

**December 3, 2015**  
**Willowmoor Floodplain Restoration Project**  
**DRAFT Alternatives Considerations Memo**

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## **Overview**

Located in Marymoor Park near the outlet of Lake Sammamish, the Willowmoor Floodplain Restoration (Willowmoor) project proposes to reconfigure the Sammamish River Transition Zone (TZ) and adjacent undeveloped King County property (see Appendix, Figure A). The TZ was constructed as part of the Sammamish River Improvement Project in the 1960s by the U.S. Army Corps of Engineers (Corps) in cooperation with King County primarily to control flooding in the Sammamish river valley. The County is responsible for maintaining the improvement project per an Operation and Maintenance Agreement with the Corps. The TZ as currently constructed has required increasingly intensive maintenance including regular mowing, trimming, removal of vegetation, removal of accumulated sediments in the channel, and associated mitigation efforts. In recent years property owners around Lake Sammamish have expressed concerns about high lake levels impacting their properties resulting from increased vegetation density within the TZ. State agency and tribal government representatives have expressed concern that these maintenance actions adversely affect water quality and habitat, and are in conflict with Federal, state and local efforts to protect and enhance riverine habitat for recovery of salmon species listed under the federal Endangered Species Act (ESA).

The Willowmoor Project seeks to improve habitat conditions and reduce the frequency and duration of high lake levels in the Sammamish River Transition Zone (TZ) in Marymoor Park while maintaining downstream Sammamish River flood control performance. Since mid-2013, the Willowmoor project design team has been collecting data, conducting technical analyses and developing a suite of conceptual design alternatives. Simultaneously, the project team has used a variety of means to engage various stakeholders and the public during the conceptual alternative development process.

The purpose of this memo is to summarize the conceptual design process and resulting alternatives as background for selecting a preferred design alternative for the Willowmoor project. This information includes: a summary of the alternatives development and analysis; their estimated costs, benefits and concerns; and, stakeholder and public feedback with respect to the design alternatives. Also included are a project timeline and summary descriptions of ongoing design considerations that would follow the FCD's approval of a preferred design alternative.

Alternatives Forwarded for Consideration:

- Existing Maintenance
- Split Channel + Pumped Groundwater
- Widened Channel + Pumped Heat Exchange

## Project Goals & Objectives

Three primary project goals were established early in the project planning phase and captured in the project charter. These goals were used to guide development of project objectives and subsequent identification and refinement of conceptual design alternatives:

- Ensure the TZ's capability to provide necessary lake level control, flow conveyance, and downstream flood control;
- Enhance habitat conditions in the river channel, floodplain, buffers, associated tributaries and adjacent wetlands for ESA-listed Chinook, steelhead, and other fish and wildlife species; and,
- Reduce costs, complexity, and ecological impacts of construction, operation and maintenance.

The project team, with input from the Stakeholder Advisory Committee (SAC), developed and refined a series of project objectives and corresponding quantitative performance criteria that correspond with each of the primary project goals. Based on feedback from SAC members, several additional objectives addressing recreational issues were also included. A full list of design objectives is provided in the April 2015 Concept Design Summary Report<sup>1</sup>.

## Conceptual Alternatives Development & Analysis

The current conditions and maintenance regime for the TZ were established as the baseline conditions to which subsequent conceptual design alternatives would be compared, and is referred to as the "Existing Conditions" alternative. The Existing Conditions alternative meets the Corps original design criteria to pass 1,500-cfs combined Lake Sammamish and Bear Creek outflow at lake level 29.0 NGVD, but does not address the habitat and water quality concerns expressed by the tribal and resource agencies. Additionally, reconfiguration of the TZ potentially will reduce the frequency and duration of high lake levels compared to the Existing Conditions alternative.

Four channel reconfiguration concepts were identified and developed for reconfiguration of the TZ (pages 24 – 36, Concept Design Summary Report<sup>1</sup>). The four concepts were then analyzed and compared to each other and the Existing Maintenance alternative. Hydraulic modeling with unsteady HEC-RAS was an essential tool used in the analysis of these concepts (pages 37 – 38, Concept Design Summary Report<sup>1</sup>). Feedback from the SAC was also important in the evaluation of these concepts with respect to flood control, high lake level reduction, habitat improvements and O&M impacts reduction (pages 38 – 39, Concept Design Summary Report<sup>1</sup>). Following the modeling and SAC feedback, the project team screened the concepts to identify which appeared the most feasible. Based on this screening, the following concepts were subsequently eliminated from consideration:

- Single Meander – This concept realigns the main channel to follow the historical meander, creates a more natural cross section, and adds natural features such as pools, riffles and benches. The existing straight channel would remain for high flow conveyance
  - ⇒ This concept was determined to not provide enough habitat improvement for the cost and high risk of archaeological discoveries while only modestly improving hydraulic performance as compared to Existing Maintenance;

- Hyporheic Channels – This concept builds on the Single Meander by adding a network of gravel filled channels southwest of the TZ that will cool diverted river water and provide juvenile salmon habitat.
  - ⇒ This concept was determined to be very expensive compared to the other concepts, have significant risks of archaeological discoveries, have potential maintenance concerns, and be incompatible with Tosh Creek.

Along with the Existing Maintenance alternative, the two concepts carried forward were the Split Channel and the Widened Channel:

- Widened Channel – This concept effectively widens the TZ channel by setting back the left bank. The low flow channel would be reconfigured into a narrower and deeper channel with meanders. The willow buffers would be removed. Floodplain benches and pools would be constructed for improved habitat. Riparian plants and trees would be planted on both banks, but especially along the left bank. The channel would be lined with natural gravels rather than angular rock. The weir notch would be modified for improved fish and boat passage.
  - ⇒ This concept was carried forward due to its relatively low cost, moderate improvements in flood conveyance and lake-level reduction (see Table 1) compared to Existing Maintenance, low risk of archaeological discoveries, improved main channel habitat and enhanced small boat passage.
- Split Channel – This concept splits the river flow into two channels; the main TZ channel primarily for flood conveyance and recreation and a new side-channel primarily for habitat and fish passage. The existing TZ channel and weir would be modified in a very similar manner as for the Widened Channel concept. The 3,400-ft long side channel would convey approximately 10% of total river flow, providing added flow conveyance during high flow periods. The side channel would include natural stream features such as meanders, pools, streambed gravels, large wood and native riparian plants and trees. Lower Tosh creek would be realigned to connect with the side channel. A second weir would control flow into the side channel.
  - ⇒ This concept was carried forward due to its significant improvement in flood conveyance and lake-level reduction (see Table 1) compared to Existing Maintenance, substantial increase in habitat, restored connection to Redmond’s Tosh Creek enhancements and separation of flood and recreation uses from habitat needs. Overall, this concept provides the best potential to meet the three project goals.

**Table 1 – Modeled Results: Reduction in High Lake Levels<sup>1</sup>**

	Average days/year lake level exceeds:		
	EL 27.0	EL 28.0	EL 29.0
Existing Maintenance	97	12	1.1
Split Channel	47 (-50)	6 (-6)	0 (-1.1)
Widened Channel	94 (-3)	11 (-1)	0.9 (-0.2)

(#) = Number of days reduced relative to Existing Maintenance

1 - Model results are based on a period from 2001 to 2014 for which conditions in the TZ and hydrologic record were sufficient to obtain supportable results. The next design phase will include additional modeling and analysis to ensure the project can deliver improved lake level without causing downstream flooding.

A summarized comparison of the four channel reconfiguration concepts is provided in Table 2.

Table 2 – Channel Reconfiguration Concepts

Channel Concept	Estimated Cost <sup>1</sup>	Benefits	Concerns
Single Meander	\$6.4 M	<ul style="list-style-type: none"> <li>• Improved flood conveyance and high lake level reductions</li> <li>• Meets river and lake hydraulic objectives</li> <li>• Enhanced channel complexity for improved habitat and fish passage</li> <li>• Alignment matches former meander</li> <li>• Improved small boat passage</li> </ul>	<ul style="list-style-type: none"> <li>• High potential for archaeological discoveries</li> <li>• Potential short-circuiting of meander</li> <li>• Required maintenance likely not much less than existing</li> <li>• Significantly higher cost and archaeological discoveries risk than Widened Channel for only modestly greater habitat and flood benefits</li> <li>• Challenging construction due to the need to build in active river channel</li> </ul>
Hyporheic Channels	\$17.7 M	<p><i>Same as in Single Meander, plus:</i></p> <ul style="list-style-type: none"> <li>• Additional left-bank flood conveyance</li> <li>• Large-scale restoration of wetlands and floodplain</li> <li>• Provides natural “hyporheic” cooling of diverted river water</li> <li>• Connects and restores lower Tosh Creek</li> </ul>	<ul style="list-style-type: none"> <li>• Very expensive</li> <li>• Very high potential for archaeological discoveries</li> <li>• Potential meander short-circuiting</li> <li>• Potential dewatering of Tosh Creek</li> <li>• Likely periodic channel maintenance required to maintain surface and hyporheic flow paths,</li> <li>• “New” technology – performance and long-term efficacy concerns for hyporheic channels</li> </ul>
Split Channel	\$8.2 M	<ul style="list-style-type: none"> <li>• Improved flood conveyance and high lake level reductions</li> <li>• Meets river and lake hydraulic objectives with weir modifications</li> <li>• 3,400-foot habitat channel with high complexity</li> <li>• Separates flood and recreation uses from habitat needs</li> <li>• Connects and restores lower Tosh Creek to side channel</li> <li>• Side channel provide flow diversion during main channel construction</li> </ul>	<ul style="list-style-type: none"> <li>• High potential for archaeological discoveries</li> <li>• Likely low-moderate maintenance required – primarily for invasive species and beaver blockages</li> <li>• Designing 2-weir system to meet design objectives over range of conditions</li> </ul>

Widened Channel	\$3.9 M	<ul style="list-style-type: none"> <li>• Improved flood conveyance and high lake level reductions</li> <li>• Meets river and lake hydraulic objectives</li> <li>• Lowest cost</li> <li>• Enhanced channel complexity</li> <li>• Least disturbance to site</li> <li>• Low potential for archaeological discoveries</li> </ul>	<ul style="list-style-type: none"> <li>• Short-term reduced shading</li> <li>• Likely low-moderate maintenance required – primarily for invasive species</li> <li>• Doesn't separate competing uses (flood control, habitat and recreation)</li> <li>• Only modest habitat improvements</li> <li>• Challenging construction due to the need to build in active river channel</li> </ul>
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1 – Preliminary construction cost includes channel and planting costs with design, engineering and administration.

In parallel with the process for developing TZ reconfiguration concepts, eight cold water supplementation concepts were identified, developed, analyzed and compared (pages 41 – 63, Concept Design Summary Report<sup>1</sup>). The results are summarized in Table 3. Cold water supplementation is advocated for by resource agencies, tribal organizations and several interest groups:

**Table 3 – Cold Water Supplementation Concepts**

Cold Water Concept	Estimated Cost		Cfs Supplied <sup>1</sup>	Cost/Cfs <sup>3</sup>
	Implementation <sup>1</sup>	O&M <sup>2</sup>		
1 - Hypolimnetic Withdrawal from Lake Sammamish	\$6.96 M	\$0.20 M	20	\$0.36 M
2 - Pumped Groundwater	\$1.60 M	\$0.10 M	3	\$0.57 M
3 - Shallow Groundwater Trench	\$0.75 M	\$0.23 M	1	\$0.78 M
4 - Purchase Potable Water	\$0.85 M	\$4.46 M	1	\$5.31 M
5 - Pump Lake Outlet Water to Heat Exchange System	\$4.20 M	\$0.44 M	10	\$0.46 M
6 - Pump Lake Outlet Water to Hyporheic Trenches	\$1.95 M	\$0.06 M	5	\$0.40 M
7 - Riffle-Pool and Hyporheic Transition Zone	\$4.34 M	\$0.12 M	<1	\$4.46 M
8 - Hypolimnetic Cooling of Lake Surface Water	\$7.44 M	\$0.20 M	20	\$0.38 M

1 – Implementation cost includes preliminary construction cost, design, engineering and administration.

2 – O&M cost expressed as Net Present Value (investment cost) of 50 years of O&M discounted to current dollars.

3 – Cost per cfs based on sum of implementation cost plus operation and maintenance (NPV) cost.

Concepts 1, 3, 4, 6, 7 and 8 were subsequently eliminated from consideration for the following reasons:

- Concepts 3, 4 and 7 didn't provide sufficient cold-water
- Concepts 4 and 7 were also too expensive relative to volume of water supplied
- Concept 6 due to performance uncertainty and substantial maintenance concerns
- Concepts 1 and 8 due to SAC concerns regarding overall expense and extensive infrastructure.

The cold-water supplementation concepts carried forward were 2 - Pumped Groundwater and 5 - Pumped Heat Exchange. Each of these remaining concepts was then matched with one of the two remaining channel reconfiguration concepts to create two combined alternatives (See Appendix A):

- Split Channel + Pumped Groundwater
- Widened Channel + Pumped Heat-Exchange

The combined alternatives were subsequently refined and evaluated relative to the baseline Existing Maintenance alternative, which assumes a continuation of the current maintenance regime without any physical reconfiguration of the channel or supplemental cold-water as described in pages 20 – 23 of the Concept Design Summary Report<sup>1</sup>. Table 4 is a summary comparison of the two combined alternatives with the Existing Maintenance alternative. A more detailed comparison table is provided in pages 75 – 82 of the Concept Design Summary Report<sup>1</sup>.

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**Table 4 – Conceptual Design Alternatives Summary Comparison Table**

Alternative	Costs		Benefits	Concerns	
		Design & Construction			O&M <sup>1</sup>
Existing Maintenance	<b>Total</b>	<b>\$0</b>	<b>\$41K/yr \$973K NPV</b>	<ul style="list-style-type: none"> <li>• Lowest cost</li> <li>• Meets existing Corps hydraulic design criteria</li> <li>• No risk of archaeological discoveries</li> <li>• Does not require Corps 408 approval</li> </ul>	<ul style="list-style-type: none"> <li>• Does not reduce high lake levels</li> <li>• Does not address habitat deficiencies</li> <li>• Does not address small boat navigation</li> <li>• Continues difficult maintenance, permitting &amp; mitigation requirements</li> <li>• Substantial objection from fisheries co-managers</li> </ul>
Split Channel + Pumped Groundwater	Split Channel	\$8.2M	\$17.3K/yr \$457K NPV	<ul style="list-style-type: none"> <li>• Significantly greater high flow capacity</li> <li>• ~50% +/- reduction in high lake levels<sup>2</sup></li> <li>• Creates 3,400 linear feet of side channel with 14 pools and good water quality</li> <li>• Improves fish passage</li> <li>• Connects to Tosh Creek</li> <li>• Creates and enhances over 17 acres of wetlands</li> <li>• Separates habitat needs from flood and recreation uses</li> <li>• Reduced side-channel water temperatures</li> <li>• Safer small boat navigation</li> </ul>	<ul style="list-style-type: none"> <li>• High potential for archaeological discoveries</li> <li>• High channel reconfiguration capital cost</li> <li>• Requires Corps 408 approval</li> <li>• Only meets water temperature reduction criteria in side-channel, not at the river scale</li> </ul>
	Pumped Groundwater	\$1.6M	\$4.4K/yr \$103K NPV		
	<b>Total</b>	<b>\$9.8M</b>	<b>\$21.7K/yr \$560K NPV</b>		
Widened Channel + Pumped Heat Exchange	Widened Channel	\$3.9M	\$12.3K/yr \$350K NPV	<ul style="list-style-type: none"> <li>• Greater high flow capacity</li> <li>• ~5 – 10% +/- reduction in high lake levels<sup>2</sup></li> <li>• Creates and enhances over 14 acres of wetlands</li> <li>• Meets water temperature reduction criteria at the river scale</li> <li>• Lowest vegetation maintenance cost</li> <li>• Safer small boat navigation</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate potential for archaeological discoveries</li> <li>• Requires Corps 408 approval</li> <li>• Highest cold water supplementation capital cost</li> <li>• Only modest physical habitat enhancements</li> </ul>
	Pumped Heat Exchange	\$4.2M	\$18.6K/yr \$435K NPV		
	<b>Total</b>	<b>\$8.1M</b>	<b>\$30.9K/yr \$785K NPV</b>		

1 – O&M cost assumes 50-year life cycle as is expressed as both average annual cost and as a Net Present Value (investment cost) discounted to current dollars.

2 – Based on measured hydrologic data from 2001 – 2014, the results of unsteady HEC-RAS modeling of the two conceptual alternatives compared to existing maintenance indicate the stated reduction in number of days lake levels exceed 27.0, 28.0 and 29.0.

## Public Process & Feedback

Engaging citizens and stakeholders and soliciting their feedback has been a critical element of the Willowmoor project from its 2013 kick-off to the present. Stakeholders for the Willowmoor project are numerous, passionate and diverse. Stakeholder-identified concerns in this process include Lake Sammamish water surface elevation, flooding along the Sammamish River, water quality and quantity issues, tribal treaty fishing rights, recreational uses, and habitat quantity and quality for endangered fish, migratory birds, and beaver. Interested stakeholders include lake-side property owners, environmental and recreational interest groups, natural resource agencies, Native American tribes, the US Army Corps of Engineers (Corps) and cities along Lake Sammamish and the Sammamish River. A variety of means to provide project information and solicit feedback have been utilized, including:

- **Public Meetings** (2),
- **Stakeholder Advisory Committee** (9 meetings),
- **Pre-Application Meeting** (regulatory agency meeting hosted by the Corps),
- **Individual Meetings** (municipalities, fisheries co-managers, and interest groups),
- **Internet Resources** (project website, a file-sharing website, and an internet survey), and
- **Person-to-Person Communications** (postcards, letters, emails, and phone calls).

## Stakeholder Advisory Committee

The project team has conducted an intensive Stakeholder Advisory Committee (SAC) process which has included nine 3-hr meetings. This process has served as the primary stakeholder forum for the project team to identify, develop, vet, revise and refine design objectives and conceptual design alternatives. SAC members represented a wide range of interests, including:

- **Lakeshore property owners** (7) – Washington Sensible Shorelines Association (WSSA), Sammamish Home Owners (SHO) and individual homeowners
- **Cities** (2) – Redmond, Bellevue
- **Natural resource agencies** (2) – Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (WDOE)
- **Recreational interest groups** (4) – Serve our Dog Areas (SODA), Friends of Marymoor Park (FOMP), Lake Sammamish Yacht Club\*, Sammamish Rowing Association (SRA)
- **Environmental interest groups** (3) – Save Lake Sammamish (SLS), Eastside Audubon, WaterTenders
- **US Army Corps of Engineers** (1)
- **WRIA 8 Salmon Recovery Council** (1)
- **Businesses** (2) – OneRedmond\*, JB Instant Lawn
- **Independent Consultants\*\*** (2) – Watershed Company\*, Parametrix

\* Representative is also a lakeshore property owner

\*\* Consultants are not under contract with King County for Willowmoor Project

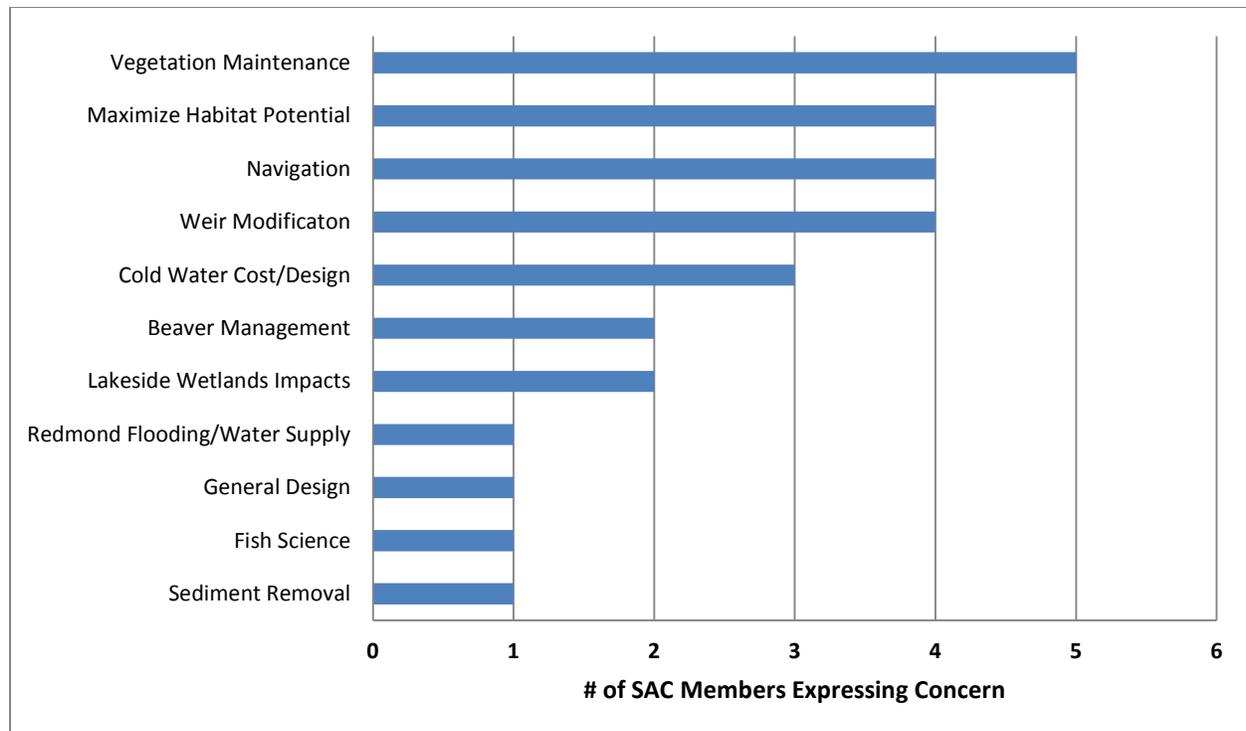
The SAC was established by charter to serve as a sounding board rather than a decision-making body. The charter identified that consensus might not be achievable due to the disparate interests on the committee, however all members agreed to work together to:

*Strive for consensus – to seek out what you and the group can and cannot agree to, live with, or modify to achieve agreement – while recognizing that majority and minority opinions may be the best result on some topics. (Willowmoor SAC Charter, 2013)*

Feedback from diverse SAC interests was frequently conflicting, particularly in regards to prioritizing the importance of flood control versus habitat restoration benefits versus recreational interests. In some cases the project team was able to revise products to meet all parties' needs satisfactorily. In other cases SAC feedback had to be noted, but ultimately not incorporated into products due to too much conflict with competing project goals, regulatory issues, or other feasibility concerns. Additionally, some SAC members have been unsatisfied with level of detail the project team has been able to provide for some products at this conceptual development stage for the project – detailed weir designs and vegetation management plans being the most prominent examples. The project team has made every effort to establish a “parking lot” for documenting items that will require further exploration and public vetting at later project stages where detailed design of these elements are more appropriate (see the *Considerations Moving Forward* section).

At the second to last SAC meeting (#8) the two conceptual design alternatives were presented to SAC members along with the Existing Maintenance alternative. The presentation included plans, sections, and 3-dimensional graphics for each alternative as well as detailed information about estimated costs, benefits and concerns. SAC members were asked at the meeting to verbally weigh in on what they liked and disliked most about each alternative. Most declined to state a solid preference as they wanted time to review the materials and discuss with their constituencies. While there was no clear “winner” among the alternatives, each one had some supporters. However, the Split Channels with Pumped Ground Water received the most positive comments. Members found this alternative intriguing because it appeared to have the most benefits for flood control, high lake level reduction and habitat enhancements. However, there were many questions remaining that will require resolution in later design stages. For example, some members were concerned that there would not be enough vegetation maintenance, while others were afraid that it would go too far, leaving an unshaded, warmer channel than is on the site currently (Figure 1).

As noted above, more detail was requested for habitat elements, navigation features and weir modification designs. Some SAC members were also very concerned about the costs of the habitat elements of the project and the feasibility of funding them, particularly something as unconventional as cold water supplementation. A representative from WRIA 8 indicated that the magnitude of the costs were very much in line with typical salmon recovery project costs. Determining attractiveness of the cold water approach was something however that could be vetted through grant applications.



**Figure 1: Design considerations communicated to project team at SAC meeting #8, 12/10/2014. Many of these items will be resolved as the project moves from conceptual to 30% design.**

The project team indicated that answers to several of the questions could be found in the Conceptual Design Report, and asked SAC members to review the report and comment in writing at a later time by mail, email, through a survey online, or through a survey that would be provided at the subsequent public meeting. Members were also asked share the conceptual design report with their constituencies and invite them to the public meeting to provide input.

## Public Meeting #2

Following the input from the SAC, the project team presented the same alternatives at the second public meeting on Saturday, March 14<sup>th</sup>, 2015. This meeting was attended by 59 people from agencies, the SAC, cities, interest groups and the general public. Flood Control District board members Hague and Lambert were on hand to provide opening comments and respond to questions about the Flood Control District and King County's respective roles in the project. Comments from SAC members at the public meeting remained consistent with their comments during SAC meetings. The largest segment of attendees was lakeshore property owners, several of whom advocated for a low-cost project focused on high lake level reduction. One representative from Friends of Marymoor Park took great issue with these sentiments, stating passionately that the project should continue to have a multi-benefit purpose.

## Agency Pre-Application Meeting

In the interval between SAC meeting #8 and the second public meetings, a project "pre-application" meeting was hosted by the Corps (February 11th, 2015). These "pre-application" meetings are routinely

hosted by the Corps at the request of project sponsors to provide regulatory and tribal feedback and guidance early in the project process in advance of permit preparation and submission. The pre-application meeting was attended by representatives of the following organizations:

- Muckleshoot Indian Tribe Fisheries Division (MITFD) - Sammamish River fisheries co-manager
- Snoqualmie Indian Tribe (SIT).
- Washington Department of Fish and Wildlife (WDFW) - Sammamish River fisheries co-manager
- Washington Department of Ecology (WDOE)

Attendees were asked to review the project alternatives, describe regulatory requirements for each, and follow up with project staff with any written thoughts about a preferred alternative or ways to improve any of the alternatives.

Most attendee comments focused on improving fish habitat quantity and quality, particularly water quality. Some attendees, including the MITFD suggested that cold water supplementation would likely provide more benefit to endangered salmon than physical habitat enhancements. However, several attendees were interested in the Split Channels alternative as well assuming there would be enough water for both channels. Other agency representatives were very interested in the fish habitat aspects of both the Split Channel and Widened Channel alternatives, particularly the water quality elements.

There was very little support expressed for the Existing Maintenance alternative, with only the Corps facilities representative noting it required the least process and cost to implement.

Snoqualmie Tribe staff also provided input on the importance of cultural resources and their potential discover during design and construction. Procedural requirements discussed included the Corps 408 process for modifying a facility and state non-consumptive water right requirements for any wells or diversions. The Washington Department of Fish and Wildlife and the MITFD noted that current maintenance practices were unsustainable. Ongoing maintenance permitting would require costly periodic mitigation.

### **Meetings with Cities**

Project team staff met with municipal staff of cities adjacent to Lake Sammamish and the Sammamish River, including a multi-city meeting where the three final project alternatives were presented. City staff had varied concerns. Redmond staff support the Split Channel with Pumped Ground Water alternative due to the habitat benefits it would provide with the caveat that project designers need to fully evaluate the potential for impacts to the Redmond's surface water outflow system. The Sammamish representative indicated an initial preference for the Split Channel alternative, but requested further study and assurance that it would not negatively impact shoreline property use or wetlands. Bellevue is still considering the conceptual design alternatives. The Kenmore representative expressed strong interest in cold water supplementation as that would be the most likely to positively impact Kenmore due to the impending TMDL for the river, and because other capital project or maintenance opportunities to address the TMDL issue are very limited.

## Final SAC Meeting

The ninth and final meeting of the Willowmoor Stakeholder Advisory Committee was held on October 14<sup>th</sup>, 2015. Margaret Norton-Arnold welcomed members, noting that the group first met in August 2013. The purpose of this meeting was to bring the group up-to-date on the activities of King County regarding Willowmoor over the past nine months. Members also provided their opinions on which of the alternatives they most support at this point in time.

At the meeting SAC members received a draft copy of this Alternatives Considerations Memo and the project team noted that the memo contains a number of issues and considerations that will be addressed as the project moves forward into design. Many of these issues were suggested by SAC members, and include potential modifications to the weir, recreation and navigation, operations and maintenance, cultural resources, and others. Members said they appreciated that these issues had been incorporated into the memo.

Committee members expressed a clear preference for a capital improvement project to move forward, with 14 out of 18 members preferring one or the other capital project alternatives over continued existing maintenance. Alternative preference was divided among constituencies. The largest group including park user groups, environmental organizations, municipal representatives, and natural resource agencies favored the Split Channels plus Pumped Groundwater alternative. In contrast, lakeside homeowners, two at-large consultants (one a lakeside property owner), and the Corps facilities maintenance representative split preferences between Existing Maintenance and Widened Channel plus Heat Exchanger. The current stated preferences of SAC members are summarized in Figure 2 below.

The cold water topic generated substantial additional discussion. Concern was expressed over funding sources with several emphasizing that while they supported the Flood Control District funding the structural channel projects and associated habitat elements, they would like to see the construction of a cold water element funded separately. With the exception of one SAC member, the heat exchanger was broadly criticized as problematic due to costs, construction feasibility, and concerns regarding effectiveness. On the other hand, many expressed that the pumped ground water was a simple approach with proven results in other applications and appropriate to the project scale.

For more detail regarding this final SAC meeting please see the Meeting Report at the end of this document.

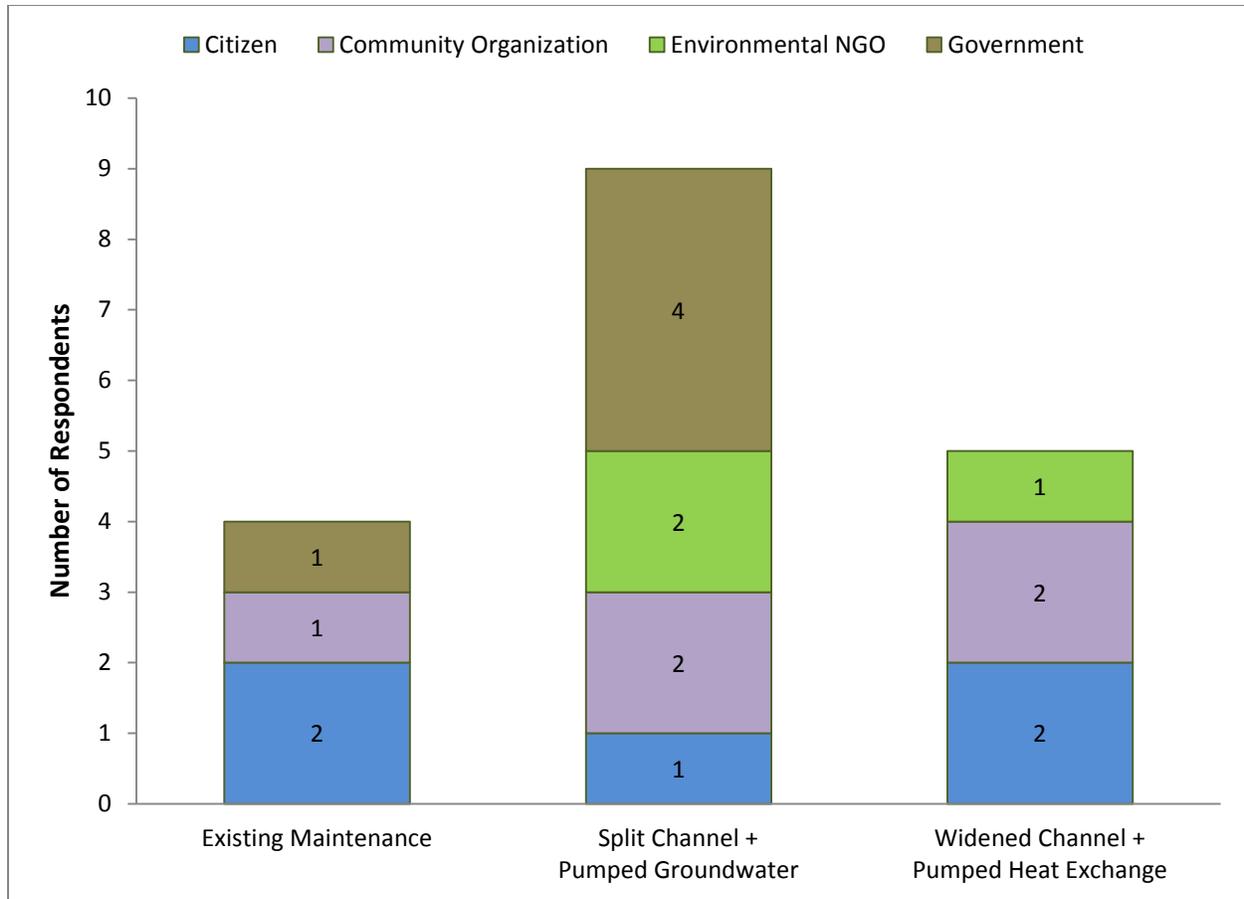


Figure 2: SAC Member Respondents: Summary of preferred alternative by organization type

### Summary of All Conceptual Alternative Feedback

A summary of alternative preferences for all stakeholders, including municipalities, agencies, tribes, the SAC and the broader public is presented in Figures 3 below. While there was support for every alternative, the Split Channel alternative again received the most statements of support. The second most popular alternative was Existing Maintenance, with support coming from lakeside property owners and community organizations representing those interests. Many of the commenters included nuances and caveats. Some commenters only preferred the Split Channel alternative, while others liked both Split Channel and Widened Channel equally. Others liked Split Channel if it included re-visiting high volume cold water supplementation via deep lake withdrawal. A smaller contingent wanted to see only cold water supplementation and no changes to channel configuration. This was due to the fact that in very dry years, such as experienced in summer 2015, lake outflow can be as low as 17 cfs. Under these conditions splitting flow between channels could potentially create fish passage issues and exacerbate warm water problems.

In summary, of the 36 individuals and organizations that responded at a meeting or in writing to the variety of alternatives presentations; 21 preferred a capital project (Split Channels, Widened Channels or cold water supplementation), 8 indicated no preference, and 7 supported Existing Maintenance.

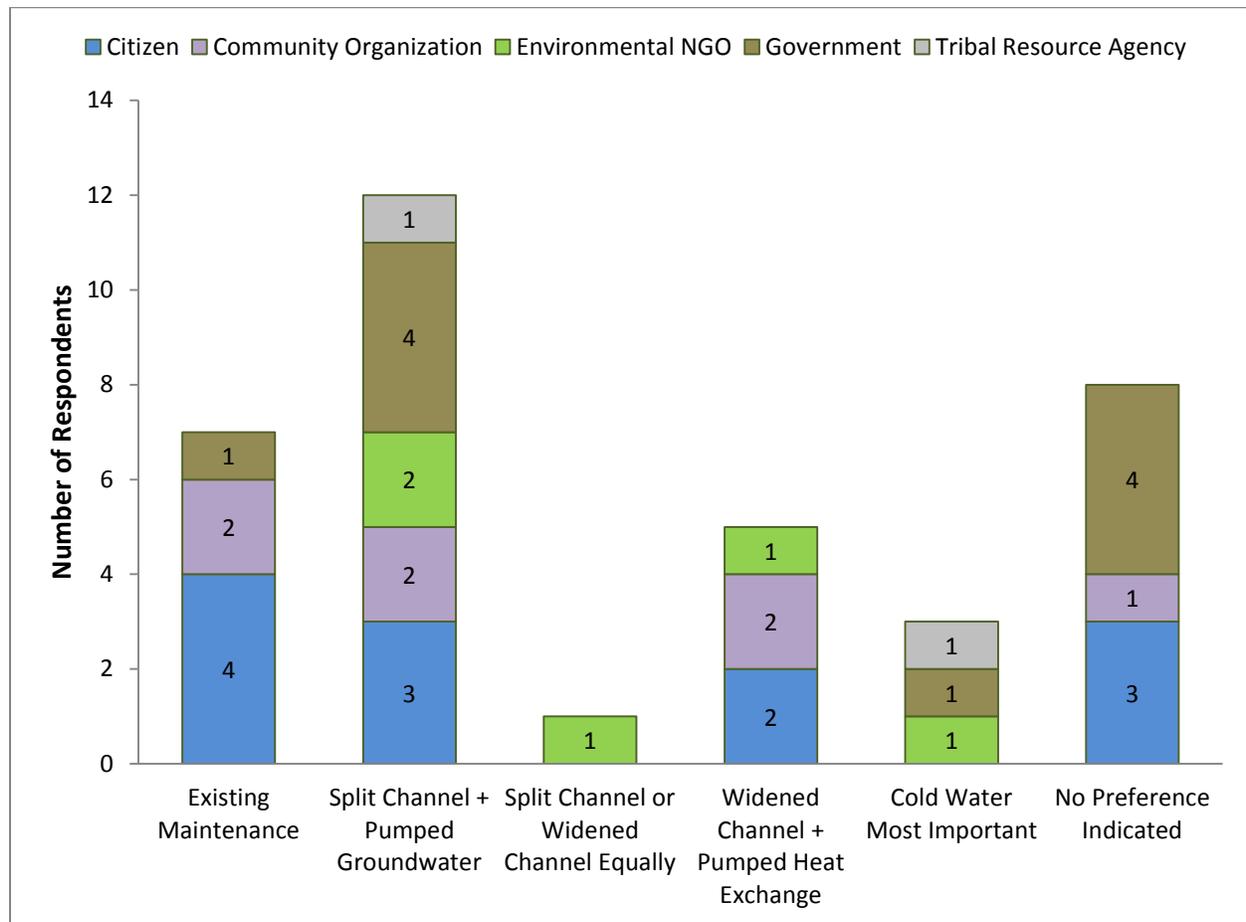
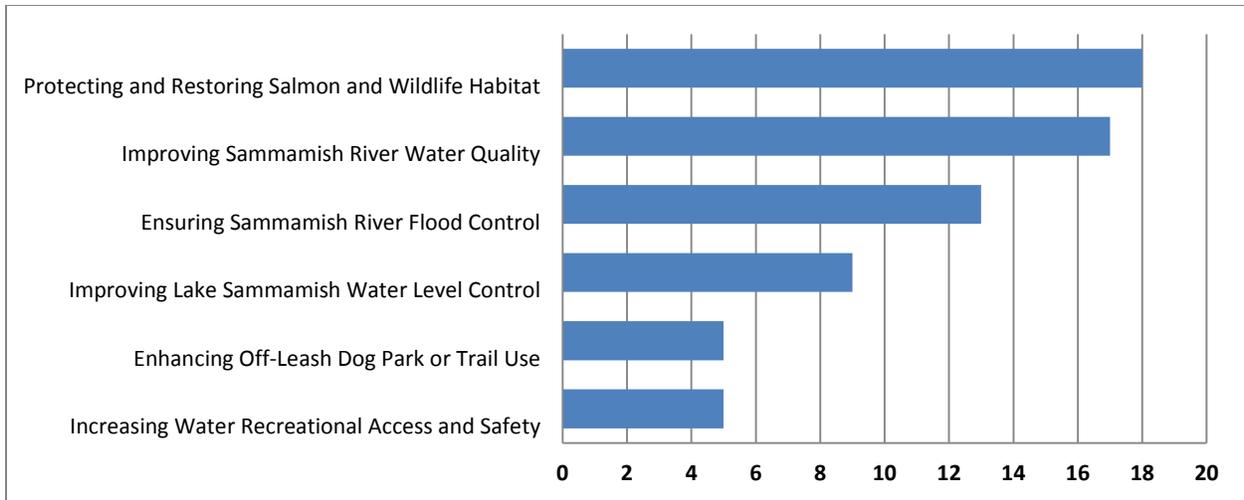


Figure 3: All Respondents: Summary of preferred alternative by organization type.

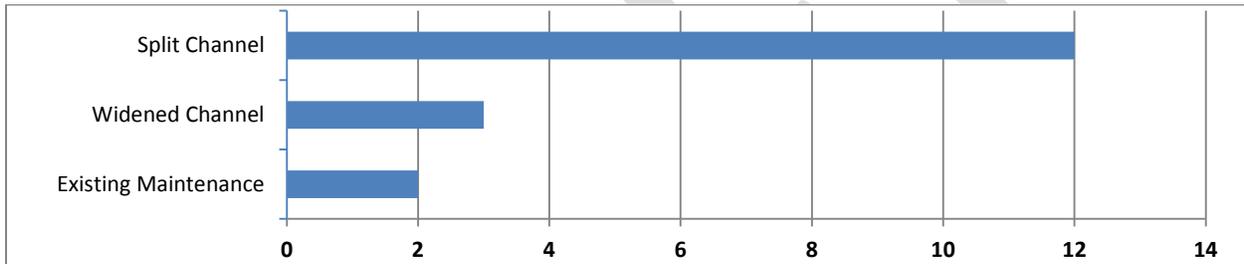
In addition to this feedback to the project team presentations, staff utilized a new social media tool called OneKingCounty on MySidewalk to document responses from a broad King County audience. The survey was developed in a way that respondents could only reply to the survey one time from a given computer. The OneKingCounty survey was advertised through the project website, to a OneKingCounty subscribers list, King County Facebook pages, at SAC meetings, and at the latest project public meeting. The team asked two key questions on this platform:

1. What are the most important issues for the Willowmoor project to address?
2. Which alternative do you prefer?

The majority of respondents prioritized protecting and restoring salmon and wildlife habitat and improving water quality, with Sammamish River flood control and Lake Sammamish water level control prioritized third and fourth respectively (Figure 44). Among the 17 individuals that responded to the preferred alternative question, the majority (12) preferred the Split Channel alternative (Figure 5).



**Figure 4: OneKingCounty Question: What are the most important issues for the Willowmoor Floodplain Restoration Project to address?**



**Figure 5: OneKingCounty Feedback, Question: Which alternative to you prefer?**

Overall, the Split Channel with Pumped Ground Water alternative received the most documented support among the alternatives presented. Much of that support, however, was delivered with strongly-worded caveats attached such as;

- Only if more cold water is provided, only if further analysis of impacts to Redmond’s stormwater outfall is developed
- Only if navigation is improved
- Only if you can quantitatively demonstrate fish benefits
- Only if there is an adaptive management plan in place should lake levels begin to rise again.

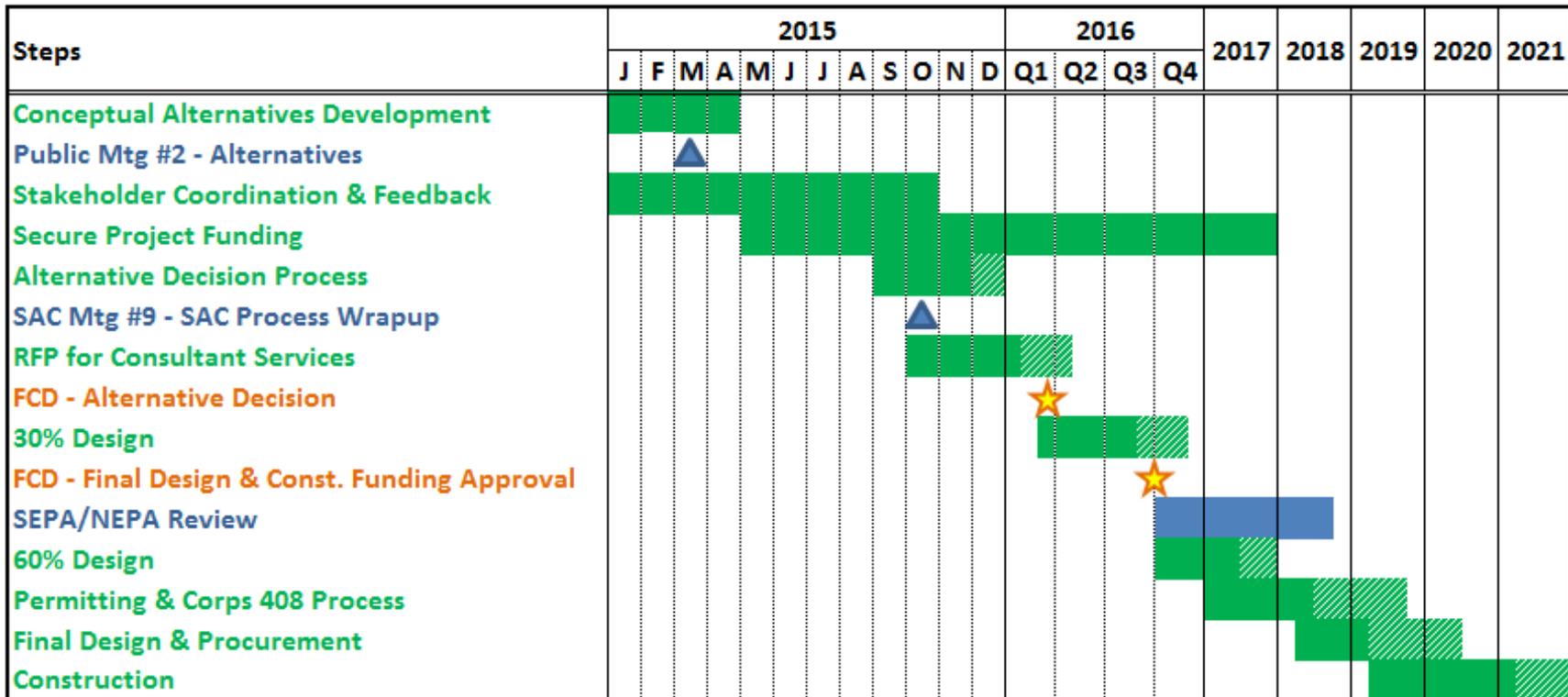
Several SAC members suggested that river-scale cold water supplementation be considered in a phased approach. First the County should test the efficacy of water temperature reduction in the reach by implementing the pumped groundwater and Tosh Creek connections to the new side channel and maximizing the potential for hyporheic flow in the channel reconfiguration. If the temperature remains high and fish do not respond to this action, only then should a river-scale approach to temperature reduction be considered. Other citizens and SAC members greatly prefer the Existing Maintenance alternative because it is currently working, i.e. they have the most confidence that TZ maintenance will provide the most dependable lake elevation control.

The most frequently suggested improvement to all alternatives was to study the potential for adjustable weir control, either through stop gates or real-time electronic adjustment configuration. This idea was broadly supported due to concerns regarding both lake level control and habitat-related climate change considerations.

Regardless of which alternative is selected, questions of funding and regulatory requirements remain outstanding. While the FCD in partnership with the City of Redmond funded this conceptual design phase, final design and construction will likely require funding partners considering the Willowmoor project has fairly equivalent flood control and habitat objectives. The WRIA 8 Salmon Recovery Council recently recommended \$200,000 in Puget Sound Acquisition and Restoration funds to the Willowmoor project to support continued design work related to the habitat enhancement components of the project. This funding is pending final approval of the Salmon Recovery Funding Board at their December 9<sup>th</sup> meeting. The King County Mitigation Reserves Program has also expressed interest in the project as it presents a unique opportunity to do a large-scale restoration project in a highly urbanized watershed. The project team will work with the FCD and other project partners to develop an appropriate cost-sharing strategy. In addition to project funding, regulatory issues pertaining to water rights, modification of a federal facility, and maintenance mitigation levels create additional project challenges beyond a typical flood or restoration project. The path forward on these items will need to be defined following selection of a preferred alternative.

### DRAFT Project Timeline

The following timeline depicts key project steps through construction.



- ★ = FCD Decision Point
- ▲ = Stakeholder/Public Input Opportunity
- ▨ = Potentially longer process

## Considerations Moving Forward

Following the FCD's final decision on a preferred alternative, there will be a number of technical and regulatory issues that will require resolution as the project design moves forward. While not exhaustive, the following table captures a number of these key considerations along with initial strategies for their resolution:

**Table 5 – Considerations Moving Forward**

Category	Consideration	Description	Resolution Strategy
Weir(s)	Flow Balancing	Existing weir & new side channel weir need to balance flows through main and side channel during variable lake level conditions, particularly during summer low flow periods.	<p>Iterative design refinement and performance modeling will be required to achieve a weir configuration that considers the following factors in an appropriate order of priority:</p> <ul style="list-style-type: none"> <li>• flow balancing criteria,</li> <li>• small boat navigation,</li> <li>• safe and unobstructed fish passage,</li> <li>• adaptive management</li> </ul> <p>An adjustable weir or another adaptive management design consideration may be necessary to achieve this balance. Corresponding monitoring and adaptive management criteria will need to be developed for the project O&amp;M manual.</p>
	Fish Passage	Safe and unobstructed passage for Chinook and other salmonids (both adult and juvenile) through the main channel weir notch.	
	Recreational Boater Safety	Passage for small watercraft through the existing notch in main channel weir can be difficult.	
	Adjustable Weir	Compared to the current fixed weir, an adjustable weir may be able to better address high lake levels, downstream flood control, and potential changes in external conditions (climate change, basin development, etc.)	
	Adaptive Management	Main and/or side-channel weirs don't meet performance criteria following implementation, or external conditions change (climate change, increased basin development, etc.)	
Recreation & Public Access	Off-Leash Dog Park	Ongoing and enhanced access to the river is an important issue for the off-leash dog park users	The project team will coordinate with Parks staff and stakeholders during design to ensure the project doesn't adversely affect access, and to make improvements where appropriate (i.e. repairs of the bottom water access steps that are currently failing and contributing sediment to the river).
	Small Watercraft Passage	The current TZ configuration can be challenging for small boat transit. Ensuring safe passage through and/or around the TZ for small boats and water craft.	The design team will coordinate with user groups during design refinement of TZ channel modifications to incorporate passage considerations; possibly include facilities for portage around the TZ.

**Table 5 – Considerations Moving Forward**

Category	Consideration	Description	Resolution Strategy
	Trails, etc.	Certain groups of stakeholders are interested in developing passive recreation features in the undeveloped project area SW of the TZ (trails, viewing platforms, benches, etc.)	The design team will coordinate with Parks staff and user groups during design refinement of TZ channel modifications to explore incorporation of passive recreation features.
O&M	Beavers	Beavers are likely to build dams in both the main and side-channels, potentially resulting in obstructing fish passage and reducing conveyance capacity	Regular monitoring of side channel during critical periods (fish migration periods, flood season); removal of dams if determined to be a problem
	Vegetation Encroachment	As native shrubs and trees grow and mature, they will encroach into the main and side channels, potentially reducing flood flow conveyance	O&M procedures will include regular monitoring and trimming as necessary to ensure adequate flood flow conveyance.
	Invasive Vegetation	The project site is currently dominated by non-native vegetation, and establishment of native vegetation may be inhibited by the invasive species.	As part of the design of these facilities, the project team will develop a plan for removing invasive species during construction. A section of the O&M manual will lay out procedures and practices for controlling them following construction.
	Recreational Facilities	Any new recreational facilities implemented as part of the project will require maintenance (trails, signage, footbridges, etc.)	As part of the design of these facilities, the project team will coordinate with Parks staff and stakeholders to develop an appropriate O&M manual, including responsibilities and funding for recreational facilities.
	Sediment	The TZ may still lose conveyance capacity over time due to sediment and/or sod mat build up.	Channel modifications will be designed to continue to meet conveyance objectives should some build up occur. Additionally, the O&M manual will include procedures for cleaning out excessive build up.
	Unforeseen Changes and Outcomes	Unforeseen changes both within and external to the project may impact project performance.	The project will be designed to provide some resiliency to unexpected changes. As part of the O&M manual, an adaptive management plan will be developed to allow for implementation of modifications to the project and/or O&M procedures.

**Table 5 – Considerations Moving Forward**

Category	Consideration	Description	Resolution Strategy
Lake Level Impacts	Ordinary High Water (OHW)	Concern has been expressed by lake shore residents that past maintenance practices for the TZ have resulted in an increase from 27.0 FT to 28.2 FT, thus affecting the value of their property.	The 28.2 FT level indicates the modern regulatory standard as determined by a City of Bellevue study using field measurements and best available science required by the Shoreline Management Act. The 27.0 FT OHW was a Corps estimate made in 1965 immediately following completion of the Sammamish River Improvement Project and prior to approximately 40 years of recorded data used for the City of Bellevue study. The two levels were established by different technical approaches.
Water Rights	River Diversion(s)	Department of Ecology may determine that a water right is required to divert flow from the main channel into a side channel or water cooling facility	During Pre-App meeting, Ecology staff indicated project may be eligible for a “beneficial use” water right / permit. Project team will coordinate with appropriate Ecology staff to determine if/what water right is needed and corresponding process.
	Groundwater Pumping	Department of Ecology will require a water right for any groundwater pumping to supply supplemental cold water to the side channel.	During Pre-App meeting, Ecology staff indicated project may be eligible for a “beneficial use” water right / permit. Project team will coordinate with appropriate Ecology staff to determine if/what water right is needed and corresponding process.
Cultural Resources	Archeological Discoveries	There is a very high likelihood that cultural artifacts may be encountered during grading of the main and side channels.	Project team will coordinate with tribes and SHPO early in design process to develop contingency plan should cultural artifacts be discovered.
Sequencing & Phasing	Phased Construction	Funding may not be available to implement pumped cold water supplementation or recreational facilities concurrently with channel modifications.	The design team will explore design and construction approaches that allow future, phased implementation of cold water and/or recreational facilities. (i.e. siting ground water pumps and delivery system in location that would minimize impact to already constructed features and habitat).
	Sequencing	Construction of project elements can potentially be sequenced for efficiency and cost savings.	For split channel alternative, side channel can be constructed “in-the-dry” and allowed to establish before connection to main channel. Then, summer flow can be routed through new side channel while constructing main channel elements.

**Table 5 – Considerations Moving Forward**

Category	Consideration	Description	Resolution Strategy
Funding	Funding for Non-Flood Elements	FCD funding is intended primarily for flood protection elements and associated mitigation.	Grants and other additional funding sources will be explored and pursued to fund habitat and recreational project elements.
Hydraulic Performance	Stormwater Outfalls	Reconfiguring the TZ and weir will likely change the timing, magnitude, frequency and duration of outflows from the lake following storm events, and could potentially impact Redmond's stormwater outfalls during moderately high outflows.	The design team will coordinate with Redmond technical staff to gather necessary outfall data, and then conduct hydraulic modeling to evaluate and refine the design so as to minimize impacts.
Regulatory	SEPA/NEPA	It will be necessary to develop a robust NEPA/SEPA strategy.	
	Corps 408	Congressional authorization is required to modify a Corps facility through the 408 process.	The project team will coordinate with local Corps regulatory staff to efficiently and effectively work through the 408 process.

## References

1. Willowmoor Floodplain Restoration Project – Concept Design Summary Report. April 2015. King County Department of Natural Resources and Parks, Water and Land Resources Division

## Appendices

Figure A: Study Area Map

Figure B: Conceptual Design Alternative – Existing Maintenance

Figure C: Conceptual Design Alternative – Split Channel + Pumped Groundwater

Figure D: Conceptual Design Alternative – Widened Channel + Pumped Heat Exchange

Figure E: Conceptual Design Alternatives – Typical Cross-Sections

Meeting Report: Willowmoor Stakeholder Advisory Committee #9

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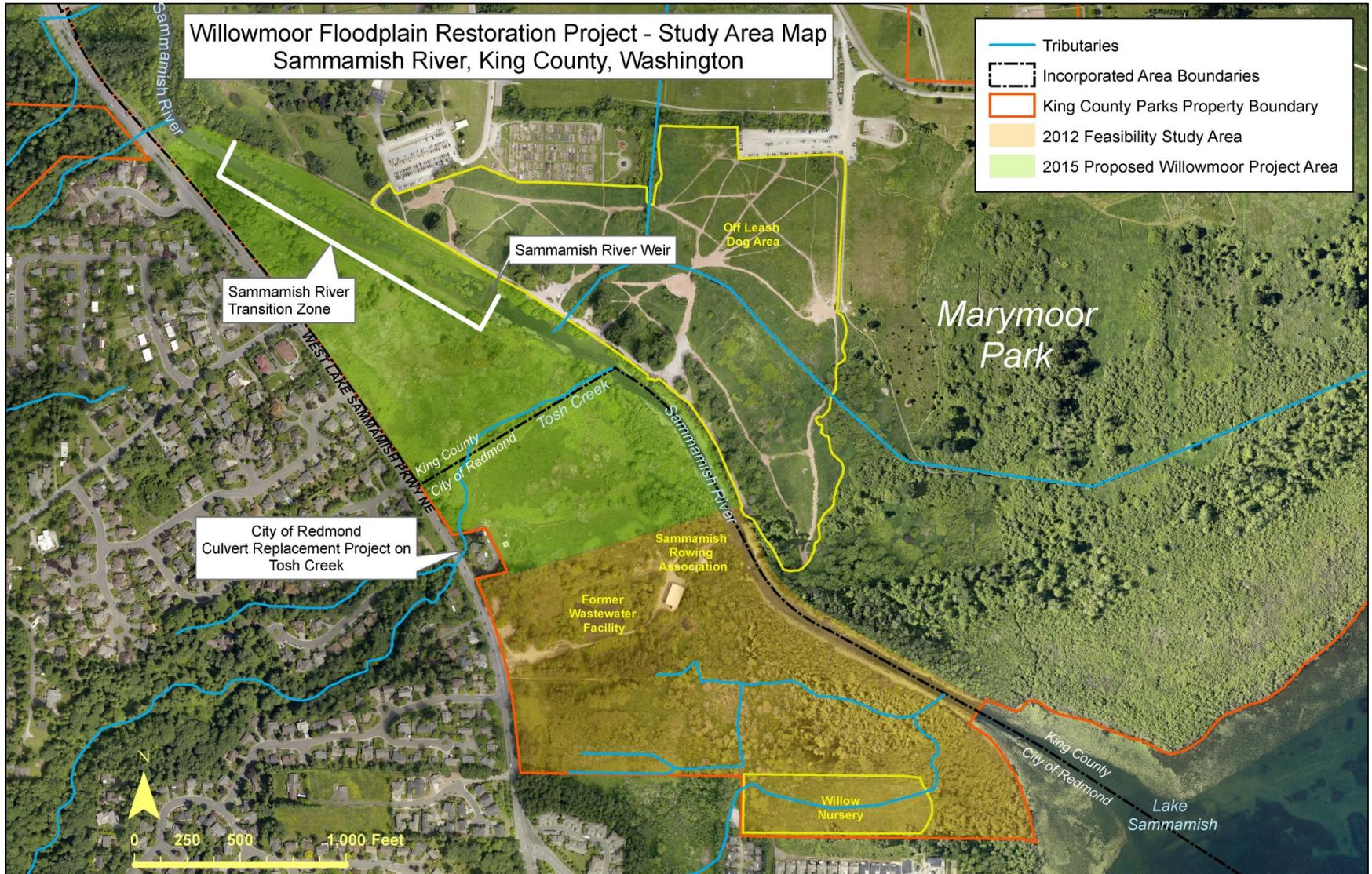


Figure A: Study Area Map

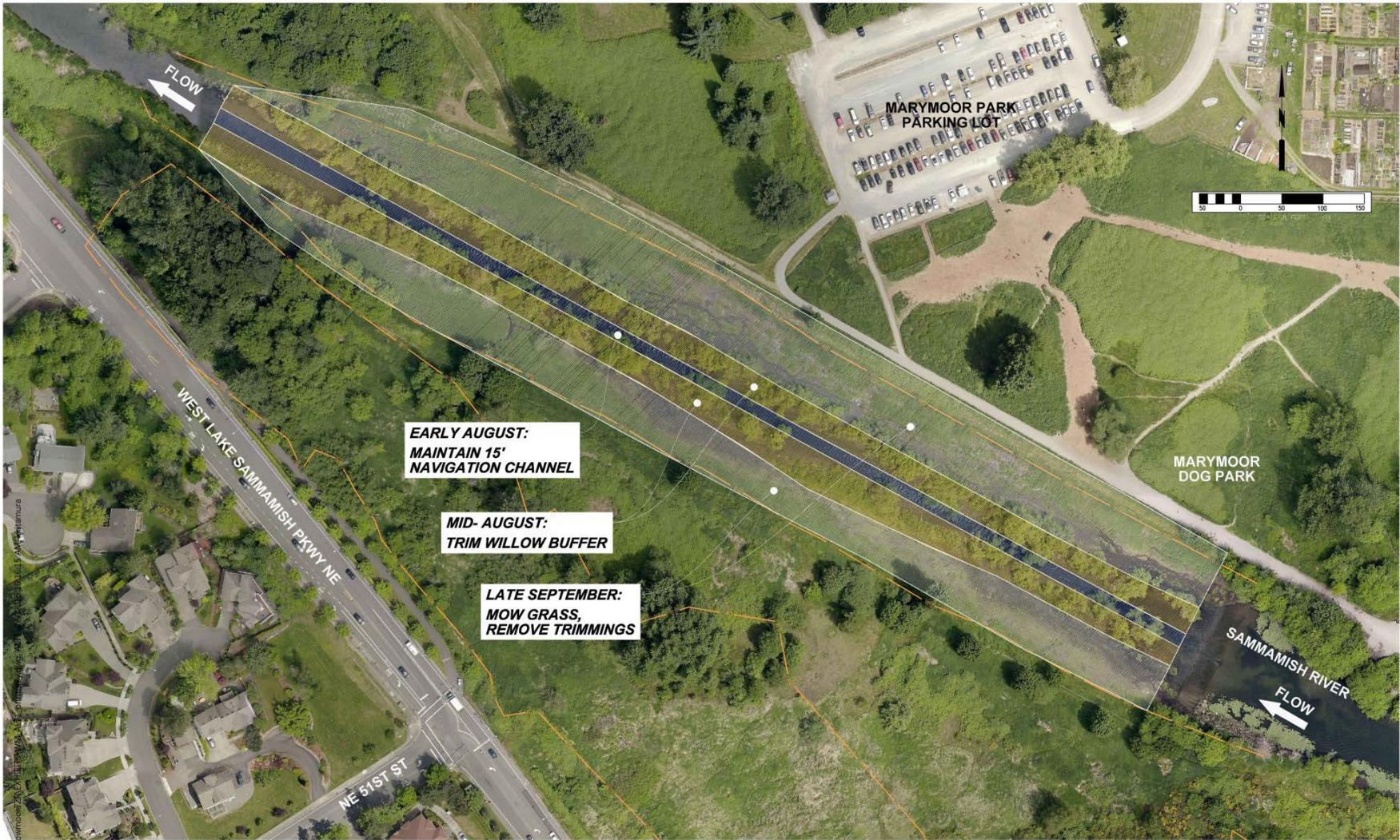


Figure B: Conceptual Design Alternative – Existing Maintenance

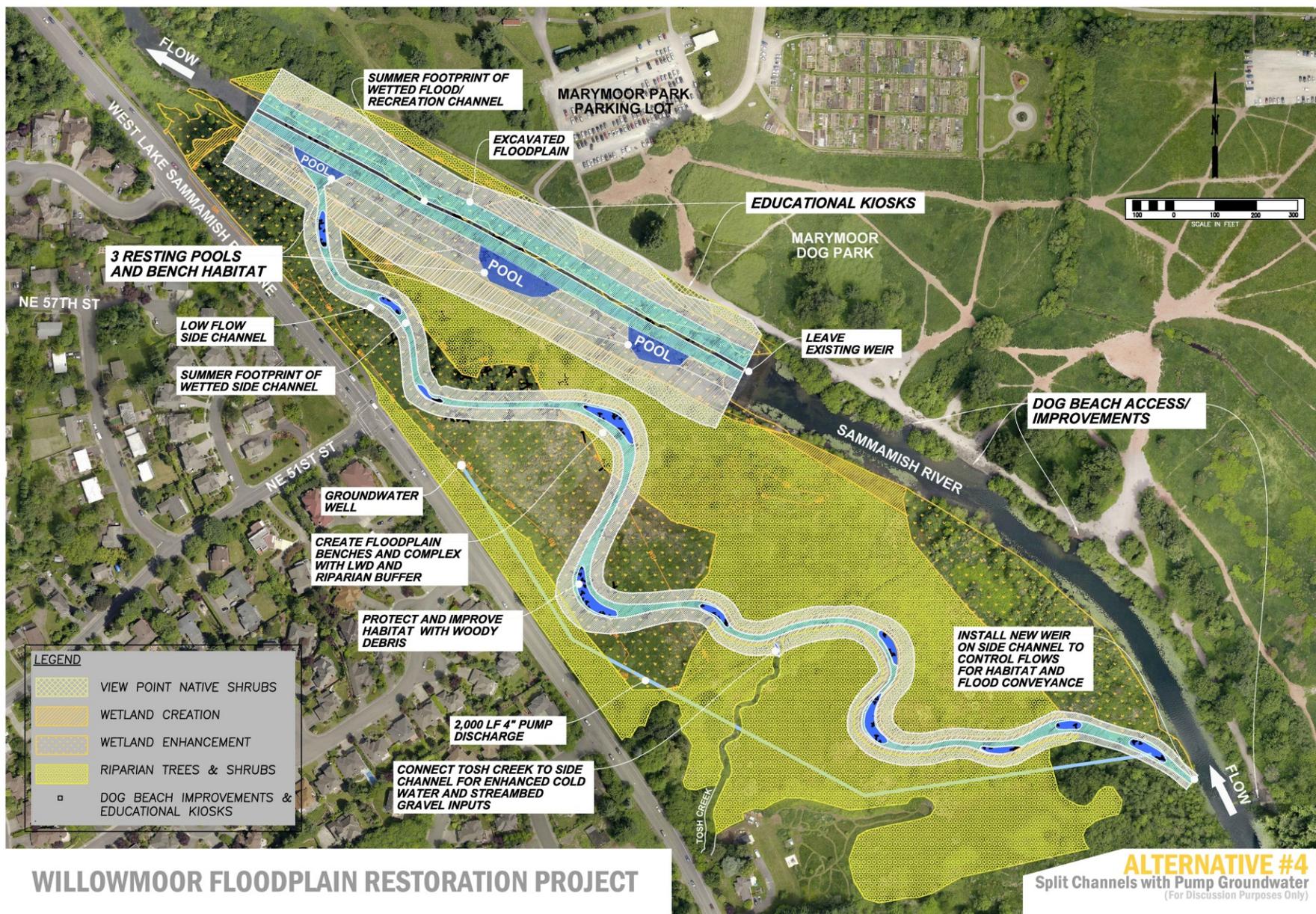
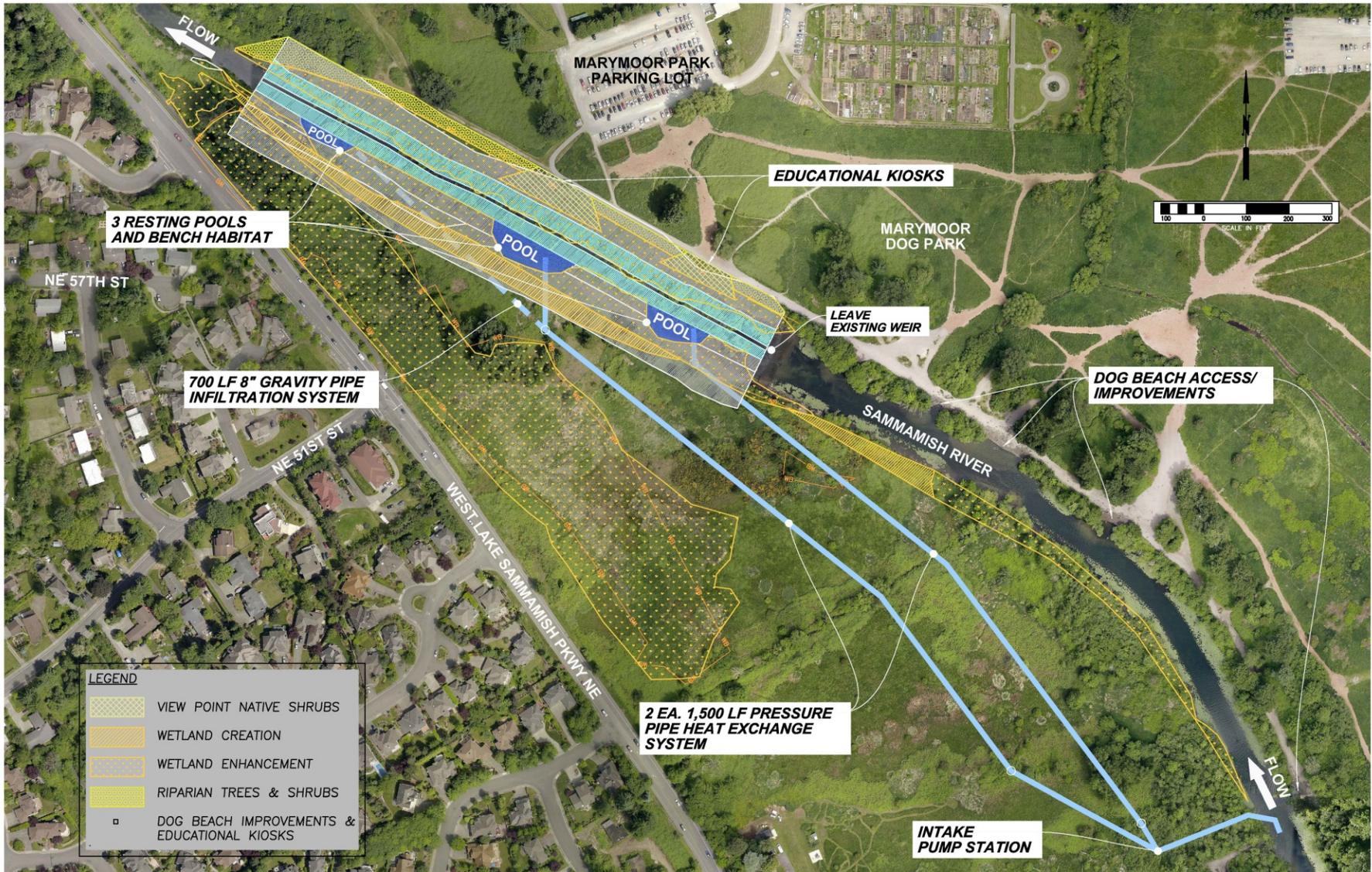


Figure C: Conceptual Design Alternative – Split Channel + Pumped Groundwater



**WILLOWMOOR FLOODPLAIN RESTORATION PROJECT**

**ALTERNATIVE #5**  
Benches and Coves with Heat Exchange System  
(For Discussion Purposes Only)

**Figure D: Conceptual Design Alternative – Widened Channel + Pumped Heat Exchange**



Figure E: Conceptual Design Alternatives – Typical Cross-Section

**WILLOWMOOR FLOODPLAIN RESTORATION PROJECT****STAKEHOLDER ADVISORY COMMITTEE****Meeting #9: October 14, 2015****--Meeting Report--****SAC Members Present:**

Paul Bucich, City of Bellevue  
 Paul Fendt, Member At-Large  
 Jonathan Frodge, Save Lake Sammamish  
 Christa Heller, Washington Department of Fish & Wildlife  
 Greg Helland, Save Our Dog Areas  
 Michael Hobbs, Friends of Marymoor Park  
 Charles Ifft, US Army Corps of Engineers  
 Jeanne Justice, City of Redmond  
 Heather Kahn, Washington Department of Ecology  
 Jim Mackey, Member At-Large  
 Dwight K. Martin, Sammamish Home Owners  
 Peter Marshall, Eastside Audubon  
 Nancy Meyers, Member At-Large  
 Martin Nizlek, WA Sensible Shorelines Association  
 Scott Sheffield (as an alternate to Gilbert Pauley, Member At-Large)  
 Bill Way, Member At-Large  
 Susan Wilkins, Member At-Large  
 Jason Wilkinson, WRIA 8 Salmon Recovery Council

**Project Team Staff and Consultants**

Roger Dane, City of Redmond  
 Kate Akyuz, King County  
 John Engel, King County  
 Craig Garric, King County  
 Norah Robinson, King County  
 April Sanders, King County Flood Control District  
 Patty Dillon, NHC  
 Margaret Norton-Arnold, Committee Facilitator

**Observers**

Reid Brockway, Sammamish Home Owners  
 Sybille Fleischmann, Washington Kayak Club  
 Dave Garland, Washington State Department of Ecology  
 Linda Thompson, EAS Conservation Committee

# **WILLOWMOOR FLOODPLAIN RESTORATION PROJECT**

## ***STAKEHOLDER ADVISORY COMMITTEE***

### **Final Meeting of the Stakeholder Advisory Committee**

This was the final meeting of the Willowmoor Stakeholder Advisory Committee. Margaret Norton-Arnold welcomed members, noting that the group first met in August 2013. The SAC has significantly shaped the development of the Willowmoor project, including contributions to the design objectives and criteria and the elements of the various project alternatives. The purpose of this meeting was to bring the group up-to-date on the activities of King County regarding Willowmoor over the past nine months. Members also provided their opinions on which of the alternatives they most support at this point in time.

### **Presentation on Design Considerations Memo**

Craig Garric and Kate Akyuz presented the contents of a Willowmoor “Alternatives Considerations Memo” that is currently under review at the Flood Control District. The memo describes the three project alternatives under consideration, and the costs and benefits of each. The Memo also includes feedback gathered from stakeholders following the March 14 public meeting. A number of meetings with cities, tribes, natural resource agencies and the U.S. Army Corps of Engineers have also taken place and have resulted in productive discussions. All SAC members received a copy of the memo and it will be posted on the project website when finalized following the SAC meeting.

Craig and Kate noted that the memo contains a number of issues and considerations that will be addressed as the project moves forward into design. Many of these issues were suggested by SAC members, and include potential modifications to the weir, recreation and navigation, operations and maintenance, cultural resources, and others. Members said they appreciated that these issues had been incorporated into the memo.

Moving forward, it is anticipated that the Flood Control District will select a preferred alternative for Willowmoor in early 2016. After this selection, the District will enter into a consultant contract for preliminary and final design, permitting, and, eventually, construction. There will be a number of opportunities for the public to remain engaged in the process, and King County will actively reach out to all interested stakeholders to ensure their continued involvement.

### **Member Opinions on Design Alternatives**

Committee members expressed a clear preference for a capital improvement project to move forward, with 14 out of 18 members preferring one or the other capital project alternatives over continued existing maintenance. Alternative preference was divided among constituencies. The largest group including park user groups, environmental organizations, municipal representatives, and natural resource agencies favored Alternative 4: Split Channels plus Pumped Groundwater. In contrast, lakeside homeowners, two at-large consultants (one a lakeside property owner), and the Corps facilities maintenance representative split preferences between Alternative 1: Existing Maintenance and 5: Widened Channel plus Heat Exchanger. The suggestion was made by several lakeside landowners that if

# WILLOWMOOR FLOODPLAIN RESTORATION PROJECT

## STAKEHOLDER ADVISORY COMMITTEE

Alternative 5 were modified, e.g. paired with the pumped ground water rather than heat exchanger, then that may draw some support away from Alternative 1 to Alternative 5. In that case the Alternative 4: Split Channel might be more popular among the group as a whole by a smaller margin. The group expressed very specific ideas to improve each of the alternatives as the project moves towards 30% design.

The cold water topic generated substantial additional discussion. Concern was expressed over funding sources with several emphasizing that while they supported the Flood Control District funding the structural channel projects and associated habitat elements, they would like to see the construction of a cold water element funded separately. With the exception of one SAC member, the heat exchanger was broadly criticized as problematic due to costs, construction feasibility, and concerns regarding effectiveness. On the other hand, many expressed that the pumped ground water was a simple approach with proven results in other applications and appropriate to the project scale.

A discussion on reconsidering the hypolimnetic heat withdrawal system as a result of feedback from constituencies external to the SAC was a point of keen interest with some welcoming reconsideration and others displeased to have it back on the table. In general, SAC members felt that regardless of the selected channel configuration alternative, further feasibility study of both design and funding of three cold water approaches including hyporheic exchange potential, pumped groundwater, and hypolimnetic water cooling systems should be considered for inclusion in 30% design work moving forward. They urged an emphasis on determining how these concepts and alternatives could work independently or (and possibly phased) to develop the most cost-effective cold water supplementation approach.

Of the 18 SAC members present, preference was indicated for the alternatives in the following order:

- Alternative 4: Split Channel plus Pumped Groundwater (9)
- Alternative 5: Widened Channel plus Heat Exchanger (5)
- Alternative 1: Existing Maintenance (4)

General comments on the DRAFT *Alternatives Considerations Memo* and individual statements of support for each alternative are summarized below.

### General Memo Comments:

- Pete Marshall (Eastside Audubon)
  - o Would like to see restrictions placed on motorized boats in the TZ and would like this recommendations included in the Alts Memo
  - o Staff Response: King County does not have regulatory jurisdiction on this state issue, however the suggestion could be noted in the memo
- Dwight Martin (Sammamish Homeowners Association)
  - o Likes Table 1 (# days above lake levels for each Alt)
  - o An adjustable weir would be good for any alternative

# WILLOWMOOR FLOODPLAIN RESTORATION PROJECT

## STAKEHOLDER ADVISORY COMMITTEE

- Blockage in upper portion of TZ low flow channel actually helped maintain higher summer lake levels, but is still problematic during high flows.
- Marty Nizlek (Washington Sensible Shorelines Association)
  - Maintenance must continue, continue monitoring effectiveness
  - County needs to do work to “reactivate” Corps certification
  - From ’65 – ’95, averaged 67 days above 27.0
  - 2011 maintenance agreement should be updated
  - Keep lake owner group involved, provide definition to the ongoing public process

Statements of Support for Preferred Alternative		
Preferred Alt	SAC Member	Comments
1	Charles Ifft (USACE)	<ul style="list-style-type: none"> <li>● Likes Alt 1 because it is the Congressionally-approved facility and is:               <ul style="list-style-type: none"> <li>○ Most reliable/predictable</li> <li>○ Most cost effective for flood control</li> </ul> </li> <li>● Could widen the existing channel to increase conveyance</li> </ul>
1	Marty Nizlek (WSSA)	<ul style="list-style-type: none"> <li>● Agrees w/ Charles points</li> <li>● Thinks existing channel could be widened to achieve conveyance and lake level objectives</li> <li>● Other cost-effective modifications could improve this alternative</li> </ul>
1	Scott Sheffield (Gil Pauley’s Alternate)	<ul style="list-style-type: none"> <li>● Alt 4 thoughts               <ul style="list-style-type: none"> <li>○ Good habitat possibly, but is it cost-effective?</li> <li>○ Split flow problematic in low-flow years</li> </ul> </li> <li>● Strongly advocates dynamic flow control – already in a heavily altered system</li> <li>● Scott personally favors Alt 5, but he is acting as an alternate for Gil Pauley who prefers Alt 1</li> </ul>
1	Nancy Meyers	<ul style="list-style-type: none"> <li>● Alts 4 &amp; 5 :               <ul style="list-style-type: none"> <li>○ too many unknowns</li> <li>○ too much O&amp;M</li> <li>○ too costly</li> </ul> </li> <li>● Spend FCD funding only on flood control projects and associated habitat improvements</li> <li>● If cold water is desirable find habitat entity to fund</li> </ul>
4	Jason Wilkinson (WRIA 8)	<ul style="list-style-type: none"> <li>● Consistent with WRIA 8 Plan goals including; floodplain reconnection, pools, wood</li> <li>● 60% design support by SRFB through grant</li> <li>● Further consideration of high volume cold water solutions</li> </ul>
4	Christa Heller	<ul style="list-style-type: none"> <li>● Has best physical habitat improvements</li> </ul>

# WILLOWMOOR FLOODPLAIN RESTORATION PROJECT

## STAKEHOLDER ADVISORY COMMITTEE

	(WDFW)	<ul style="list-style-type: none"> <li>• Important for WDFW <ul style="list-style-type: none"> <li>○ Weir modifications</li> <li>○ Improved fish passage</li> <li>○ Adaptive management for entire project site</li> </ul> </li> <li>• Increase cold water at the reach and river scale (if possible and feasible – further investigation is encouraged).</li> </ul>
4	Heather Khan / Dave Garland (WADOE)	<ul style="list-style-type: none"> <li>• Harder to shade a wider single channel (DG)</li> <li>• Pumped GW simple, low maintenance (DG)</li> <li>• Doesn't like deep lake withdrawal because of low DO (HK) [Staff note: a low cost mechanical or passive aerator is proposed to resolve this issue.]</li> </ul>
4	Paul Bucich (Bellevue)	<ul style="list-style-type: none"> <li>• Bellevue does not have a formal position yet on this project, this is Paul's personal technical feedback.</li> <li>• Concerned w/ heat exchanger: <ul style="list-style-type: none"> <li>○ Lots of flow to manage, efficacy questions</li> <li>○ Requires fish screens</li> <li>○ High O&amp;M</li> <li>○ Big footprint</li> <li>○ Better if gravity fed</li> <li>○ Concern w/ warm zone between withdrawal and discharge points</li> </ul> </li> <li>• Likes pumped GW (works on other projects, reliable, inexpensive)</li> </ul>
4	Greg Helland (SODA)	<ul style="list-style-type: none"> <li>• Best for dogs and habitat</li> <li>• Most improvement to Park users experience</li> </ul>
4	Peter Marshall (Eastside Audubon)	<ul style="list-style-type: none"> <li>• More habitat</li> <li>• Improves poorly used area</li> <li>• Side channel benefits from Tosh Cr and pumped GW during low flow periods</li> <li>• Likes additional wetland habitat</li> </ul>
4	Michael Hobbs (Friends of Marymoor Park)	<ul style="list-style-type: none"> <li>• Better passive recreation</li> <li>• Better habitat</li> <li>• Concern: loss of willow buffer in TZ (both Alts 4 &amp; 5)</li> <li>• Prefers to widen TZ but leave willow buffer in place</li> </ul>
4	Jeanne Justice (Redmond)	<ul style="list-style-type: none"> <li>• Best habitat and best flood control</li> <li>• Connects with Tosh Cr</li> <li>• Pumped GW reliable</li> <li>• Strongly opposed to Alt 1</li> </ul>
4	Susan Wilkins	<ul style="list-style-type: none"> <li>• Separation of uses w/ two channels good</li> </ul>

**WILLOWMOOR FLOODPLAIN RESTORATION PROJECT**  
**STAKEHOLDER ADVISORY COMMITTEE**

		<ul style="list-style-type: none"> <li>• Doesn't agree that side channel will be too slow and problematic</li> <li>• Likes GW cooling</li> </ul>
5	Bill Way	<ul style="list-style-type: none"> <li>• Alt 1 would be good with following <ul style="list-style-type: none"> <li>○ Backwater lobes</li> <li>○ Natural substrate</li> <li>○ Pools</li> <li>○ Hyporheic cooling</li> </ul> </li> <li>• Mechanized cooling bad</li> <li>• Strong concerns w/ flow split <ul style="list-style-type: none"> <li>○ Too many moving parts</li> <li>○ Side channel O&amp;M</li> <li>○ TZ fish stranding in low flow conditions with flow split</li> <li>○ Split Channel has fatal flaws</li> </ul> </li> <li>• 100% of water should be managed in single channel for habitat</li> </ul>
5	Paul Fendt	<ul style="list-style-type: none"> <li>• It makes water colder</li> <li>• Known that fish can move through</li> <li>• Low maintenance</li> <li>• Concerns w/ split channel <ul style="list-style-type: none"> <li>○ Too complex, lots of uncertainty</li> <li>○ Conditions in side-channel will likely degrade over time</li> </ul> </li> </ul>
5	Jonathan Frodge (Save Lake Sammamish)	<ul style="list-style-type: none"> <li>• Concerned splitting flows will cause higher water temps, so better to keep water in single channel – deeper, faster</li> <li>• FCD is supposed to support habitat work</li> </ul>
5	Dwight Martin (Sammamish Home Owners)	<ul style="list-style-type: none"> <li>• Better chance of single channel succeeding</li> <li>• Fundamentally doesn't like mechanized cooling <ul style="list-style-type: none"> <li>○ Energy use contrary to concept of improving habitat</li> <li>○ Better to use solar power</li> <li>○ Likes hyporheic cooling</li> </ul> </li> </ul>
5	Jim Mackey (Lk. Sammamish Yacht Club)	<ul style="list-style-type: none"> <li>• More cost effective</li> <li>• Keeps water in one channel, good for fish and recreation</li> <li>• Combined w/ pumped GW instead of heat exchange</li> <li>• Concerns w/ flow split for WQ, boats during low flows</li> </ul>

## **WILLOWMOOR FLOODPLAIN RESTORATION PROJECT**

### ***STAKEHOLDER ADVISORY COMMITTEE***

Although not present at the meeting, Anne Corley, representing the Sammamish Rowing Club, had stated in an email that her organization could support any of the alternatives, noting that none of them would interfere with the Club's ability to access the water.

### **Public Comment**

Reid Brockway asked about the County's ongoing plans to inform and engage the public in the project. He said the County should distribute a detailed plan describing how and when this communication would occur.

### **Thank You Certificates**

After the public comment, the group celebrated their hard work sharing cake as John Engel thanked the SAC for their work over the past two years, noting that the group had been very helpful in assisting the County with defining and evaluating the project alternatives. John announced that Craig Garric will be leaving the project, and is going to work in the Snoqualmie Basin for King County's Flood Control District. Craig also thanked the committee for their work. Kate Akyuz will be the Project Manager moving forward. Each member received a certificate of appreciation from King County and the King County Flood Control District.