

CITY OF BOISE RECYCLED WATER PROGRAM

CITY of BOISE

WHO IS BOISE?

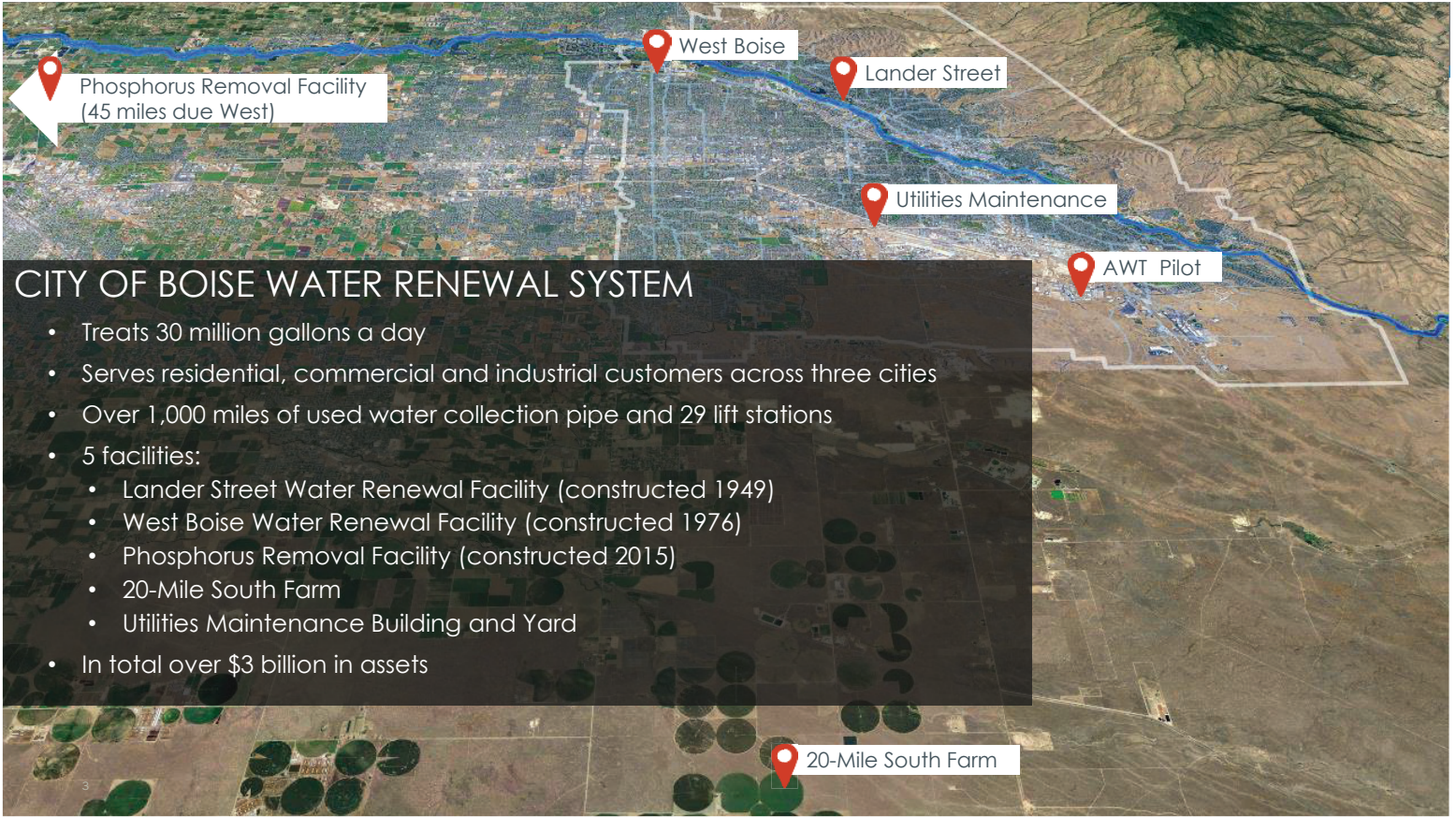


Capital city

Population: 237,447 (2021)

Semi-arid climate with hot, dry summers and cold, snowy winters. Approx 200 sunny days per year.

Protecting environment (especially the Boise River) is a key community priority



CITY OF BOISE WATER RENEWAL SYSTEM

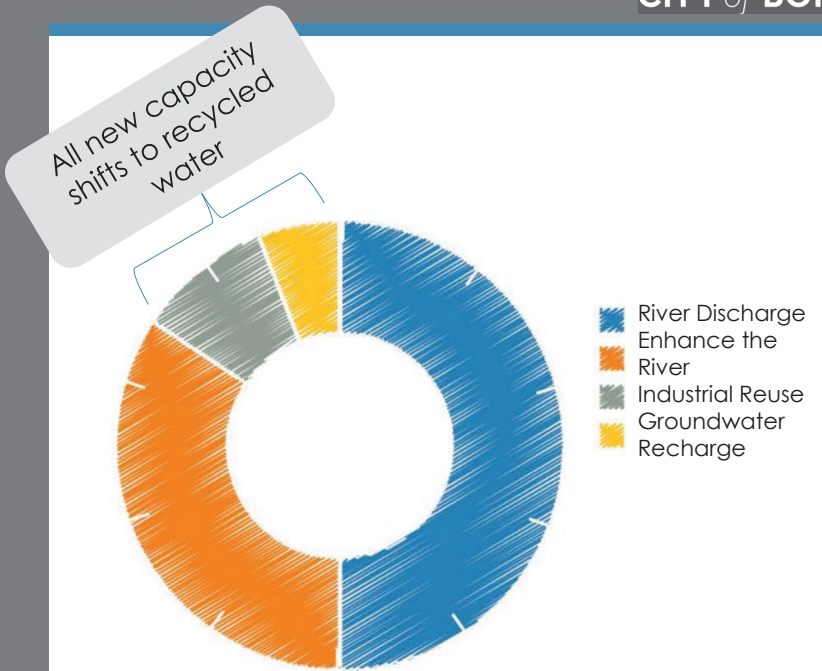
- Treats 30 million gallons a day
- Serves residential, commercial and industrial customers across three cities
- Over 1,000 miles of used water collection pipe and 29 lift stations
- 5 facilities:
 - Lander Street Water Renewal Facility (constructed 1949)
 - West Boise Water Renewal Facility (constructed 1976)
 - Phosphorus Removal Facility (constructed 2015)
 - 20-Mile South Farm
 - Utilities Maintenance Building and Yard
- In total over \$3 billion in assets

WATER RENEWAL UTILITY PLAN

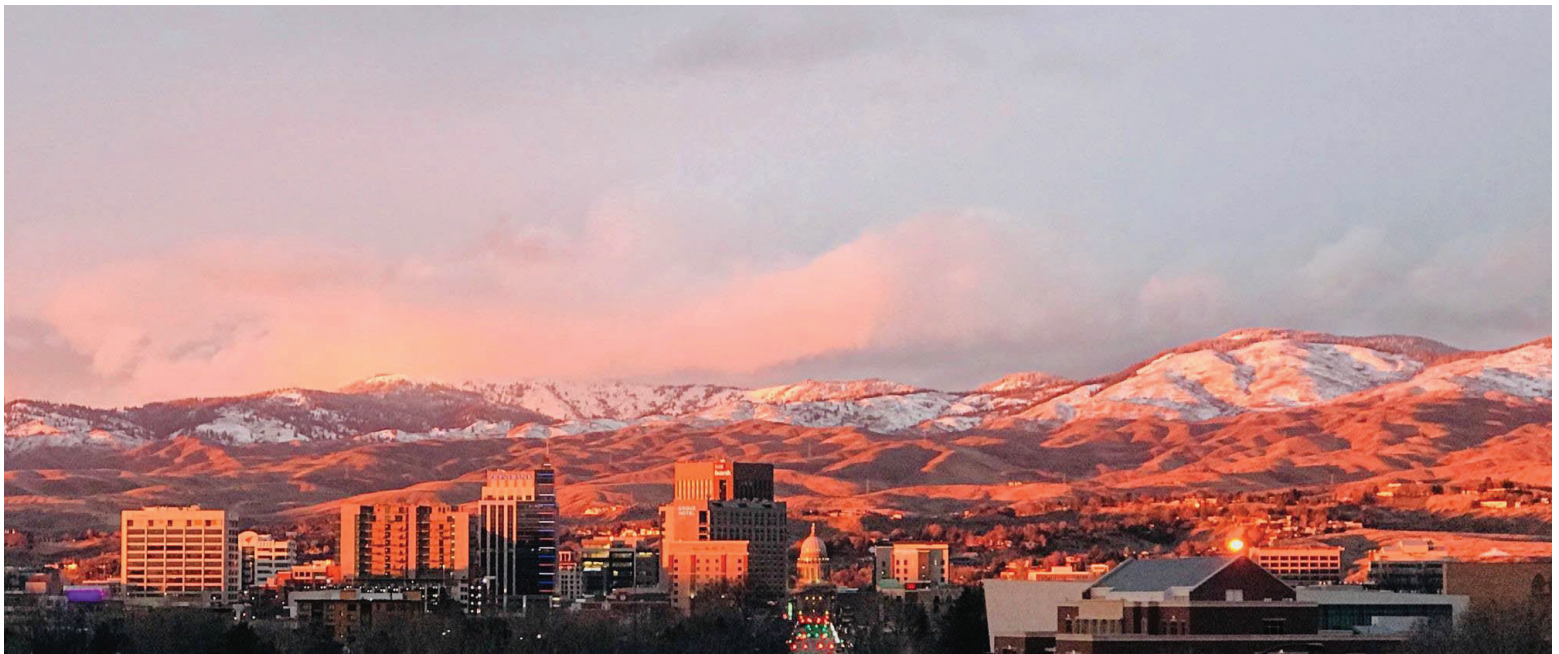
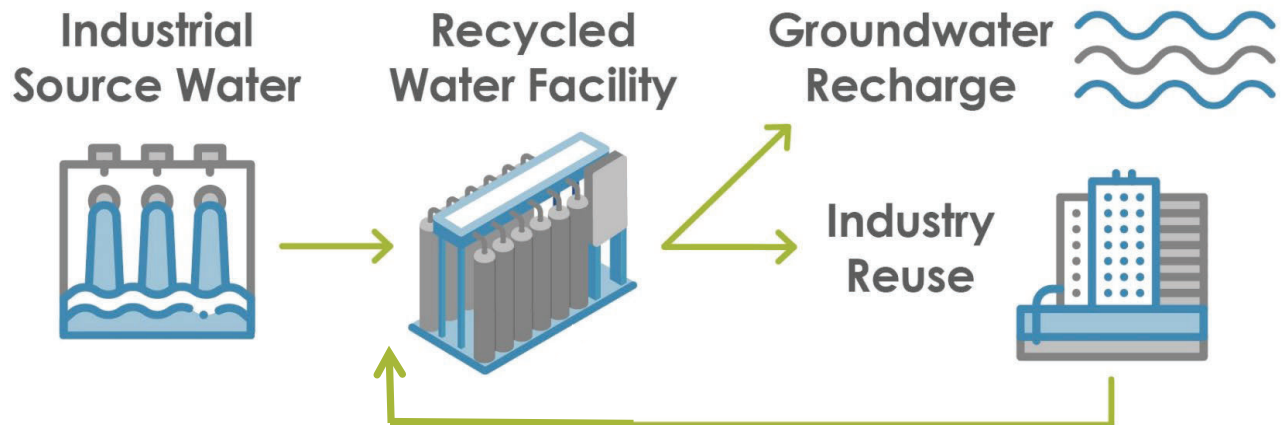
A PLAN FOR BOISE, BY BOISE

The Water Renewal Utility Plan recommended a portfolio of investments including the Recycled Water Program.

The Recycled Water Program will **preserve local water** by protecting the Boise River, bolstering the local groundwater supply, and **creating resiliency against the impacts of climate change**.



OUR RECYCLED WATER PROGRAM



ADVANCED WATER TREATMENT PILOT

PILOT OBJECTIVES

Transparency in *water quality data*



Increased *operator confidence*



Development of *financial data*



Support *regulatory approvals*



Increased *stakeholder confidence*

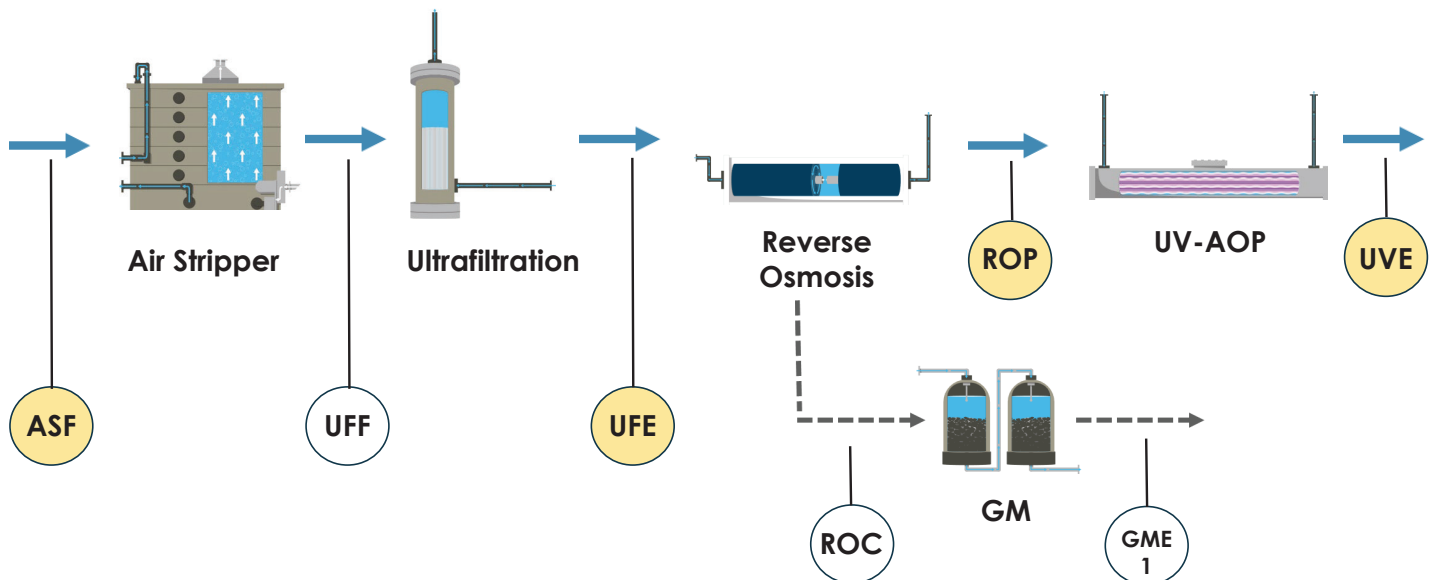


Develop data to *inform design criteria*



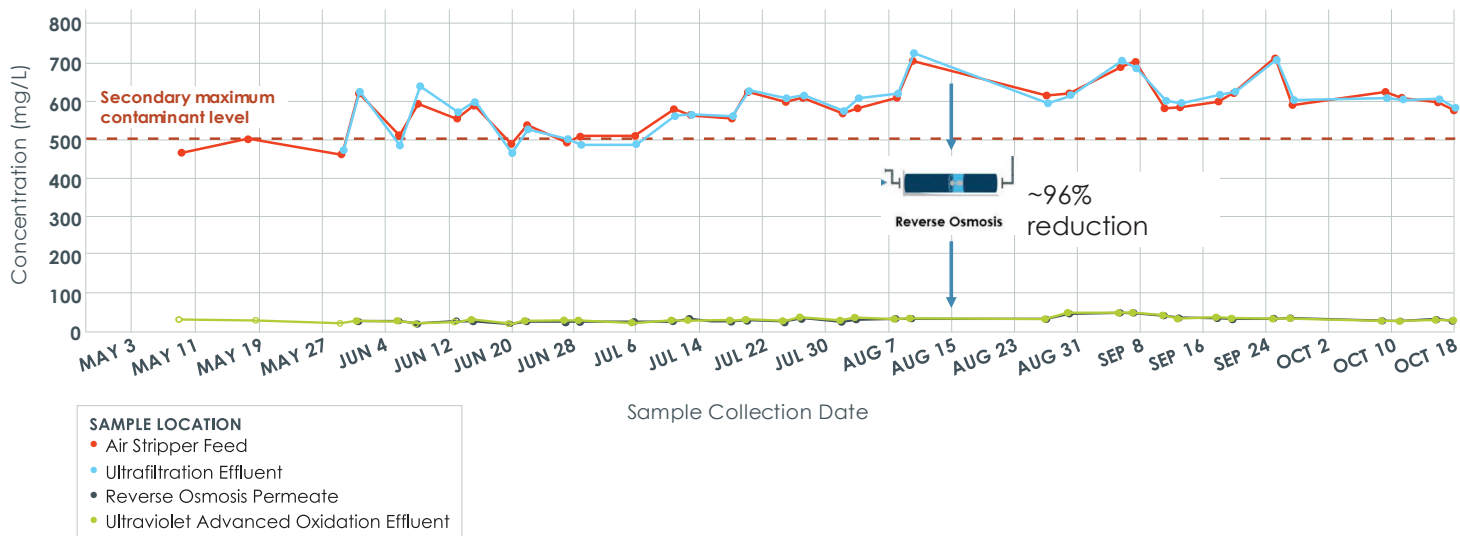
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PHASE 1 CONFIGURATION AND MONITORING POINTS



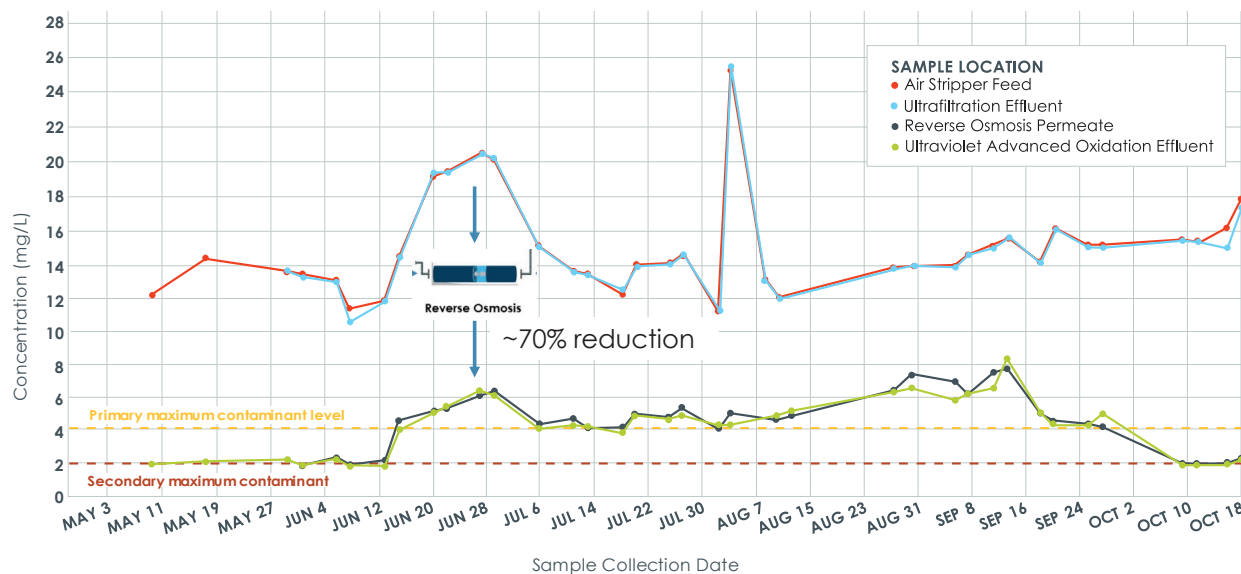
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TOTAL DISSOLVED SOLIDS (TDS)



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FLUORIDE



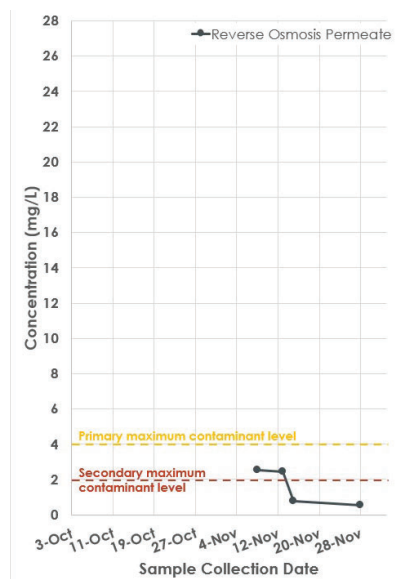
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PILOT MODIFICATIONS FOR FLUORIDE

- New RO Membranes

loose brackish water RO membranes → tight brackish water RO membranes

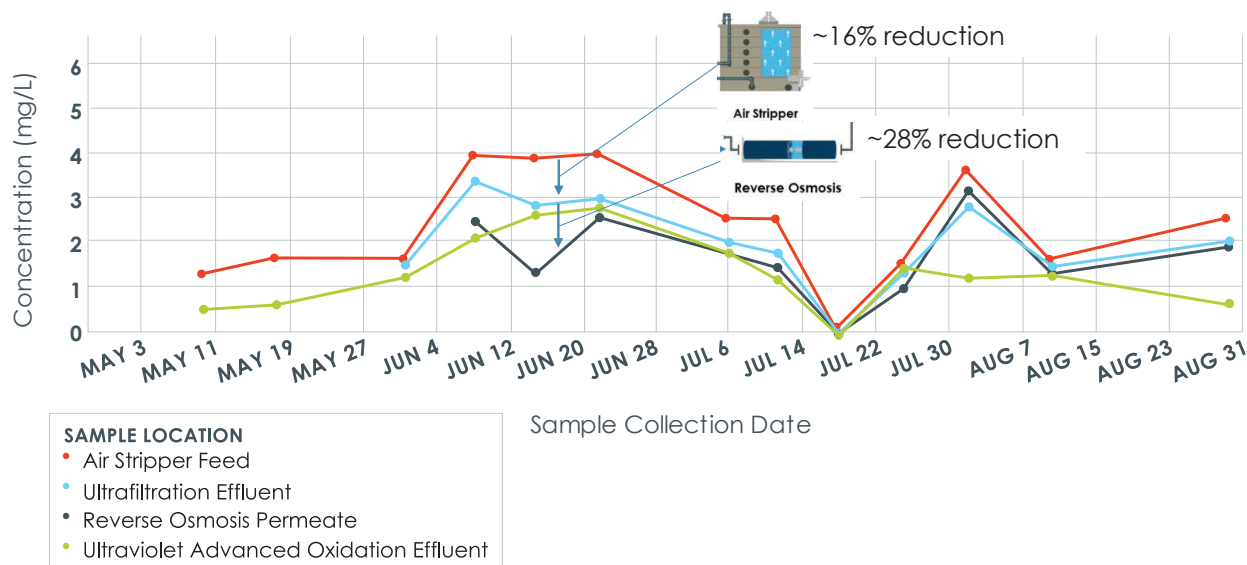
- Modified pH adjustment
- Increased recovery
- New anti-scalant formulation
- Side-stream activated alumina testing



* Graph contains preliminary results which are unvalidated
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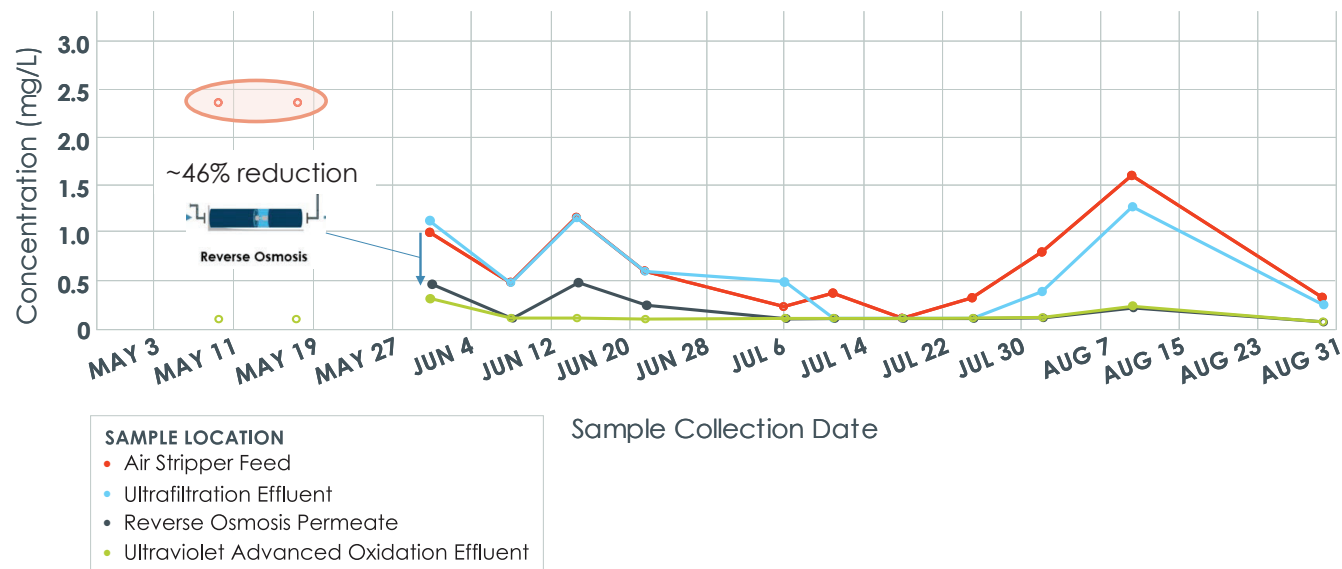
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ACETONE



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ISOPROPYL ALCOHOL (IPA)



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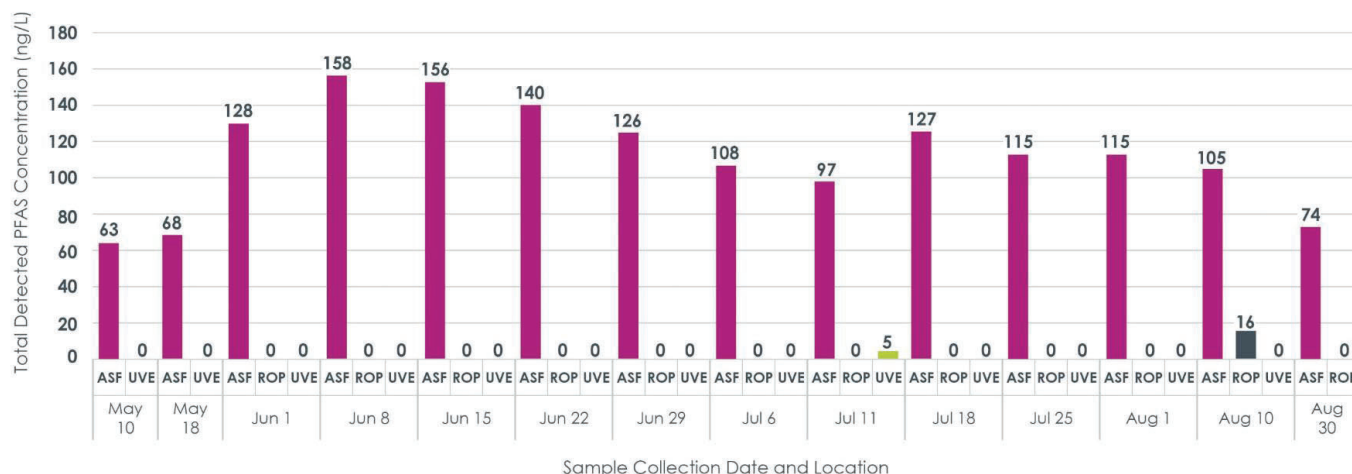
PILOT MODIFICATIONS FOR ACETONE/IPA

- Side-stream biological treatment testing for acetone and IPA removal
- Bench testing to characterize total organic carbon following UV-AOP

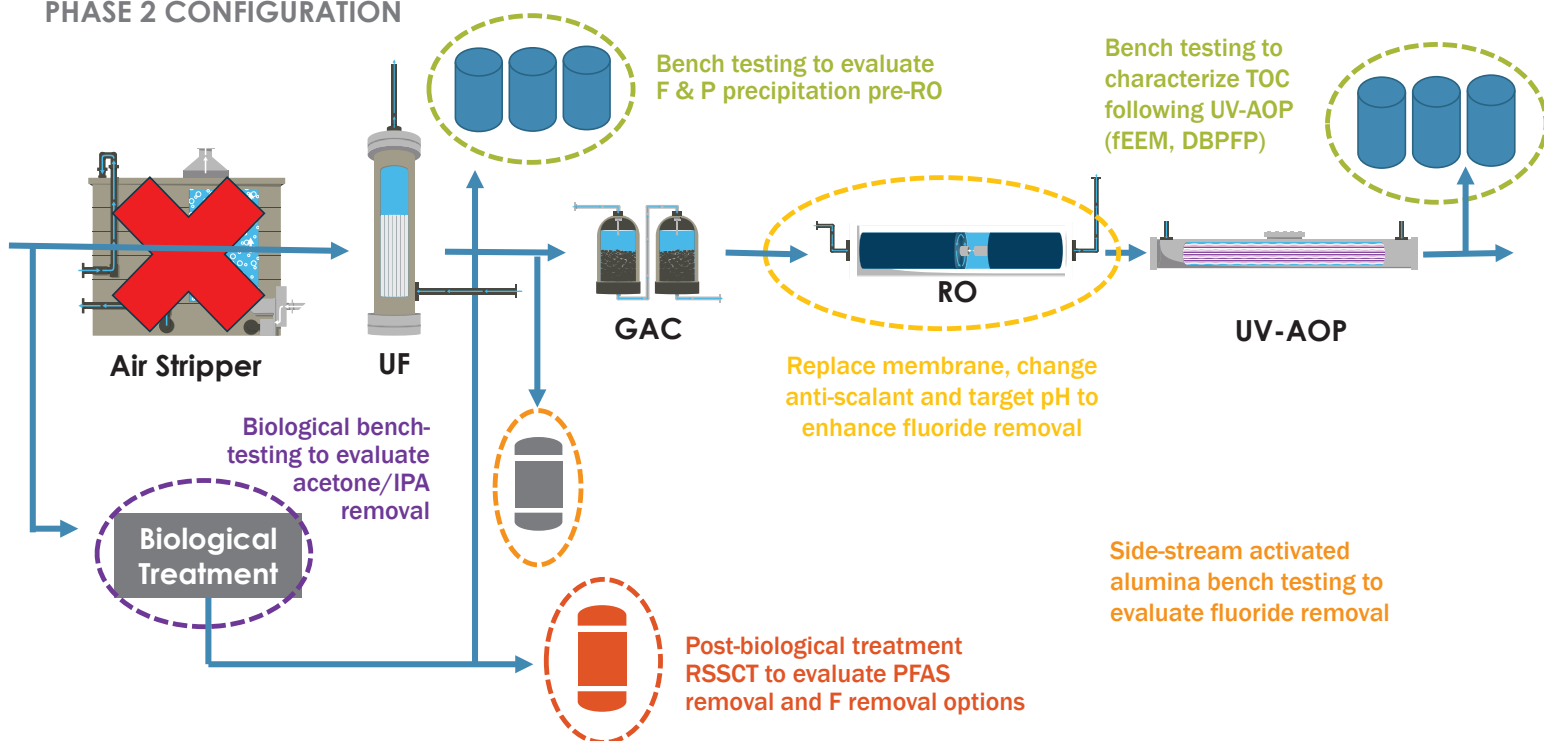
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TOTAL DETECTED PFAS CONCENTRATION

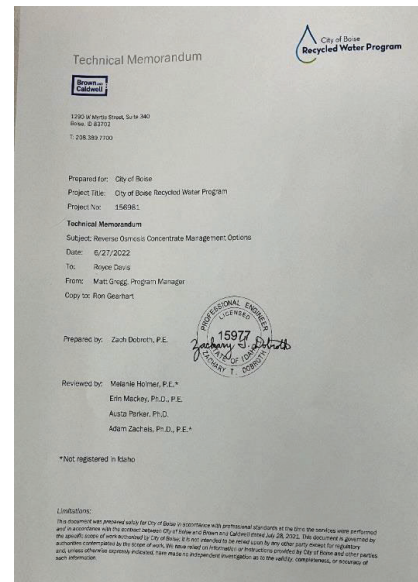


PHASE 2 CONFIGURATION



ROC MANAGEMENT OPTIONS TM

- Volume reduction Approaches
 - Pressure Driven Membrane Processes
 - Vibratory Shear-Enhanced Processes
 - Other Advanced Membrane Processes
 - Mechanical and Thermal Processes
 - Natural Treatment Systems
- Disposal Approaches
 - Surface Water
 - Sanitary Sewer
 - Deep Well Injection
 - Evaporation Ponds
 - Land Application
 - Zero Liquid Discharge



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SANITARY SEWER DISCHARGE

- ROC to Lander and West Boise WRF
 - University of Idaho Study on ROC effects on a biological process.
 - Difference of removing water but discharge constituents. Will it make a difference?
 - Modeling the ROC discharge

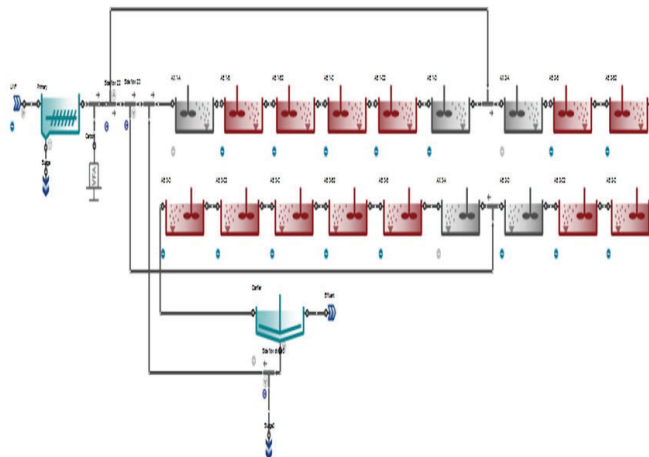


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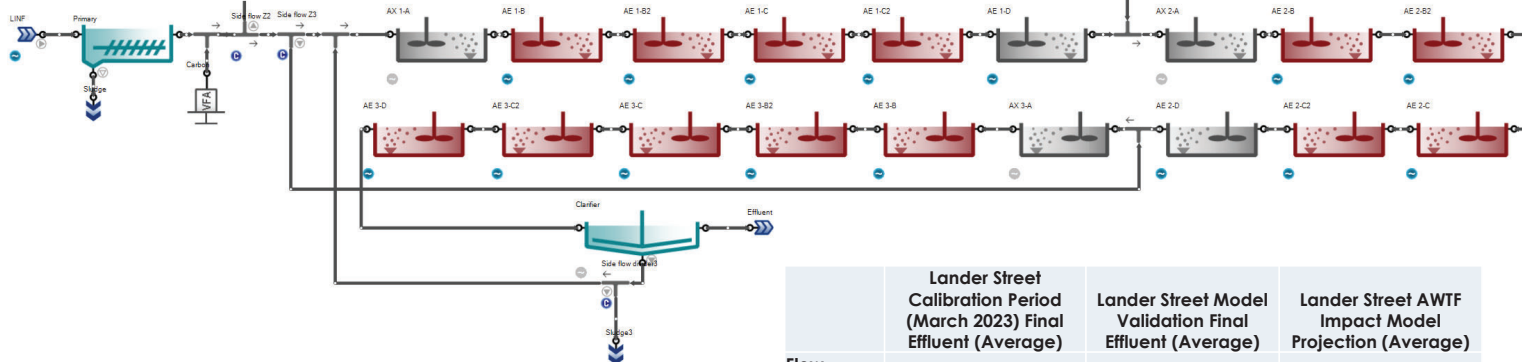
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LANDER AND WEST BOISE WRF MODELING

- ROC to Lander and West Boise WRF
 - University of Idaho Study on ROC effects on a biological process.
 - Difference of removing water but discharge constituents. Will it make a difference?
 - Modeling the ROC discharge



	Lander Street Natural and Expanded Service Area	Industrial Pre-Treated Effluent	AWTF RO Concentrate	New Lander Street Influent
Flow (MGD)	13.74	3.96	0.79	10.57
BOD (mg/L)	232.30	36.72	50.00	291.90
TSS (mg/L)	201.86	23.09	1.00	253.77
TP (mg/L)	5.28	2.00	3.00	6.34
NH3 (mg/L)	26.21	13.67	60.00	33.44



	Lander Street Calibration Period (March 2023) Final Effluent (Average)	Lander Street Model Validation Final Effluent (Average)	Lander Street AWTF Impact Model Projection (Average)
Flow (MGD)	10.4	10.4	10.6
BOD (mg/L)	6.50	2.90	2.70
TSS (mg/L)	7.10	7.20	7.00
TP (mg/L)	0.47	0.47	0.46
NH3 (mg/L)	0.31	0.31	0.25

UNIVERSITY OF IDAHO ROC STUDY

- Partnered with University of Idaho
 - Shipped 4,000 gallons to U of I with 200-gallon drums
 - Ran a bench and a pilot scale test
 - Effects on ML and NH₃ and P removal



University
of Idaho

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ROC CONDITIONING

- ROC to Granular Media Fluorosorb 200
 - Remove the PFAS and other constituents from the ROC
 - Worked good other than
.....
 - Sizing and life of the media?

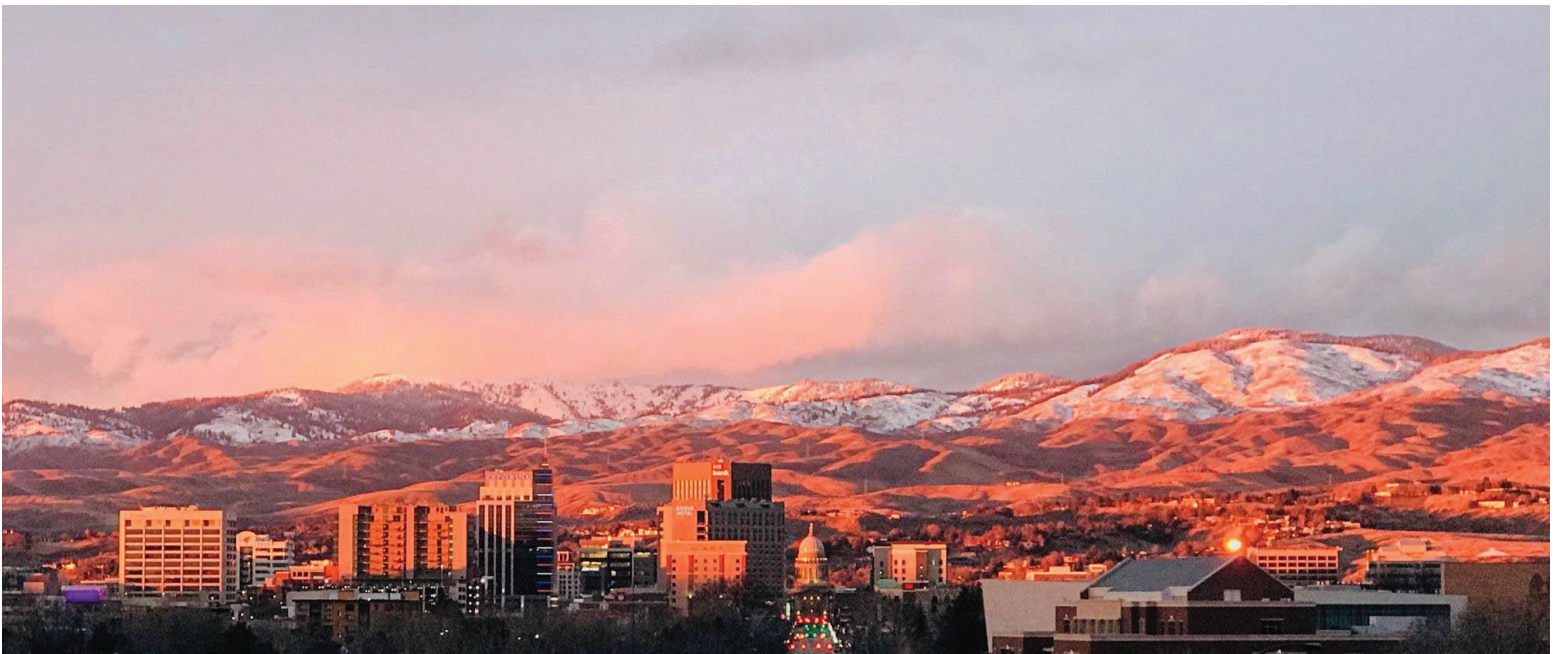


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PHASE 2 BIO TREATMENT AND ROC?

- Can we remove any constituents that would benefit the WRF?
 - PFAS
 - NH₃
 - Phosphorus
- Still need ROC polishing?

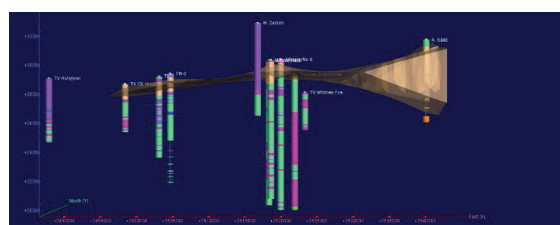
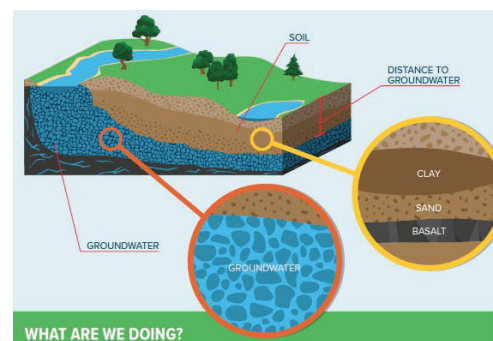


**GROUNDWATER RECHARGE AND
LAND ACQUISITION**

GROUNDWATER RECHARGE OUTCOMES

GROUNDWATER SYSTEM ANALYSIS

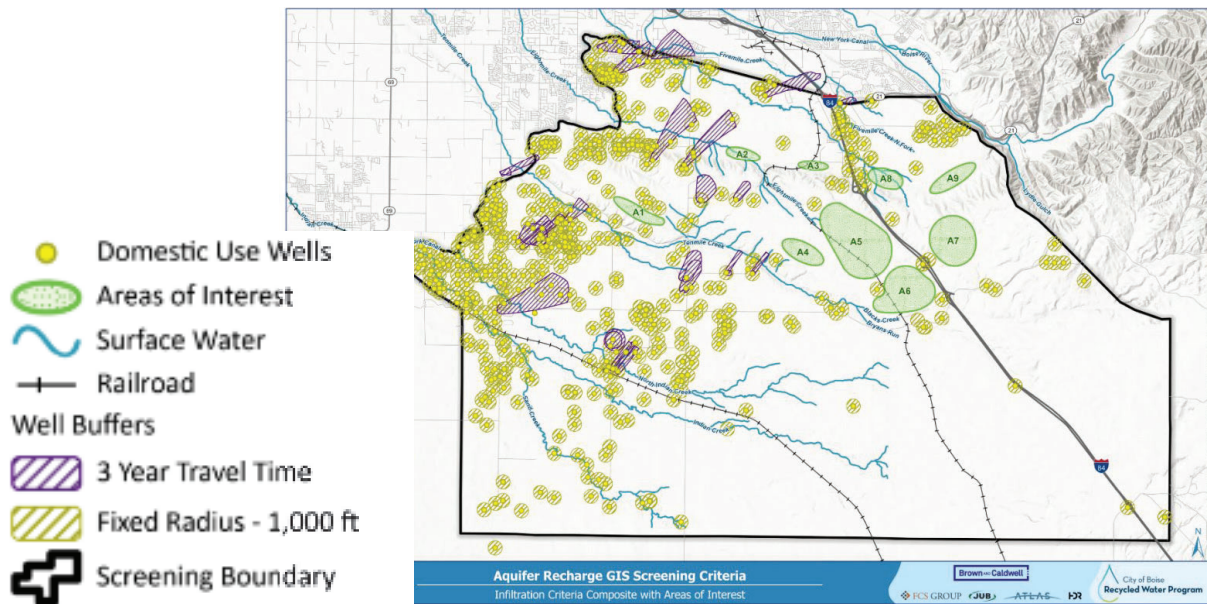
- **Geologic Testing:** Studying the conditions below the surface to learn what types of soil layers there are and how deep the groundwater is.
- **Hydrogeologic Testing:** Studying and modeling how long it takes water to filter through the soil and the direction and speed of the groundwater flow to learn how the purified water will mix with the groundwater.
- **Geochemical Testing and Modeling:** Studying the minerals and metals present in the soil so that we can maintain and enhance the water quality in the groundwater.



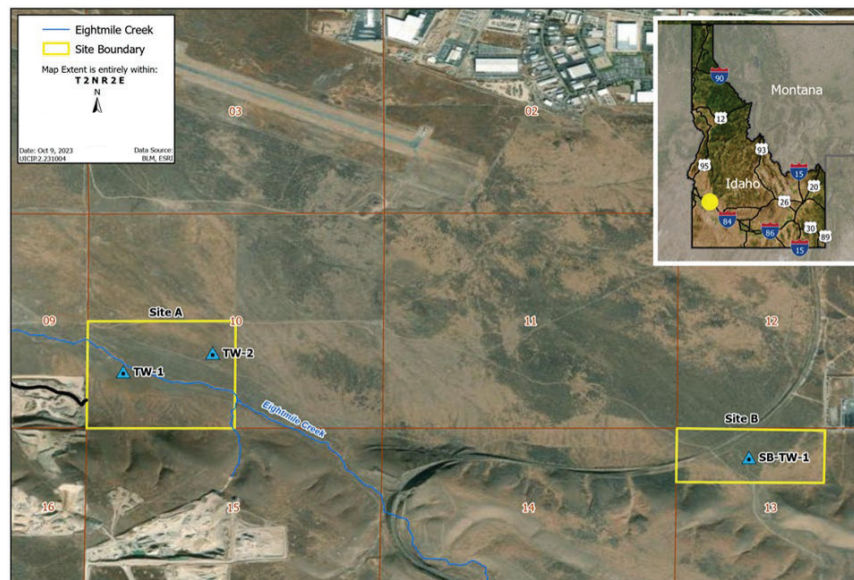
Borehole Lithology

Basalt	Gravel
Cinders/Scoria	Sand
Clay	Sandstone
Claystone	

GWR SITE AREAS OF INTEREST

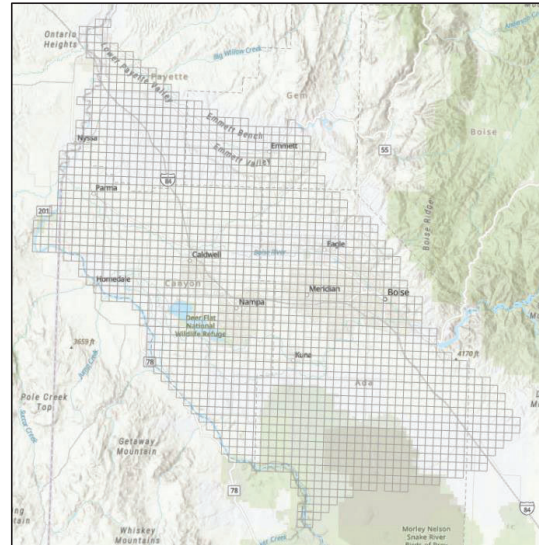


IDENTIFIED SITES

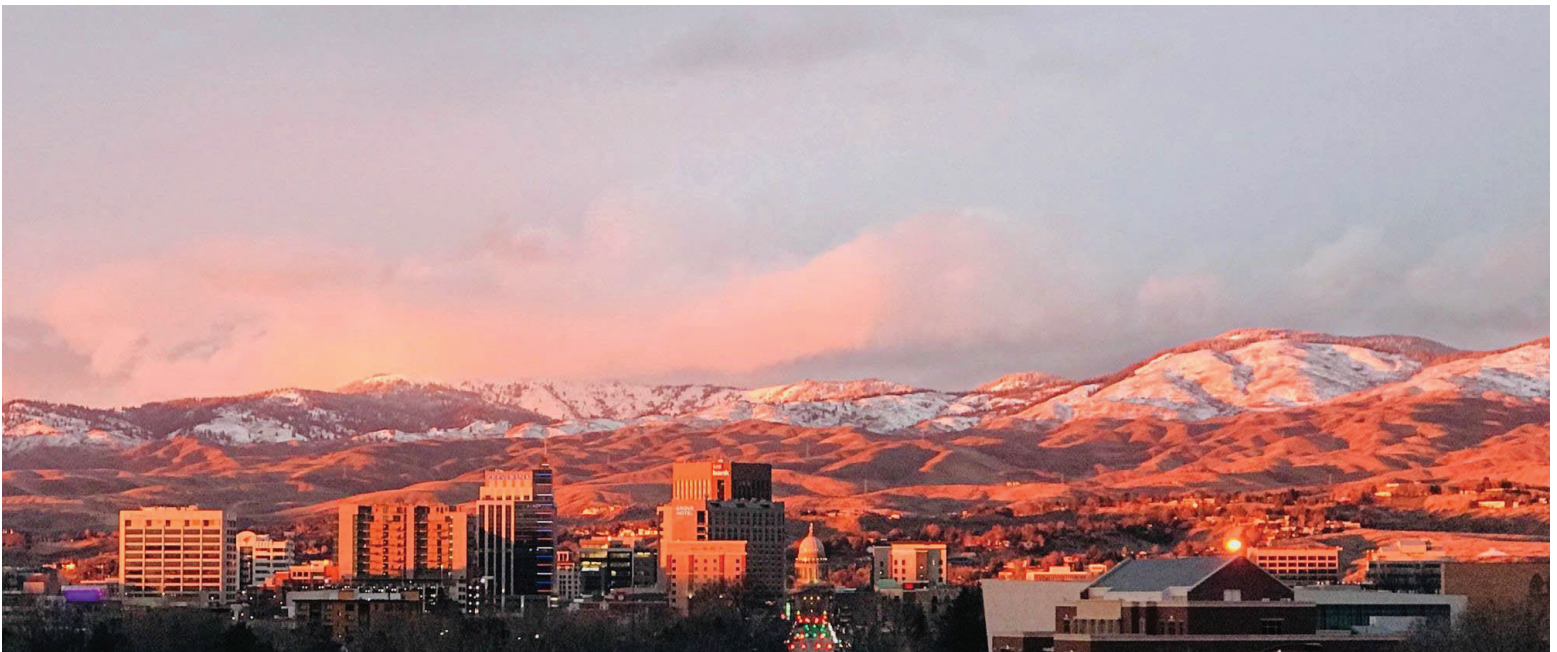


USGS MODEL FRAMEWORK

- *Treasure Valley Groundwater Flow Model*
- Regional 3D groundwater flow model
- City is refining vertical and horizontal grids in model and incorporating Transport Modeling



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PERMITTING

TWO AGENCIES

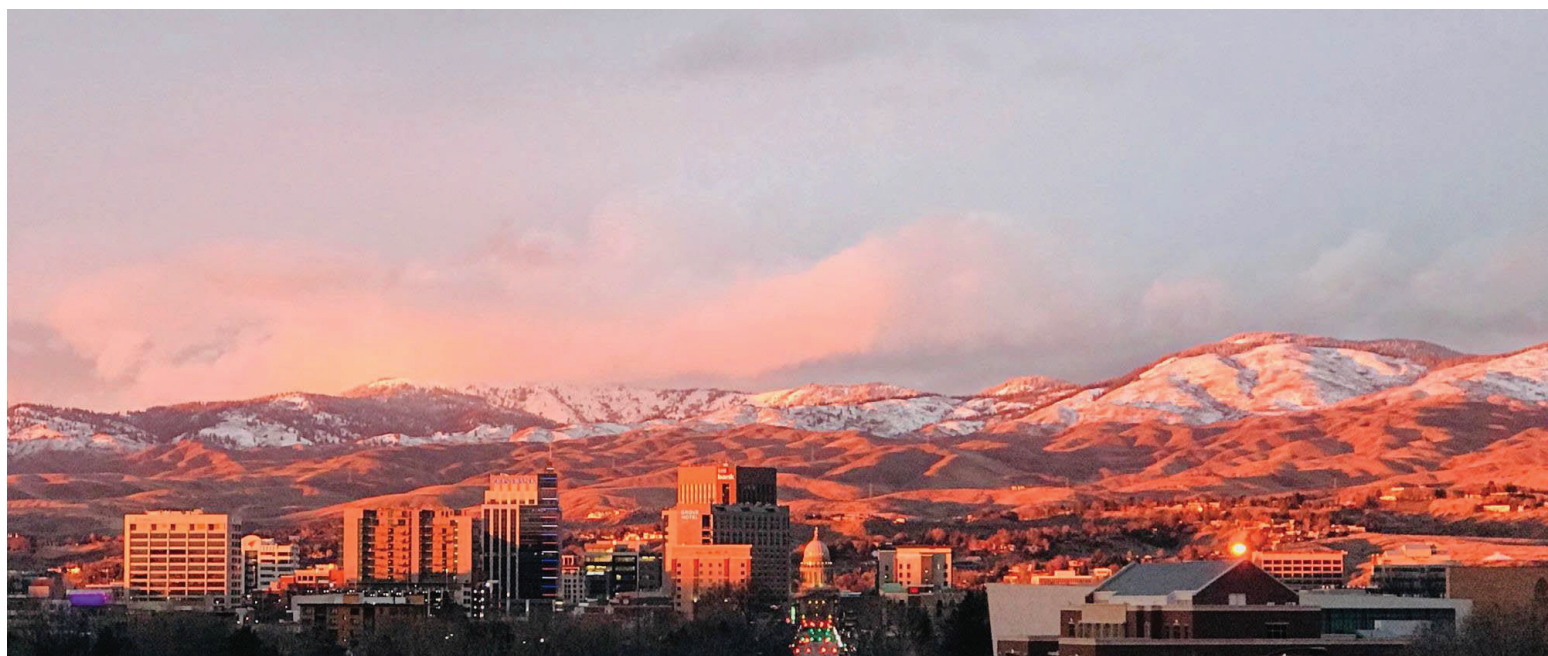
Idaho Department of Environmental Quality

- Case by Case basis for a Reuse Permit
- Several Reuse permits in Idaho
- Land application rules
- Meet with IDEQ regular basis
- Infiltration

Idaho department of Water Resources

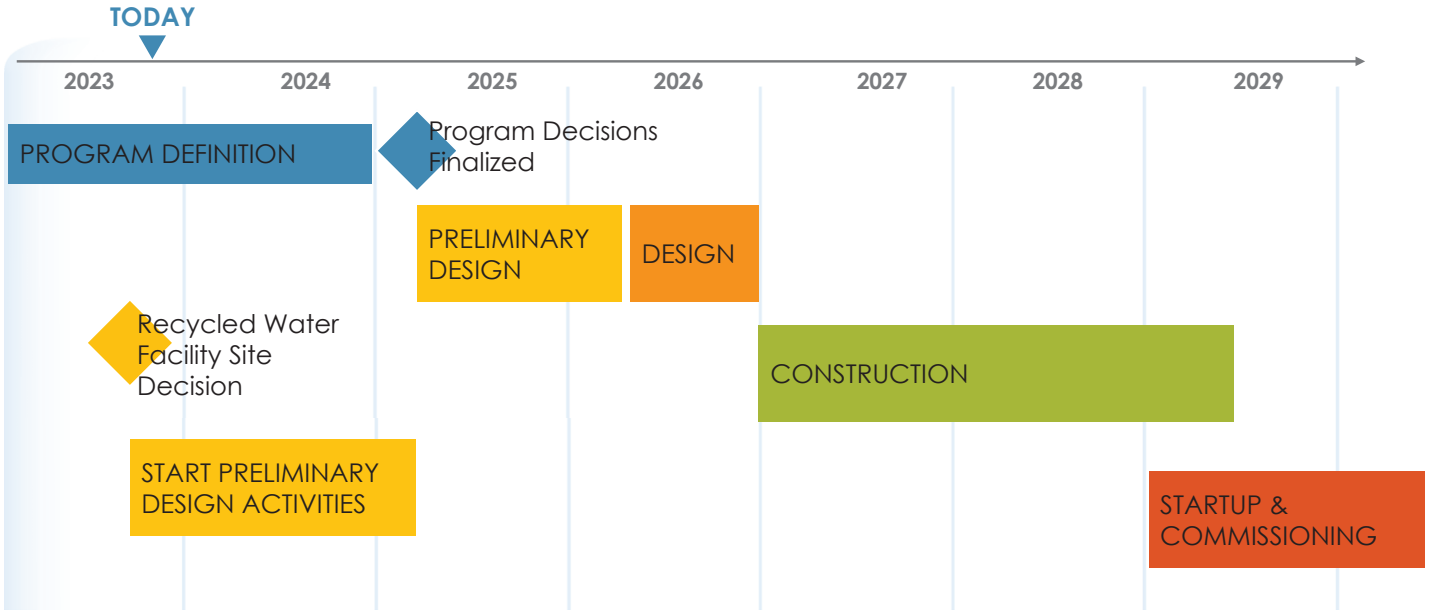
- Underground Injection Control Permit
- Current rules only allow for industrial water. No Municipal water
- UIC rulemaking currently underway. Working on changing language to be quality based.

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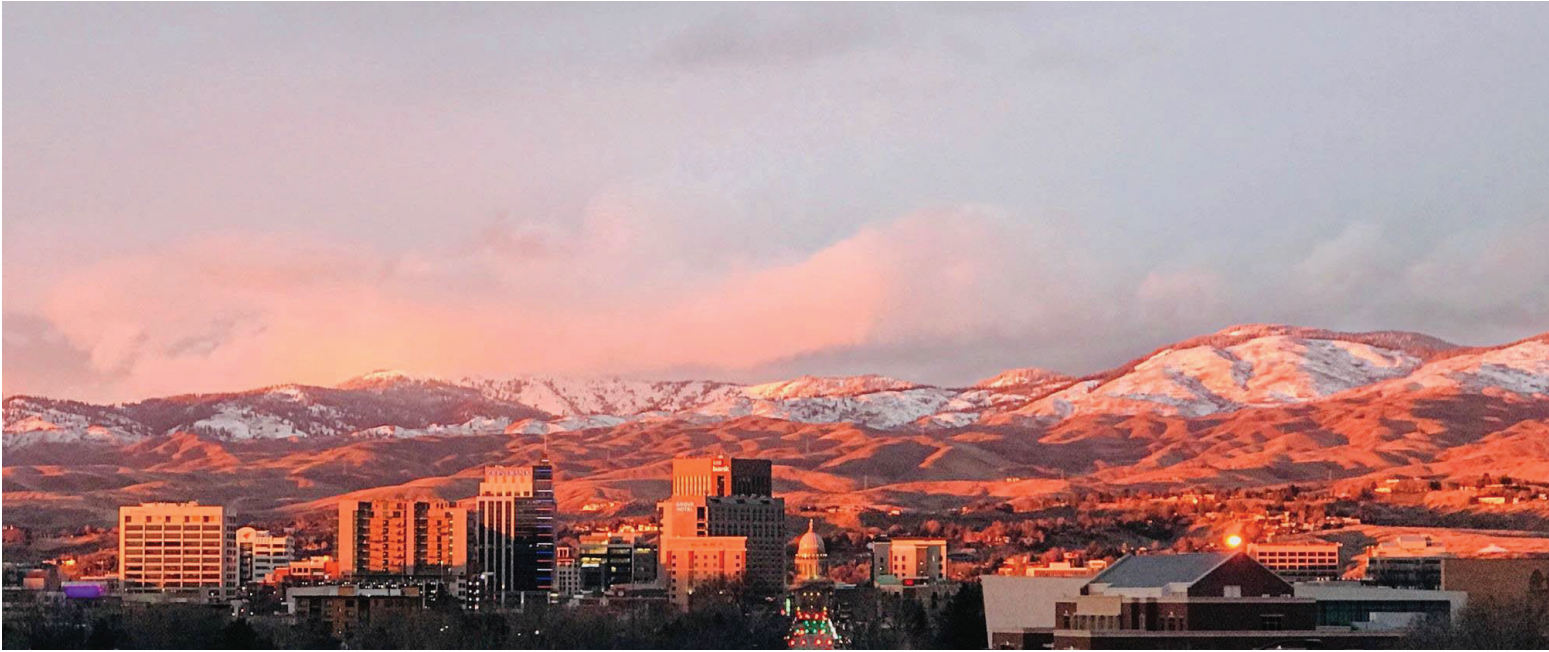


WHAT'S NEXT?

RECYCLED WATER PROGRAM SCHEDULE



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THANKS!