

# Appendix A

*Water Availability Analysis for the Willamette River at Wilsonville Option and  
Willamette River Minimum Perennial Streamflows*

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# Water Availability Analysis Detailed Reports

WILLAMETTE R > COLUMBIA R - AB MOLALLA R  
WILLAMETTE BASIN

Water Availability as of 5/27/2010

Watershed ID #: 182

Date: 5/27/2010

Exceedance Level: 80%

Time: 3:46 PM

Water Availability Calculation	Consumptive Uses and Storages	Instream Flow Requirements	Reservations
Water Rights		Watershed Characteristics	

## Water Availability Calculation

Monthly Streamflows in Cubic Feet per Second  
Storage at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	21,400.00	2,250.00	19,100.00	0.00	1,500.00	17,600.00
FEB	23,200.00	7,440.00	15,800.00	0.00	1,500.00	14,300.00
MAR	22,400.00	7,220.00	15,200.00	0.00	1,500.00	13,700.00
APR	19,900.00	6,870.00	13,000.00	0.00	1,500.00	11,500.00
MAY	16,600.00	4,200.00	12,400.00	0.00	1,500.00	10,900.00
JUN	8,740.00	2,050.00	6,690.00	0.00	1,500.00	5,190.00
JUL	4,980.00	1,870.00	3,110.00	0.00	1,500.00	1,610.00
AUG	3,830.00	1,720.00	2,110.00	0.00	1,500.00	614.00
SEP	3,890.00	1,470.00	2,420.00	0.00	1,500.00	918.00
OCT	4,850.00	717.00	4,130.00	0.00	1,500.00	2,630.00
NOV	10,200.00	851.00	9,350.00	0.00	1,500.00	7,850.00
DEC	19,300.00	924.00	18,400.00	0.00	1,500.00	16,900.00
STO	15,200,000.00	2,250,000.00	13,000,000.00	0.00	1,090,000.00	11,900,000.00

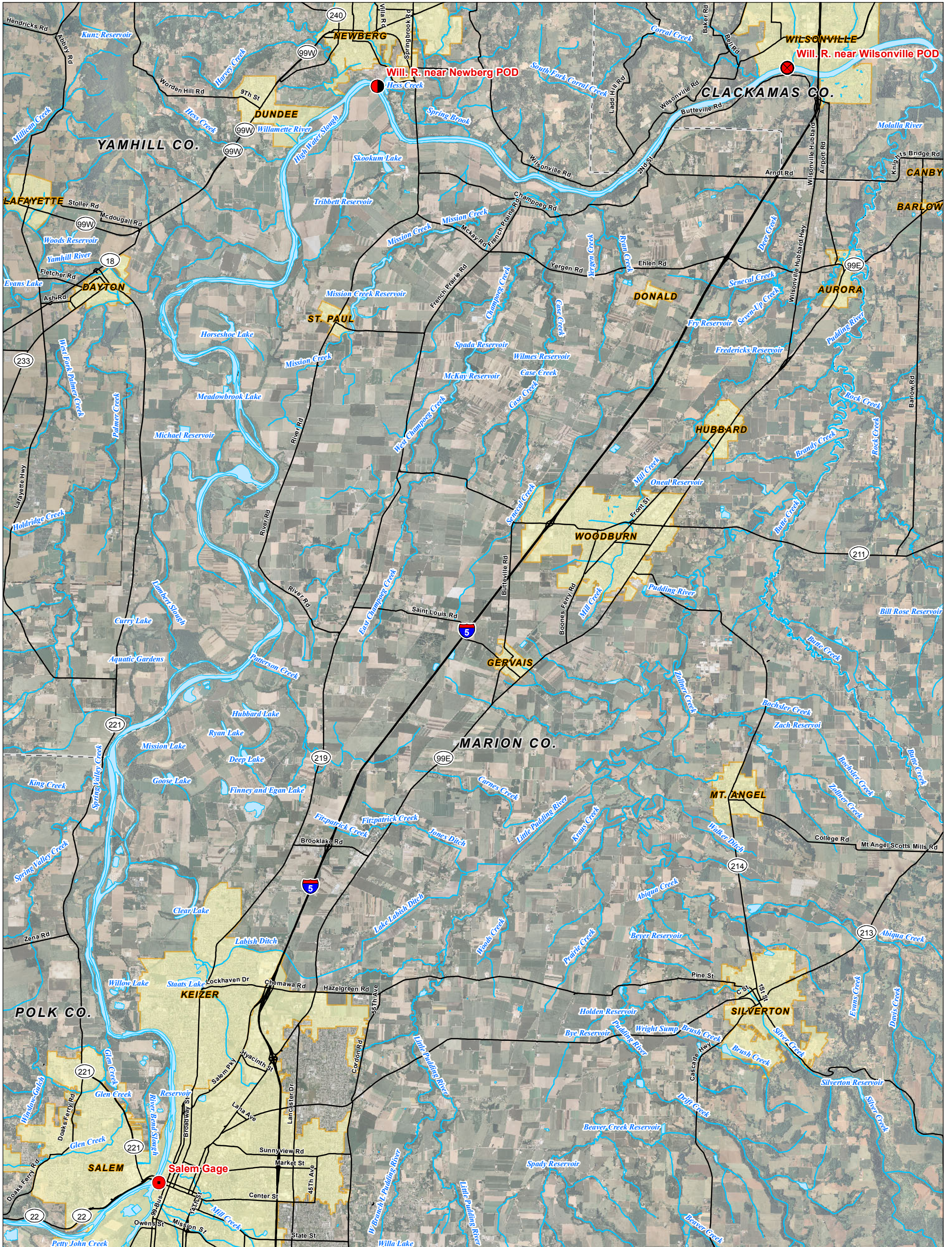
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# Appendix B

*Map of Salem Gage and Point of Diversion for the Willamette River at Wilsonville  
Option*

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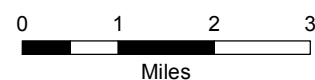
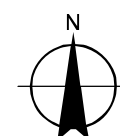
**LEGEND**

- Will. R. near Newberg POD
- Salem Gage
- Will. R. near Wilsonville POD
- Cities
- Counties
- Major Roads
- Major Watercourses
- Major Waterbodies

**Newberg, Salem, and Wilsonville Area Map**

Hillsboro Water Supply Study

**MAP NOTES:**  
 Date: August 30, 2010  
 Data Sources: USGS, OWRD, ESRI



# Appendix C

*Water Right Certificates and Municipal Permits for the Willamette River at  
Wilsonville Option*

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Willamette River at Wilsonville

DocumentName	Stakeholder	Uses	Source	TributaryTo	MaxRateCfs
Cert:45670 OR *	CITY OF EUGENE	IM	WILLAMETTE RIVER	COLUMBIA RIVER	128
Cert:59145 OR *	COUNTY OF LANE; PARKS AND RECREATION DIVISION	RC	WILLAMETTE RIVER	COLUMBIA RIVER	80.00
Cert:64748 CF *	PALMER CREEK WATER DISTRICT IMPROVEMENT CO.	IR,IS	WILLAMETTE RIVER	COLUMBIA RIVER	40.34
Cert:65400 OR *	CITY OF SALEM; DIRECTOR OF PUBLIC WORKS	AS	NORTH SANTIAM RIVER	SANTIAM RIVER	70.00
Cert:68537 OR *	CITY OF EUGENE; EUGENE WATER AND ELECTRIC BOARD	MU	MCKENZIE RIVER	WILLAMETTE RIVER	90.00
Cert:68663 CF *	SANTIAM WATER CONTROL DISTRICT	IR	NORTH SANTIAM RIVER	SANTIAM RIVER	139.40
Cert:84796 RR *	MUDDY CREEKS IRRIGATION PROJECT	IR,IS	MCKENZIE RIVER	WILLAMETTE RIVER	42.96
Permit:S 27441 *	CITY OF EUGENE	MU	MCKENZIE RIVER	WILLAMETTE RIVER	183.00
Permit:S 35551 *	CITY OF CORVALLIS	MU	WILLAMETTE RIVER	COLUMBIA RIVER	46.7
Permit:S 35819 *	CITY OF ADAIR VILLAGE	MU	WILLAMETTE RIVER	COLUMBIA RIVER	82
Permit:S 45565 *	CITY OF SALEM	MU	WILLAMETTE RIVER	COLUMBIA RIVER	200
Permit:S 49240 *	AMANDA RICH; WILLAMETTE RIVER WATER COALITION	IM,MU	WILLAMETTE RIVER	COLUMBIA RIVER	202

IM = industrial/manufacturing

RC = recreation

IR = irrigation

IS = irrigation (supplemental)

AS = aesthetics

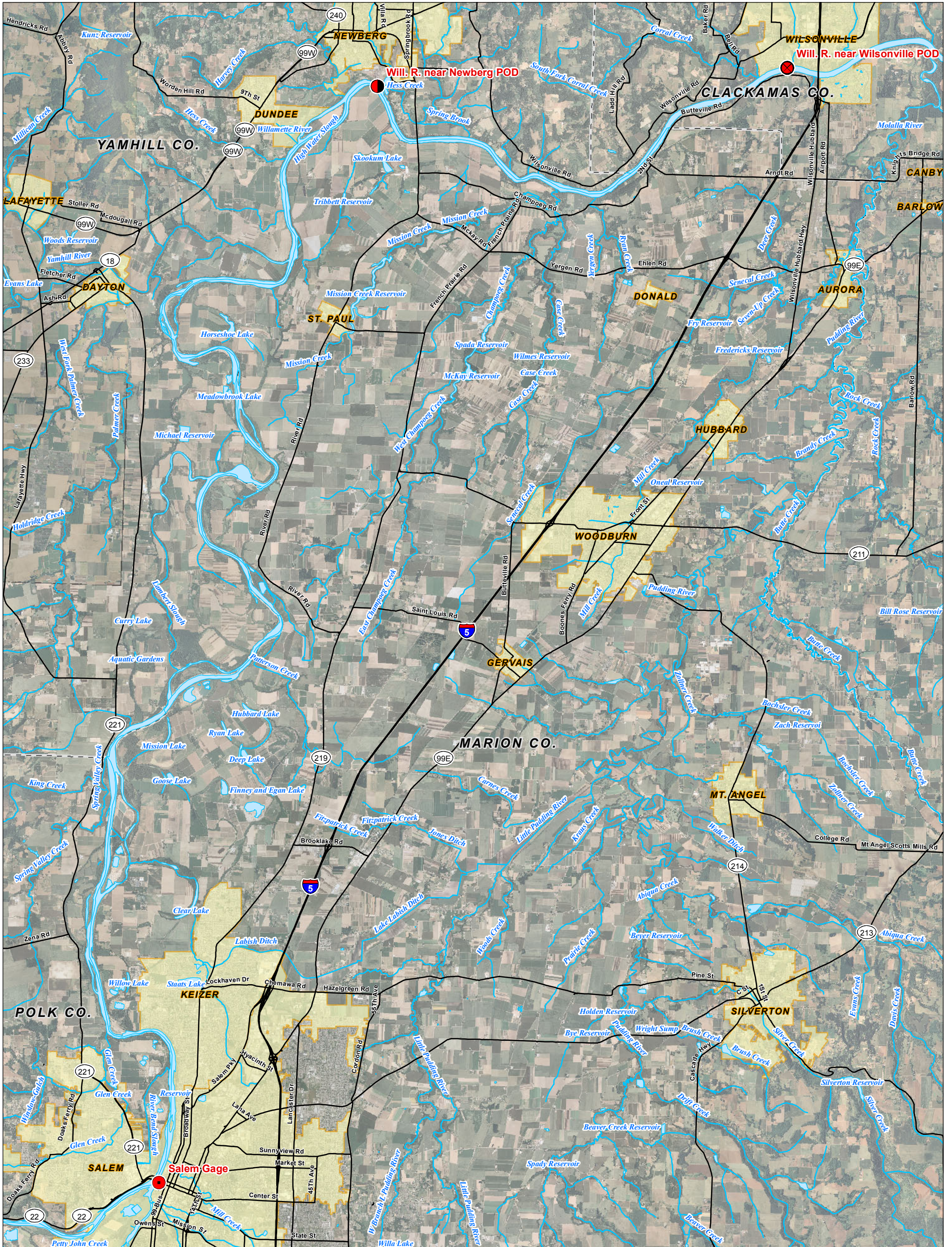
MU = municipal

# Appendix D

*Map of Point of Diversion for the Willamette River at Newberg Option*

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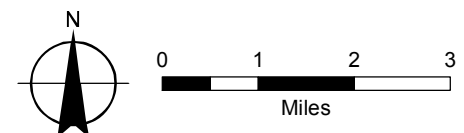


**LEGEND**

- Will. R. near Newberg POD
- Salem Gage
- ⊗ Will. R. near Wilsonville POD
- Cities
- Counties
- Major Roads
- Major Watercourses
- ⊕ Major Waterbodies

**MAP NOTES:**  
 Date: August 30, 2010  
 Data Sources: USGS, OWRD, ESRI

**Newberg, Salem, and Wilsonville Area Map**  
 Hillsboro Water Supply Study



# Appendix E

*Water Right Certificates and Municipal Permits for the Willamette River at  
Newberg Option*

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Willamette River at Newberg

DocumentName	Stakeholder	Uses	Source	TributaryTo	MaxRateCfs
Cert:45670 OR *	CITY OF EUGENE	IM	WILLAMETTE RIVER	COLUMBIA RIVER	128.00
Cert:59145 OR *	COUNTY OF LANE; PARKS AND RECREATION DIVISION	RC	WILLAMETTE RIVER	COLUMBIA RIVER	80.00
Cert:64748 CF *	PALMER CREEK WATER DISTRICT IMPROVEMENT CO.	IR,IS	WILLAMETTE RIVER	COLUMBIA RIVER	40.34
Cert:65400 OR *	CITY OF SALEM; DIRECTOR OF PUBLIC WORKS	AS	NORTH SANTIAM RIVER	SANTIAM RIVER	70.00
Cert:68537 OR *	CITY OF EUGENE; EUGENE WATER AND ELECTRIC BOARD	MU	MCKENZIE RIVER	WILLAMETTE RIVER	90.00
Cert:68663 CF *	SANTIAM WATER CONTROL DISTRICT	IR	NORTH SANTIAM RIVER	SANTIAM RIVER	139.40
Cert:84796 RR *	MUDDY CREEKS IRRIGATION PROJECT	IR,IS	MCKENZIE RIVER	WILLAMETTE RIVER	42.96
Permit:S 27441 *	CITY OF EUGENE	MU	MCKENZIE RIVER	WILLAMETTE RIVER	183
Permit:S 35551 *	CITY OF CORVALLIS	MU	WILLAMETTE RIVER	COLUMBIA RIVER	46.7
Permit:S 35819 *	CITY OF ADAIR VILLAGE	MU	WILLAMETTE RIVER	COLUMBIA RIVER	82
Permit:S 45565 *	CITY OF SALEM	MU	WILLAMETTE RIVER	COLUMBIA RIVER	200

IM = industrial/manufacturing  
 RC = recreation  
 IR = irrigation  
 IS = irrigation (supplemental)  
 AS = aesthetics  
 MU = municipal

# Appendix F

*JWC Live Flow Water Rights*

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## Appendix F. JWC Certificated Live Flow Water Rights for Municipal Use

Source	Priority Date	Application and Permit	Certificate	Entity name on water right	Authorized Rate (cfs)
Sain Creek	1/22/1912	A: S-2016 P: S-1136	c. 81026	City of Hillsboro	3.00
Sain Creek	5/1/1915	A: S-4250 P: S-2443	c. 81027	City of Hillsboro	2.00
Tualatin River	8/15/1930	A: S-13681 P: S-10408	c. 67891	City of Hillsboro	9.00
Tualatin River	2/6/1974	A: S-51643 P: S-46423	c. 85913	City of Hillsboro	43.00
Tualatin River	7/15/1980	A: S-60357 P: S-45455	c. 85914	City of Beaverton	25.00
Roaring and Clear Creeks and Tualatin River	4/28/1976	A: S-54203 P: S-40615	c.85916	City of Forest Grove	33.00*
Total					115.00

\* Certificate 85916 authorizes the use of up to 38.26 cfs. The JWC portion of this water right is 33 cfs from Tualatin River.

# Appendix G

*Water Availability Analysis for Gage 14206500 on the Tualatin River*

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## Water Availability Analysis Detailed Reports

TUALATIN R > WILLAMETTE R - AT GAGE 14206500  
WILLAMETTE BASIN

Water Availability as of 5/27/2010

Watershed ID #: 30201013

Date: 5/27/2010

Exceedance Level: 80%

Time: 3:47 PM

Water Availability Calculation	Consumptive Uses and Storages	Instream Flow Requirements	Reservations
Water Rights		Watershed Characteristics	

### Water Availability Calculation

Monthly Streamflows in Cubic Feet per Second  
Storage at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,090.00	500.00	590.00	0.00	100.00	490.00
FEB	1,420.00	563.00	857.00	0.00	100.00	757.00
MAR	1,140.00	424.00	716.00	0.00	100.00	616.00
APR	676.00	324.00	352.00	0.00	100.00	252.00
MAY	332.00	268.00	63.80	0.00	100.00	-36.20
JUN	179.00	297.00	-118.00	0.00	100.00	-218.00
JUL	80.90	329.00	-248.00	0.00	100.00	-348.00
AUG	44.30	312.00	-268.00	0.00	100.00	-368.00
SEP	54.20	267.00	-213.00	0.00	94.50	-307.00
OCT	69.40	151.00	-82.00	0.00	100.00	-182.00
NOV	160.00	258.00	-97.90	0.00	100.00	-198.00
DEC	758.00	483.00	275.00	0.00	100.00	175.00
STO	751,000.00	251,000.00	544,000.00	0.00	72,100.00	502,000.00

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# Appendix H

*Water Availability Analysis for Gage 14207500 on the Tualatin River*

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## Water Availability Analysis Detailed Reports

TUALATIN R > WILLAMETTE R - AT GAGE 14207500  
WILLAMETTE BASIN

Water Availability as of 5/27/2010

Watershed ID #: 30201006

Date: 5/27/2010

Exceedance Level: 80%

Time: 4:18 PM

Water Availability Calculation	Consumptive Uses and Storages	Instream Flow Requirements	Reservations
Water Rights		Watershed Characteristics	

### Water Availability Calculation

Monthly Streamflows in Cubic Feet per Second  
Storage at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,290.00	461.00	829.00	0.00	250.00	579.00
FEB	1,640.00	521.00	1,120.00	0.00	250.00	869.00
MAR	1,300.00	381.00	919.00	0.00	250.00	669.00
APR	833.00	278.00	555.00	0.00	250.00	305.00
MAY	407.00	229.00	178.00	0.00	250.00	-72.30
JUN	191.00	289.00	-98.40	0.00	130.00	-228.00
JUL	90.30	332.00	-242.00	0.00	100.00	-342.00
AUG	68.60	311.00	-243.00	0.00	100.00	-343.00
SEP	46.80	254.00	-207.00	0.00	94.50	-301.00
OCT	52.00	96.90	-44.90	0.00	100.00	-145.00
NOV	183.00	207.00	-24.40	0.00	250.00	-274.00
DEC	967.00	441.00	526.00	0.00	250.00	276.00
STO	913,000.00	229,000.00	718,000.00	0.00	137,000.00	611,000.00

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# Appendix I

## *Outline of Information for an ASR Limited License Application*

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**Detailed Information Required in the ASR Limited License Application per OAR 690-350-020**

<b>OAR</b>	<b>Comments</b>
690-350-020 (2) <b>Pre-Application Conference</b>	To be determined – will query OWRD on the likelihood of application being approved and what specific information it will need, such as site-specific hydrogeologic data for well clusters
690-350-020 (3) (a) <b>Applicant Information</b>	Application Form – standard OWRD form
690-350-020 (3)(a)(B) <b>Operations Information</b>	Include a Pilot Testing Program in the ASR limited license application
690-350-020 (3)(a)(C) <b>License Duration</b>	Outlined in the pilot testing program description
690-350-020 (3)(a)(D) <b>Proposed Use</b>	Outlined in the pilot test program description
690-350-020 (3)(a)(E) <b>Ultimate Project Size</b>	Define the number of ASR wells, locations, rates, and anticipated storage volume
690-350-020 (3)(a)(F) <b>Water Right Statement</b>	A letter will need to be signed by JWC allowing the use of their water right permit for the proposed ASR project
690-350-020 (3)(a)(G) <b>Water Right Holder Agreement</b>	The letter stated above, must be approved and signed by the JWC and included in the application
690-350-020 (3)(a)(H) <b>Legal Land Use</b>	Land use approval will be required for the different proposed ASR sites – multiple jurisdictions will be involved, thus this step will require time to complete
690-350-020 (3)(a)(I) <b>Map</b>	The ASR limited license will include detailed maps outlining ASR well locations and detailed geologic and hydrogeologic information necessary for the ASR limited licenses application to be evaluated by OWRD.
690-350-020 (3)(a)(J) <b>DHS Compliance</b>	Preliminary system operation and wellhead facility designs should be prepared for one or two ASR test wells and these will be reviewed by DHS and included in the application. Future ASR wells also will receive operation and design approval as they become available.
690-350-020 (3)(a)(K) <b>Supplemental Information</b>	Included as needed in the application

<b>OAR</b>	<b>Comments</b>
690-350-020 (3)(b)(A) <b>Proposed ASR Test Program</b>	The ASR limited license will include a detailed pilot testing program (rates, storage volumes, injection and recovery periods), a detailed water quality monitoring and testing program, and a quality assurance and quality control plan for select wells and amended in the future for additional wells
690-350-020 (3)(b)(B) <b>Proposed System Design</b>	The application will include a system operation and wellhead facility design for at least one test well and amended in the future for additional wells as they are brought on line.
690-350-020 (3)(b)(C) <b>Groundwater Information</b>	Using existing information, site-specific hydrogeologic setting, and water quality data will be included in application.
690-350-020 (3)(b)(D) <b>Source Water Quality</b>	Using existing information detailed water quality will be included in the application.
690-350-020 (3)(b)(E) <b>Comments on Source Water/Standards</b>	The application will include source water data from the JWC treatment plant
690-350-020 (3)(b)(F) <b>Receiving Water Quality</b>	Using existing information detailed water quality will be included in the application.
690-350-020 (3)(b)(G) <b>Comments on Compatibility</b>	Using existing data the application will demonstrate that water quality compatibility issues have not occurred using JWC source water and assuming basalt aquifers as the receiving formation
690-350-020 (3)(c) <b>Other Information</b>	A UIC registration for each proposed test well will be included since the permit is needed for injection testing during the exploration phase. Future UIC permits will be amended to the permit as ASR wells come on line.

# Appendix J

## Methodology for Preliminary Water Rights Evaluation and Ranking Table



**Water Solutions, Inc.**

11/2010

**Memorandum** - CONFIDENTIAL: ATTORNEY-CLIENT PRIVILEGED COMMUNICATION, EXEMPT FROM PUBLIC DISCLOSURE.

**To:** Niki Iverson, City of Hillsboro  
**From:** Adam Sussman, GSI Water Solutions, Inc.  
**RE:** Hillsboro Water Supply Options: Preliminary Water Rights Screening Evaluation

As part of the City of Hillsboro’s Water Supply Alternatives Project, GSI Water Solutions, Inc. (GSI) produced the draft report *Water Rights Review of Water Supply Options (Technical Report No. 4)* in November 2010. This report evaluated several water supply options (from a water rights perspective) available to the City. In order to begin rating these options, GSI and the City developed draft preliminary screening criteria for consideration by the project partners.

The draft criteria consider each option’s feasibility based on: water availability, ability to obtain the required water use authorization, reliability of the water right, and the quantity of water available versus the total amount of water needed. For each supply option, each criterion is rated on a scale of 1 to 5, with 1 representing the lowest feasibility and 5 representing the greatest feasibility (Table 1). The ratings assigned to each criterion are then summed for each option. Preliminary screening results including additional background associated with the ratings are in Table 2.

Table 1. Preliminary screening criteria to evaluate Hillsboro water supply options\*.

Criteria	1	2	3	4	5
<b>Water availability</b>	Very limited	Small period of the year	Seasonally or part of the year	Most of the Year	Year-Round
<b>Ability to obtain the water use authorization</b>	Very limited options	One or two viable options, but high public interest (resource constraints/third parties)	Two or more viable options, high public interest	One or two viable options & low public interest	Many viable options, low public interest
<b>Reliability of the water right</b>	Subject to regulation for conditions or priority date	High likelihood of regulation for conditions or priority date	Moderate likelihood of regulation for conditions or priority date	Low likelihood of regulation for conditions or priority date	No condition or priority date concerns
<b>Quantity of water available vs. Total amount of water needed</b>	1 - 25%	26-50%	51-75%	76-90%	91-100%

\* These criteria are being used to evaluate water supply options from only a water rights perspective

Table 2. Hillsboro Water Supply Options: Ratings for Preliminary Water Rights Screening with Explanations

Source Options	Water Availability	Ability to Obtain Water Use Authorization	Reliability of Water Right	Quantity Available vs. Total Quantity Needed	Total Rating
<b>Willamette River at Wilsonville or Newberg<sup>1</sup></b> new water use permit acquire existing water right federal storage contract	5 Water available year-round for a new water right; upstream permits and certificates available	4 Could obtain a new permit; could transfer existing water rights; low public interest	4 New water right would have "flow target" conditions; existing permits could already have "flow target" conditions, but those are less restrictive than a new permit	5 Over 600 cfs available in the peak-season for a new permit	18
<b>Willamette River at Newberg<sup>2</sup></b> exchange with TVID and BOR	3 TVID right would only provide water during the irrigation season	1 Ability to receive approval of exchange unlikely	3 New permit on the Willamette River would have "flow target" conditions	2 TVID's stored water may not meet future demands	9
<b>Willamette River at Newberg</b> agreement with TVID	4 Water available for new stored water right for irrigation; TVID Scoggins stored water likely only available during irrigation season for municipal use	4 Could obtain a new permit; several viable options to gain access to TVID stored water; low public interest	4 Unclear about stored water right and contract conditions, but stored water should be reliable; use of TVID's stored water is reliable	2 TVID's stored water may not meet future demands	14
<b>Tualatin Basin Water Supply Project</b> storage & secondary water right application natural flow	4 Scoggins Creek only available in January for storage; pump back from Tualatin available November through May for storage; Scoggins Creek live flow has limited availability; new live flow permit from Tualatin River limited to December through April	3 High public interest in dam raise; dam raise and new Tualatin permit are viable options	3 High likelihood of conditions on storage right and live flow right	5 Storage right could meet projected demand; live flow permit could support ASR	15
<b>City of Portland</b> surface water rights groundwater rights	5 Water available year-round	4 Water use authorization already obtained but cannot go forward without regional water supply agreement	4 Well-established surface water right with some potential limitations associated with Portland's HCP; groundwater permits do have permit extension conditions	4 Quantity appears available for projected demand, but more information is needed from the City of Portland	17
<b>Northern Groundwater</b> new groundwater permit acquire existing groundwater right acquire existing surface water right (surface to groundwater transfer)	5 Water available year-round assuming no PSI	3 Pursuit of new groundwater use will result in high public interest due to resource and land use concerns	4 New groundwater use with no PSI will have a low likelihood of regulation	3 Quantity available may only partially meet projected demand	15
<b>Durham</b> new water use permit new water use permit for "Treated effluent" reclaimed water registration	1 Water only seasonally available for live flow permit; Clean Water Services has a first right of refusal agreement with TVID; seasonal and daily variability	3 New permit for seasonal use may be viable; reclaimed water registration likely not viable	1 TVID's right of first refusal, seasonality of supply, existing water rights, existing discharge permits, and dependence on future treated effluent make this option relatively unreliable	1 Seasonal use and future treated effluent do not meet projected demand	6
<b>Aquifer Storage and Recovery (ASR)</b> use of existing Hillsboro live flow right	5 Non-peak season source water available; ASR stored water available for peak-season use	4 Source water already obtained; ASR limited license viable	4 Source water generally available without regulation during non-peak season; limited license conditions TBD	2 Quantity will not meet projected demand; strategic use as a bridge to other options	15

<sup>1</sup> Any options for water right or use authorization for the Willamette and Newberg options for municipal water are virtually the same. The locations are in the same regulatory reach of the river for flow and/or fish persistence conditions. Therefore, these supply options were combined for screening purposes.

<sup>2</sup> The supply option that considers an exchange with TVID (new water right permit on the Willamette in exchange for stored water in Scoggins) involves a very different regulatory process than the previous option and several regulatory hurdles for consideration