



# Aquifer Storage and Recovery (ASR) Facilities Tour – Oregon

Prepared for : Englishman River Water Service (ERWS)

November 9, 2011

*[arrowsmithwaterservice.ca](http://arrowsmithwaterservice.ca)*

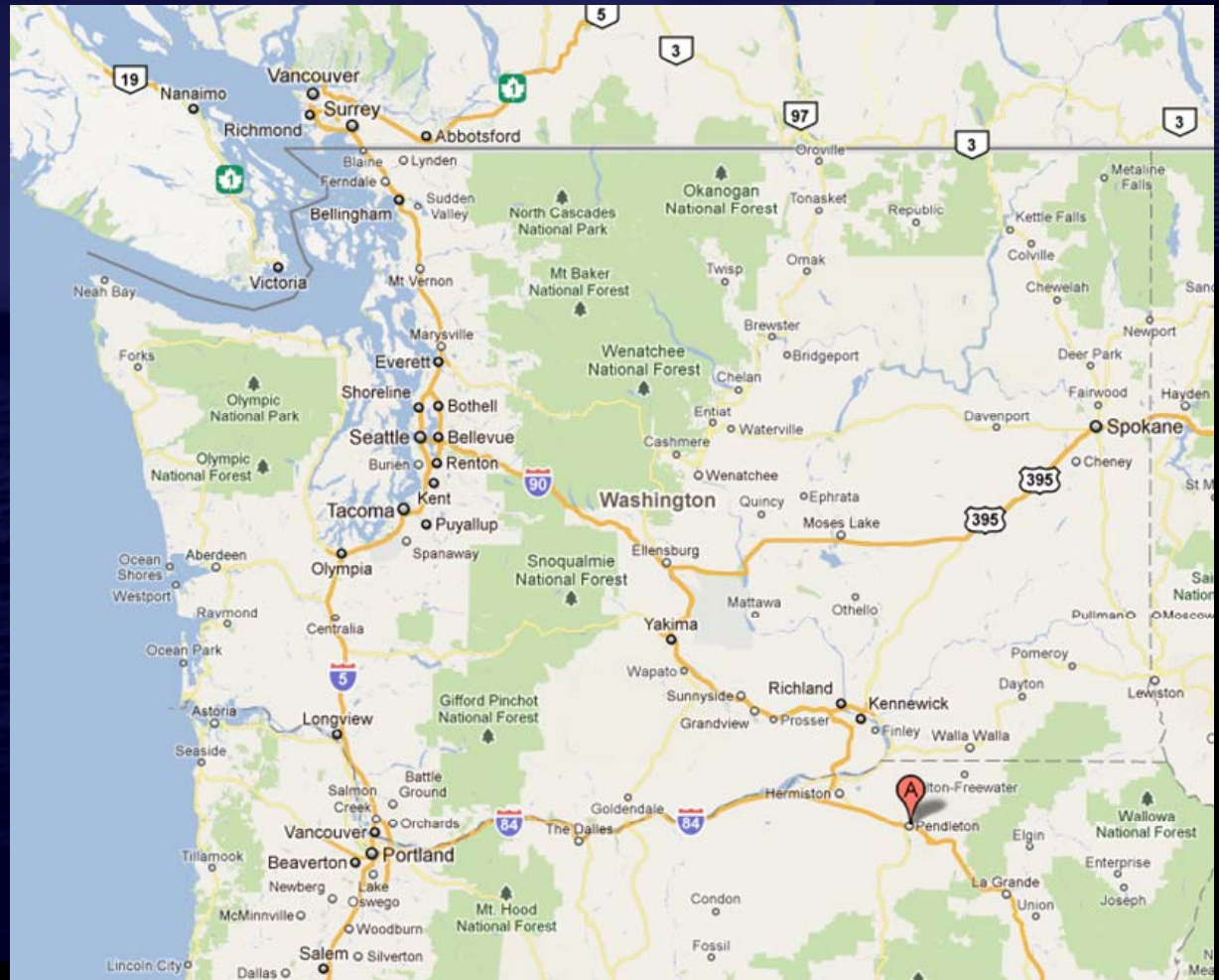
**Purpose:**

- Tour Plants and talk with the Engineers and Operators to discuss lessons learned
- Discuss advantages and disadvantages
- Discuss Challenges and procedures
- Discuss operational needs / budgets and Capital Costs

# Pendleton, Oregon

Location:

350 Km east of  
Portland



# Pendleton, Oregon

Old West..... Meets Modern Technology

## Background:

- City incorporated in 1880
- Population served is 17,000
- Growth Rate 1.4 %
- Prior to ASR (2003) they had two sources of Drinking Water
  - Wells
  - Old Springs / River

## Challenges:

- Aquifer Levels were decreasing 2' – 4' per year
- Needed additional water
- Limited surface water withdrawal - Federal fishery regulations
- Surface water (Umatilla River) – required treatment (State Regulations)
- Very High Peak Summer Demand





# Pendleton, Oregon

## Water Treatment Facility:

- Plant Capacity 57,000 m<sup>3</sup> /day (15 million gallons per day)
- Using Zenon 500C membranes
- Will Reuse old membranes from the WTP for their future WWTP.
- Solar panels as part of a third party partnership with Honeywell.
- Removes all organics, viruses and bacteria
- Fully automated system, requires min. daily manual operation





# Pendleton, Oregon

## ASR Facility:

- Started ASR wells in 2003
- Have 3 wells with a Limited License of up to 7,600 m<sup>3</sup> /day (2 million gallons)
- Total storage capacity of 1.5 million m<sup>3</sup> (415 million gallons) storage and recovered annually
- Looking at doubling their capacity with future upgrades
- Recharge: November to May – Extract; June to October

## Drinking Water In.....Drinking Water Out

## Advantages:

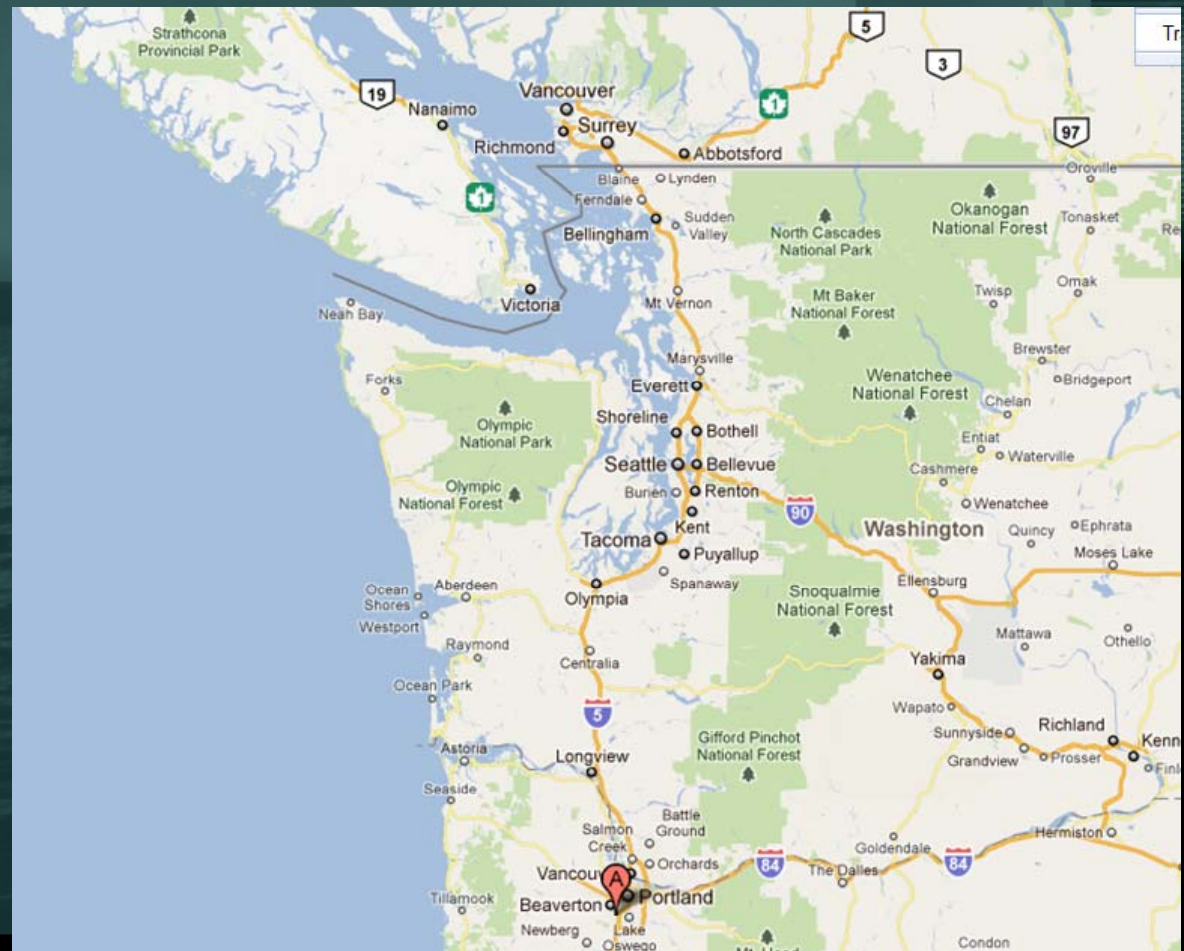
- Cooler water supplied in summer
- Augment summer peak demands
- Regenerate power when recharging
- Aquifer levels have stopped declining and are expected to increase with more ASR well production



# Tigard, Oregon

Location:

South of Portland





# Tigard, Oregon

## Background:

- Population served is 57,000
- Growth Rate 16% (buildable land)
- Over 18,000 service connections

## Challenges:

- Aquifer Levels were decreasing
- Mandated by State to stop using existing wells
- Moratorium was put on Well Development
- Needed additional water
- No secondary source of water
- Limited supply of wholesale water from Portland Water District
- Decommission old wells







# Tigard, Oregon

## ASR Facility:

- Started ASR program in 2001 – first system
- wells 600' – 1000' Columbia Basalt Aquifer
- 568,000 m<sup>3</sup> (150 million gallons) of storage
- Extract 95 % of water
- Converted 2 existing wells into ASR
- Currently constructing new ASR Well – development funded
- Operational period: injection October – May, extraction June – September
- Use treated water from other jurisdictions (Portland) to store in ASR wells





# Tigard, Oregon

## Benefits:

- Cooler water supplied in summer
- Augment summer flows
- Postponed costly capital water treatment expansions
- Aquifer levels have stopped declining
- Have found old abandoned artesian well come back into service
- Onsite generation of CL2 – ‘just add salt’ = no CL2 gas in local neighbourhoods







# Beaverton, Oregon



## Background:

- Population served is 90,000

## Challenges:

- Receive bulk water from Joint Water Commission
- Looking at major water improvement facilities (pipelines, reservoirs & treatment)
- Existing well production was limited
- needed to bridge the gap when peak summer demands exceeded available supply capacity





# Beaverton, Oregon

## ASR Facility:

- Started ASR over 15 years ago
- wells 600' – 1000' Columbia Basalt Aquifer
- 568,000 m<sup>3</sup> (150 million gallons) of storage
- Can extract 23,000 m<sup>3</sup> per day
- Recover over 95 %
- Converted 2 existing wells into ASR plus one new construction
- Operational period: injection October – May, extraction June – September
- Use treated water from other jurisdictions to store in ASR wells



# Beaverton, Oregon



## Benefits:

- Cooler water supplied in summer
- Augment summer flows
- Postponed costly capital water treatment expansions
- Aquifer levels have stopped declining
- Have improved native groundwater quality – reduced iron and manganese concentrations
- Onsite generation of CL2 – ‘just add salt’ = no CL2 gas in local neighbourhoods
- Integrate ASR wells in existing neighbourhoods



# Summary.....For Further Information on ASR Applications in the West see:

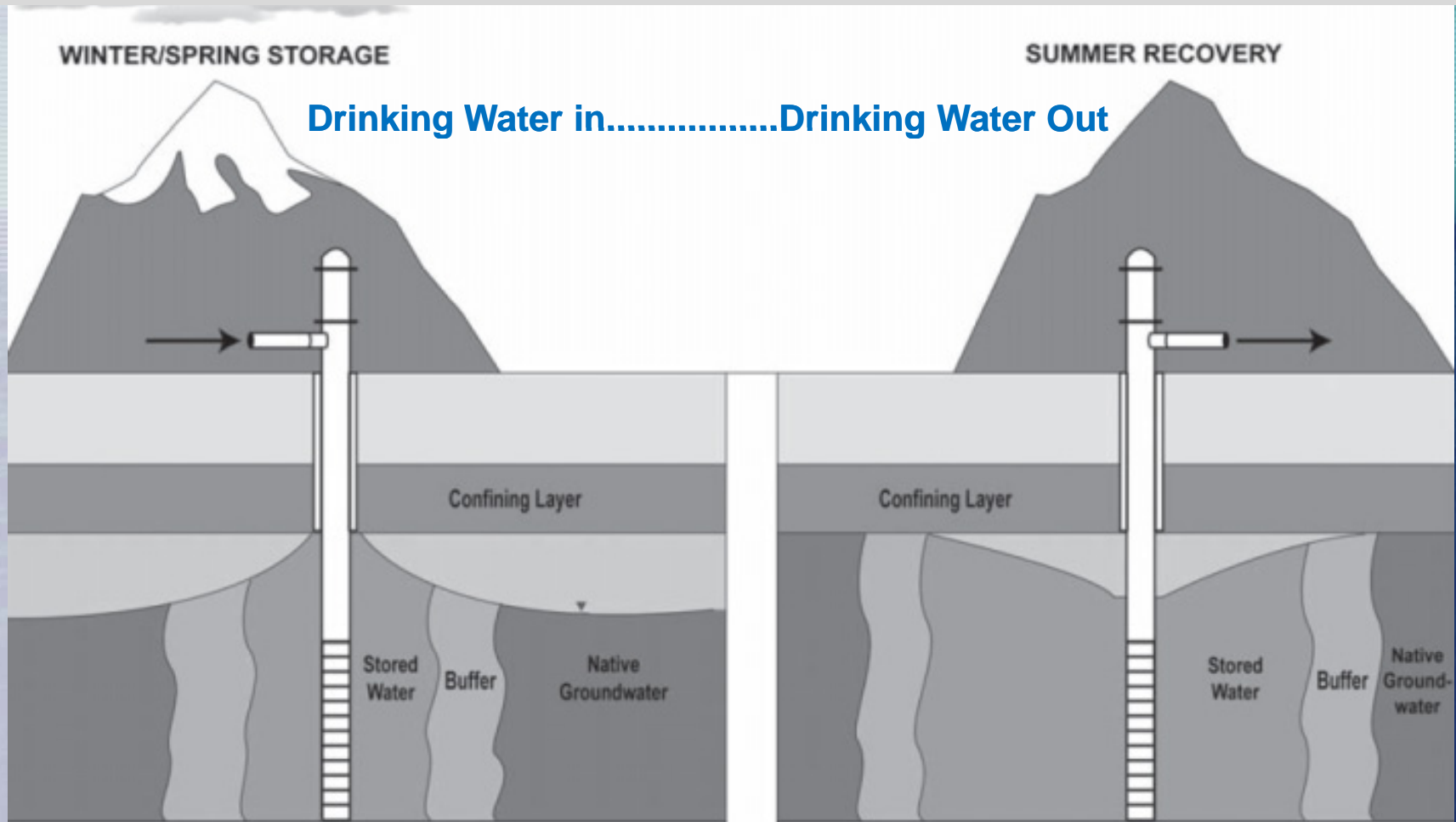
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Aquifer Storage and Recovery  
Advantages, Challenges, Applications

&

Approaches for Expanding ASR in the West

[www.thewatereport.com](http://www.thewatereport.com)





## Thank You

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