

Building on the Success and Reliability of ASR: City of Beaverton's Critical Supply Infrastructure

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Outline




- Beaverton supply and ASR history
- ASR operation and maintenance
- ASR expansion evaluation (“master plan”)
- ASR 5 well siting
- Long-term plans and closing


Menu  Set Weather  OREGONLIVE
 The Oregonian

Houses hide Beaverton's underground water supply



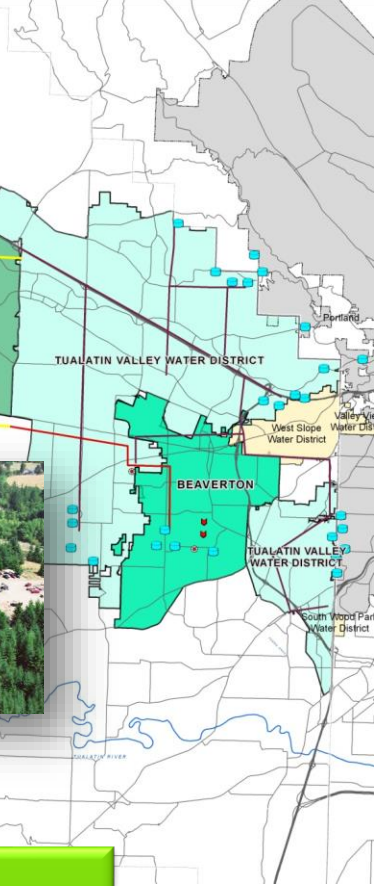
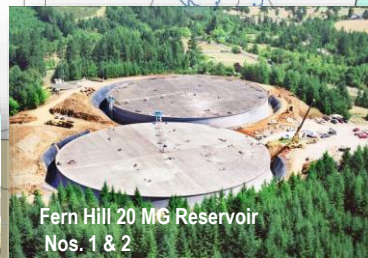
This house on SW Hanson Street hides a wellhead and giant water pump. The city of Beaverton keeps a store of water in aquifers on Sexton Mountain, but ugly wells and water pumps aren't welcome in subdivisions, so the city hides them in house facades. (Wendy Owen/Staff)

1 / 10   Share  Caption

By  Wendy Owen | [The Oregonian/OregonLive](#)
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on July 01, 2015 at 6:00 AM, updated July 01, 2015 at 2:14 PM



JOINT WATER COMMISSION WATER SOURCES AND SERVICE AREAS



Other Wholesale Customer
Wholesale Provider

**JWC Water Supply System
(75% of City's summer water), ASR (25%
summer water)**



City of Beaverton Water System & Supply

Beaverton ASR capacity: 5 mgd

COB JWC transmission capacity: 14 mgd

COB JWC treatment capacity: 21.7 mgd

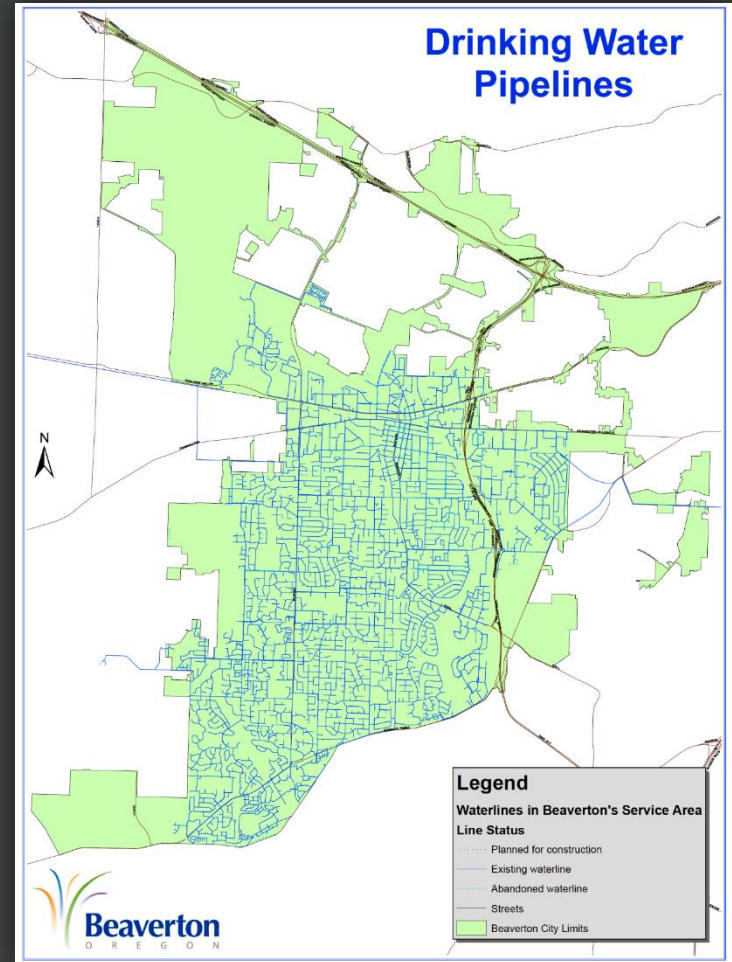
2015 Average Daily Demand (ADD): 6.98 mgd

2015 Peak Day Demand (PDD): 13.4 mgd

2015 Peak Day Demand (PDD):
15.2 mgd (COT 2 mgd, 7/31/15)

2003 Peak Day Demand (PDD):
16.85 mgd (COB only)

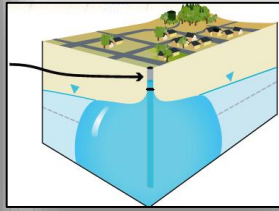
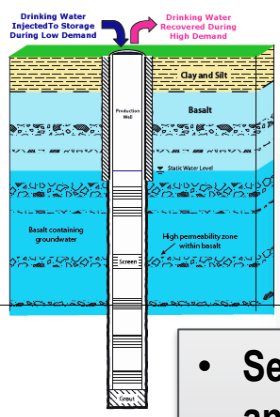
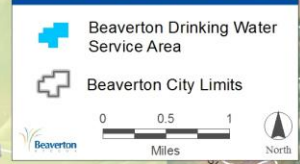
City of Beaverton water customers:
70,000 population



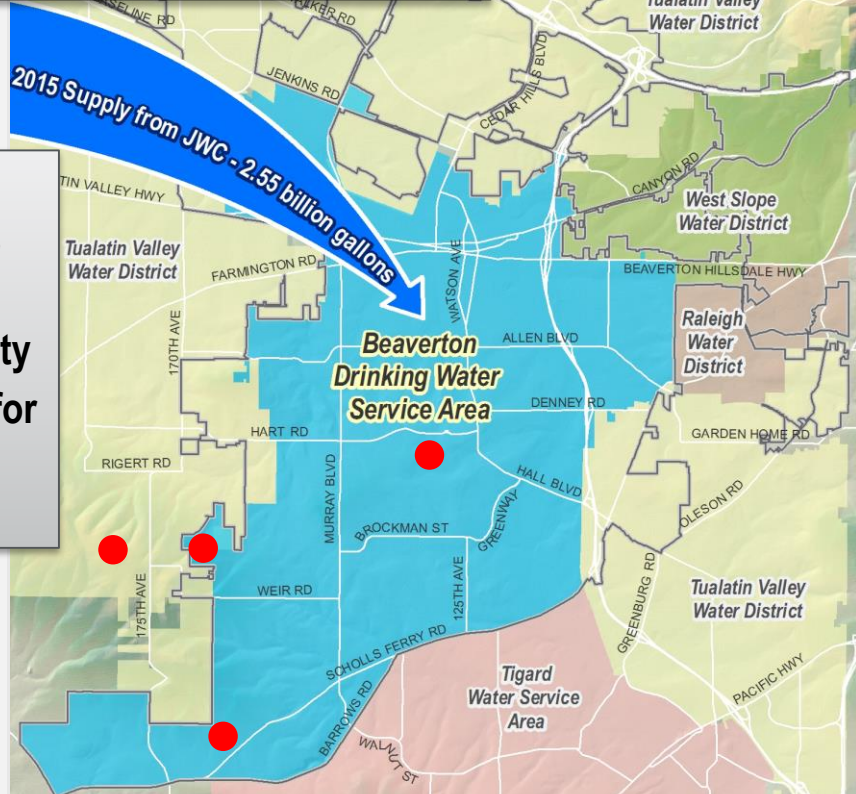
Beaverton ASR Program

City of Beaverton

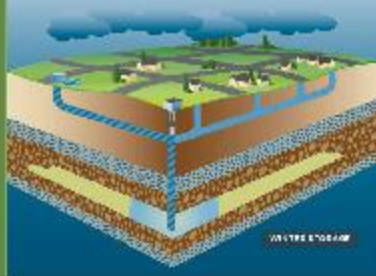
Total City Population: 94,000
 Total Customer Water Meters: 18,500
 Population Served: 70,000



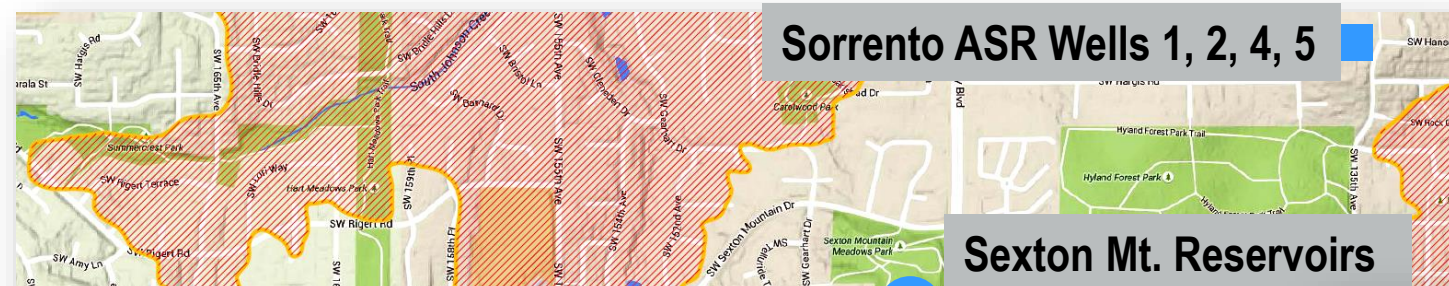
- Second municipality in Oregon to develop ASR, and have been successfully operating ASR wells since 1998.
- Two active ASR wells (ASR2, ASR4), 5MG capacity
- Currently in an ASR expansion phase on a path for up to three future facilities to serve growth, emergencies and create resiliency.



1. SAKINAKI
 2. Process transformation
 3. Storage and recovery
 4. Distribution and storage
 5. Use recovery
 6. Emergency storage
- VERTICAL STORAGE... BEAVERTON...
 A LARGE PORTION...
 BEAVERTON...
 BEAVERTON...
 BEAVERTON...



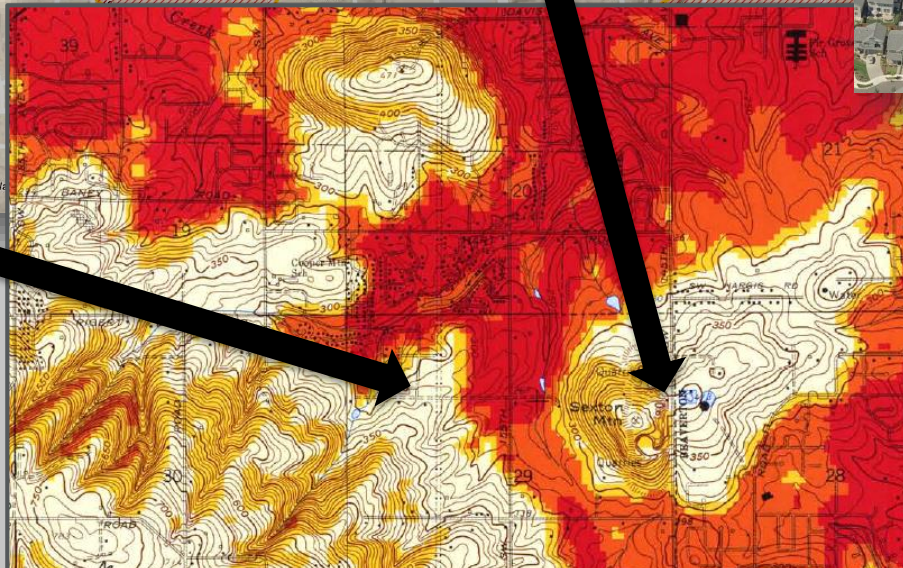
Sorrento ASR Wells 1, 2, 4, 5



Sexton Mt. Reservoirs



ASR Well 6



COB Water Reservoirs and ASR Facilities located in locations with lower earthquake hazard



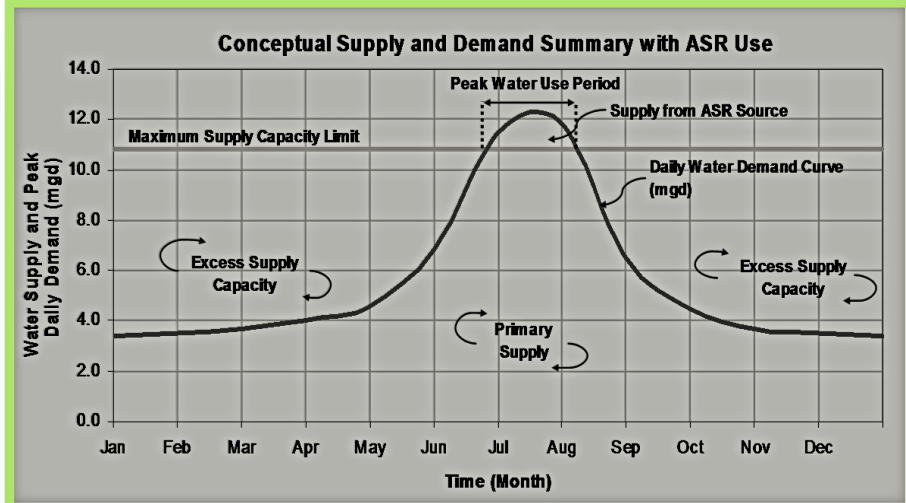
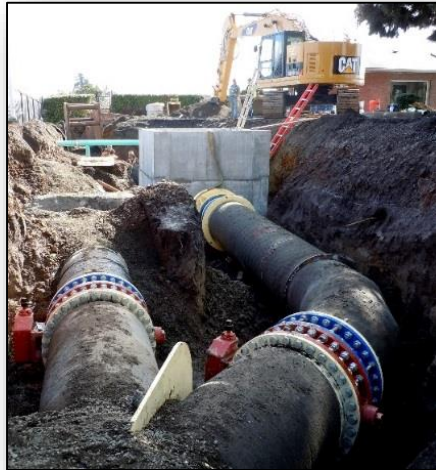
Why Use Aquifer Storage and Recovery (ASR)?

- Ability to meet summer peak water demands by use of wintertime excess WTP capacity. Preserve stored surface water during summer shortages.
- Backup in-town supply during interruption from JWC supply, which is 20 miles distant.
- Wells more resilient to large seismic events.
- Delays in JWC capital projects costs.
- Benefit/Cost equals 1.25



Barney Reservoir
8/20/15, 30% full

April 2015
COB 36" Transmission Line
& JWC STL Project







1997 - ASR No. 1
1 mgd (out of service)

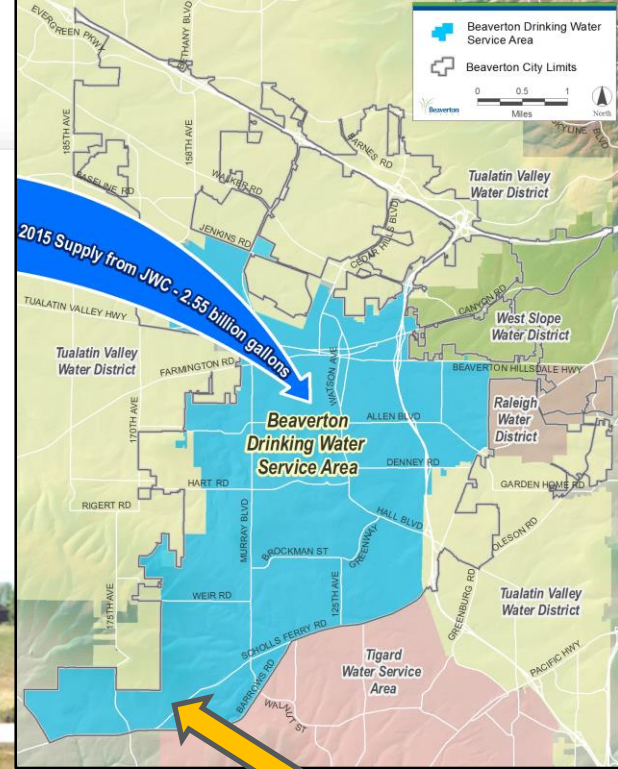
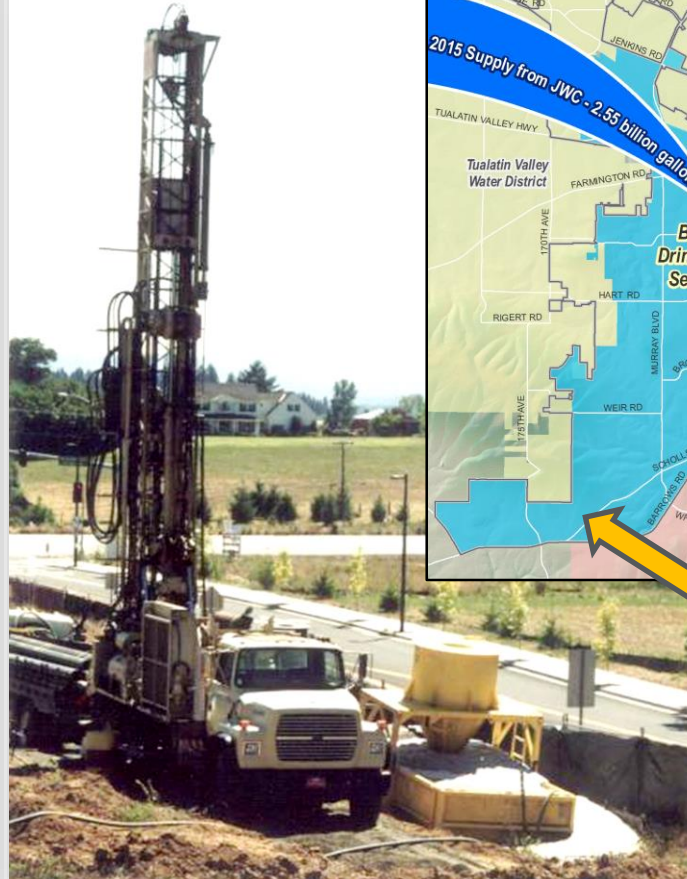


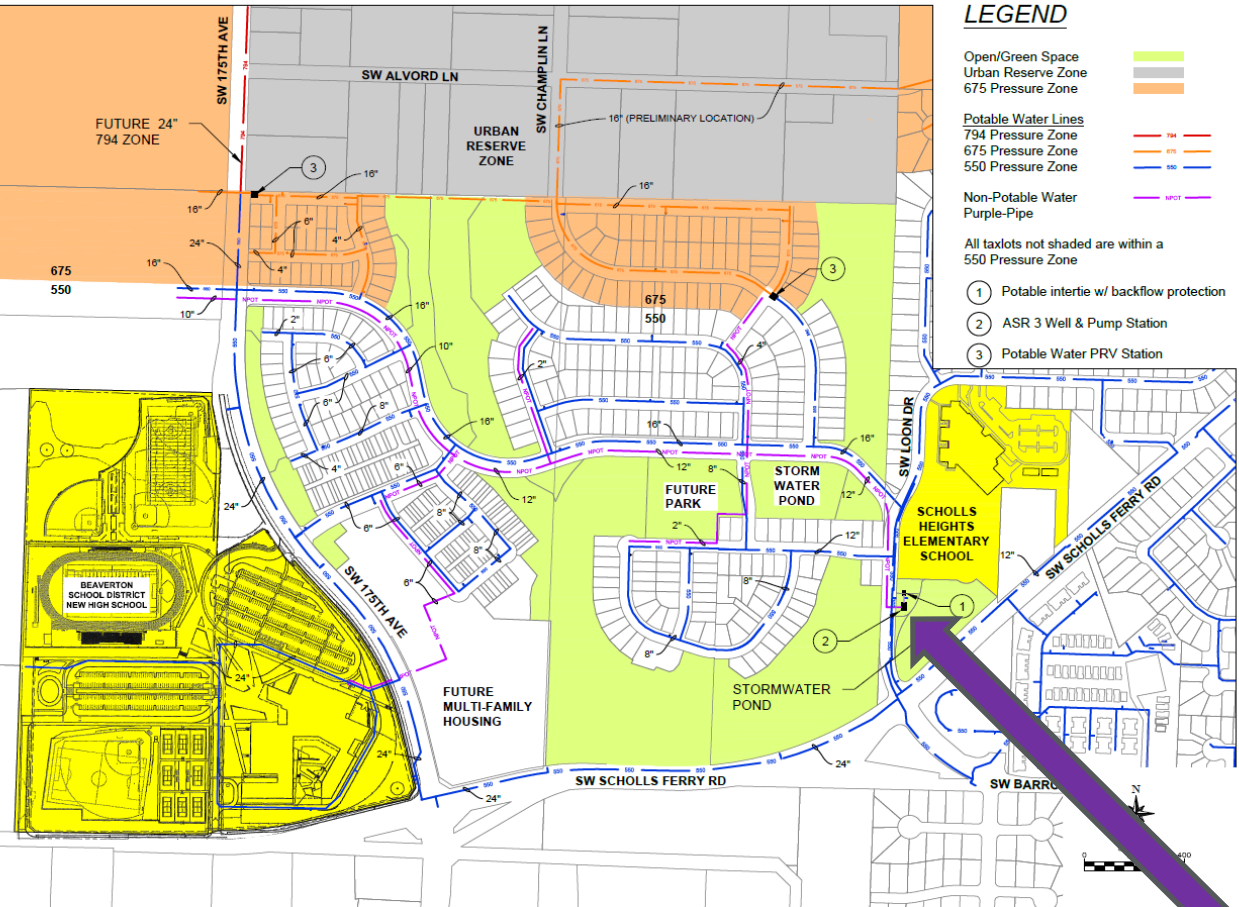
2001 - ASR No. 2
2 mgd



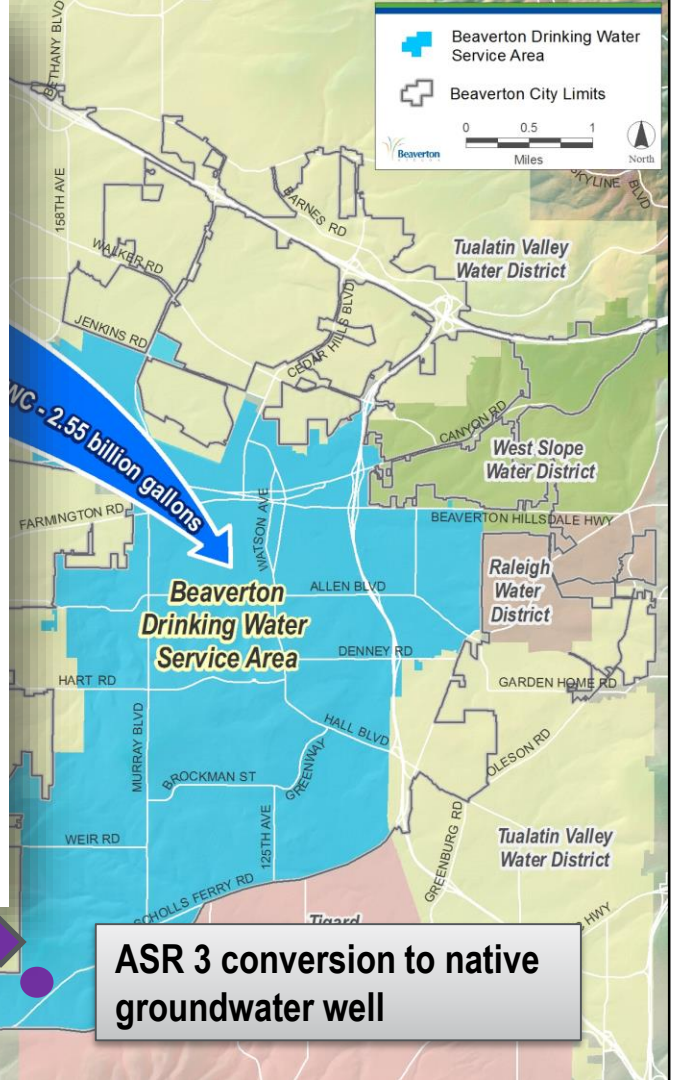
2007 - ASR No. 4
3 mgd

ASR No.3 – Drilled in 2000 (0.7MG)





**South Cooper Mt. Development Area
Non-Potable Purple Pipe Water System**



**ASR 3 conversion to native
groundwater well**

ASR No. 4
3 mgd
Operational February 2007

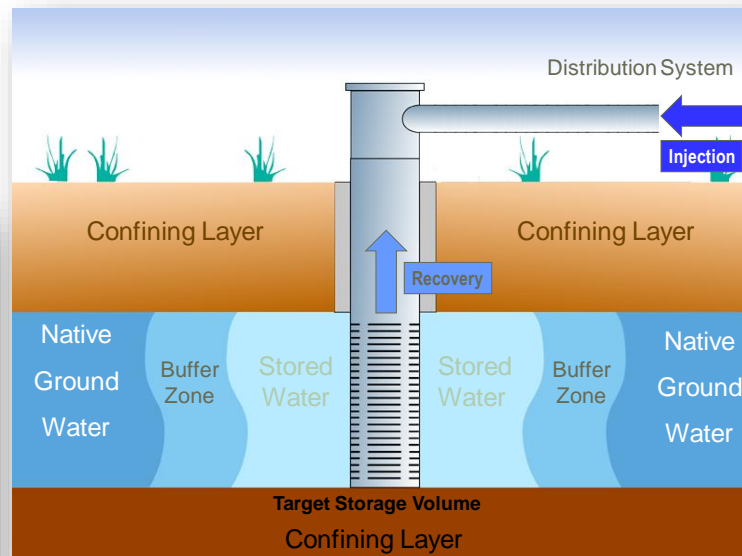


Operation and Performance

- How City operates the ASR
- When / why ASR 1 was taken off line
- Current performance



The Importance of a Downhole Valve



- Better control of injection/recovery flow rate
- Pump to waste (40-50K gallons)
- Injection rate 75% of recovery rate
- Minimize risk of air plugging
- Removes suspended materials
- Water quality testing and monitoring

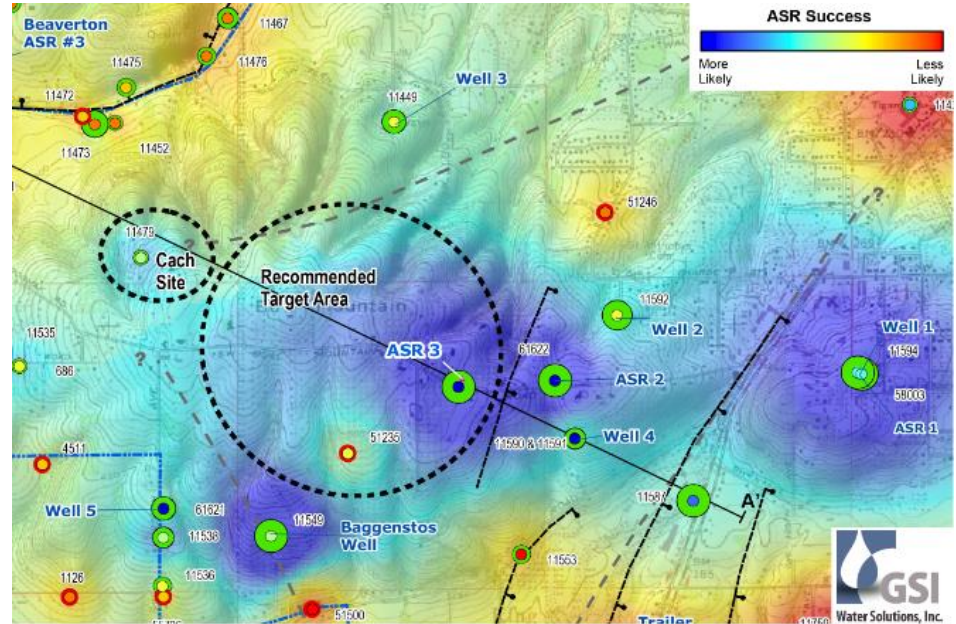


ASR Expansion Study (“Master Plan”) Where Do We Drill Next?

ASR Expansion Evaluation

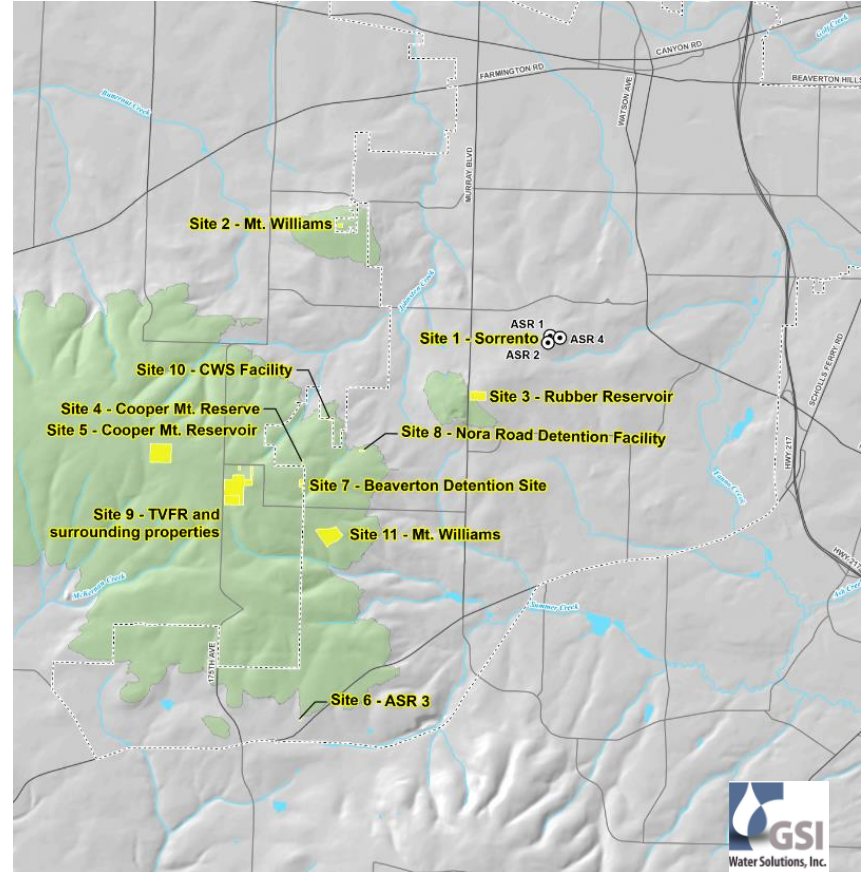
Goal:

- Develop additional ASR capacity (>1 mgd) and increase storage capacity (>100 MG)
- Formally document ASR expansion plan for planning/communications & budgeting/funding



ASR Expansion Evaluation

- Initial screening to identify key sites based on:
 - Infrastructure needs
 - Ownership and land use
 - Site conditions
 - Preliminary planning level costs
- Short-list additional evaluation:
 - Hydrogeology, ASR potential
 - Engineering considerations (site layout, hydraulic assessment)

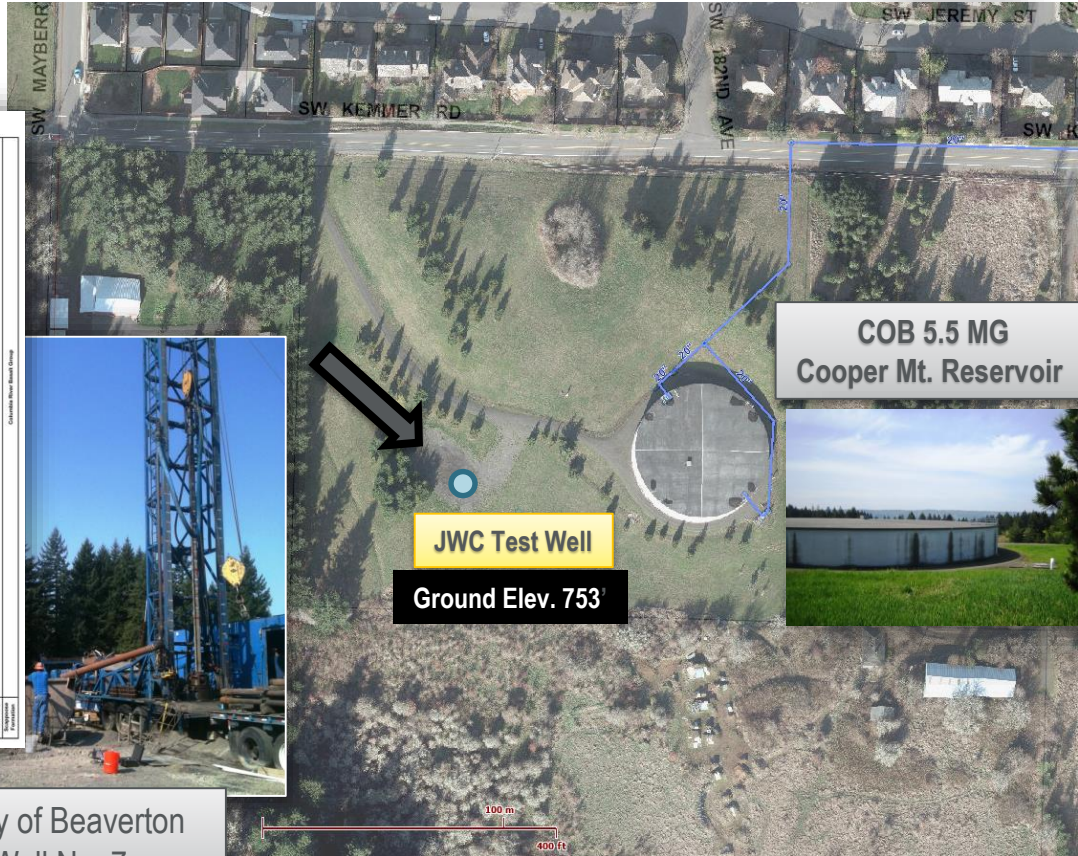
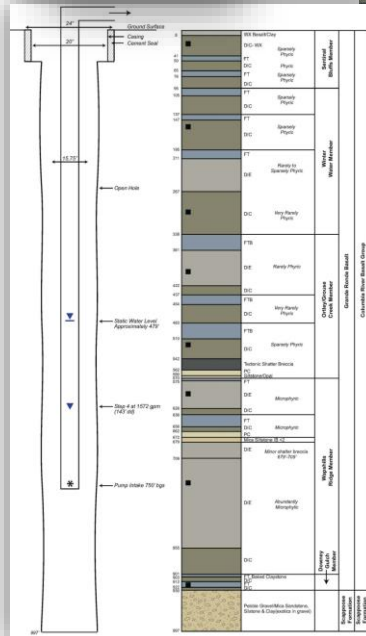


Evaluation of short-listed sites

Site No.	Description/ Name	Opinion of Total Cost	Infrastructure Requirements	Ownership/ Land Use	Site Conditions	Cost per mgd capacity	Hydrogeologic Criteria	Net Relative Score
A	Sorrento	(+) \$2.94M	(0)	(+) City-owned	(+) Minimal additional site development	(0) \$4,232 (1.0 mgd)	(0) 1 mgd yield and 150 MG storage	+3
D	Cooper Mountain Reserve	(-) \$3.97M	(+) Existing detention facility for pump-to-waste	(-) Privately-owned	(0) Site grading required	(+) \$3,815 (1.5 mgd)	(+) 1.5 mgd yield and 200 MG storage	+1
E	Cooper Mountain Reservoir	(-) \$4.31M*	(0)	(+) City-owned	(+) Ability to install multiple wells at site	(+) \$2,482 (2.5 mgd)	(+) 2.5 mgd yield and 200 MG storage	+3
H	Development Detention Facility	(+) \$2.95M	(+) Existing detention facility site for pump-to-waste	(+) City-owned	(-) Mitigation for current site function; Proximity to residences; tight space	(0) \$4,255 (2.0 mgd)	(0) 1 mgd yield and 150 MG storage	+2



JWC ASR Test Well Site 44 (1,000' depth, 14" diameter)



**COB 5.5 MG
Cooper Mt. Reservoir**

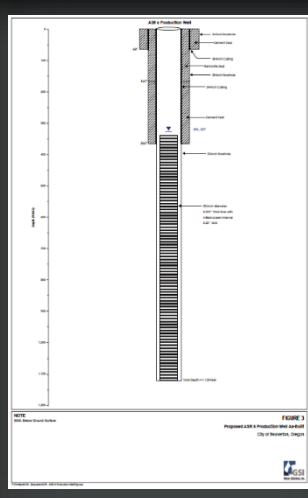
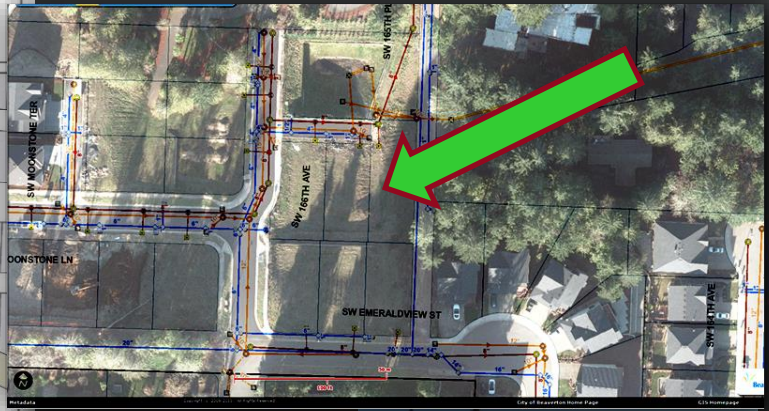
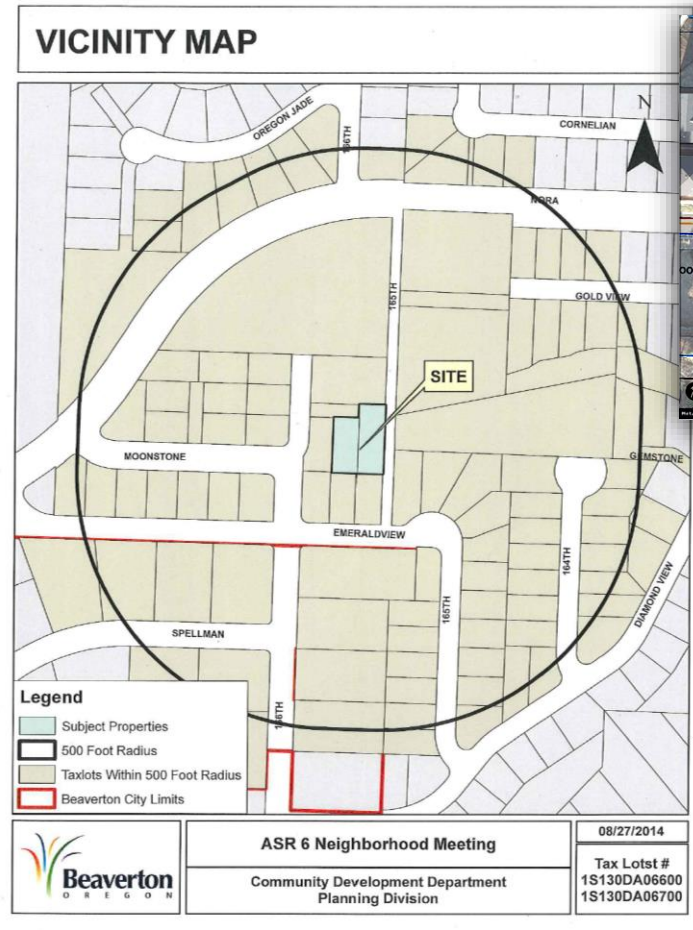


**JWC Test Well
Ground Elev. 753'**



**Future City of Beaverton
ASR Well No. 7**

Future ASR 6 Location



Infrastructure Finance Authority (IFA) Funding for ASR No. 5

- Application process
- Business case (mitigate contamination, replace lost capacity, green element – regenerative drive)
- Benefits and “hurdles” (lessons learned)
- How City was able to secure additional loan amount

APPLICATION - General

Infrastructure Finance Authority
Oregon Business Development Department
775 Summer St, NE, Suite 209
Salem, Oregon 97301-1200

Applicant: City of Beaverton

Project Name: Beaverton Aquifer Storage & Recovery (ASR) Well No. 5

Applicant Information

Applicant's Organization Type:

City Special District, organized under ORS County Port District, organized under ORS Other

Contact Name: Brian Barnett, P.E. Phone: (503) 536-2892
 Fax: (503) 588-4052
 Title:
 Project Manager: Email: bbarnett@beavertonoregon.gov
 Mailing Address: City of Beaverton, PO Box 4755, Beaverton, OR 97076
 Street Address: 12725 SW Millikan Way, Beaverton, OR 97005

Applicant's Federal Tax ID No: 93-6002125

Budget Line Item	Project Budget			Total
	IFA Funding Source 1	IFA Funding Source 2	Non-IFA Funds	
Planning/Engineering	\$650,000		\$200,000	\$850,000
ASR Well Design and Drilling	\$850,000			\$850,000
Pump Station/Well House Construction	\$1,500,000		\$1,500,000	\$3,000,000
Construction Contingency	\$250,000		\$250,000	\$250,000
Totals	\$3,000,000		\$450,000	\$3,450,000

Page 1 of 4
Revised 02/20/12

Application Supplement for
Safe Drinking Water Revolving Loan Fund
Drinking Water Project

Please refer to the current Safe Drinking Water Revolving Loan Fund (SDWRLF) Program Guidelines & Applicant's Handbook and the Green Project Reserve (GPR) Project Eligibility Guidance (PEA) Eligibility Guidance dated April 20, 2010 as references to be used in the completion of this SDWRLF Application Supplement. Electronic versions of these documents are available by contacting your Regional Coordinator. For questions, please contact your Regional Coordinator.

REQUIRED APPLICANT NAME & DUNS NUMBER

Applicant: City of Beaverton (OR) Business: 537945
 DUNS Registration: Once registered please go to: <http://www.dunsmicro.com>
 OR Registration: - Add your DUNS Number and find your active registration
 - Print the Screen
 - Include the printout with your application
 NOTE: The OR registration expires annually and must be kept active until the SDWRLF project is closed.

Project Type
 Planning & Preliminary Engineering
 Final Design (includes Specifications)
 Construction
 Final Design and Construction
 Note: This is not Design/Bid

Detailed Project Budget

Budget Line Item	Complete for Planning/Design			Total
	SDWRLF	Other IFA Funds	Non-IFA Funds	
Planning, Preliminary Engineering & Feasibility:				
• Site Planning, Layout, Preliminary land surveying & prepare Preliminary Design for ASR's Pumping Station and site improvements	\$50,000			\$50,000
• Prepare EIR as outlined in the Environmental Review Process Handbook for DWSRF, revised November 2012. (Costs shown under environmental review line below.)	\$5,000			\$5,000
• FERC Consult, Exemption and Hydro-power Water Rights Application	\$40,000			\$40,000


 January 21, 2015

The Honorable Dennis Doyle
Mayor of Beaverton
PO Box 4755 / 12725 Millikan Way
Beaverton, OR 97076

RE: Award for Safe Drinking Water Revolving Loan Fund, Beaverton Aquifer Storage and Recovery Well No. 5, Project No. 331506, Awarded January 20, 2015.

Dear Mayor Doyle:

Congratulations on your successful application for the above-referenced project to construct the new Aquifer Storage and Recovery (ASR) Well No. 5 and convert ASR Well No. 1 to a monitoring well at the Sororia Reservoir and Pump Station site.

The award consists of a Loan of \$2,250,000 and a Forgivable Loan of \$750,000 for a total award of \$3,000,000. The interest rate on the loan will be 2.96% for a maximum term of 20 years. The forgivable loan is based largely on the determination by the Oregon Health Authority that this project is consistent with an "Environmentally Innovative" project.

A contract will be sent to you shortly for your signature containing the full terms and conditions of your award. Please note that the legal obligations for funding and for reimbursement of project expenses are subject to execution of the contract.


Your project is being administered through the Infrastructure Finance Authority. We encourage you to offer appropriate media opportunities to help build public awareness of your project's purposes and benefits. Please notify us of any event celebrating your project.

As always, we are available to answer questions that may arise during the implementation of your project. If you need assistance, please contact me in Portland at (503) 229-5222 or by email at jane.a.hillcock@oregon.gov.

Sincerely,

 Jane Hillcock, Regional Coordinator
 Infrastructure Finance Authority

• Brian Barnett, P.E., Project Engineer
 David Manning, P.E., Principal Engineer
 David Wolff, Assistant Finance Director
 IFA


 PUBLIC HEALTH DIVISION
 Center for Health Protection, Drinking Water Services
 Kara Brown, Governor
 March 11, 2015

800 NE Oregon Street, Suite #540
 Portland, OR 97232-1102
 (503) 673-9405
 (877) 673-0004 - FAX
<http://health.oregon.gov>

Brian Barnett, PE, Project Engineer
 City of Beaverton
 PO Box 4755
 Beaverton, OR 97076

Re: Categorical Exclusion request for City of Beaverton (PWS ID #4100081)
 Water System Improvements; SD-13-37

Dear Mr. Barnett:

The purpose of this letter is to grant a Categorical Exclusion to the City of Beaverton from further environmental review for an infrastructure project to be funded with Drinking Water State Revolving Fund (DWSRF) monies. The project funded by the DWSRF and covered by this Categorical Exclusion consists of:

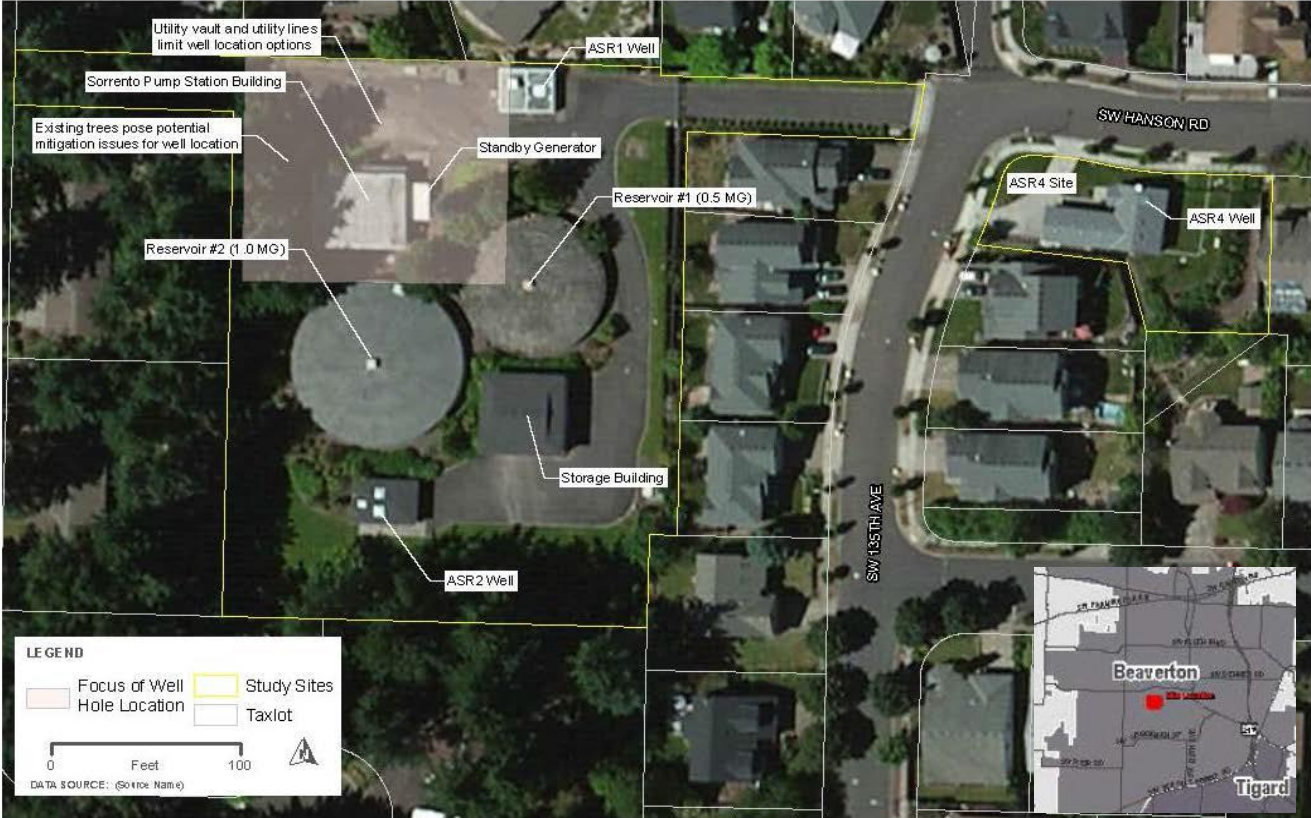
- Drilling a new well (ASR No. 5), construction of a new pump station, yard piping, on-site hypochlorite generation system and sodium fluoride saturator equipment. ASR Well No. 5 will replace existing ASR Well No. 1 and will draw from the same common aquifer.
- Electrical and controls, energy recovery system, integrated pump/motor operation control and data acquisition telemetry, power and communication lines, lighting, building HVAC and security.

Drinking Water Services concurs that the project is eligible for a Categorical Exclusion from further environmental review [OAR 333-061-0903 (2)(a)]. It is the water system's responsibility to ensure that all project activities adhere to local, state and federal permitting requirements.

Please post this acceptance in a newspaper of general circulation, and directly notify any interested parties in the project area (similar to Public Meeting notifications to interested parties). A dated copy of the notice as it appears in the newspaper or official affidavit of publication must be submitted to our office for verification. After publication of the notice, the DWSRF environmental review process is complete for the elements covered by this approval and the project may then proceed.

ASR 5 Well Siting

Vision is for Sorrento Facility to serve as a “Critical Facility” for the City of Beaverton



Alternative ASR 5 Well Locations

▪ Key Factors:

- Hydraulic interference
- Utilities
- Trees
- Access/space for O&M
- Visual/noise impacts





Photo A



Photo B



Photo C



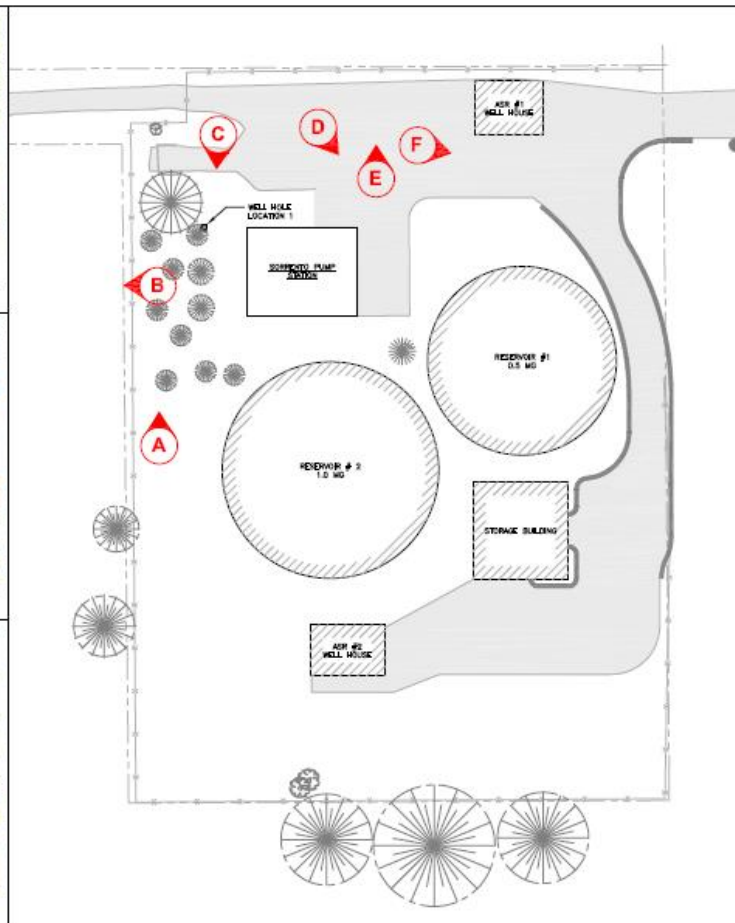
Photo D



Photo E



Photo F





Early Permitting and Stakeholder Input

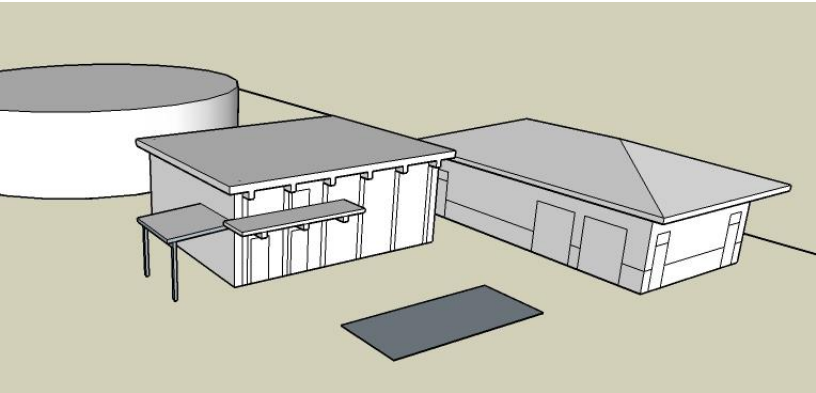
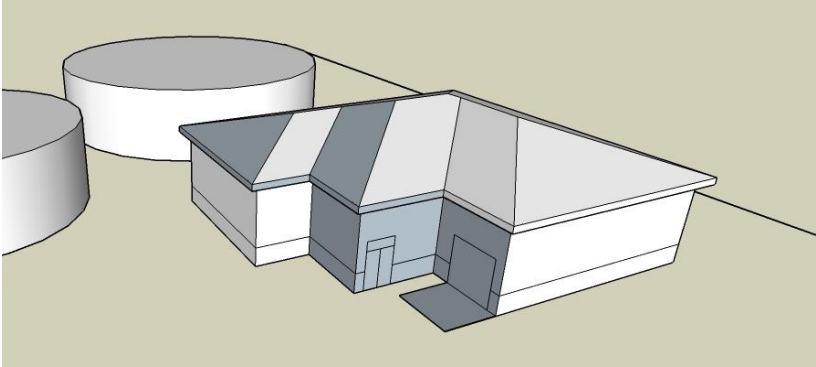
- **Workshops with Engineering and Ops staff**
 - Utility of space (layout) and access
- **Pre-application meeting with City Planning**
 - Major modification to conditional use
 - No major concerns
- **Neighborhood open house meeting**
 - Strong support for combined structure and more setback from property line



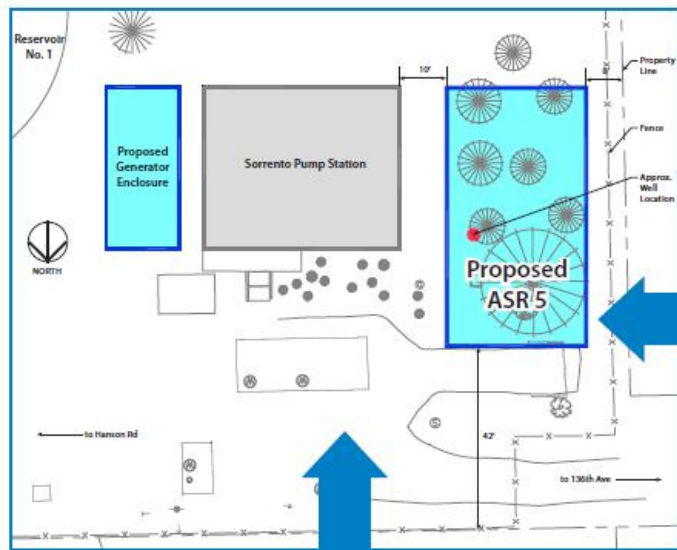
City Engineering and Operations Input Critical to Concept Development



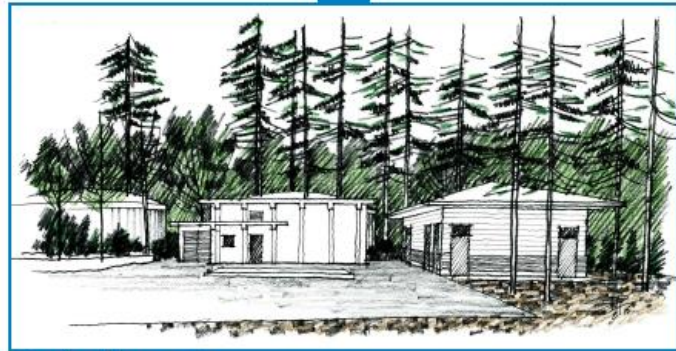
- Pros
- Stay inside with dry chemical
 - Shorter distance between dry chemical storage and chemical room
 - Open conference room at entry
 - Floor-to-ceiling storage door at entry
 - Better location for interior
- Cons
- Addition piping cost



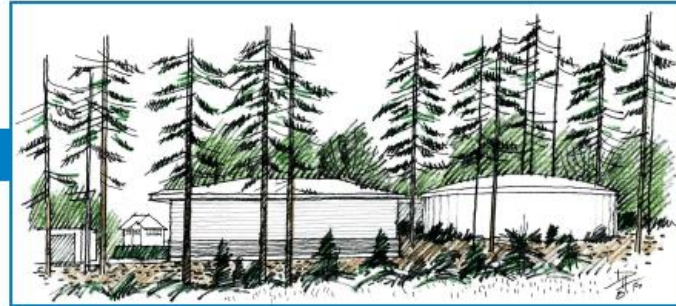
ASR 5 Separate Facility Alternative 1



Plan view



View looking south

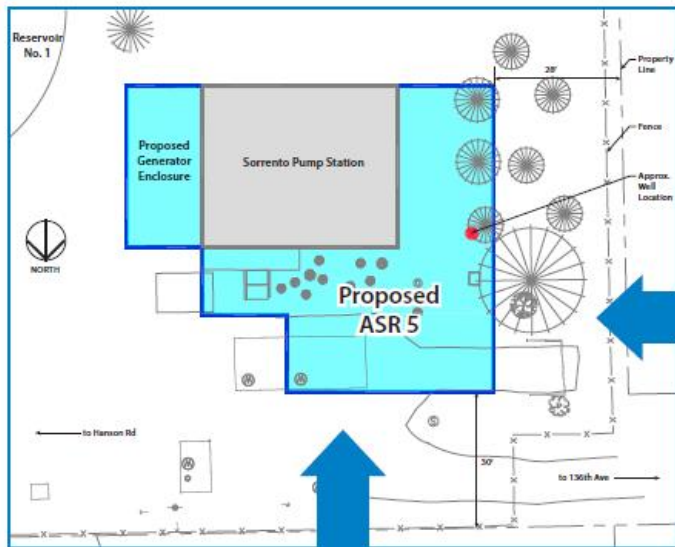


View looking east

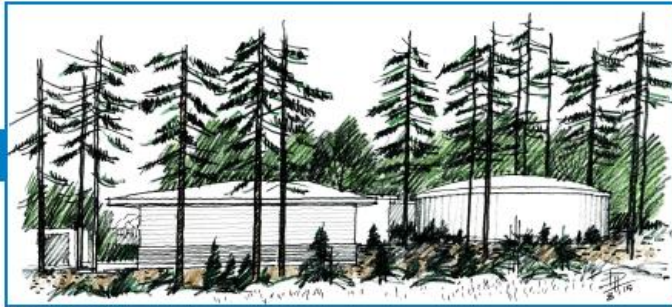


Bird's eye view to southeast

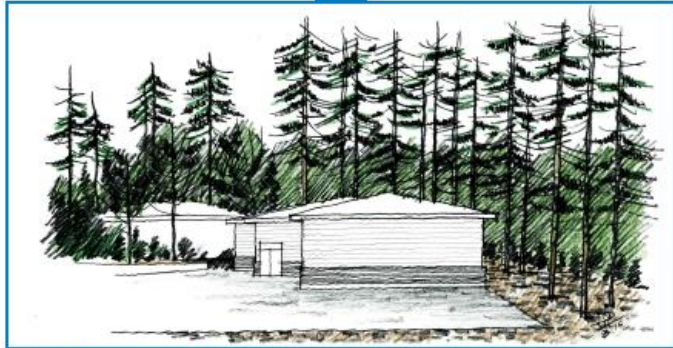
ASR 5 Combined Facility Alternative 2



Plan view



View looking east



View looking south



Bird's eye view to southeast

Final Location of ASR 5 Well

▪ Key Factors:

- Drill rig access (building and trees)
- Property line setback
- Alignment with new building layout



Long-term Plans / Closing



City's Long-term Vision for ASR

- Continue using ASR to bridge gap in supply
- Look for opportunities to leverage funding
- Locate ASR facilities to maximize geographic resiliency
- Coordinate and engage neighboring water partners

Thank You! Questions?

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Portland, OR

