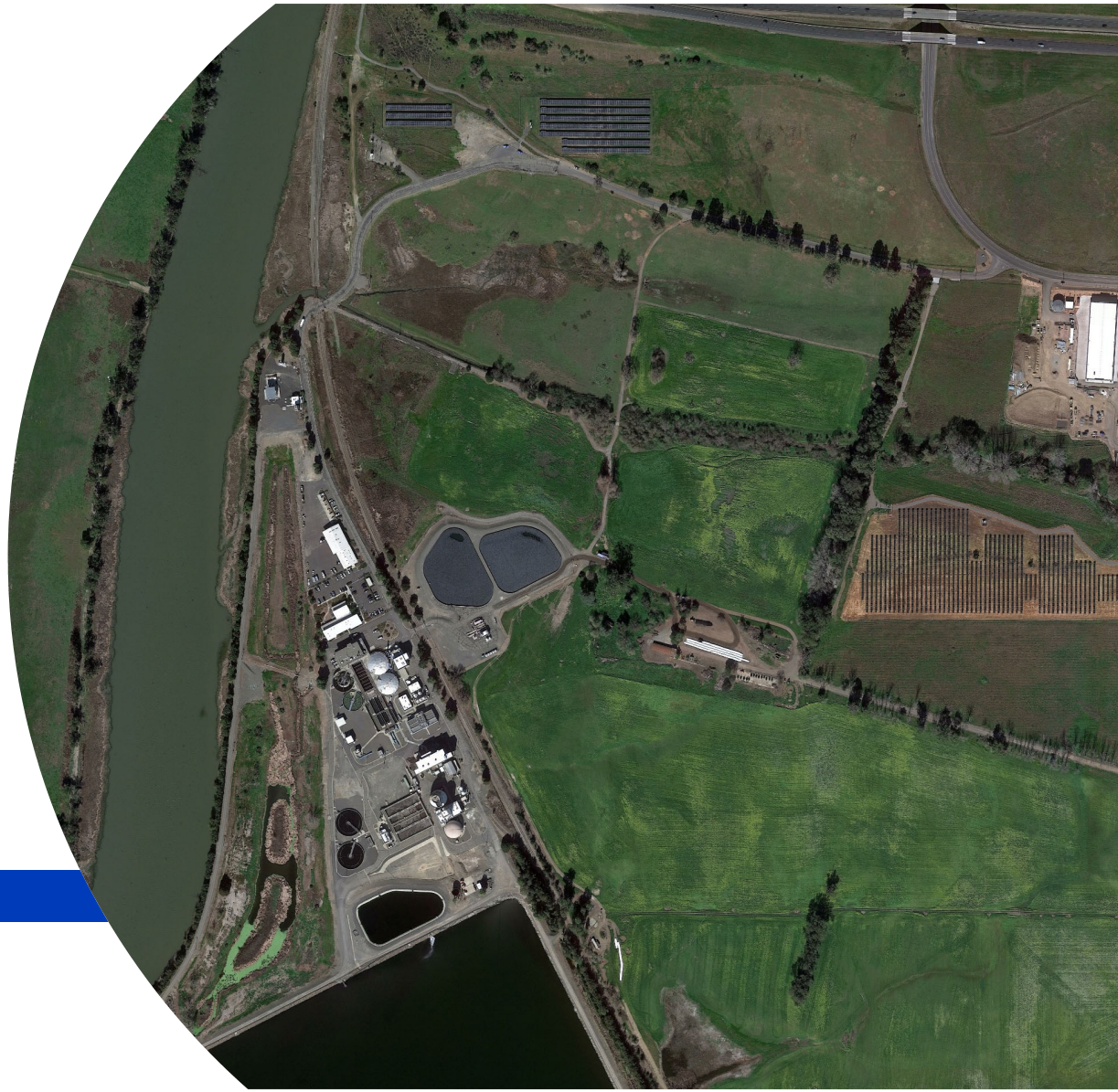
Purified Water Feasibility Study

City of Napa and Napa Sanitation District

BACWA Recycled Water Committee Meeting

TEAMS | January 16, 2024



Acknowledgements

NapaSan

Andrew Damron
Tim Healy
Christopher Francis

CITY OF NAPA

Felix Riesenberg
Joy Eldredge
Erik Kebbas
Tonya Espinoza
Ginerva Augustini
Stephanie Proft

carollo 90 YEARS

Elizabeth Charbonnet
Andy Salveson
Amos Branch
Elisa Garvey
Julia Schmitt
Cora LeMar
Rosemary Smud
Lydia Holmes
Jon Marshall
Nick Mitchell
Andrew Coulter
Doug Wing

Waterology Consulting
Delivering water management solutions

JP Robinette
Jerry Brown

LWA
LARRY WALKER ASSOCIATES
science | policy | solutions

Denise Conners
Mitch Mysliwiec

WSC

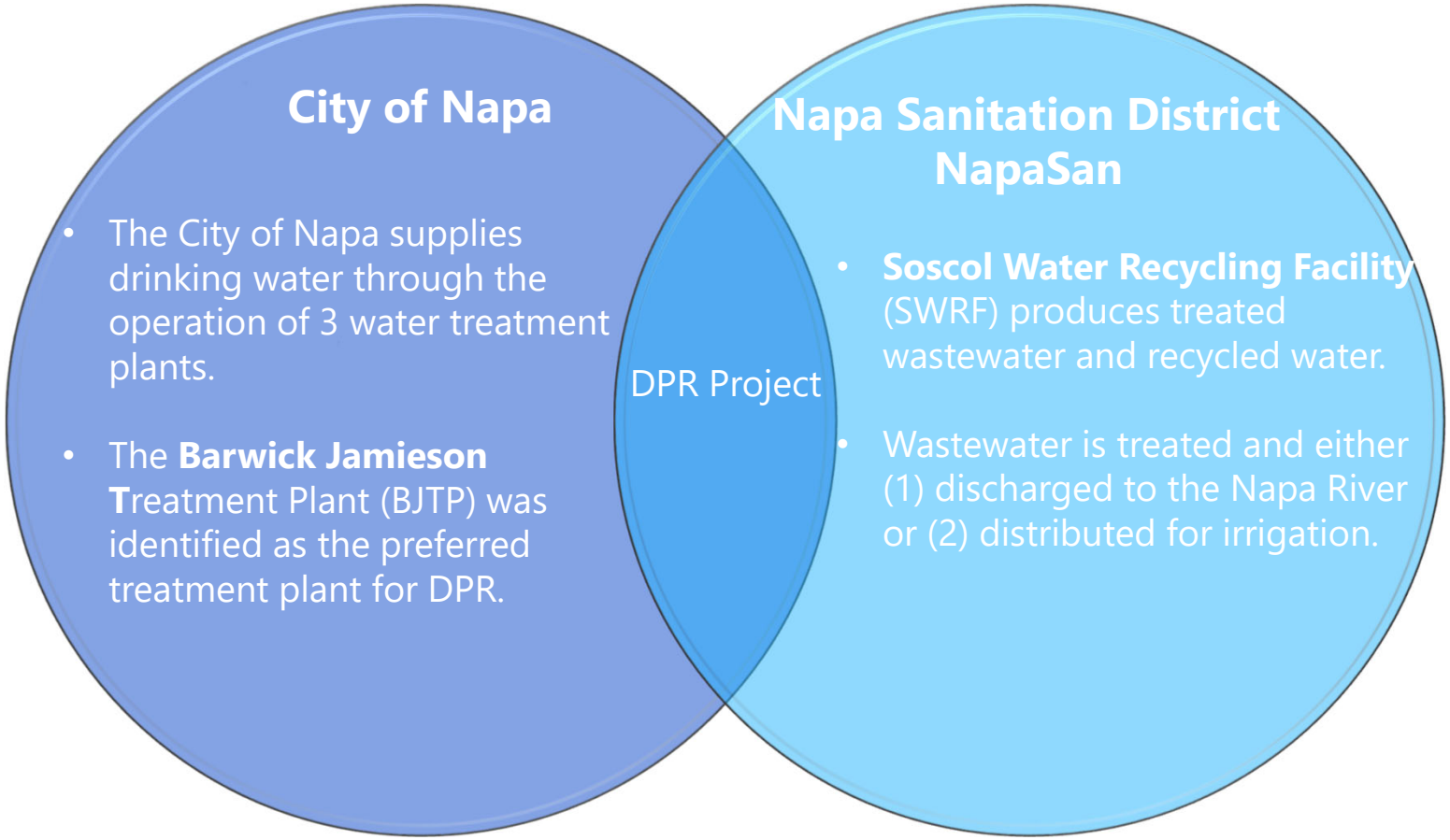
Haili Matsukawa
Rob Morrow

Agenda

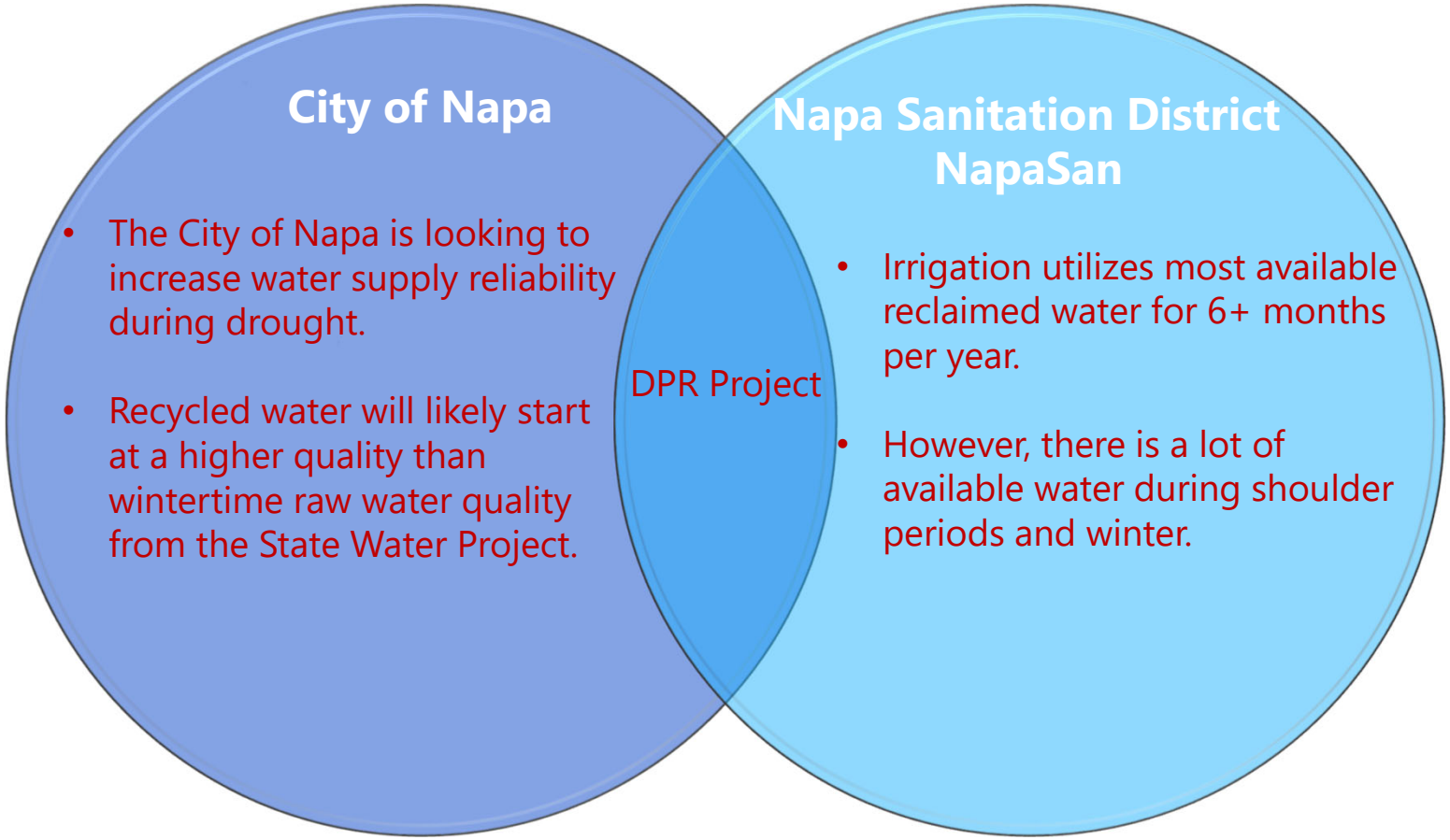
Topic	Description
City of Napa and Napa Sanitation District Background	• Overview of Project Partners - Collaboration
Direct Potable Reuse Background	• Basics of DPR
Project Components – Available Flow	• Determine flow not used for agriculture
Project Components – Project Alternatives	• Determine DPR Project Alternatives
Project Components – Regulations and Treatment	• Treatment and Regulatory Requirements
Project Components – Reverse Osmosis Concentrate	• What to do with the Reverse Osmosis Concentrate?
Project Components – Interagency Coordination	• Agency roles, discussions, governance & partnerships
Layouts and Cost Development	• AWPF Site Layout Examples and Cost Development
Next Steps	• Project Next Steps
Open Discussion/Questions	• Open dialogue, Q&A

City of Napa and Napa Sanitation District Background

Project Partners & Collaboration



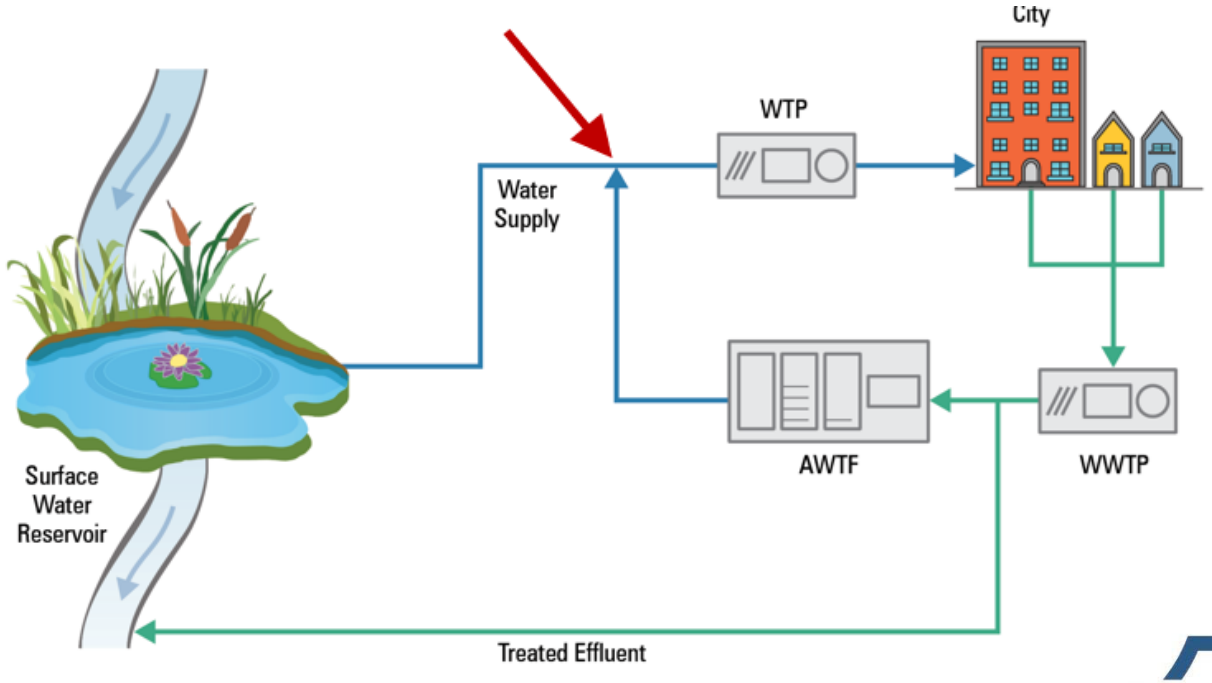
Project Partners & Collaboration



Direct Potable Reuse Background

Direct Potable Reuse (DPR) Options

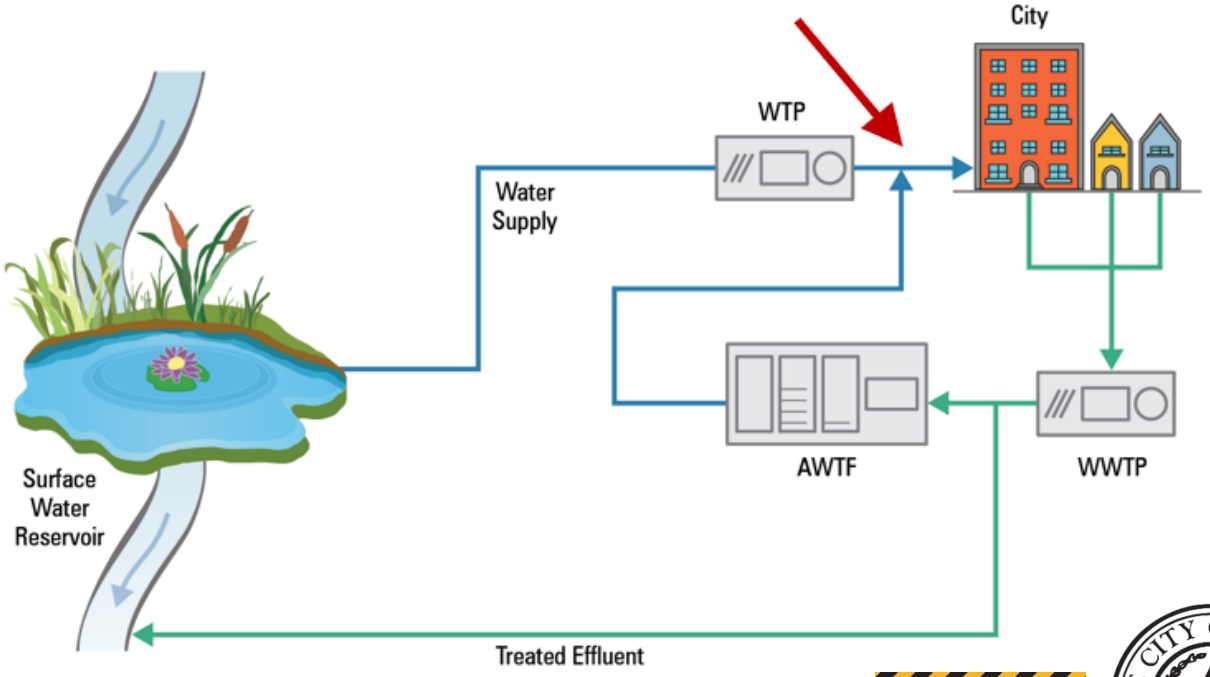
- There are two main options for DPR.
  - **Option 1**: DPR with Raw Water Augmentation (RWA).



BIG SPRING TEXAS

Direct Potable Reuse (DPR) Options

» **Option 2**: DPR with Treated Water Augmentation (TWA).



UNDER CONSTRUCTION

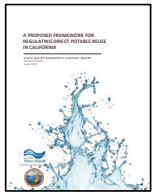
DPR Regulatory Timeline

2010
- SB 918

2013
- SB 322

2016 /17
- DPR Feasibility Reports

2018 /19
- DPR Framework

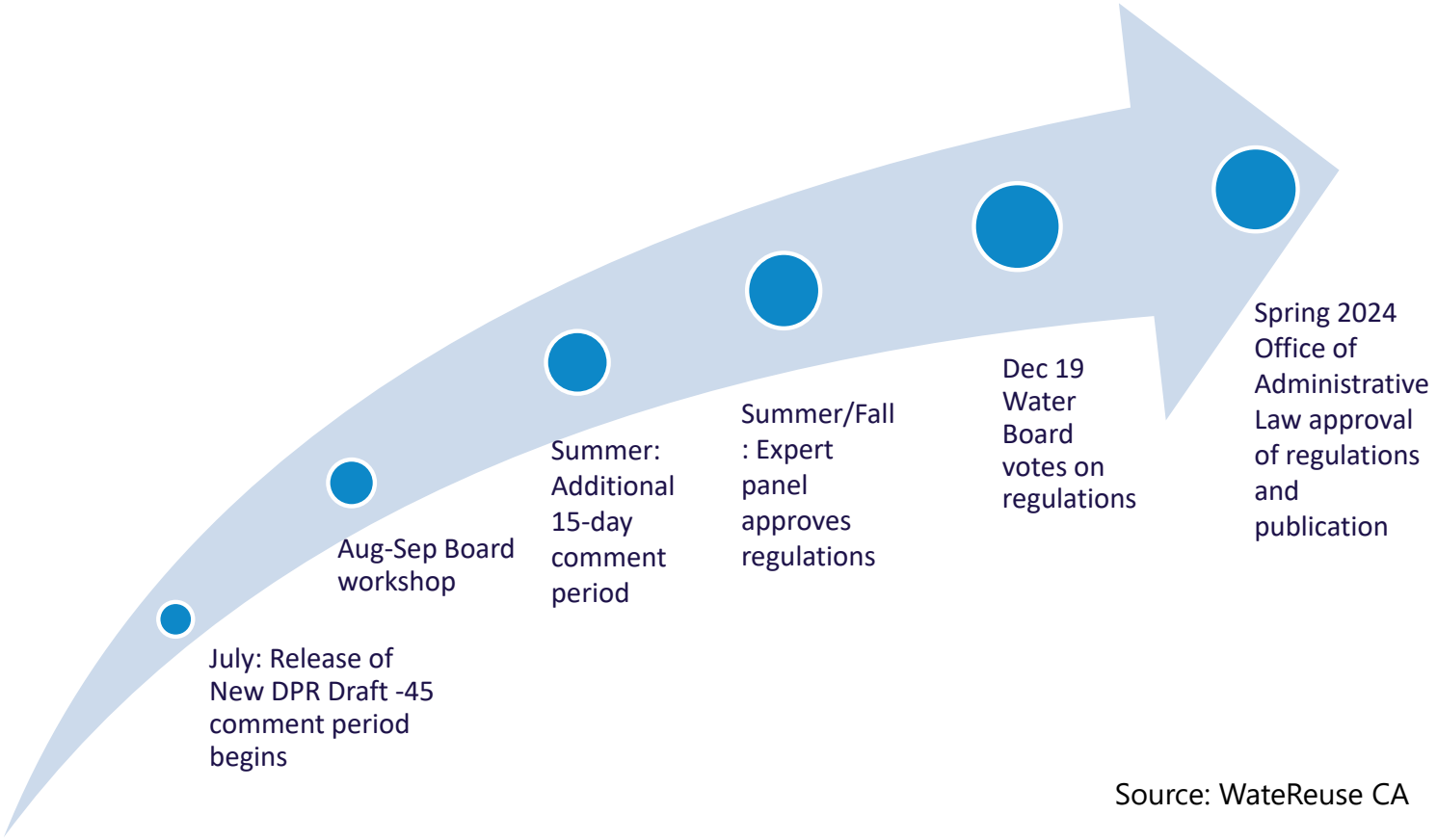


2021
- 2021 Draft DPR Criteria (March and August)

2022
- 2022 DDW Comments on NWRI Panel Report

2023
- 2023 DDW completes DPR (RWA and TWA) regulations

DPR Regulatory Timeline (continued)

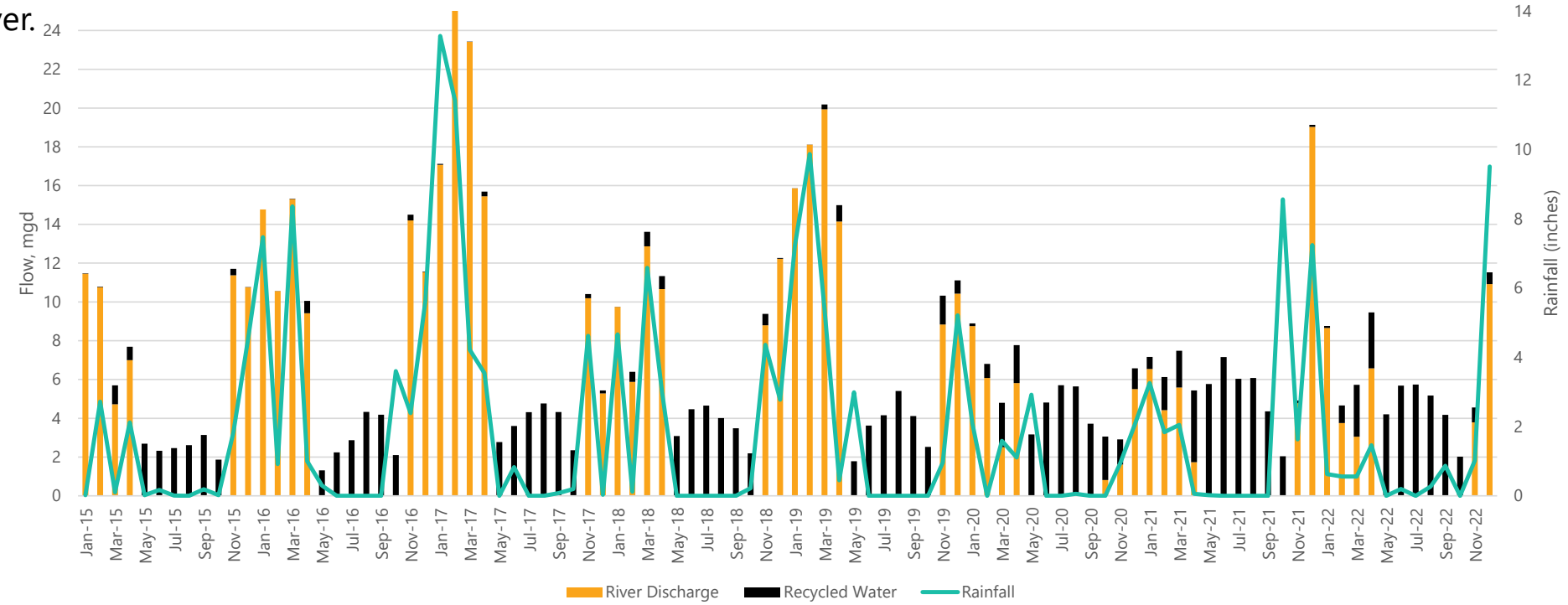


Source: WateReuse CA

Project Components – Available Flow

Determining Available Flow

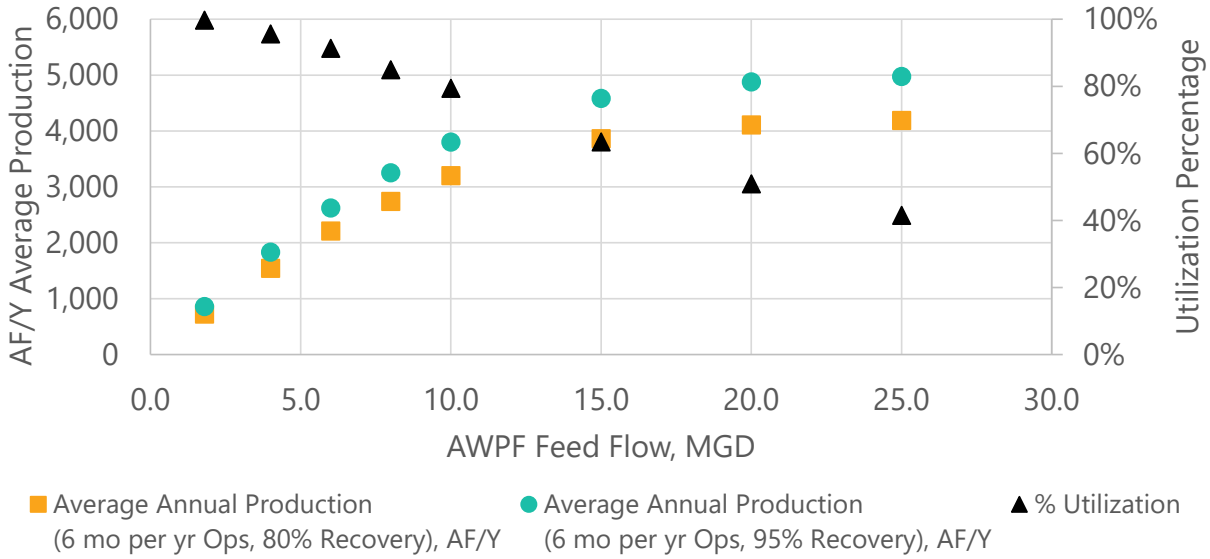
- Currently NapaSan SWRF discharges to the Napa River during the wet season and provides recycled non-potable water during the dry season.
- The DPR Advanced Water Purification Facility (AWPF) was sized based on Napa SWRF effluent sent to the River.



Plot of Monthly River Discharge and Recycled Water at NapaSan and Rainfall (2015-2022)

Sizing the Advanced Water Purification Facility (AWPF)

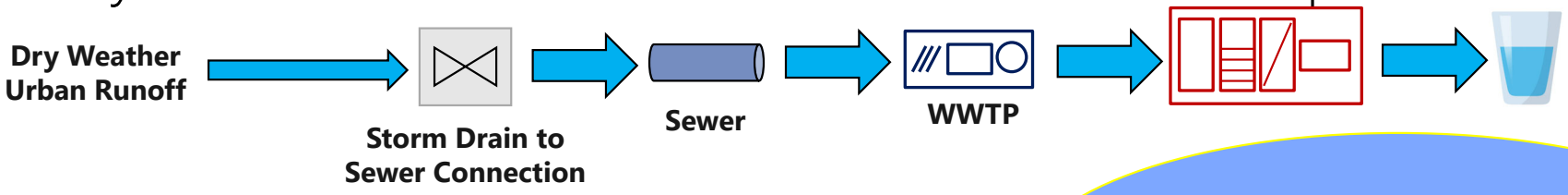
- There is variability in the water that can be captured for the AWPF throughout the wet weather months. This impacts **percent utilization**.
  - **Percent utilization** is the amount of time the facility is in use based on the chosen flow rate.
- **3 different AWPF sizes*** were chosen for this project.
  - 1.8 mgd = ~94% Utilization
  - 6 mgd = ~83% Utilization
  - 10 mgd = ~70% Utilization



Water Production vs Utilization for Varying AWPF Feed Flow Rates

Notes: *assumes that oxidation ponds will be full going into the irrigation season.

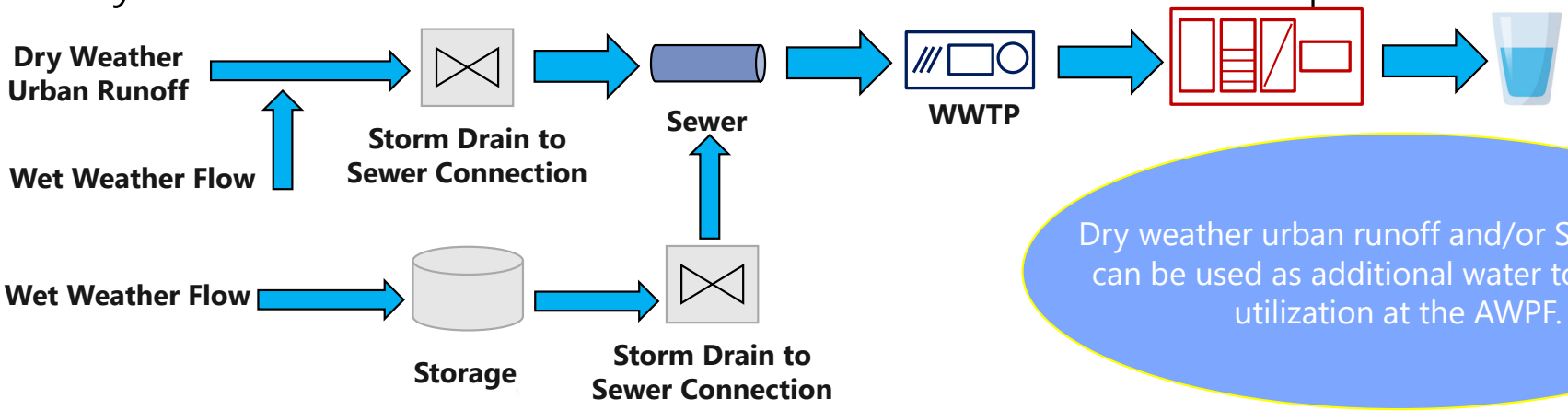
Dry Weather Urban Runoff and Stormwater Capture



Dry weather urban runoff and/or Stormwater can be used as additional water to increase utilization at the AWPF.

- **Dry weather urban runoff** is available throughout the year.
  - What: non-stormwater flow sourced from overirrigation, broken sprinkle systems, fire hydrant testing, car washing, infiltration and inflow (I&I) from groundwater into leaky pipes, and other sources.
  - How: capture involves infrastructure that diverts dry weather urban runoff from the storm drain to the wastewater collection system for conveyance and treatment.

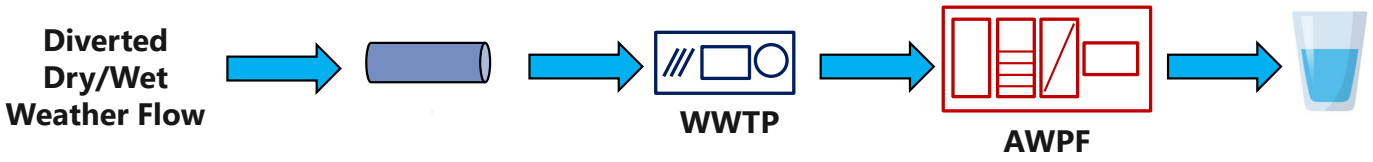
Dry Weather Urban Runoff and Stormwater Capture



Dry weather urban runoff and/or Stormwater can be used as additional water to increase utilization at the AWPF.

- **Stormwater runoff** is available during high- and low-rainfall seasons.
  - » What: stormwater captured during rainfall events.
  - » How: two options
    1. Divert Wet Weather Flow to the wastewater collection system like the dry weather urban runoff capture scenario.
    2. Storage basins can be used to capture Wet Weather Flow that is then metered into the wastewater collection system.

Potential to Increase Flow



- Dry weather urban runoff/Wet weather stormwater capture and diversion was considered as means to increase utilization.
  - » Field work and a planning level estimates were performed to determine captured flow quantity.
- **Dry Weather Flow** Estimate = **0.7 mgd**.
- **Wet Weather Flow** Estimate = varies depending on if it is a wet or dry year.
  - » Estimated captured volume for dry years = **60-80 MG*.**

Acronyms: mgd – million gallons per day; MG – million gallons
Notes: *taken from one diversion point in the system and assumes equalization.

Project Components – Project Alternatives

Project Alternatives

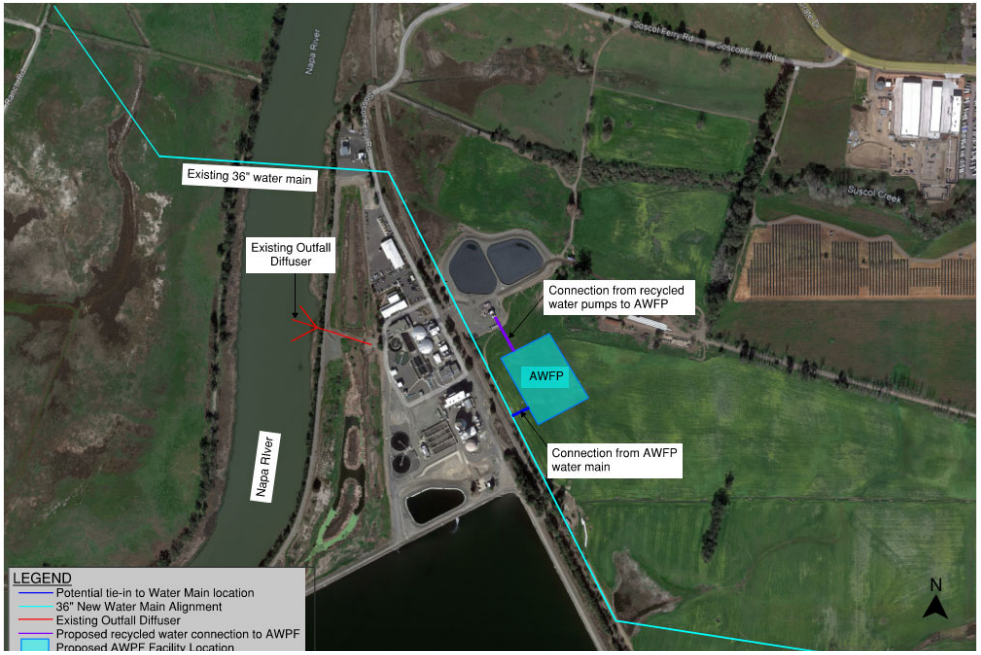
- DPR Project Alternatives Considered:
  - » Project Type – RWA or TWA.
  - » Project Location – NapaSan SWRF or City of Napa BJTP
- **3 different AWPF project alternatives** were chosen for this project.

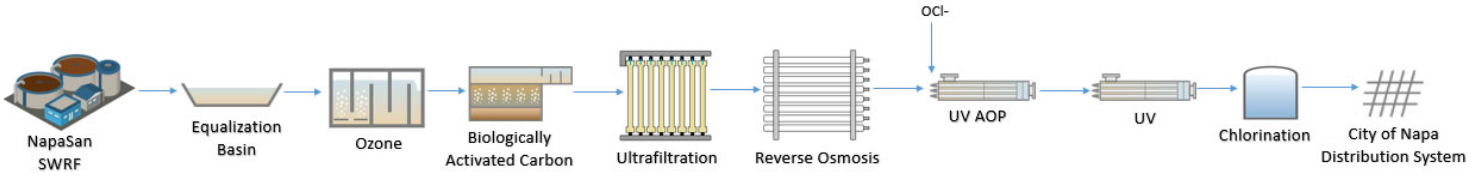
Barwick Jamieson Treatment Plant (BJTP)

NapaSan Soscol Water Reclamation Facility (SWRF)

Project Options

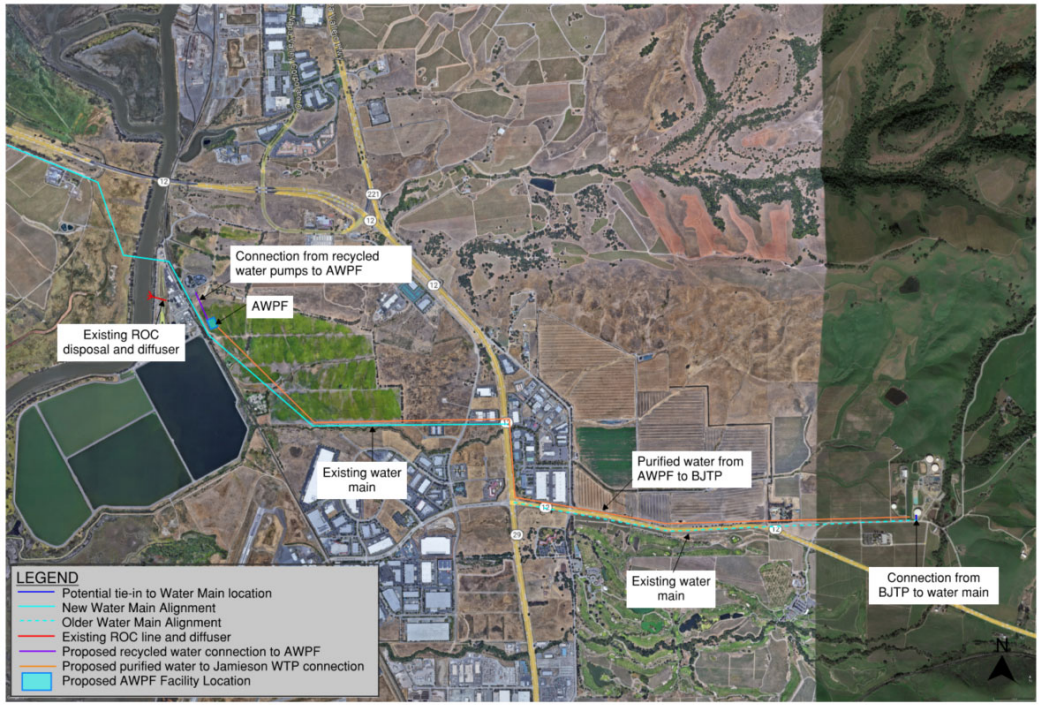
- **Location & Treatment:**
  1. Alternative 1: Advanced Water Purification Facility (AWPF) at NapaSan for Treated Water Augmentation (TWA)

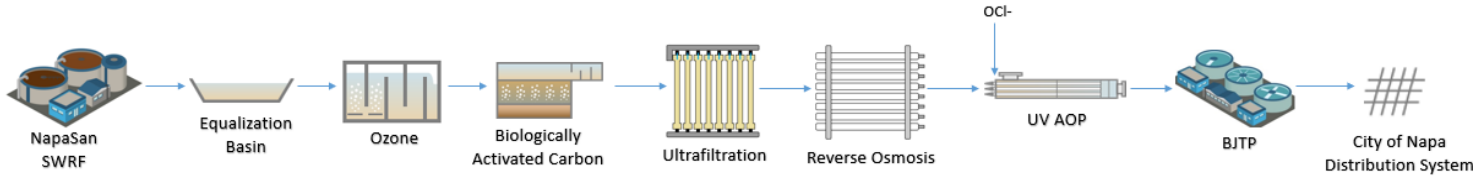




Project Options

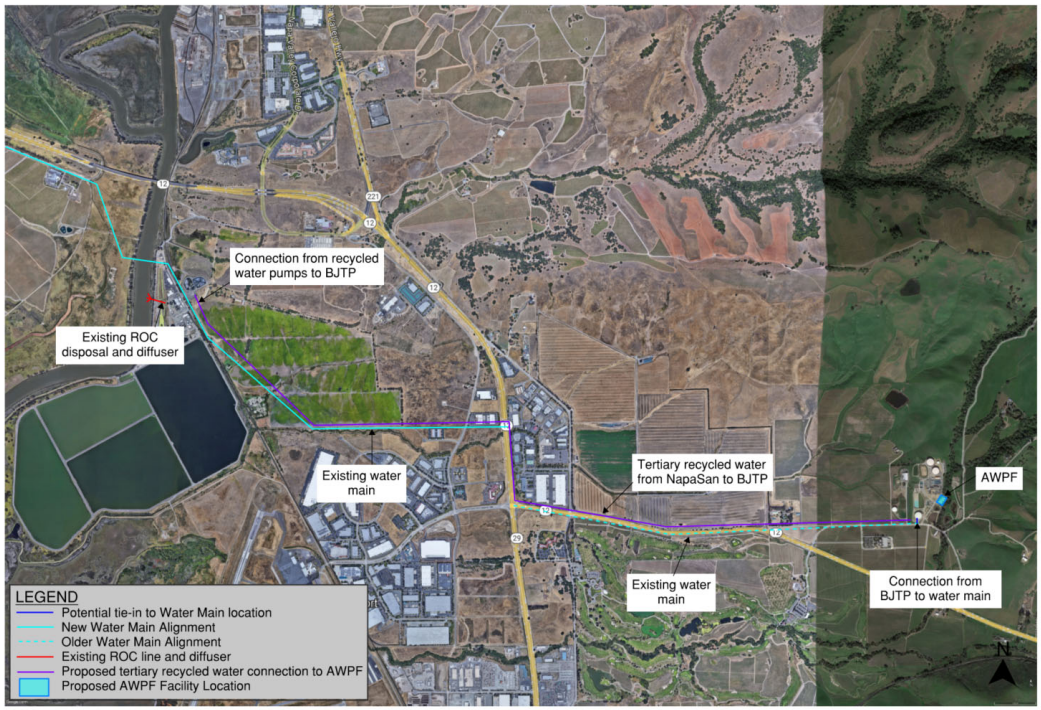
- **Location & Treatment:**
  2. Alternative 2: AWPF at NapaSan for Raw Water Augmentation (RWA)

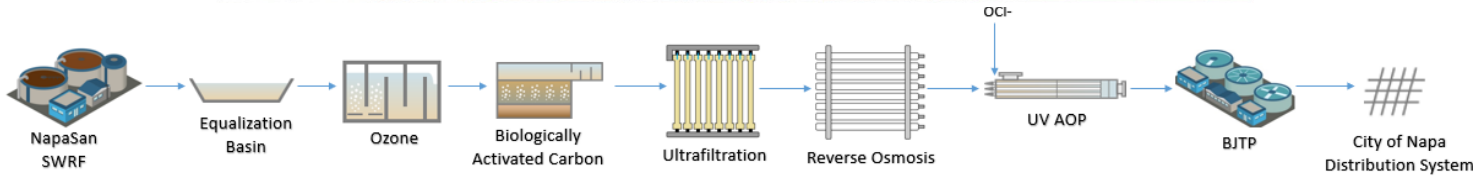




Project Options

- **Location & Treatment:**
  3. Alternative 3: AWPF at the Barwick Jamieson Treatment Plant (BJTP) for RWA





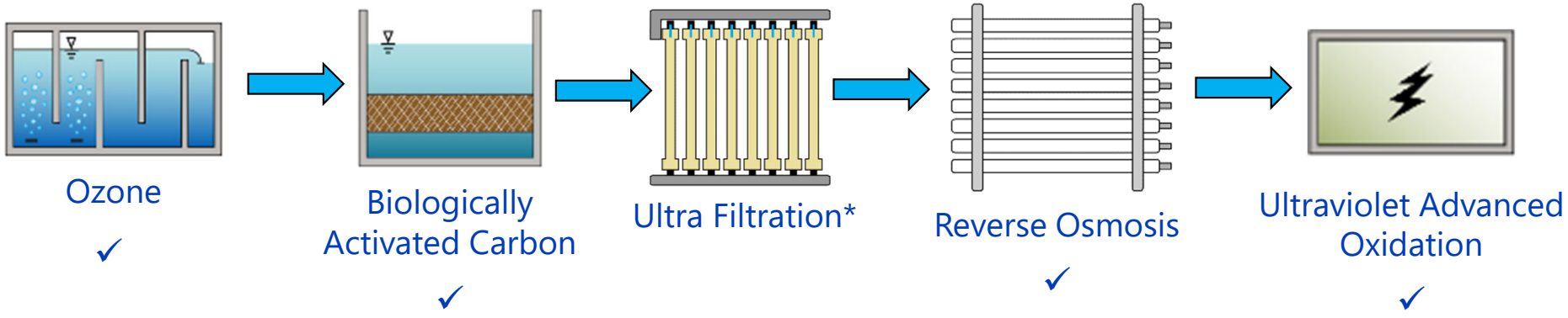
Project Components – Regulations & Treatment

Project Requirements - Regulations

- DPR regulations in California require a **Direct Potable Reuse Responsible Agency** (DiPRRA). A **Partner Agency** can also be involved in a DPR project.
- From the Regulations:
  - » "DiPRRA means the public water system responsible for compliance with this Article for a DPR project."
  - » "A Partner Agency means an entity included in a DPR project other than a DiPRRA, such as a wastewater agency, wastewater collections agency, public water system, or other entity responsible for water treatment, water conveyance, or storage."
    - A **Joint Plan** is required between agencies.

Project Requirements - Treatment

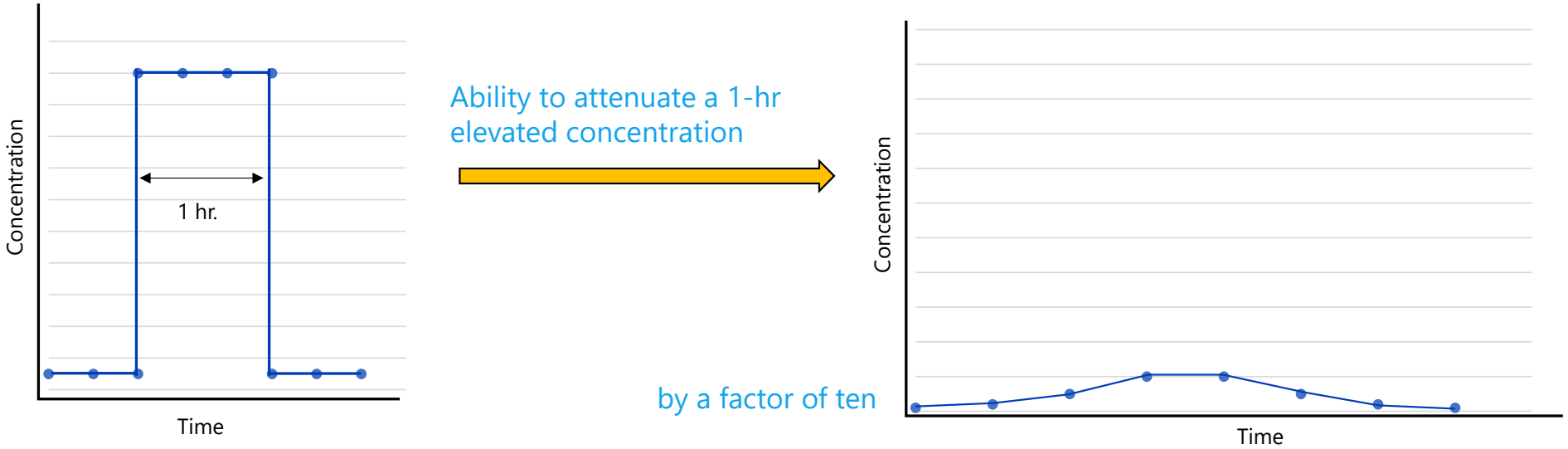
- **DPR regulations in California proposes the following treatment train for an Advanced Water Purification Facility:**



Notes: *not required as a treatment process; however, useful for reduction in turbidity, pathogen removal, and pretreatment upstream of RO and UV AOP.

DPR Details

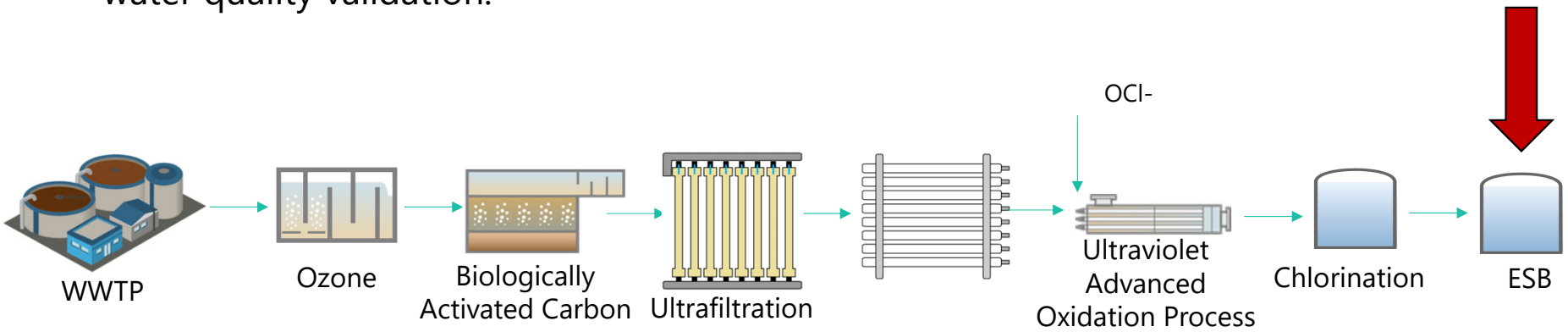
- **Some specifics regarding California DPR Regulations**.
  - » Dilution Requirements.
    - Regulations require a 10:1 dilution of a one-hour chemical spike. This dilution can occur at any point in the treatment and distribution process before water is distributed to customers.



DPR Details

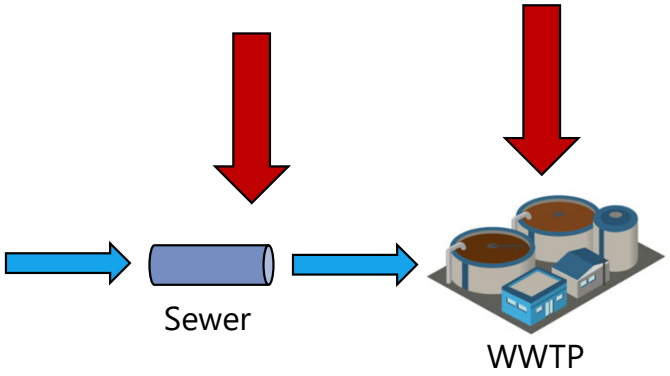
» Engineered Storage Buffer (ESB)

- Regulations require a diluent water/response time. With this, if a failure is identified, the system must divert or shut off before 10% of the off-spec water reaches the diversion or shutoff point.
- ESBs allows for this response time to be met. In addition, ESBs allow for identification of treatment failures, implementation of appropriate actions, and a final monitoring point for water quality validation.



DPR Details

- Enhanced Source Control Plan (ESCP) -
  - Requires all the elements of source control needed for IPR.
  - Quantitative evaluation of chemicals discharged to the collection system.
  - Online monitoring that may indicate a chemical peak from an illicit discharge.
  - Notification of discharges above allowable limits.
  - Monitoring of local surveillance programs to determine when community outbreaks or disease occur.



DPR Details

» Operational Requirements.

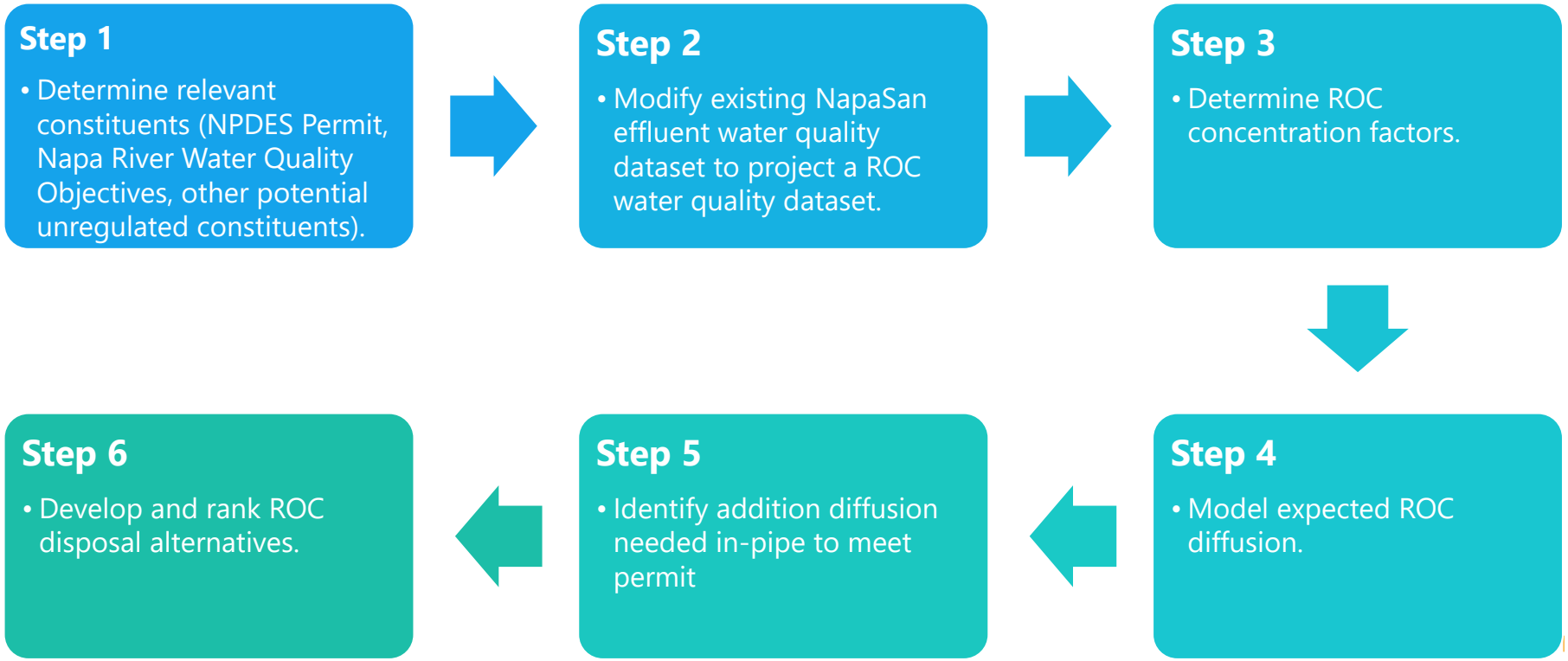
- Designated **Chief Operator** or **Shift Operator** on-site at all times (**24/7**).
- One **Chief Operator** holds a valid Grade 5 Advanced Water Treatment Operator (AWT5) certification to oversee operations of the entire treatment train.
- One **Shift Operator** holds at least a valid Grade 3 Advanced Water Treatment (AWT3) operator certification.
- Both certifications must be issued by the California-Nevada section of the American Water Works Association and the California Water Environment Association.
- There is potential (after 12 months) to apply to the State Board to waive the requirement for the Chief Operator to be on site at all times.

American Water Works Association
Dedicated to the World's Most Vital Resource
CALIFORNIA-NEVADA SECTION

Project Components – Reverse Osmosis Concentrate

Reverse Osmosis Concentrate – Residuals Management Purpose & Approach

- *Assessment of whether the discharge of Reverse Osmosis Concentrate (ROC) may impact beneficial uses in the Napa River.*



Reverse Osmosis Concentrate – Residuals Management Results

- Summary of which systems may consistently attain calculated effluent limitations.

Summary of Attaining Effluent Limitations (Y= Yes, N = No)

Parameter	Conventional (80%) Recovery Systems (mgd)			High (95%) Recovery Systems (mgd) (1)		
	1.8	6.0	10.0	1.8	6.0	10.0
Chromium	Y	Y	Y	Y	Y	Y
Copper	Y	Y	Y	Y	N	N
Nickel	High Ambient Precludes Dilution					
Zinc	Y	Y	Y	Y	Y	N
Cyanide	Y	Y	Y	Y	Y	Y

Notes:
1. The Maximum Effluent Concentration reflects a 1:1 in-pipe ROC to secondary effluent dilution.

- Due to the historic high ambient measurement of nickel, dilution is not allowed.

Reverse Osmosis Concentrate – Residuals Management Results

- **Constituents which may consistently attain calculated effluent limitations are**:
  - » Copper - 95% RO Recovery RO at 6 mgd and 10 mgd
    - **Solution:**
    - Blending. However, this would negate the advantage of a high recovery system.
    - Additional removal within the AWPF (shown through a pilot plant).
  - » Nickel - 80% and 95% RO Recovery of all AWPF sizes.
    - **Solution:** Dilution is not allowed due to high ambient measurement. A receiving water study to reevaluate nickel concentration or to develop translators (if successful) is expected to allow for compliance of all conventional RO systems.

Reverse Osmosis Concentrate – Residuals Management Results

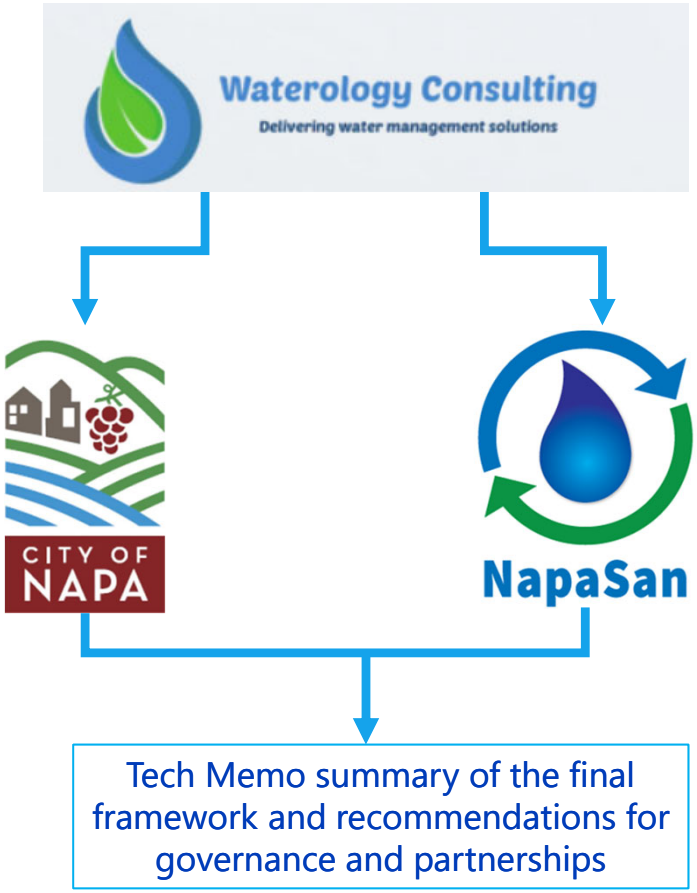
- **Constituents which may consistently attain calculated effluent limitations are**:
  - » Zinc - 95% Recovery RO at 10 mgd
    - – **Solution:**
    - – Blending. However, this would negate the advantage of a high recovery system.
    - – Additional removal within the AWPF (shown through a pilot plant).
  - » Cyanide – Cyanide compliance assumes the additional regulatory considerations under development by the Regional Water Board are adopted allowing use of the reevaluated dilution credits (Proposed Basin Plan Amendment Public Notice 6/9/23).

Project Components – Interagency Coordination

Project Requirements – Interagency Coordination

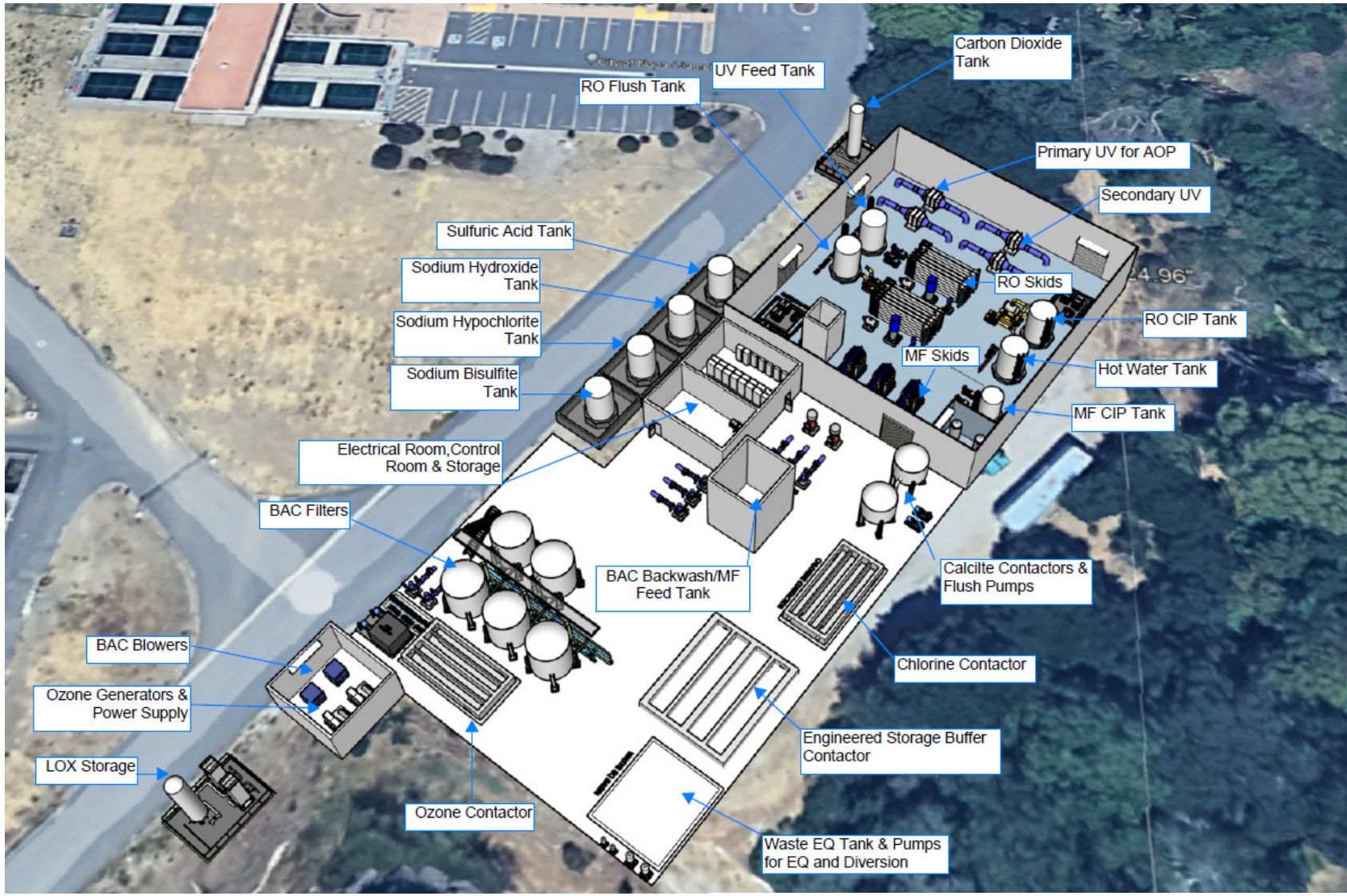
- Waterology is working with Carollo and the City of Napa and NapaSan to discuss project governance and partnerships.
- Phased Approach:
  - » **Phase 1** - Preparatory Steps: explored in individual meeting with each agency.
    - Project Scoping and Objectives.
    - Stakeholder Mapping.
    - Legal and Regulatory Assessment.

  Phase 2 - Governance Structure Design: explored in two workshops with both agencies.
    - Governance Model Evaluation and Selection.
    - Resource Allocation and Funding Mechanisms.



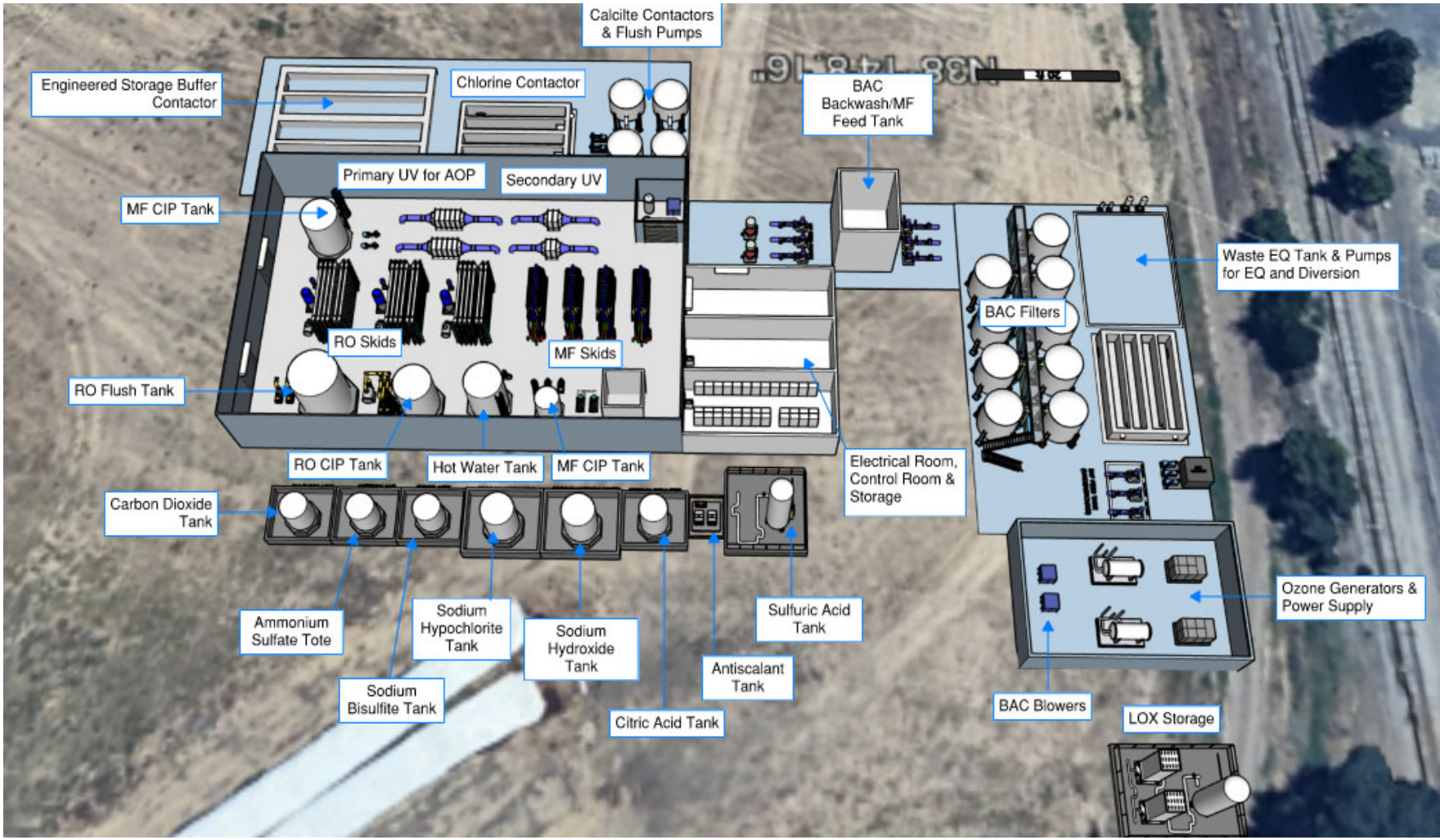
Layouts & Cost Development

Layouts



Barwick Jamieson Treatment Plant – 1.8 mgd

Layouts



NapaSan – 6 mgd

Cost Development

- UNDER DEVELOPMENT.
- COSTS INCLUDE THE FOLLOWING:
  - » Treatment Costs.
  - » Infrastructure Costs.
  - » O&M Costs (chemicals, staffing, etc.)

Next Steps

Next Steps for Project Completion

- Governance & Partnerships
  - » Phase I : Project Scoping, Stakeholder Mapping, Legal & Regulatory Assessment (took place in November 2023).
  - » Phase II:
    - Workshop 1 – Evaluate different governance modes (took place in December 2023).
    - Workshop 2 – Resource Allocation and Mechanisms (to take place in February – costs pending).
  - » Mix of agency one-on-one meetings and group meetings.
- Complete Costs
  - » Present to both agencies.
- Deliver Project Alternatives, Costs, and Report.

Open Discussion/Questions