Report

Water Rights Review of Water Supply Options
(Technical Report No. 4)

Prepared for

City of Hillsboro
Water Supply Alternatives Project

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Prepared by

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Acronyms and Abbreviations

ASR	aquifer storage and recovery
Beaverton	City of Beaverton
BiOP	Biological Opinion
cfs	cubic feet per second
City	City of Hillsboro
CSSWF	Columbia South Shore Well Field
CWS	Clean Water Services
DEQ	Oregon Department of Environmental Quality
Durham	City of Durham
GSI	GSI Water Solutions, Inc.
HCP	habitat conservation plan
IR	Initial Review
JWC	Joint Water Commission
mgd	millions of gallons per day
Newberg	City of Newberg
ODFW	Oregon Department of Fish and Wildlife
OWRD	Oregon Water Resources Department
PFO	Proposed Final Order
Port	Port of Portland
Portland	City of Portland
PSI	potential for substantial interference (with surface water)
RM	river mile
Salem	City of Salem
TBWSP	Tualatin Basin Water Supply Project
TVID	Tualatin Valley Irrigation District
TVWD	Tualatin Valley Water District
USACE	U.S. Army Corps of Engineers
USBOR	U.S. Bureau of Reclamation
WMCP	water management and conservation plan
WRWC	Willamette River Water Coalition
WTP	water treatment plant
WWTP	wastewater treatment plant

Executive Summary

GSI Water Solutions, Inc. (GSI), developed a technical report (Technical Report No. 4) to provide a water rights review of water supply options being considered by the City of Hillsboro (City). Seven main options have been identified as potential opportunities to obtain addition water supply for the City's future water needs.

There are several alternatives, from a water rights perspective, for implementing most of the identified options. For each alternative, GSI has explained the applicable water right process, source availability, and the impact of existing water rights on the City's ability to obtain water. GSI also has described potential conditions that the Oregon Water Resources Department (OWRD) could impose through the relevant water right process, the expected reliability of the proposed water source, and the potential risks for each alternative. Finally, GSI included a discussion of the relevant timelines for the water right processes at issue and other issues that the City should consider.

The following provides an abbreviated summary of GSI's assessment of the water supply options under consideration and the various water right process alternatives for implementing these options. Table ES-1 includes a summary of GSI's evaluation of each of the above-described review criteria.

Willamette River at Wilsonville Option

The first option considered was diverting surface water from the Willamette River near the City of Wilsonville. The City could implement this option by applying for a new water right for "live flow" from the Willamette River, acquiring an existing water right and modifying it through the "transfer" or "permit amendment" process to allow the City to use the right for municipal purposes, or contracting for stored water from federal storage projects.

For an application for "live flow" from the Willamette River, the OWRD currently would find that water was available for the use, but could impose conditions allowing diversion only when certain flows needed for fishery resources were met at the Salem gage.

Acquiring an existing water right also appears to be a viable alternative for implementing the Willamette River at Wilsonville Option. According to OWRD data, there are 12 upstream water rights authorizing the use of 40 cubic feet per second (cfs) or more. The City would need to identify a willing seller or partner.

There is, however, not currently water available for the third alternative. The federal government does not currently issue contracts for stored water from the Willamette Basin federal storage projects for municipal purposes.

Willamette River at Newberg Option

GSI reviewed the City's opportunities to obtain Willamette River water from a point of diversion near the City of Newberg. Like the Willamette River at Wilsonville Option, the City could implement this option by applying for a new water use permit or acquiring an existing water right. The additional alternative considered for obtaining water at a point near Newberg is to implement a water right exchange with the Tualatin Valley Irrigation District (TVID).

The alternatives to apply for a new water right or acquire an existing water right were found to be the same as those for the Willamette River at Wilsonville Option.

For the exchange alternative, the OWRD has a water right process to allow the holder of a certificate to exchange water sources with a permit holder. The TVID, however, would need to be a willing participant in the exchange process. In addition, federal review and approval processes, including environmental impact review under the National Environmental Policy Act (NEPA) and consultation under the Endangered Species Act (ESA), likely would be required because a portion of TVID's water supply is from a federal storage project (Scoggins Reservoir). Further, OWRD may conclude that the exchange process is not available to water rights evidenced by a permit, rather than a certificate.

As an alternative to the exchange process, TVID could obtain a new water right to use stored water from the Willamette Basin storage projects and the City would enter into an agreement with TVID to gain access to stored water from Scoggins Reservoir that TVID would "replace" with water from the Willamette Basin storage projects.

Tualatin Basin Water Supply Project Option

GSI also considered opportunities for the City to obtain water through the Tualatin Basin Water Supply Project (TBWSP). GSI reviewed the TBWSP application to store additional water in Scoggins Reservoir, and the water right that would be required to use the additional stored water. GSI also considered other Joint Water Commission (JWC) Tualatin Basin live flow water rights.

The TBWSP's storage application requested authorization to store an additional 60,000 acre-feet in an enlarged Scoggins Reservoir. In its initial review, the OWRD found water to be available for storage from Scoggins Creek in January, and from the Tualatin River from November through May. A resulting storage permit likely will have conditions to protect flows for fish in Scoggins Creek and the Tualatin River. A right to use the stored water likely would be issued without onerous conditions.

GSI's assessment of existing JWC water rights found that Scoggins Creek has a limited amount of water available for use under the JWC's Permit S-50879, which allows the use of up to 75 cfs

during non-peak season months. The Tualatin River, however, routinely has 75 cfs available for additional appropriation during non-peak season months and a new water right from the Tualatin River may be a good opportunity to supplement non-peak season supply.

City of Portland Option

GSI considered the opportunities for obtaining water through a regional water sales agreement with the City of Portland (Portland). Both Portland's groundwater and surface water rights were reviewed as potential sources of additional supply.

Based on information in Portland's water management and conservation plan, Portland's existing groundwater rights appear to provide an insufficient additional supply to meet Hillsboro's future demands. Portland's surface water rights appear to provide sufficient supply and may provide an opportunity to meet Hillsboro's water supply needs. However, Hillsboro would need to negotiate pricing and any other conditions with Portland to access this water.

Northern Groundwater Option

Under this option, the City would obtain groundwater from the Sauvie Island area and convey it to the City's service area for municipal use. Water right alternatives for implementing this option include applying for a new groundwater use permit, acquiring an existing surface water or groundwater right and modifying it through the "transfer" or "permit amendment" process to allow the City to use groundwater for municipal purposes.

The reliability of a new groundwater right likely would be dependent on its proximity to surface water. If the OWRD determined that the proposed use of groundwater was hydraulically connected to surface water and would have the "potential for substantial interference with surface water" in the Columbia River, the agency likely would include permit conditions to protect fishery resources in the Columbia River. These conditions could reduce the City's ability to divert groundwater during the summer months.

The City potentially could acquire an existing surface water right and "transfer" it to allow the diversion of groundwater at the City's proposed wells in the Sauvie Island area. The geology in the area, however, appears to preclude the implementation of this option.

Finally, the City could acquire an existing groundwater right and modify it to allow the diversion of groundwater at the City's proposed wells in the Sauvie Island area. The process would differ slightly depending on whether the City acquired a water right certificate or a municipal water use permit. Both types of groundwater rights appear to be available, although the City would need to identify a willing seller or partner.

Durham Option

The sixth option under consideration is to obtain water from the Tualatin River at a location near the City of Durham (Durham). This option potentially could be implemented through several water right processes. The City could obtain a new "live flow" water use permit from the Tualatin River. The City also could obtain a new water use permit for treated effluent. Finally, the City could obtain authorization to use treated effluent through the reclaimed water registration process.

The OWRD currently would find that water was available for a new "live flow" water use permit from a point of diversion at Durham for municipal use from November through April. Thus, it would not provide water during the high demand period of the year.

Alternatively, it appears that the City could apply for a new water use permit to use future treated effluent from Clean Water Services (CWS). Both the Oregon Department of Fish and Wildlife (ODFW) and the Oregon Department of Environmental Quality (DEQ) could provide comments on the City's application as part of OWRD's "Division 33" additional public interest review process. These agencies could recommend denial of the application or conditions limiting the use of water under the discharge permit to protect flows and water quality for fish.

Finally, the City potentially could file a reclaimed water registration with OWRD for the use of treated effluent from CWS for municipal purposes. To implement this option, DEQ would need to include this "reuse" of water in CWS's discharge permit. According to OWRD staff, DEQ will not include reuse of effluent in the permit if the water will be discharged into a waterway. As a result, it appears this option could be implemented only if the treated effluent were conveyed via a pipe.

Aquifer Storage and Recovery Option

The final option considered was the development of a new aquifer storage and recovery (ASR) project. The City would need to obtain a new ASR limited license to implement this option. The City could use its existing water rights as the water source for its ASR project. This option is being explored in more detail under the JWC ASR Phase I Project currently underway.

Alternative	Water Right Process	Source Availability	Existing Water Rights	Conditions	Reliability	Risks	Timelines for Water Right Process	Other Issues
Willamette River at Wilsonville Option								
New Water Right	Water right application	Water available year-around: 614 cfs in Aug. to 14,600 in January, according to OWRD database	Considered in water availability	Expect condition to maintain fish flow targets at Salem Potential water quality conditions	Due to <u>current</u> management of federal projects, relatively reliable.	• Third party protests possible • More stringent conditions possible • Secondary water rights to protect stored water instream • Future management of federal storage projects could result in target flows not being met	1 year (without protest) If a protest is filed - 2 to 5 years.	Need to understand WRWC governance structure for existing Willamette River treatment plant
Acquire Existing Water Right	Transfer for certificates	7 upstream certificates greater than 40 cfs	Existing water rights are not expected to affect a transfer	No additional conditions beyond those in existing right	Relatively reliable – dependent on original right	Third party protests possible	8 months to 1 year	Identify willing seller or partner. Negotiate MOU/IGA and cost
	Permit amendment for municipal use permits	5 upstream municipal permits greater than 40 cfs	Existing water rights are not expected to impact a permit amendment	No additional conditions beyond those in existing right, including extensions	Relatively reliable - dependent on original right	• OWRD could interpret the regulations differently and deny application • Could be difficult to obtain certificate at new place of use in the future	6 to 8 months	Identify willing seller or partner Negotiate MOU/IGA and cost Potentially participate in permit extension process
Federal Storage	Contract from USACE and new secondary use water right	USACE is not currently issuing contracts for M&I from Willamette Basin federal reservoirs	N/A	N/A – but if new water rights became available, unclear if the same as for new water right above	If a water right could be acquired, reliability dependent on water right conditions and contract conditions	If a contract/ water right could be acquired: • Cost • Reliability • Bi-Op conditions	N/A (Will depend on outcome of M&I contracting program with federal agencies)	N/A

Alternative	Water Right Process	Source Availability	Existing Water Rights	Conditions	Reliability	Risks	Timelines for Water Right Process	Other Issues
Willamette River at Newberg Option								
New Water Right	Water right application	Water available year-around: 614 cfs in Aug. to 14,600 in January according to OWRD database	Considered in water availability	Expect condition to maintain minimum fish flows at Salem Potential water quality conditions	Due to <u>current</u> management of federal projects, relatively reliable	• Third party protests possible • More stringent conditions possible • Secondary water rights to protect stored water instream • Future management of federal storage projects could result in target flows not being met	1 year (without protest) If a protest is filed - 2 to 5 years	N/A
Acquire Existing Water Right	Transfer for certificates	7 upstream certificates greater than 40 cfs	Existing water rights are not expected to affect a transfer	No additional conditions beyond those in existing right	Relatively reliable - dependent on original right	Third party protests possible	8 months to 1 year	Identify willing seller or partner Negotiate MOU/IGA and cost
	Permit amendment for municipal use permits	4 upstream municipal permits greater than 40 cfs	Existing water rights are not expected to impact a permit amendment	No additional conditions beyond those in existing right, including extensions	Relatively reliable - dependent on original right	• OWRD could interpret the regulations differently and deny application • Could be difficult to obtain certificate at new place of use in the future	6 to 8 months	Identify willing seller or partner Negotiate MOU/IGA and cost Potentially participate in permit extension process
Water Right Exchange with TVID	Exchange TVID water right for Willamette River water right (after obtaining a water right permit on Willamette River) OWRD staff have, however, recently indicated that an exchange may require two certificates	TVID has a contract for use of BOR's existing water right Water is available on the Willamette according to OWRD database	OWRD will not allow exchange if it would adversely affect existing water users	No additional conditions on Willamette River water right but additional conditions on exchange possible	TVID's water supply appears reliable	• WRD staff may conclude that an exchange requires two certificates • Third party may submit comments and request a public hearing • May not be able to meet exchange criteria • Additional federal review and approval may be required	8 months to 1 year	TVID would need to be willing applicant for the exchange

Alternative	Water Right Process	Source Availability	Existing Water Rights	Conditions	Reliability	Risks	Timelines	Other Issues
Agreement with Tualatin Valley Irrigation District	TVID - Water right application and/or possible contract with USBOR City – agreement with TVID	Stored water is available	Existing water rights are not expected to affect this option	Stored water-unclear if the same conditions for live flow described above would apply	TVID -Reliability dependent on water right conditions and contract conditions City-TVID's water supply appears reliable	• Third party protests possible • Conditions could reduce reliability • Process for City to access TVID's stored water could allow third party protests	TVID - 1 year (without protest); if a protest is filed - 2 to 5 years City- will depend on process	TVID will need access to a point of diversion on Willamette River City will likely need a new contract from USBOR
Tualatin Basin Water Supply Project Option								
Existing Application (Storage)	Water right application	OWRD determined water available from Scoggins Creek in January, and from the Tualatin River Nov. through May	Considered in water availability	Will be determined in collaborative environmental process, but expect bypass flow condition for Scoggins Creek and a target flow for Tualatin River	Reliability will depend on conditions and outcome of modeling currently under way by MWH	Third party protests possible	1 year (without protest) If a protest is filed—2 to 5 years	Relationship to JWC water use permit for off-season use of Scoggins Creek
Secondary Application	Water right application	Stored water will be available if storage permit issued	Not relevant for right to use stored water	No onerous conditions expected	Reliability will be based on storage right and conditions	Third party protests possible, but less likely	1 year (without protest) If a protest is filed—2 to 5 years	N/A
Permit S-50879 for 75 cfs from Scoggins Creek	N/A – existing permit	75 cfs frequently unavailable Oct.--May	Existing right to store water in Scoggins Reservoir reduces available water	Bypass flow on Scoggins Creek Subordinate to fill schedule for Scoggins Reservoir	Not very reliable		N/A	
New Water Right from Tualatin River	Water right application	75 cfs frequently available Dec. --April	Considered in water availability	Expect target flow, and peak and ecological flow conditions	Relatively reliable	Third party protests possible	1 year (without protest) If a protest is filed—2 to 5 years	
City of Portland								
Bull Run	Agreement with City of Portland	Bull Run capacity for use by other entities of approx. 126 cfs estimated for 2028 based on information in WMCP	N/A	N/A	Reliability likely related to agreement	N/A	unknown	Need to negotiate pricing and any other conditions
Groundwater	Agreement with City of Portland	No expected groundwater capacity for use by other entities because provides Portland with back-up for Bull Run		Undeveloped portions of rights subject to fish flow targets on the Columbia River	Capacity likely insufficient to meet additional supply needs	N/A	unknown	Potential water quality issues

Alternative	Water Right Process	Source Availability	Existing Water Rights	Conditions	Reliability	Risks	Timelines	Other Issues
Northern Groundwater Option								
New Groundwater Permit	Water right application	50 to 100+ mgd of groundwater available	Interference could occur –magnitude depends on amount of appropriation	If found to have potential for substantial interference with surface water, would expect conditions to protect surface water flows. Conditions would depend on whether affecting Columbia R. or Multnomah Channel.	Reliability dependent on conditions Conditions to protect fish flows on Columbia River could significantly reduce reliability	Third party protests possible.	1 year (without protest) If a protest is filed—2 to 5 years	
Acquire Existing Groundwater Right	Transfer application	21 groundwater certificates in study area	Not expected to impact change	No additional conditions beyond those in existing right	Reliability dependant on original certificate	Third party protests possible	8 months to 1 year	Need to find a willing seller and agree on price
	Permit amendment for municipal use permit	4 groundwater permits for municipal use in study area	Not expected to impact change	No additional conditions beyond those in existing right, including extensions	Reliability dependant on original permit	• OWRD could interpret the regulations differently and deny application • Could be difficult to obtain certificate at new place of use in the future	6 to 8 months	Identify whether Port of Portland would be seller or partner Negotiate contract and cost
Acquire Existing Surface Water Right	Surface water to groundwater transfer	Option not feasible due to local geology	--	--	--	--	--	--

Alternative	Water Right Process	Source Availability	Existing Water Rights	Conditions	Reliability	Risks	Timelines	Other Issues
Durham Option								
New Water Right from Tualatin River	Water right application	Water available from Tualatin River only December through April according to OWRD database	Existing water rights are considered in OWRD's water availability and result in water not being available May through November	Conditions to protect flow for listed fish expected	Would not provide water supply during high-demand times of the year		--	--
New Water Right from Treated Effluent	Water right application	The future peak season annual average daily discharge is projected to be 39.8 cfs in 2025.	Existing water rights are considered in OWRD's water availability but may not affect this application	Difficult to predict , but ODFW and DEQ could recommend conditions to protect listed fish	Dependent on the amount of effluent available and any conditions on the permit	• Third party protests possible • Numerous unknown issues	1 year (without protest) If a protest is filed—2 to 5 years	TVID approval needed because it has a right of first refusal for effluent
Reclaimed Water Registration for Treated Effluent	Reclaimed water registration	The current peak season average daily discharge for all plants is calculated to be 73.3 cfs. 10.4 cfs may be "spoken for" in CWS permit.	May be notified and have opportunity to demonstrate use will impair their water right	N/A	Dependent on the amount of effluent available	• DEQ may not include reuse in discharge permit if water is to be released into Tualatin River. As a result, process could not be used. • Affected water right holders may be able to object • CWS may object to reduced dilution flows • Ability to meet criteria unlikely - DEQ must determine it will improve water quality in receiving stream	9 months to 1 year	TVID approval needed because it has a right of first refusal for effluent

1. Introduction

GSI Water Solutions, Inc. (GSI), under a contract with Black & Veatch Corporation, has conducted a water rights review for several water supply options for the City of Hillsboro (City or Hillsboro). This is Technical Report No. 4 of the City's Water Supply Alternative Project.

This report is organized as follows:

- **Section 1**: Introduction
- **Section 2**: Description of the Willamette River at Wilsonville Option
- **Section 3**: Description of the Willamette River at Newberg Option
- **Section 4**: Description of the Tualatin Basin Water Supply Project Option
- **Section 5**: Description of the City of Portland Option
- **Section 6**: Description of the Northern Groundwater Option
- **Section 7**: Description of the Durham Option
- **Section 8**: Description of Aquifer Storage and Recovery Option

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2. Willamette River at Wilsonville Option

Under this option, the City of Hillsboro (City) would divert surface water from the Willamette River at a point of diversion near the City of Wilsonville and at or near the existing water treatment plant (WTP) (Willamette River WTP). (The following water rights analysis would be the same whether Hillsboro would use the existing facility or a facility slightly upstream or downstream from that location.) The diversion would be authorized by a new water use permit, acquiring an existing water right, or obtaining a contract and water right for the use of water stored in the Willamette Basin federal storage projects.

2.1 New Water Use Permit

Under this alternative, the City would obtain a new surface water permit authorizing the diversion of water from the Willamette River at or near the Willamette River WTP.

Process to Obtain a New Water Right: The City would apply to the Oregon Water Resources Department (OWRD) for a new water use permit authorizing the use of surface water from the Willamette River for municipal purposes within its service area. OWRD reviews permit applications to determine whether there is water available for the proposed use, the proposed use is consistent with the applicable basin program rules, the proposed use would cause injury to existing water rights, and the proposed use is consistent with other rules of the Oregon Water Resources Commission.

Source Availability: According to OWRD's online water availability database, water is available from the Willamette River near Wilsonville during all months of the year at 80 percent exceedance. (OWRD uses an 80 percent exceedance standard to determine whether water is available for a new live flow water right. In other words, after considering existing water rights, OWRD considers whether water is available for the proposed new use 80 percent of the time.) The net water available in the Willamette River at the 80 percent exceedance level ranges from 614 cubic feet per second (cfs) in August to 14,600 cfs in January. Appendix A contains the water availability analysis for the Willamette River above the Molalla River. OWRD's water availability calculations could change, however, if stored water released from the Willamette Basin federal storage projects were protected instream. (See *Impact of Existing Water Rights* discussion below.)

Basin Program: When processing applications for new water use permits, OWRD determines whether the proposed use is included in the relevant basin program rules as an allowable use (referred to as "classified" use) for the proposed water source. The Willamette Basin Program rules classify the mainstem of the Willamette River in this location for municipal purposes year-around.

Impact of Existing Water Rights: With the exception of unadjudicated pre-1909 claims for surface water, existing water rights are considered in OWRD's determination of water availability. Further, because of the significant flow in the Willamette River, water rights currently are not regulated to meet the needs of senior water users. A portion of the water flowing in the Willamette River during the peak demand (summer) months is water released

from the federal storage projects in the basin. Following issuance of the 2008 Willamette Project Biological Opinion (BiOp) regarding operation of the storage projects, the federal government is considering how much of this stored water is needed for federally listed fish, and how to protect that water instream. If the federal government obtains a water right to use the majority of the stored water for instream purposes to protect fish, stored water released from the federal storage projects could be protected for instream purposes. One approach to protecting these flows could be to convert minimum perennial streamflows to instream water rights. OWRD's minimum perennial streamflows for the Willamette River include live flow (or natural flow) and stored water components. (See the list of Willamette Basin Minimum Perennial Streamflows included in Appendix A.) The stored water components of these minimum perennial flows have not been included in OWRD's water availability calculations. If these flows were converted to instream water rights, it would reduce the water available for new uses. As a result, OWRD could find that water was not available for new water rights during portions of the year and water users with live flow rights from the Willamette River potentially could be regulated in favor of the federal government's use of the stored water for instream purposes. While this scenario is difficult to predict, and perhaps is unlikely, it needs to be considered as a potential risk for this option.

Conditions: As part of its review of new water right permit applications, OWRD is required to consult with an interagency review team that includes the Oregon Department of Fish and Wildlife (ODFW) and the Oregon Department of Environmental Quality (DEQ) to consider the impacts of the proposed use on listed fish species. This process is referred to as a Division 33 review.

GSI is aware that ODFW has concerns about new appropriations of water from the Willamette River affecting fish listed as sensitive, threatened, or endangered under the state and federal Endangered Species Acts. Based on ODFW's recommendations, OWRD recently proposed to condition new water rights for use of water from the Willamette River to prohibit diversion of water when flows are less than identified flows needed to protect listed fish. These flows are measured at the gage at the City of Salem (Salem). Appendix B contains a map that shows the location of the Salem gage and the proposed point of diversion for the Willamette River at Wilsonville Option. It is likely that the City would receive the same or similar conditions allowing diversion only when the recommended fish flow targets are met at the Salem gage. Table 2-1 shows these recommended fish flow targets.

Table 2-1. ODFW's Recommended Fish Flow Targets on the Willamette River (measured at Salem).

Month	Cubic Feet per Second
July 1—October 31	5,630
November 1—March 31	6,000
April 1—April 15	15,000—19,200*
April 16—April 30	17,000
May 1—May 31	15,000
June 1—June 15	12,600
June 16—June 30	8,500

* Oregon Water Resources Department (OWRD) uses the lower number in this range.

To date, DEQ's official comments submitted through the Division 33 process have complimented the "flow targets" submitted by ODFW. However, we understand that DEQ may in the future provide comments suggesting more onerous conditions to protect water quality, such as mitigation to offset temperature impacts.

Reliability: A permit authorizing the use of water from the Willamette River should be relatively reliable. The reliability of such a permit likely would be limited only by the above-described condition limiting diversions to meet the target flows. Salem gage records for 1970 to 2005 show that river flows often have been insufficient to meet these flow targets during some portions of the year. In particular, the target flows during late spring and early summer are the flows that are most often not met. For instance, the available stream gage records indicate that flow targets for June 1—June 15 were not met on at least 1 day in 69 percent of the years, and target flows for May 16—31 were not met on at least 1 day in 60 percent of the years. As shown in Table 2-2, river flows were less frequently below flow targets during early spring and late summer, and river flows always met or exceeded the flow targets during September, October, November, and March. Table 2-2 was developed as part of the Tualatin Valley Water District's (TVWD) 2007 permit extension for Permit S-49240 (now held by the Willamette River Water Coalition [WRWC]) and has some slight discrepancies with the target flows for November through April ultimately recommended by ODFW. Nonetheless, it is reproduced here (with permission from TVWD) to demonstrate that the high spring flow targets historically have not been met, but the targets in July through October appear to be less problematic.

Table 2-2. Willamette River Flows at Salem Gage Compared to ODFW Target Flows (October 1, 1970 – September 30, 2005).

Period	Standard (cubic feet per second)	Flow At or Below Standard	
		Number of Years with at Least One Occurrence	Percent of Years with at Least One Occurrence
October	5,630	0	0%
November	6,200	0	0%
December	6,200	2	5.9%
January	6,200	1	2.9%
February	6,200	1	2.9%
March	6,200	0	0%
April 1—April 15	15,000	9	26%
April 16—April 30	15,000	15	43%
May 1—May 15	15,000	18	51%
May 15-May 31	15,000	21	60%
June 1—June 15	12,600	24	69%
June 16—June 30	8,500	18	51%
July	5,630	3	8.6%
August	5,630	1	2.9%
September	5,630	0	0%

ODFW = Oregon Department of Fish and Wildlife.

Leading up to and since issuance of the 2008 BiOp, the U.S. Army Corps of Engineers (USACE) generally has managed the federal storage projects to meet these flow targets, as shown in Figure 2-1, which compares the river flows (blue) with the flow targets (pink). Figure 2-1 shows

that the target flows generally have been met during the last several years. Of course, there is no guarantee that the USACE will continue to manage its reservoirs in a manner that would cause the Salem target flows to be met.

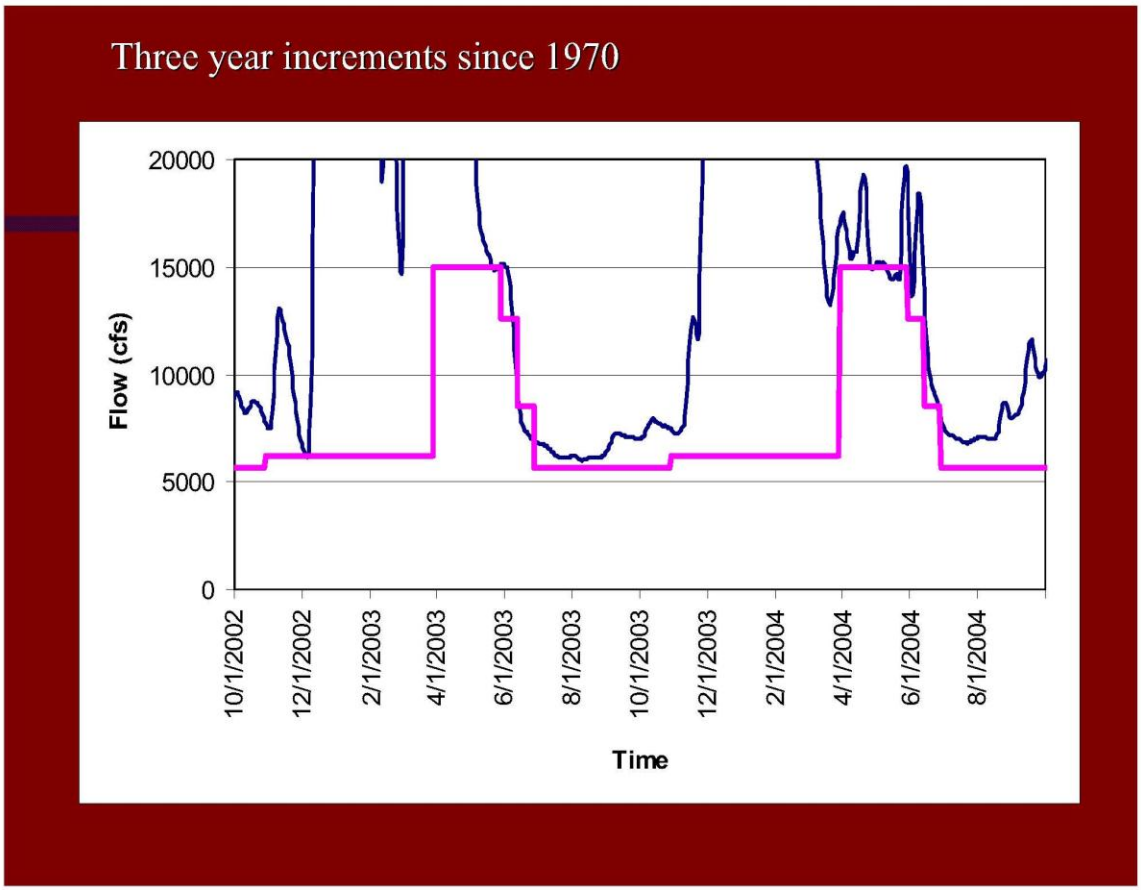

Figure 2-1. Comparison of Flows at Salem Gage and Fish Flow Targets. (Data source: this figure was included in a PowerPoint presentation developed by ODFW.)

Risks: There are several risks associated with this option. First, OWRD provides an opportunity for third parties to file protests to OWRD's proposed final order (PFO) for a water right application. The test for a new water right is whether the use would impair the public interest, which provides a broad basis for attack. A protest often can be resolved through negotiation and settlement, but can lead to an administrative hearing and judicial review. Protests can be expensive, especially if they are resolved through a hearing and judicial review. Although it is typically difficult to predict whether a protest will be filed, in this situation, the likelihood of a protest appears somewhat reduced on the basis of the resource protection conditions that likely would be included in a PFO issued for such an application, and the amount of water available in the Willamette River.

In addition, there is a risk that the resulting permit could have more stringent conditions than expected. Further, although the target flows for listed fish generally are met as a result of the

current management of the federal storage projects, this could change in the future. As a result, water rights with flow target conditions to protect fish could be regulated more frequently. Finally, the federal government could obtain a water right protecting instream stored water released from Willamette Basin federal storage projects. In that case, it could become much more difficult to obtain a new water use permit for the Willamette River, and existing water users potentially could be regulated in favor of the federal government's instream right.

Timeline: GSI would expect the City could receive a new water right permit within approximately 1 year after filing a permit application, assuming a third party does not file a protest. If a protest were filed, the permit process could take 2 to 5 years.

Other Issues: To use the existing diversion facility structure and WTP, the City likely would need to become a member of the WRWC or have an agreement with the WRWC and the City of Wilsonville. (Currently, WRWC members are the Cities of Tigard, Tualatin, and Sherwood, as well as the TVWD.)

2.2 Acquire an Existing Water Right

Under this alternative, the City would acquire an existing surface water right on the Willamette River or an upstream tributary. The right would be either a permit for municipal purposes or a water right certificate for any beneficial purpose. In either case, the right would need to be changed to allow diversion at or near the Willamette River WTP.

Process for a Permit Amendment: If the City obtained an existing municipal water use permit, it potentially could change the point of diversion through the permit amendment process. All other elements of the permit would remain the same. In other words, if the permit had conditions for an extension, the conditions also would apply to diversions of water at the new point of diversion. The permit amendment process does not allow the permit holder to change the character of use (designated beneficial use), and allows only the place of use to be changed to land that is contiguous to the existing place of use described in the permit. (By law, however, a municipality is allowed to provide water outside of the place of use authorized in its water right.) OWRD reviews permit amendment applications to determine whether the proposed change would cause injury to existing water rights. OWRD provides notice of permit amendments and accepts comments, but the permit amendment statute does not provide for "protests."

It is important to remember that to obtain a permit amendment, the holder must be in compliance with the terms and conditions of the permit, including timelines. As a result, a permit holder cannot request a permit amendment if the permit's development timeline has passed. The permit holder would need to apply for, and obtain, an extension of time before applying for a permit amendment.

Process for a Transfer: If the City obtained an existing water right certificate, it potentially could change the point of diversion, place of use, and the character of use (designated beneficial use), as needed, through the transfer process. All other elements of the water right would remain unchanged, such as the priority date and the authorized amount of water use. Existing

conditions on the water right also would remain, but OWRD could include additional conditions on the right to prevent the changes from causing injury to other existing water rights. OWRD reviews transfer applications to determine whether the proposed change would cause injury to existing water rights. OWRD provides notice of transfers and notices are placed in local newspapers. OWRD allows protests to transfers.

Process to Certificate a Water Right Following a Transfer or Permit Amendment: If the City obtained a certificated water right and changed the point of diversion, place of use, and character of use (if necessary), it should not be particularly difficult to obtain a water right certificate after the "changed" right was fully developed (construction completed and the water put to full beneficial use). If, however, the City obtained a permit and amended the permit to have a point of diversion at or near the Willamette River WTP, the process to obtain a water right certificate almost certainly would be more complex. As previously described, the place of use on the permit could not be changed to include the City's service area unless it was contiguous to the place of use on the existing permit. Consequently, when the water use was fully developed, the City's service area likely would not be included in the place of use in the certificate. Municipalities have statutory authority to provide water outside of the place of use identified in their water rights as long as certain criteria are being met, but this does not modify that place of use. The City would need to file a subsequent transfer application to include its service area in the place of use. After completing the transfer by demonstrating use of water at the new place of use (the City's service area), a certificate then could be obtained for the right that included the City's place of use.

Source Availability: OWRD queried its water rights database for water rights that authorize the use of 40 cfs or more from a point of diversion upstream from the Willamette River WTP. Based on the results of that search, GSI has identified seven water right certificates and five municipal water use permits fitting those criteria. Appendix C contains a table that identifies those certificates and municipal permits. It should be noted that the status of the certificates is not known. The non-municipal water right certificates would need to be evaluated for forfeiture resulting from non-use; it only takes an affidavit from a prospective opponent to launch a full-scale contested case hearing, so the potential for delay is there. Also, the status and the value of the permits currently are not known.

The identified permits include the WRWC Permit S-49240, which authorizes the use of 202 cfs and has a point of diversion at the Willamette River WTP. Consequently, this permit would not require a permit amendment if the City obtained authorization to divert water at this location. The City, however, would need to become a member of the WRWC to access this water right at this point of diversion.

Impact of Existing Water Rights: The impact of existing water rights comes into play in the context of the injury evaluation completed during OWRD's review of the transfer or permit amendment. Generally, moving a point of diversion downstream does not cause injury. Moving a point of diversion upstream typically requires a more thorough injury analysis. In this situation, because water is available to meet existing rights and currently there are no instream water rights in this portion of the Willamette River, moving a point of diversion upstream to this location likely will not be found to cause injury. The distance that a water

right could be moved upstream would depend on water availability, intervening water rights, and the potential for injury.

Conditions: Any existing conditions on the water right and any associated extension order would remain with the water right following the transfer or permit amendment process. For example, many existing irrigation water rights have seasonal limitations. As another example, the WRWC permit extension order contains conditions requiring permit holders to take several actions before initiating or expanding diversions of water under the permit. The permit holders must obtain OWRD approval on a water management and conservation plan (WMCP) and the plans must include additional sections pertaining to public education and voluntary conservation. Further, the permit holders must wait 60 days after approval of their WMCPs before diverting additional water. Use of water under the permit is subject to the fish persistence flows described in Table 2-2.

The other identified permits also will need extensions of time to allow complete development of the right and likely will receive conditions with similar fish persistence target flows.

In addition to the existing conditions, as part of the transfer process OWRD would include a condition stating that the amount of water that could be diverted at the new point of diversion would be limited to the amount available at the original point of diversion. If the existing minimum perennial streamflows were converted to instream water rights, OWRD might require streamflow monitoring and only allow diversion at the new point of diversion when the instream water right was met.

Reliability: Reliability would depend on conditions on the water right acquired and whether flow limitations existed at the original point of diversion.

Risks: There are several risks with this option. First, OWRD could interpret the applicable regulations differently and deny a permit amendment application. Second, for a transfer, a third party could file a protest, but protests are limited to addressing whether the transfer would cause injury. As a result, protests to transfer applications are relatively rare, and the risk in this case is low. For a permit amendment, a third party may request reconsideration of the final order, or appeal the final order to circuit court. The risk for such a challenge is increased in this case because it is unusual to request a point of diversion to serve a location not included in the authorized place of use. It is difficult to predict whether third parties would object to a transfer or permit amendment application without knowing which water right is proposed to be changed.

Timeline: The timeline for OWRD to process and approve a transfer application would be approximately 8 months to 1 year. A permit amendment would be expected to take between 6 and 8 months to complete. Additional upfront time would be needed to evaluate candidate water rights and to develop the necessary agreements.

Other Issues: To implement this option, the City would need to find a willing seller or partner. The City will need to negotiate a memorandum of understanding or intergovernmental agreement to document the transaction. And the parties will need to negotiate a mutually

acceptable price. For a water use permit, the City potentially could need to participate in the permit extension processes for the permit.

2.3 Contracting for Release of Water from Federal Storage Projects

Under this alternative, the City would obtain a contract and a new water right permit to use stored water from the Willamette Basin federal storage projects, and divert the water at the Willamette River WTP.

Process: To implement this option, the City would need to obtain a contract from the USACE, and would need to obtain a secondary water right from OWRD to "use" the stored water for municipal purposes. The USACE would need to perform environmental impact review under NEPA and consult with the federal fishery agencies under the ESA.

Source Availability: All of the water stored in the Willamette Basin Project reservoirs is for irrigation use, according to the water rights held by the U.S. Bureau of Reclamation (USBOR) for these reservoirs. USBOR issues contracts for the use of water from the Willamette Basin federal storage projects for irrigation purposes only. To date, the USACE has not issued contracts for any other purposes. OWRD will not issue a water right for use of this stored water for other than irrigation purposes until the water right has been modified and contracts are available.

Numerous Willamette Basin municipal water suppliers are participating in an effort to encourage the USACE to begin issuing contracts for stored water for municipal purposes at a feasible price. It is, however, too early in the process to predict whether this effort will ultimately be successful.

Conditions: If the City were able to obtain a contract and a water right to use the stored water in the federal projects, the water right likely would have conditions, but it is unclear if the conditions would be similar to those described for a new water right under this option. Use of the stored water also could be subject to "contract conditions" regarding the ability to interrupt water delivery of stored water for the contracted use.

Reliability: If the City could obtain a contract and a water right, the reliability of the water right would be dependent on the water right conditions and the "contract conditions."

Risks: If the City could obtain a contract and a water right, there would be several risks associated with this option. First, the cost of stored water for municipal and industrial purposes could be too high to make this option feasible. A group of municipal water suppliers is working with the USACE to address this issue, but it is too soon to predict the results of this effort. Further, the water right and contract conditions could cause the water right to be relatively unreliable. Finally, the required NEPA and ESA review could add significant delay, both for the performance of the review and potential litigation following.

3. Willamette River at Newberg Option

Under this option, the City would divert surface water at a point of diversion at approximately River Mile (RM) 50 on the Willamette River near the City of Newberg (Newberg). The City's diversion of water would be authorized by a new water use permit, an existing water right, or instituting an exchange with Tualatin Valley Irrigation District (TVID) after obtaining a new or existing water right.

3.1 New Water Use Permit

Under this alternative, the City would obtain a new surface water permit authorizing diversion of surface water from the Willamette River. Appendix D contains a map that shows the point of diversion for the Willamette River at Newberg Option. This option is essentially the same as the Willamette River at Wilsonville Option (see Section 2) to obtain a new water right. Both locations are in the same "water availability basin" for purposes of determining the amount of water available for appropriation and both locations likely would be viewed similarly by ODFW and DEQ regarding potential conditions. The discussions related to use of the Willamette River WTP and facilities, of course, would not be applicable.

3.2 Acquire an Existing Water Right

Under this alternative, the City would acquire an existing surface water right from the Willamette River or an upstream tributary. The right would be either a permit for municipal purposes or a certificate for any beneficial purpose. The right would need to be changed to allow diversion at the Newberg point of diversion. For the most part, this option would have the same considerations as the option to acquire an existing water right on the Willamette River at Wilsonville. The available existing water rights, however, would vary from that for the Willamette River at Wilsonville Option (see Section 2) because the WRWC permit would not be an identified water right upstream from the proposed Newberg point of diversion. Appendix E contains a table that identifies the certificates and municipal permits for the Willamette River at Newberg Option.

3.3 Water Right Exchange with Tualatin Valley Irrigation District

Under this alternative, the City would obtain either a new water right or an existing water right, as described above. The City then would enter into an exchange agreement with TVID whereby TVID would use Willamette River water under the City's water right, and the City would use Tualatin Basin water under the U.S. Bureau of Reclamation (USBOR) water right used by TVID. The infrastructure and preliminary conceptual designs for the exchange concept may need to consider the water needs of TVID customers withdrawing irrigation water directly out of the mainstem Tualatin River and not through the Springhill Pump Plant.

Exchange Process: OWRD has authority to allow some water right holders to use water from another source in exchange for supplying water in an equal amount to satisfy "prior appropriations from the other source" under some conditions. Holders of certificates (or a

Determination of Satisfactory Proof such as that obtained by TVID) may apply for an exchange if the applicant's source is sometimes insufficient; or better conservation could be accomplished. OWRD can approve an application for an exchange unless the exchange (1) would adversely affect other water users, (2) would be too difficult to administer, (3) would adversely affect the public interest, or (4) if sufficient water would not be available to replace the water to be used under the exchange.

OWRD staff has recently indicated that the exchange process may require both water right holders involved in an exchange to hold certificates. This interpretation of the exchange program would preclude the City from using the exchange process as described in this alternative. Further discussion of this alternative is provided in the event that OWRD concludes that it could process an exchange between a certificate and a permit.

Source Availability: TVID has an available water supply from live flow and stored water in the Tualatin Basin. Further, water is available from the Willamette River near Newberg during all months of the year at the 80 percent exceedance level, according to OWRD's online Water Availability Analysis.

Conditions: The exchange order could include any conditions OWRD considered necessary. Likely conditions could include enhanced water use and reporting requirements. Additional conditions would not be placed on the "new" Willamette River water use permit as part of the exchange process.

Reliability: TVID's source of water (live stream flow and stored water in Scoggins Reservoir) appears to be reliable. USBOR and TVID recently received a Determination of Satisfactory Proof from OWRD recognizing that TVID had fully developed the USBOR water right for irrigation, thus giving the water right additional certainty.

A water right from the Willamette River could be relatively reliable. As described in the reliability discussion regarding the new water right for the Willamette River at Wilsonville Option (see Section 2), the potential flow target conditions reduce the certainty of such a water right.

Risks: The City may not be able to meet the criteria required for an exchange, or OWRD could deny the application. Also, any person can submit comments to OWRD on an exchange. People submitting comments can request a public hearing. If the issues raised remain unresolved, the Oregon Water Resources Commission can initiate a contested case proceeding. Moreover, as described above, there is a risk that OWRD would conclude that an exchange can only occur if the water rights to be exchanged were both evidenced by a water right certificate.

This option appears to have risks beyond those related to water rights. Because some of the source water would be from Scoggins Reservoir (a federal storage project), additional federal evaluation requirements, such as NEPA and ESA, likely would be necessary. NEPA litigation has proved fertile ground for those seeking to stall a project, though agencies more often than not prevail.

Timeline: The expected timeline for an exchange is 8 months to 1 year. If comments are submitted, the process could take 2 to 5 years.

Other Issues: USBOR and/or TVID would need to be a willing applicant for the exchange process. There may be limited incentive for USBOR and/or TVID to request an exchange to obtain water under a conditioned permit instead of its secure Tualatin Basin source.

This alternative likely would require the City to enter into an intergovernmental agreement with USBOR and TVID to implement an exchange. Beyond the water right requirements, the agreement could trigger numerous federal contractual and environmental requirements, including NEPA review.

3.4 Agreement with Tualatin Valley Irrigation District

As an alternative to the exchange process described above, the City and TVID could enter into a water use agreement. Under this alternative, TVID could obtain a new water right and a contract to use stored water from the Willamette Basin storage projects. The City would enter into an agreement with TVID to gain access to the stored water from Scoggins Reservoir that TVID would "replace" with water from the Willamette Basin storage projects.

Process: To implement this option, TVID would need to obtain a contract from the U.S. Bureau of Reclamation (USBOR) and a secondary water right from OWRD to use the stored water from the Willamette Basin projects for irrigation purposes. The City would need to enter into an agreement with TVID and likely USBOR, and would need OWRD authorization to gain access to the stored water from Scoggins Reservoir. The USBOR contract would require NEPA review and ESA consultation.

Source Availability: Stored water is available from the Willamette Basin federal storage projects from a Willamette River point of diversion for new irrigation use. (All of the water stored in the Willamette Basin Project reservoirs is for irrigation use, according to the water rights held by the USBOR for these reservoirs.) However, TVID would also need a new irrigation contract from USBOR if it obtained a water right to use Willamette Basin project stored water. More research is needed on the availability of new contracts in light of the BiOp. If TVID used stored Willamette Basin project water for irrigation, additional stored water would be available from Scoggins Reservoir for municipal purposes.

Conditions: If TVID were able to obtain a contract and a water right to use the stored water in the federal projects, the water right likely would have conditions, but it is unclear if the conditions would be similar to those described for a new water right for live flow. Use of the stored water also could be subject to "contract conditions" regarding the ability to interrupt water delivery of stored water for the contracted use. If the City could obtain access to the stored water from Scoggins Reservoir, it is unclear what, if any, conditions would be placed on the City's use of this stored water. OWRD's ability to condition the water use would be dependent on the process used to gain access to this water.

Reliability: The reliability of TVID's "new" water right for irrigation would be dependent on the water right conditions. If TVID also obtained a contract from USBOR, "contract conditions" could also affect its reliability. If the City entered into an agreement with TVID and gained access to the Scoggins Reservoir stored water, the source of water appears to be reliable.

Risks: This alternative has some limited risks. Third parties can protest the issuance of new water use permits, although protests on permits to use stored water are relatively rare. Further, conditions in TVID's "new" irrigation water right, and potentially in its contract, could cause the water right to be less reliable. Depending on the process the City would use to access TVID's stored water, there may be opportunities for public involvement, including third party protests. Further, NEPA documentation may be challenged.

Timeline: GSI would expect TVID could receive a new water right permit within approximately 1 year after filing a permit application, assuming a third party does not file a protest. If a protest were filed, the permit process could take 2 to 5 years. The timeline for the City to access stored water from Scoggins reservoir would depend on the process.

Other Issues: TVID would need to obtain access to a point of diversion on the Willamette River and convey the water to its distribution system. The City would likely need a new contract from the USBOR to access stored water in Scoggins Reservoir.

4. Tualatin Basin Water Supply Project Option

Under this option, the City would obtain additional water supply from the Tualatin Basin. The additional water supply could be water stored in an expanded Scoggins Reservoir. An application for a permit to store this water currently is pending.

4.1 Tualatin Basin Water Supply Project

4.1.1 Water Right Application Filed

Members of the Tualatin Basin Water Supply Project (TBWSP) filed an application for a storage permit (Application R-86734) on December 21, 2006. The application requests a permit to store an additional 60,000 acre-feet of water from Scoggins Creek and the Tualatin River in an enlarged Henry Hagg Lake (Scoggins Reservoir) for multi-purpose use.[1] After raising Scoggins Dam, the TBWSP would store water from Scoggins Creek and water pumped into the reservoir from the Tualatin River from the Springhill pumping facility. The current "pump back" rate under consideration is 300 cfs. If the dam were raised by only 25 feet, the "pump back" rate would be reduced to 200 cfs.

On July 6, 2007, OWRD issued an initial review (IR) for the application with a favorable review. The IR noted that OWRD also must receive evidence of land use approval from Washington County before issuance of a permit. Furthermore, the IR indicated that before beginning construction of the project or issuance of a permit, dam designs and specifications must be submitted to, and approved by, OWRD.

Processes to Obtain a Water Right: The next step in the water right application process is for OWRD to issue a PFO. Before OWRD can issue the PFO, it must consult with ODFW and DEQ under the Division 33 interagency review process. OWRD then will issue a PFO and final order. (The opportunity to protest the PFO is described under the "Risks" section.)

Source Availability: In its IR, OWRD found that water was available for appropriation at 50 percent exceedance from Scoggins Creek during January and from the Tualatin River during the period from November 1 through May 31. (OWRD typically uses the 50 percent exceedance standard to determine whether water is available for water right applications to store water. This standard considers whether the requested water is available, after considering existing water rights, 5 years out of 10.) GSI is aware that staff members from Clean Water Services (CWS) performed a preliminary analysis using OWRD data and determined that a rate of 300 cfs was available from December through April at 50 percent exceedance from the Tualatin River at the Springhill Pump Plant.

Basin Program: The IR also found that the proposed use (storage for multipurpose use) was allowed by the Willamette Basin Program.

[1] Information provided by the City indicates that raising the dam 40 feet would allow the reservoir to hold an additional 52,550 acre-feet, and raising the dam 20 feet would hold an additional 24,300 acre-feet.

Existing Water Rights: Existing water rights were considered in OWRD's analysis of water availability for this application.
Conditions: Under the Division 33 review process, ODFW and DEQ will recommend conditions on the water right to protect listed fish. These conditions could be intended to protect water quality and peak and ecological flows, or to create bypass flows. Although GSI understands that these issues will be addressed through the collaborative environmental permitting process for the storage project, it is worth noting that in the extension process for the Joint Water Commission's (JWC) Permit S-50879, ODFW identified a target flow for the persistence of fish (an extension-related standard) in the Tualatin River from October 1 through May 31 based on a *2006 Draft Fish Habitat Technical Report* prepared by R2 Resource Consultants for the TBWSP. Further, ODFW typically provides comments related to peak and ecological flows when the applicant requests more than the amount of water available at 50 percent exceedance, the reach has outstanding fishery or aquatic values, or the storage project will take a significant portion of elevated flows, even though water is available. In at least one instance, ODFW has recommended conditions to protect high flows determined to be necessary to maintain fish habitat and meet the flow needs of fish protected under the Endangered Species Act. In that case, ODFW recommended no diversion be allowed during the "two-year recurrence interval" high flow event. For Scoggins Creek, GSI also is aware that ODFW recommended by-pass flows as conditions on the JWC's permit S-50879, which was issued in 1990.

Reliability: The reliability of this water right to store water will depend on the conditions included in the permit and will be described in further detail in the results of the modeling project with the consulting firm MWH currently underway. GSI understands the modeling project will evaluate the overall project fill reliability related to pump back availability, potential conditions such as peak and ecological flows, by-pass flows, and natural flow water right permit reliability for the JWC.

Risks: When OWRD issues its PFO for this water right application, it will provide notice to the public. Third parties will have an opportunity to file protests.

Timelines: A new water right application typically would take approximately 1 year to process. The timeline for this application will depend in part on the time necessary to complete the collaborative environmental permitting process. If the application was protested by a third party, the process could take 2 to 5 years.

4.1.2 "Secondary" Water Right Required for Use of Stored Water

Process to Obtain a "Secondary" Water Right: To use the water stored in an expanded Scoggins Reservoir, members of the TBWSP would need to apply for and receive a "secondary" water right. This water right would authorize the use of the additional stored water. It is our understanding that a secondary water right application has not yet been filed. OWRD's review criteria for a secondary water right are the same as for those of a live flow right, but the process typically is somewhat easier because the water at issue already has been appropriated from the stream for storage and conditions already have been placed on the storage permit.

Source Availability: OWRD would find that stored water was available for the use if there were a water right to store water for the TBWSP.

Basin Program: OWRD would find that the Willamette Basin Program allows the use of stored water for any beneficial purpose.

Existing Water Rights: OWRD considers existing water rights in its water availability analysis completed during the water right permit application review process. Additionally, because the source for this right would be stored water under the TBWSP storage right, there would not be other water rights sharing that source.

Conditions: OWRD would consult ODFW and DEQ as part of the Division 33 review. GSI generally would not expect the agencies to recommend onerous permit conditions on the use of stored water. Such conditions typically are placed on the storage right. In this case, however, the agencies could recommend conditions to address impacts to Scoggins Creek below the dam if the stored water were to be transported to the Springhill WTP through a pipe. Again, GSI expects this issue would be addressed through the collaborative environmental permitting process.

Reliability: The reliability of this secondary water right will depend on the conditions placed on the storage right and the amount of water stored in the expanded reservoir.

Risks: Third parties would be allowed to file protests to the application, although the risk of a protest to the secondary right is likely less than the possibility of a protest to the reservoir (primary storage) permit.

Timeline: The water right application process typically takes 1 year if a third party does not file a protest. If a protest were filed, the process could take 2 to 5 years.

4.2 Other JWC Tualatin Basin Live Flow Water Rights

The JWC has 115 cfs in certificated live flow water rights, which are presented in Appendix F. Most of these rights often are regulated off in May or early June in favor of senior water rights on the Tualatin River. The JWC also holds an existing permit (Permit S-50879) that authorizes the use of 75 cfs from Scoggins Creek only during the non-peak season (October through May). As described in its 2010 WMCP, the JWC intends to rely on Permit S-50879 for future water supply (including for aquifer storage and recovery [ASR]) during the non-peak season. The JWC's Permit S-50879, however, has a number of existing limitations, which make it not particularly reliable (see Figure 4-1). Permit S-50879 is subordinate (junior) to the fill schedule for Scoggins Reservoir, which GSI understands to refer to the existing storage right. Further, the permit requires a by-pass flow of 15 to 20 cfs, depending on the time of year, from Scoggins Dam to the mouth of Scoggins Creek. Moreover, the full 75 cfs authorized by the permit often is not available in Scoggins Creek for appropriation. Finally, as part of the permit extension process, ODFW has recommended that use of the permit be curtailed to meet a target flow for fish of 100 cfs at the Golf Course gage (U.S. Geological Survey No. 14204800). (See memorandum dated September 1, 2009, from Kevin Hanway and Niki Iverson to Management Committee RE: JWC Permit Extension, 50879.)

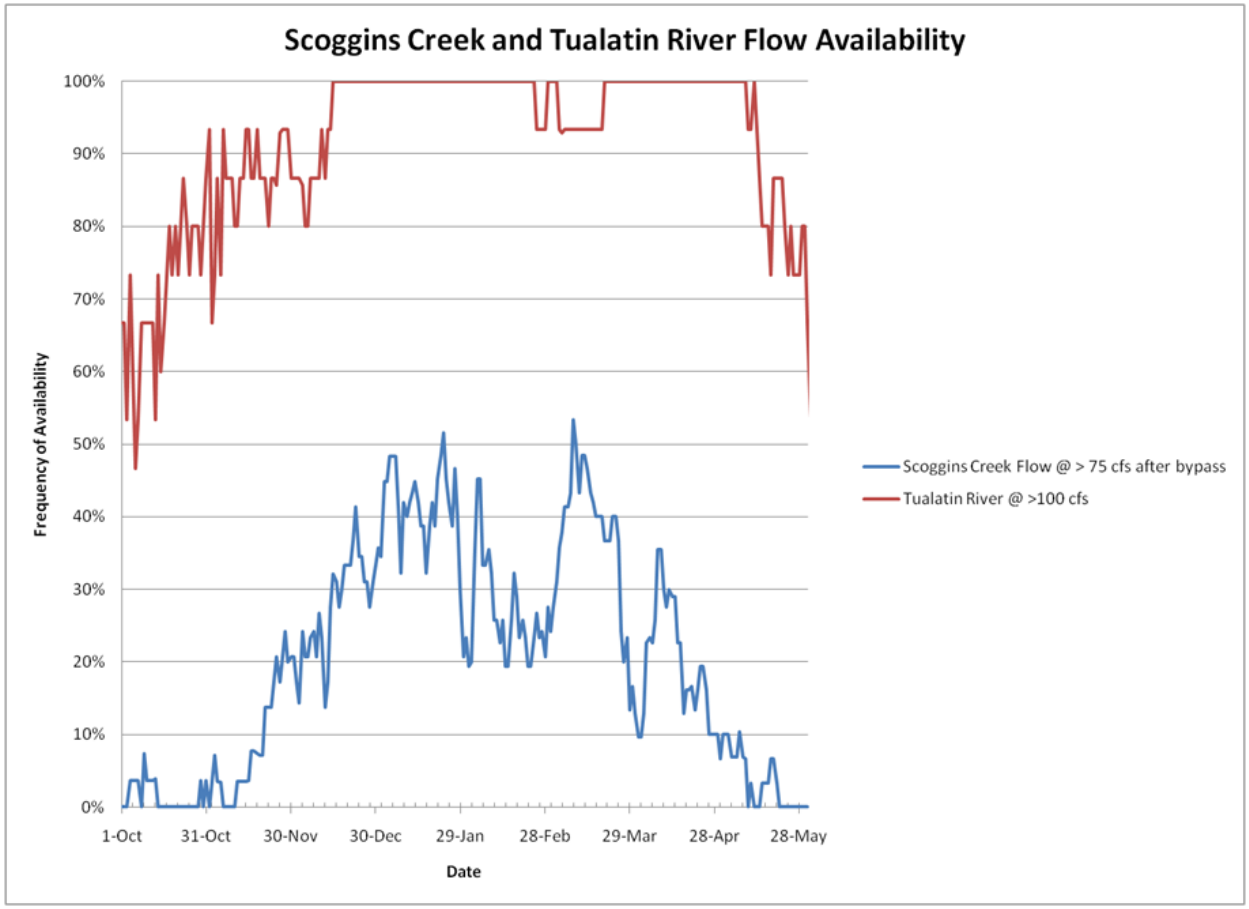

Figure 4-1. Frequency of Flows in the Tualatin River and in Scoggins Creek.

The blue line in Figure 4-1 shows the frequency at which flows in Scoggins Creek would meet or exceed the 75 cfs authorized rate for Permit S-50879, considering the flow in Scoggins Creek (the source), the filling of Scoggins Reservoir, and the Scoggins Creek by-pass flow in the permit. As shown, this flow typically is met significantly less than 50 percent of the time. Because of the unreliability of Permit S-50879, the City should (1) carefully consider the relationship of the TBWSP application to the need for non-peak season water; and (2) consider applying for a new water right for the use of water from the Tualatin River to augment non-peak season supply. This new right, however, would allow water use only from December through April, based on OWRD's water availability at 80 percent exceedance.

Figure 4-1 also shows the frequency at which the flows in the Tualatin River (shown in red) would meet or exceed a 100 cfs target flow at the Golf Course gage. As shown, the Tualatin River at the gage usually would have a flow of 100 cfs or more from mid-December through April.

The City could apply for a new water right to "supplement" the use of water under Permit S-50879. In combination with the water diverted under Permit S-50879, the new permit could

allow the diversion and use of a combined total of 75.0 cfs. It appears likely that a new water right on the Tualatin River could be obtained for the following reasons.

- According to OWRD's online water availability analysis, water currently is available at 80 percent exceedance from the Tualatin River from December through April. (Appendix G contains the water availability analysis for Gage 14206500 on the Tualatin River at the City of Farmington). This water availability analysis takes into account the TBWSP's storage right application. If the TBWSP's water right application was not included in OWRD's water availability analysis, water would be available from December through May. This change in water availability (allowing water use in May) likely does not benefit the City because the Tualatin River is classified only for municipal purposes from November 1 through April 30. Thus, to obtain authorization to use Tualatin River water during May, the City would need to obtain an exception to the Willamette Basin Program from the Oregon Water Resources Commission.

- As described above, the Tualatin River is classified for municipal purposes during only a portion of the year.

- OWRD would not find that the new water right would cause injury to existing water rights.

- Although ODFW, and perhaps DEQ, would recommend conditions for the permit, GSI does not anticipate that ODFW would recommend denial of the application. Based on the advice that ODFW provided for the JWC's fish persistence conditions, GSI would expect ODFW to recommend that OWRD condition a resulting permit to prohibit diversions when flows at the Golf Course gage (Gage 14204800) were below 100 cfs. ODFW also may recommend peak and ecological flow protection conditions. In addition, to avoid concerns from third parties about seeking more water than is needed, the right could be conditioned to limit water use, in combination with water use under Permit S-50879, to a total of 75 cfs.

GSI would expect the new permit to be more reliable than Permit S-50879 for several reasons.

- It would be dependent on the amount of flow in the Tualatin River, rather than the flow in Scoggins Creek, which is a significantly smaller watershed.

- The permit also would not be subject to the bypass flow on Scoggins Creek or the fill schedule for Scoggins Reservoir. The flow potentially available for use under a new water right is shown in Figure 4-2, which provides a simplified analysis for demonstration purposes. It does not account for additional water storage from Scoggins Creek during January resulting from the dam raise, but does consider flow required for pump back at a constant rate of 300 cfs during December through April, since the "new" Tualatin River permit would be considered junior to the pending stored water right permit application. A more rigorous analysis will be necessary to fully understand the potential reliability of a new water right and is expected to occur in the TBWSP's modeling project with MWH.

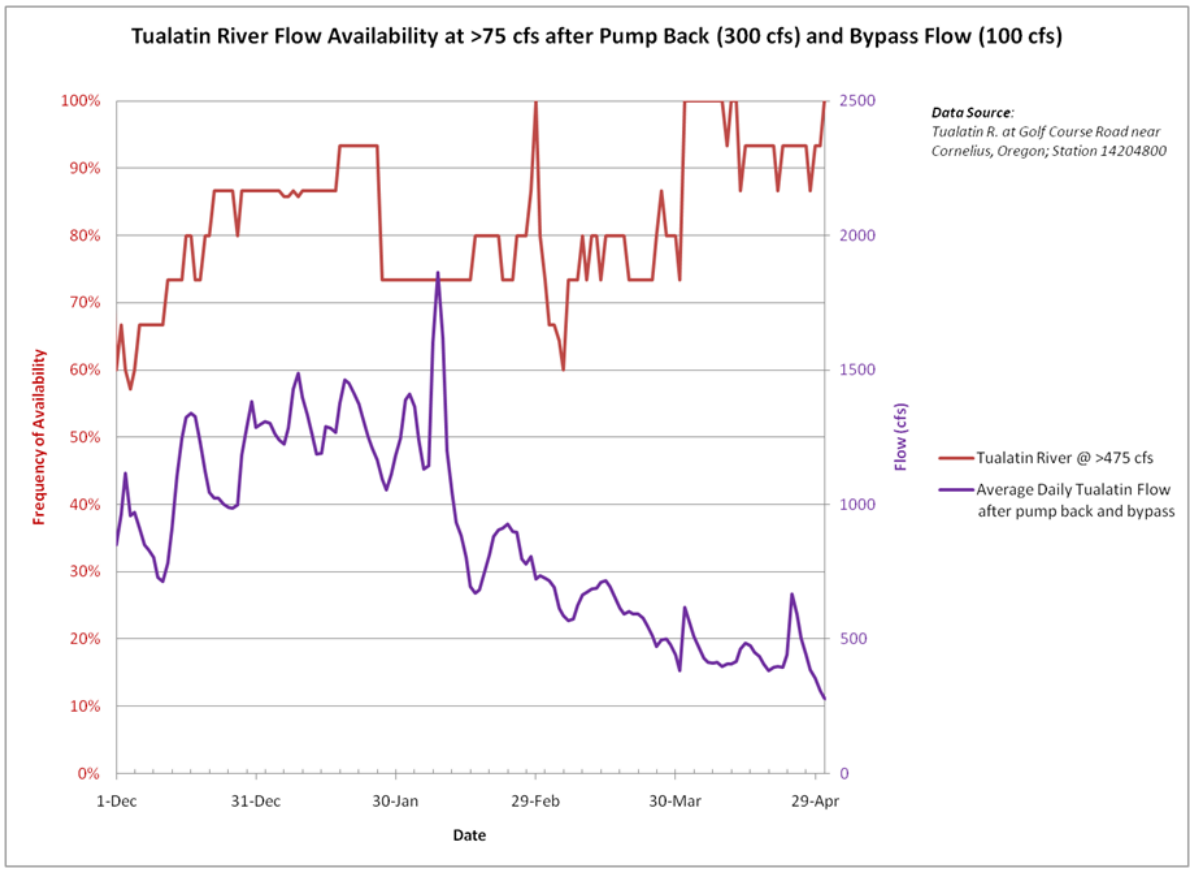

Figure 4-2. Potential Water Available for a New Water Right from the Tualatin River.

The red line in Figure 4-2 describes the frequency at which 475 cfs would be expected to be available at the Golf Course gage from December through April. The 475 cfs rate is used to predict the frequency at which the City could divert 75 cfs, after considering the 300 cfs rate expected for the pump back to Scoggins Reservoir and an anticipated 100 cfs bypass flow on the Tualatin River. As shown, this rate is projected to be available more than 70 percent of the time during the December through April period.

5. City of Portland Option

Under this option, the City would obtain additional water supply from the City of Portland (Portland). This additional water could be obtained from Portland's surface or groundwater supplies. Portland's primary municipal water supply source is the Bull Run watershed, supplemented by groundwater supply from the Columbia South Shore Well Field (CSSWF).

5.1 City of Portland Surface Water Rights

Process: The City would need to enter into a regional water sales agreement to obtain water from Portland.

Source Availability: Portland has a water right for the Bull Run River based on a legislative withdrawal. Portland also has an unadjudicated surface water registration (SWR 391), claiming a water right pre-dating the 1909 water code for municipal use for the full flow of the Bull Run River. The average annual yield of the Bull Run watershed during approximately the last 10 years was 180 billion gallons per year, which converts to a rate of 763 cfs, assuming constant year-around flow. The Bull Run River, however, is subject to another unadjudicated surface water registration (SWR 389), which claims 200 cfs for instream use. According to Portland's *2008 Final Draft Water Management and Conservation Plan*, the maximum rate of diversion under Portland's Bull Run water right to date is 172 cfs. In theory, this leaves approximately 391 cfs of Bull Run water for additional supply, assuming that 200 cfs would be protected instream. Portland's WMCP provides a maximum day demand projection for the year 2028 of 437 cfs. Based on this projected demand and readily available information in Portland's WMCP, Portland, theoretically, would have additional average annual water rights capacity of 126 cfs from Bull Run. Before pursuing this option, the City would need to obtain information from Portland about the sustainability of its water supply and more specifics about the projected demands. For example, do the projected demands include TVWD?

Portland also has a water right for the Little Sandy River based on legislative withdrawal and an unadjudicated surface water registration claiming a water right pre-dating the 1909 water code for municipal use for the full flow of the Little Sandy River. Portland has not utilized its Little Sandy River water right to date. As part of its draft habitat conservation plan (HCP), Portland has proposed to forego any consumptive use of the Little Sandy River for the term of the 50-year plan. Thus, it appears this water right likely would not provide municipal water right capacity for Portland in the foreseeable future.

Portland has an unadjudicated surface water registration for the Willamette River claiming a water right pre-dating the 1909 water code for a total of 28 mgd (43.3 cfs). Portland's WMCP indicates that it currently does not exercise its municipal water right from the Willamette River and has not done so since the mid-1920s. It is unclear when, or if, Portland will use Willamette River water, and as a result, it is unclear whether this right could be a source of future water supply.

Existing Water Rights: Portland's Bull Run water right is senior to all consumptive water rights within the basin. Other water rights would not affect the City's ability to obtain a contract from Portland for water.
Conditions: There would be no water right conditions affecting a contract with Portland; however, there could be conditions on the water use included in the contract.

Reliability: Reliability of this source likely would be related to the agreement. More information may be needed from Portland to understand whether the HCP affects source reliability.

Risks: There are no water right-related risks with this option.

Timeline: The timeline for securing this source would be related directly to the timing of agreement negotiations with Portland.

Other Issues: The City would need to negotiate pricing and any other conditions with Portland.

5.2 City of Portland Groundwater Rights

Process: The process to obtain groundwater from Portland would be the same as the process to obtain surface water, which is described Section 5.1.

Source Availability: Portland has five water use permits for the use of groundwater from the CSSWF. These groundwater permits authorize a maximum use of up to 530.6 cfs. Portland considers the CSSWF to be a year-round emergency backup water supply. According to Portland's 2008 Final Draft WMCP, 222 cfs of the authorized rate has been appropriated to date, which leaves 308 cfs of undeveloped groundwater supply. Portland, however, considers the long-term capacity of the CSSWF wells to be 127 cfs because of operational limitations, which are limited aquifer yields over extended time periods, mechanical reliability of the system, and the presence of manganese in some of the CSSWF wells. It does not appear that water from the CSSWF would be available to meet Hillsboro's future water demands because Portland needs it for an emergency water supply source. However, a combination of surface water and groundwater may be more reliable and should be explored further if this option continues to be considered.

Portland also holds numerous groundwater rights for uses at parks and golf courses. These water rights, however, do not appear to provide a feasible additional water supply for other users.

Existing Water Rights: Other water rights would not affect the City's ability to obtain a contract for water from Portland.

Conditions: Portland recently received final orders on extension applications for its CSSWF permits. These orders included conditions requiring curtailment of the undeveloped portion of the groundwater rights when the 7-day rolling average flow in the Columbia River at

Bonneville Dam does not meet the identified minimum fish flows. As shown in Table 5-1, these target flows are limited to April 1 through September 30.

Table 5-1. ODFW Fish Flow Target on the Columbia River at Bonneville Dam[1]

Month	Target Flows (cfs)
April 1—April 30	183,000
May 1—May 31	328,000
June 1—June 30	471,000
July 1—July 31	325,000
August 1—August 31	184,000
September 1—September 30	117,000

[1] As provided in the final orders for the City of Portland's extension applications on its groundwater permits.

Under these conditions, the amount of water that can be appropriated under the undeveloped portion of the right is reduced in proportion to the amount by which the 7-day rolling average of mean daily flows in the Columbia River at Bonneville does not meet the stated target flows for that time period. Because the permits at issue are for the use of groundwater, each order identifies the percentage of the rate that affects the Columbia River. The orders vary as to the percentages, which range from 9 to 95 percent. The order also provides that the impact to the Columbia River will be based only on the consumptive portion of Portland's groundwater use by providing credit for the portion of the groundwater use that "returns" to the river at the wastewater treatment plant (WWTP). Finally, it provides Portland with credit for the HCP flows for the Lower Bull Run River. The required reduction is capped at a maximum of 20 percent. In other words, the overall reduction to the maximum total amount of the undeveloped portion of the permit that affects Columbia River surface water and legally can be appropriated will not exceed 20 percent.

There would be no water right conditions affecting an agreement with Portland.

Reliability: Reliability of this source likely would be related to the agreement and permit conditions. As described in more detail below, the fish flow target conditions on Portland's groundwater permits are not met more than 40 percent of the time in June and July and approximately 25 percent of the time in August. More evaluation of reliability would be needed if the City decides to move forward with this option.

Risks: There are no water rights-related risks with this option.

Timeline: The timeline for securing this water source would be related directly to the timing of agreement negotiations with Portland.

Other Issues: The City would need to negotiate pricing and any other conditions with Portland.

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6. Northern Groundwater Option

Under this option, the City would appropriate groundwater from wells in the Sauvie Island area. The appropriation of groundwater would be authorized by a new groundwater use permit, or by one or more existing water rights.

6.1 New Groundwater Use Permit

Under this alternative, the City would obtain a new water use permit authorizing the appropriation of groundwater from wells in the Sauvie Island area.

Process to Obtain a New Water Right: The process to obtain a new water right is described in detail under the Willamette River at Wilsonville Option (see Section 2). The process to obtain a new groundwater right is essentially the same as that to obtain a new surface water right.

Source Availability: GSI's assessment of the groundwater supply indicates that OWRD would determine that 50 to 100 mgd, or more, of groundwater are available from the unconsolidated sedimentary aquifer for further appropriation (see Technical Report No. 1.)

As part of the application review process for a groundwater permit, OWRD's staff also would determine whether the groundwater source is hydraulically connected to surface water. If the source is hydraulically connected, OWRD's staff would determine if the proposed use of groundwater would have the "potential for substantial interference" (PSI) with surface water. OWRD would assume that a proposed use of hydraulically connected groundwater will have PSI if it meets any of the following criteria:

1. The well is less than ¼ mile from the surface water.
2. Water would be appropriated at a rate of more than 5 cfs and the well is less than 1 mile from the surface water.
3. Water would be appropriated at a rate more than 1 percent of the discharge rate of the stream that is expected 80 percent of the time, and the well is less than 1 mile from the surface water.
4. Groundwater appropriation for a period of 30 days would cause stream depletion more than 25 percent of the rate of appropriation, and the well is less than 1 mile from the surface water.

If a proposed use of groundwater is determined to have PSI, OWRD then considers limitations and restrictions associated with the hydraulically connected surface water source, including whether surface water is available for appropriation. As discussed in more detail in Technical Report No. 1, groundwater levels in the gravel unit (and in the overlying sand unit) appear to be strongly controlled by the stage of the Columbia and Willamette Rivers. Most, but not all, of the target wellfield development area is located slightly more than 1 mile from these rivers and from the Multnomah Channel. Although it may be possible to locate many well sites more than

1 mile from these surface water bodies, it is possible that OWRD will conclude that induced leakage of surface water could be sufficiently large to result in PSI.
If the groundwater use was determined to have PSI with Multnomah Channel, OWRD likely would find that surface water was available, although it has not conducted a water availability analysis for Multnomah Channel. Instead, OWRD would ask the local watermaster whether water was available for the proposed use. If OWRD determines the proposed use has PSI with the Columbia River, OWRD also would find that water was available. Again, OWRD has not conducted a water availability analysis for the Columbia River, so the water availability assessment would be referred to the local watermaster.

Basin Program Classification: The Willamette Basin Program rules classify the groundwater resources in the basin, with certain exceptions, for municipal purposes. None of the exceptions would be applicable here.

If the proposed use would appropriate groundwater from unconfined alluvium within ¼ mile from a surface water source, the use also would be required to be consistent with the surface water classifications in the Willamette Basin Program. The basin program classifications for surface water, however, would not impede such a groundwater application. The basin program rules for the Columbia Subbasin classify surface water in this portion of the Willamette River and Multnomah Channel for municipal purposes. The basin program rules do not provide surface water classifications for the main stem Columbia River.

Existing Water Rights: The proposed use may cause interference with existing groundwater or surface water rights in the area. The magnitude of this interference would depend on the amount of the City's groundwater appropriation and proximity to existing wells.

Development of a wellfield would cause a drawdown of water levels in the aquifer, which could affect nearby wells and potentially be viewed by OWRD as creating possible injury to certain nearby existing well owners. Injury to another groundwater user can be caused when a well owner cannot access the water they are accustomed to pumping and to which they are legally entitled from a reasonably efficient well that fully penetrates the aquifer. The amount of project-induced drawdown that would be deemed injurious is a site-specific evaluation, but in its review of permit applications for groundwater rights, OWRD frequently considers 25 feet of project-induced drawdown in a neighboring well to be the threshold for creating an injury. However, even if the project were to induce 25 feet or more of drawdown in a neighboring well, it is possible that an injury might not exist if OWRD were to find that the neighboring well does not "fully penetrate" the aquifer—that is, it does not penetrate the full thickness of the aquifer (or nearly the full thickness), but instead penetrates only the uppermost portion of the aquifer. In such a case, rather than determining that an injury exists, OWRD could require the owner of the affected neighboring well to deepen the well to meet the requirement to have first fully penetrated the aquifer source to developed their groundwater right. However, regardless of whether actual deepening of a well occurs, other information could lead OWRD to conclude that a project has the potential to create injury to one or more existing groundwater users.

If OWRD determines the proposed use would have PSI with surface water, the effects on existing surface water rights would be considered as part of assessing surface water availability, as previously described in the discussion of groundwater source availability.

Conditions: If the proposed use of groundwater is determined to have PSI with surface water, as described above, the application would undergo a Division 33 review as if the application were for the use of surface water. In that case, GSI would expect ODFW to recommend conditions to protect listed fish. If the groundwater use were found to have PSI with the Columbia River, ODFW likely would recommend conditions requiring that the use be curtailed when certain target flows are not met at Bonneville Dam. GSI would anticipate that ODFW would recommend target flow conditions similar to those included in the final orders for extensions of time for several of the Portland's groundwater rights (see Section 5). The effect of these fish flow targets would be significantly different for a new water right application than for a permit extension. For a new application, we understand that ODFW recommends use of permit extension "fish persistence" target flows except that ODFW would recommend that a new use be "regulated off" (required to stop) when the target flow was not met, instead of curtailed in proportion to the percentage by which the target flow was missed. It is possible, however, that OWRD could determine that not all of the groundwater was coming from surface water. In that case, the City would have to curtail only a portion of its water use.

Figure 6-1 shows the Columbia River flows at Bonneville (blue) and the fish flow targets (pink) during the period from 2000 through 2007. As shown in Table 6-1, flows during these years did not meet the applicable target flows on any day during June and July. Target flows during August and September also were not met on the majority of days during 2000 through 2007. As a result, a new water right with these fish flow targets may not allow the diversion of water most days during the period from May through September.

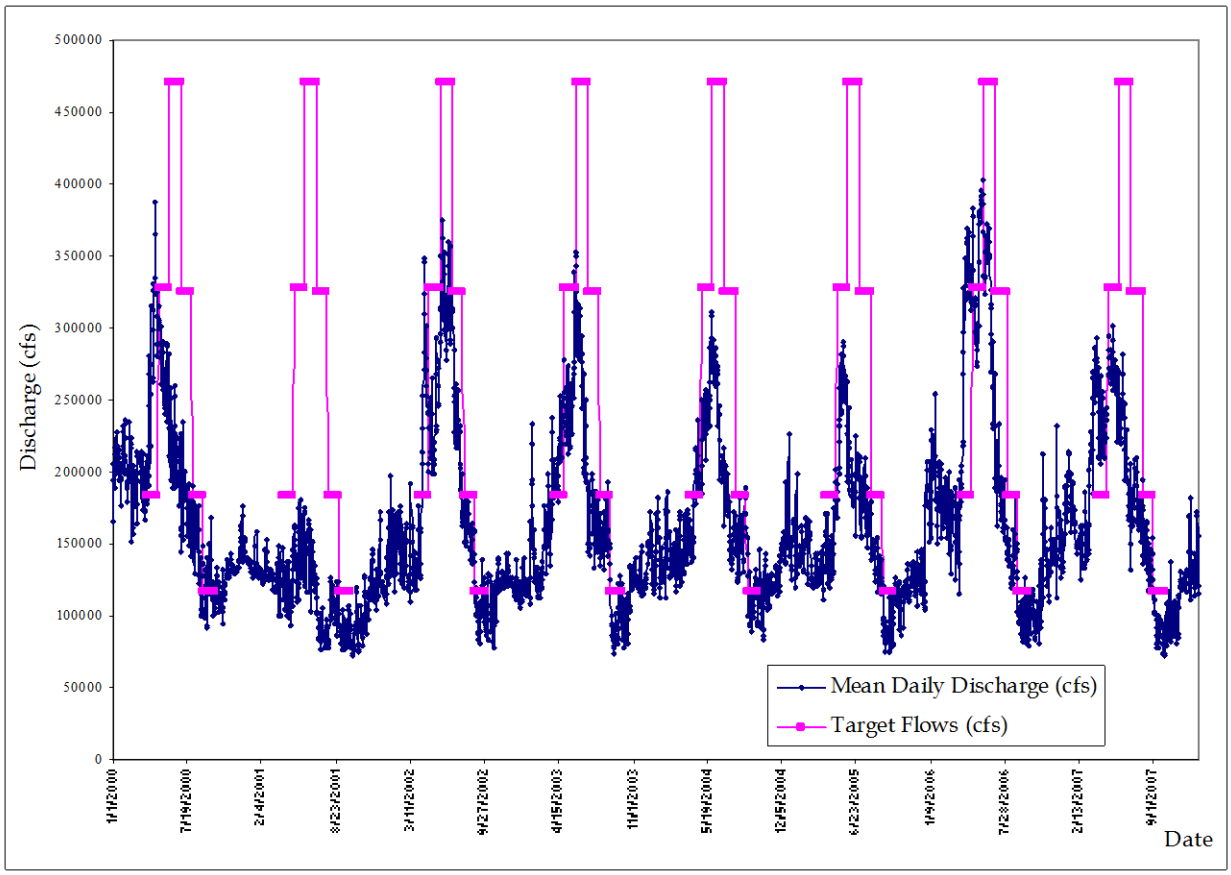

Figure 6-1. Comparison of Flows on Columbia River at Bonneville Dam and Fish Flow Targets.

Table 6-1. Frequency that Fish Flow Targets on the Columbia River at Bonneville Dam Were Not Met, 2000-2007.

Period	Fish Flow Targets (cfs)	Number of Days Target Missed	Percentage of Time Target Not Met
April	183,000	86	36%
May	328,000	227	92%
June	471,000	240	100%
July	325,000	248	100%
August	184,000	242	98%
September	117,000	203	85%

If the groundwater use were determined to have PSI with Multnomah Channel, it is unclear what conditions ODFW would recommend, but the conditions most likely would be the same as for the Columbia River.

Finally, ODFW could raise concerns that the proposed use would have an adverse impact on wetlands that provide habitat for listed fish and other wildlife, in which case it is unclear what conditions OWRD might propose. If the proposed use of groundwater was found to have PSI with surface water, the applicant potentially could mitigate for those impacts, as further described below.

Further, the City may be able to provide mitigation, which could avoid the above-described conditions to protect listed fish. The most likely opportunity to provide mitigation would be for the City to obtain a certificated surface water right that authorized the use of water at a rate equal to or exceeding the anticipated impact to surface water, and transferring that water right instream.

Opportunities to Avoid PSI: As discussed in Technical Report No. 1, the preferred target area for groundwater development is along the north-south central axis of Sauvie Island, away from the Multnomah Channel and Columbia River, because this area coincides with the thickest portion of the target aquifer. This preference is also for the purpose of locating as many wells as possible slightly more than 1 mile from the Columbia and Willamette Rivers and from Multnomah Channel, to minimize the chance of OWRD concluding that the potential for substantial interference with surface water exists.

Reliability: Because of the reliability of groundwater recharge from the major river systems and the high transmissivity of the target aquifer (as described in Technical Report No. 1), it is likely that development of a wellfield on Sauvie Island would not cause water level declines resulting in well-to-well interference between the City's wells and drawdown effects at nearby groundwater users' wells that would result in regulation of the water right after it has been developed. Additionally, the reliability of this water supply source may not be affected by minimum fish flow targets in adjoining surface water bodies if wells can be located more than 1 mile from those bodies. However, if one or more wells were located within 1 mile of

Multnomah Channel, the Columbia River, or the Willamette River, then it is conceivable that the permit may contain conditions requiring curtailment of pumping from those wells during the months that minimum fish flow targets are not being met in these river systems.

Risk: As previously described, OWRD allows third parties to file protests to new water right applications. It is not unusual for existing groundwater users in the area surrounding a proposed new groundwater use to file protests. Additionally, a third party could file a protest based on concerns about impacts to surface water.

Another risk is that the resulting permit could be heavily conditioned. The conditions could reduce the City's access to water based on impacts to wetlands, seasonal use, PSI, or drawdown in the aquifer.

Timeline: The water right application process typically takes 1 year to complete, if a protest were not filed. If a protest were filed, the process could take 2 to 5 years.

Other Issues: As a municipality, the City is not required to obtain authorization or an easement to locate wells on particular property before obtaining a water right. (Because a water right does not grant access to property, the City ultimately would need authorization to locate wells on private property.) However, as described above, a significant portion of the review for a groundwater permit is dependent on the location of the points of appropriation (wells). As a result, changing the well location during the water right review process could require a second review of the application. Consequently, finalizing the locations of wells before initiation of the water right review process is advisable.

6.2 Acquire an Existing Groundwater Right

Under this alternative, the City would acquire an existing groundwater right located on Sauvie Island or adjacent areas. The right would be either a permit for municipal purposes or a certificate for any beneficial purpose. The City would locate one, or more, groundwater right(s) authorizing the use of groundwater and move these rights to the City's wells.

Processes to Transfer a Groundwater Certificate: A water right certificate is changed through the transfer process, which allows changes to the place of use, point of appropriation, and the character of use (designated beneficial use). Because the water source cannot be changed through the transfer process, the new point of appropriation would need to develop water from the same source (aquifer) as the original point of appropriation. After acquiring a certificated water right, the City could use the transfer process to change the point of appropriation to its wellfield, change the place of use to its service area, and change the character of use, if necessary. As previously described, OWRD will review a transfer application to determine whether it will cause injury to existing rights. If changing the point of appropriation would reduce other water right holders' ability to obtain water, OWRD could determine that the change would cause injury.

Processes to Amend a Groundwater Permit: A permit is changed through the permit amendment process. This process allows changes to the point of appropriation and to the place of use if the new place of use is contiguous to the existing place of use. Because the water

source cannot change through the permit amendment process, the new point of appropriation would need to develop water from the same source (aquifer) as the original point of appropriation. If the City obtained a municipal groundwater permit, it could change the point of appropriation to its wellfield. The place of use could not be changed; however, as previously described, municipalities can deliver water outside of the stated place of use of their water right as long as they do not impair prior water rights. Consequently, water could be used within the City's service area without changing the permit.

Review Criteria for Changing a Groundwater Right: OWRD would review applications for permit amendments and transfers similarly. In both processes, OWRD will consider whether the proposed change would cause injury to other water users or enlargement of the original water right. OWRD also will consider whether the source (aquifer) would remain the same. As the distance between the existing and the proposed points of appropriation increases, it often becomes more likely that OWRD would determine that the wells would appropriate water from different sources.

Process to Certificate a Water Right Following a Transfer or Permit Amendment: If the City obtained a certificated water right and changed the point of appropriation, place of use, and character of use (if necessary), it should not be particularly difficult to obtain a water right certificate after the changed right was fully developed. If, however, Hillsboro obtained a permit and amended the permit to change the point of appropriation, when the water use was fully developed, the City's service area would not be included in the place of use because of the above-described requirement that the place of use be contiguous to the original place of use. As a result, to have its service area included in the certificated place of use, Hillsboro would need to file a subsequent transfer application to include its service area in the place of use.

Source Availability: Based on the results from a query of OWRD's online water rights database, there are 21 certificates and 4 municipal permits authorizing the use of groundwater near the Northern Groundwater Option study area, which is described in more detail in Technical Report No. 1. For example, the Port of Portland (Port) holds a municipal groundwater right (Permit G-13093) just south of Sauvie Island. This permit authorizes the use of up to 23.53 cfs of groundwater, but the Port has used only approximately 0.89 cfs to date, according to the Port's 2008 updated WMCP. Permit G-13093 has been extended to allow development of the right until October 1, 2044. (It should be noted that use of this right reduces the amount of surface water the Port can use under its surface water Permit S-51547.) As another example, Portland holds municipal groundwater rights for wells located on Pearcy Island, just south of Sauvie Island.

Existing Water Rights: Other existing water rights are not expected to affect either a permit amendment or a water right transfer of existing groundwater rights, provided that new wells are located sufficient distances from existing wells to avoid causing injury to existing water rights.

Conditions: No additional conditions beyond those in the existing water rights are expected. For example, the Port's Permit G-13093 limits the use of groundwater under the permit, in combination with surface water use under Permit S-51547. Permit G-13093 also is conditioned to be regulated if the authorized groundwater use will measurably reduce surface water flows

necessary to maintain the Columbia Slough or Smith and Bybee Lakes. Permit S-51547 is further limited to allow groundwater use only from a confined alluvial aquifer situated at a depth between approximately 100 and 300 feet below land surface.

Reliability: The reliability of the water right would be dependent on the reliability of the right transferred.

Risks: There are several risks with this option. OWRD could interpret the applicable regulations differently and deny a permit amendment application.

For a transfer, a third party could file a protest, but protests are limited to addressing whether the transfer would cause injury. As a result, protests to transfer applications are relatively rare. For a permit amendment, a third party may request reconsideration of the final order, or appeal the final order to circuit court. It is difficult to predict whether third parties would object to a transfer or permit amendment application without knowing which water right is proposed to be changed.

Timelines: A transfer would be expected to take 8 months to 1 year, and a permit amendment would be expected to take 6 to 8 months.

Other Issues: The City would need to identify a willing seller or partner. If it is the Port, the City would need to determine whether the Port would be a seller or partner, and would need to negotiate a contract and cost.

6.3 Acquire an Existing Surface Water Right (Surface Water to Groundwater Transfer)

Under this alternative, the City would obtain an existing surface water right (either a certificate or a municipal permit) and change it to allow appropriation of groundwater.

Process for a Surface Water to Groundwater Transfer: The surface water to groundwater transfer process provides the ability to change a surface water right to allow the water right holder to appropriate water from a well. To approve such a transfer, OWRD must determine that the well would appropriate water from an aquifer that is hydraulically connected to the authorized surface water source associated with the original right; and that the change would not result in injury to other water rights or enlargement of the original right. Further, the well would need to be within specified distances from the stream and the original point of diversion.[2] Finally, OWRD would need to find that the proposed change would affect the surface water source "similarly"[3] to the authorized point of diversion identified in the water right.

[2] OWRD requires that the well be within 500 feet from the surface water source and within 1,000 feet up or down stream from the original point of diversion. If the well location does not meet these requirements, the applicant can provide evidence that the transfer would, nonetheless, meet the other criteria.

[3] OWRD would require the use of groundwater at the new point of diversion to affect the surface water source identified in the water right and result in stream depletion of at least 50 percent of the rate of appropriation within 10 days of continuous pumping.

Source Availability: Although there are numerous surface water rights in the area, it appears that this is not a feasible option. It is unlikely that OWRD would find that water appropriated from the new point of appropriation (well) would affect the surface water source similarly because the gravel layer from which the water would be appropriated is too deep and has an overlying fine-grained layer that would restrict the connection between surface water and groundwater. As a result, it is unlikely that OWRD would find that the use of groundwater would affect the surface water source "similarly" to the point of diversion identified in the existing water right.

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7. Durham Option

Under this option, the City would divert water from the Tualatin River at a location near the City of Durham (Durham). There are several potential options for the City to obtain authorization to divert water at this location. First, the City could obtain a new water use permit authorizing the diversion of live flow from the Tualatin River. OWRD would require the City to have a permit for a new diversion of public water from the Tualatin River. As described below, there is limited water available from the Tualatin River. Consequently, the City could consider obtaining a new water use permit for which the authorized source was "treated effluent" from the Tualatin River. It appears likely that OWRD would require the City to have a permit for this use of water because the water becomes "public water" when it is released into the river. Finally, the City may be able to use treated effluent under a reclaimed water registration. Under this alternative, the City would submit to OWRD a reclaimed water registration, rather than a permit application, indicating that it intends to reuse treated effluent. Each of these alternatives is further described below.

7.1 New Water Use Permit from the Tualatin River

Under this alternative, the City would obtain a new water use permit authorizing diversion of surface water during winter months from the Tualatin River at a location near Durham.

Process to Obtain a New Water Right: See the discussion in Section 2 about the process to obtain a new water right authorizing the use of water under the Willamette River at Wilsonville Option (see Section 2).

Source Availability: According to OWRD's online water availability analysis, water is available at 80 percent exceedance (the standard used for new live flow applications) in the Tualatin River near Durham from December through April. OWRD's information shows that the net water available ranges from 276 cfs in December to 869 cfs in February, excluding months with no water available. Appendix H contains the water availability analysis for Gage 14207500 on the Tualatin River.

Basin Program: The Willamette Basin Program rules classify the Tualatin River in this location for municipal purposes only from November 1 through April 30.

Existing Water Rights: Existing water rights are considered as part of OWRD's water availability determination. Based on the expected demands of these existing water rights, OWRD has determined that water is not available from May through October of each year.

Conditions: As a result of OWRD's consultation with ODFW and DEQ under its Division 33 review process, GSI would expect the agencies to recommend permit conditions restricting Hillsboro's use of water to protect listed fish.

Reliability: Because of limited water availability, this new water right would not provide an additional water supply during the times of the year when water demand is high.

7.2 New Water Use Permit for "Treated Effluent"

Under this alternative, the City could seek to obtain a water use permit that authorized the use of treated effluent from four WWTPs managed by CWS along the Tualatin River: Forest Grove WWTP at approximately RM 56.6; Hillsboro WWTP at approximately RM 45.5; Rock Creek WWTP at approximately RM 38; and Durham WWTP at approximately RM 9. Each WWTP functions independently, except during some months when Forest Grove WWTP and Hillsboro WWTP wastewater is sent to Rock Creek WWTP for treatment and discharge. All four WWTPs discharge treated water into the Tualatin River.

The source requested in the water right application that would be submitted under this option would be future treated effluent, rather than the Tualatin River. Water would be measured as it was released from the Tualatin Basin WWTPs, and up to that amount of water would be diverted at a new diversion below Durham.

Process to Obtain a New Water Right: See the discussion of the process to obtain a new water right authorizing the use of water under the Willamette River at Wilsonville Option (see Section 2).

Source Availability: The WWTPs record the amount of treated water that is discharged daily. Using the discharge information provided by CWS that spans the years 2003 to 2009, GSI has calculated the current peak season (May 1-October 31) average daily discharge for all WWTPs to be 73.3 cfs (47.4 million gallons per day [mgd]) with an average standard deviation of 8.5 cfs (5.5 mgd). CWS already holds a water use permit authorizing the use of up to 10.4 cfs of treated effluent from Rock Creek WWTP for flow augmentation and pollution abatement. This amount, presumably, would reduce the amount of effluent available for the City's use.

CWS projects the future peak season daily discharge for all WWTPs to be an additional 39.8 cfs (25.7 mgd) by 2025. Further study would be required to determine timing and availability of this effluent.

Basin Program: The Willamette Basin Program rules classify the Tualatin River in this location for municipal purposes only from November 1 through April 30. It is, however, unclear whether the classifications for the Tualatin River would apply to an application to use treated effluent.

Existing Water Rights: Existing water rights are considered as part of OWRD's water availability determination. Based on the expected demands of these existing water rights, OWRD has determined that water is not available from May through October of each year. It is not clear, however, that these existing water rights that authorize the use of water from the Tualatin River, and the resulting water availability calculations, would apply to an application to use future treated effluent.

Conditions: It is difficult to predict what, if any, conditions ODFW and DEQ would recommend as part of the Division 33 review process. It is possible that ODFW and DEQ would recommend very restrictive conditions, or denial, because of concerns about listed fish and the total maximum daily load established on the Tualatin River.

Reliability: The reliability of this right would be dependent on the amount of effluent available for use and any conditions included in the permit.

Risks: There are several risks associated with this option. ODFW or DEQ could recommend onerous conditions or denial of the application. Further, a third party could file a protest against the PFO.

Timeline: Water right permits typically are issued within 1 year if a protest is not filed. If a protest was filed, the process could take 2 to 5 years. Because of the unique nature of this proposed water right, the application review process could take additional time.

Other Issues: To obtain this future water supply, GSI understands that the TVID would need to give its approval because it has a right of first refusal for this wastewater. Also, CWS would need to be "on-board," given its policy objectives and regulatory requirements in the basin.

In theory, the City could argue that the water right holders have not lost control of the wastewater and, consequently, this is not "public water" and they are not subject to the water right application process at all. This approach raises a number of complex legal issues that would require additional analysis.

7.3 Reclaimed Water Registration

This alternative is similar to the alternative above, except that the City would use treated effluent under a reclaimed water registration instead of a water use permit.

Process for a Reclaimed Water Registration: Under OWRD's reclaimed water registration process, a person can register the use of treated municipal effluent, instead of obtaining a permit, if certain criteria are met. The use of the reclaimed water must be authorized by the facility's discharge permit. DEQ must determine that the use of reclaimed water is intended to improve water quality in the receiving stream. Further, DEQ consults with ODFW to determine that use of the reclaimed water will not have a significant negative impact on fish and wildlife. According to OWRD staff, DEQ will not include a use of reclaimed water in a facility's discharge permit if the effluent will be released into a stream and then re-diverted for re-use of the treated effluent. Thus, successful implementation of this option could require that the treated effluent be conveyed via a pipeline, rather than using the Tualatin River as a conveyance system.

Source Availability: As described above, the current peak season daily discharge for all WWTPs is calculated to be 73.3 cfs based on discharge information provided by CWS. CWS already holds a water use permit authorizing the use of up to 10.4 cfs of treated effluent from Rock Creek WWTP for flow augmentation and pollution abatement. This amount, presumably, would reduce the amount of effluent available for the City's use. As a result, the current peak season daily discharge available for use by the City would be 62.9 cfs (73.3 cfs minus 10.4 cfs).

The future peak season daily discharge for all WWTPs is projected to be an additional 39.8 cfs (25.7 mgd). The available future peak season daily discharge is projected to be 102.7 cfs (62.9 cfs

plus 39.8 cfs). Further study of the timing and availability of this water would be necessary if this option were pursued.
It is unclear whether a distinction should be made between the current discharge and projected additional discharge as it relates to a "source of water" for a reclaimed water registration. If this option continues forward, that distinction should be evaluated further.

Existing Water Rights: If the municipality has discharged wastewater into a natural watercourse for 5 or more years, and the discharge is more than 50 percent of the total average flow of the stream, and if the discharge would cease as the result of the registration, OWRD will notify any person who has a water right that may be affected by ceasing the discharge. According to records from Gage 14207500 on the Tualatin River at West Linn (for the period of 1952 to 1970), the annual mean daily discharge is 1,530 cfs. Neither the current peak season daily discharge of 73.3 cfs nor the future peak season daily discharge of an additional 39.8 cfs from the WWTPs, therefore, would appear to trigger OWRD's notification provision.

Conditions: No conditions would be anticipated because OWRD does not issue an order approving a reclaimed water registration. OWRD accepts registrations and maintains records of the accepted registrations, but does not provide a written approval of the use.

Reliability: Assuming DEQ would include the use of reclaimed water in CWS's discharge permit (despite the water being first released into the Tualatin River), then the reliability of this supply would be dependent on the amount of effluent available for use.

Risks: There are several risks associated with this option. First, it is unlikely that the City could meet the applicable criteria. Second, affected water right holders potentially could object, as described above. Additionally, the NPDES permit holder (CWS) could be opposed to the direct pipe approach due to resulting reduced dilution flows. Finally, there may be significant public perception issues to overcome related to the use of this water for potable purposes.

Timeline: The City likely would be able to complete the reclaimed water registration process in 9 months to 1 year, if DEQ would issue a discharge permit that included the re-diversion and use of reclaimed water after the effluent was released into the Tualatin River.

Other Issues: To obtain this future water supply, the TVID would need to give its approval because it has a right of first refusal agreement for this wastewater.

8. Aquifer Storage and Recovery (ASR) Option

Under this option, the City and the other JWC partners would develop a phased ASR program with an estimated total capacity of 18.7 mgd (28.9 cfs).

To develop an ASR program, the JWC first would need to obtain an ASR limited license for ASR testing to determine if recovery of water injected into an aquifer is feasible at the proposed rates. (After the initial testing period demonstrates that the project is feasible, the JWC would apply for an ASR operational permit.)

Because the TVWD and City of Beaverton (Beaverton) are JWC members and jointly hold an existing ASR limited license (#002), it may seem logical to use this existing ASR limited license to advance the JWC ASR program. However, it appears best for the JWC to obtain a separate ASR limited license and use ASR Limited License #002 as a fall-back option in the unlikely event that a new ASR limited license is stalled or heavily conditioned.

ASR Limited License #002 was issued in July 1998 and has received two 5-year extensions from OWRD, with a current expiration date of July 22, 2013. The licensees may store up to 1.5 billion gallons in the basalt aquifer using 13 injection wells and may recover for municipal use a combined withdrawal of up to 12.5 mgd of stored water from the same 13 wells. Since the initial issuance, numerous minor amendments and modifications have been made to the TVWD-Beaverton ASR limited license (e.g., changes in well locations, changes in rates and volumes).

The reasoning behind recommending that the JWC pursue an independent ASR limited license rather than use ASR Limited License #002 is discussed below:

- The current ASR limited license does not have sufficient capacity in terms of storage, number of wells, or recovery yield to accommodate the proposed JWC ASR program. To accommodate the proposed JWC ASR program, the ASR Limited License #002 would have to be greatly expanded. That type of modification to the current license would be unprecedented for OWRD and, if allowed, would require a public comment period, along with substantial supporting information to justify the expansion request; this effort would be equal to or even greater than the effort to submit a new application on behalf of the JWC.

- Adding a third party (i.e., JWC) to ASR Limited License #002 also would require a public comment period. Moreover, adding the JWC as a third party to the current ASR limited license (#002), either by modifying the current license through OWRD or by preparing an independent agreement among the parties (TVWD, Beaverton, and JWC), GSI believes would be difficult to craft because existing ASR wells and future ASR wells already targeted by TVWD and Beaverton would have to be excluded from the agreement.

- A new JWC ASR limited license would be "cleaner" and better defined for the proposed ASR project, and also would ensure that all JWC partners are on equal footing.

- Lastly, the effort to expand ASR Limited License #002 and craft an agreement would not be any less time consuming or costly than applying for a new ASR limited license.

Process to Obtain an ASR Limited License: The necessary steps and the time frame for submitting a new ASR limited license application to OWRD on behalf of the JWC are outlined below. The application also must include a work plan for the proposed project.

The ASR limited license application should be submitted before test well drilling by the JWC because it will be important to understand if the application would be approved before JWC invests heavily in deep test wells. GSI understands that the JWC plans to start the ASR exploration plan in 2010. Accordingly, the ASR application could be submitted during the period of time it will take the JWC to design, bid, and award the test wells. Sufficient data are available based on the TVWD-Beaverton program and the work completed as part of the JWC Capital Improvement Plan to support the JWC ASR limited license application. Assuming no delays, the JWC ASR limited license could be obtained before test well drilling. It would be important to have completed the public comment period before drilling begins so that the JWC could better understand whether the limited license would be conditioned by OWRD before investing in test wells. Future ASR wells would be included in the ASR limited license application in addition to the test well locations.

The following summarizes the process for obtaining a new ASR limited license. Appendix I contains a detailed outline of the necessary information to be included in the ASR limited license application.

- ***Attend a pre-application meeting with OWRD.*** This required step will help the JWC understand whether the OWRD has any significant concerns about the proposed JWC ASR program as outlined in the *March 2009 JWC Capital Improvement Master Plan*. Also during the pre-application meeting, it will be important to determine how much detailed information OWRD will need for each ASR site and whether groups of ASR wells can be clustered when presenting hydrogeologic information and for evaluating potential injury to other existing water rights.

- ***Prepare the application.*** GSI anticipates it would take approximately 3 months to complete the ASR limited license application. Existing information, such as the *March 2009 JWC Capital Improvement Master Plan*, would be used to develop the application.

Source Availability: During the potential storage season for ASR, which typically is from November through April (6 months), the live flow water rights on the Tualatin River held by the JWC authorize use of up to 115 cfs (Certificates 81026, 81027, 67891, 85913, 85914, and 85916). The amount of water needed to meet the projected ASR storage demand is 27.8 cfs (18 mgd) during the winter months. The JWC uses live flow to meet its non-peak season demands. JWC's August 2010 WMCP included projected non-peak season demands, which includes up to 18 mgd for ASR purposes. The plan showed that the JWC non-peak season demand will exceed 115 cfs by the year 2022. After that date, JWC will rely on its Permit S-50879 from Scoggins Creek. As previously described, an extension for Scoggins Creek Permit S-50879 is currently in progress. Stream flow analysis work by GSI and JWC's staff shows that the adjusted daily

average flows in Scoggins Creek of 37.5 cfs (half of the maximum authorized rate of Permit S-50879) was available for use during November through April (ASR storage period) an average 40 to 50 percent of the time (see Figure 8-1.)

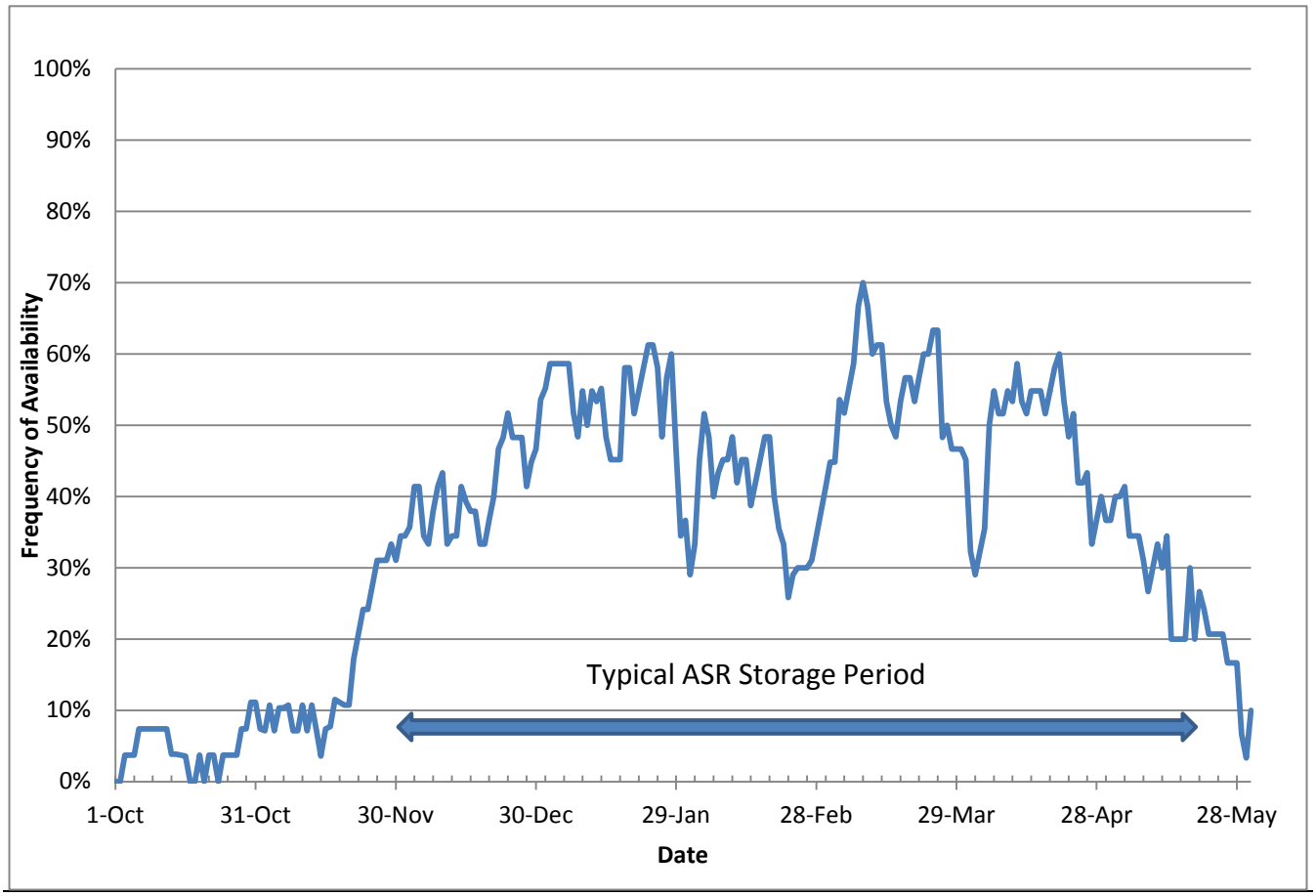

Figure 8-1. Frequency at Which 37.5 cfs Are Available in Scoggins Creek for ASR.

Existing Water Rights: OWRD considered existing water as part of its water availability analysis when it issued the underlying water rights to be used for ASR by the JWC.

Conditions: It is important to note that even though ASR is considered a beneficial use inherent in the water right used for source water, the limited license can be conditioned and perhaps even the resulting ASR permit can be conditioned, regardless of seniority. For example, the City of Baker City ASR operational permit was conditioned by restricting the use of its water right for ASR storage because of injury concerns by junior water users. Moreover, although GSI is aware that ODFW is becoming more concerned about peak and ecological flows during the winter months, the mechanism for ODFW to participate in the ASR limited license review process is currently unclear.

Timeline: Approval for an ASR limited license typically is issued within 142 days after OWRD receives the application based on the following timeline. Within 45 days of receiving the

application, OWRD will issue a completeness review. The purpose of the completeness review is to make sure that the application fulfills the requirements of Oregon Administrative Rule (OAR) 690-350. If the application is not complete, then OWRD will identify additional information needed for submission of the application. Within 7 days of the completeness review, OWRD will provide public notice of the proposed ASR project. After public notice of the ASR project is provided, a 30-day public comment period ensues. Following the public comment period, OWRD has 60 days to issue a decision on accepting the application.

9. Summary of Preliminary Rating Process

Based on a working draft of this Technical Report (dated November 2010), GSI and the City developed a methodology for creating a relative ranking, from a water rights perspective, of the options evaluated in the report. A memorandum describing the methodology used in the preliminary evaluation and a table containing the resulting rankings are attached in Appendix J.

The methodology and associated rankings were vetted with the Technical Advisory Committee. The Committee was in agreement with the relative rankings developed.

As a result of the rankings and discussions with the Technical Advisory Committee, several key conclusions were reached regarding the water supply options included in this Technical Report.

- The Durham Option was eliminated from further consideration because of the anticipated inability to obtain a water right for the proposed water use.

- The alternative to enter into an exchange agreement with TVID, which was described under the Willamette River at Newberg Option, was determined to be infeasible because of recent OWRD interpretations of the exchange process.

- Finally, it was determined that the Willamette River at Wilsonville and the Willamette River at Newberg Options, from a water rights perspective, are essentially identical.