Columbia Basin Sustainable Water Coalition
Stakeholder Meeting
Date: Thursday, November 21, 2024
Time: 10:30 am - 12:30 pm
Location: Moses Lake City Council Chambers, 401 S Balsam St, Moses Lake / Zoom

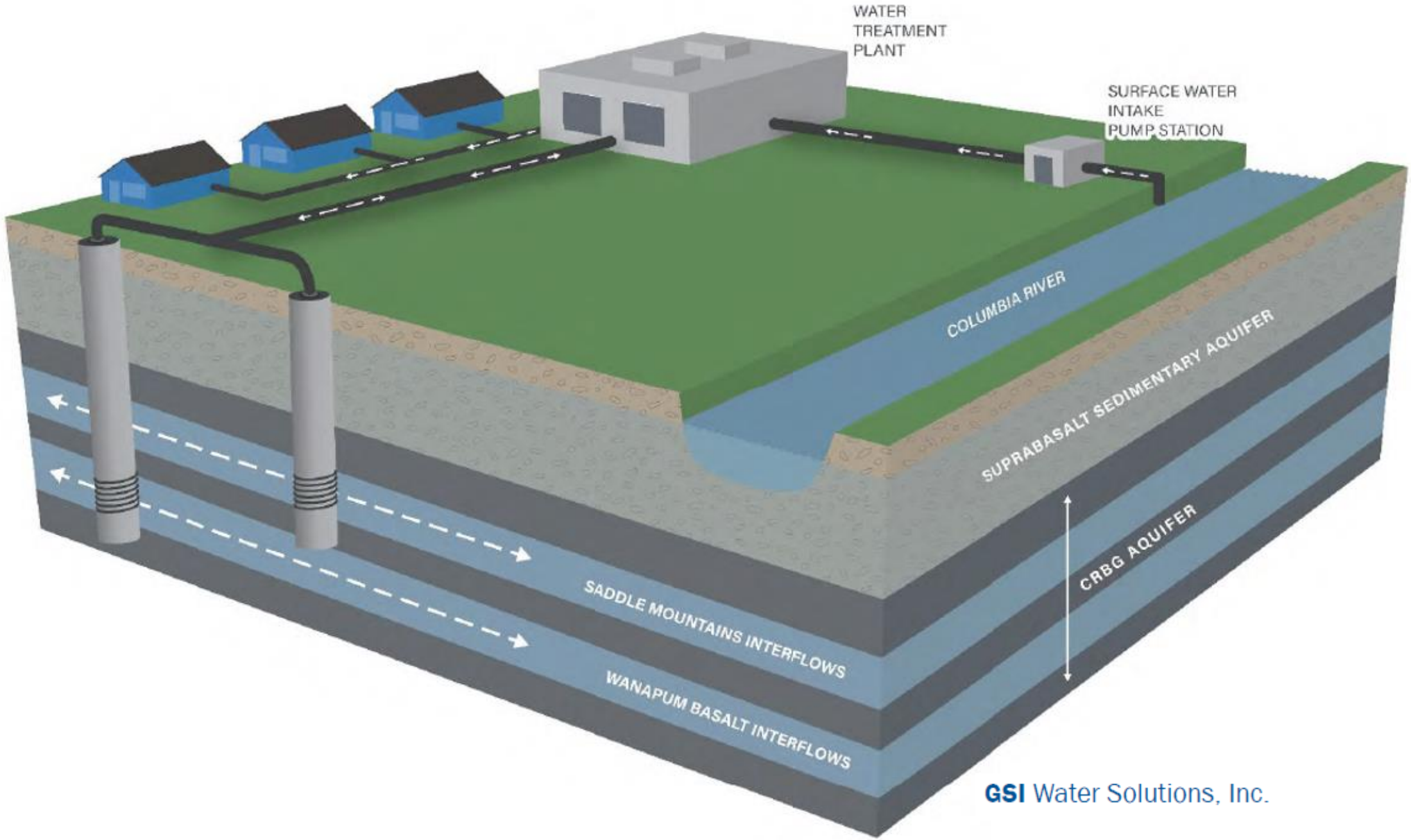
Aquifer Storage & Recovery Challenges and Opportunities

ASR Presentations and Roundtable Discussion, facilitated by Ben Lee, Landau Associates

- Setting the Scene – Regulatory Introduction, Kevin Lindsey, GeoEngineers
- Municipal Experiences with ASR, Mayor Shawn Logan of Othello and Others
- Regulatory Change Attempts Previously Pursued, Tim Flynn, Aspect Consulting
- Roundtable

Aquifer Storage and Recovery

Aquifer storage and recovery is a water resources management technique for actively storing water underground during wet periods for recovery when needed, usually during dry periods. The timeframe can range from months to decades. Intentional aquifer storage, with the intent of using the water later, has been used for hundreds of years, but is being further developed and refined as demand for fresh water threatens to exceed supply in [ ] many [ ] parts of the world. (USGS)


WATER
TREATMENT
PLANT
SURFACE WATER
INTAKE
PUMP STATION
COLUMBIA RIVER
SUPRABASALT SEDIMENTARY AQUIFER
CRBG AQUIFER
SADDLE MOUNTAINS INTERFLOWS
WANAPUM BASALT INTERFLOWS

columbia basin sustainable water coalition

PRELIMINARY WATERSHED MANAGEMENT PLAN

Mid-Columbia Basin, Washington

December 21, 2023

Prepared for

Columbia Basin Sustainable Water Coalition
Mid-Columbia Basin, Washington

Local Water Resource Project Alternatives

Local Aquifer Storage and Recovery (ASR): involving the injection of water (typically surface water) into the ground during times or seasons of water availability and reduced water demand (e.g., during the winter wet season) and retrieving that water (or a portion of that water) during times or seasons of higher demand (e.g., during the dry summer season). ASR is typically accomplished using high-capacity injection/extraction wells that are either constructed specifically for that purpose or are converted from other uses (e.g., groundwater supply well), access to a source of water for storage, and water treatment and conveyance infrastructure.

www.CBSWC.org

LANDAU ASSOCIATES

GeoEngineers

PREFERRED ALTERNATIVES

This section summarizes the results of the alternatives scoring assessment and CBSWC's current perspective regarding relative priority for alternative implementation. The alternative rankings summarized below are based on the CBSWC's understanding of current technical, regulatory, and external funding opportunity conditions. The CBSWC understands that the relative rankings of the alternatives may evolve over time as additional information is obtained or external conditions change.

Preferred Project Alternatives

Based on the results of the alternatives scoring and ranking process described above, the project alternatives are ranked in the following order with respect to CBSWC preference for implementation:

1. OGRWP (Project Alternative A1)
2. New Source Treatment and Regional Distribution (Project Alternative A6)
3. Water Conservation (Project Alternative A3)
4. CBP Completion (Project Alternative A2)
5. Aquifer Recharge by Deep Well Injection (Project Alternative A5)
6. Aquifer Recharge by Passive Rehydration (Project Alternative A4).

Preferred Water Resource Management Tool Alternatives

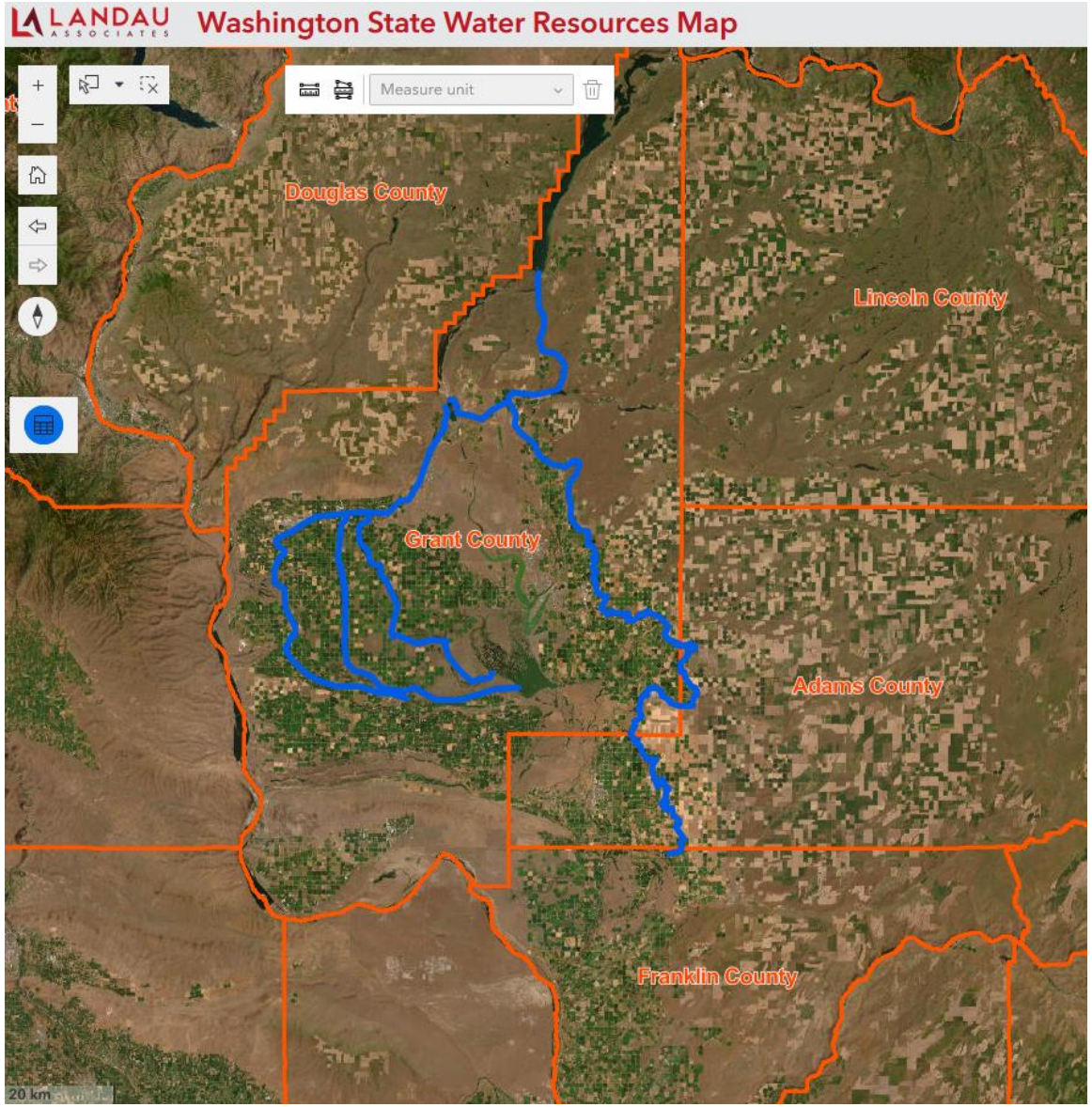
Based on the results of the alternatives scoring and ranking process described above, the water resource management tool alternatives are ranked in the following order with respect to CBSWC preference for implementation:

1. Groundwater Level Monitoring (Tool Alternative B1)
2. Numerical Groundwater Modeling (Tool Alternative B2).

Preferred Water Resource Planning Alternatives

Based on the results of the alternatives scoring and ranking process described above, the water resource planning alternatives are ranked in the following order with respect to CBSWC preference for implementation:

1. Integrated Planning and Project Implementation (Planning Alternative C3)
2. Groundwater Management Planning (Planning Alternative C2)
3. Bureau of Reclamation Basin Study (Planning Alternative C4)
4. Coordinated Water System Planning (Planning Alternative C1).



www.CBSWC.org

Kevin Lindsey, PhD, LHG - GeoEngineers

Washington ASR, Regs and Guidance Summary:

Required Authorizations; WAC 173-157-050:

1) Source water rights (usually surface).
   a. Groundwater right, not required, but good to have.
2) Reservoir permit (**RP**) for ASR (the base permit) allows storage.
   a. If source water rights incl intended beneficial use, reservoir permit allows recovery.
   b. Otherwise a secondary permit needed to access stored water for beneficial use.
   c. May have an appended/associated preliminary permit authorizing pilot testing (*RCW 90.03 and 90.44*).
3) Class V Underground Injection Control registration for injection well(s).
4) National Pollution Discharge Elimination System permit if any discharge to surface water.

Source Water and WDOH; WAC 246-290:

1) Using WDOH approved surface water source(s) vs new surface water source for potable ASR effort.
2) Later leads to surface source water approval and all it entails (*see WDOH Pub 331-123*).
3) Reclaimed water touched on below.

What to know before ASR RP application:

1) WAC 173-157-100 (3). Pre-app meeting to discuss project development pathway, project plans, feasibility study report (*see Ecology Pub 22-12-003*).
2) WAC 173-157-100 (1). Assess potential impacts to hydrogeo system and environment. If *"…does not describe general settings and conditions with sufficient information for department to assess the application…"* Ecology will likely require a detailed feasibility study to *"…reduce uncertainty of impacts and quantify available storage capacity of the aquifer."*
3) WAC 173-157-100 (2). To further reduce uncertainty, design pilot phase to collect data to validate conceptual hydrogeologic model and monitor and adjust plans implemented as conditions in **RP** application and preliminary permit for pilot test.
4) WAC 173-157-120 (1) – (9) further describes topics to address for **RP** application, such as conceptual hydrogeologic model report, groundwater, and surface water system (what, where, how much), groundwater quality compatibility, potential ASR effects and mitigation of environmental impacts, groundwater monitoring during pilot testing and project operation.
5) WAC 173-157-200 (1) – (7) dives into **RP** reservoir permit application processing/reviews/etc.

Additional Considerations:

1) If source water potable muni water (WDOH regs, existing or newly approved), disinfection byproducts (DBPs) likely present:
   a. DBPs (haloacetic acid, trihalomethanes, bromate, chlorite) exceeding native groundwater concentrations are contaminants (*see WAC 173-200 and Ecology Pub 92-02*), exceedances are not automatically authorized for ASR.
   b. Contaminants in source water leads to anti-degradation policy (*see WAC 173-200-030*).
   c. Addressing anti-D leads to treatment and/or AKART analysis by project proponent (*see Ecology Pub 17-10-035*).
   d. AKART needed for Ecology to consider OCPI on a case-by-case basis with respect to GWQS.
   e. Native groundwater quality background determination and water quality requirements (*see Ecology Pub 92-02, Ecology Pub 22-12-003*) and source water/native groundwater and source water/aquifer matrix chemical reactions need to be characterized/modeled.
2) If source water is reclaimed water a reclaimed water permit authorizes beneficial use of reclaimed water for groundwater recharge and the recovery of the reclaimed water from the aquifer by the project proponent (*see* WAC *173-219 and Ecology Pub 15-10-024*).
3) Quality Assurance Project Plan(s) (*see Ecology Pub 04-03-030*) describing planned water quality sampling, aquifer testing, and pilot testing approved by Ecology will be required at several points before pilot test preliminary permit issued.

Back to the Pre-App:

This pre-application meeting is important to set up and continue constructive dialog with Ecology and make sure there is a common basis of understanding for all the above, including the **RP** application content and guidance docs.

Guidance Doc Citations:

DOH Pub 331-123, revised June 2020: Water System Design Manual, 518 pages, 9 Appendices.

Developed by DOH to establish uniform concepts for Group A public water system design and consistent review of design documents. Chapter 5 Source of Supply particularly relevant to new surface water sources.

Ecology Pub 92-02, revised October 2005: Implementation Guidance for the Ground Water Quality Standards, 129 pages, 5 Appendices.

Provides explanation and interpretation of WAC 173-200 to promote consistent statewide implementation of actions that can potentially degrade ground water quality. Topics include, but not limited to, Antidegradation Policy (Chapter 3), Hydrogeologic studies including background groundwater quality (Chapter 4 and Appendix E), and more…

Ecology Pub 04-03-030, revised December 2016, Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, 47 pages, 12 Appendices.

Describes data collection/sampling guidelines to use in projects collecting new data, like work done in support of an ASR reservoir permit application, including pilot testing and monitoring.

Ecology Pub 15-10-024, revised February 2019: Reclaimed Water Facilities Manual: The Purple Book, 160 pages.

Reviews/describes reclaimed water rules, guidance, requirements, and reporting, to name a few topics.

Ecology Pub 17-10-035: Guidance for Aquifer Storage and Recovery AKART Analysis and Overriding Consideration of the Public Interest Determination, 63 pages, 4 Appendices.

Provides guidance for: (1) ASR Reservoir Permit applicants for AKART analyses and when OPI considered to meet the GWQS (WAC 173-200) and (2) Ecology staff in the AKART and OPI determination approval process.

Ecology Pub 22-12-003: Underground Artificial Storage and Recovery Reservoir Permit Pre-Application Process, 1 page.

A working flow chart for coordinating OCR, Water Quality, and Water Resources programs during ASR pre-app process for potential projects with OCR funding agreements.

Underground Artificial Storage and Recovery Reservoir Permit Pre-Application Process

This is a working flow chart for coordination between OCR, WQ and WR Ecology programs during the pre-application period for potential Aquifer Storage and Recovery (ASR) projects with OCR funding agreements.

Note: Written reports in bold yellow highlight. Color coded roles: WQ in green, WR in blue and OCR in orange, DOH in purple

DEPARTMENT OF ECOLOGY
State of Washington

Pre-application meeting with applicant, **WQ, WR, OCR, DOH**

Feasibility Study Report with Implementation Plan

WQ reviews Report and recommendation provided

WQ, WR, OCR DOH review and recommendation

WQ review

Aquifer testing and WQ sampling **QAPP**

WQ reviews report and recommends additional work

Aquifer testing and water quality characterization and Geochemical Compatibility Modeling (water-water and rock-water) Summarize in **Data Collection Report**

Additional aquifer testing & WQ characterization if needed to determine WQ criteria for project compliance

Decide if project will comply with WQ Criteria and WQ feedback to proponent

No

Yes

AKART report & Request for OPI determination

Additional treatment or other measures

Yes

Reservoir Permit Application Submitted with **Final compiled Feasibility Report**

Pre-Application Form:
Proposed source water and water rights
- Proposed reservoir if known
- Anticipated issues
- AKART anticipated?
- List of references (background reports)
- Application approach

WQ Resources/Guidance:
- Purple Book-Reclaimed water guidance
- AKART/OPI Guidance
- Groundwater Quality Standards Imp. 9602

WR Resources/Guidance:
- WR Aquifer Test Guidance
- Applicant to discuss any permit requirements for aquifer testing with WR

General Guidance
- ASR Application Instructions
- ASR overview Flow chart
- QAPP guidance

Implementation plan includes steps and timeline to address WAC 173-157-:
- Conceptual model (-120)
- Project Operation Plan (-130)
- Legal Framework (-140)
- EAA (SEPA for full project) (-150)
- Mitigation Plan (-160)
- Monitoring plan (-170)

Assess GW quality compliance (WAC 173-200) & other WQ requirements[1], include:
- Existing WQ data on
  - Background[2] data (8 samples)
  - Injection water
  - Aquifer
  - Aquifer matrix (chip samples)
- Numerical Simulation predictions of potential geochemical reactions in aquifer
- Identify data gaps and next steps

- WQ Feedback on next steps and additional data needs from Feasibility Study report review
- Identify data gaps and ok to proceed to QAPP
- DOH check-in
- OCR and WR provide non-WQ review of Feasibility study and identify additional data gaps

Complete QAPP to address:
1) All sampling/testing:
   -aquifer test
   -WQ sampling to fill WQ data gaps
   -modeling (on case-by-case basis)
2) QAPP review by OCR, WQ, and WR, with copy to DOH, as needed)
3) OCR approves QAPP before field work.
4) Note additional QAPPs may be needed for future sampling efforts.

- Refine predicted geochemical reactions using new data
- Potential for additional geochemical modeling, as needed
- OCR, WQ, WR review of final report
- WQ reviews and recommends additional data collection, if needed
- Send to DOH for information and review (if DOH requested additional data collection)

AKART report and request for OPI.
- AKART and WQ sampling report included in Final compiled feasibility report. Feedback on OPI request and reviewed as part of final compiled feasibility report[3]

- Final report compiles all reporting to date in one document. **WQ, WR, and OCR review. If part of funding agreement, OCR reviews for agreement deliverable before submittal for permit application**
- Send copy to DOH for information

NOTES:
1. Refer to WQ Resources Guidance provided at pre-application meeting (ECY publications nos. 15-10-024 and 17-10-035).
2. Background groundwater quality conditions must be established according to the procedure defined in the Groundwater Quality Implementation Guidance (ECY Publication no. 96-02, Section 4.2.1.1.3). Background conditions should be used to define criteria for assessing compliance with the Groundwater Quality standards and to determine that the ASR operation is not violating anti-degradation.
3. Notes on timing/next steps: WQ issues OPI with ECY Director approval OR denial before a permit decision. Informal feedback to applicant would happen as part of application review and before preliminary permit for pilot testing. (Preliminary permit(s) for pilot testing issue after reservoir application submitted and are based on application.) Reservoir permit includes WQ criteria, monitoring & reporting.
4. WQ = Ecology Water Quality Program, WR = Ecology Water Resources Program; OCR = Ecology Office of Columbia River; DOH = WA Department of Health

To request an ADA accommodation, contact Ecology by phone at 509-454-4241 or email at tim.poppleton@ecy.wa.gov. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's website for more information.

V: 06.21.22
Publication #22-12-003

Mayor Shawn Logan – City of Othello

City Of Othello

Mayor Shawn Logan

Overview

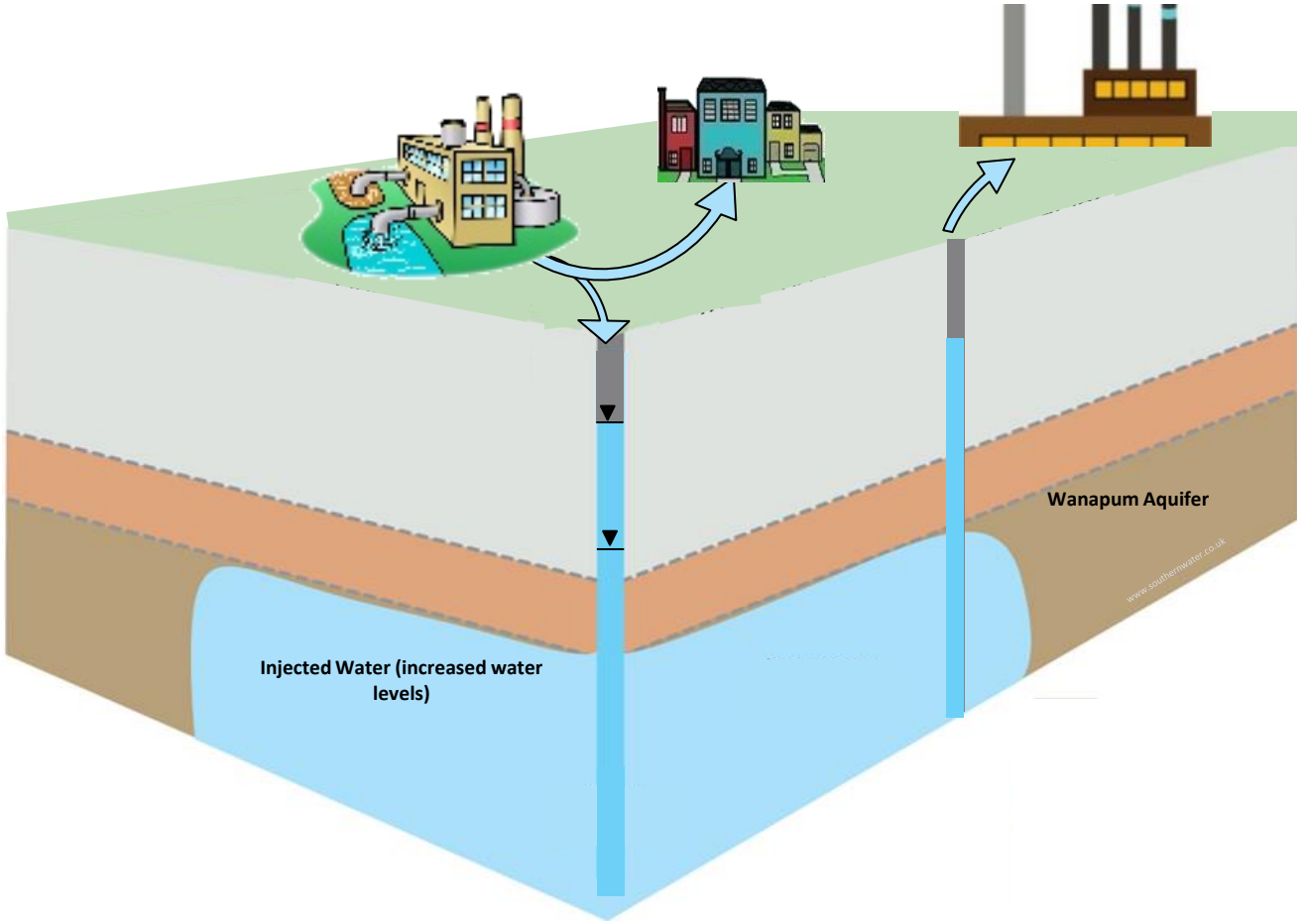
ASR BACKGROUND

ASR BENEFITS

REGULATORY HURDLES

LESSONS LEARNED

What is ASR?

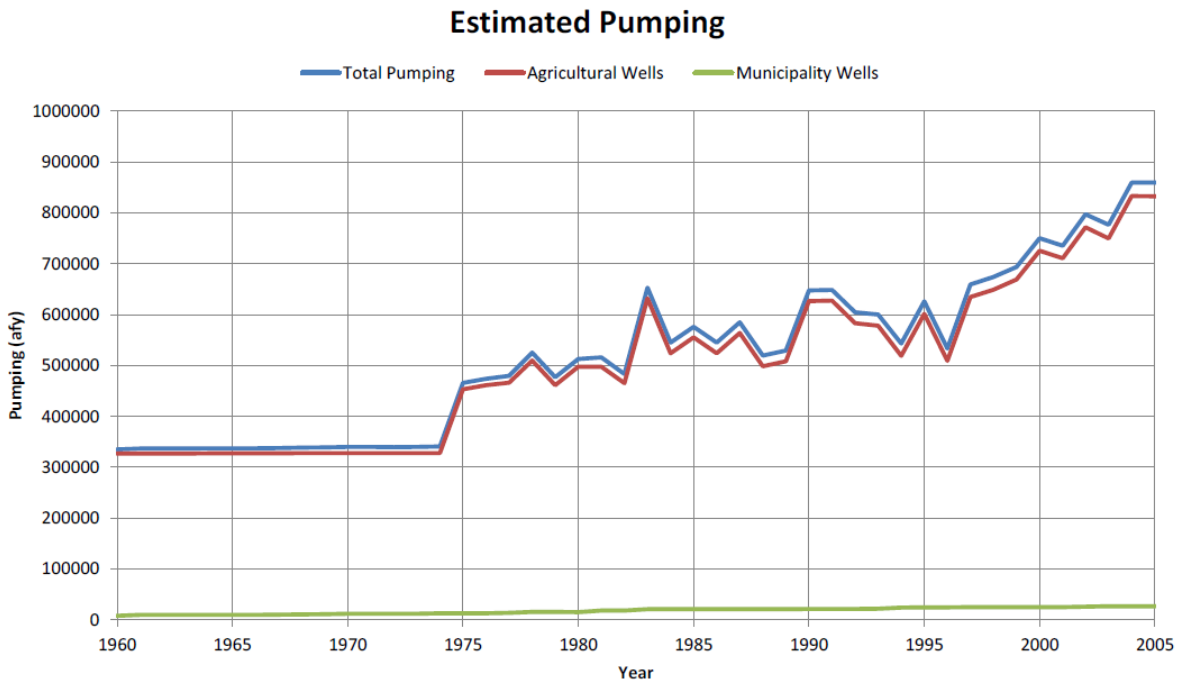


- Maximizes the City's Investment in SW Treatment *(Excess surface water is stored underground)*
- Sustainable Groundwater Use & Reliable Production
- A Benefit to All Local Groundwater Users:
  - Othello and nearby water systems
  - Rural Homes
  - Agriculture
  - Food Processors

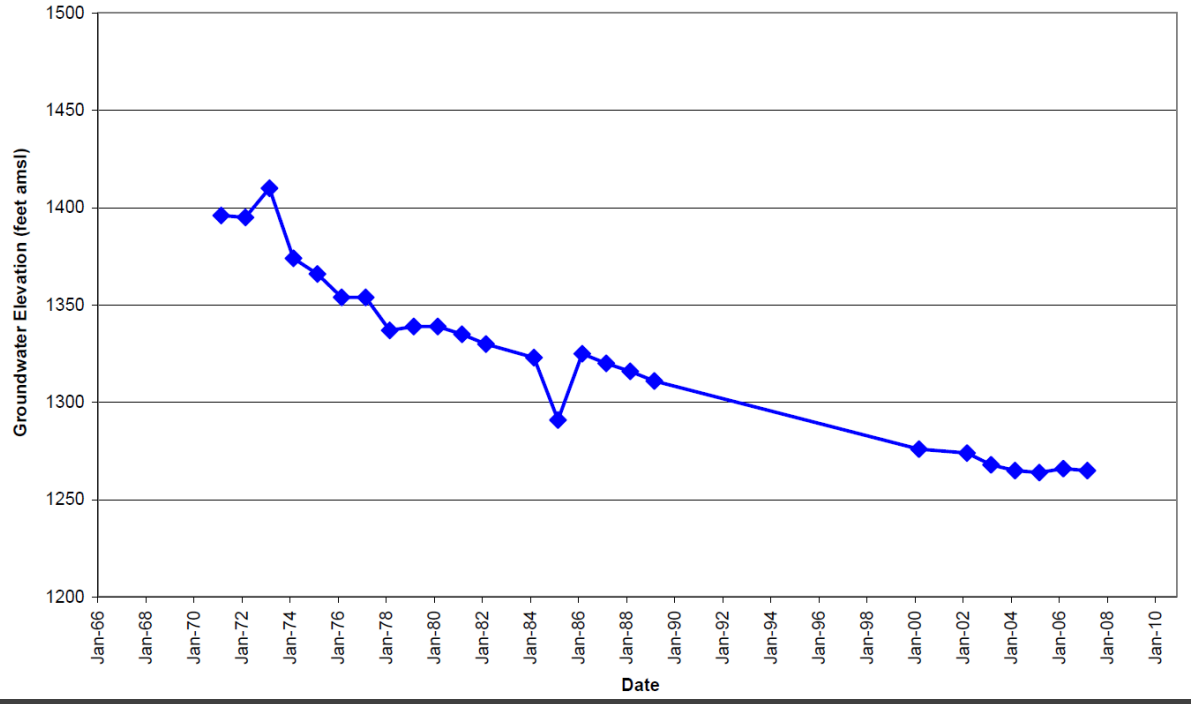
Othello Water Supply Needs

- Historic Decline in Water Levels = Annual Production Losses up to 200 gpm
- Augment Pumping by Developing SW source:
  - Treated USBR M&I Water
  - Treated Industrial Wastewater
- ASR program to Recharge Aquifer using Excess SW

Groundwater Levels in Wanapum Basalt Aquifer



Estimated Pumping within GWMA



New Surface Source to Augment Groundwater

Irrigation Canals Have Capacity

- 8,500 afy of M&I water available
- Either canal could supply up to 12 MGD **(May – Oct)**
- Water is High Quality
- ASR Extends Benefits to **Year-round with Industrial Supply**

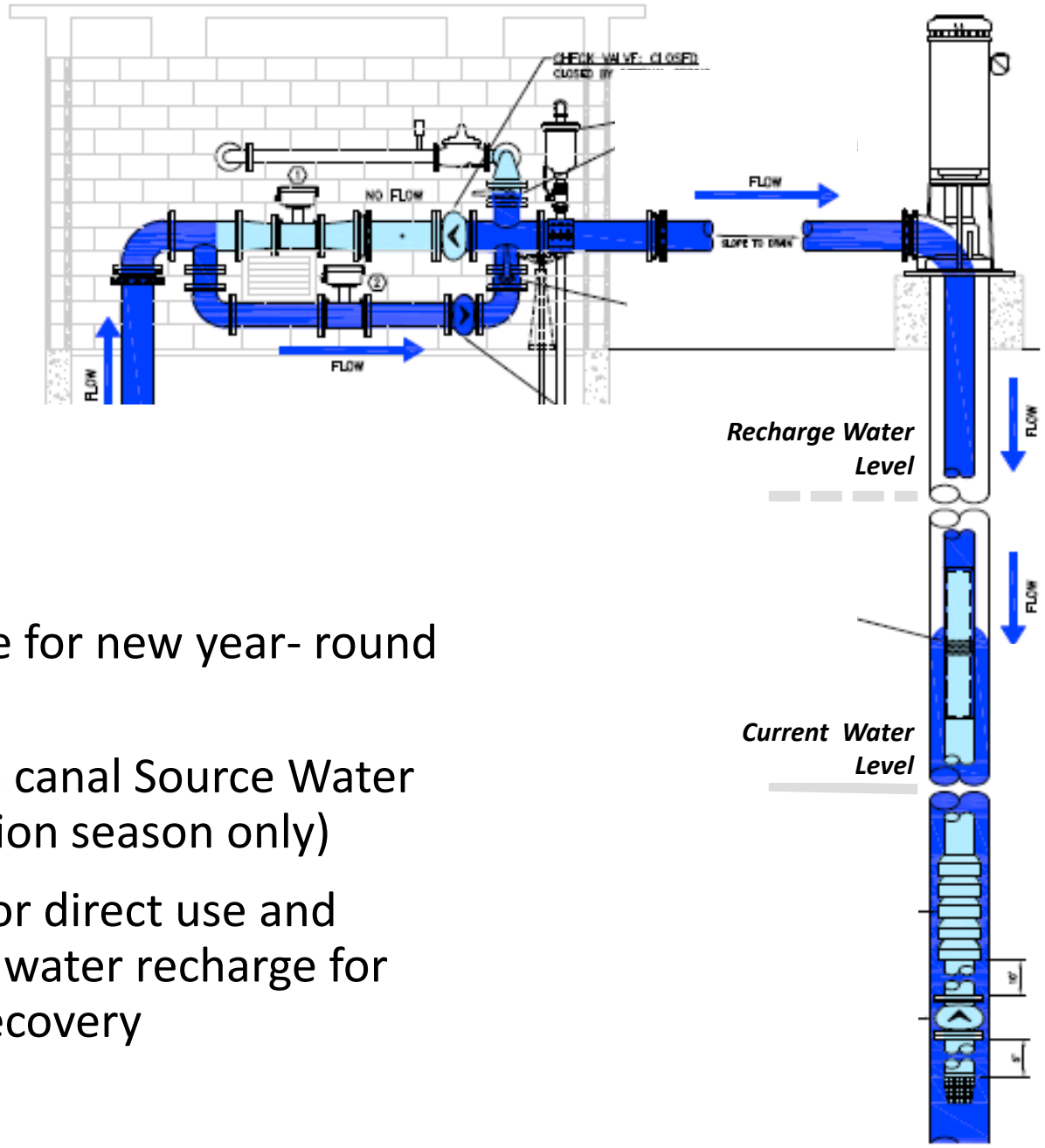
EL- 68 Canal

Othello's Water Supply Strategy

ASR Component – Overview

Treatment

Othello Well Schematic



- Provide for new year- round supply
- EL – 68 canal Source Water (irrigation season only)
- Treat for direct use and groundwater recharge for later recovery

ASR Program Development

- Evaluate Source Options
- Feasibility Study
- Reservoir Permit Application
- Phase I and II Pilot Testing
- Permitting
- **Program Implementation**

Othello's ASR Valve

Phase 1 ASR Pilot Testing

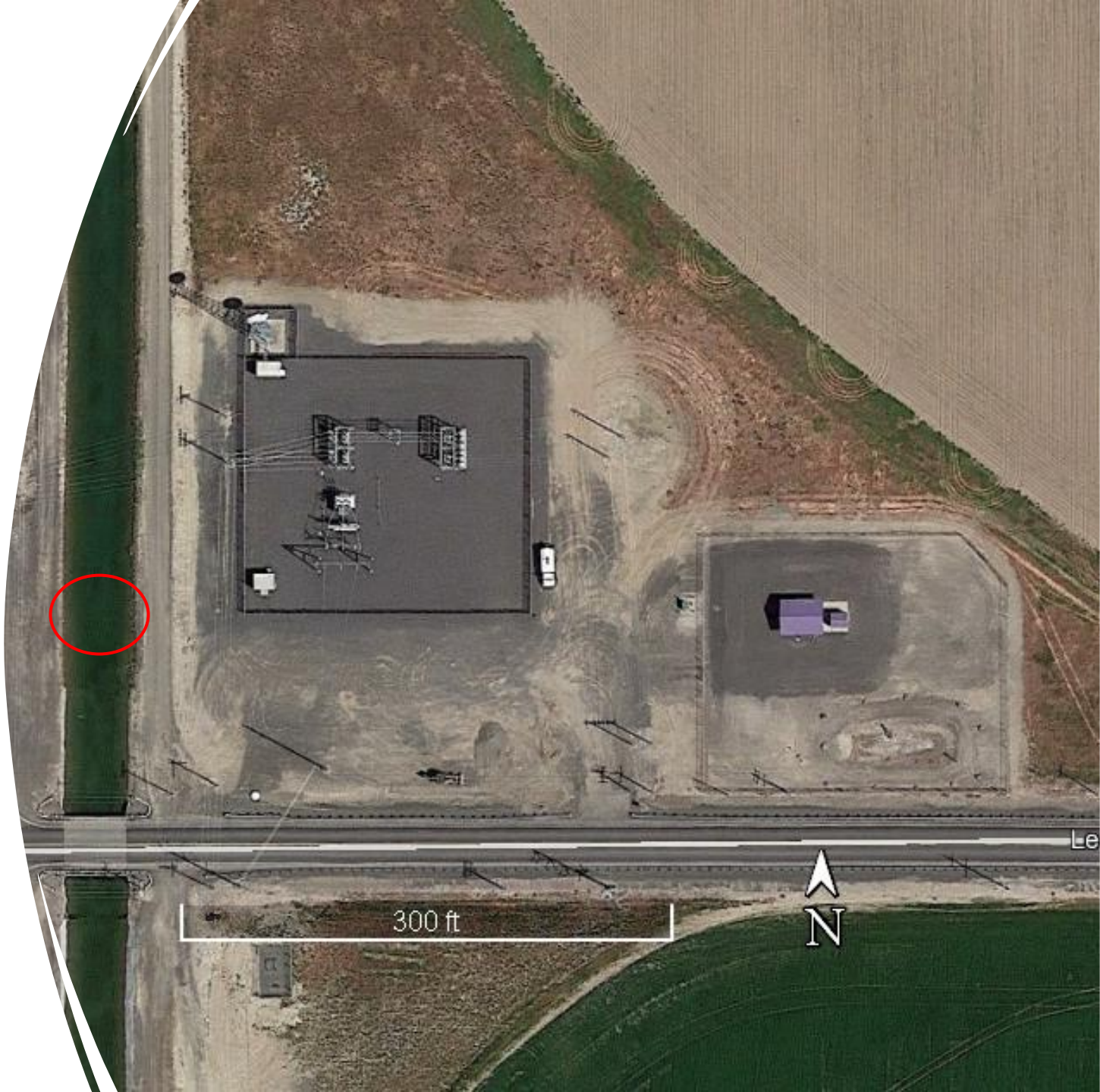
Phase 1 (2019-2020)	**Nov - Dec 2019: Setup & Baseline Testing** **Dec - Feb 2020: Recharge Period** ▪ 600 gpm for 39 days (100 AF/32 MG) **Feb - May 2020: Storage Period** ▪ 90 days (no pumping) **May 2020: Recovery Period** ▪ Initiated pumping in May 2020 **June 2020: Reporting/Phase II Planning**

Phase II ASR Pilot: *Summary & Schedule*

- Water Treatment System Design and Lease
  Commerce Grant Secured
- Test Permitting, Design, Implementation
- Collect Additional Canal WQ Data (June – Oct 2020)
- Water Service Contract and Reservoir Permit (Fall 2020)
- Deploy Control Valve and Construct Diversion (Winter/Spring 2020-2021)
- Recharge at Well 8 (May – Sept 2021)
- Storage (through Spring 2022)
- DOH Source Approval Dec 2023

Regulatory Hurdles: Case Study

- Expectations:
  - We've never passed this way before so everything to the City was new.
  - Vision was a sustainable long term water supply solution.
  - We knew we faced uncertainty in this process.
- Reality:
  - USBR – Reservoir Permit
  - DOE (OCR) Multi-phase process
  - DOH Mixed use classification surprised us.
  - Permitting was complicated



Lessons Learned/Regulatory Success

Timeliness

- Process timeline is longer than you think it should be

Compliance and Quality

- Compliance with water quality is a core issue in the process.

Lessons Learned

- Meet Early and Often with Regulators
- Compliance with one set of Regulators doesn’t mean compliance with the other

Process Improvement

- Regulatory collaboration
- Confine the process to specifics
- With less complexity comes less expense

Summary

- **<u>Now is the time</u>** to address water supply issues.
- City Has Growing Water Demand with Limited Ground water Supply.
- We have identified ASR as our best option to diversify our water sources using treated canal water.
- ASR is a lengthy and expensive process that can and should be simplified.

Shawn Logan, Mayor
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OTHELLO
WASHINGTON

Tim Flynn, CGWP, LHG – Aspect Consulting/Geosyntec

Aspect
A Geosyntec Company

Streamlining ASR Permitting in Washington

11.21
2024

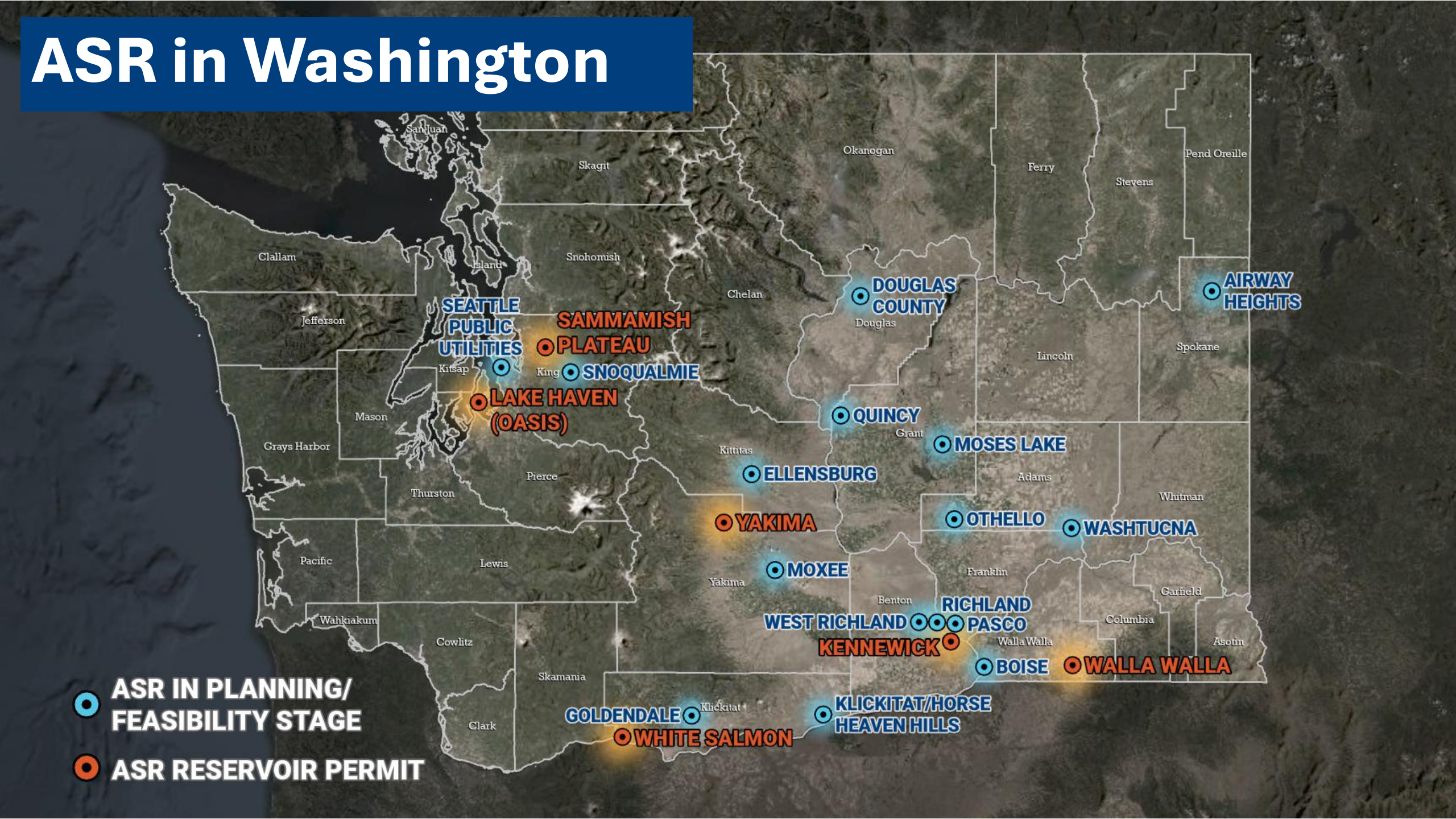
COLUMBIA BASIN SUSTAINABLE WATER COALITION

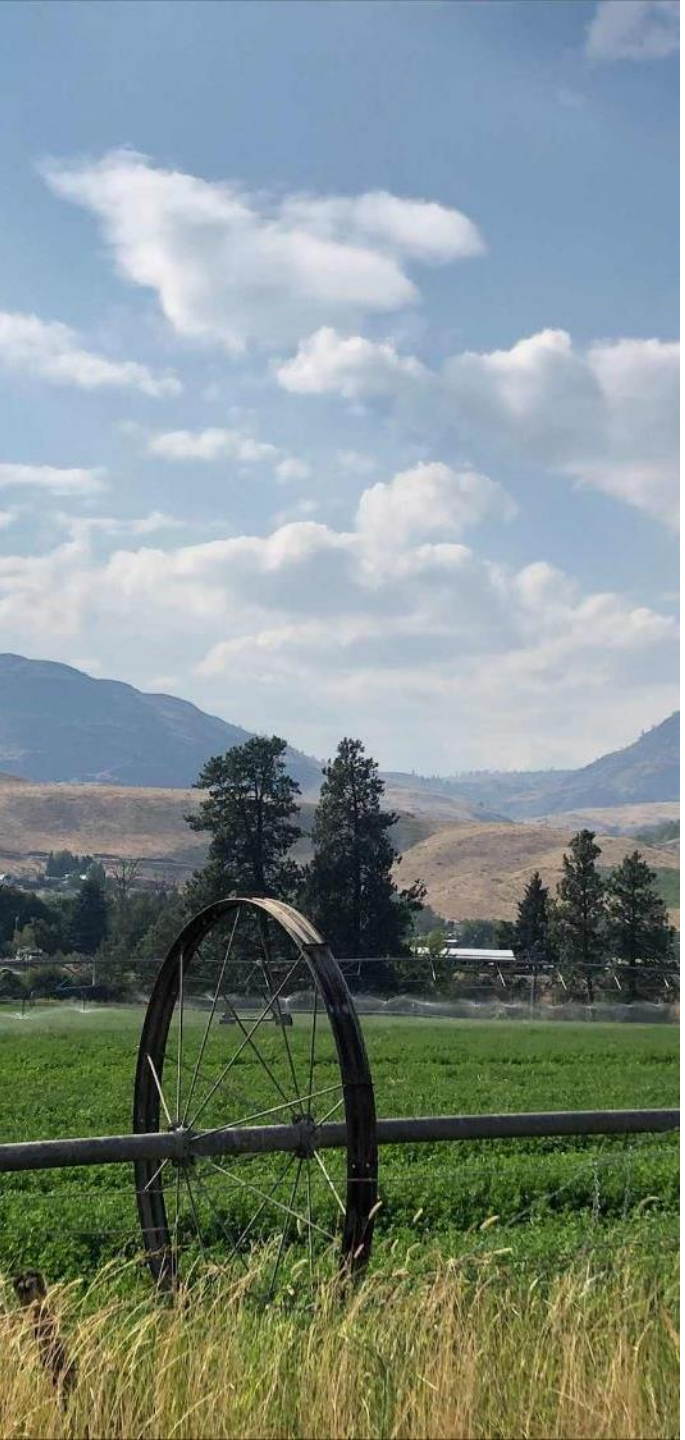
Presented by Tim Flynn

TOPICS FOR THIS SEGMENT

- → Regulatory Framework
- → Constraints & Recommended Changes
- → SB5018
- → Additional Considerations

ASR in Washington





ASR Permitting in Washington

RCW 90.03.370 (Water Code/Reservoir Permits) – Statute Expanded definition of reservoirs to include geologic formations
Chapter 173-157 WAC (ASR Rule) - Primary Guidance Document (2003) Outlines process for ASR permitting
Chapter 173-200 WAC (GW Quality Standards) Antidegradation policy
Chapter 246-290 (Public Health Drinking Water Regulations) Regulates potable supply sources

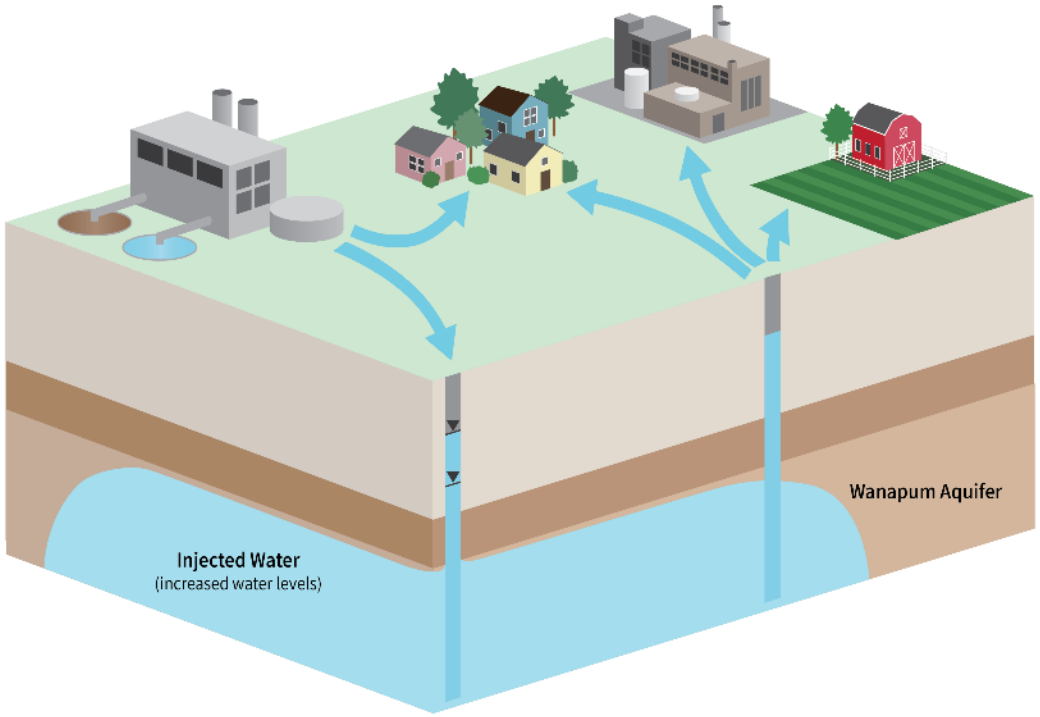
Additional Regulations
Chapter 173-218 WAC (Underground Injection Control Regulations)
Chapter 173-219 (Reclaimed Water Use Authorization) Developing rule for use of reclaimed water including for ASR

ASR Programmatic Constraints in Washington State

...and recommended changes

Overview of Constraints and Recommended Changes

- **Regulatory Jurisdiction** (coordination across state agencies)
- **Recoverable Quantity** (Ecology)
- **Compliance w/GW Quality Standards** (Ecology)
- **Compliance with DOH Drinking Water Regulations** (DOH)



ASR Programmatic constraints and recommended changes:

REGULATORY JURISDICTION

Programmatic Constraints	Recommended Change
• **Overlapping regulatory authority** between state agencies creates **permitting uncertainty** • Uncertainty of ASR permitting **process and cost** are impediments to investment	• **Clarify and align permitting authority** (Ecology and Health) to streamline process to encourage ASR

ASR Programmatic constraints and recommended changes:

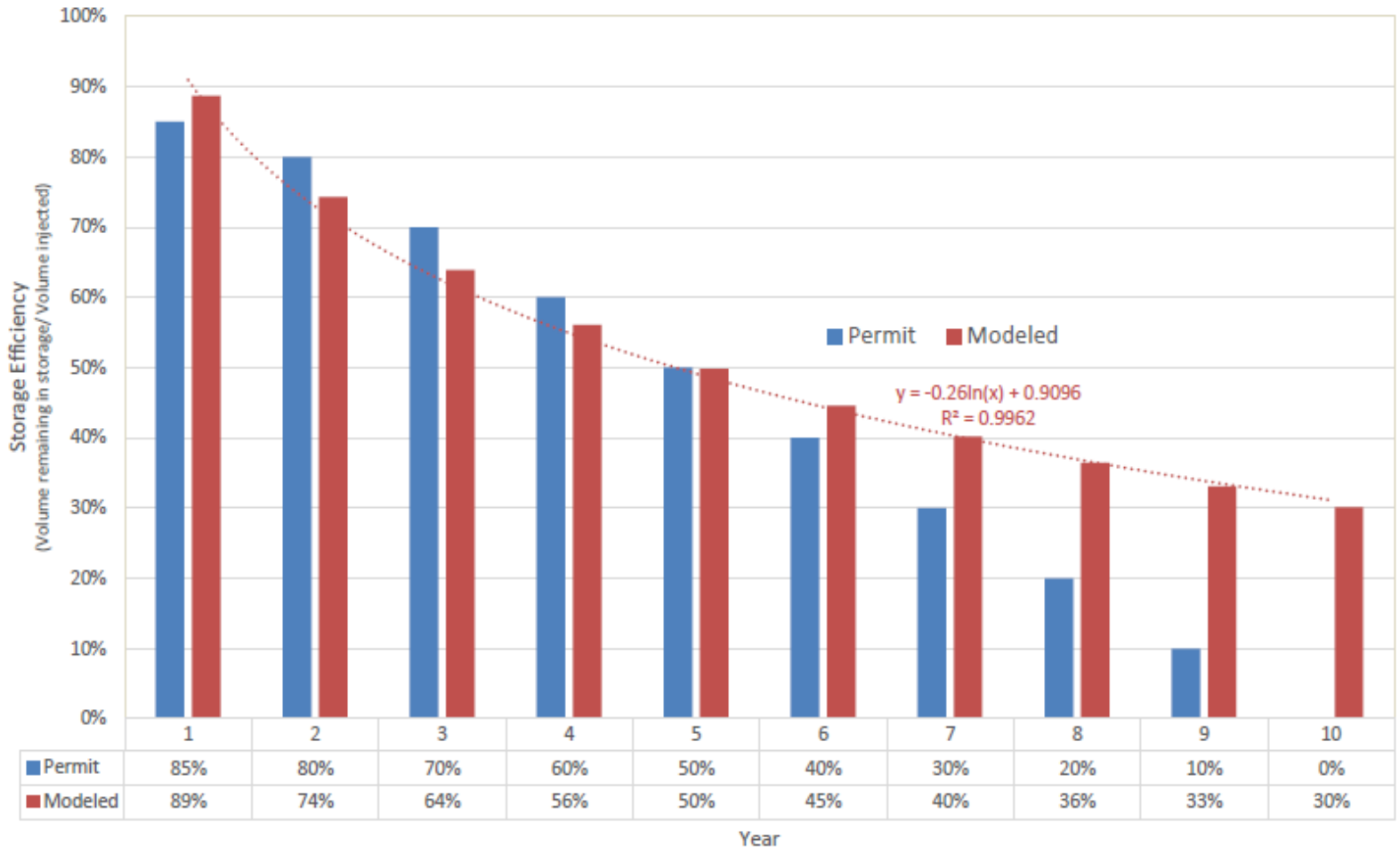
RECOVERABLE QUANTITY

Programmatic Constraints	Recommended Changes
• Recoverable Quantity based on **capture of same molecules** • **No specific provision** to carry storage water year to year	• Defining Recoverable Quantity based on **Water Budget** • Permitting Quantified **Annual Carry-Over** (wet water banking) • **Allocating Mitigation Credit** for Non-Recoverable Quantity (increased baseflow to streams)

City of Yakima Carry Over (wet water banking)

Multiple Benefits to Recharge & Storage

- Can "bank" stored water and only recovery when surface water diversion is curtailed;
- Build up storage for drought events every 3 to 5 years;
- Reservoir permit (based on modeling) and allows for:
  - Storage of up to 14,400 afy
  - 9 years of carryover
  - Exercise existing rights prior to recovering stored water
- Considering mitigation credits for streamflow benefits



	1	2	3	4	5	6	7	8	9	10
Permit	85%	80%	70%	60%	50%	40%	30%	20%	10%	0%
Modeled	89%	74%	64%	56%	50%	45%	40%	36%	33%	30%

ASR Programmatic constraints and recommended changes:

COMPLIANCE WITH GW QUALITY STANDARDS (ANTI-DEGRADATION POLICY)

Programmatic Constraints	Recommended Changes

• Recharge water must meet **background water quality**:
  • Common issues with **disinfection by-products** (DBPs) and secondary water quality constituents
  • Must apply **all known and reasonable treatment technology** (AKART); or
  • Obtain **statutory waiver**
	• **Permitting alternative** to address DBPs and background water quality:
	  • **Statutory waiver** if recharge source is protective of public health and aquatic resources
	  • **Defining Alternative Point of WQ Compliance** (e.g. at distant monitoring point)

ASR Programmatic constraints and recommended changes:

COMPLIANCE W/DRINKING WATER STANDARDS

(DOH POTABLE SOURCE PROTECTION POLICY)

Programmatic Constraints

- **Requires disinfection** (incl. viruses) prior to recharge in potable source well or target drinking water aquifer
- Often negates ability to avoid propagation of DBPs and results in **disinfection both during recharge and recovery stage**

Recommended Changes

- **Meet disinfection policy at alternative point of compliance** or at time of recovery
- Assign **in-situ treatment credits** for virus deactivation in storage aquifer (use of separate recovery well)

DOH's ASR and Drinking Water Wells Fact Sheet

Photo credit: JOHN CALLERY (via pexels.com)

Senate Bill 5018

Prior Efforts to Streamline ASR Permitting

Prior Efforts to Streamline Permitting

Compliance with Groundwater Quality Standards

- **SB5018** was introduced by Senators Honeyford and Erickson in 2014 (64th Legislative Session)
- An act relating to underground artificial storage and recovery projects; and amending RCW 90.03.370 (reservoir permits)

Prior Efforts to Streamline Permitting

Compliance with Groundwater Quality Standards

"An underground artificial storage and recovery project is deemed to comply with state water quality standards for groundwater if the following requirements are met: (i) Water stored in the project is controlled such that there is a high likelihood that the quantity of water stored will be available for recovery; (ii) water stored in the project that is not recovered does not preclude groundwater from being used for beneficial uses in the future; (iii) the project is protective of aquatic resources; and (iv) at the point of injection or other point agreed upon by the project applicant and the department, water quality for water in the project does not exceed fifty percent of the state drinking water quality standard for maximum contaminant levels or maximum residual disinfectant levels adopted pursuant to RCW 43.20.050."

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Prior Efforts to Streamline Permitting

Compliance with Groundwater Quality Standards

"An underground artificial storage and recovery project is deemed to comply with state water quality standards for groundwater if the following requirements are met: (i) Water stored in the project is controlled such that there is a high likelihood that the quantity of water stored will be available for recovery; (ii) water stored in the project that is not recovered does not preclude groundwater from being used for beneficial uses in the future; (iii) the project is protective of aquatic resources; ***and (iv) at the point of injection or other point agreed upon by the project applicant and the department, water quality for water in the project does not exceed fifty percent of the state drinking water quality standard for maximum contaminant levels or maximum residual disinfectant levels adopted pursuant to RCW 43.20.050****."*

Prior Efforts to Streamline Permitting

Recoverable Quantity

→ An earlier draft of SB5018 also included **clarification of recovery efficiency and "wet" water carry over** (but was not in introduced SB).

> ***"…If the project is designed for storage over multiple years, recovery shall be limited to the cumulative amount of water stored. In no cases shall recovery impair existing water rights or result in a new appropriation…"***

Additional Considerations

→ASR in Regulated/ Closed Basins

→Use of Reclaimed Water

→Ecology's 2017 ASR Survey

…and… It's Time!

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ROUNDTABLE