for the Irrigated Area method. Seasonal water use by month is reported by subbasin and scenario (Table 4). The month of July has the highest irrigation requirement, resulting in the highest monthly consumptive use impact. This information may be used when evaluating projects designed to offset subbasin- and season-specific impacts.

**Table 4: WRIA 15 Monthly Consumptive Water Use**

Subbasin	Projected No. PE Wells (Baseline)	Consumptive Use by Month (cfs)											
		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
West Sound	1,336	0.0311	0.0311	0.0311	0.0311	0.3316	0.7239	0.9879	0.7585	0.3726	0.0311	0.0311	0.0311
Hood Canal	656	0.0153	0.0153	0.0153	0.0153	0.1628	0.3555	0.4851	0.3724	0.1829	0.0153	0.0153	0.0153
South Hood Canal	1,126	0.0262	0.0262	0.0262	0.0262	0.2795	0.6101	0.8327	0.6393	0.3140	0.0262	0.0262	0.0262
Bainbridge Island	491	0.0114	0.0114	0.0114	0.0114	0.1219	0.2661	0.3631	0.2788	0.1369	0.0114	0.0114	0.0114
South Sound	1,553	0.0361	0.0361	0.0361	0.0361	0.3855	0.8415	1.1484	0.8817	0.4331	0.0361	0.0361	0.0361
Vashon – Maury Island	368	0.0086	0.0086	0.0086	0.0086	0.0914	0.1994	0.2721	0.2089	0.1026	0.0086	0.0086	0.0086
McNeil Anderson, Ketron	38	0.0009	0.0009	0.0009	0.0009	0.0094	0.0206	0.0281	0.0216	0.0106	0.0009	0.0009	0.0009
<b>Totals</b>	<b>5,568</b>	<b>0.1295</b>	<b>0.1295</b>	<b>0.1295</b>	<b>0.1295</b>	<b>1.3822</b>	<b>3.0171</b>	<b>4.1174</b>	<b>3.1612</b>	<b>1.5527</b>	<b>0.1295</b>	<b>0.1295</b>	<b>0.1295</b>
Subbasin	Projected No. PE Wells (Low Growth)	Consumptive Use by Month (cfs)											
		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
West Sound	1,142	0.0266	0.0266	0.0266	0.0266	0.2835	0.6188	0.8445	0.6484	0.3185	0.0266	0.0266	0.0266
Hood Canal	561	0.0130	0.0130	0.0130	0.0130	0.1393	0.3040	0.4148	0.3185	0.1564	0.0130	0.0130	0.0130
South Hood Canal	1,119	0.0260	0.0260	0.0260	0.0260	0.2778	0.6064	0.8275	0.6353	0.3120	0.0260	0.0260	0.0260
Bainbridge Island	491	0.0114	0.0114	0.0114	0.0114	0.1219	0.2661	0.3631	0.2788	0.1369	0.0114	0.0114	0.0114
South Sound	1,158	0.0269	0.0269	0.0269	0.0269	0.2875	0.6275	0.8563	0.6574	0.3229	0.0269	0.0269	0.0269
Vashon – Maury Island	368	0.0086	0.0086	0.0086	0.0086	0.0914	0.1994	0.2721	0.2089	0.1026	0.0086	0.0086	0.0086





McNeil Anderson, Ketron	22	0.0005	0.0005	0.0005	0.0005	0.0055	0.0119	0.0163	0.0125	0.0061	0.0005	0.0005	0.0005
<b>Totals</b>	<b>4,861</b>	<b>0.1130</b>	<b>0.1130</b>	<b>0.1130</b>	<b>0.1130</b>	<b>1.2067</b>	<b>2.6340</b>	<b>3.5946</b>	<b>2.7598</b>	<b>1.3555</b>	<b>0.1130</b>	<b>0.1130</b>	<b>0.1130</b>
		<b>Consumptive Use by Month (cfs)</b>											
<b>Subbasin</b>	<b>Projected No. PE Wells (High Growth)</b>	<b>Jan</b>	<b>Feb</b>	<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>	<b>July</b>	<b>Aug</b>	<b>Sept</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
West Sound	1,403	0.0326	0.0326	0.0326	0.0326	0.3483	0.7602	1.0375	0.7965	0.3912	0.0326	0.0326	0.0326
Hood Canal	689	0.0160	0.0160	0.0160	0.0160	0.1710	0.3733	0.5095	0.3912	0.1921	0.0160	0.0160	0.0160
South Hood Canal	1,128	0.0262	0.0262	0.0262	0.0262	0.2800	0.6112	0.8341	0.6404	0.3145	0.0262	0.0262	0.0262
Bainbridge Island	516	0.0120	0.0120	0.0120	0.0120	0.1281	0.2796	0.3816	0.2930	0.1439	0.0120	0.0120	0.0120
South Sound	1,992	0.0463	0.0463	0.0463	0.0463	0.4945	1.0794	1.4730	1.1309	0.5555	0.0463	0.0463	0.0463
Vashon – Maury Island	368	0.0086	0.0086	0.0086	0.0086	0.0914	0.1994	0.2721	0.2089	0.1026	0.0086	0.0086	0.0086
McNeil Anderson, Ketron	56	0.0013	0.0013	0.0013	0.0013	0.0139	0.0303	0.0414	0.0318	0.0156	0.0013	0.0013	0.0013
<b>Totals</b>	<b>6,152</b>	<b>0.1430</b>	<b>0.1430</b>	<b>0.1430</b>	<b>0.1430</b>	<b>1.5272</b>	<b>3.3336</b>	<b>4.5493</b>	<b>3.4928</b>	<b>1.7155</b>	<b>0.1430</b>	<b>0.1430</b>	<b>0.1430</b>

## 6.0 References

Ecology. 2018. *Recommendations for Water Use Estimates*. Washington State Department of Ecology, Publication 18-11-007.

Ecology. 2019. Final Guidance for Determining Net Ecological Benefit. Washington State Department of Ecology, Publication 19-11-079.

GeoEngineers and HDR, 2020. Draft Irrigated Acreage Comparability Study. Technical memorandum provided to the Washington State Department of Ecology on January 16, 2020.

HDR. 2019a. Draft PE Well and Connection Growth Projections. Technical memorandum provided to the Washington State Department of Ecology on December 31, 2019.

HDR. 2019b. Draft Consumptive Use Analytical Methods Technical Memorandum. Technical memorandum provided to the Washington State Department of Ecology on December 31, 2019.

Natural Resource Conservation Service, 1997. Washington Irrigation Guide (WAIG). U.S. Department of Agriculture.

Welch, Wendy B.; Frans, Lonna M.; Olsen, Theresa D, 2014. *Hydrogeologic framework, groundwater movement, and water budget of the Kitsap Peninsula, west-central Washington*. Scientific Investigations Report Number 2014-5106.

2784 **Appendix H – Project Inventory**

2785 **WRIA 15 Project Inventory for Inclusion in the Watershed Restoration and Enhancement Plan**

2786 CATEGORIES (does not reflect prioritization)

2787 I. Ready to implement and provides quantitative offset value (see Chapter 5).

2788 II. Ready to implement and provides habitat benefit and un-quantifiable streamflow benefit.

2789 III. Provides habitat only benefit.

2790 IV. Unable to implement at this time because the project is highly conceptual or not currently  
2791 legal.

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
<b>Bainbridge Island Subbasin</b>												
III	Springbrook Creek Bridge	Habitat no Offset	47°38'35.0"N 122°34'02.5"W	Reconnect side channel habitat and minor flood plain restoration. (Part of a larger barrier removal project.)					City of Bainbridge Island/Bainbridge Island Land Trust	Final Design / Construct	\$1,200,000 (includes barrier removal costs)	\$200,000
IV	Transfer surface water right to groundwater for public farmland	Water Rights Acquisition	47°37'50.8"N 122°33'27.9"W	Switch irrigation source from surface reservoir to existing or new well to re-time stream flows and improve stream temperature issues.	TBD				City of Bainbridge Island/Friends of the Farms	Feasibility		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	KPUD Stream Augmentation Project	Offset no Habitat		Kitsap Public Utility District (KPUD) currently owns and operates 54 public water systems throughout rural Kitsap County. KPUD is proposing to augment streams that are located near water mains of their systems. The water would be produced from either existing water-supply wells or new wells installed to be dedicated only for stream augmentation. The objective of the project is to provide “water-for-water” offset for future permit-exempt wells (PEWs) by discharging water indirectly into the stream to augment streamflow. KPUD has systems located in West Sound, North Hood Canal and Bainbridge Island subbasins of WRIA 15. Some members of the WRIA 15 Committee support further exploration of this project through feasibility studies. There are a number of concerns, including impact on deep aquifers and water quality. If KPUD decides to pursue this project, close coordination with the WRIA 15 Tribes and WRIA 15 partners is recommended.	67.6			Kitsap PUD		Conceptual	\$10,000 per site plus \$8000 annual O&M	
<b>North Hood Canal Subbasin</b>												
II	Big Beef Creek Restoration	Habitat with Offset	Multiple Parcels (hidden for privacy)	Restore wetlands, floodplain, and riparian along this ditched segment of upper Big Beef Creek. Acquisition likely needed.						Scoping		\$667,092

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
II	Grovers Creek and Leyman Wetland Restoration	Habitat with Offset	Robinson and Duncans parcels	Stream channel and wetland restoration are proposed on 1,600 feet of Grovers Creek and 10 acres of wetlands. Two parcels owned by the Robinson and Duncans were historically farmed, reed canary grass established and stream channel ditched. The project will improve fish passage and establish wetland and riparian vegetation. The project will also enhance water infiltration and improve floodplain function. This project will benefit Coho, Chum, steelhead and cutthroat habitat. Funding for restoration design has been obtained and preliminary design is in progress. Funding for final design and construction are needed.		1600 ft of stream restoration ; 10 acres wetland		Kitsap Conservation District (KCD)		Design	\$300,000	
II	Hansville Wetland Enhancement	Habitat with Offset	Hansville	Degraded wetland could be restored.			<a href="#">Link</a>			Conceptual		
IV	Big Beef Refugia Acquisitions	Habitat no Offset						Kitsap County		Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	KPUD Stream Augmentation Project	Offset no Habitat		Kitsap Public Utility District (KPUD) currently owns and operates 54 public water systems throughout rural Kitsap County. KPUD is proposing to augment streams that are located near water mains of their systems. The water would be produced from either existing water-supply wells or new wells installed to be dedicated only for stream augmentation. The objective of the project is to provide “water-for-water” offset for future permit-exempt wells (PEWs) by discharging water indirectly into the stream to augment streamflow. KPUD has systems located in West Sound, North Hood Canal and Bainbridge Island subbasins of WRIA 15. Some members of the WRIA 15 Committee support further exploration of this project through feasibility studies. There are a number of concerns, including impact on deep aquifers and water quality. If KPUD decides to pursue this project, close coordination with the WRIA 15 Tribes and WRIA 15 partners is recommended.	90.3			Kitsap PUD		Conceptual	\$10,000 per site plus \$8000 annual O&M	
<b>South Hood Canal Subbasin</b>												
II	Tahuya Headwaters	Habitat with Offset	Tahuya River (South Kitsap)	Purchase of fee and/or easement of up to 3 miles of riparian corridor in the upper Tahuya River and tributaries. Floodplain restoration including potential for LWD placement and BDA. Currently under one timberland owner.		3 miles riparian corridor protected				Acquisition		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Bremerton Reclaimed Water/Water Reuse Feasibility Study	Offset no Habitat		Pursue feasibility studies for reclaimed and reuse water opportunities.								
IV	Mason County Rooftop Runoff Infiltration Project-	Offset no Habitat	County Wide	Mason County has proposed a possible modification of the County building code to require capture of roof runoff from new rural residential (RR) development, typically on 5 acre parcels or greater, with direct connection to home site infiltration facilities (i.e., parcel dry wells, infiltration trenches, infiltration galleries, or rain gardens). This proposed code revision would typically require infiltration facilities that achieve recharge of 85 percent of the annual average rooftop runoff for new RR parcel development roof, with some reduction possible in less permeable soils to limit infiltration facility sizes.	72			Mason County				
<b>South Sound Subbasin</b>												
II	Coulter Creek Protection	Habitat with Offset	Coulter Creek	Coulter Creek. Protection (acquisition of fee or easement) of riparian buffer and floodplain restoration of 3-5 mile riparian corridor owned by single landowner.		3-5 miles riparian protection and restoration		GPC		Acquisition		



Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
III	Gig Harbor Golf Club Artondale Creek Habitat Improvement	Habitat with Offset	Artondale Creek	A portion of Artondale Creek and approximately 2 acres of the floodplain would be restored by replacing two existing bridges to open up the floodplain and plantings to increase shade, improve instream habitat, reduce stream temperature, and improve riparian buffers and upland habitat conditions. The restoration project may also be extended downstream if needed to improve fish passage to the project site. The project is located in the South Sound subbasin of WRIA 15 on the Gig Harbor Peninsula.		Improve instream and floodplain habitat conditions; improve water temperatures.			Gig Harbor Golf Club, Pierce Co, Tribe	Conceptual	\$500,000 (with offset improvements)	
III	Rocky Creek Protection and Riparian Buffer	Habitat no Offset	Rocky Cr	Rocky Creek. Protection (acquisition of fee or easement) of riparian buffer and floodplain restoration of ~4 mile riparian corridor owned by single landowner.		4 miles riparian corridor protection and restoration		GPC		Acquisition		
IV	Upper Little Minter Creek watershed acquisition and floodplain/wetland restoration project	Habitat with Offset	Little Minter Creek - 15311 and 12521 94TH AV NW	Reconnecting ditches, more sinuosity, beaver habitat; potential water right.						Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Upper Burley Creek Floodplain/Wetland Restoration	Habitat with Offset	East of Bethel Burley Road, south of Holman Road. Kitsap Co Parcels: 242301-3-016-2006, 242301-3-017-2005, 252301-2-009-2006, 252301-2-038-2001, 252301-2-039-2000, 252301-2-047-2000	Restore wetlands, floodplain, and riparian along this segment of Burley Creek that has been ditched and drained. Acquisition likely needed also.						Conceptual		
IV	Mid Burley Creek Floodplain/Wetland Restoration	Habitat with Offset	East of Bethel Burley Road, south of Swofford Lane. Kitsap Co Parcels: 362301-2-004-2008, 362301-2-003-2009, 9000-010-192-0008, 362301-2-021-2007, 362301-2-022-2006, 362301-2-012-2008, 362301-2-005-2007, 362301-2-014-2006, 362301-3-021-2005, 362301-3-020-2006	Restore wetlands, floodplain, and riparian along this segment of Burley Creek that has been ditched and drained. Acquisition likely needed also.						Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	360 Trails/Gateway Park	Habitat with Offset	Minter Creek - E of Gateway Park, N of SR 302, W of 94th Ave NW	Education/outreach, land acquisition, conservation easement, beaver enhancement opportunity.					WDFW or Kitsap Conservation District	Conceptual		
IV	Burley Creek Drainage Floodplain and Ag Restoration	Habitat with Offset	North of Bethel Burley and Burley Olalla intersection.							Conceptual		
IV	Pierce County parcels near Belfair - 186th Ave	Habitat with Offset	Pierce County property - undeveloped woodland/riparian on Rocky Creek. 13711 186th Ave NW, Gig Harbor	Assess riparian area for floodplain or wetland enhancement						Conceptual		
IV	Filucy Bay Floodplain Enhancement	Habitat with Offset		Restore/improve floodplain and surrounding wetlands on a Pierce Co owned property.						Scoping		
IV	Coulter Tree Farm	Habitat with Offset	Coulter Creek							Conceptual		
IV	Pierce County parcel near Belfair - Elgin Clifton Road	Habitat with Offset	Pierce County property - undeveloped woodland near south branch of Rocky Creek	Assess wetland area for enhancement or beavers						Conceptual		
IV	Floodplain enhancement on multiple sites	Habitat with Offset	Rocky, Curley, L. Anderson, Irene, Grovers	Floodplain restoration on existing properties owned by GPC. Large Woody Debris placement on Rocky Creek, Curley Creek, Little Anderson Creek, Irene Creek. Beaver Dam Analogs on Rocky Creek and Grovers creek preserves.				Great Peninsula Conservancy		Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Artondale Creek Preservation	Habitat no Offset	Parcel removed for privacy.	Identified in the Wild Fish Conservancy (WFC) watershed typing exercise for potential preservation. Land owner is interested.					Great Peninsula Conservancy; Wild Fish Conservancy	Conceptual		
IV	Pierce County parcel near Belfair - Elgin Clifton Road	Offset no Habitat	Pierce County property - public works site. <a href="https://epip.co.pierce.wa.us/cfapps/atr/epip/summary.cfm?parcel=0022244000">https://epip.co.pierce.wa.us/cfapps/atr/epip/summary.cfm?parcel=0022244000</a>	Stormwater retrofit or MAR at sand/gravel pit.	TBD					Conceptual		
IV	Pierce County parcel near Belfair - Elgin Clifton Road	Offset no Habitat	Pierce County property - undeveloped woodland near south branch of Rocky Creek	Preserve forest for infiltration benefit (conservation easement in trust).						Conceptual		
IV	Pierce County parcel near Home - 18th St NW	Offset no Habitat	Pierce County property - undeveloped woodland. Corner of 18th St NW and 180th Ave NW	Preserve forest for infiltration benefit (conservation easement in trust).						Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Burley Creek Watershed Mine Reclamation Options	Offset no Habitat	West of Bethel Burley Rd, north of High Ridge Ct. Kitsap Co Parcels: 4799-000-009-0008, 4799-000-001-0303, 4799-000-020-0102, 262301-1-039-2001, 262301-1-041-2007, 262301-1-013-2001	Review mine reclamation plan and determine whether infiltration or wetland restoration are options.						Conceptual		
IV	Horseshoe Lake Golf Course Water Use Options	Water Rights Acquisition	Parcel: 5349-000-007-0002	Review water use at Horseshoe Lake Golf Course and consider options for water use reductions, transfer of water rights, etc.						Scoping		
IV	Trophy Lake Golf Course Water Use Options	Water Rights Acquisition	Parcel: 202301-3-010-2006	Review water use at Trophy Lake Golf Course and consider options for water use reductions, transfer of water rights, etc.						Scoping		
IV	Coulter Creek / Estuary		Coulter / Estuary	Opportunities for land acquisition and habitat restoration.			Acquisition + Develop natural storage on GPC properties		Great Peninsula Conservancy	Acquisition	\$350,000	\$0
IV	Burley Creek		Burley Ck	Opportunities for land acquisition and habitat restoration.			Acquisition + Develop natural storage on GPC properties		Great Peninsula Conservancy	Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Purdy Creek		Purdy Ck	Opportunities for land acquisition and habitat restoration.			Acquisition + Develop natural storage on GPC properties		Great Peninsula Conservancy	Conceptual		
IV	Minter Creek		Minter Ck	Opportunities for land acquisition and habitat restoration.			Acquisition + Easement to increase average stand age for higher baseflows		Great Peninsula Conservancy	Acquisition	\$225,000	\$105,000
IV	Rocky Creek		Rocky Creek	Opportunities for land acquisition and habitat restoration.			Develop natural storage on GPC properties		Great Peninsula Conservancy	Conceptual		
IV	Mason County Rooftop Runoff Infiltration Project	Offset no Habitat	County Wide	Mason County has proposed a possible modification of the County building code to require capture of roof runoff from new rural residential (RR) development, typically on 5 acre parcels or greater, with direct connection to home site infiltration facilities (i.e., parcel dry wells, infiltration trenches, infiltration galleries, or rain gardens). This proposed code revision would typically require infiltration facilities that achieve recharge of 85 percent of the annual average rooftop runoff for new RR parcel development roof, with some reduction possible in less permeable soils to limit infiltration facility sizes.	7				Mason Co			

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Filucy Bay projects		Filucy Bay tributaries (Schoolhouse Ck)	Opportunities for land acquisition and habitat restoration.			Develop natural storage on GPC properties		Great Peninsula Conservancy	Conceptual		
<b>South Sound Islands Subbasin</b>												
II	Schoolhouse Creek Restoration	Habitat with Offset	Anderson Island	The Anderson Island Parks District and Pierce County has been working on this Creek for many years. The County replaced two culverts in 2013. There are two remaining barriers on County road that the County is seeking funding from the fish barrier removal board for and one partial barrier on a private road. The Parks District has also been looking for funding to creek meandering and wetland restoration on a section of creek that was previously ditched and used for agriculture.						Construction		
II	East Oro Bay Barrier Removal	Habitat with Offset	Anderson Island, East Oro Bay near Jacobs Point Park	There is an earthen dam that impounds the top of the estuary in East Oro Bay.						Construction		
<b>Vashon Maury Subbasin</b>												
IV	Maury Island Initiative	Water Rights Acquisition	Maury	Property associated with the WR first acquired in 2008 and later in 2019. Portion of the WR may have already been forfeited and remaining portion may be small. Likely .05 CFS instantaneous flow certificate for group domestic supply; Parcel numbers 3222039011, 3222039027	TBD					Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Frog Holler Forest Water Right Acquisition	Water Rights Acquisition	South Vashon	Forest was acquired by VLT in 2016. There may be a water right associated with the property that is at risk of relinquishment in 2021. Likely 6 irrigated acres. Beneficial Use is for irrigation and domestic; Long Claim; Parcel Number 2522029016	6?				King County or Vashon Maury Island Land Trust	Conceptual		
IV	Piner Point	Water Rights Acquisition	South Vashon	Property was acquired by King County Parks in 2014. There is a small cabin on the property and the water right supports domestic water supplies across three properties. Small, but may be important since V-M is a single source aquifer. Est at 1.5 annual acre feet. Parcel 6175800300; Certificate: Domestic Use Multiple	1.5					Conceptual		
IV	Forest Glen Natural Area	Water Rights Acquisition	Vashon	Property acquired in 2014 and converted into a park owned by King County. May be forfeited already or coming up in 2022; Long Claim for domestic supply and irrigation; 16 annual acre feet; 10 GPM instantaneous flow	16					Conceptual		
<b>West Sound Subbasin</b>												
II	Mid Olalla Creek Floodplain/Wetland restoration	Habitat with Offset	Parcels removed for privacy	Restore wetlands, floodplain, and riparian along this segment of Olalla Creek that has been ditched and drained. Acquisition likely needed also.						Conceptual		



Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
II	Ruby Creek Restoration	Habitat with Offset	Ruby Creek	Approximately .44 miles of stream will be enhanced by excavating reed canary grass from the channel which is also inhibiting fish passage in this stream section. Installation of LWD, excavation of planting mounds and riparian planting are also proposed. The overall project involves restoration and enhancement of 11.7 acres of stream and wetland habitat. Chum, Coho, cutthroat trout and steelhead are documented in this reach of Ruby Creek. Design is complete and funding is needed for construction. Part of a larger fish barrier removal project.		Open access to 3.5 miles; improve 11.7 acres of stream and wetland habitat			Kitsap Conservation District	Construction		635000 (includes barrier removal)
II	Dogfish Creek Wetland Restoration	Habitat no Offset	Malone parcel	This project involves enhancement of 2,832 feet of Dogfish Creek and enhancement of 24 acres of mapped wetland. The 80 acres owned by Malone was historically farmed, reed canary grass established and stream channel ditched. The project will enhanced beaver activity and establish wetland and riparian vegetation. This project will also improve stream flow and floodplain function. This project will benefit Coho, Chum, steelhead and cutthroat habitat. Funding for restoration design has been obtained and preliminary design is in progress. Funding for final design and construction are needed. Part of a larger fish barrier removal project.		Enhance 2832 feet of creek and 24 acres of wetland		Kitsap Conservation District (KCD)		Design		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
II	Lower Blackjack Creek Subbasin Restoration and Remediation Actions	Habitat with Offset	Lower Blackjack Cr	This project proposes restoration and remediation of stream corridor habitat within the lower Blackjack Creek Subbasin as a subset of the Foster Pilot program within WRIA 15. Each restoration and remediation action has been identified and vetted by the Suquamish Tribe in their Blackjack Creek Watershed Protection and Restoration Plan composed in December, 2017.				Port Orchard Public Works		Design	\$2,133,500	
II	Clear Creek Wetland and Floodplain Restoration	Habitat with Offset						Kitsap County Public Works		Design	\$3,743,045	
II	Lower Blackjack Creek Infrastructure Removal and Habitat Remediation	Habitat with Offset	Lower Blackjack Cr	Assess the feasibility, perform due diligence, then construction/remediation of infrastructure in Blackjack Creek. This is part of the WRIA 15 Foster Pilot program. Projects include: 1. Rehabilitating an existing water main crossing over the creek by directionally drilling the water main to cross underneath the creek and removing the old infrastructure 2. Cleaning up debris from abandoned transient camps and replanting 3. Update old storm drainage to creek/tributary with LID principles				Port Orchard Public Works		Feasibility	\$3,130,000	

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
II	Blackjack Watershed Protection & Restoration Feasibility Plan	Habitat with Offset		This project will build on the 2017 "Blackjack Creek Watershed Assessment, Protection, and Restoration Plan", and identify the highest priority tax parcels for protection or restoration based on a systematic evaluation of their value to salmon recovery. This evaluation will include a literature review of existing studies and GIS desktop analysis to identify the riparian and wetland habitats with the most value to salmon, highest connectivity to other salmon habitat, and greatest threat of development. The project will use this evaluation to rank parcels, and conduct outreach to landowners of the highest ranked parcels.				Great Peninsula Conservancy		Planning/Design	\$200,000	\$0
III	Salmonberry Creek and Wetland Protection Project	Habitat no Offset	Salmonberry Creek	Great Peninsula Conservancy (GPC) will protect 90 acres of riparian, wetland, and fish habitat through purchasing a conservation easement on property on Salmonberry Creek in Kitsap County. Salmonberry Creek is located in an ESSB 6091 prioritized basin (WRIA 15), and contains Endangered Species Act-listed steelhead trout.		90 acres protection		Great Peninsula Conservancy		Acquisition	\$420,000	

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
III	Floodplain Restoration Upstream of Navy RR Trestle	Habitat with Offset	<a href="#">Link</a>	This action will aim to restore floodplain connectivity, riparian processes, and instream habitat conditions. Restoration actions should focus on removal of artificial fill along the abandoned road grade constricting the channel at RS 11100, restoring riparian forest conditions, and targeted wood placements to increase channel complexity and restore natural stream grade. Restoration of riparian processes will require negotiation of conservation easements or acquisition of the streamside parcel along the northern (left) bank. The parcel totals 6 acres and has an assessed value of \$240,000 per 2012 tax records. This action is constrained, in part, by channel confinement at the Navy RR trestle. The channel reach upstream of this segment flows through parcels that are part of the Mountaineers Foundation Rhododendron Preserve, where riparian conditions are more intact, instream wood is more abundant, and a broader floodplain exists due to the lack of bank protection.		6 acres restoration				Construction		\$255,000
III	Curley Creek Acquisition	Habitat no Offset	<a href="#">Link</a>	This project will build upon work done through the SRFB Curley Creek Estuary Acquisition and Curley Creel Feasibility study. Project will acquire highest quality remaining Chinook and steelhead habitat available on lower Curley Creek.						Feasibility		\$200,000

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
III	Instream Habitat Enhancement at the Confluence with Chico Creek	Habitat no Offset		Large wood placements to create additional complexity near the tributary confluence will improve habitat conditions in the near term while concurrent efforts to set back constraints to floodplain processes can be implemented.						Conceptual		
III	Grovers Creek Protection Phase II	Habitat no Offset		Great Peninsula Conservancy's Lower Grovers Creek Habitat Protection Project aims to protect and restore 10.5 acres of riparian and wetland habitat along Grovers Creek and Miller bay in north Kitsap County for the benefit of people, salmon, and other wildlife. This project includes two properties in the Grovers Creek Watershed of north Kitsap County, including the 1.5-acre Tucker property and 9-acre Grovers Creek Durham Preserve Project owned by GPC. The Puget Sound Nearshore Ecosystem Restoration Project has prioritized the Grovers Creek Watershed as a "Protect High" watershed under its Coastal Inlet Strategy due to the fact that it remains relatively undeveloped.		10.5 acres protection	-	Great Peninsula Conservancy		Acquisition	\$685,650	

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
III	Curley Creek prioritized restoration	Habitat no Offset		In November 2017 the Suquamish Tribe released a completed watershed assessment and protection and restoration plan for Curley Creek, one of the three high priority freshwater streams in the East Kitsap shoreline. This Near Term Action proposes to use this plan to work with partners to identify which of the high priority protection and restoration actions are feasible to move forward to implementation and then to carry out that work.				Midsound Fisheries Enhancement Group		Planning/Design	\$625,000	\$0
IV	Floodplain Restoration Upstream of Kitsap Lake	Habitat no Offset								Conceptual		
IV	Acquisition of Johnson Creek headwaters	Habitat no Offset		The headwater wetlands of Johnson Creek (a salmon stream) in Poulsbo is relatively intact and undeveloped, however it is at risk of being developed. There is opportunity to acquire for preservation (GPC) or recreation (Parks).						Conceptual		
IV	Lower Strawberry Creek Restoration Design	Habitat no Offset	Strawberry Creek - Dyes Inlet							Design		
IV	Mid-Upper Blackjack Creek Floodplain/Wetland Restoration	Habitat with Offset	Parcels removed for privacy	Restore wetlands, floodplain, and riparian along this segment of Blackjack Creek that has been ditched and drained. Acquisition likely needed also.						Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	Remove infrastructure from outlet of Kitsap Lake	Offset no Habitat	<a href="#">Link</a>	Remove infrastructure from the channel at the lake outlet to prevent future manipulation of lake levels. Fish screens at the outlet of Kitsap Lake previously restricted anadromous fish passage. The screens were removed in 1999; however, the concrete pieces that supported the screens remain in the channel. At times, this infrastructure has been altered by local residents to control the lake level without authorization. Such action results in rapid drawdown of streamflow in downstream segments of Kitsap Creek.						Conceptual		
IV	Long Lake Augmentation	Offset no Habitat	Long Lake	Potential flow augmentation and BDAs.						Conceptual		

Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
IV	KPUD Stream Augmentation Project	Offset no Habitat		Kitsap Public Utility District (KPUD) currently owns and operates 54 public water systems throughout rural Kitsap County. KPUD is proposing to augment streams that are located near water mains of their systems. The water would be produced from either existing water-supply wells or new wells installed to be dedicated only for stream augmentation. The objective of the project is to provide “water-for-water” offset for future permit-exempt wells (PEWs) by discharging water indirectly into the stream to augment streamflow. KPUD has systems located in West Sound, North Hood Canal and Bainbridge Island subbasins of WRIA 15. Some members of the WRIA 15 Committee support further exploration of this project through feasibility studies. There are a number of concerns, including impact on deep aquifers and water quality. If KPUD decides to pursue this project, close coordination with the WRIA 15 Tribes and WRIA 15 partners is recommended.	183.9			Kitsap PUD		Conceptual	\$10,000 per site plus \$8000 annual O&M	



Category	Project Name	Type of Project	Project Location	Project Description	Estimated Water Offset Amount (acre feet)	Habitat Value (no set value)	Project Hyperlink (if applicable)	Existing Sponsor	Potential Sponsor (Where No Existing Sponsor Exists)	Project Stage	Estimated Cost	Existing Funding (as of Dec 2020)
	Koch Creek Regional Stormwater facility	Offset no Habitat	Location Information Latitude: 47.6477 Longitude: -122.641	This project includes enlarging and reconstructing a small existing storm pond. The new larger facility will collect stormwater runoff from 53 acres of housing, industrial areas and roads. The pond will capture and release runoff gradually over time, reducing the flow of water entering Koch Creek, located in the Dyes Watershed of Kitsap County, and allowing pollutants to settle out. These pond improvements will reduce flooding during storm events and improve water quality to Koch Creek.	TBD			Kitsap County		Planning/Design	\$850,000	\$350,000
	Ridgetop Blvd Green Street LID Retrofit Phase III	Offset with Habitat	Silverdale	Kitsap County Public Works is currently constructing Phase I & II of the overall Ridgetop Blvd green street project. Phase I and II projects are supported by Ecology grant/loan funding. Phase III of the Ridgetop Blvd project would extend the green street (median full-infiltration bioretention) from the end of Phase II to Silverdale Way. Phase III would be constructed using the same street cross-section, median bioretention, and traffic calming designs used in the first two phases.	TBD			Kitsap County Public Works		Construction	\$2,000,000	

Commented [VMSJ(61)]: Do we want to include these?  
Received no feedback

2792 **Appendix I – Detailed Project Descriptions**

2793 **Managed Aquifer Recharge Project Portfolio for WRIA 15**

2794

2795 **Summary**

2796 Managed Aquifer Recharge (MAR) projects are being considered in WRIA 15 as a method to  
2797 increase infiltration to aquifers to improve streamflow and to offset the water use from future  
2798 permit exempt (PE) wells in the watershed. The planning and implementation of MAR projects  
2799 is complex, leading to uncertainty as to their potential use as water offset projects and inclusion  
2800 in the Watershed Restoration and Enhancement Plan. A potential approach to addressing  
2801 uncertainty is to include a portfolio of MAR projects that have different locations, project  
2802 sponsors, water sources, and size. Uncertainty is addressed by qualitatively assessing the  
2803 potential for implementation on a high, medium, and low basis and then assigning a probability  
2804 to the potential offset from each project. The overall potential for MAR in WRIA 15 is the sum  
2805 of the potential offsets multiplied by their probability. MAR projects in WRIA 15 have been  
2806 identified through different sources and are estimated to have a total potential water offset of  
2807 1,424 acre-feet/year. The overall potential, accounting for uncertainty, is estimated to be 578  
2808 acre-feet/year. Considering MAR projects that can be implemented within the next 10 years,  
2809 the estimated potential offset is 520 acre-feet/year. The remaining MAR projects would likely  
2810 take longer than 10 years to implement.

2811

2812 **WRIA 15 MAR Projects**

2813 There are different types of MAR projects. Aquifer Storage and Recovery (ASR) projects are a  
2814 type of MAR project that actively injects water into aquifers for storage and recovery by  
2815 pumping later. Passive MAR projects infiltrate water into shallow aquifers, with the intent that  
2816 water discharges from the shallow aquifer into streams on a delayed basis and improves  
2817 streamflow during low-flow periods. For WRIA 15, only passive MAR projects are being  
2818 considered. The source of water for the passive MAR projects in WRIA 15 may be recycled  
2819 water (highly treated wastewater), stormwater or diverted surface water.

2820

2821 MAR projects have the potential to recharge a significant volume of water into shallow  
2822 aquifers, greater than the estimated consumptive use of PE wells forecast for the next 20 years.  
2823 The estimated consumptive use for future PE wells in WRIA 15 is in the range of 669 to 847  
2824 acre-feet per year. However, the planning and implementation of individual MAR projects is  
2825 complex, leading to uncertainty as to their potential use as water offset projects and inclusion  
2826 in the Watershed Restoration and Enhancement Plan. Proposing a portfolio of potential MAR  
2827 projects is an approach which will provide projects in most subbasins in WRIA 15, have different  
2828 water sources, different scales and different implementing entities. Table 1 lists the current  
2829 portfolio of MAR projects and includes the potential water offset, the estimated timeframe for  
2830 implementation and the relative certainty of implementation. The estimated timeframe is  
2831 included to address whether the project can provide water offsets on a timely basis consistent  
2832 with growth in PE connections. The relative certainty of implementation is a qualitative

2833 assessment based upon the project sponsor’s ability to perform the project, the relative cost,  
 2834 and potential issues in design, permitting and funding.

2835

2836 **Table 1. Portfolio of Potential Managed Aquifer Recharge Projects**

Subbasin	MAR Project	Potential Sponsor	Potential Offset (ac-ft/year)	Estimated Timeframe for Implementation	Relative Certainty of Implementation (High, Medium, Low)
West Sound	Kingston Treatment Plant Recycled Water*	Kitsap County Public Works	328	5 years	High
	Grovers Creek MAR	Unknown	20 <sup>1</sup>	>10 years	Low
	Silverdale Recycled Water <sup>2*</sup>	Silverdale Water District	167	5 years	Medium
North Hood Canal	Silverdale Recycled Water, includes Asbury Parcel <sup>2*</sup>	Silverdale Water District	333	5 years	Medium
South Hood Canal	Tahuya River MAR	Unknown	200	5-10 years	Low
Bainbridge Island	M & E Farms Storage*		17	5-10 years	Medium
	Johnson Farms Storage*		90	>10 years	Low
	Miller Rd MAR*		19	>10 years	Low
South Sound	Port Orchard Airport MAR*		100	>10 years	Low
	Belfair WWTP MAR*		70	>10 years	Low
	Coulter Creek Heritage Park MAR (may be		20 <sup>1</sup>	>10 years	Low

	multiple projects)				
	Minter Creek MAR		20 <sup>1</sup>	>10 years	Low
	Rocky Creek between Wye and Koeneman Lakes MAR		20 <sup>1</sup>	>10 years	Low
<b>Vashon – Maury Island</b>	Judd Creek MAR		20 <sup>1</sup>	>10 years	Low
<b>McNeil Island, Anderson Island, Ketron Island</b>	None				
<b>Totals</b>			<b>328</b>		High Relative Certainty
			<b>517</b>		Medium Relative Certainty
			<b>579</b>		Low Relative Certainty

2837 <sup>1</sup>Potential offset not estimated yet; 20 acre-feet/year assumed based upon ¼ acre total size infiltration  
2838 basin at each project site. <sup>2</sup>Silverdale Recycled Water Project could provide water offsets to both West  
2839 Sound and North Hood Canal Subbasins. An assumption of the split in benefits was made (2/3 North  
2840 Hood Canal, 1/3 West Sound). **\*Detailed project description available at end of document.**

2841 One MAR project, the Kingston Recycled Water Project, is thought to have a high relative  
2842 certainty. The potential water offset from the project is 328 acre-feet per year. Three potential  
2843 MAR projects are thought to have a medium relative certainty. Those projects have a potential  
2844 water offset of 517 acre-feet per year. The remainder have a low relative certainty but should  
2845 remain on the list until more is found out about those projects.

2846 A method of predicting outcomes from the portfolio of projects is to assign a probability to  
2847 each level of relative certainty and multiply that probability by the potential offset. That  
2848 calculation is shown in Table 2. Probabilities of 80 percent, 50 percent, and 10 percent are used  
2849 in the calculation to represent high through low relative certainty. Using this calculation, the  
2850 likely offset that will occur from pursuing a portfolio of MAR projects is 568 acre-feet per year.

2851 The calculation can be adjusted by changing the relative certainty of a project or by using a  
2852 different probability to represent the different levels of relative certainty.

2853 **Table 2. Water Offsets Adjusted by Probability of Implementation**

Relative Certainty of Implementation (High, Medium, Low)	Total Estimated Offset (acre-feet/year)	Probability	Adjusted Offset (acre-feet/year)
High Relative Certainty	328	80%	262
Medium Relative Certainty	517	50%	258
Low Relative Certainty	579	10%	58
<b>Totals</b>			<b>578</b>

2854

2855 The high and medium relative certainty projects could be implemented in the next ten years,  
2856 providing an estimated potential offset of 520 acre-feet/year. The remaining MAR projects  
2857 would likely take longer than 10 years to implement.

2858 **Work Required to Implement a MAR Project**

2859 The successful implementation of a MAR project is complex and involves several critical steps  
2860 prior to actual construction (Covert, 2019):

- 2861
- 2862 • Identification of potential locations that:
    - 2863 ○ Have available aquifer capacity such that water infiltration can occur without creating overflows to the surface,
    - 2864 ○ Have soils and underlying geology with suitable hydraulic properties,
    - 2865 ○ Are located such that enough infiltrated water will discharge to surface water during low streamflow periods, and
    - 2866 ○ Are available for permanent use through acquisition or easements.
  - 2867 • Identification of a physically and legally available water source.
  - 2868 • Characterization and evaluation of site-specific hydrogeologic properties.
  - 2869 • Assessment of source water and aquifer compatibility, potential water quality changes during infiltration, and other water quality considerations.
  - 2870 • Development of preliminary MAR project designs and implementation cost estimates.
  - 2871 • Identification of project permitting requirements and potential hurdles.
- 2872
- 2873

- 2874 • Assessment of ongoing operation and maintenance (O&M) costs, and identification of  
2875 potential funding sources to support O&M.

2876 **References**

2877 Covert, John. Presentation to Watershed Restoration and Enhancement Committee. Managed  
2878 Aquifer Recharge Opportunities, January 14, 2019

2879 **Detailed Descriptions for Larger MAR Projects**

2880

2881 Kingston Treatment Plant Recycled Water And Managed Aquifer Recharge Project- West  
2882 Sound Subbasin

2883 *Description*

2884 Kitsap County is proposing to produce Class A recycled water at the existing Kingston Treatment  
2885 Plant, which would be used for summer irrigation at the White Horse Golf Course (WHGC) and winter  
2886 indirect groundwater recharge to the area north of WHGC. The stated objective of the County for the  
2887 project is to “treat water as a resource rather than a waste stream” to address water quality and  
2888 quantity concerns specific to Kingston, and other related water resource issues throughout the  
2889 county. This project is in the West Sound subbasin of WRIA 15.

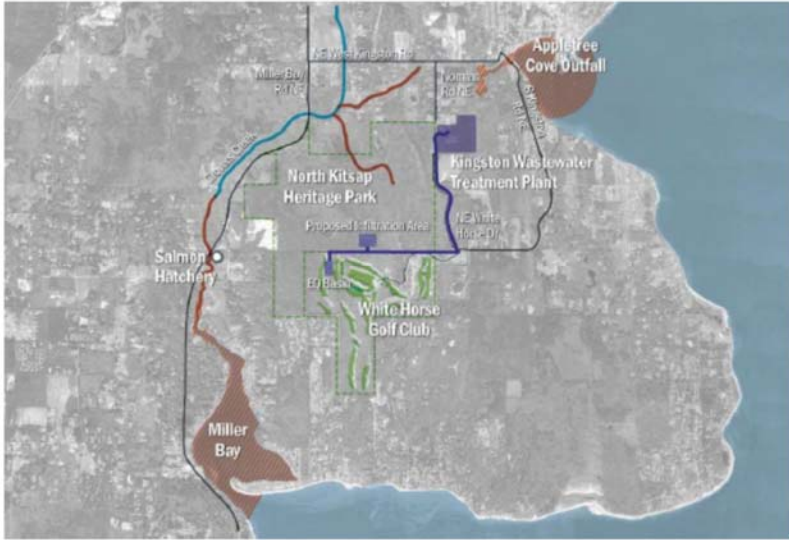
2890 *Quantitative or qualitative assessment of how the project will function, including anticipated offset*  
2891 *benefits, if applicable. Show how offset volume(s) were estimated.*

2892 Currently, irrigation water for WHGC is purchased from the Kitsap Public Utility District (KPUD) and  
2893 is sourced from groundwater wells in the area that pump from a sea-level aquifer. Quantity of  
2894 usable groundwater is limited and, eventually, as the local demand for groundwater supplies  
2895 increases, this water source could decline because it is not being adequately replenished.  
2896 Additionally, with increased withdrawals from the sea-level aquifer, there is a concern of saltwater  
2897 intrusion and the associated impacts to groundwater quality over time. Delivery of recycled water to  
2898 WHGC would preserve 29 million gallons per year (89 acre-feet) of potable water from  
2899 KPUD’s groundwater supply system and eliminate the stress to the supply system imposed by  
2900 large swings in potable water system demands during the irrigation season. Recycled water use will  
2901 also decrease the risk of saltwater intrusion within the regional sea-level aquifer and extend the  
2902 useful life of existing potable water infrastructure. The proposed Project would infiltrate about 107  
2903 million gallons per year (328 acre-feet) of highly treated recycled water into the shallow aquifer that  
2904 provides baseflow to Grovers Creek and its tributaries. Assuming an average infiltration volume of 0.3  
2905 million gallons per day, the Project could increase baseflow in Grovers Creek by roughly 0.5 cfs. The  
2906 water use and infiltration numbers are obtained from the Kingston Recycled Water Plan (Brown &  
2907 Caldwell, 2019).

2908 The water offset quantity for the WRIA 15 Watershed Plan would be 328 acre-feet per year.

2909 *Conceptual-level map and drawings of the project and location.*

2910 Figure 1 shows the location of the facilities proposed for the project. Additional maps and drawings  
2911 can be obtained in the Kingston Recycled Water Facility Plan.



2912  
 2913 **Figure 1. Location of pipeline to WHGC and to infiltration area (from Brown & Caldwell, 2019)**

2914 *Description of the anticipated spatial distribution of likely benefits*  
 2915 Water infiltration at the White Horse Golf Course could increase groundwater levels over  
 2916 approximately 500 acres of the headwaters of the South Fork of Grovers Creek and provide increased  
 2917 groundwater inputs and flows into nearly three miles of perennial streams (Grovers Creek and SF  
 2918 Grovers Creek) and up to 1.5 miles of intermittent streams (tributaries to Grovers Creek and SF  
 2919 Grovers Creek). Water infiltration could also enhance or restore wetlands associated with the creeks  
 2920 or headwater areas.

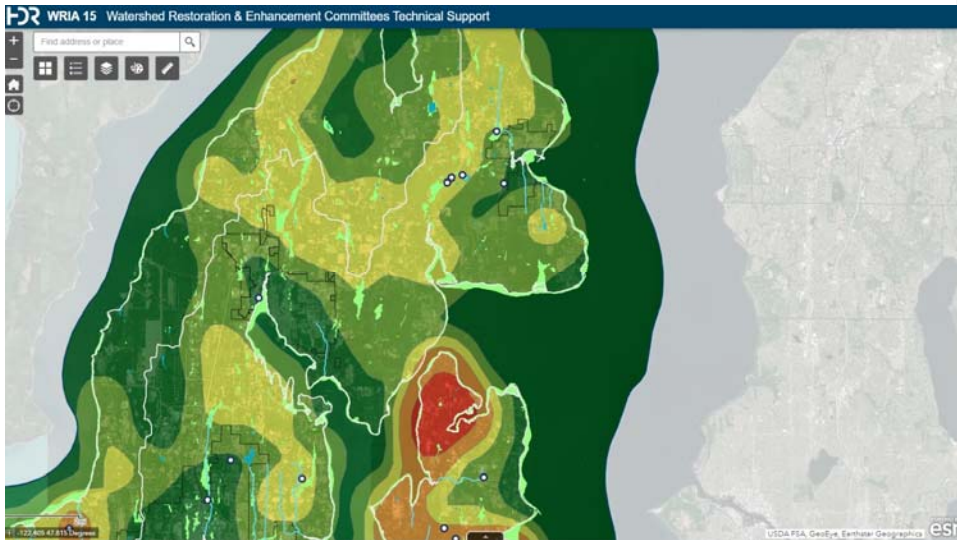
2921 *Location relative to future PE well demand*  
 2922 The forecast consumptive use for the West Sound subbasin using the irrigated area method and  
 2923 baseline growth assumptions is listed in Table 1.

2924 **Table 1. Forecast PE Consumptive Use Demand for West Sound Subbasin**

Acre-feet per year	Gallons per minute	Cubic feet per second
183.9	114.0	0.2545

2925 A copy of the PE growth heat map from the WRIA 15 webmap is shown in Figure 2.





2926  
 2927 Source:  
 2928 <https://hdr.maps.arcgis.com/apps/webappviewer/index.html?id=d7d02dedb57241aa81dd7eb376c86>  
 2929 [25a](#)

2930 **Figure 2. WRIA 15 PE Growth Heat Map**

2931 *Performance goals and measures.*

2932 The performance goals are to reduce groundwater use by 89 acre-feet per year during summer by  
 2933 switching the source of supply from Kitsap PUD to recycled water and to increase infiltration by 328  
 2934 acre-feet per year to improve baseflow in Grovers Creek. The measures will be an increase in  
 2935 baseflow in summer in Grovers Creek and South Fork Grovers Creek by about 0.5 cfs. The increased  
 2936 baseflow should reduce water temperatures in those streams.

2937 *Descriptions of the species, life stages and specific ecosystem structure, composition, or function*  
 2938 *addressed.*

2939 The Washington Department of Fish and Wildlife (WDFW 2020) has identified that coho salmon are  
 2940 present in both Grovers Creek and the SF Grovers Creek; the Endangered Species Act (ESA) listed  
 2941 Puget Sound winter steelhead are present in Grovers Creek (although Grovers Creek is not listed as  
 2942 critical habitat); and chum salmon are present at the mouth of Grovers Creek below the fish hatchery  
 2943 weir/dam operated by the Suquamish Tribe near Miller Bay Road (barrier ID: 930696), for Grovers  
 2944 Creek Hatchery. The Washington Stream Catalog (WDF 1975) indicates that both coho and chum  
 2945 salmon were historically present in Grovers Creek. These North Kitsap streams were noted in the

2946 Stream Catalog (WDF 1975) as having good steady base flows at the time (likely due to the glacial  
2947 outwash soils and infiltration of water).

2948 Increased base streamflow and reduced water temperatures would primarily benefit juvenile  
2949 salmonid rearing habitats by providing increased area and quality of summer stream rearing habitat.  
2950 This would improve both productivity and survival of juveniles. The alteration of natural stream  
2951 hydrology has been identified as a high priority limiting factor in WRIA 15 (NOAA 2007) and  
2952 streamflow is important for supporting riparian vegetation and wetlands that provide shading, food  
2953 web support, and flood and sediment attenuation functions.

2954 *Identification of anticipated support and barriers to completion.*

2955 A stakeholder coordination and public involvement program was completed and is described in the  
2956 Water Facility Plan. Support was expressed for the recycled water, WHGC irrigation and winter  
2957 infiltration option. The project is also believed to be in alignment with the broader goals of Ecology,  
2958 Governor Jay Inslee's Shellfish Initiative, West Central Local Integrating Organization, and the Puget  
2959 Sound Partnership's Strategic Initiatives to prevent pollution, protect and restore habitat, and recover  
2960 shellfish beds. The main barrier to completion is funding for construction and O&M costs.

2961 *Potential budget and O&M costs.*

2962 The total construction costs of water treatment, conveyance, irrigation and infiltration are estimated  
2963 to be \$13.65 million (includes engineering and construction costs). The construction costs for  
2964 conveyance and infiltration basins total \$3.3 million and infrastructure needed for irrigation at WHGC  
2965 is \$1.6 million. An additional 35 percent would be added for design, construction services and  
2966 administrative costs. The annual O&M cost for winter infiltration and summer irrigation is estimated  
2967 to be \$151,000.

2968 *Anticipated durability and resiliency.*

2969 The project would have lasting benefits as it would be actively managed by Kitsap County Public  
2970 Works, O&M would likely be funded through ratepayers, and the source of water (domestic  
2971 wastewater) will increase with increasing population and will not vary substantially from year to year  
2972 due to climate factors.

2973 *Project sponsor(s) (if identified) and readiness to proceed/implement.*

2974 The project sponsors would be Kitsap County Public Works Department and the Suquamish Tribe. A  
2975 pre-design study was completed (Brown & Caldwell, 2019). In addition, stakeholder coordination and  
2976 public involvement was performed and there is general support for this project. The project sponsors  
2977 are discussing

2978 *References*

2979 Brown and Caldwell, November 14, 2019. Kingston Recycled Water Facility Plan. Prepared for  
2980 Kitsap County Public Works.

- 2981 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
2982 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
2983 Fisheries Service, January 19, 2007.
- 2984 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
2985 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).
- 2986 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
2987 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

2988 Silverdale Water District No. 16 Recycled Water Project – North Hood Canal and West  
2989 Sound Subbasins

2990 *Description*

2991 Silverdale Water District No. 16 (SWD) is building infrastructure to move recycled water throughout  
2992 most of their service area. The source of the recycled water is wastewater that originates from  
2993 surrounding communities of Poulsbo, Bangor, Silverdale, and Central Kitsap, and flows to the  
2994 Central Kitsap Treatment Plant (CKTP). Currently, the treated effluent discharges into Puget Sound  
2995 approximately 3,200 feet offshore at Port Orchard Bay. The average daily rate of discharge is about  
2996 3.4 million gallons per day (MGD). The goal for the project is for zero discharge into Puget Sound.

2997 The CKTP will produce recycled water (“Class A” reclaimed water<sup>40</sup>) using a sand filtration system  
2998 with a capacity of 4 MGD. SWD will distribute the recycled water for various uses, including  
2999 irrigation, dual-plumbing (flushing toilets), construction, streamflow augmentation and aquifer  
3000 recharge. SWD has installed 7.4 miles of the planned 13.7 miles of purple pipe, the universal color  
3001 for recycled water pipes. When completed, SWD will have the ability to move 3.5 MGD through the  
3002 system.

3003 The stated objective of the project is to provide “water-for-water” offset for future permit-exempt  
3004 (PE) wells. This can be accomplished by infiltrating water and indirectly augmenting streamflow or  
3005 by direct augmentation to a surface water body such as a stream or wetland. The key element of  
3006 SWD’s recycled water infrastructure pertinent to an offset for PE wells is the pipeline that runs  
3007 along Newberry Hill Road. By extending this portion of pipeline and connecting it to the recycled  
3008 water source, the recycled water would reach three potential infiltration sites that could indirectly  
3009 augment streams. These are the sand and gravel facilities at Dickey Road, the Asbury Soils site and  
3010 a stormwater retention pond along Newberry Hill Road at the end of the pipeline. The benefitting  
3011 streams are within the West Sound and North Hood Canal subbasins of WRIA 15. They are  
3012 potentially Little Anderson, Anderson, Big Beef, Strawberry, Wildcat, and Chico creeks. Direct  
3013 augmentation could also occur along the pipeline route. Strawberry Creek is along the path of a  
3014 recycled water pipeline and is a candidate for direct augmentation. In other parts of SWD’s service  
3015 area with recycled water pipelines Clear and Barker creeks are candidates for direct augmentation.  
3016 For this project description only the infiltration projects along Newberry Hill Road are described.

3017 *Quantitative or qualitative assessment of how the project will function, including anticipated offset*  
3018 *benefits, if applicable. Show how offset volume(s) were estimated.* SWD estimates the total amount  
3019 available for stream augmentation through infiltration at the Newberry Hill Road sites is  
3020 approximately 0.5 MGD, equivalent to 0.77 cubic feet per second (CFS), 560 acre-feet per year (AFY)

---

<sup>40</sup> “Class A reclaimed water” means a water resource that meets the treatment requirements of chapter 173-219 WAC, including, at a minimum, oxidation, coagulation, filtration, and disinfection.

**Commented [VMSJ(62):** From Kitsap County (needs to be addressed): 1) The water initially planned to be produced at CKTP will not meet the standards necessary to indirectly or directly infiltrate the water (state ground water quality standards). This use would require additional treatment beyond what we have constructed at CKTP and hence would cost much more than described in the proposal. (I would guess order of magnitude of \$10-25M in capital.) 2) The project description erroneously assumes we can remove the outfall at CKTP. The Ecology recycled water rule requires a method to get rid of water that does not meet reuse standards. There really is no room to store it on site, so it would be discharged via the outfall.

3021 and 347 gallons per minute (GPM). The reclaimed water system will be equipped with a Supervisory  
3022 Control and Data Acquisition (SCADA) system that includes weather monitoring and forecasting.  
3023 The SCADA systems will allow SWD to regulate flow at all points of discharge/augmentation.

3024 *Map of the project and location.*

3025 Figure 1 shows the location of existing and proposed recycled water system pipe within the SWD  
3026 service area, the three potential sites along the proposed Newberry Hill Road pipeline, and the  
3027 costs for future elements of the planned recycled water system.

3028 *Description of the anticipated spatial distribution of likely benefits*

3029 The potential infiltration site at the Dickey gravel pit would likely benefit Strawberry Creek in the  
3030 West Sound subbasin. The Asbury infiltration site would likely benefit Johnson, Wildcat and Chico  
3031 Creek in the West Sound subbasin. The stormwater retention pond along Newberry Road would  
3032 likely benefit Little Anderson Creek in the North Hood Canal subbasin and could enhance the  
3033 nearby wetland at the headwaters of Anderson Creek and a tributary to Big Beef Creek.

3034 *Locations relative to future PEW demand*

3035 The estimated consumptive use for future PE wells for the West Sound and North Hood Canal  
3036 subbasins are provided in Table 1. The quantities assume the median growth estimate and use of  
3037 the irrigated area method.

3038 **Table 1. Estimated Future Consumptive Use Quantity Using Median Growth Estimate and**  
3039 **Irrigated Area Method**

Subbasin	Estimated Future Consumptive Use (AFY)
West Sound	183.9
North Hood Canal	90.3

3040

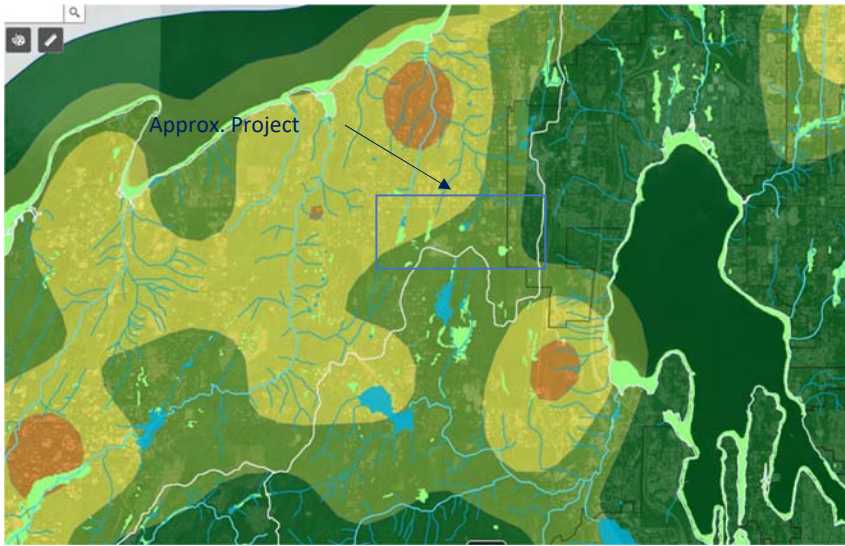
3041 The potential water offset quantity for this project is much greater (285 AFY greater) than the PE  
3042 well consumptive use estimates for the West Sound and North Hood Canal subbasins combined.  
3043 Additional recycled water could be available for Clear and Barker Creeks,

3044 The Anderson Creek subbasin appears to have a relatively high concentration of PE wells just north  
3045 of the project area. The stormwater retention pond augmentation site at the headwaters of Little  
3046 Anderson Creek would address is located in an area with especially high potential for future PE  
3047 wells.

3048 A copy of the PE well growth heat map from the WRIA 15 webmap is shown in Figure 2.

3049

3050



3051  
3052  
3053

**Figure 2. WRIA 15 PE Growth Heat Map**

3054  
3055  
3056

*Performance goals and measures.*

3057 The stream augmentation amount will be measured and recorded using totalizing flow meters. The  
 3058 performance goals are to augment streams that are located near the infiltration sites. KPUD  
 3059 currently maintains 29 stream gaging stations in Kitsap County. KPUD's monitoring of Little  
 3060 Anderson Creek is on a monthly basis, not continuously, because of the stream channel conditions  
 3061 and access. KPUD does not currently monitor Strawberry Creek. However, the indirect  
 3062 augmentation may not be obviously detectible or measurable at a stream gage that is typically  
 3063 located near the mouth given the variability of stream flow in Kitsap County that is dependent on  
 3064 the timing and amount of precipitation (daily, monthly, seasonally, year-to-year) in these drainage  
 3065 basins. The increased baseflow should be most detectible in the upper reaches of the stream if the  
 3066 augmentation occurs near the headwaters of the stream. The increased baseflow, although small,  
 3067 should reduce water temperatures in those streams.

3068  
3069  
3070

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

3071 The Washington Department of Fish and Wildlife (WDFW 2020) has identified that coho and chum  
 3072 salmon and the Endangered Species Act (ESA) listed Puget Sound winter steelhead are present in  
 3073 both Anderson Creek and Strawberry Creek; Big Beef Creek and Wildcat Creek contain these species  
 3074 plus the ESA-listed Puget Sound Chinook salmon.; and chum salmon are present at the mouth of

3075 Koch Creek below Highway 3. The Washington Stream Catalog (WDF 1975) indicates that both coho  
3076 and chum salmon were historically present in all of these creeks, although due to their size, only Big  
3077 Beef Creek produced large numbers of salmon. These streams (except Big Beef Creek) were noted in  
3078 the Stream Catalog (WDF 1975) as having substantial low flow problems including intermittent flows.

3079  
3080 Big Beef Creek is listed for high water temperatures on Ecology's 303(d) list of impaired waterbodies  
3081 and Strawberry Creek is listed for dissolved oxygen and bacteria (Ecology 2020).

3082  
3083 Increased base streamflow and reduced water temperatures would benefit both adult migrants to  
3084 spawning grounds and juvenile salmonid rearing habitats by providing increased area and quality of  
3085 summer stream rearing habitat. This would improve survival of adults and both productivity and  
3086 survival of juveniles. The alteration of natural stream hydrology has been identified as a high priority  
3087 limiting factor in WRIA 15 (NOAA 2007) and streamflow is important for supporting riparian  
3088 vegetation and wetlands that provide shading, food web support, and flood and sediment  
3089 attenuation functions.

3090  
3091 The headwaters of Big Beef Creek and Anderson Creek include wetland areas that could also benefit  
3092 from increased groundwater levels, further supporting cold water volumes to the creek.

3093  
3094 *Identification of anticipated support and barriers to completion.*

3095 SWD is the stakeholder who will coordinate the operations and maintenance of the  
3096 infiltration/augmentation sites. SWD will collect, compile, share and report the metering data.

3097 The primary barrier is the availability of funding for the construction and operations and  
3098 maintenance (O&M) costs. Other barriers include water quality issues (concerns regarding trace  
3099 chemicals, such as pharmaceuticals and personal care products) and the feasibility of infiltration.  
3100 Feasibility issues would need to be studied and addressed during a feasibility study phase.

3101 *Potential budget and O&M costs.*

3102 As of today, the construction costs for building the elements to get the reclaimed water to the end  
3103 of the Newberry Hill section is \$12.8 million. These costs include \$5.1 million for the conveyance  
3104 and metering along Newberry Hill Road. The annual O&M cost for the reclaimed water system is  
3105 estimated to be \$100,000. Additional costs for feasibility studies, design, permitting and  
3106 construction management would be incurred, typically 15-20 percent of the construction cost, or  
3107 \$1.92 - \$2.56 million. The total implementation costs would be approximately \$14.7 million to \$15.4  
3108 million.

3109 *Anticipated durability and resiliency.*

3110 The project would have lasting benefits. SWD will manage the augmentation. The SCADA system  
3111 will allow for adaptive management of the augmentation rate. It is proposed to use only a portion

**Commented [VMSJ(63)]:** Is the cost estimate for the treatment or the conveyance? We should specify the cost of the conveyance for the purpose of augmentation.

3112 of the recycled water available, ensuring a reliable supply. Assuming an O&M funding source is  
3113 found, SWD will manage the infiltration and provide a reliable, long-term operator.

3114 *Project sponsor(s) (if identified) and readiness to proceed/implement.*

3115 SWD would sponsor the project. The project is in agreement with their plans for recycled water and  
3116 is a continuation of pipeline already constructed. A feasibility study is needed to analyze and plan  
3117 for conditions at the sites, as well as work through easements or acquisitions of sites suitable for  
3118 infiltration. The overall feasibility, planning, permitting and design stage would take up to 2 years.  
3119 Funding for the project will also need to be secured. As this project will help remove a wastewater  
3120 outfall into Puget Sound, we assume the Departments of Ecology and Health will support it and  
3121 provide grant funding for implementation.

3122 *Sources of Information*

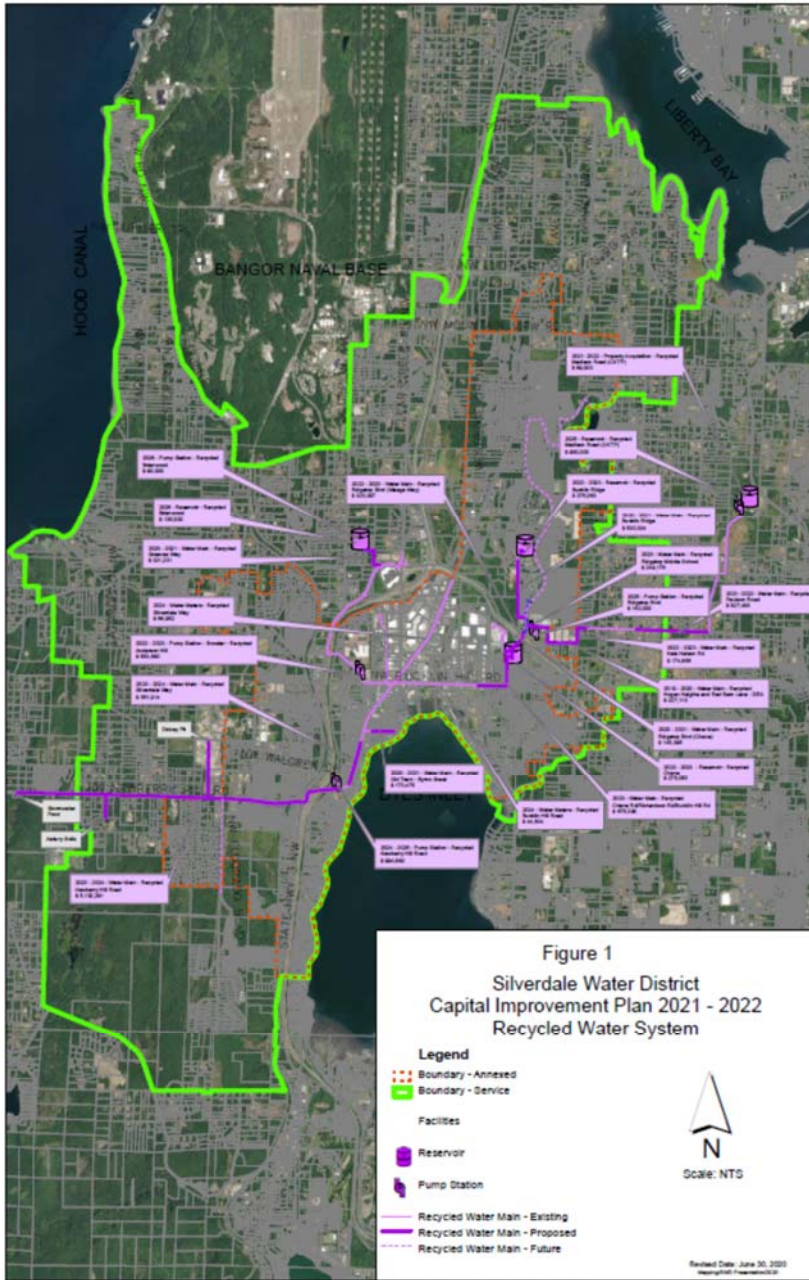
3123 Ecology (Washington Department of Ecology), 2020. 303(d) Listed Waterbodies. Available at:  
3124 [https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-](https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d)  
3125 [of-state-waters-303d](https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-improvement/Assessment-of-state-waters-303d)

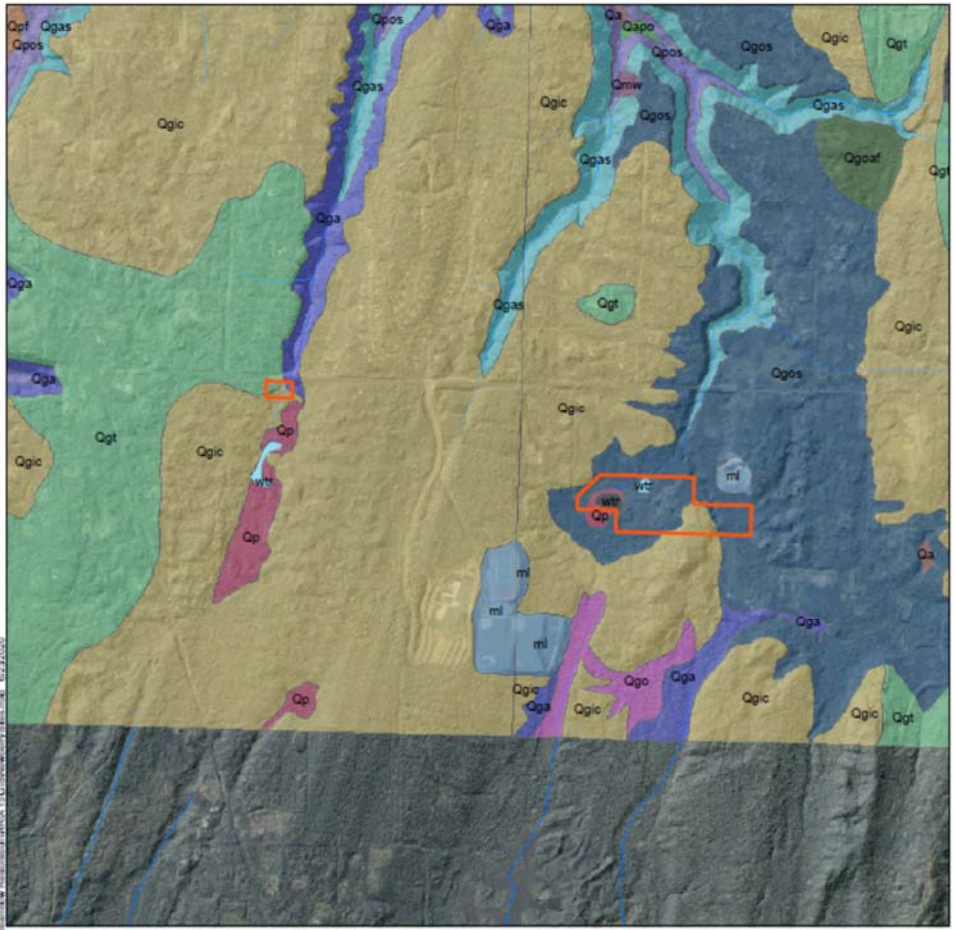
3126 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3127 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3128 Fisheries Service, January 19, 2007.

3129 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
3130 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

3131 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
3132 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>







**Geologic Unit Symbol, Symbology**

Qa--Quaternary alluvium	Qgos--Pleistocene continental glacial drift
Qapo--Pleistocene alpine glacial drift	Qgt--Pleistocene continental glacial till
Qga--Pleistocene continental glacial drift	Qmw--Quaternary mass-wasting deposits
Qgas--Pleistocene continental glacial drift	Qp--Quaternary bog, marsh, swamp, or lake deposits
Qgic--Pleistocene continental glacial drift	Qpf--Pleistocene glacial and nonglacial deposits
Qgo--Pleistocene continental glacial drift	Qpos--Pleistocene continental glacial drift
Qgoaf--Pleistocene continental glacial drift	af,mi--Holocene artificial fill and modified land
	Parcels of Interest

Figure 2  
 Newberry Hill Road Sites

3135 Port Orchard Airport Stormwater Infiltration Project – South Sound **Subbasin**

3136 *Description*

3137 The proposed project would divert stormwater from the 104-acre Port Orchard Airport to a nearby  
3138 infiltration facility which could be at several locations, including the airport, off-site at a nearby Kitsap  
3139 County-owned parcel or off-site at an area south of the airport.

3140 Future development at the airport would increase stormwater runoff and can provide the  
3141 opportunity to construct stormwater facilities that could infiltrate stormwater or convey stormwater  
3142 to an off-site infiltration facility. The airport site is located along Sidney Road SW in Port Orchard and  
3143 was rezoned as REC – Rural Employment Center in 2016. This zone provides for isolated areas of  
3144 industrial and commercial type uses in the rural areas of Kitsap County and are designated to  
3145 promote the rural economy by providing and creating jobs close to where people live. This zoning  
3146 allows future development at the airport including a wider range of commercial, industrial, and  
3147 institutional uses such as offices, retail, and restaurants.

3148 The project is in the South Sound subbasin of WRIA 15. The site is mostly within a Category II Critical  
3149 Aquifer Recharge Area (CARA), with a small area of Category I CARA at the southerly end of the site.  
3150 The streams that could potentially benefit are Minter and Burley creeks and their tributaries in the  
3151 vicinity of the project site.

3152 *Quantitative or qualitative assessment of how the project will function, including anticipated offset*  
3153 *benefits, if applicable. Show how offset volume(s) were estimated.*

3154 The project would function by collecting stormwater runoff from future developed and impervious  
3155 surfaces and conveying it to an infiltration facility. Water quality treatment of the stormwater would  
3156 also be required before infiltration to settle out fine particles which may plug an infiltration facility.  
3157 Three potential areas for infiltration and groundwater recharge have been identified. They are on-site  
3158 at the south end of the airport, east of the airport at a County-owned parcel that was used as a  
3159 gravel pit and south of the airport. Although there are active gravel pits adjacent to the airport, use  
3160 of those pits for infiltration is not proposed as an option as it is believed those pits will be in  
3161 operation for years and will be reclaimed by backfilling with fill material which is not likely to be  
3162 suitable for infiltration.

3163 Figure 1 provides a conceptual plan view for the project and Figure 2 provides a geologic map  
3164 clipped from the WRIA 15 web map. An initial geologic review of an infiltration project was  
3165 performed and indicated there is potential for groundwater recharge. A more detailed geotechnical  
3166 evaluation would be required to confirm the site suitability and provide recommendations on the  
3167 design of the infiltration facility.

3168 To estimate the volume of stormwater runoff that may be available for recharge, streamflow data on  
3169 Burley Creek from Kitsap PUD was used (KPUD 2020). Average monthly flows in Burley Creek were

**Commented [VMSJ(64)]:** Need to address comments from Kitsap Co re: permitting and backfill

3170 multiplied by the ratio of the drainage area at the point of diversion to the Burley Creek drainage  
 3171 area. Table 1 summarizes the anticipated average monthly yield at the project site based on the area-  
 3172 discharge relationship from Burley Creek. This is a conservative (low) estimate of stormwater runoff  
 3173 as impervious surfaces will generate much more runoff per acre than that of the Burley Creek basin.

3174 **Table 1**  
 3175 **Estimated Average Monthly Yield at Port Orchard Airport (acre-feet)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
44	35	38	31	24	19	17	16	16	25	38	40

3176  
 3177 Two assumptions were made in estimating the potential groundwater recharge. The first is the  
 3178 infiltration facility would operate in the winter and early spring (November to March) and the second  
 3179 is 50 percent of the runoff could be infiltrated. The quantity that can be infiltrated will not be known  
 3180 until more detailed hydrological and geotechnical investigations are completed. With those  
 3181 assumptions, up to 98 acre-feet per year could be recharged. The average rate of recharge would be  
 3182 0.33 cfs (148 gpm). Averaged throughout the entire year, the average rate of recharge would be  
 3183 0.135 cfs (61 gpm).

3184 The water offset quantity for the WRIA 15 Watershed Plan is preliminarily estimated to be up to 98  
 3185 acre-feet per year. If suitable infiltration areas are identified, it is likely additional water would be  
 3186 available for recharge to groundwater.

3187 *Conceptual-level map and drawings of the project and location.*

3188 Figure 1 shows the locations of the potential infiltration facilities proposed for the project.

3189 *Description of the anticipated spatial distribution of likely benefits*

3190 Stormwater storage and infiltration could provide additional groundwater input and flows to the  
 3191 Minter and Burley Creek stream systems. Water infiltration could also enhance or restore wetlands  
 3192 associated with groundwater discharge areas. Depending on the location of the infiltration facility,  
 3193 there is approximately 5 miles of tributaries to Burley Creek and Burley Creek that could benefit from  
 3194 groundwater recharge, or approximately 4.5 miles of tributaries to Minter Creek and Minter Creek  
 3195 that could benefit.

3196 **Location relative to future PE well demand**

3197 The forecast consumptive use for the South Sound subbasin using the irrigated area method and  
 3198 baseline growth assumptions is listed in Table 2.

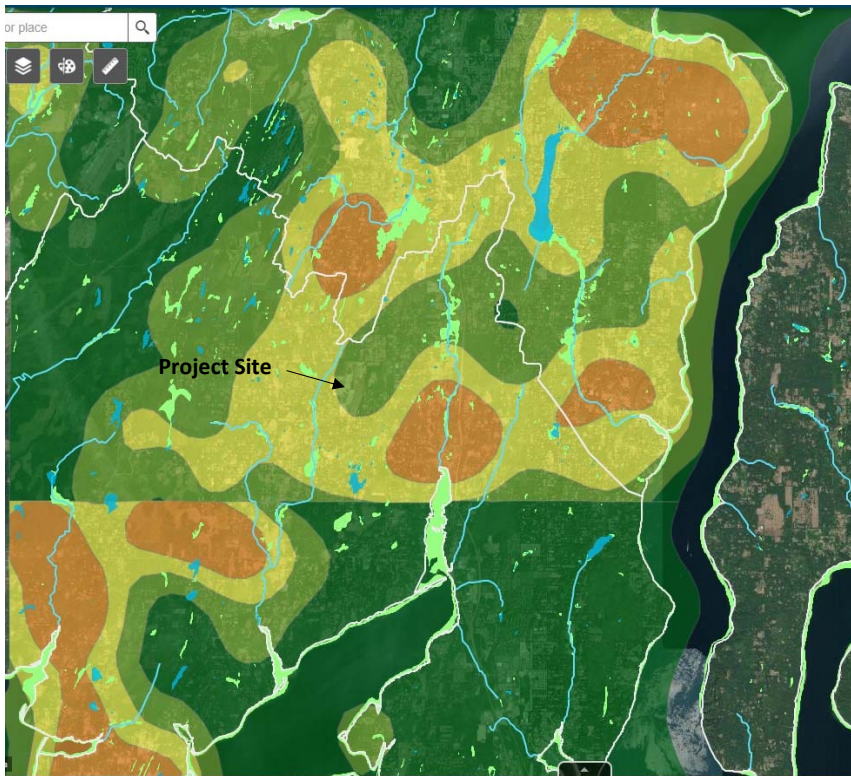
3199

3200

3201 **Table 2. Forecast PE Consumptive Use Demand for South Sound Subbasin**

<b>Acre-feet per year</b>	<b>Gallons per minute</b>	<b>Cubic feet per second</b>
213.8	132.5	0.2958

3202 A copy of the PE growth heat map from the WRIA 15 webmap is shown in Figure 3. The project site is  
3203 in an area predicted to have a lesser level of growth in PE wells, however higher levels of growth is  
3204 predicted in both the Minter Creek and Burley Creek basins. The estimated water offset benefit of 98  
3205 acre-feet per year is 46 percent of the offset estimated for the South Sound subbasin.



3206

3207 Source: <https://hdr.maps.arcgis.com/apps/webappviewer/index.html?id=d7d02dedb57241aa81dd7eb376c8625a>

3208

3209 **Figure 3. WRIA 15 PE Growth Heat Map**

3210 *Performance goals and measures.*

3211 The performance goals are to increase groundwater recharge by 98 acre-feet per year to improve  
 3212 baseflow in Minter and Burley Creeks. The measures will be an increase in baseflow in summer in the  
 3213 creeks by about 0.13 cfs, assuming the water infiltrated discharges to creeks at a steady-state rate  
 3214 equal to the annual average recharge. The average flow in Burley Creek from July to September is 17  
 3215 cfs, with low flows about 9 cfs. There is less streamflow data available for Minter Creek, however data  
 3216 reviewed indicates streamflow levels about the same as Burley Creek. The increased streamflow from  
 3217 recharge will be a very small increase in either stream but may benefit tributaries receiving increased  
 3218 groundwater discharge relatively more.

3219 *Descriptions of the species, life stages and specific ecosystem structure, composition, or function*  
3220 *addressed.*

3221 Minter and Burley creeks support a variety of species and life stages including the Endangered  
3222 Species Act-listed Puget Sound winter steelhead and its critical habitat (NOAA, 2016). Tributaries of  
3223 the East Kitsap Peninsula are part of the Central and South Puget Sound Demographically  
3224 Independent Population (DIP; NOAA, 2019). Other anadromous salmonid species found in the  
3225 watershed that would benefit from this project include Coho, coastal cutthroat trout, fall and summer  
3226 chum, and fall Chinook salmon (WDFW, 2020).

3227 The salmonids and other aquatic species in the Burly/Minter watershed are subject to degraded  
3228 ecosystem function due to limiting factors present at the site. In the Puget Sound Salmon Recovery  
3229 Plan, NOAA identifies the alteration of natural stream hydrology as a high priority limiting factor in  
3230 WRIA 15 (NOAA 2007), and streamflow is important for supporting riparian vegetation and wetlands  
3231 that provide shading, food web support, and flood and sediment attenuation functions. Increased  
3232 base streamflow and reduced water temperatures would primarily benefit juvenile salmonid rearing  
3233 habitats by providing increased area and quality of summer stream rearing habitat. This would  
3234 improve the survival of juveniles. Addressing the streamflow limiting factor and improving habitat  
3235 conditions would help support salmonids at various life stages and increase presence, recruitment,  
3236 and survival in the area of the project. Along with the habitat restoration actions and regional  
3237 planning efforts already undertaken in the Minter/Burly watersheds, addressing increasing base  
3238 streamflow could contribute to the VSP parameters of abundance, productivity, spatial structure, and  
3239 diversity for the ESA-listed Distinct Population Segment of Puget Sound winter steelhead.

3240 *Identification of anticipated support and barriers to completion.*

3241 The project was proposed by members of the Watershed Restoration and Enhancement Committee  
3242 as a potential project that would fit the goals of the committee. There is not currently a sponsor. The  
3243 most likely entity to construct and operate the facility is Kitsap County Public Works. The primary  
3244 barrier would be the availability of funding for the construction and operations and maintenance  
3245 (O&M) costs. Other barriers include the feasibility of infiltration and whether the timing of  
3246 development and subsequent project matches the time frame for water offsets. Owners of the  
3247 airport also have not been contacted to ascertain their interest in a project.

3248 It is anticipated that the project would be supported by both the Minter Creek Watershed Strategies  
3249 Group, the Puget Sound Partnership, and the West Sound Watersheds Council (the lead entity in this  
3250 region of WRIA 15). The Minter Creek Watershed Strategies Group (MCWSG) conducted a regional  
3251 planning effort for the Minter/Burley Creek basin. The goals of this project to increase base  
3252 streamflows and reduce temperatures in the basin align with the priorities for land use identified in  
3253 the MCWSG's 2014 report, Minter Creek Watershed Strategies: A Coordinated Approach to Land Use  
3254 Planning in the Watershed (MCWSG, 2014). Section 8 of the same plan identifies intersections with  
3255 the Puget Sound Partnership's Action Agenda, with which this project also aligns. West Sound

3256 Watersheds Council aligns salmon strategies with Puget Sound Salmon Recovery Plans and  
3257 implements the Puget Sound Partnership's Action Agenda in coordination with the West Central  
3258 Local Integrating Organization. The West Central Local Integrating Organization's 2016 Ecosystem  
3259 Recovery Plan identifies actions in the basin to implement salmon recovery actions. Two theories of  
3260 change identified in this plan are directly addressed by the proposed project: "7.2 Decrease water  
3261 withdrawal, diversion, per capital water use," and "10.3 Fix problems caused by development"  
3262 (WCLIO, 2016). Minter and Burley creeks are not directly identified in the plan, but the project fits  
3263 into general strategies for improving streamflow and habitat conditions for salmonids in WRIA 15.  
3264 The project also addresses strategies identified in NOAA's Recovery Plan for Puget Sound Steelhead  
3265 (NOAA, 2019). Recovery Strategy 3.3.2 specifically identifies improving hydrologic conditions and  
3266 restoring groundwater recharge areas as important to improving survival for steelhead in South  
3267 Puget Sound.

3268 *Potential budget and O&M costs.*

3269 The construction costs of an infiltration facility separate from stormwater facilities constructed for  
3270 future development at the airport is estimated to be around \$400,000. An additional 35 percent  
3271 would be added for design, construction services and administrative costs, for a total of \$540,000.  
3272 The annual O&M cost is estimated to be \$30,000. All costs are based upon a conceptual level of  
3273 understanding of the project and will change once additional feasibility studies are completed. The  
3274 size of the infiltration facility will have the largest effect on construction costs. No entity that will pay  
3275 the annual O&M costs has been identified. It is assumed project costs would be covered through  
3276 grants.

3277 *Anticipated durability and resiliency.*

3278 The project would have lasting benefits if it is managed by Kitsap Public Works. The source of water  
3279 (stormwater runoff) will vary from year to year due to climate factors, however the project benefits  
3280 were described assuming a conservative amount of stormwater is captured and infiltrated.

3281 *Project sponsor(s) (if identified) and readiness to proceed/implement.*

3282 Kitsap County Public Works is the most suitable project sponsor but has not committed to assuming  
3283 the project sponsor role. The project is also in a very conceptual level of detail and additional studies  
3284 will be needed to determine its feasibility or arrangement.

3285 *References*

3286 Kitsap PUD Hydrological Data, 2020. Available at: <http://kpudhydrodata.kpud.org/>

3287 Minter Creek Watershed Strategies Group (MCWSG), 2014. Minter Creek Watershed Strategies:  
3288 A Coordinated Approach to Land Use Planning in the Watershed. March 2014.



- 3289 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3290 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3291 Fisheries Service, January 19, 2007.
- 3292 NOAA, 2019. ESA Recovery Plan for the Puget Sound Steelhead Distinct Population Segment  
3293 (*Oncorhynchus mykiss*). December 30, 2019. Available from:  
3294 [https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-](https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus)  
3295 [steelhead-distinct-population-segment-oncorhynchus](https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus)
- 3296 WDFW (Washington Department of Fish and Wildlife), 2020. Statewide Washington Integrated  
3297 Fish Distribution. Available at:  
3298 [http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0?geometry=-](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0?geometry=-122.777%2C47.430%2C-122.518%2C47.471)  
3299 [122.777%2C47.430%2C-122.518%2C47.471](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0?geometry=-122.777%2C47.430%2C-122.518%2C47.471)

3300 Belfair Wastewater Reclamation Facility – South Sound Subbasin

3301 *Description*

3302 A potential project was identified that would use recycled water from the Belfair Wastewater and  
3303 Water Reclamation Facility and infiltrate the water to provide an offset. Research into the operations  
3304 of the current treatment facility is summarized below.

3305 The Belfair Wastewater and Water Reclamation Facility is authorized to distribute Class A reclaimed  
3306 water to public and private entities for commercial and industrial uses, to apply reclaimed water to  
3307 land for irrigation at agronomic rates, and/or for groundwater recharge by surface percolation at  
3308 locations listed in the permit. Current authorized uses are shown in the following table.

3309

Customer	Use	Location	Average Monthly Flow
Mason County – Forest Irrigation Field	Irrigation and groundwater recharge	39-acre irrigation site just east of reclamation plant	0.125 MGD
Mason County – Belfair Reclamation Plant	Supply to hose bibs, equipment wash, toilet flushing, plant processes, fire flow, and irrigation	25200 NE State Route 3	

3310

3311 The irrigation site is in the West Fork Coulter Creek basin. Currently, the plant is at about ½ capacity  
3312 and treats/irrigates about 70 acre-feet per year.

3313 **Issues**

3314 Potential issues with this project are:

- 3315 • The irrigation site is already in operation and has capacity to treat the remainder of the plant  
3316 capacity.

3317 Johnson Farm Springbrook Creek Managed Aquifer Recharge Project – Bainbridge Island  
3318 Subbasin

3319 *Description*

3320 The Johnson Farm property has an existing storage pond that is used to supply irrigation water to  
3321 the farm during the summer. The property has a surface water right to withdraw 0.2 cfs and 40 acre-  
3322 feet to irrigate 20 acres. The period of use is June 1 to September 30.

3323 The Johnson Farm site has the potential for additional surface water storage, for infiltration of stored  
3324 water and for transfer of an existing surface water source to a groundwater source. For this project  
3325 description, only the potential for infiltration and groundwater recharge, along with a source switch,  
3326 is described as they have the potential for providing water offsets to fit the goals of the Watershed  
3327 Restoration and Enhancement Committee. **This project is currently not feasible due to legal**  
3328 **restrictions.**

3329 *Quantitative or qualitative assessment of how the project will function, including anticipated offset*  
3330 *benefits, if applicable. Show how offset volume(s) were estimated.*

3331 The project would function by diverting water from an existing storage pond to an area on the farm  
3332 for infiltration during the winter and early spring season (November to March). During the summer  
3333 months, groundwater would be used in lieu of surface water for irrigation. There will be a benefit to  
3334 groundwater from infiltration and benefit to surface water during summer by allowing surface water  
3335 to flow through or around the pond instead of being used for irrigation. The project would require  
3336 reconfiguration of the existing pond to allow water to be routed around the pond in summer and to  
3337 provide a source of water by gravity or pumping to an infiltration basin. Figure 1 provides a  
3338 conceptual plan view for the project and Figures 2-4 provide geologic maps prepared to review the  
3339 initial feasibility of an infiltration project. The initial geologic review indicated there is potential for  
3340 groundwater recharge. A more detailed geotechnical evaluation would be required to confirm the  
3341 site suitability and provide recommendations on the design of the infiltration facility.

3342 To estimate the volume of stormwater runoff that may be available for recharge, streamflow data on  
3343 Springbrook Creek from the City of Bainbridge Island (Berg 2020) was used. Average monthly flows  
3344 in Springbrook Creek were multiplied by the ratio of the pond drainage area to the Springbrook  
3345 Creek drainage area. Table 1 summarizes the anticipated average monthly yield at the project site  
3346 based on the area-discharge relationship from Springbrook Creek.

3347 **Table 1**  
3348 **Estimated Average Monthly Yield at Johnson Farm (acre-feet)**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
28	51	42	25	15	7	4	4	4	17	38	23

3349

3350 Two assumptions were made in estimating the potential groundwater recharge. The first is the  
3351 infiltration facility would operate in the winter and early spring (November to March) and the second  
3352 is 50 percent of the runoff could be infiltrated. The quantity that can be infiltrated will not be known  
3353 until more detailed hydrologic and geotechnical investigations are completed. With those  
3354 assumptions, up to 91 acre-feet per year could be recharged. The average rate of recharge would be  
3355 0.31 cfs (138 gpm). Averaged throughout the entire year, the average rate of recharge would be  
3356 0.126 cfs (57 gpm). It is not known at this time whether it is feasible to infiltrate at that rate.

3357 In addition to groundwater recharge, removing the surface water discharge would improve  
3358 streamflow by up to 0.2 cfs during summer. High temperatures and low dissolved oxygen have been  
3359 measured at the existing pond discharge during warmer months. If the existing pond were bypassed  
3360 during summer, the project would also improve instream water quality by reducing stream  
3361 temperatures and increasing dissolved oxygen.

3362 The water offset quantity for the WRIA 15 Watershed Plan is preliminarily estimated to be up to 91  
3363 acre-feet per year.

3364 *Conceptual-level map and drawings of the project and location.*

3365 Figure 1 shows a conceptual plan view of the project.

DRAFT

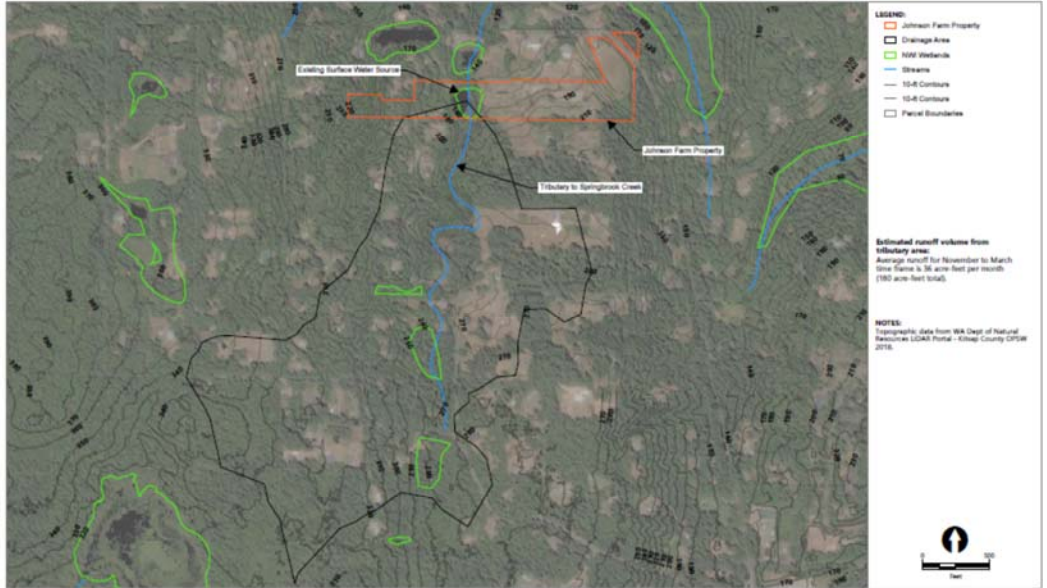
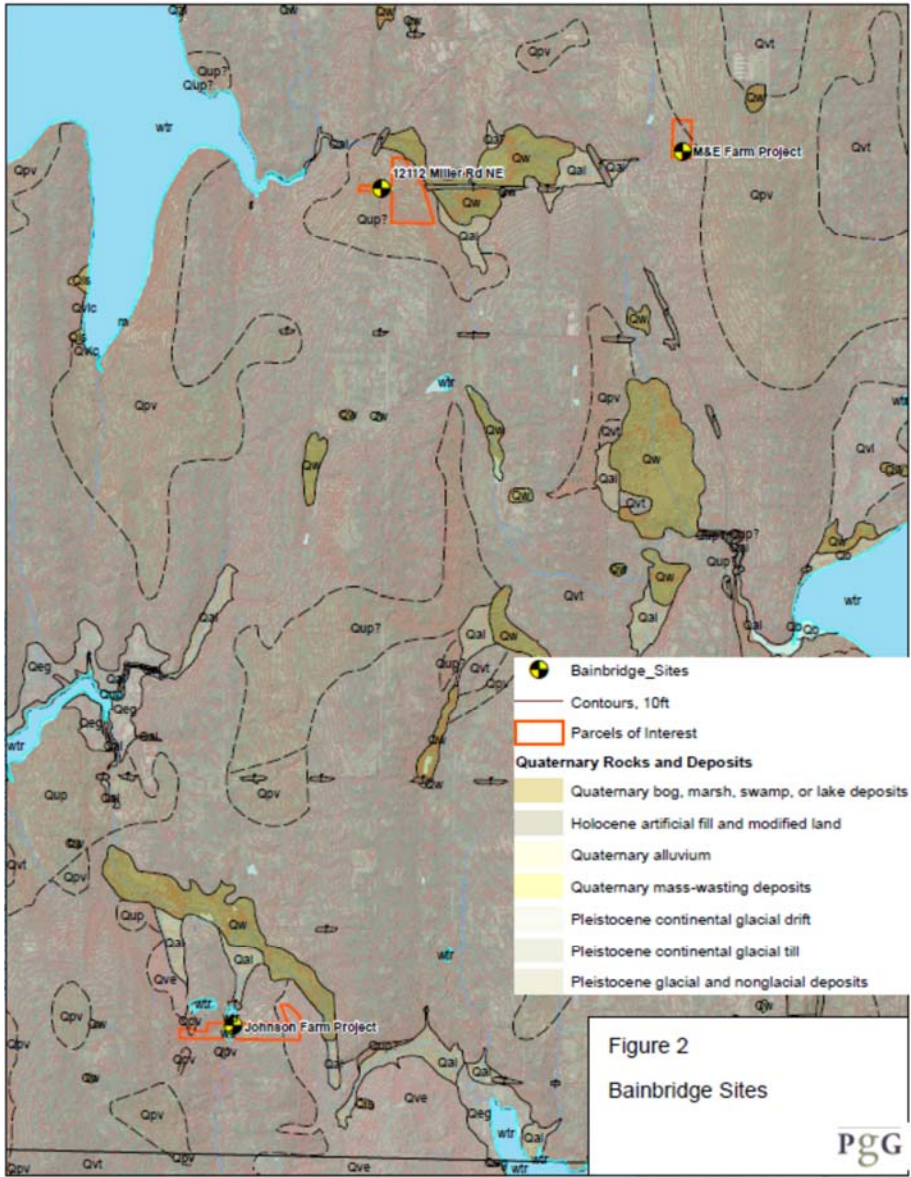


Figure 1  
Johnson Farm, Springbrook Creek - Stormwater Infiltration  
WRIA 15  
Watershed Restoration and Enhancement

3366



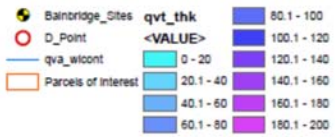
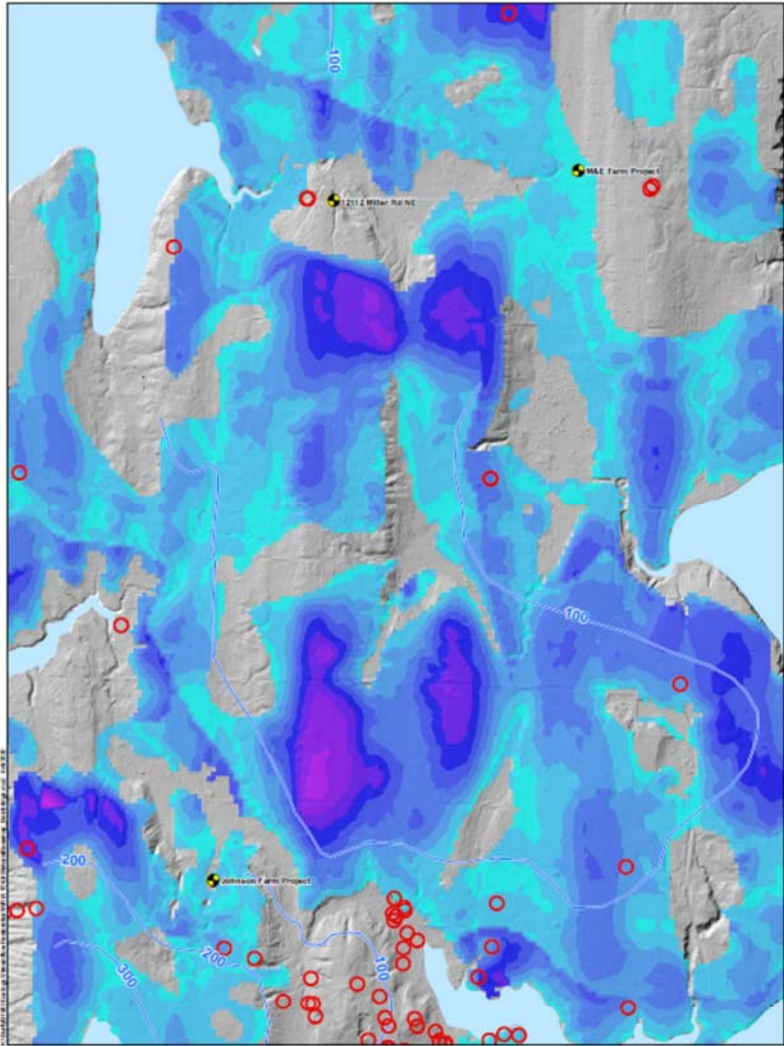


Figure 3



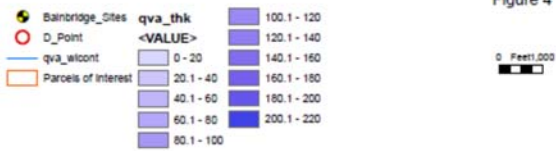
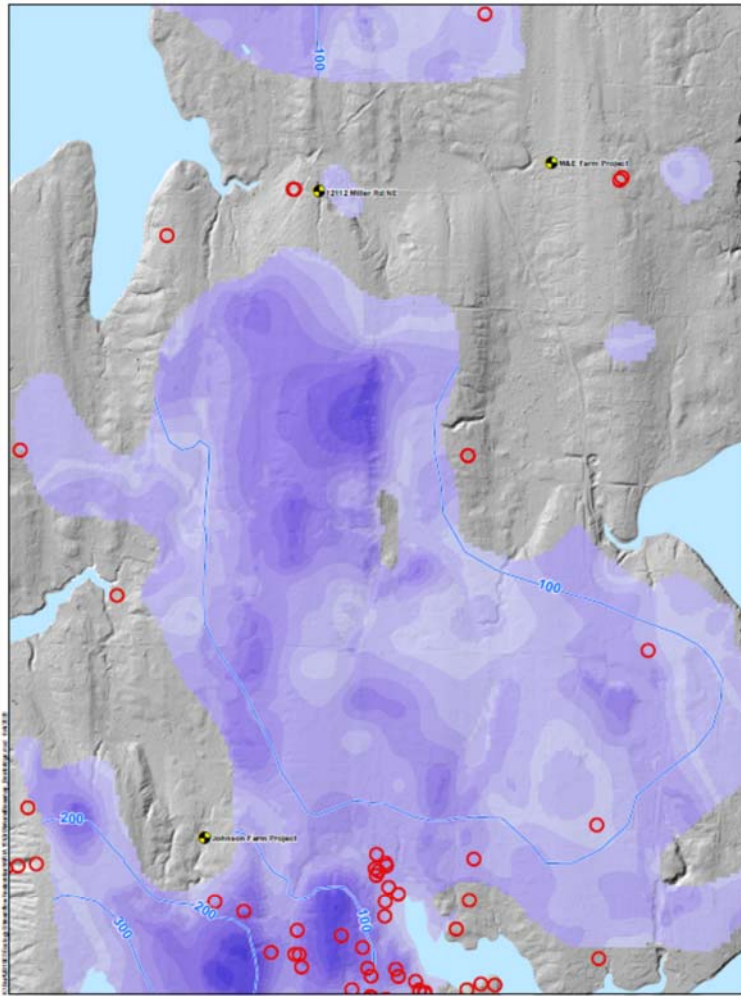


Figure 4

0 Feet 000

3369  
3370

*Description of the anticipated spatial distribution of likely benefits*



3371 Replacement of the surface water source with a new groundwater source at Johnson Farm could  
 3372 improve water quality in Springbrook Creek and its tributary that runs through the property. Water  
 3373 storage and infiltration at the Johnson Farm Property could increase groundwater levels in the  
 3374 headwaters of Johnson Creek and provide increased groundwater inputs and flows into Springbrook  
 3375 Creek. The length of stream potentially benefitting is 1.4 miles (from the site to the mouth of  
 3376 Springbrook Creek). Detailed groundwater evaluations would be required to estimate how much  
 3377 benefit to Springbrook Creek would occur. Water infiltration could also enhance wetlands associated  
 3378 with groundwater discharge areas.

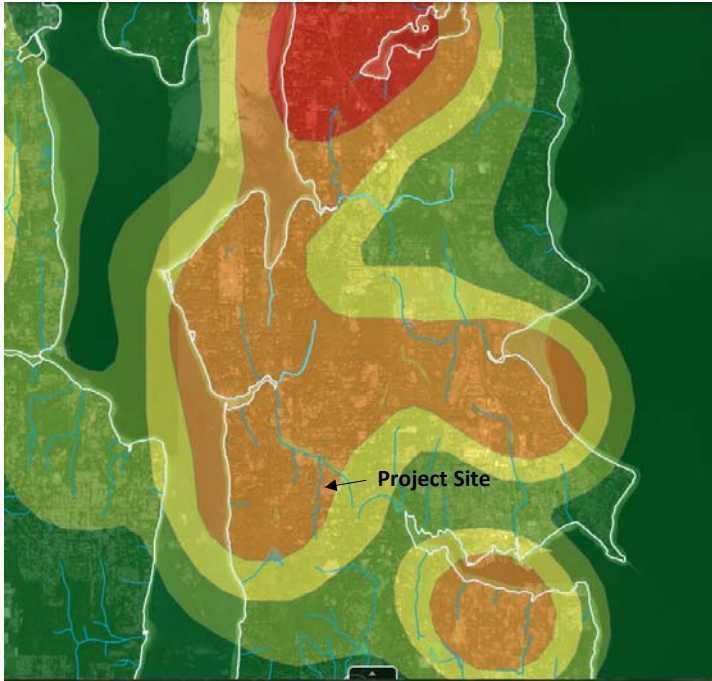
3379 *Location relative to future PE well demand*

3380 The forecast consumptive use for the Bainbridge Island subbasin using the irrigated area method  
 3381 and medium growth assumptions is listed in Table 1.

3382 **Table 1. Forecast PE Consumptive Use Demand for Bainbridge Island Subbasin**

<b>Acre-feet per year</b>	<b>Gallons per minute</b>	<b>Cubic feet per second</b>
67.6	41.9	0.0935

3383 A copy of the PE growth heat map from the WRIA 15 webmap is shown in Figure 5. The project site is  
 3384 located in an area predicted to have a moderate amount of PE well growth compared to other areas  
 3385 in Kitsap County. Much of the Springbrook Creek watershed is in an area predicted to have a  
 3386 moderate amount of PE well growth so this project would provide a water offset where additional  
 3387 consumptive use is predicted. The estimated water offset benefit of 91 acre-feet per year exceeds the  
 3388 total offset estimated for the Bainbridge Island subbasin using the irrigated area method and  
 3389 medium growth prediction.



3390

3391 Source:

3392 <https://hdr.maps.arcgis.com/apps/webappviewer/index.html?id=d7d02dedb57241aa81dd7eb376c86>

3393 [25a](#)

3394 **Figure 5. WRIA 15 PE Growth Heat Map**

3395 *Performance goals and measures.*

3396 The performance goals are to reduce surface water use by up to 40 acre-feet per year during  
3397 summer by switching the source of supply to a new onsite groundwater source and to increase  
3398 infiltration by up to 91 acre-feet per year to improve baseflow in Springbrook Creek. The measures  
3399 will be an increase in baseflow in summer in Springbrook Creek by about 0.3 cfs, assuming the water  
3400 infiltrated discharges to Springbrook Creek at a steady-state rate equal to the annual average  
3401 recharge. The flow in Springbrook Creek in July-September averages about 0.5 cfs with annual low  
3402 flows of less than 0.4 cfs (Berg 2020). The groundwater recharge could increase baseflows by 75  
3403 percent. Increased baseflow and bypass of the existing pond during summer could also slightly  
3404 reduce water temperatures in the stream.

3405 *Descriptions of the species, life stages and specific ecosystem structure, composition, or function*  
3406 *addressed.*

3407 Springbrook Creek is one of the most productive fish-bearing streams on Bainbridge Island. It  
3408 supports cutthroat trout, coho salmon, chum salmon, sculpin, lamprey, and historically supported  
3409 ESA-listed Puget Sound winter steelhead (BILT, 2018). Springbrook Creek also contains one of two  
3410 reaches on Bainbridge Island that are designated as critical habitat for Puget Sound steelhead (BILT,  
3411 2018).

3412 The salmonids and other aquatic species in Springbrook Creek are subject to degraded ecosystem  
3413 function due to limiting factors present at the site. In the Puget Sound Salmon Recovery Plan, NOAA  
3414 identifies the alteration of natural stream hydrology as a high priority limiting factor in WRIA 15  
3415 (NOAA 2007), and streamflow is important for supporting riparian vegetation and wetlands that  
3416 provide shading, food web support, and flood and sediment attenuation functions. Increased base  
3417 streamflow and reduced water temperatures would primarily benefit juvenile salmonid rearing  
3418 habitats by providing increased area and quality of summer stream rearing habitat. This would  
3419 improve the survival of juveniles. Addressing the streamflow limiting factor and improving habitat  
3420 conditions would help support salmonids at various life stages and increase presence, recruitment,  
3421 and survival in the area of the project.

3422 *Identification of anticipated support and barriers to completion.*

3423 The project was proposed by the City of Bainbridge Island as a potential project that would fit the  
3424 goals of the Watershed Restoration and Enhancement Committee. Friends of the Farms is the land  
3425 manager and could be the project sponsor. Either the City or Friends of the Farm could construct,  
3426 operate and maintain the pond and infiltration facilities as they own the property. Even the City does  
3427 not operate the farm they are the water resources manager for Bainbridge Island and would have the  
3428 resources to manage the project. The primary barrier would be the availability of funding for the  
3429 construction and operations and maintenance (O&M) costs. Other barriers include the feasibility of  
3430 infiltration. Feasibility issues would need to be studied and addressed during a feasibility study  
3431 phase.

3432 *Potential budget and O&M costs.*

3433 The total construction costs of the pond reconfiguration, piping and infiltration facility is estimated  
3434 to be around \$400,000. An additional 35 percent would be added for design, construction services  
3435 and administrative costs, for a total of \$540,000. The annual O&M cost is estimated to be \$30,000. All  
3436 costs are based upon a conceptual level of understanding of the project and may change once  
3437 additional feasibility studies are completed. The costs would also change if the project is scaled back.

3438 *Anticipated durability and resiliency.*

3439 The project would have lasting benefits as it would be actively managed by the City of Bainbridge  
3440 with O&M funded by the City using existing staff. The source of water could vary substantially from

3441 year to year due to climate factors, however the project benefits were described assuming a  
3442 conservative amount of stormwater is captured and infiltrated.

3443 *Project sponsor(s) (if identified) and readiness to proceed/implement.*

3444 The City of Bainbridge Island is the most suitable project sponsor but has not committed to  
3445 assuming the project sponsor role yet. The project is also in a very conceptual level of detail and  
3446 additional hydrologic and geotechnical studies will be needed to determine its feasibility or  
3447 arrangement.

3448 *References*

3449 Bainbridge Island Land Trust, 2018. Springbrook Creek Watershed Assessment, Final Report  
3450 December 26, 2018. SRFB Project #14-1517. Available from: [https://www.bi-](https://www.bi-landtrust.org/wp-content/uploads/2019/02/Springbrook-Creek-Assessment-Report-Narrative-1.pdf)  
3451 [landtrust.org/wp-content/uploads/2019/02/Springbrook-Creek-Assessment-Report-](https://www.bi-landtrust.org/wp-content/uploads/2019/02/Springbrook-Creek-Assessment-Report-Narrative-1.pdf)  
3452 [Narrative-1.pdf](https://www.bi-landtrust.org/wp-content/uploads/2019/02/Springbrook-Creek-Assessment-Report-Narrative-1.pdf)

3453 Berg, Christian, 2020. Personal Communication, June 24, 2020

3454 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3455 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3456 Fisheries Service, January 19, 2007.

3457 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
3458 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

3459 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
3460 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

3461 M&E Farm Manzanita Creek Infiltration Project-Bainbridge Island

3462 *Description*

3463 The proposed project at the historic M&E Tree Farm site would collect stormwater runoff from an  
3464 adjacent residential area for infiltration and groundwater recharge in a constructed infiltration facility.  
3465 The project is located in the Manzanita Creek watershed on Bainbridge Island in the Bainbridge  
3466 Island subbasin.

3467 *Quantitative or qualitative assessment of how the project will function, including anticipated offset*  
3468 *benefits, if applicable. Show how offset volume(s) were estimated.*

3469 The project would function by collecting stormwater from an adjacent area and directing it to a city-  
3470 owned parcel (historic M&E Tree Farm) near the upper reaches of Manzanita Creek. An infiltration  
3471 facility would be constructed on that site to recharge groundwater. A stormwater pond may be  
3472 required for flow equalization and settling out fine particles which may plug an infiltration facility.  
3473 Figure 1 provides a conceptual plan view for the project and Figures 2-4 provide geologic maps  
3474 prepared to review the initial feasibility of an infiltration project. The initial geologic review indicated  
3475 there is potential for groundwater recharge. A more detailed geotechnical evaluation would be  
3476 required to confirm the site suitability and provide recommendations on the design of the infiltration  
3477 facility.

3478 To estimate the volume of stormwater runoff that may be available for recharge, streamflow data on  
3479 Manzanita Creek from Kitsap PUD was used. Average monthly flows in Manzanita Creek were  
3480 multiplied by the ratio of the stormwater collection area to the Manzanita Creek drainage area. Table  
3481 1 summarizes the anticipated average monthly yield at the project site based on the area-discharge  
3482 relationship from Manzanita Creek.

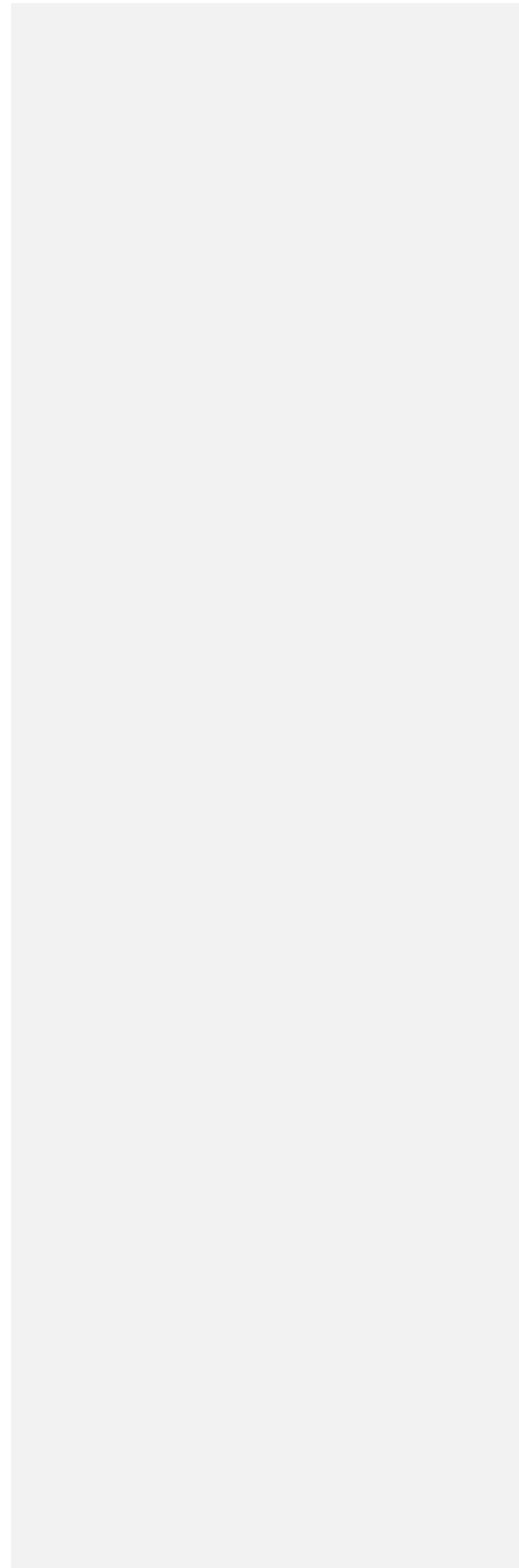
3483 **Table 1**  
3484 **Estimated Average Monthly Yield at M&E Tree Farm Site (acre-feet)**

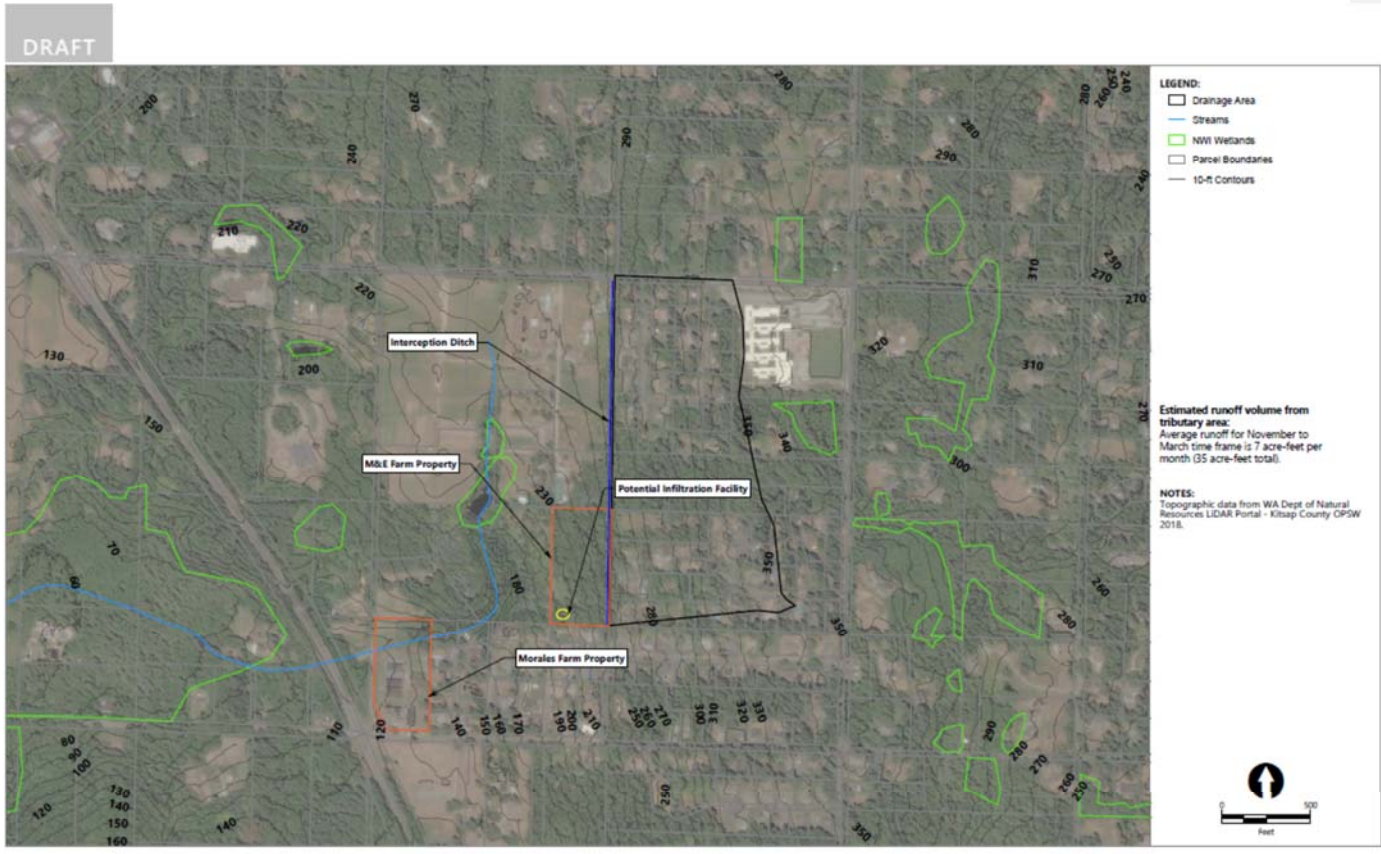
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
13	6.4	3.3	3.9	1.4	0.9	0.6	0.5	0.6	1.4	4.3	8.3

3485  
3486 Two assumptions were made in estimating the potential groundwater recharge. The first is the  
3487 infiltration facility would operate in the winter and early spring (November to March) and the second  
3488 is 50 percent of the runoff could be infiltrated. The quantity that can be infiltrated will not be known  
3489 until more detailed geotechnical investigations are completed. With those assumptions, up to 17.6  
3490 acre-feet per year could be recharged. The average rate of recharge would be 0.06 cfs (27 gpm).  
3491 Averaged throughout the entire year, the average rate of recharge would be 0.024 cfs (11 gpm).  
3492 The water offset quantity for the WRIA 15 Watershed Plan is preliminarily estimated to be up to 17.6  
3493 acre-feet per year.

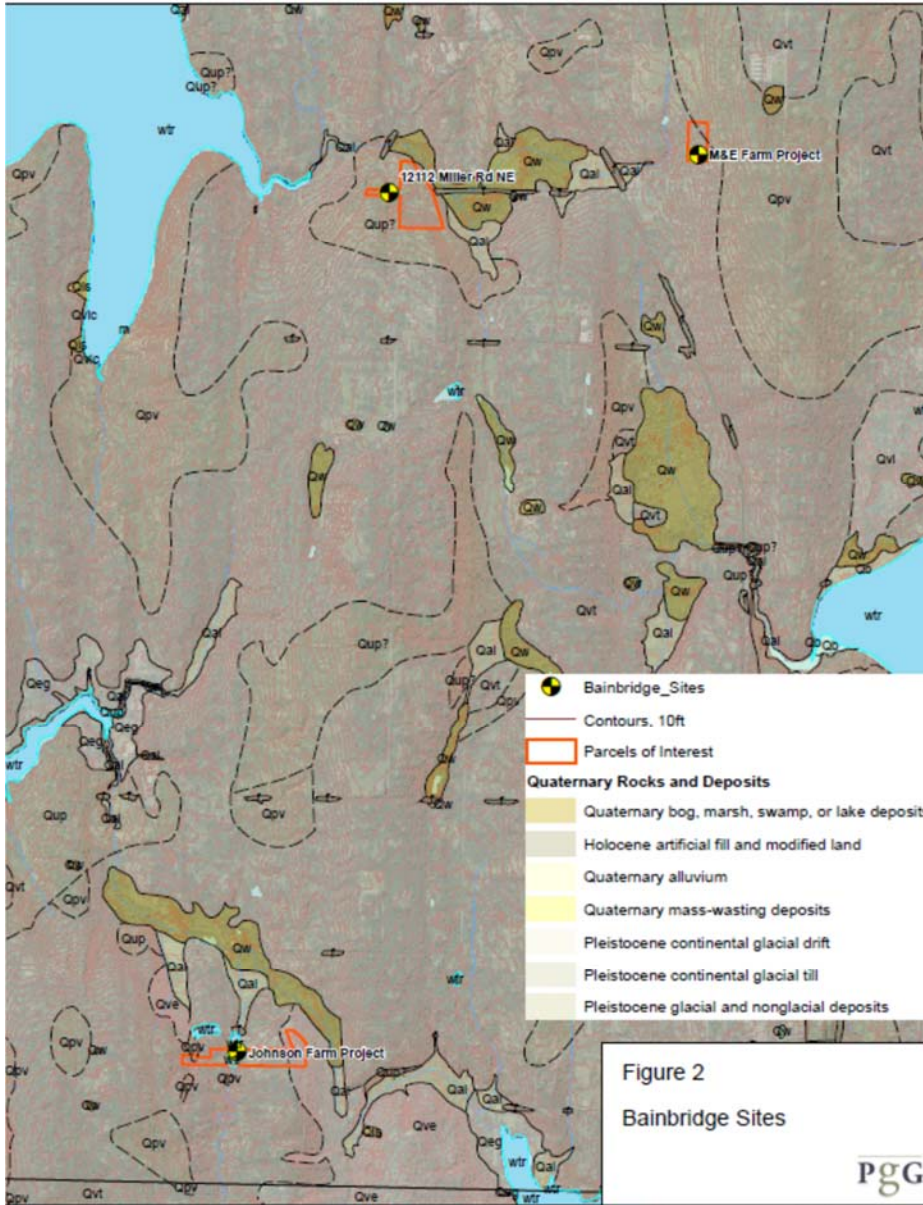
3494 *Conceptual-level map and drawings of the project and location.*

3495 Figure 1 shows a conceptual plan view of the project.





**Figure 1**  
**M&E Farm, Manzanita Creek - Stormwater Infiltration**  
 WRIA 15  
 Watershed Restoration and Enhancement





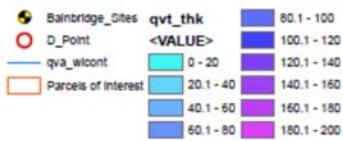
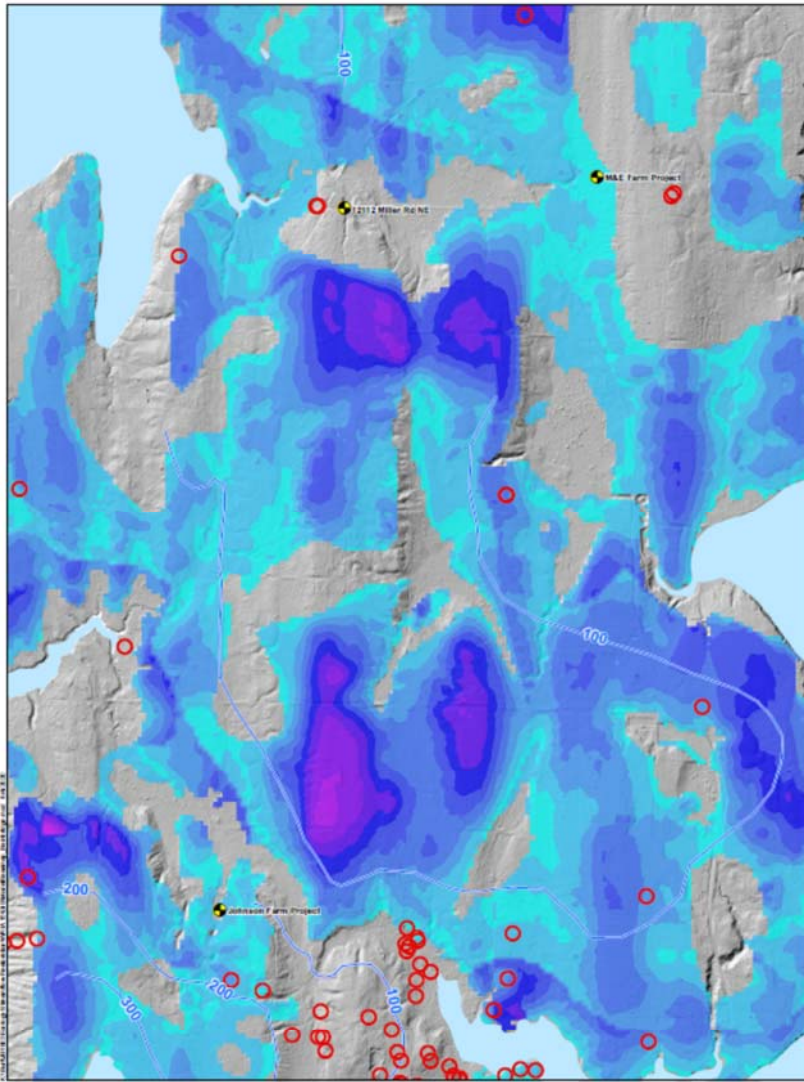


Figure 3



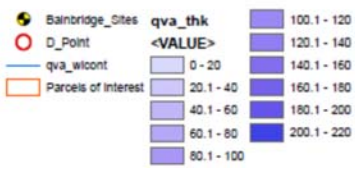
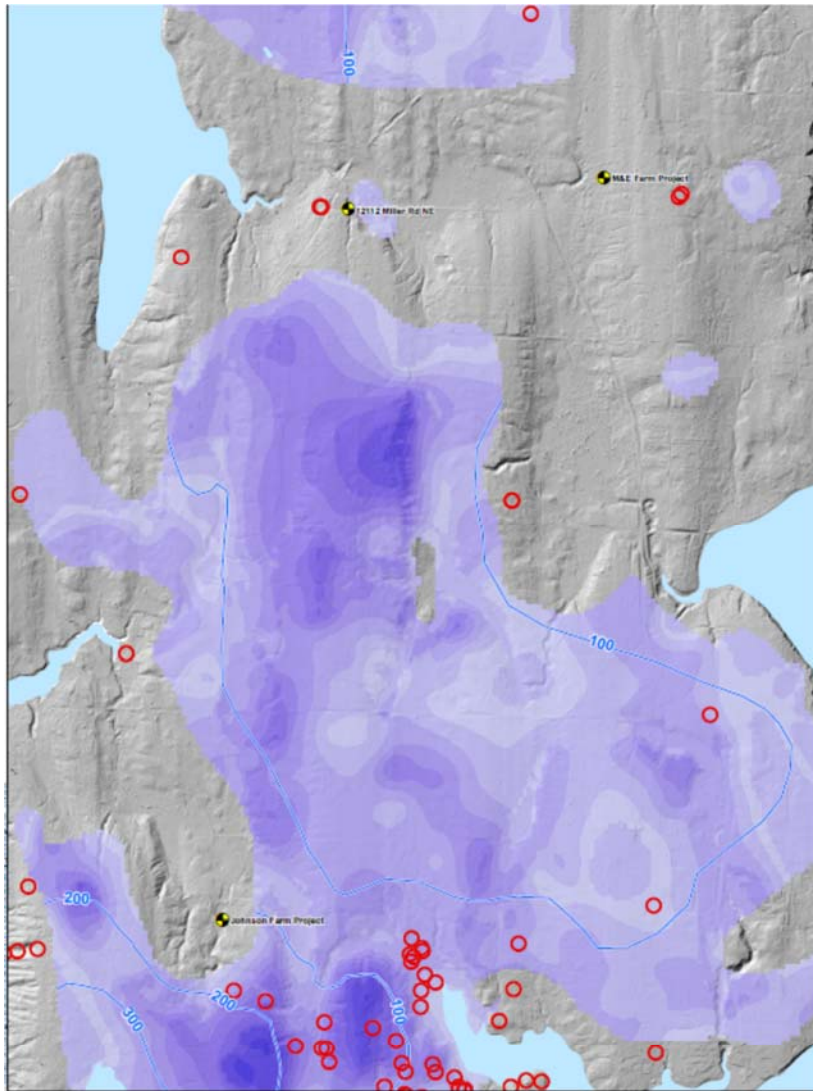


Figure 4



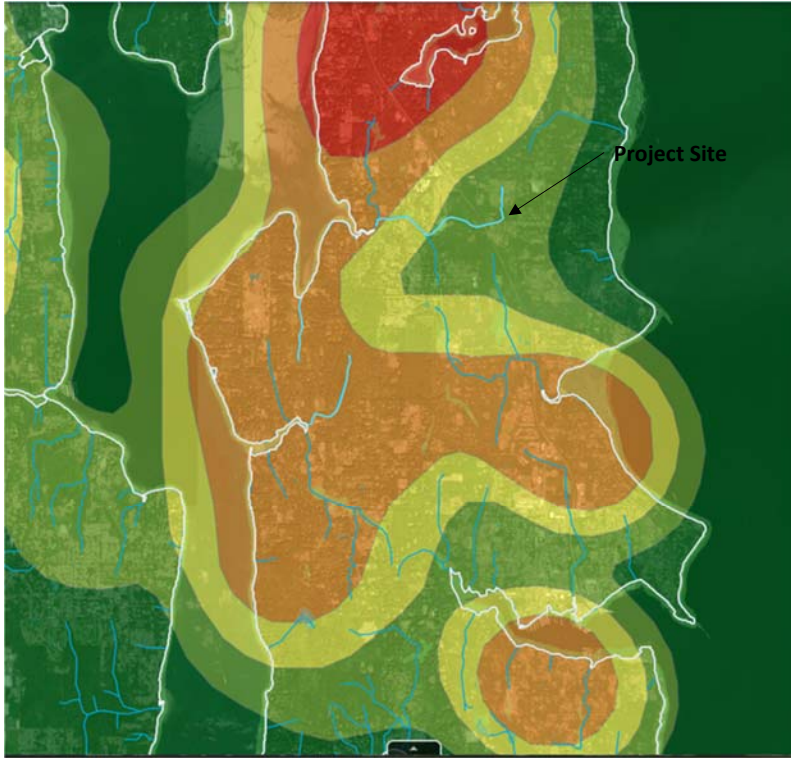
3502 *Description of the anticipated spatial distribution of likely benefits*  
 3503 Water storage and infiltration at the historic M&E Tree Farm Property could increase groundwater  
 3504 levels in the headwaters of Manzanita Creek and provide increased groundwater inputs and flows  
 3505 into Manzanita Creek. Detailed groundwater evaluations would be required to estimate how much  
 3506 benefit to Manzanita Creek would occur. Water infiltration could also enhance wetlands associated  
 3507 with groundwater discharge areas.

3508 *Location relative to future PE well demand*  
 3509 The forecast consumptive use for the Bainbridge Island subbasin using the irrigated area method  
 3510 and baseline growth assumptions is listed in Table 1.

3511 **Table 1. Forecast PE Consumptive Use Demand for Bainbridge Island Subbasin**

<b>Acre-feet per year</b>	<b>Gallons per minute</b>	<b>Cubic feet per second</b>
67.6	41.9	0.0935

3512 A copy of the PE growth heat map from the WRIA 15 webmap is shown in Figure 5. The project site is  
 3513 located in an area predicted to have less growth in PE wells, however more growth is predicted  
 3514 northwest of the site in the Manzanita Creek watershed along the North Fork Manzanita Creek. The  
 3515 estimated water offset benefit of 17.6 acre-feet per year is 26 percent of the offset estimated for the  
 3516 Bainbridge Island subbasin.



3517

3518 Source: <https://hdr.maps.arcgis.com/apps/webappviewer/index.html?id=d7d02dedb57241aa81dd7eb376c8625a>

3519 **Figure 5. WRIA 15 PE Growth Heat Map**

3520 *Performance goals and measures.*

3521 The performance goals are to increase groundwater recharge by 17.6 acre-feet per year to improve  
 3522 baseflow in Manzanita Creek. The measures will be an increase in baseflow in summer in Manzanita  
 3523 Creek by about 0.02 cfs, assuming the water infiltrated discharges to Manzanita Creek at a steady-  
 3524 state rate equal to the annual average recharge. The flow in Manzanita Creek in July-September  
 3525 averages about 0.3 cfs with annual low flows of 0.11 to 0.18 cfs (KPUD). The groundwater recharge  
 3526 could increase baseflows by 8-20 percent. Increased baseflow could also slightly reduce water  
 3527 temperatures in the stream.

3528 *Descriptions of the species, life stages and specific ecosystem structure, composition, or function*  
3529 *addressed.*

3530 The Washington Department of Fish and Wildlife (WDFW 2020) has identified that coho salmon are  
3531 present in both Manzanita Creek and the SF Manzanita Creek; the Endangered Species Act (ESA)  
3532 listed Puget Sound winter steelhead are present in Manzanita Creek (although Manzanita Creek is  
3533 not listed as critical habitat); and chum salmon are present at the mouth of Manzanita Creek below  
3534 the fish hatchery weir/dam operated by the Suquamish Tribe near Miller Bay Road (barrier ID:  
3535 930696), for Manzanita Creek Hatchery. The Washington Stream Catalog (WDF 1975) indicates that  
3536 both coho and chum salmon were historically present in Manzanita Creek. These North Kitsap  
3537 streams were noted in the Stream Catalog (WDF 1975) as having good steady base flows at the time  
3538 (likely due to the glacial outwash soils and infiltration of water).

3539 The salmonids and other aquatic species in Manzanita Creek are subject to degraded ecosystem  
3540 function due to limiting factors present at the site. In the Puget Sound Salmon Recovery Plan, NOAA  
3541 identifies the alteration of natural stream hydrology as a high priority limiting factor in WRIA 15  
3542 (NOAA 2007), and streamflow is important for supporting riparian vegetation and wetlands that  
3543 provide shading, food web support, and flood and sediment attenuation functions. Increased base  
3544 streamflow and reduced water temperatures would primarily benefit juvenile salmonid rearing  
3545 habitats by providing increased area and quality of summer stream rearing habitat. This would  
3546 improve both productivity and survival of juveniles. The alteration of natural stream hydrology has  
3547 been identified as a high priority limiting factor in WRIA 15 (NOAA 2007) and streamflow is  
3548 important for supporting riparian vegetation and wetlands that provide shading, food web support,  
3549 and flood and sediment attenuation functions. Increased base streamflow and reduced water  
3550 temperatures would primarily benefit juvenile salmonid rearing habitats by providing increased area  
3551 and quality of summer stream rearing habitat. This would improve the survival of juveniles.  
3552 Addressing the streamflow limiting factor and improving habitat conditions would help support  
3553 salmonids at various life stages and increase presence, recruitment, and survival in the area of the  
3554 project. Addressing increased base streamflow could contribute to the VSP parameters of  
3555 abundance, productivity, spatial structure, and diversity for the ESA-listed Distinct Population  
3556 Segment of Puget Sound winter steelhead.

3557 *Identification of anticipated support and barriers to completion.*

3558 The project was proposed by the City of Bainbridge Island as a potential project that would fit the  
3559 goals of the Watershed Restoration and Enhancement Committee. Friends of the Farms is the land  
3560 manager and could be the project sponsor. The City would likely construct, operate and maintain the  
3561 stormwater collection and infiltration facilities. The primary barrier would be the availability of  
3562 funding for the construction and operations and maintenance (O&M) costs. Other barriers include  
3563 the feasibility of infiltration. Feasibility issues would need to be studied and addressed during a  
3564 feasibility study phase.

3565 It is anticipated that the project would be supported by the Puget Sound Partnership, the West  
3566 Sound Watersheds Council (the lead entity in this region of WRIA 15), and other local partners. The  
3567 West Sound Watersheds Council aligns salmon strategies with Puget Sound Salmon Recovery Plans  
3568 and implements the Puget Sound Partnership's Action Agenda in coordination with the West Central  
3569 Local Integrating Organization. One of the Near-Term Actions in the Action Agenda is a planning  
3570 and design project to conduct the following:

3571 "Watershed-scale planning in two highest priority salmon-habitat basins on Bainbridge  
3572 Island, working in collaboration with stakeholders through the Bainbridge Island Natural  
3573 Resources Management Team (City departments of planning and public works, Kitsap County  
3574 planning, WDFW, local Land Trust, local Watershed Council, Puget Sound Restoration Fund,  
3575 Mid Sound Fisheries Enhancement Group, Metro Parks and Recreation, Suquamish Tribe,  
3576 Kitsap Conservation District, and Kitsap Public Health District)" (PSP, 2020).

3577 The proposed project could fit into this watershed-scale planning effort which would include  
3578 Manzanita Creek. The West Central Local Integrating Organization's 2016 Ecosystem Recovery Plan  
3579 also identifies actions in the basin to implement salmon recovery actions. Two theories of change  
3580 identified in this plan are directly addressed by the proposed project: "7.2 Decrease water  
3581 withdrawal, diversion, per capital water use," and "10.3 Fix problems caused by development"  
3582 (WCLIO, 2016). Manzanita Creek is not directly identified in the plan, but the project fits into general  
3583 strategies for improving streamflow and habitat conditions for salmonids in WRIA 15. The project  
3584 also addresses strategies identified in NOAA's Recovery Plan for Puget Sound Steelhead (NOAA,  
3585 2019). Recovery Strategy 3.3.2 specifically identifies improving hydrologic conditions and restoring  
3586 groundwater recharge areas as important to improving survival for steelhead in South Puget Sound.

3587 *Potential budget and O&M costs.*

3588 The total construction costs of an interceptor ditch, stormwater pond and infiltration facility is  
3589 estimated to be around \$200,000. An additional 35 percent would be added for design, construction  
3590 services and administrative costs, for a total of \$270,000. The annual O&M cost is estimated to be  
3591 \$20,000. All costs are based upon a conceptual level of understanding of the project and may change  
3592 once additional feasibility studies are completed.

3593 *Anticipated durability and resiliency.*

3594 The project would have lasting benefits as it would be actively managed by the City of Bainbridge  
3595 with O&M funded by the City using existing staff. The source of water could vary substantially from  
3596 year to year due to climate factors, however the project benefits were described assuming a  
3597 conservative amount of stormwater is captured and infiltrated.

3598 *Project sponsor(s) (if identified) and readiness to proceed/implement.*  
3599 The City of Bainbridge Island is the most suitable project sponsor but has not committed to  
3600 assuming the project sponsor role yet. The project is also in a very conceptual level of detail and  
3601 additional geotechnical studies will be needed to determine its feasibility or arrangement.

3602 *References*  
3603 Kitsap PUD Hydrological Data, 2020. Available at: <http://kpudhydrodata.kpud.org/>

3604 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3605 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3606 Fisheries Service, January 19, 2007.

3607 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
3608 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

3609 WDFW (Washington Department of Fish and Wildlife), 2020. Statewide Washington Integrated  
3610 Fish Distribution. Available at:  
3611 [http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01\\_0?geometry=-](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0?geometry=-122.777%2C47.430%2C-122.518%2C47.471)  
3612 [122.777%2C47.430%2C-122.518%2C47.471](http://geo.wa.gov/datasets/4ed1382bad264555b018cc8c934f1c01_0?geometry=-122.777%2C47.430%2C-122.518%2C47.471)NOAA, 2019. ESA Recovery Plan for the Puget  
3613 Sound Steelhead Distinct Population Segment (*Oncorhynchus mykiss*). December 30, 2019.  
3614 Available from: [https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-](https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus)  
3615 [puget-sound-steelhead-distinct-population-segment-oncorhynchus](https://www.fisheries.noaa.gov/resource/document/esa-recovery-plan-puget-sound-steelhead-distinct-population-segment-oncorhynchus)

3616 West Central Local Integrating Organization, 2016. Ecosystem Recovery Plan. Available from:  
3617 <http://sophie-glass.squarespace.com/lio-ecosystem-recovery-plan/>

3618 Puget Sound Partnership, 2020. Action Agenda. Available from:  
3619 <https://actionagenda.pugetsoundinfo.wa.gov/Project/Detail/13327>

3620 Gig Harbor Golf Club Project-South Sound Subbasin

3621 *Description*

3622 The proposed project would replace a surface water diversion on Artondale Creek with a new  
3623 groundwater well to provide irrigation water for Gig Harbor Golf Club and restore habitat over a 600-  
3624 foot reach of Artondale Creek. A portion of Artondale Creek and approximately 2 acres of the  
3625 floodplain would be restored by replacing two existing bridges to open up the floodplain and  
3626 plantings to increase shade, improve instream habitat, reduce stream temperature, and improve  
3627 riparian buffers and upland habitat conditions. The restoration project may also be extended  
3628 downstream if needed to improve fish passage to the project site. The project is located in the South  
3629 Sound subbasin of WRIA 15 on the Gig Harbor Peninsula. **This project is not currently feasible  
3630 due to legal restrictions.**

3631 *Quantitative or qualitative assessment of how the project will function, including anticipated offset  
3632 benefits, if applicable. Show how offset volume(s) were estimated.*

3633 The project would function by removing a surface water diversion and constructing a new well to  
3634 replace the water supply for the golf course. The golf club has a Certificate of Surface Water Right of  
3635 0.27 cfs and 70 acre-feet per year to irrigate 35 acres. The priority date is May 7, 1958. The period of  
3636 use is April 15 to October 1. By switching to a groundwater source, there would be an immediate  
3637 surface water increase in Artondale Creek of up to 0.27 cfs during the April 15 – October 1 time  
3638 frame. The average increase (70 acre-feet/165 days) would be 0.21 cfs. There would be a  
3639 corresponding increase in groundwater use and a new well would need to withdraw from a deep  
3640 aquifer to minimize the potential effect on surface water. However, since the golf club is on a  
3641 peninsula and close to Wollochet Bay, the impact to surface water is likely minimal. Groundwater  
3642 analyses are required to design a new well to minimize surface water impacts.

3643 Stream restoration elements and the removal of two bridges would increase floodplain connection  
3644 and improve riparian habitat conditions, providing beneficial habitat impacts to fish and other  
3645 aquatic species.

3646 *Conceptual-level map and drawings of the project and location.*

3647 Figure 1 shows the location of the stream restoration elements and new groundwater well source for  
3648 irrigation water.



DRAFT



Figure 1  
Gig Harbor Golf Course  
WRIA 15  
Watershed Restoration and Enhancement

3649

3650 **Figure 1. Conceptual Project Description.**

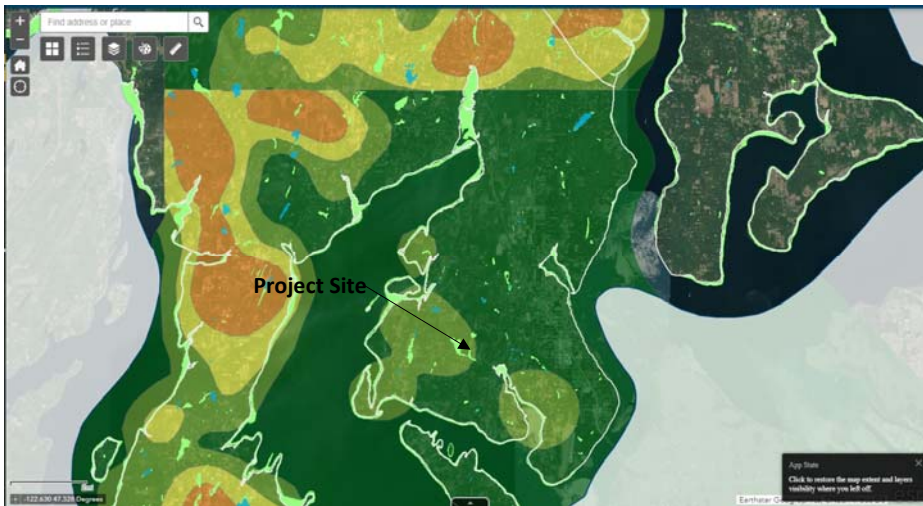
3651 *Description of the anticipated spatial distribution of likely benefits*

3652 The project could result in an increased streamflow of up to 0.27 cfs and up to 70 acre-feet during  
3653 the late Spring to early fall period in Artondale Creek. The increased streamflow would benefit 0.6  
3654 miles of Artondale Creek between the golf course and the head of Wollochet Bay.

3655 **Location relative to future PEW demand**

3656 The estimated consumptive use for future PE wells for the South Sound subbasin is 213.8 acre-feet,  
3657 assuming the median growth estimate and use of the irrigated area method.

3658 The project site is located in an area of relative moderate amount of predicted PE well growth. A copy  
3659 of the PE well growth heat map from the WRIA 15 webmap is shown in Figure 2.



3660  
3661 **Figure 2. WRIA 15 PE Growth Heat Map**

3662 *Performance goals and measures.*

3663 The performance goals are to decrease surface water use by up to 0.27 cfs and 70 acre-feet per year  
3664 to improve streamflow in Artondale Creek and improve instream and floodplain habitat conditions.  
3665 The increased streamflow and increased shade from riparian plantings should also reduce water  
3666 temperatures in the stream.

3667 *Descriptions of the species, life stages and specific ecosystem structure, composition, or function  
3668 addressed.*

3669 Artondale Creek supports a variety of species and life stages, similar to the other small streams  
3670 within the Gig Harbor Peninsula area. The primary anadromous species found in Artondale Creek are  
3671 coho and chum salmon, and cutthroat trout have also been observed. Specifically, Artondale Creek

3672 and its east branch support runs of coho salmon and cutthroat trout and Artondale Creek supports a  
3673 run of chum salmon (Pierce County, 2015). The salmonids and other aquatic species in Artondale  
3674 Creek are subject to degraded ecosystem function due to limiting factors present at the site. In the  
3675 Puget Sound Salmon Recovery Plan, NOAA identifies the alteration of natural stream hydrology as a  
3676 high priority limiting factor in WRIA 15 (NOAA 2007), and streamflow is important for supporting  
3677 riparian vegetation and wetlands that provide shading, food web support, and flood and sediment  
3678 attenuation functions. Increased base streamflow and reduced water temperatures would primarily  
3679 benefit juvenile salmonid rearing habitats by providing increased area and quality of summer stream  
3680 rearing habitat. This would improve the survival of juveniles. Addressing the streamflow limiting  
3681 factor and improving habitat conditions would help support salmonids at various life stages and  
3682 increase presence, recruitment, and survival in the area of the project.

3683 *Identification of anticipated support and barriers to completion.*

3684 A preliminary meeting was held with Board members of the Gig Harbor Golf Club and they were  
3685 receptive of the project. Input from WDFW, tribes, Pierce County and other stakeholders is needed  
3686 before developing the project any further. If support is obtained from those stakeholders, the main  
3687 barrier to completion would be obtaining funding.

3688 The West Sound Watersheds Council, which is the Lead Entity in this region of WRIA 15, aligns  
3689 salmon strategies with Puget Sound Salmon Recovery Plans and implements the Puget Sound  
3690 Partnership's Action Agenda in coordination with the West Central Local Integrating Organization.  
3691 The West Central Local Integrating Organization's 2016 Ecosystem Recovery Plan identifies actions in  
3692 the Gig Harbor basin to implement salmon recovery actions. Two theories of change identified in this  
3693 plan are directly addressed by the proposed project: "7.2 Decrease water withdrawal, diversion, per  
3694 capital water use," and "10.3 Fix problems caused by development" (WCLIO, 2016). Artondale Creek  
3695 is not directly identified in the plan, but the project fits into general strategies for improving  
3696 streamflow and habitat conditions for salmonids in WRIA 15.

3697 The Gig Harbor Basin Plan, which was written by Pierce County Public Works and Utilities and  
3698 adopted in 2005, is a comprehensive guide to surface water management in the Gig Harbor Basin  
3699 (Pierce County, 2005). It identifies surface water management issues in the basin and recommends  
3700 actions to reduce flood hazards, improve water quality, improve fish passage, and improve riparian  
3701 habitat in the Gig Harbor Basin. Artondale Creek is described in this plan as having more than 50  
3702 percent fair or poor fish habitat in addition to problem areas such as fish passage barriers. The reach  
3703 of Artondale Creek which extends through the project area has the least valuable habitat for fish and  
3704 wildlife than any other reach in Artondale Creek due to channelization and removal of riparian  
3705 vegetation. The proposed project directly addresses this degraded habitat and aligns with the Gig  
3706 Harbor Basin Plan.

3707 *Potential budget and O&M costs.*  
3708 No detailed estimate of implementation costs has been prepared but a conceptual level cost of  
3709 about \$500,000 is estimated. That includes costs of drilling, testing and permitting a new well,  
3710 restoration of 2 acres of floodplain and stream, construction of a traffic bridge at the entrance to the  
3711 golf club and a lighter duty bridge to cross the stream near a tee box, engineering and permitting. A  
3712 contingency of 25 percent was added because of the conceptual level of detail available at this stage.  
3713 The O&M costs of the well and bridges would likely be paid for by the golf course as part of their  
3714 maintenance activities.

3715 *Anticipated durability and resiliency.*  
3716 The project would have lasting benefits as it would be actively managed by Gig Harbor Golf Club  
3717 with O&M likely performed by existing golf course maintenance and grounds staff. The new  
3718 groundwater well source for irrigation should provide more reliability and less variability from year to  
3719 year due to climate factors.

3720 *Project sponsor(s) (if identified) and readiness to proceed/implement.*  
3721 A project sponsor has not yet been identified but could be the Gig Harbor Golf Club, Pierce County, a  
3722 tribe, the lead entity or another restoration organization in Pierce County and WRIA 15.

3723 *References*  
3724 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3725 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3726 Fisheries Service, January 19, 2007.

3727 Pierce County. 2015. Pierce County Comprehensive Plan: Gig Harbor Community Plan Background.  
3728 Available from: <https://www.co.pierce.wa.us/AgendaCenter/ViewFile/Item/793?fileID=976>

3729 Pierce County. 2005. Pierce County Public Works and Utilities Gig Harbor Basin Plan – Volume 1 – Basin  
3730 Plan and SEIS. Available from: <https://www.co.pierce.wa.us/ArchiveCenter/ViewFile/Item/1218>

3731 Washington Department of Ecology, Water Rights Viewer. Available from:  
3732 <https://apps.wr.ecology.wa.gov/waterresources/map/WaterResourcesExplorer.aspx>

3733 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
3734 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

3735 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
3736 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

3737 West Central Local Integrating Organization. 2016. Ecosystem Recovery Plan. December 29, 2016.  
3738 Available from:  
3739 <https://pspwa.app.box.com/s/nxli7o61pnjxx4rkmo7nokcjh9huc0kf/file/293115183651>

3740 Wild Fish Conservancy. 2014. Watertyping Interactive Maps. West Sound Watersheds, Kitsap Peninsula  
3741 (WRIA 15). Available from: <http://www.moonlitgeo.com/wfc/?lat=47.785&lng=-122.54&zoom=12>

3742 **Community Forest Projects Portfolio in WRIA 15**

3743 **Summary**

3744 This streamflow restoration action is the acquisition of forest lands or change in forest  
3745 management practices to preserve stands or emphasize a longer harvest interval. Preserving or  
3746 maintaining forests with stand ages more than 40 years can increase dry-season low flows. A  
3747 portfolio of projects is presented along with an estimate of the potential increase in  
3748 streamflow. To date, 20 projects have been identified and streamflow increases of over 1,000  
3749 acre-feet/ year are estimated assuming the forest stands are more than 40 years old and  
3750 subject to harvest. Potential streamflow benefits were estimated using average values of  
3751 streamflow increase per acre estimated from the VELMA hydrologic model for similar projects  
3752 in the Nisqually Watershed (WRIA 11). As projects move forward for funding considerations,  
3753 further hydrologic modeling would need to be performed for WRIA 15 Community Forest  
3754 projects to estimate potential increases in streamflow.

3755 **Description of Community Forest Projects**

3756 Hydrologic modeling performed for Community Forest Projects in the Nisqually Watershed  
3757 show that forest management practices that emphasize longer harvest intervals (>80 years),  
3758 forest thinning and robust riparian buffers can significantly increase dry-season low flows. The  
3759 hydrologic modeling was performed using the VELMA model and the results are consistent with  
3760 available observed long-term monitoring data in the Pacific Northwest region (Perry and Jones  
3761 2016, Segura et al 2020). Recent empirical studies in western Oregon have established that  
3762 young, rapidly growing forests can transpire over three times more water than mature  
3763 forests. These studies were conducted at relatively small scales, ranging from individual trees  
3764 and stands of trees (Moore et al. 2004) to small headwater catchments (Perry and Jones 2016).

3765 An estimate of the potential streamflow increase with implementation of Community Forest  
3766 projects was prepared using information contained in the Nisqually Watershed Response to the  
3767 2018 Streamflow Restoration Act (Nisqually Watershed Planning Unit 2019). In that plan, the  
3768 average streamflow benefit is 0.14 acre-feet per year per acre of Community Forest acquired.  
3769 That assumes the forest stands acquired have an average age of 40 years. The value for WRIA  
3770 15 may differ because of differing hydrologic conditions and would need to be modeled to  
3771 select an appropriate value. In some cases for WRIA 15, the value may be higher because of  
3772 permanent protection.

3773 Maintaining mature forest cover also provides significant habitat benefits that grow with stand  
3774 complexity and age. Older trees provide a wider range of niche habitats and create long-term  
3775 habitat benefits of snags and large woody debris.

3776 The estimated consumptive use for future PE wells in WRIA 15 is 766.4 acre-feet per year, with  
3777 a higher goal of 1218 acre feet per year. To meet the consumptive use offset for the entire  
3778 WRIA, Community Forest of about 5,500 to 8,700 acres would need to be acquired or managed  
3779 to emphasize a longer harvest interval. Since there are other projects that will provide water  
3780 offsets, that area of community forest is not required for the plan. However, the Watershed  
3781 Committee wants to include Community Forest Projects in the Watershed Plan. Table 1  
3782 presents the acreage of potential community forest projects identified by sponsors by subbasin,

3783 as well as a target acreage in each subbasin that will provide water offsets to help meet the  
3784 Watershed Plan goal of offsetting future PE well demand within each subbasin. The total target  
3785 acreage is 1,723 acres, which will provide an estimated 241 acre-feet of water offset. The  
3786 projects identified by sponsors need further confirmation to determine whether the projects  
3787 would meet the criteria of having forest stands greater than 40 years old and subject to harvest.  
3788 In some cases, thinning is expected to occur on the properties.

3789 The cost of acquiring community forest is likely in the range of \$10,000 - \$15,000 per acre.<sup>41</sup>  
3790 The total acquisition cost for 1,723 acres would likely be in the range of \$17.2 – \$25.8 million.  
3791 This does not include restoration costs.

3792 Additional information about Community Forest type projects was prepared by Paul Pickett of  
3793 the Squaxin Tribe and is located on Box at  
3794 <https://app.box.com/file/690715571320?s=98rgsj14yxzhakbmk17y1j4euminkp0b>

#### 3795 **References**

3796 Moore, G. W., Bond, B. J., Jones, J. A., Phillips, N., & Meinzer, F. C. (2004). Structural and  
3797 compositional controls on transpiration in 40-and 450-year-old riparian forests in western  
3798 Oregon, USA. *Tree physiology*, 24(5), 481-491.

3799 Nisqually Watershed Planning Unit (2019). Nisqually Watershed Response to the 2018  
3800 Streamflow Restoration Act (RCW 90.94): Addendum to the Nisqually Watershed  
3801 Management Plan. Olympia, WA.

3802 Perry, T.D. and Jones, J. A. (August 2016). Summer streamflow deficits from regenerating  
3803 Douglas-fir forest in the Pacific Northwest, USA. *Ecohydrology*, doi: 10.1002/eco.1790.

3804 Segura, C., Bladon, K.D., Hatten, J.A., Jones, J.A., Hale, C., Ice, G.G. (2020). Long-term effects of  
3805 forest harvesting on summer low flow deficits in the Coast Range of Oregon. *Journal of*  
3806 *Hydrology*, Volume 585, June 2020.

---

<sup>41</sup> Current costs in North Hood Canal per acre are approximately \$9000. The larger range takes into account variations across the WRIA and future pricing. This estimate is only for the acquisition and does not include any potential restoration work that may occur on some properties.

3807 Table 1. Portfolio of Community Forest Type Projects in WRIA 15

Subbasin	Project Name (Sponsor, if known)	Description	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
<b>Bainbridge Island</b>	Springbrook Creek Protection and Restoration (Bainbridge Island Land Trust)	Purchase of 22.85 acres of intact stream, wetland, riparian and forest habitat and removal of fish passage barrier culvert in high priority protection site as identified in Springbrook Creek Watershed Assessment (2018) and Department of Ecology Watershed Characterization.	22.85	3.2
<b>North Hood Canal</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>• Crabapple Creek Habitat Acquisition and Restoration</li> <li>• Little Anderson Creek Habitat Protection</li> <li>• Divide Block Habitat Acquisition and Restoration</li> <li>• West Port Gamble Block Habitat Protection</li> <li>• Port Gamble Heritage Park Timber Rights Acquisition</li> <li>• Gamble Creek Parcel</li> <li>• Boyce Anderson DNR Parcel</li> <li>• Seabeck DNR Parcel</li> <li>• Grovers Creek Mainstem protection and restoration</li> </ul> (Sponsors may be Great Peninsula Conservancy, Kitsap County and Port Gamble S’Klallam Tribe)	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Approx. 2,100 acres has been identified as potential projects by sponsors, target for Community Forest in this subbasin is 500 acres	70
<b>South Hood Canal</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>• Bear Creek Protection</li> <li>• Tahuya Headwaters</li> </ul>	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Target is 500 acres in South Hood Canal Subbasin	70

Subbasin	Project Name (Sponsor, if known)	Description	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
	(Sponsors may be Great Peninsula Conservancy and others)			
<b>South Sound</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>Rocky Creek Preserve</li> <li>Coulter Creek Overton Lands</li> <li>Key Peninsula Forest Lands</li> </ul> (Sponsors may be Great Peninsula Conservancy and others)	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Target is 500 acres in South Sound Subbasin	70
<b>Vashon Maury</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>Judd Creek Headwaters</li> <li>Shinglemill Creek Headwaters</li> <li>Mileta Creek Headwaters</li> <li>Christiansen Creek Headwaters</li> <li>Fisher Creek Headwaters</li> <li>Tahlequah Creek Headwaters</li> </ul> (Sponsors may be Vashon-Maury Island Land Trust or King County)	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Target is 100 acres in Vashon Maury Subbasin	14
<b>West Sound</b>	Community Forest Projects, including: <ul style="list-style-type: none"> <li>East Branch Ostrich Bay Creek along Skylark Drive W.</li> <li>Strawberry and L. Anderson Creek Parcel</li> </ul> (Sponsors may be Great Peninsula Conservancy and others)	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Target is 50 acres in West Sound Subbasin	7
<b>South Sound Islands</b>	Anderson Island Community Forest Projects <ul style="list-style-type: none"> <li>Near Idie Ulsh Park (40 acres total)</li> <li>Near Saint Anne's Park (6.68 acres)</li> </ul> (Sponsors may include Anderson Island Parks District, Great Peninsula Conservancy, Nisqually Land Trust, Forterra)	Community forest projects will protect forested land from development or change timber harvest practices and restore streams, riparian areas, wetlands	Target is 50 acres in South Sound Islands Subbasin	7



3808

Subbasin	Project Name (Sponsor, if known)	Description	Acreage	Potential Streamflow Restoration Increase (Acre-feet/year)
<b>Totals</b>			Overall Target is 1,723 acres	241

3809 **Conservation District Rain Garden And Low Impact Development**  
3810 **Programs**

3811 **Description**

3812 The Rain Garden and Low Impact Development (LID) Program at the Kitsap Conservation District  
3813 (KCD) works cooperatively with county services, landowners, and local communities to expand  
3814 knowledge and use of LID practices throughout Kitsap County. With funding from Clean Water  
3815 Kitsap, the KCD helps landowners to protect local water resources by providing information,  
3816 technical assistance, and financial incentives toward the installation and maintenance of rain  
3817 gardens and other LID solutions. Within this program, the KCD offers free site visits to any  
3818 landowner in unincorporated Kitsap County to assess and discuss what LID projects are feasible for  
3819 their property.

3820 Since 2010, the KCD Rain Garden and LID cost-share program has helped landowners fund and  
3821 install 320 rain gardens (KCD 2020; KCD, Pers. Comm., September 29, 2020).<sup>42</sup> In 2014, the program  
3822 expanded to include a number of new LID options in addition to rain gardens, such as rain barrels,  
3823 lawn modification, soakage trenches, and native plants. 163 of these practices have been installed  
3824 (KCD 2020, Appendix A). Rain gardens (RG) are designed to collect and filter water that flows off  
3825 hard surfaces, like roofs and roads. Low impact development focuses on ways that we can adapt  
3826 human-constructed landscapes to reduce harmful impacts on natural resources and the  
3827 environment. Based on 9 years of data, the KCD Rain Garden and Low Impact Development  
3828 Program has conservatively put 257 acre-feet of water back into the ground. The KCD estimates  
3829 that they will continue to implement 50 practices (40 RG plus 10 other practices) per year with a  
3830 total average offset of 29 acre-feet per year (KCD, Pers. Comm., September 29, 2020).

3831 The goal of this project would be to support the implementation of RGs and LIDs across Kitsap  
3832 County (Figure 1). The implementation of specific projects would focus on critical Kitsap County  
3833 streams in which permit exempt wells (PEW) are projected to be high (Figure 2).

3834 **Quantitative or qualitative assessment of how the project will function, including**  
3835 **anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

3836 The KCD estimates that the Rain Garden and Low Impact Development Program has put 257 acre-  
3837 feet of water back into the ground. The average RG or LID project is estimated to put 0.70 acre-feet  
3838 of water into the ground on an annual basis. The KCD intends to implement 50 practices (40 RG  
3839 plus 10 other practices) per year with an average offset of 29 acre-feet per year (KCD, Pers. Comm.,  
3840 September 29, 2020). It is recommended that KCD targets the percent of applications per subbasin

Commented [VMSJ(65)]: Need to insert updated description after December

---

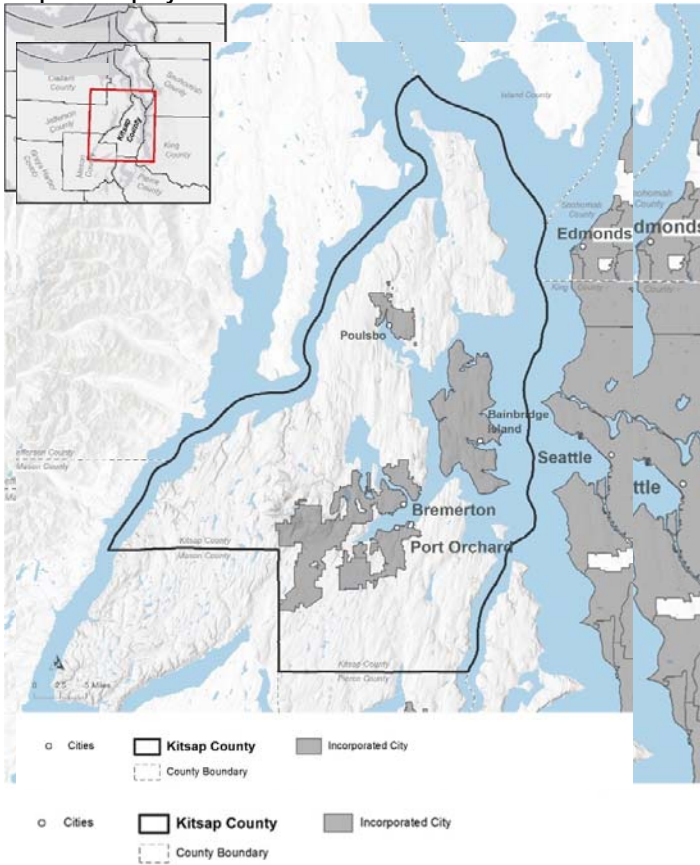
<sup>42</sup> Installations include projects within the cities of Poulsbo, Bremerton and Bainbridge Island.

3841 per year as presented in Table 1.

3842 *Table 1. Target Percent of Applications per Subbasin per Year*

Subbasin	Target % of Applications	Total Amount of Potential Offset Benefit by 2038
North Hood Canal	20%	116 acre feet per year
West Sound	40%	232 acre feet per year
Bainbridge Island	10%	58 acre feet per year
South Sound	20%	116 acre feet per year

3843 **Map of the project and location.**

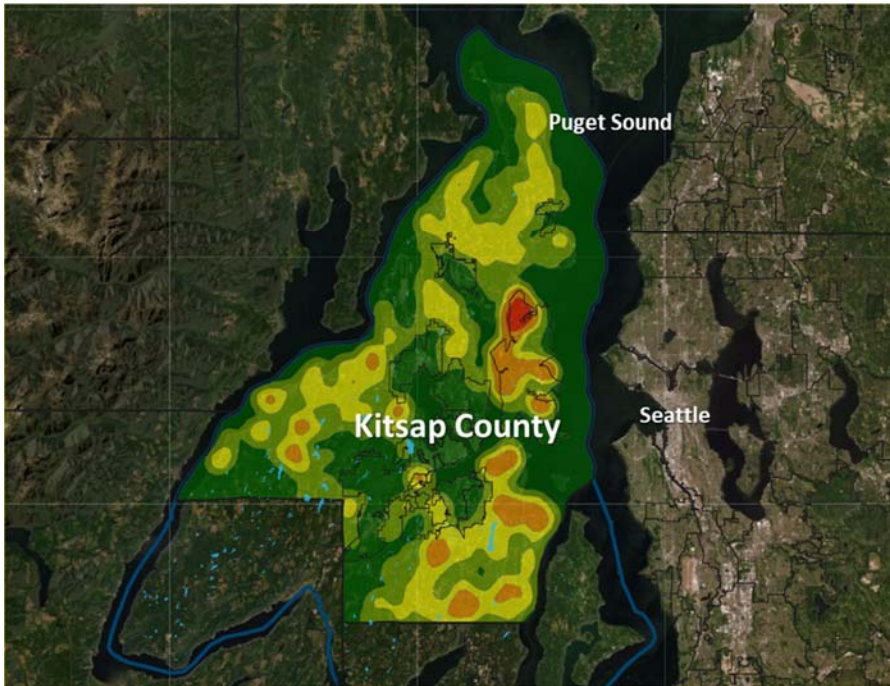


3844 **Figure 1. Kitsap County with incorporated portions of the county highlighted in dark grey.**

3846 Figure 1 above shows the location of Kitsap County. Future RGs and LIDs would occur throughout  
3847 unincorporated portions of the county. Existing RG and LID locations are provided as attachments.

3848 **Description of the anticipated spatial distribution of likely benefits**

3849 The spatial distribution of likely benefits from this project would occur throughout Kitsap County  
3850 with priority towards critical Kitsap County streams in which permit exempt wells are projected to  
3851 be high which are identified by orange and red in Figure 2.



3852  
3853 **Figure 2. Kitsap County permit exempt connections potential growth. Red shading indicates**  
3854 **high future projected growth and green shading indicates low future projected growth.**  
3855

3856 **Performance goals and measures.**

3857 This project would be measured by the number of functional RGs and LIDs installed within Kitsap  
3858 County above the average number of the practices installed annually by KCD (e.g. average 33 per  
3859 year since 2010).

3860 **Descriptions of the species, life stages and specific ecosystem structure, composition,**  
3861 **or function addressed.**

3862 The Washington Department of Fish and Wildlife has identified that Fall Chinook, Coho Salmon,  
3863 Summer Chum, Fall Chum, Winter steelhead, and Pink Salmon are present in Kitsap County (WDFW  
3864 2020).

3865 Increased base streamflow and reduced water temperatures would benefit both adult migrants to  
3866 spawning grounds and juvenile salmonid rearing habitats by providing increased area and quality of  
3867 summer stream rearing habitat. This would improve survival of adults and both productivity and  
3868 survival of juveniles. The alteration of natural stream hydrology has been identified as a high priority  
3869 limiting factor in WRIA 15 (NOAA 2007) and streamflow is important for supporting riparian  
3870 vegetation and wetlands that provide shading, food web support, and flood and sediment  
3871 attenuation functions.

3872

3873 **Identification of anticipated support and barriers to completion.**

3874 The KCD is the project sponsor who will coordinate the operations and maintenance of the RGs and  
3875 LIDs infiltration/augmentation sites. KCD will collect, compile, share and report data.

3876 The primary barrier is the availability of funding for the construction of RGs and LIDs. Other barriers  
3877 include private landowner willingness and partnerships with the county and cities to focus in  
3878 particular areas.

3879

3880 **Potential budget and O&M costs.**

3881 The average size for a residential rain garden is around 100-120 square feet. The average  
3882 construction cost for a RG or LID is ~\$10-15 per square foot if using a landscape contractor for  
3883 installation. (Cost can be much higher if the whole project is done by a contractor as opposed  
3884 to KCD employees.) The average cost per residential rain garden is \$1375. It is assumed that the  
3885 landowner would be responsible for the O&M costs. For larger commercial site applications, using  
3886 a general contractor, the estimated cost per square foot would be \$20-35.

3887 **Anticipated durability and resiliency.**

3888 The project would have lasting benefits. The KCD will manage the implementation of RGs and LIDs  
3889 in partnership with the landowner.

3890 **Project sponsor(s) (if identified) and readiness to proceed/implement.**

3891 The KCD is a willing project sponsor and is ready to proceed immediately. The KCD has been  
3892 successfully installing RG and LIDs since 2010 with increased complexity beginning in 2014 (KCD  
3893 2020). If funding is increased, the primary barrier would be private landowner willingness to install  
3894 RGs and LIDs as well as partnerships with the county and cities to focus in particular areas.

3895

3896 **Sources of Information**

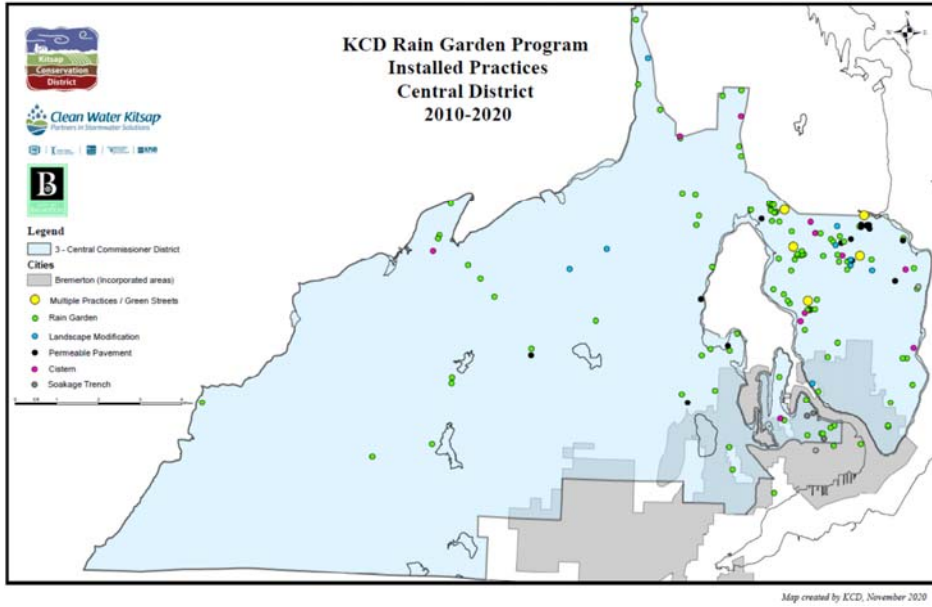
3897 NOAA (National Oceanic and Atmospheric Administration, National Marine Fisheries Service),  
3898 2007. Puget Sound Salmon Recovery Plan. Volume I. Adopted by the National Marine  
3899 Fisheries Service, January 19, 2007.

3900 Kitsap Conservation District (KCD). 2020. 2010-18 KCD RG Program Practices – South, North,  
3901 and Central Districts. <https://kitsapcd.org/programs/raingarden-lid>. Accessed September  
3902 28, 2020.

3903 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and  
3904 Salmon Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

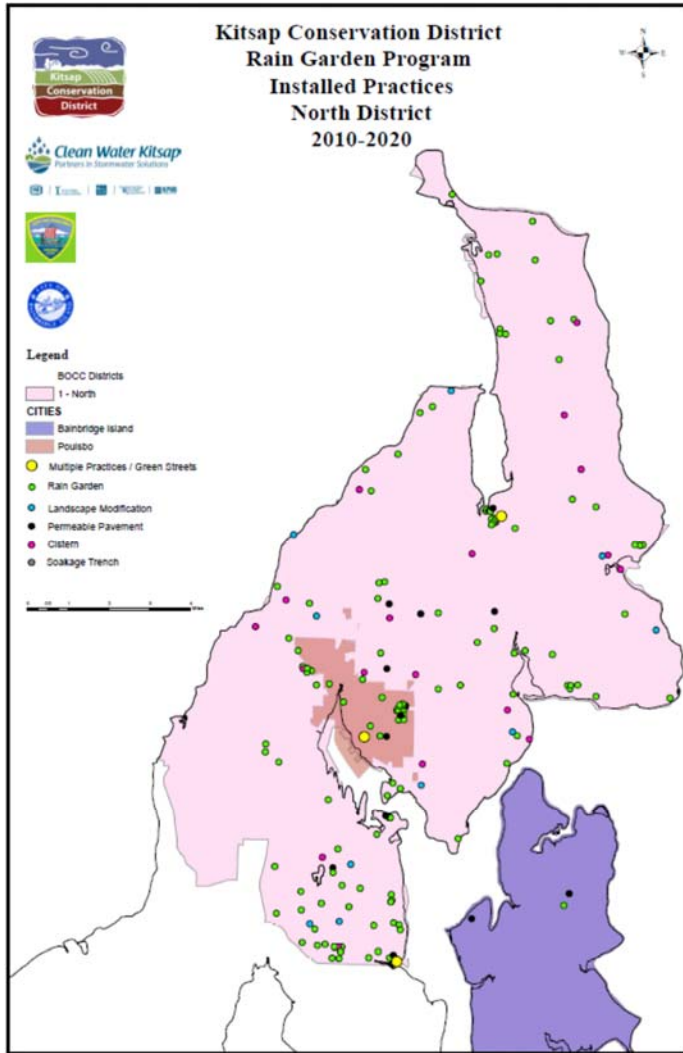
3905 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
3906 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>

3907 Appendix A



3908

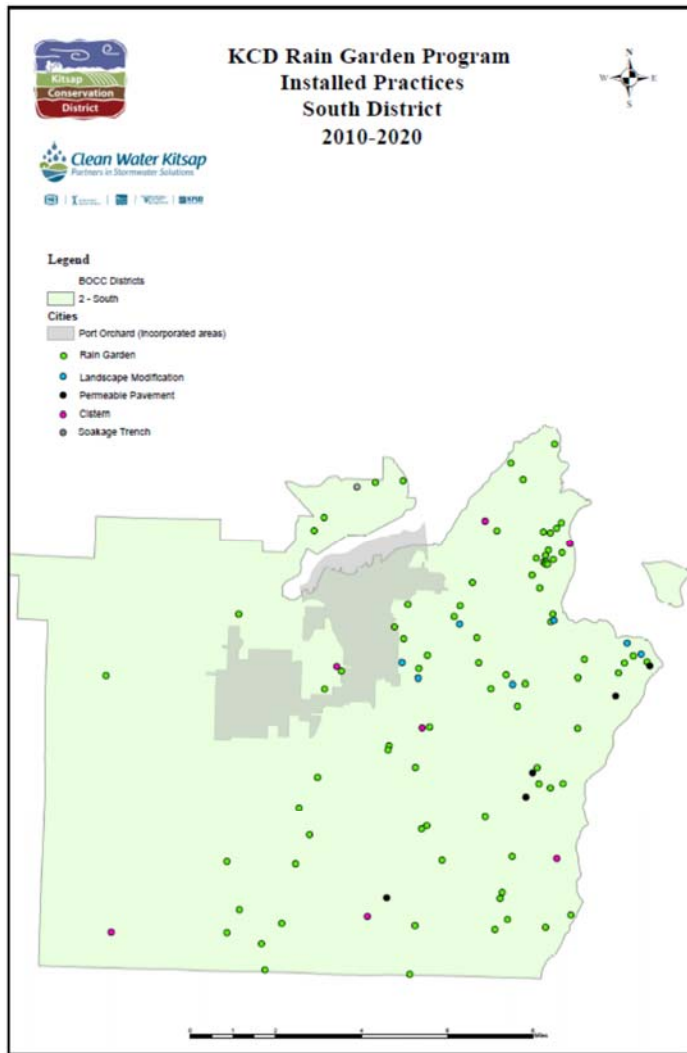
3909 Figure A-1. KCD Rain Garden program installed practices in Central District (2010-2020).



3910

3911 Figure A-2. KCD Rain Garden program installed practices in North District (2010-2020).





3912

3913 Figure A-3. KCD Rain Garden program installed practices in South District (2010-2020).

3914 Proposed Water Offset for Typical Kitsap Conservation District **Raingarden**

3915 **Draft** – December 1, 2020

3916

3917 **Introduction**

3918 The purpose of this document is to estimate the water offset for future Kitsap Conservation District rain  
3919 garden projects. Calculations of the annual recharge are presented that are based upon hydrologic  
3920 modeling performed by HDR for the Mason County Rooftop Infiltration Project (HDR, 2020). For these  
3921 calculations it was assumed rain gardens will be installed on houses that are currently connected to a  
3922 storm drainage system, so that the entire infiltration volume will be counted as a water offset. A lesser  
3923 infiltration volume and water offset would be realized for houses that are not currently connected to a  
3924 storm drainage system as roof downspouts may splash onto the ground and partially or totally infiltrate.  
3925 That calculation will be provided in a separate document.

3926

3927 **Calculations**

3928 Calculations are provided using a range of potential rain garden sizes. KCD data shows the average rain  
3929 garden they have constructed since 2010 has an infiltration trench area of about 200 square feet (sf) and  
3930 captures approximately 1,900 sf of impervious surface. Their installation experience includes areas of  
3931 larger impervious surfaces in commercial areas and the median infiltration trench area is 140 sf, which is  
3932 more typical for their residential home installations. Infiltration volumes are calculated using rain garden  
3933 sizes of 100, 140, and 200 sf, as well as impervious surfaces of 1,600, 1,900 and 2,800 sf. The Mason  
3934 County Rooftop Infiltration Project assumed 2,800 sf as the impervious surface that would be captured,  
3935 based upon an average roof size. The infiltration rate used in the calculations corresponds to Group B  
3936 soils as rain gardens use amended soils which are similar to Group B. The infiltration rate used for Group  
3937 B soils is 2 inches/hour.

3938

3939 HDR's hydrologic modeling estimated the average annual recharge for an infiltration trench that is 80 sf  
3940 to be 0.14 acre-feet/year. That was part of their calculation of baseline conditions assuming a minimum  
3941 trench size of 80 sf under current regulations. The modeling was performed using an annual average of  
3942 70 inches precipitation, which occurs in Mason County. The average annual recharge equates to 26  
3943 inches per year over the assumed 2,800-sf impervious surface.

3944

3945 A larger infiltration trench will infiltrate more water; there is a proportional relationship between  
3946 infiltration area and infiltration capacity. There is also a proportional relationship to the amount of  
3947 runoff to the impervious area, assuming all the runoff is captured. A limit to the amount of infiltration is  
3948 the volume of annual precipitation minus potential losses due to evaporation. To estimate the amount  
3949 of water that will be infiltrated in a KCD rain garden the HDR results were proportionally scaled up by  
3950 the amount of infiltration area (100 – 200 sf) and scaled down by the amount of impervious area (1,600  
3951 – 2,800 sf). Those calculations are summarized in Table 1.

**Commented [VMSJ(66):** Will merge with above project description

3952 **Table 1. Percentage Change in Infiltration Capacity and Corresponding Infiltration Volume**

3953

Impervious Surface Captured, sf	Infiltration Trench Size, sf/Infiltration Volume, acre-feet							
	80 (Mason County Study)		100		140		200	
	%	Volume	%	Volume	%	Volume	%	Volume
1,600	64%	0.090	80%	0.113	113%	0.158	161%	0.225
1,900	68%	0.095	85%	0.119	119%	0.166	170%	0.238
2,800	100%	0.140	125%	0.175	175%	0.245	250%	0.350

3954

The equivalent values in terms of rainfall infiltrated is provided in Table 2.

3955

3956

3957

3958

**Table 2. Volume of Rainfall Potentially Infiltrated**

Infiltration Trench Size, sf			
80 (Mason County Study)	100	140	200
26 inches	32.7 inches	45.7 inches	65.3 inches

3959

The calculations indicate that the rain gardens KCD is installing have, on average, the capacity to infiltrate 65.3 inches of precipitation, or about 0.23 acre-ft per installation per year. For the median infiltration trench area of 140 sf the infiltration capacity will be about 45.7 inches, or about 0.17 acre-feet per year.

3960

3961

3962

3963

3964

3965

The volume of infiltration is limited by the amount of precipitation in some areas of Kitsap County as precipitation can be less than the capacity. Table 3 provides infiltration volumes for varying precipitation volumes varying from 40 inches to 70 inches, the average and median trench area in a KCD project, and assuming a 1,900 sf impervious area. To be conservative, 10 percent loss due to evaporation or other losses are assumed.

3966

3967

3968

3969

3970

**Table 3. Estimate of Annual Volume Infiltrated for KCD Rain Garden Projects**

3971

3972

Average Annual Precipitation, inches	200 sf trench		140 sf trench	
	Annual Volume Infiltrated, Inches	Annual Volume Infiltrated, acre-feet	Annual Volume Infiltrated, Inches	Annual Volume Infiltrated, acre-feet
40	36	0.131	36	0.131
50	45	0.164	45	0.164
60	54	0.196	45.7	0.166
70	63	0.229	45.7	0.166

3973

For a typical residential rain garden project with 140 sf infiltration trench, the average annual volume infiltrated would range from 0.16 acre-feet in areas with precipitation greater than 50 inches to 0.13 acre-feet in areas with precipitation of 40 inches. These volumes can be used as estimates of the water offset quantity for future KCD rain garden projects. The actual values will need to be tracked during implementation, but the quantities shown in Table 3 provide a planning-level estimate of water offsets from KCD projects.

3974

3975

3976

3977

3978

3979

3980 For every 20 rain gardens constructed at sites that are currently connected to storm drainage systems,  
3981 they will collectively infiltrate about 3 acre-feet per year. This volume will be redirected into the shallow  
3982 groundwater system instead of being directly discharged to surface water sources through their existing  
3983 storm drainage systems. This groundwater recharge eventually contributes to increases in groundwater  
3984 baseflow discharge back to streams that can be counted as water offset for RCW 90.94 purposes.  
3985

3986 **Vashon-Maury Island Land Conservation And Water Rights**  
3987 **Acquisition Project**

3988  
3989 **Description**

3990 One set of potential projects being evaluated by the Watershed Restoration & Enhancement  
3991 Committee (Committee) for Water Resources Inventory Area (WRIA) 15 is the acquisition (fee and  
3992 conservation easements) of sensitive habitats and water rights in the Vashon-Maury Island sub-  
3993 basin with the intent of enhancing instream flows and mitigating out of stream uses (i.e., reductions  
3994 in flows associated with permit-exempt wells). Assuming property acquisition is coupled with water  
3995 right acquisition, associated habitat benefits could include removal of structures and impervious  
3996 surfaces, wetland and riparian protection and restoration, and decommissioning permit exempt  
3997 wells (PEWs).

3998 To support identification of potential water right acquisition projects, the Department of Ecology  
3999 (Ecology) queried their Water Rights Tracking System (WRTS) database and provided tables and  
4000 associated GIS data of all active water rights within WRIA 15 to the Committee. Inactive water  
4001 rights (e.g., previously approved changes, cancelled or withdrawn applications) were excluded from  
4002 the data provided by Ecology. The tables of active water rights included over 8,500 water right files  
4003 within WRIA 15. As an initial screening, water rights under consideration were limited to certificates  
4004 and permits that included commercial and Industrial (CI), stockwater (ST), or irrigation (IR) uses. The  
4005 list of active water right permits and certificates was further reduced by removing any with a  
4006 priority date later than the July 24, 1981 adoption date of Chapter 173-515 WAC, the instream flow  
4007 rule for WRIA 15. Over 1,000 water rights in WRIA 15 met these screening criteria, including 86  
4008 water rights (70 surface water and 16 groundwater) in the Vashon-Maury Island sub-basin.

4009 The Committee identified priority streams in the Vashon-Maury Island sub-basin for land  
4010 conservation and restoration activities, including water right acquisition. Going generally north to  
4011 south, priority streams include Shinglemill, Beall, Judd, Fisher, Christiansen, and Tahlequah creeks  
4012 on Vashon Island and Mileta Creek on Maury Island (Figure 1). These stream basins are priority due  
4013 to their flows and salmon use, but additional water rights and may occur on smaller tributaries. The  
4014 water right list was then reviewed to identify water rights with points of diversion or withdrawal  
4015 within the drainages of the priority streams, with a focus on water rights located near the  
4016 headwaters of the streams. Based on the Committee's review, and specifically review by the King  
4017 County representative, selected water rights excluded from the initial screening (e.g., claims and  
4018 rights with purposes of use other than CI, ST, and IR) were added back to the list of water rights for  
4019 further evaluation. Twenty-seven water rights were identified in the priority stream drainages.  
4020 Twenty-six of the water rights authorize surface water diversions and one authorizes a groundwater  
4021 withdrawal. This list of rights represents the set of potential water right acquisition projects in the  
4022 Vashon-Maury Island sub-basin. Table 1 provides a summary of the number of selected water

4023 rights per priority stream sub-basin and the dominant purpose of use<sup>43</sup>.

4024 **Table 1. Summary of Selected Water Rights in Priority Stream Sub-Basins**

Stream Sub-Basin	Number of Rights by Dominant Purpose of Use		
	IR	DG/DM/DS	ST
Beall	1	0	0
Christiansen	2	1	0
Fisher	3	1	0
Judd	3	3	0
Mileta	2	0	0
Shinglemill	3	3	1
Tahlequah	2	2	0
Total	16	10	1

4025 Notes:

4026 IR – Irrigation

4027 DG/DM/Ds – Domestic General, Domestic Multiple, Domestic Single

4028 ST - Stockwater

4029 These rights authorize a combined instantaneous diversion rate (Qi) of 1.569 cubic feet per second  
4030 (cfs). Only 13 of the 27 selected water rights list the annual authorized quantity (Qa). The  
4031 stockwater right does not list an annual quantity. Three of the ten domestic water rights list the Qa,  
4032 with quantities of 1 to 2 acre-feet per year (afy). Ten of the 16 irrigation water rights list the Qa,  
4033 with a combined quantity of 184 afy for irrigation of 89.5 acres, or approximately 2 afy per acre.  
4034 The remaining 6 irrigation water rights list a combined acreage of 50 acres. Assuming a water use of  
4035 2 afy per acre, similar to the other irrigation water rights in the sub-basin, 50 acres would equate to  
4036 an additional annual irrigation use of 100 afy. .

4037 Benefits to instream flow would be realized by acquiring all or a portion of a given water right and  
4038 placing it into the state Trust Water Right Program (TWRP) for instream flow purposes. Quantitative  
4039 benefits to instream flow would depend on the purpose of use and the manner in which the right is  
4040 currently used. For example, a domestic water right that diverts from a stream for indoor uses only  
4041 may have a consumptive use of about 10 percent of total use. If the septic return flows from this  
4042 use return to the same stream from which the water was diverted, placing this water right into the

---

<sup>43</sup> Water rights may include more than one purpose of use. For this summary, water rights with an irrigation component among the authorized uses are included in the IR column; rights with a stockwater component and no irrigation use are included in the ST column; and rights with domestic uses and no stock or irrigation uses are included in the DG/DM/DS column.

4043 TWRP would have only limited benefit to instream flows. Conversely, an IR water right may have a  
4044 consumptive use of about 80 percent of total use (assuming reasonably efficient irrigation  
4045 practices) and placing this water right into the TWRP would result in greater benefits. The period of  
4046 use, or seasonality, will also affect when instream flow benefits would occur.

4047 **Quantitative or qualitative assessment of how the project will function, including**  
4048 **anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

4049 Direct benefits to instream flow in a priority stream would be realized through nonuse of the  
4050 acquired water rights. Depending on the specific opportunity, nonuse would be achieved through  
4051 fallowing of irrigated fields, reduced hay harvest, changing to an alternate crop that does not  
4052 require irrigation, removal of livestock, or provision of an alternate source of supply. The acquired  
4053 water right would be placed into the state TWRP and dedicated to instream flow purposes. By  
4054 placing it into the TWRP, increases in instream flows realized by a project would be protected from  
4055 future appropriation or use.

4056 The potential instream flow offset realized by a project would be limited to the consumptive impact  
4057 on instream flows under the existing water right uses. A general discussion of the potential  
4058 consumptive use associated with irrigation, stockwater, and domestic uses is provided in the  
4059 following paragraphs. More detailed evaluation would be required once a specific project or  
4060 projects are selected to accurately quantify consumptive uses and assess the timing and location of  
4061 instream flow offsets associated with placing a right into the TWRP.

4062 The timing and location of instream flow offsets will depend on several factors, including:

- 4063 • The period of use of the water right (seasonal or continuous). A seasonal diversion may  
4064 only affect stream flows for part of the year, while a continuous diversion (e.g., for  
4065 domestic uses) would likely affect stream flows year-round.
- 4066 • Whether the right is for surface water or groundwater. The effect of groundwater  
4067 withdrawals on surface water flows tend to lag behind the pumping period, such that the  
4068 effects of seasonal pumping persist for weeks or months after pumping ceases. The  
4069 location of effects on surface water flows may also be more dispersed and the peak impact  
4070 lower with groundwater pumping. Conversely a surface water diversion will affect stream  
4071 flow instantaneously and directly.
- 4072 • Hydrogeologic conditions and the location of the place of use. Only a portion of water  
4073 diverted for use is consumed, the remaining quantity that recharges groundwater and/or  
4074 discharges back to surface water is termed the return flow. The timing and location of  
4075 where return flows would return to an affected stream depend on the location where water  
4076 is used, how water is managed (e.g., domestic septic systems versus sewer systems), and  
4077 hydrogeologic conditions between the place of use and the surface water.

4079 For an irrigation water right, annual consumptive use can be estimated based on the State of  
4080 Washington Irrigation Guide (WIG) and Ecology Water Resources Program Guidance 1210 –  
4081 Determining Irrigation Efficiency and Consumptive Use (Ecology, 2005). The WIG lists the crop  
4082 irrigation requirement (CIR) for a variety of crops at stations throughout the state. The CIR is the  
4083 amount of water needed from irrigation to support crop growth that is not provided by  
4084 precipitation or stored soil moisture. Using the Bremerton station, CIRs in WRIA 15 range from  
4085 about 4.51 inches (0.375 feet) for strawberries to 22.3 inches (1.86 feet) for raspberries. The CIR for  
4086 grass/pasture, the most likely crop grown, is 16.8 inches (1.4 feet).

4087 Guidance 1210 provides typical irrigation application efficiencies (Ea) and percent consumptive use  
4088 (%CU) associated with different irrigation methods. The CIR divided by the application efficiency  
4089 provides the total irrigation water requirement (TIR). Multiplying the TIR by the %CU provides the  
4090 consumptive use. Assuming sprinkler irrigation with an average Ea of 75 percent, TIRs per acre in  
4091 WRIA 15 could range from about 0.5 feet to 2.5 feet, with a likely amount of 1.9 feet. Assuming a  
4092 %CU of 80 percent if the TIR, consumptive use per acre could range from 0.4 to 2 feet per acre of  
4093 irrigated land, with a likely value of 1.5 feet. The total consumptive use for a water right can then be  
4094 estimated as the irrigated acreage times the consumptive use per acre.

4095 Table 2 provides a summary of irrigated acreage and the potential range of associated  
4096 consumptive use, based on the consumptive use per acre described above and the authorized  
4097 irrigated acreage listed in the water rights. Site-specific evaluations of crop type, irrigation  
4098 methods, and irrigated acreage would be needed to determine the potential consumptive use that  
4099 could be available to support instream flows by placing a given water right into the TWRP.



4100 **Table 2. Summary of Authorized Irrigated Acreage and Consumptive Use by Priority Stream**  
 4101 **Sub-Basins**

<b>Stream Sub-Basin</b>	<b>Authorized Acreage</b>	<b>Low-End CU in AFY</b>	<b>High-End CU in AFY</b>	<b>Likely CU in AFY</b>
Beall	8	3.2	16	12
Christiansen	19	7.6	38	28.5
Fisher	42	16.8	84	63
Judd	30	12	60	45
Mileta	7	2.8	14	10.5
Shinglemill	11.5	4.6	23	17.3
Tahlequah	22	8.8	44	33
Total	139.5	55.8	279	209.3

4102 The period over which consumptive use impacts occur would generally be the irrigation season, or  
 4103 about May through September, although as discussed above accounting for the lag associated  
 4104 with groundwater pumping impacts and the timing of return flows would affect this period. As an  
 4105 example, retiring about 3 acre-feet of consumptive use would equate to an average instream flow  
 4106 benefit of about 0.01 cfs during the irrigation season.

4107 Typical indoor domestic uses are expected to be about ten percent consumptive. The domestic  
 4108 water rights in the property drainages authorize use of less than 2 afy each, such that annual  
 4109 benefits to instream flow would be less than 0.2 afy per domestic water right. Acquiring domestic  
 4110 water rights would likely require providing an alternate source of supply (e.g., hookup to a public  
 4111 water system) or acquisition of the residential properties served by the water right. For ST rights the  
 4112 benefits would depend on the specific stock operation, including water uses and management and  
 4113 discharge of effluent. Although more limited in the potential amount of water that could be  
 4114 realized by retiring these water rights, domestic and ST water rights are expected to provide  
 4115 opportunities for year-round instream flow benefits not presented by the IR water rights.

4116 **Map of the project and location.**

4117 Figure 1 (attached) shows the location of priority streams within the Vashon-Maury Island sub-  
 4118 basin.

4119 **Description of the anticipated spatial distribution of likely benefits**

4120 Water right acquisition would be focused on stream headwaters or above known areas of fish  
 4121 habitat. By acquiring a water right, discontinuing uses, and placing the right into the TWRP  
 4122 historical consumptive use associated with the right would be allowed to remain instream. The

4123 instream flow represented by the water right in the TWRP would be protected from future  
4124 appropriation or use by others allowed to remain instream from the historic point of diversion to  
4125 the point of discharge to marine waters, benefiting aquatic habitat through the entire downstream  
4126 reach.

4127 **Performance goals and measures.**

4128 The range of potential offset benefit from the water right acquisition opportunities on Vashon  
4129 Maury is approximately 56 to 279 acre feet per year. We recommend counting 10 percent of the  
4130 total potentially available water rights as the offset benefit presented in the WRIA 15 plan, or 27.9  
4131 acre-feet per year (10 percent was applied for the water right acquisition opportunities in the  
4132 Nisqually plan).

4133 **Descriptions of the species, life stages and specific ecosystem structure, composition,  
4134 or function addressed.**

4135 The Washington Department of Fish and Wildlife (WDFW 2020a; WDFW 2020b) has identified that  
4136 coho and chum salmon are present in Judd and Shinglemill creeks, and the Endangered Species Act  
4137 (ESA) listed Puget Sound fall Chinook are present in Judd Creek, the ESA-listed Puget Sound winter  
4138 steelhead are present in Judd, Christensen, and Shinglemill creeks, and cutthroat trout are likely  
4139 present in all Vashon and Maury Island creeks that have perennial flow (noted as present in Fisher,  
4140 Tahlequah, Shinglemill, Christensen, and Mileta creeks). The Washington Stream Catalog (WDF 1975)  
4141 indicates that both coho and chum salmon were historically present in Judd Creek and other creeks  
4142 on Vashon Island, although there had been limited surveys of fish populations at that time. East  
4143 Kitsap creeks were generally noted in the Stream Catalog (WDF 1975) as having substantial low flow  
4144 problems, lack of riparian cover, and fine sediment inputs from forestry and agricultural land uses. An  
4145 impassable fish barrier culvert is present at about rivermile 1 on Judd Creek and an impassable dam  
4146 is present on Beall Creek (WDFW 2020a).

4147  
4148 Judd and Fisher creeks are listed as Category 5 for high water temperatures on Ecology's 303(d) list  
4149 of impaired waterbodies; Judd and Shinglemill creeks are listed as Category 5 and Christensen Creek  
4150 is listed as a Category 2 for bioassessment (poor quality based on macroinvertebrate sampling); and  
4151 Shinglemill and Tahlequah creeks are listed as Category 1 for water temperature (Ecology 2020).

4152 Increased base streamflow and riparian and wetland restoration would contribute to reducing water  
4153 temperatures that would benefit both adult migrants to spawning grounds and juvenile salmonid  
4154 rearing habitats by providing increased area and quality of summer stream rearing habitat. This  
4155 would improve survival of adults and both productivity and survival of juveniles. The alteration of  
4156 natural stream hydrology has been identified as a high priority limiting factor in WRIA 15 (NOAA  
4157 2007) and streamflow is important for supporting riparian vegetation and wetlands that provide  
4158 shading, food web support, and flood and sediment attenuation functions.  
4159

4160

4161 The headwaters of Judd, Fisher, and Shinglemill creeks include numerous wetland areas that could  
4162 also benefit from increased groundwater levels, further supporting cold water volumes to the  
4163 creeks.

4164

4165 Land conservation and restoration activities may provide habitat benefits in addition to streamflow  
4166 restoration. Those habitat benefits would derive from removal of structures and impervious  
4167 surfaces, decommissioning of PE wells, wetland and riparian protection and restoration.

4168

4169 **Identification of anticipated support and barriers to completion.**

4170 The primary barrier is the willingness of water right holders to sell their water rights and land. A  
4171 secondary barrier is the availability of funding for water right acquisition and permitting.

4172 **Potential budget and O&M costs.**

4173 Water right acquisition costs are location and market specific. As a planning-level assumption,  
4174 costs per consumptive acre-foot of irrigation water or stockwater could be in the \$1,000 to \$5,000  
4175 range. As discussed above, consumptive use per acre could range from about 0.4 to 2.0 acre-feet.  
4176 Costs for acquisition of domestic water rights are likely to be strongly affected by the costs of  
4177 providing an alternate water supply. These costs could be highly variable, depending on the  
4178 availability and location of an alternate supply. Following water right acquisition and permitting  
4179 there are expected to be no ongoing O&M costs associated with water right acquisition.

4180 Budgets and O&M costs for property acquisition and associated habitat benefits through removal  
4181 of structures and impervious surfaces, wetland and riparian protection and restoration, and  
4182 decommissioning of PEWs will depend on the specific project opportunities and are not included in  
4183 here.

4184 **Anticipated durability and resiliency.**

4185 Water right acquisition projects would have long-lasting benefits and would require minimal future  
4186 management once permitting is complete. The durability and resiliency of other habitat  
4187 improvement projects associated with property acquisition will depend on the specific projects and  
4188 are not included in here.

4189 **Project sponsor(s) (if identified) and readiness to proceed/implement.**

4190 King County and Vashon-Maury Island Land Trust are potential sponsors of the projects. Both  
4191 entities have extensive experience with implementing similar projects and would be ready to  
4192 proceed once funding is secured.

4193 **Sources of Information**

4194 Ecology (Washington Department of Ecology), 2020. 303(d) Assessed Waterbodies. Available at:  
4195 <https://apps.ecology.wa.gov/waterqualityatlas/StartPage.aspx>

4196 WDF (Washington Department of Fisheries), 1975. "A Catalog of Washington Streams and Salmon  
4197 Utilization, WRIA 15." Accessed at: [https://www.streamnetlibrary.org/?page\\_id=95](https://www.streamnetlibrary.org/?page_id=95).

4198 WDFW (Washington Department of Fish and Wildlife), 2020a. Salmonscape. Available at:  
4199 <http://apps.wdfw.wa.gov/salmonscape/map.html>

4200 WDFW, 2020b. Priority Habitats and Species on the Web. Available at:  
4201 <https://geodataservices.wdfw.wa.gov/hp/phs/>

4202 **Beall Creek Bypass Flow Improvement**

4203 **Draft** Project Description

4204 November 17, 2020

4205

4206 **Description**

4207 Beall Creek is a first order stream along the eastern shore of Vashon Island in King County with a  
4208 drainage basin of 211 acres (Figure 1). Historically, Beall Creek likely had a fish community that  
4209 included Cutthroat Trout, Coho Salmon, and steelhead trout. Juvenile coastal cutthroat have been  
4210 observed utilizing Beall Creek (Salmonscape 2020). The focus of this project for the WRIA 15  
4211 watershed plan is to more accurately measure the Water District 19 water requirements at the  
4212 Water District 19 (District) diversion. To accomplish that the existing diversion, which is a fish  
4213 passage barrier, will be replaced. This project will improve bypass flow at the diversion, resulting  
4214 in flow improvements to Beall Creek at a rate of an estimated 26 acre feet per year.

4215 **Fish Barriers on Beall Creek**

4216 A plastic sheet pile dam across Beall Creek impounds water for the District's irrigation diversion at  
4217 river mile (RM) 0.30 (Figure 2). The District withdraws as much as 350 gallons per minute from the  
4218 spring-fed creek (a type-two water supply) for community water supply. There are no fish passage  
4219 facilities at the District's irrigation diversion which results in a complete barrier to upstream fish  
4220 passage at this location (Kerwin and Nelson 2000, Salmonscape 2020). The Washington  
4221 Department of Fish and Wildlife (WDFW) identified the District's irrigation diversion as a complete  
4222 fish passage barrier in June 2017 (Salmonscape 2020). A partial fish passage at Beall Creek RM 0.02  
4223 was also identified in June 2017. There are currently no plans to address the partial barrier at RM  
4224 0.02.

4225 **Previous Project Development**

4226 In May 2018, a Preliminary Design Report for the Beall Creek Fish Passage project was completed  
4227 for the District's upstream irrigation diversion at RM 0.30 (Fisheries Engineers 2018). The report  
4228 included a number of proposed modifications to the District's Beall Creek diversion including:

- 4229
- 4230 • A new concrete dam to be built flush with the existing stream channel;
  - 4231 • A proposed roughened channel for upstream fish passage;
  - 4232 • A means to measure and control the water supply diversion and release of bypass flow;
  - 4233 • A new vertical plate fish screen installed within the existing water intake basin to physically  
4234 exclude fish from the pumped water intake;
  - 4235 • A sand and silt sluicing system to facilitate the District's maintenance of the water supply  
4236 intake; and
  - A new water delivery system to Water Treatment Plant 1 (Fisheries Engineers 2018).

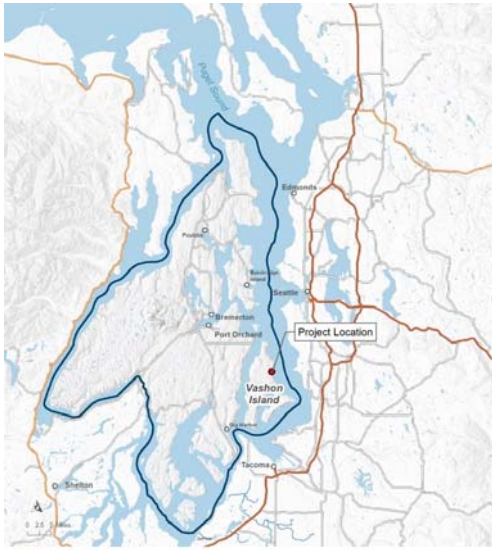
4237 Some members of the WRIA 15 Committee do not support including offset benefits from fish  
4238 barrier removal projects. Therefore, the streamflow benefit considered for this project are  
4239 modifications to the diversion to improve flow in Beall Creek.

4240 **Quantitative or qualitative assessment of how the project will function, including**  
4241 **anticipated offset benefits, if applicable. Show how offset volume(s) were estimated.**

4242 If this Beall Creek Bypass Flow Improvement project were completed, the improved measuring  
4243 capabilities would ensure a minimum flow in the stream of 48 gallons per minute and a more  
4244 accurate diversion of water supply requirements thereby bypassing more flow than they currently  
4245 do. The estimated offset benefit would be the minimum flow during the dry season when water  
4246 demands and diversions by the District is highest. Assuming a 4-month dry season (June-  
4247 September), the offset quantity would be 26 acre-feet.

4248 **Map of the project and location.**

4249



4250 **Figure 1. Location of Vashon Island and Beall Creek (red circle).**  
4251



4252 Figure 2. Beall Creek with a partial fish passage barrier at river mile 0.02 (yellow) and a complete fish passage  
 4253 barrier at river mile 0.30 (red). Both locations are associated with Water District 19. This project is focused on flow  
 4254 improvements at river mile 0.30.  
 4255  
 4256

4257 **Description of the anticipated spatial distribution of likely benefits**

4258 This project would put more water in the last 0.3 miles of Beall Creek to support aquatic life  
 4259 downstream. The fish barrier removal component of the project would open up ~0.6 miles of stream  
 4260 habitat for migratory fishes in Beall Creek, upstream of the District’s irrigation diversion (Figure 2).  
 4261 However, a partial fish passage at Beall Creek RM 0.02 remains unaddressed so fish distribution  
 4262 throughout Beall Creek may remain limited even if the project is completed.

4263 **Performance goals and measures.**

4264 The project will be measured by the presence of a minimum 48 gallons per minute bypass flow to  
 4265 allow fish passage through the roughened channel and preserve aquatic life downstream of the  
 4266 diversion.

4267 **Descriptions of the species, life stages and specific ecosystem structure, composition,  
 4268 or function addressed.**

4269 WDFW has identified that resident Coastal Cutthroat trout are present in Beall Creek (Salmonscape  
 4270 2020). The proposed roughened channel would allow for upstream fish passage and the new vertical  
 4271 plate fish screen installed within the existing water intake basin would physically exclude fish from  
 4272 the pumped water intake, reducing or eliminating fish mortality. As a whole, this project supports all  
 4273 life stages of the resident Coastal Cutthroat trout.

4274 **Identification of anticipated support and barriers to completion.**

4275 Water District 19 is the primary stakeholder for the bypass flow improvement project. The District  
4276 will collect, compile, share and report project data. The project is supported by the Washington  
4277 Department of Fish and Wildlife, the Washington Department of Ecology, and the Puyallup Tribes  
4278 of Indians.

4279 The primary barrier is the availability of funding for project construction and operations. The  
4280 preliminary design and cost estimate was developed in 2018 (Fisheries Engineers 2018) however  
4281 the District has been unable to obtain funds for the project.

4282 **Potential budget.**

4283 As of October 2019, the estimated costs for both the barrier removal and the flow improvements  
4284 was \$110,000 (Fisheries Engineers 2018, Water District 19 2019). This cost estimate includes  
4285 \$82,000 for construction, \$8,000 for Final Project Design, \$6,000 for Project Permits, and \$14,000  
4286 for Construction Management (Fisheries Engineers 2018).

4287 **Anticipated durability and resiliency.**

4288 The project would have lasting benefits. The project would likely improve the District's maintenance  
4289 capabilities for the water diversion system integrated with the fish passage facilitates (Fisheries  
4290 Engineers 2018) providing a more reliable bypass flow.

4291 **Project sponsor(s) (if identified) and readiness to proceed/implement.**

4292 The District would sponsor the project. Funding for the project will also need to be secured.

4293 **Sources of Information**

4294 Kerwin, John and Nelson, Tom S. (Eds.). December 2000. Habitat Limiting Factors and  
4295 Reconnaissance Assessment Report, Green/Duwamish and Central Puget Sound  
4296 Watersheds (WRIA 9 and Vashon Island). Washington Conservation Commission and the  
4297 King County Department of Natural Resources.

4298 Fisheries Engineers. 2018. Beall Creek Fish Passage Project Preliminary Design Report. Prepared  
4299 for Water District 19. June 2018.

4300 Water District 19. 2019. Water District 19 meeting minutes from October 8, 2019.

4301 <http://www.water19.com/wp-content/uploads/2019/12/Comm-Meeting-100819-FINAL.pdf>

4302 WDFW (Washington Department of Fish and Wildlife), 2020. Salmonscape mapping of fish  
4303 distribution. Available at: <http://apps.wdfw.wa.gov/salmonscape/>