



**Dublin San Ramon  
Services District**

*Water, wastewater, recycled water*

# 2021 Alternative Water Supply Study: A Framework for a Resilient and Sustainable Water Future

Preview of Preliminary Results

April 6, 2021

**Brown AND  
Caldwell**

# Agenda

- **Introduction**
- **Future Water Needs**
- **Alternatives**
- **Evaluation**
- **Recommended Framework**
- **Next Steps**

## Speakers:



**Jan Lee**  
DSRSD  
AGM



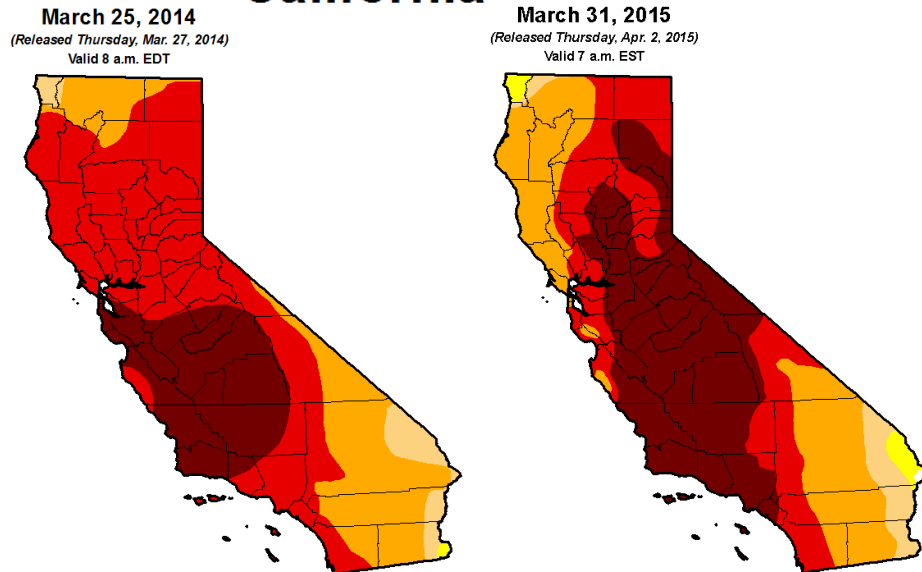
**Katie Ruby, PE**  
Brown and Caldwell  
Senior Associate/  
1Water Engineer



**Jenny Gain, PE**  
Brown and Caldwell  
Regional NorCal  
1Water Lead

# Background

## U.S. Drought Monitor California



### Intensity:

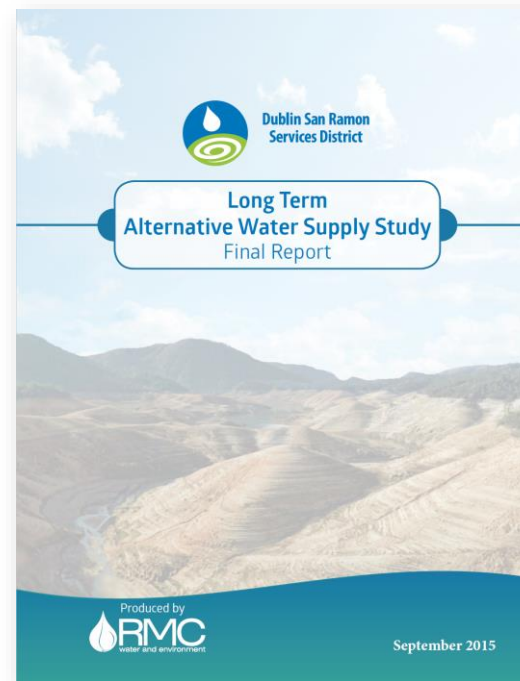
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

**Author:**  
Eric Luebbehusen  
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

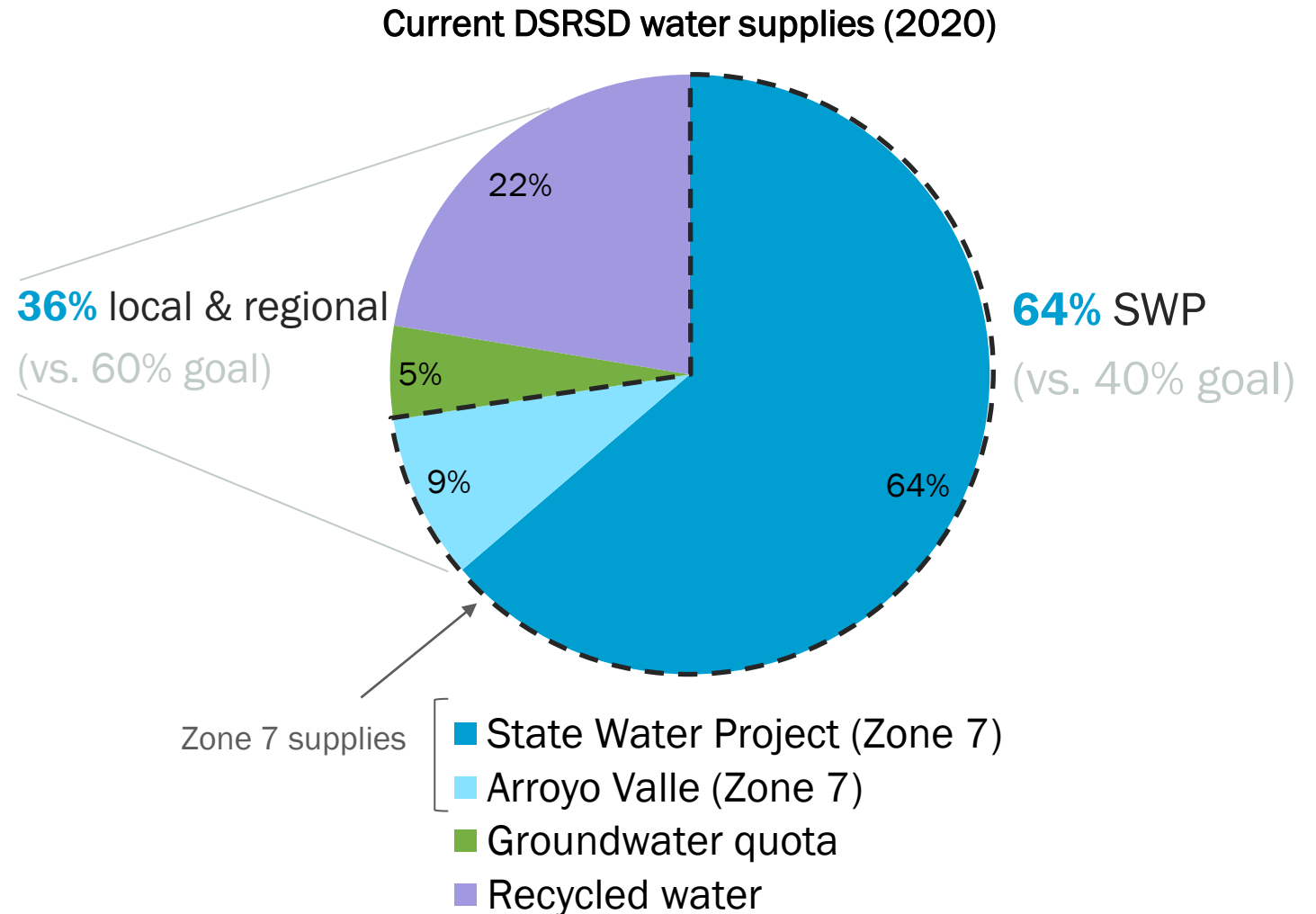


- **Sept. 2015:** Long Term Alternative Water Supply Study (2015 Study)
- **Oct. 2015:** Water Supply, Storage, Conveyance, Quality and Conservation Policy

# Current DSRSD Water Supplies Compared to 2015 Policy

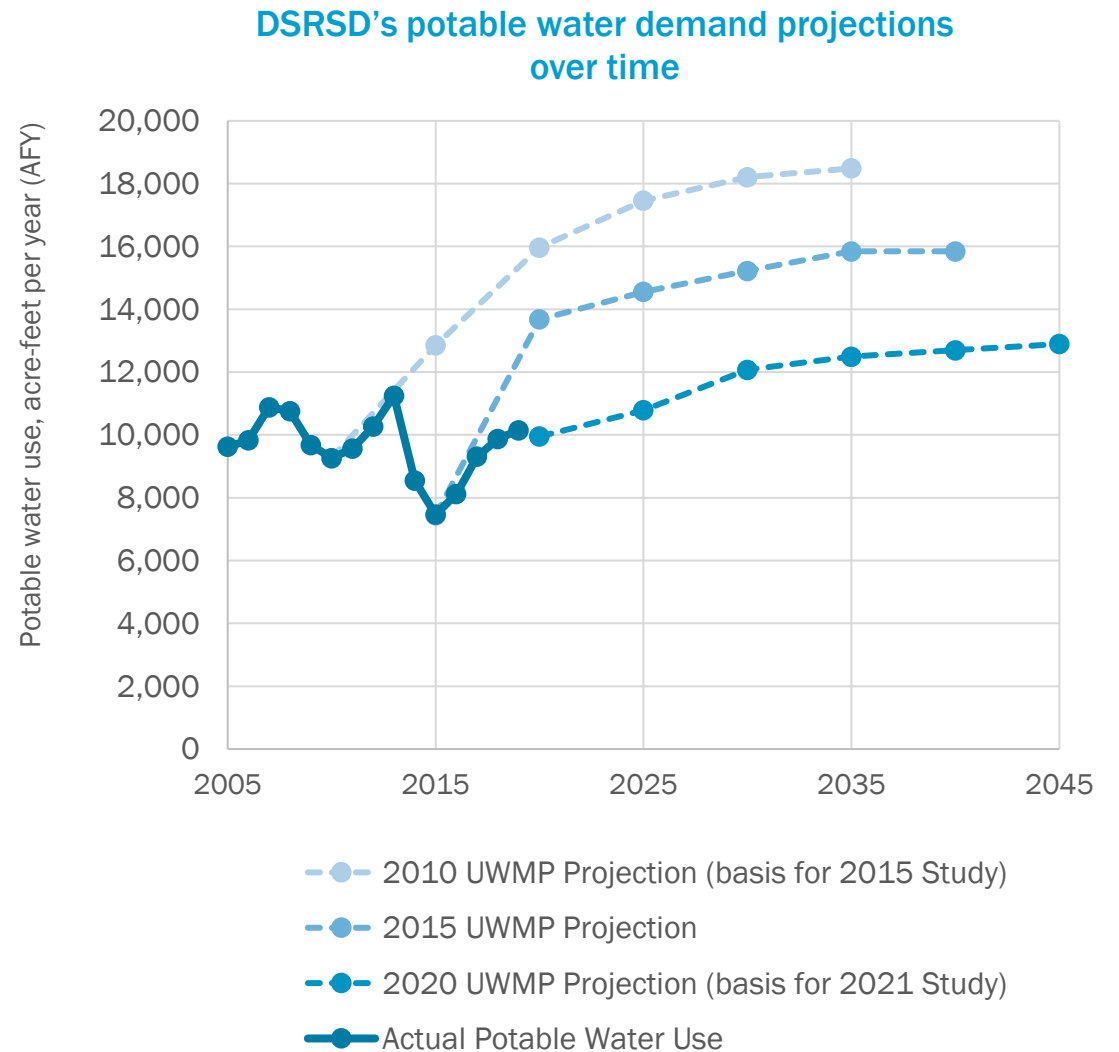
## DSRSD Policy Goals:

- At least **60%** of demand satisfied by local and regional supplies
  - No more than **40%** originates from one source
  - Except for brine, **0%** of wastewater discharged to Bay
  - Independent conveyance system to serve DSRSD's customers
- + more



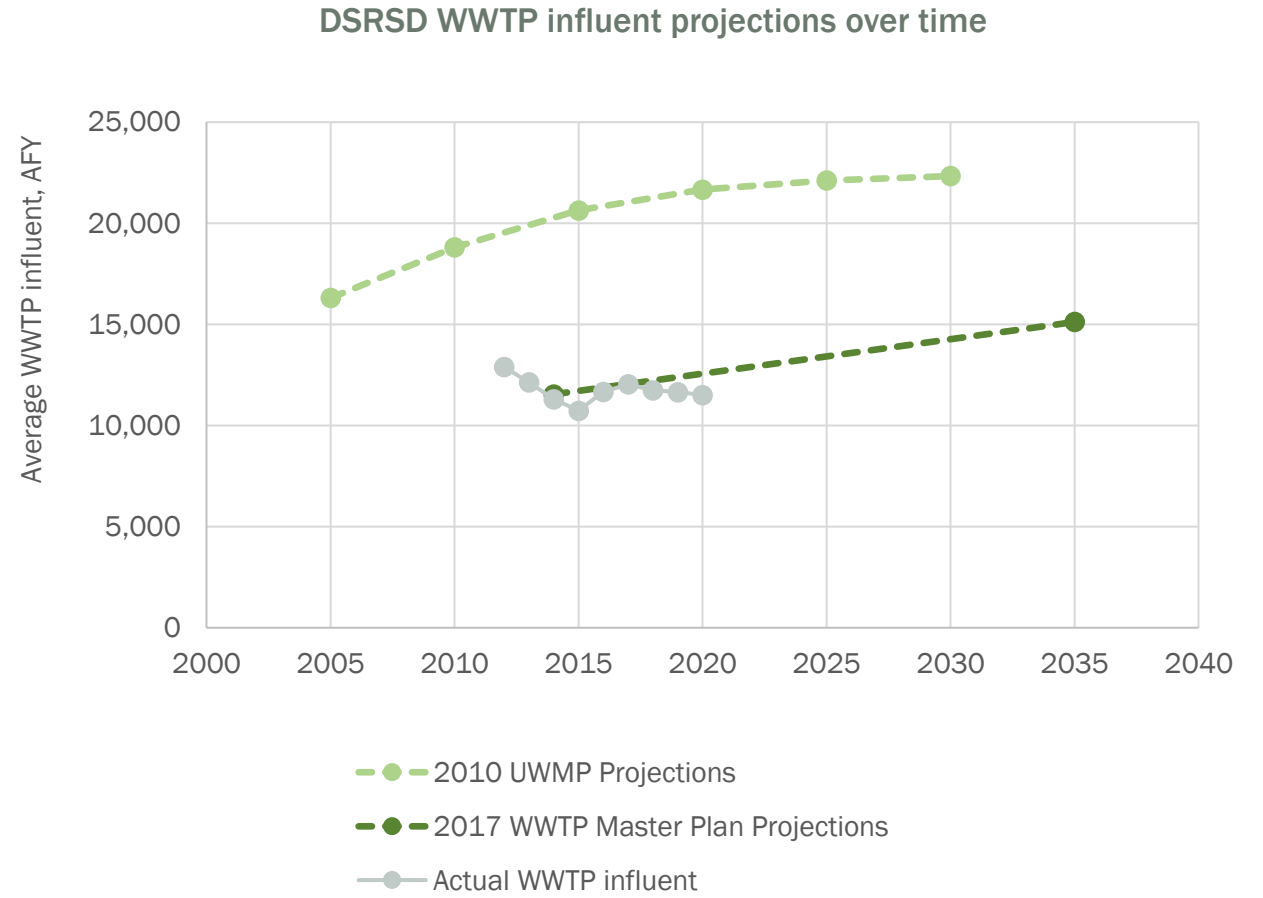
# Much has changed since 2015

- Lower demand projections due to conservation



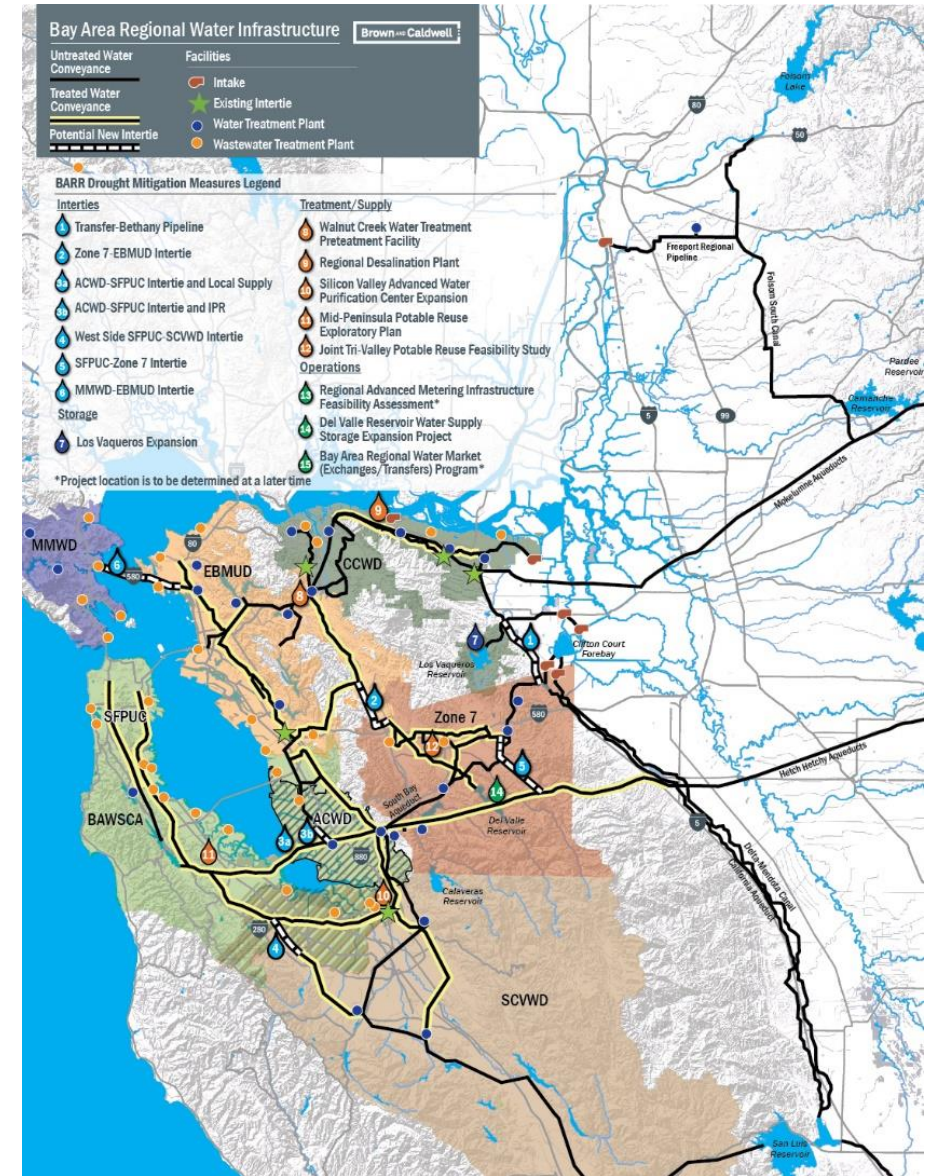
# Much has changed since 2015

- Lower demand projections due to conservation
- Lower wastewater projections



# Much has changed since 2015

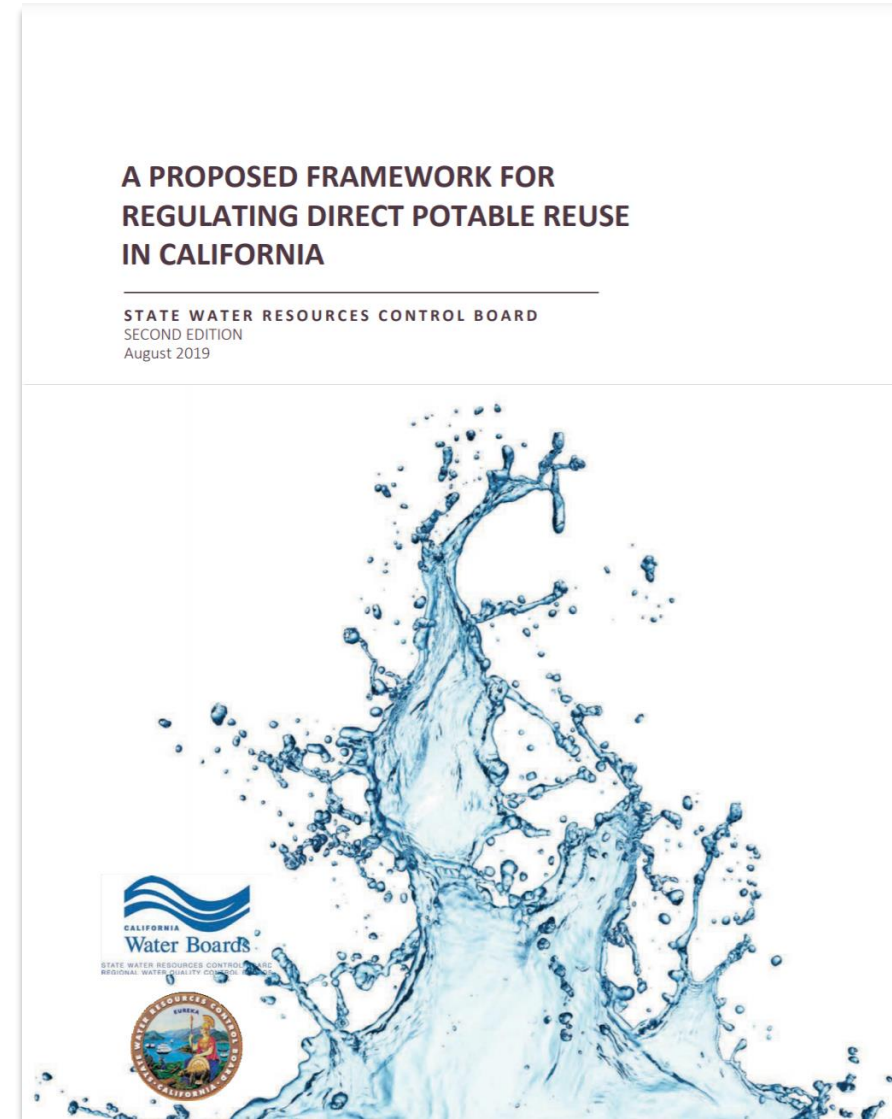
- Lower demand projections due to conservation
- Lower wastewater projections
- Regional and local efforts





# Much has changed since 2015

- Lower demand projections due to conservation
- Lower wastewater projections
- Regional and local efforts
- Regulations



Source: State Water Resources Control Board



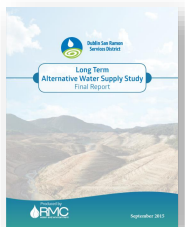
# 2021 AWSS Project Objectives

1. **Update** the 2015 Study with new and refined information
2. Support DSRSD's strategic plan goal to develop and implement an **integrated recycled and potable water program**
3. Inform potential updates to DSRSD's **Water Supply, Storage, Conveyance, Quality, and Conservation Policy**
4. Inform DSRSD's **2020 Urban Water Management Plan (UWMP) update**
5. Prepare a **framework for a resilient and sustainable water future**:
  - Outlines near- and long-term **strategies**
  - Informs and guides DSRSD's **advocacy and collaborative efforts**



# Approach

## 2015 AWSS

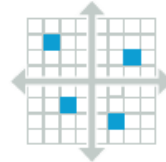


### 1) Screen and confirm alternatives



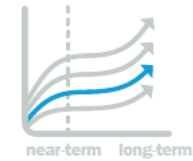
**RESULT: Updated list of alternatives**

### 2) Develop future planning scenarios



**RESULT: Evaluation criteria**

### 3) Evaluate alternatives against futures



**RESULT: Prioritization of near-term and long-term supply alternatives**

### 4) Develop an adaptable framework



**RESULT: Updated Water Supply Policy**

# Future Water Needs

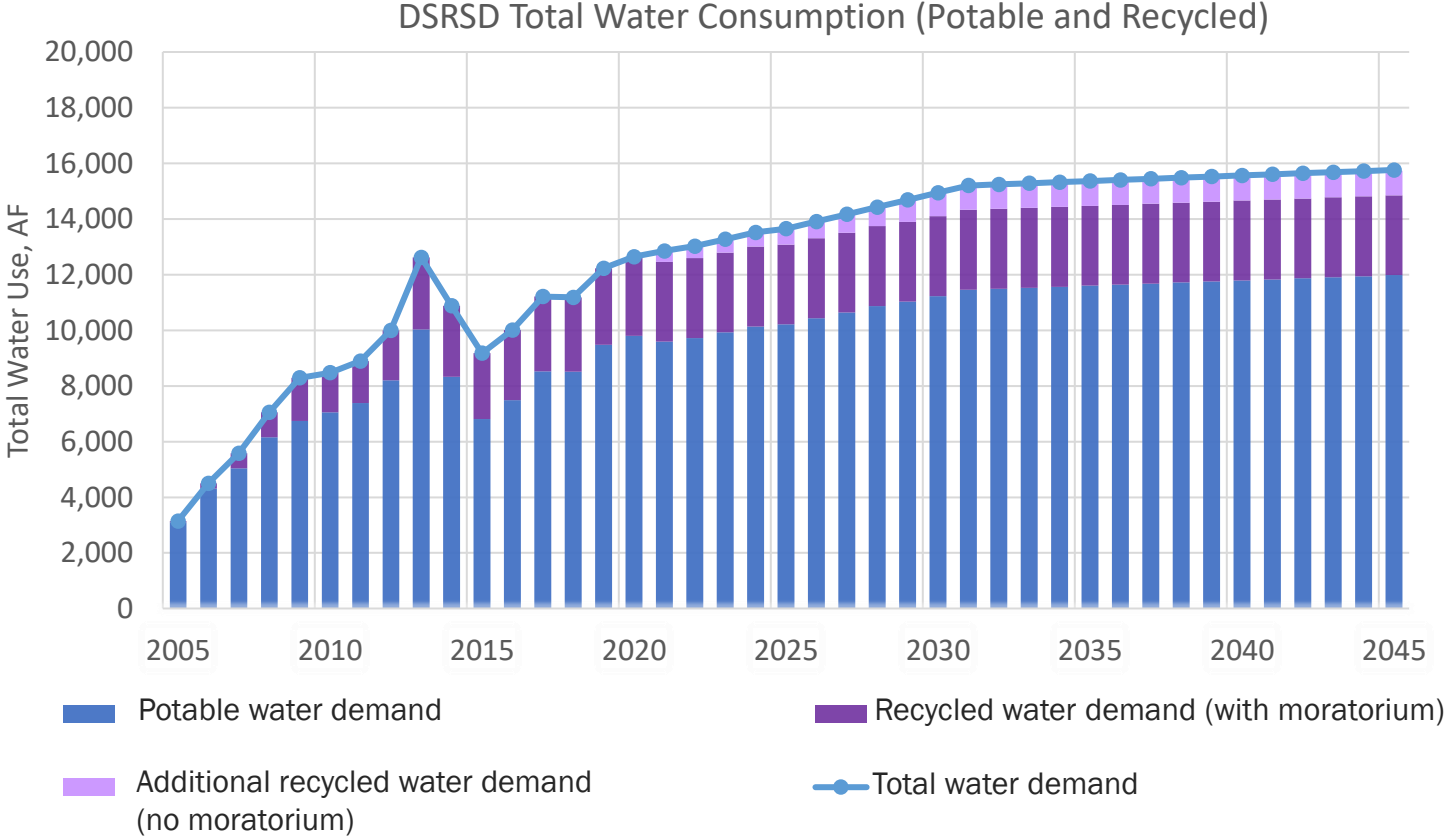
# DSRSD Future Demand for Recycled and Potable Water

## Projected water demand in 2045

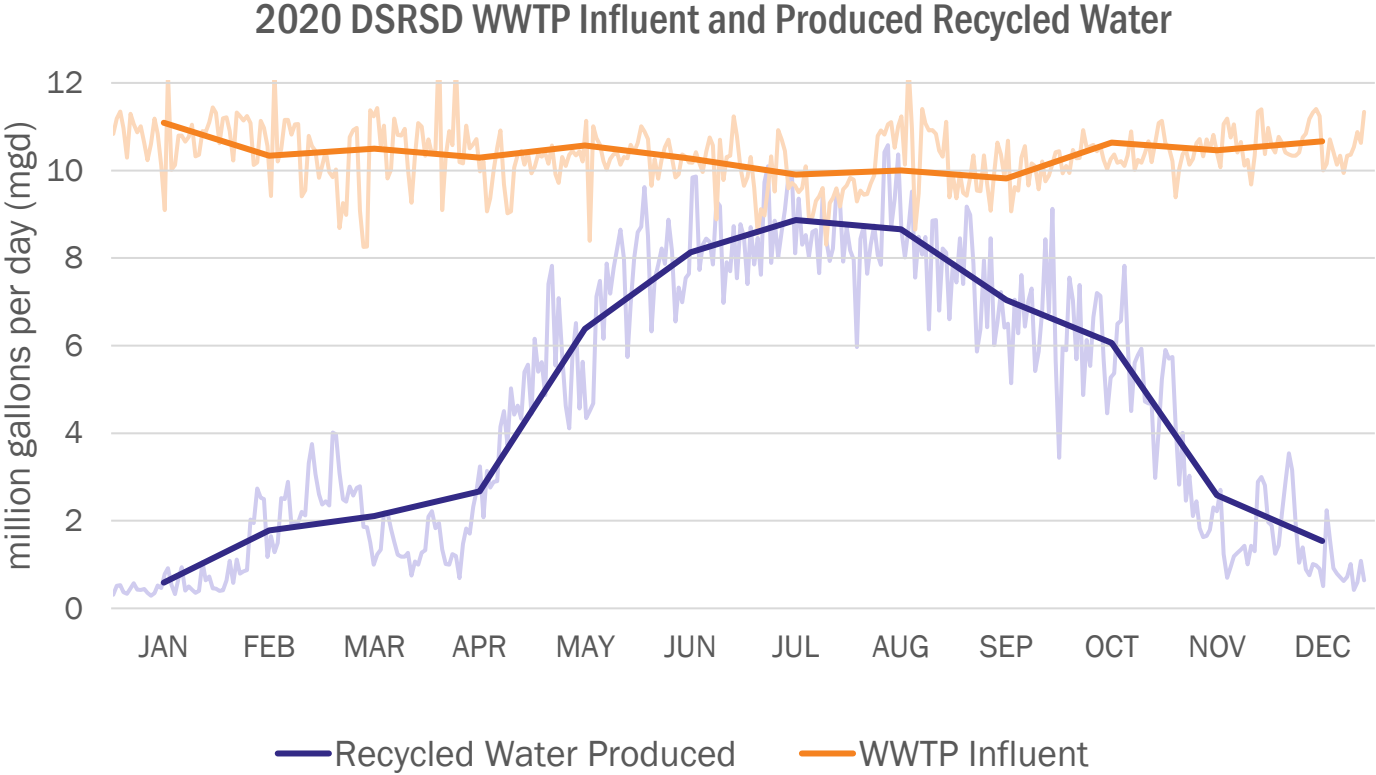
- Total: ~16,000 AFY
- Increase: ~2,900 AFY

## Recycled water

- Potential to offset ~30% of demand increase (900 AFY)
- Contingent on wastewater availability

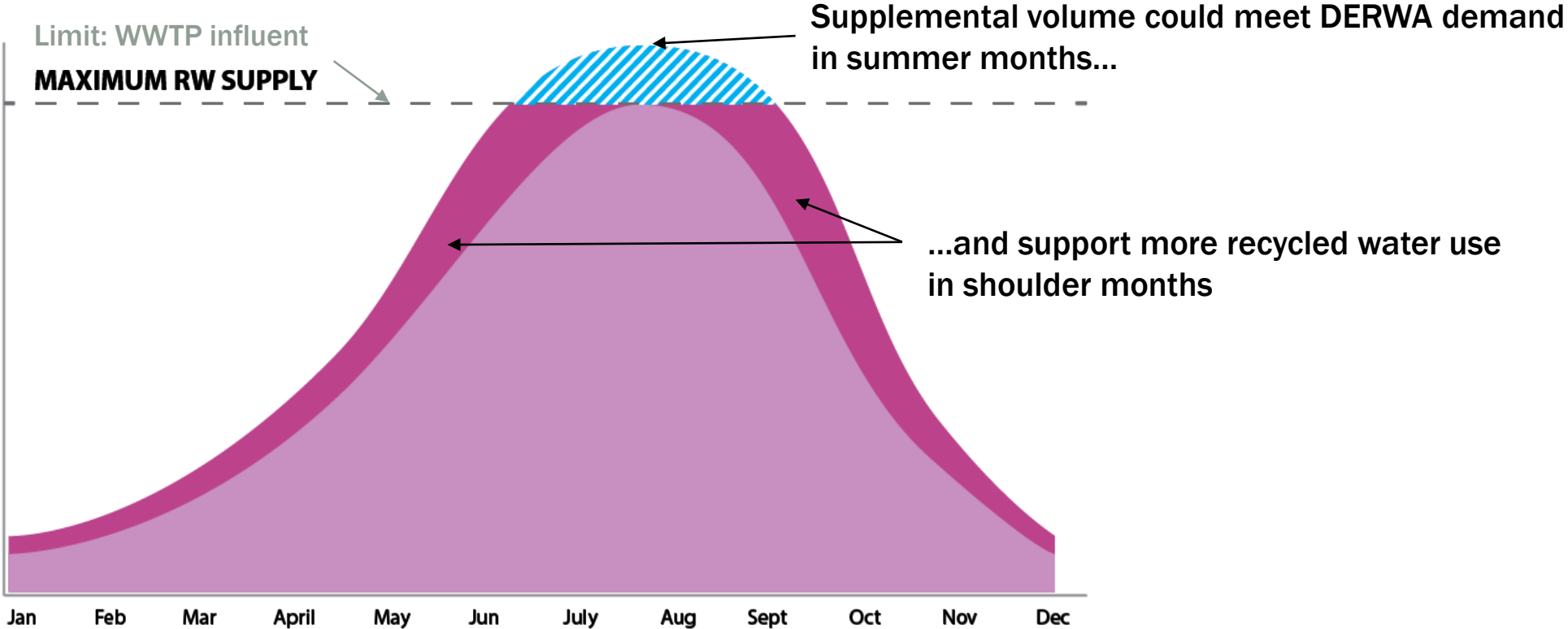


# Recycled water is limited by wastewater availability



**Seasonal storage:**  
Storing recycled water in winter months for later use in summer months

# Expanding recycled water increases potable supply reliability



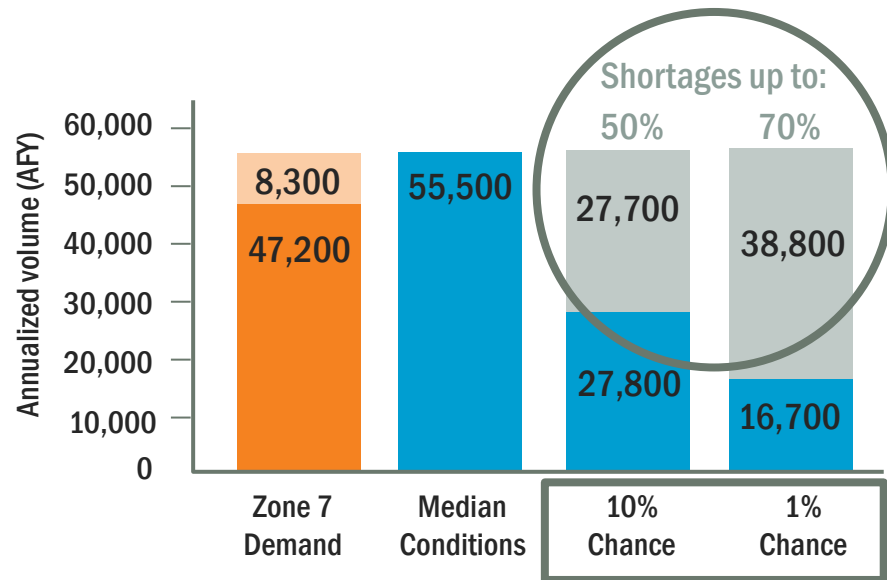
## Benefits

- Maximizes recycled water supply
- Leverages existing infrastructure
- Reduces peak potable demands
- Offsets the need for new supplemental potable supply



# Additional potable supplies are needed for Tri-Valley communities' long-term reliability

2040: Zone 7's projected demands and available supply  
(assuming no new water supply projects)



## Zone 7's Water Supply Reliability Policy Goals

Meet treated water customers' water needs as follows:

- **100%** of M&I water demands **90%** of the time
- At least **85%** of M&I water demands **99%** of the time

Source: Zone 7's 2019 Water Supply Evaluation Update

# Exploring Conveyance and Storage Options

## Conveyance to move supply into the Tri-Valley

- Improves reliability and resilience (e.g., Delta and/or South Bay Aqueduct outages)

## Additional regional storage

- Improves operational flexibility and reliability
- Complements Zone 7's existing surface reservoirs and groundwater storage



Levee failures can result in extended periods of unusable Delta supply.



Photo credits: CA Department of Water Resources (DWR)

# Potential Alternatives

# Identifying Potential Alternatives

- Revisited and screened 2015 Study alternatives
- Incorporated Zone 7 and regional efforts
- Explored projects not previously considered (added non-potable options)
- Engaged potential regional partners for input

Potential Regional Partners	
Alameda County Water District (ACWD)	City of Livermore
Central Contra Costa Sanitary District (CCCSD)	City of Pleasanton
Contra Costa Water District (CCWD)	Zone 7 Water Agency
East Bay Municipal Utility District (EBMUD)	

# Revisiting Alternatives from 2015 - Demand Management

## 2015 AWSS Alternatives

Enhanced conservation  
Residential turf replacement  
Greywater capture/reuse

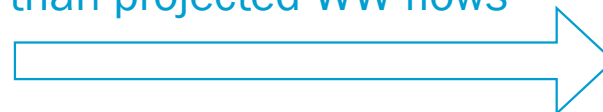
Rainwater capture/reuse

Recycled water for residential irrigation

Long-term water use efficiency legislation



DERWA moratorium, lower than projected WW flows



## 2021 AWSS Approach

**Incorporated as baseline assumption**

Not further evaluated, due to seasonality and lack of year-to-year availability

Not further evaluated, since lack of wastewater prevents connection of new recycled water customers

# Revisiting Alternatives from 2015 - Potable Reuse and Desalination

## 2015 AWSS Alternatives

IPR via groundwater recharge  
IPR via reservoir augmentation

Direct potable reuse

Bay desalination  
(facility in Hayward)

Joint Tri-Valley Potable  
Reuse Study

DPR regulations  
anticipated in 2023

Bay Area Regional  
Desalination studies

## 2021 AWSS Approach

Included as **Tri-Valley Potable Reuse**  
under Zone 7's supply alternatives

Included as **treated water  
augmentation (TWA)**  
(direct to DSRSD's distribution system)

Replaced with **Bay Area Regional  
Desalination** (at Mallard Slough)  
under Zone 7 options



# Revisiting Alternatives from 2015 - Other Alternatives

## 2015 AWSS Alternatives

North of Delta Transfers, wheeled through EBMUD's system

Fringe Basin groundwater  
*(previously screened out due to limited potable supply potential)*

Lessons learned from past transfer attempts & BARR partnership; discussions with EBMUD

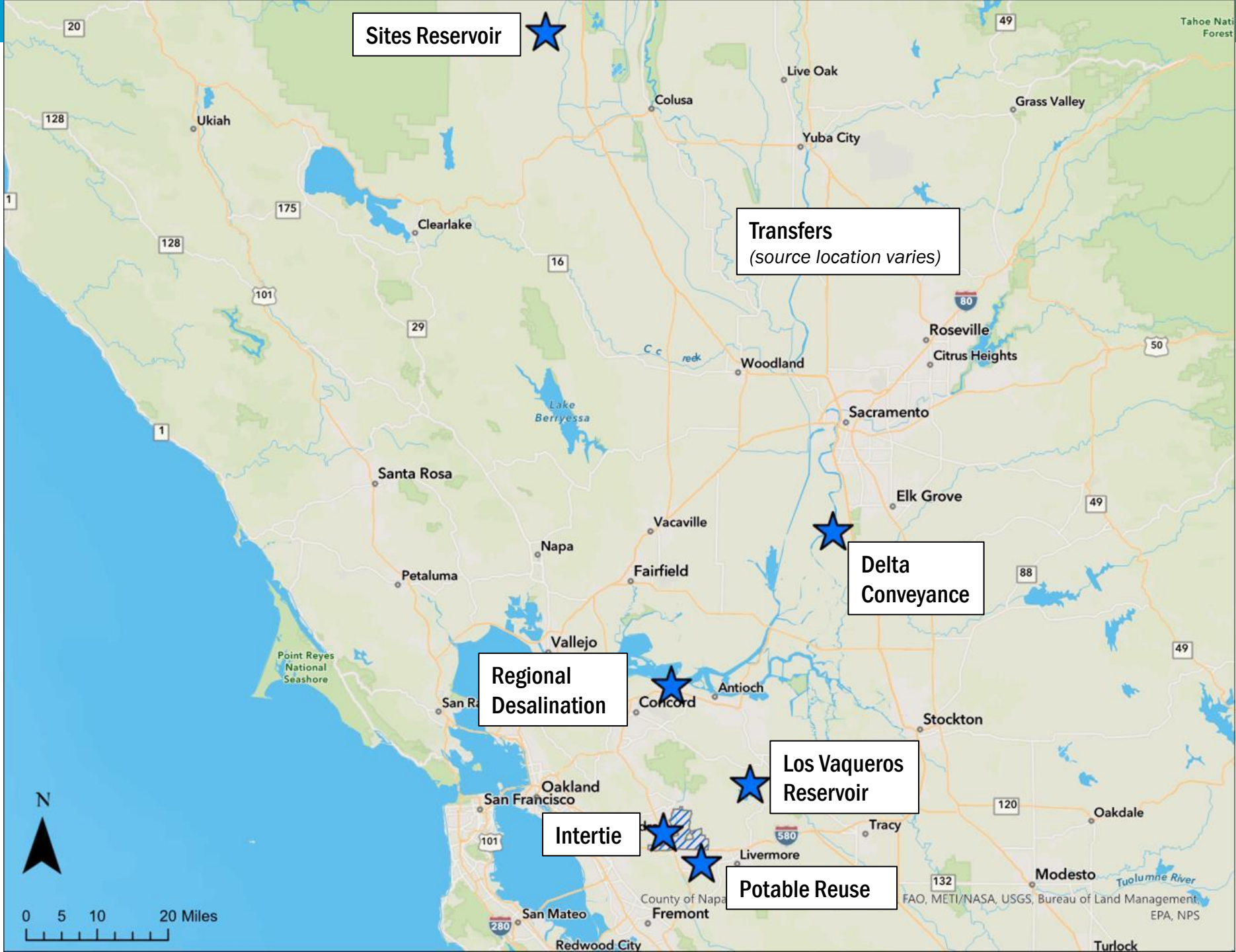


## 2021 AWSS Approach

Included as broader **transfer/exchange opportunities** in partnership with Zone 7

Added back as a **non-potable alternative**

# Incorporating Zone 7 and Regional Efforts



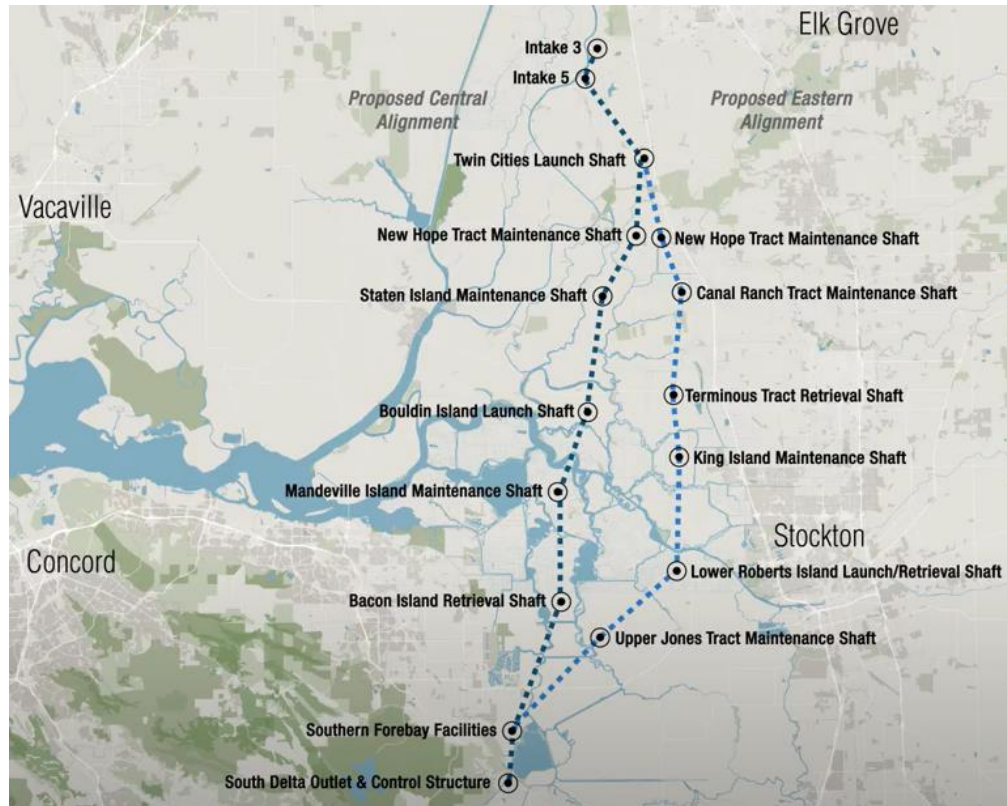
# Zone 7 Water Supply Reliability Options

Potential Projects	Supply	Storage	Conveyance
Delta Conveyance	✓		✓
* Sites Reservoir	✓	✓	
* Los Vaqueros Reservoir Expansion and Transfer-Bethany Pipeline		✓	✓
Bay Area Desalination	✓		
Potable Reuse	✓		
Water Transfers and Exchanges	✓		
* Interties			✓

\* New addition (since 2015 Study)

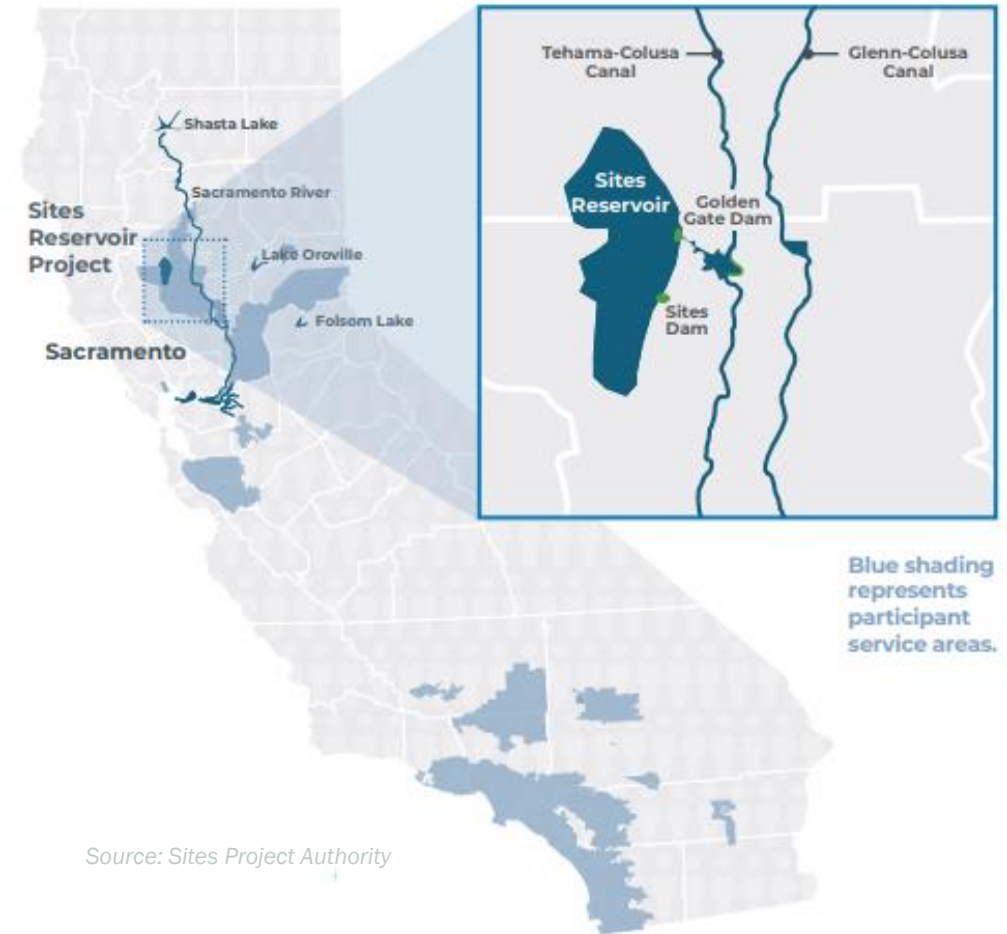
# Zone 7 Options

## Delta Conveyance



Source: Delta Conveyance Design and Construction Authority

## Sites Reservoir

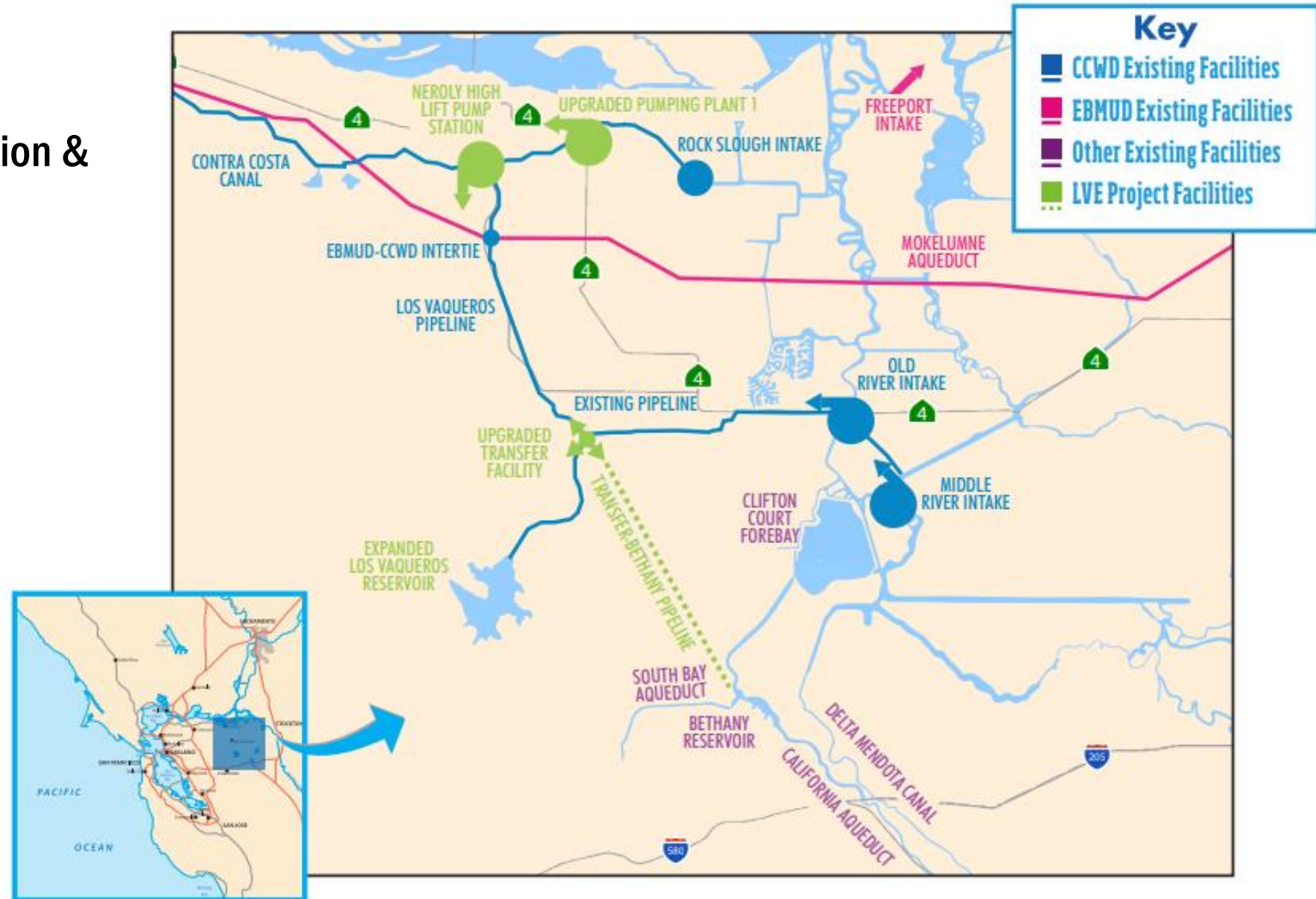


Source: Sites Project Authority



# Zone 7 Options

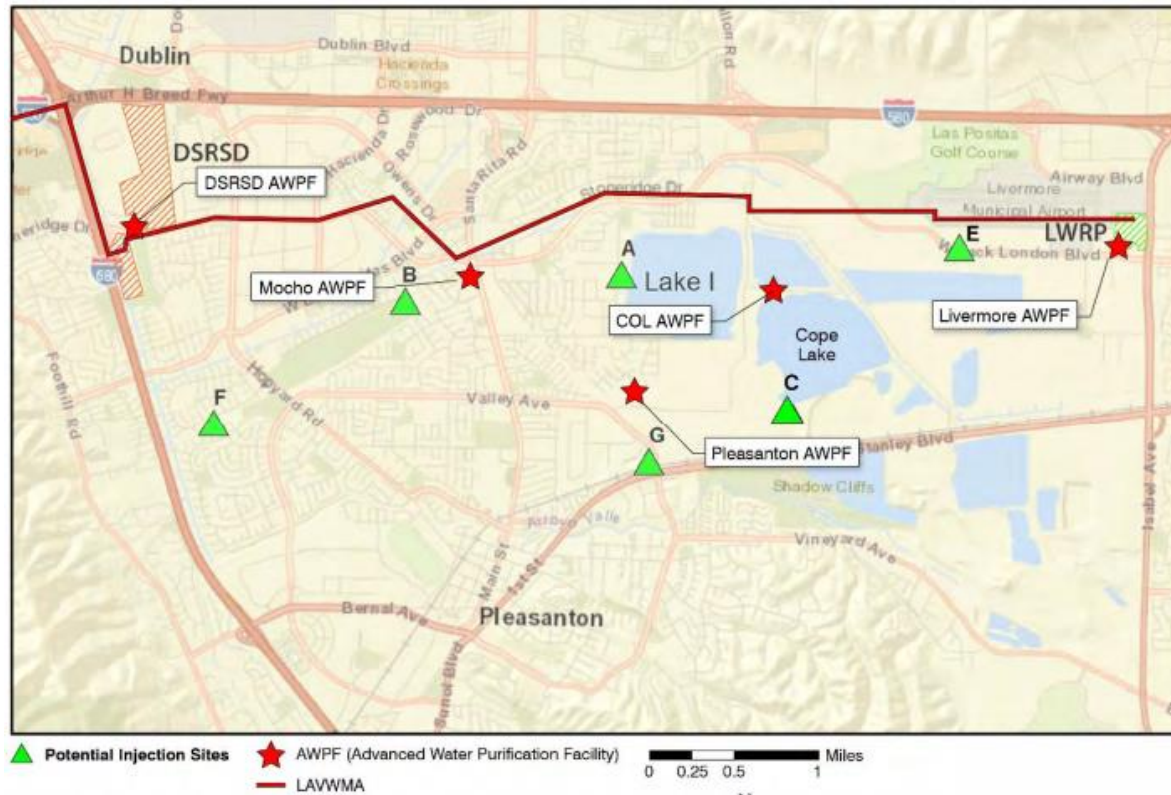
## Los Vaqueros Reservoir Expansion & Transfer-Bethany Pipeline



Source: Contra Costa Water District

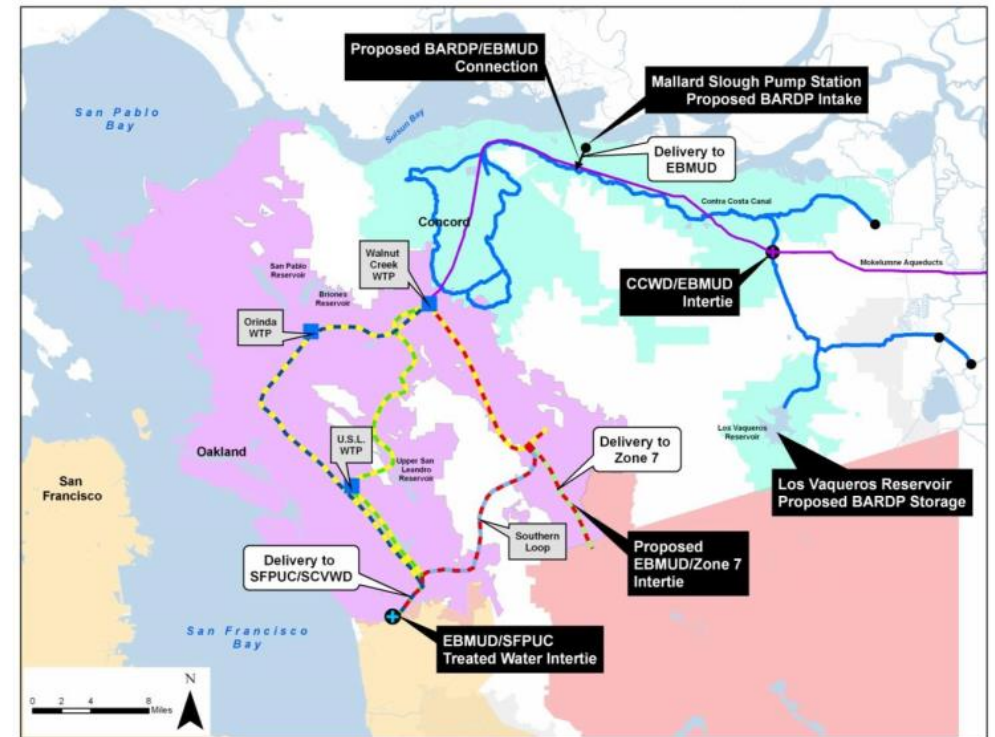
# Zone 7 Options

## Tri-Valley Potable Reuse



Source: 2018 Joint Tri-Valley Potable Reuse Technical Feasibility Study

## Bay Area Regional Desalination

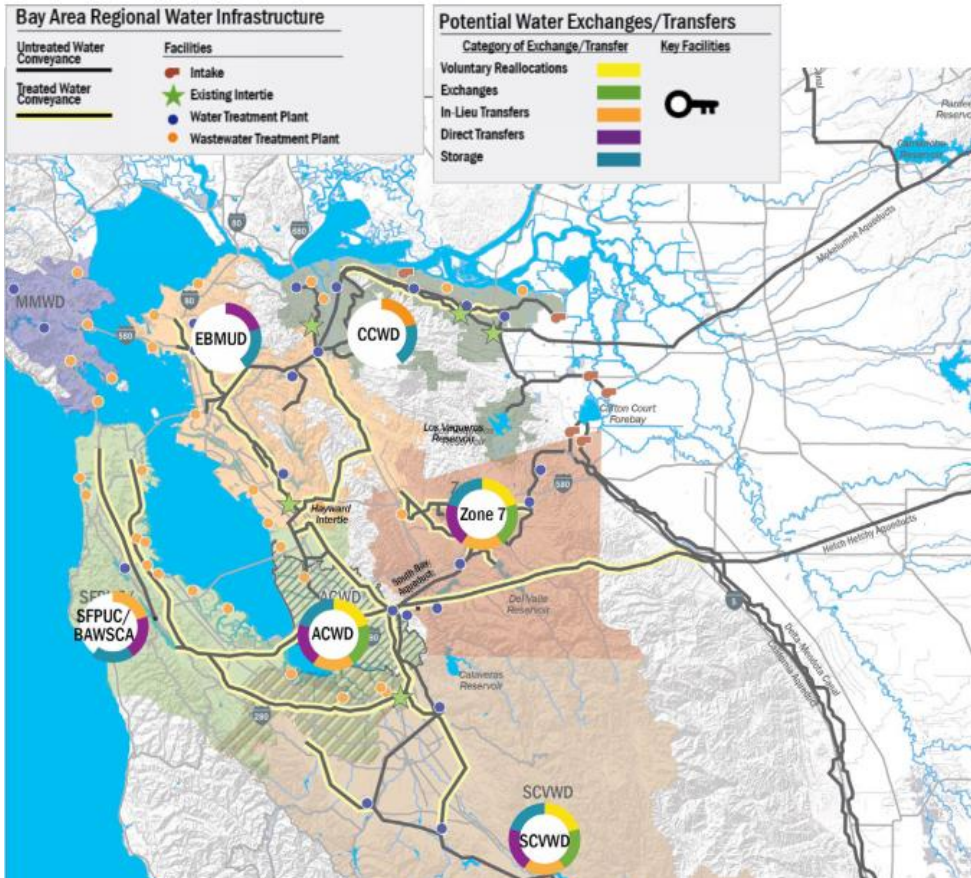


Source: Zone 7 2019 Water Supply Evaluation Update.



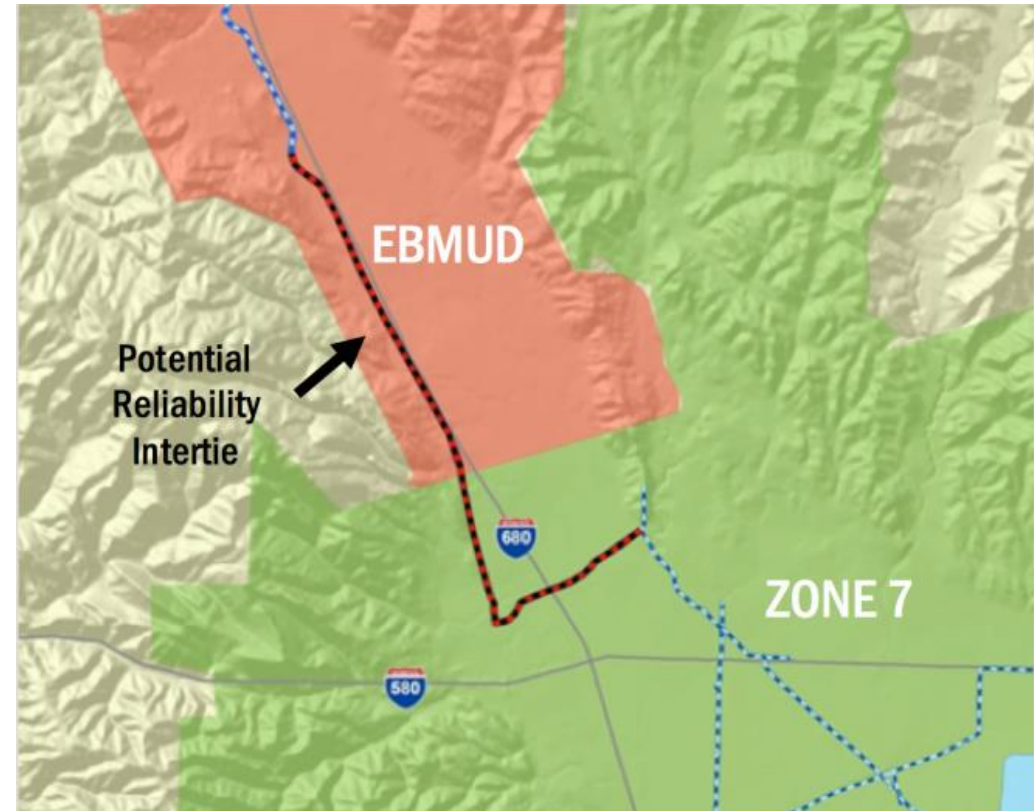
# Zone 7 Options

## Water Transfers and Exchanges



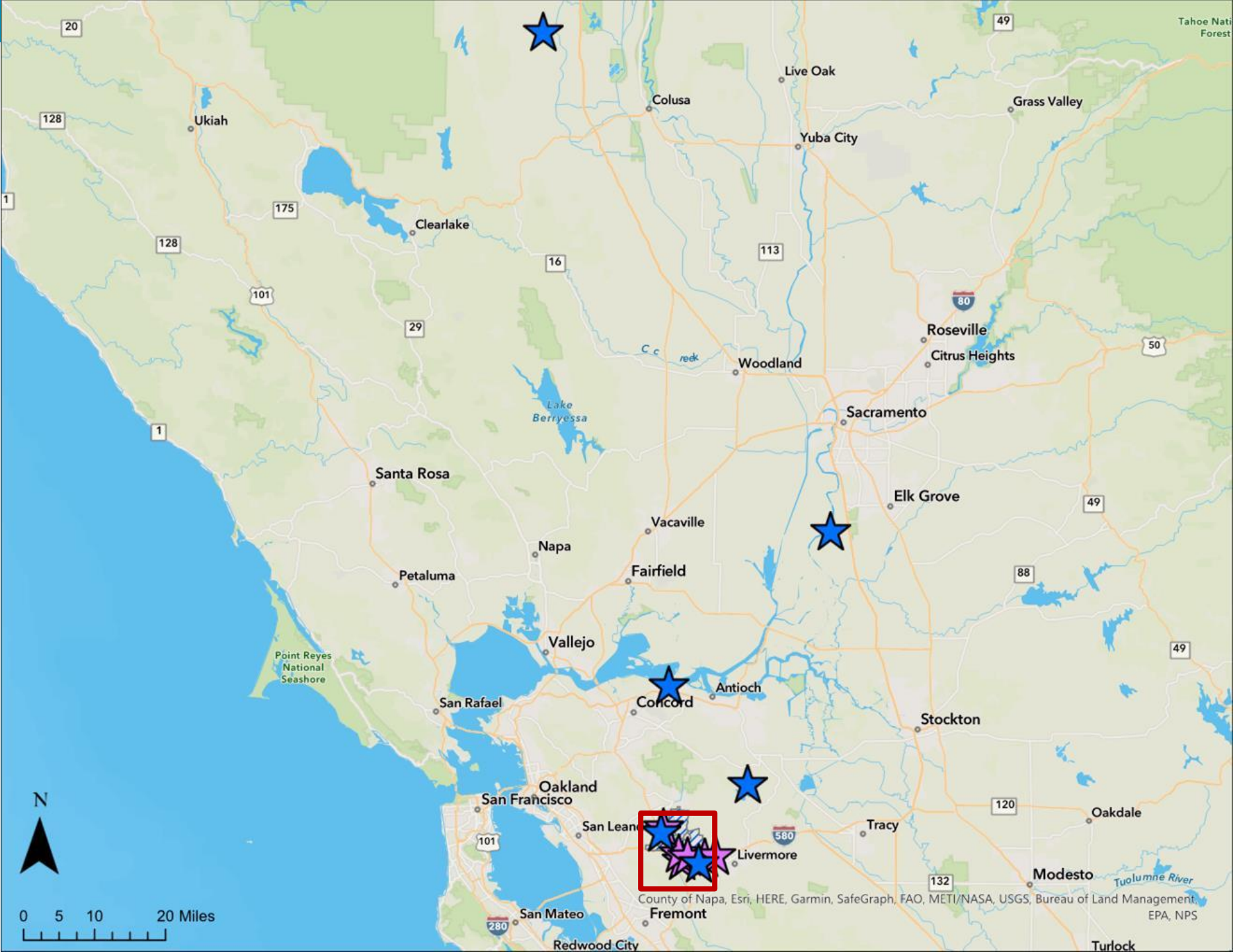
Source: BARR Drought Contingency Plan (2017)

## Intertie



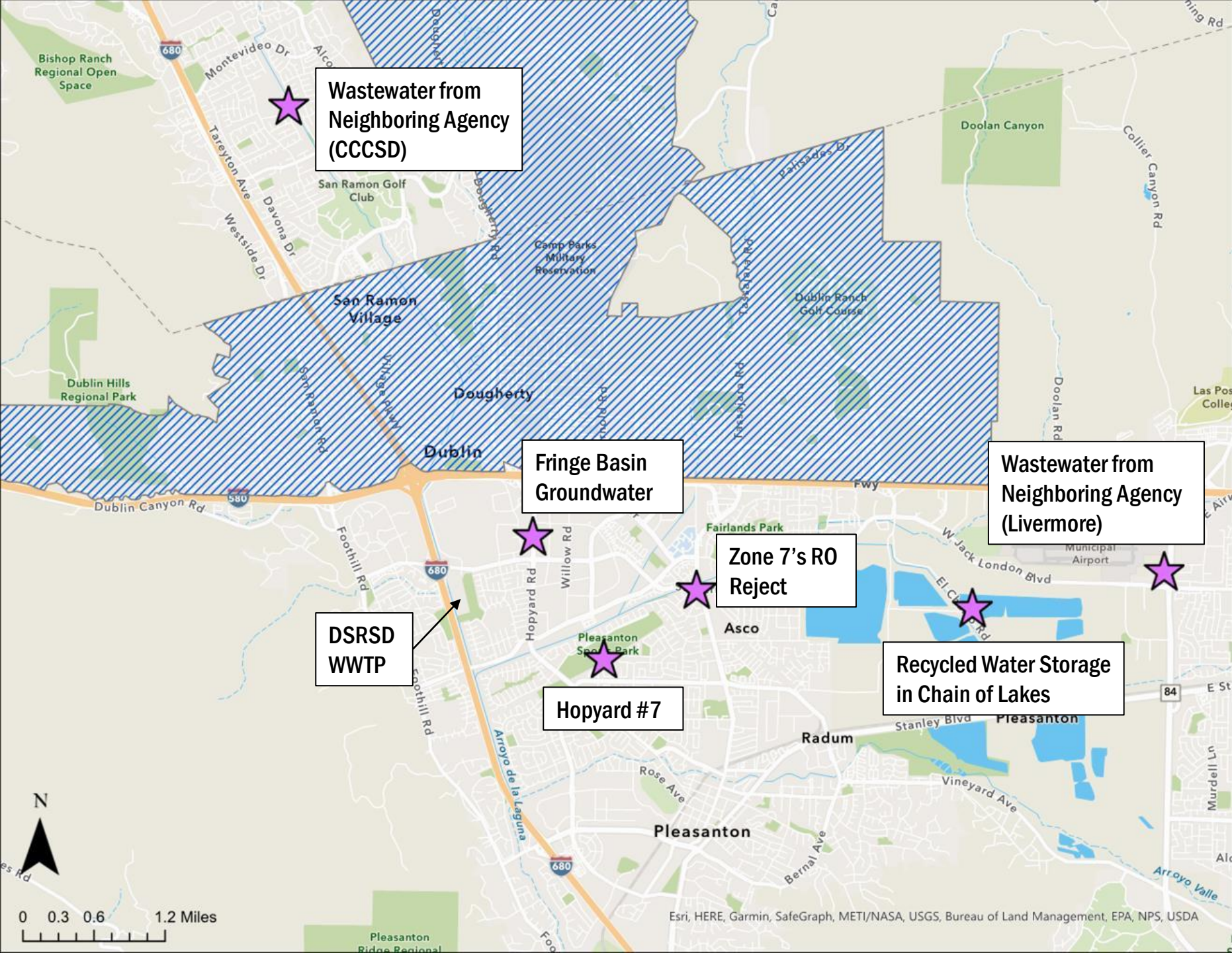
Source: BARR Drought Contingency Plan (2017)

# Exploring Non-Potable Options





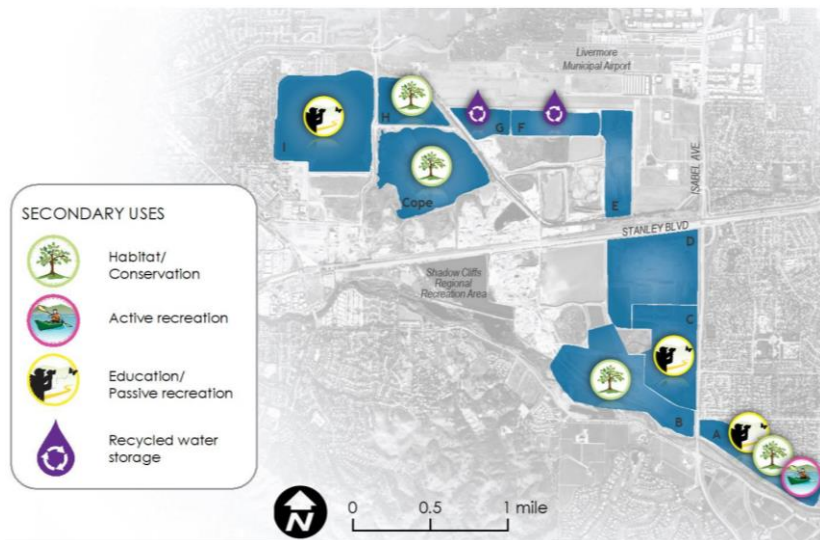
# Exploring Non-Potable Options



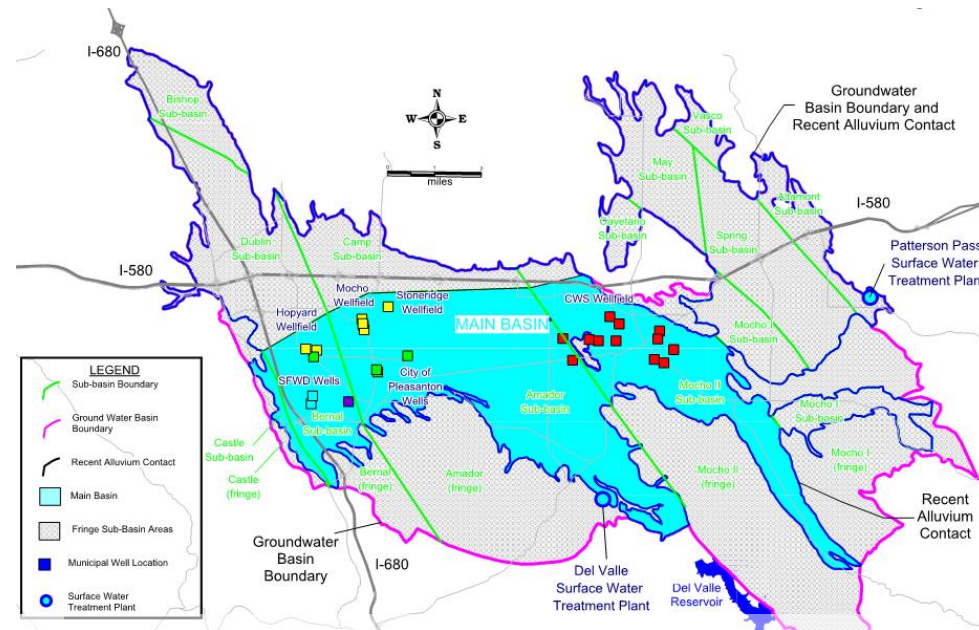


# Non-Potable Supply and Storage Alternatives

- Storage of tertiary treated recycled water in Chain of Lakes
- Groundwater (non-potable) from the Fringe Basin or Zone 7's Hopyard #7 well
- Reverse osmosis (RO) reject from Zone 7's groundwater demineralization facility
- Supplemental wastewater from neighboring agency (CCCSD or Livermore)



Source: Zone 7 Preliminary Chain of Lakes Evaluation Update, 2020



Source: Zone 7 Groundwater Management Plan, 2005



Mocho Demin Plant

# Summary of 2021 AWSS Alternatives

Potable Supply, Storage, and Conveyance		Supply	Storage	Conveyance
*	P-1. Direct Potable Reuse via Treated Water Augmentation			
*	P-2. Tri-Valley Potable Reuse			
*	P-3. Regional Desalination			
*	P-4. Water Transfers and Exchanges			
*	P-5. Intertie			
*	P-6. Delta Conveyance			
*	P-7. Sites Reservoir			
*	P-8. Los Vaqueros Reservoir Expansion and Transfer-Bethany Pipeline			
Non-Potable Supply and Storage				
*	NP-1. Recycled Water Storage in Chain of Lakes			
*	NP-2. Fringe Basin Groundwater			
*	NP-3. Groundwater from Hopyard #7 Well			
*	NP-4. RO Reject from Zone 7's Groundwater Demineralization Facility			
*	NP-5. Wastewater from Neighboring Agency			

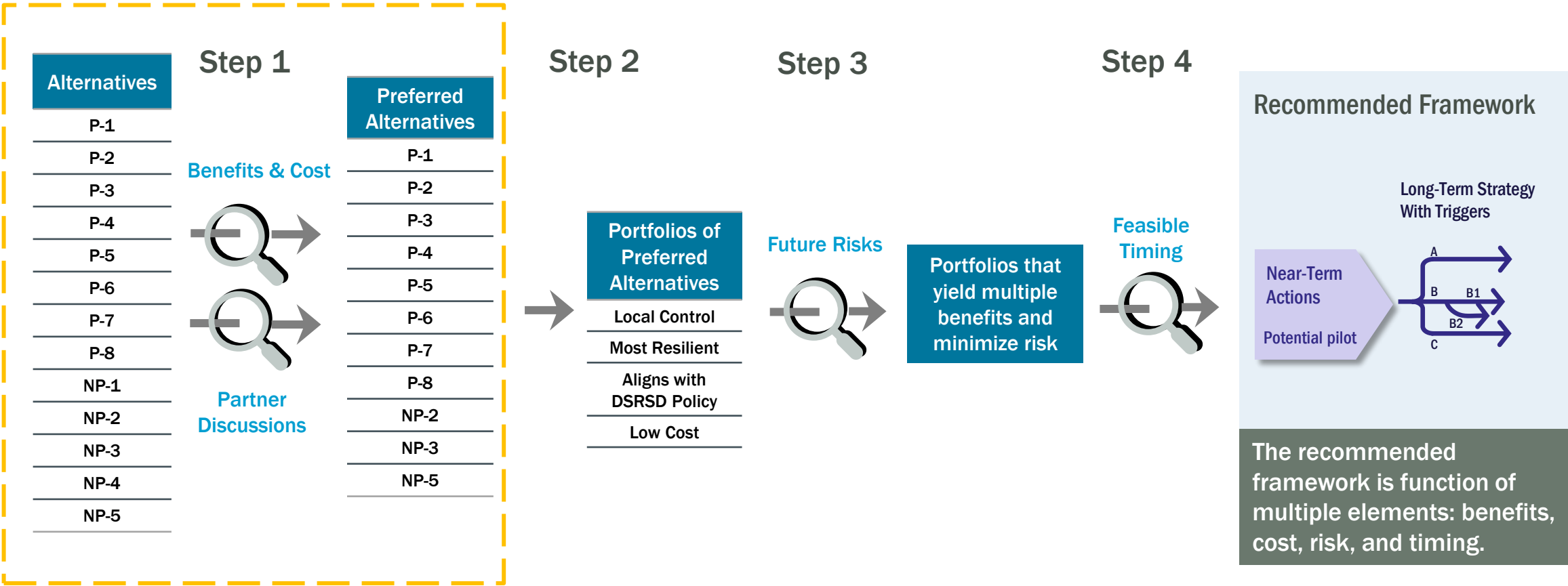
\* mentioned in Governor Newsom's CA Water Resilience Portfolio

Gray = currently being explored by Zone 7

# Preliminary Evaluation



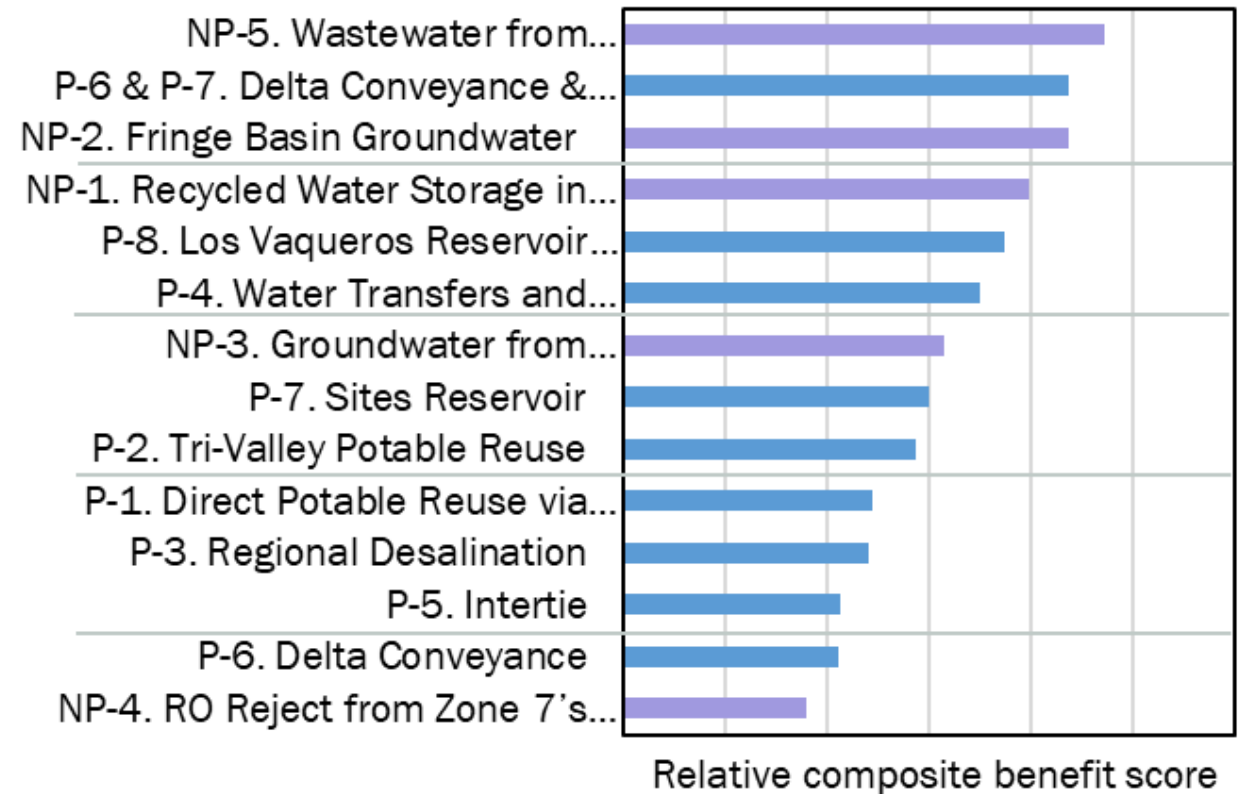
# Evaluation Process Overview



# Assessing Relative Benefits

Alternatives were scored using 9 evaluation criteria in four general categories:

- **Technical** – technical and regulatory feasibility
- **Institutional** – institutional complexity and community support
- **Resilience** – dry-year supply, resilience to shocks, and local control
- **Sustainability** – water quality and environmental sustainability

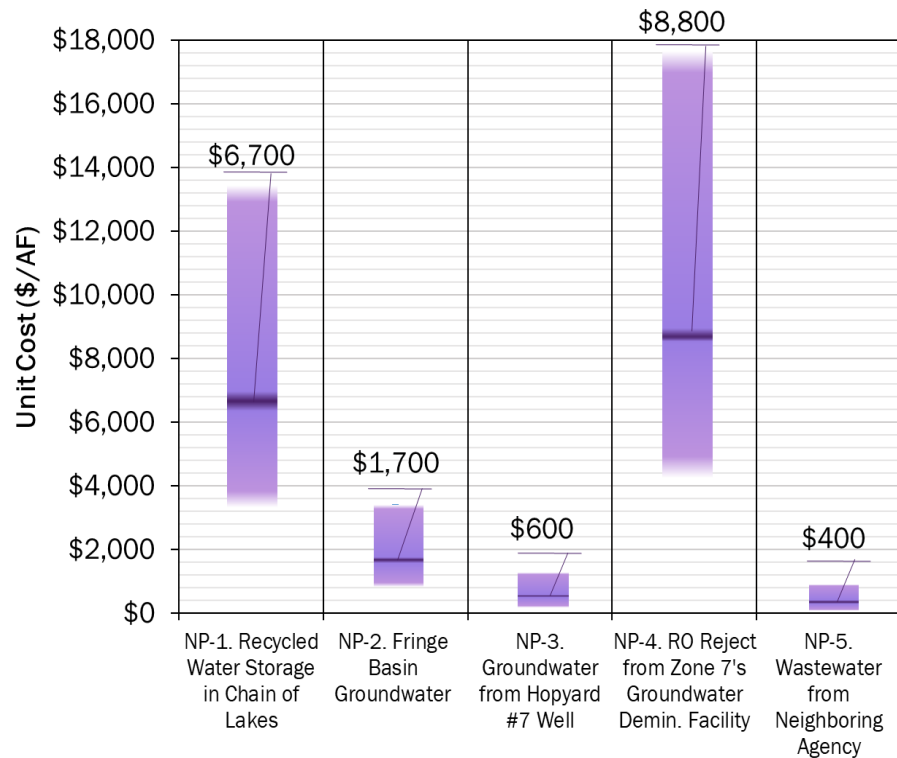


# Estimated Unit Costs

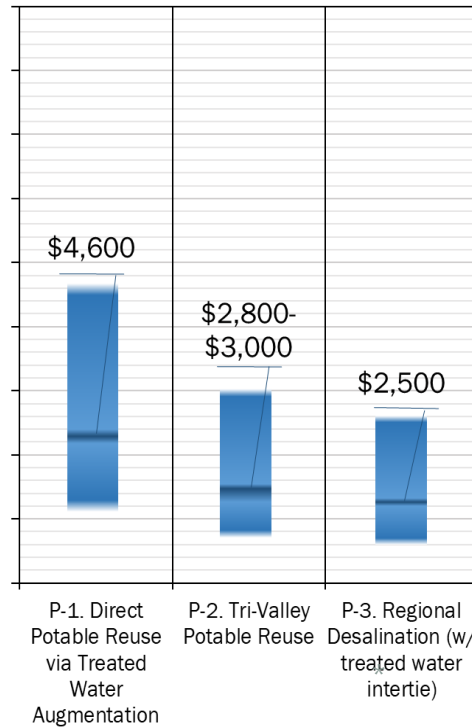
Note: costs will be refined as more information is available

Error bars represent level of accuracy for order-of-magnitude estimates: -50% to +100%

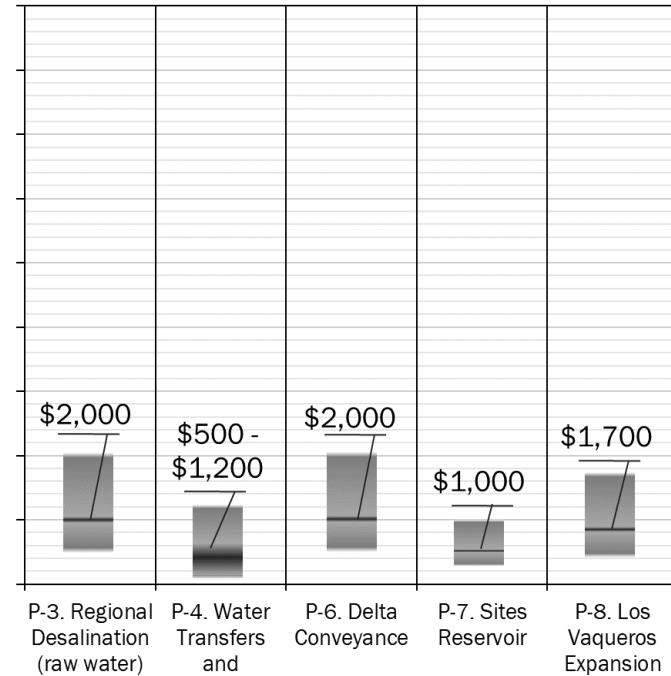
Non-potable alternatives



Potable alternatives – treated water

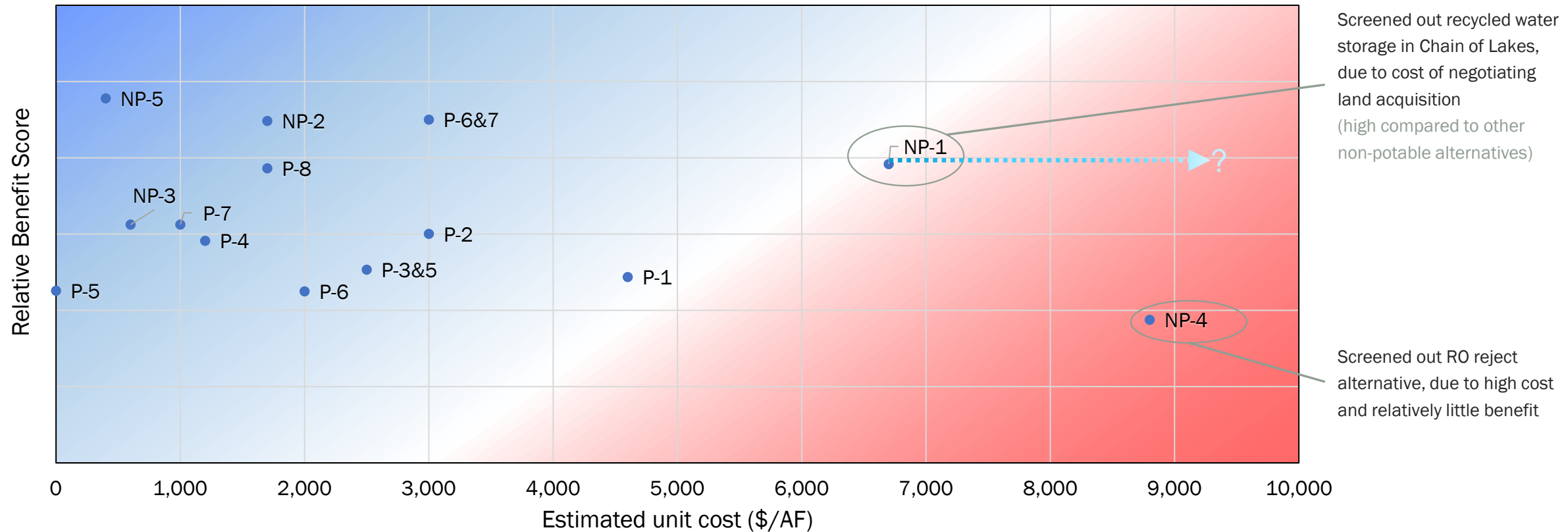


Potable alternatives – raw water



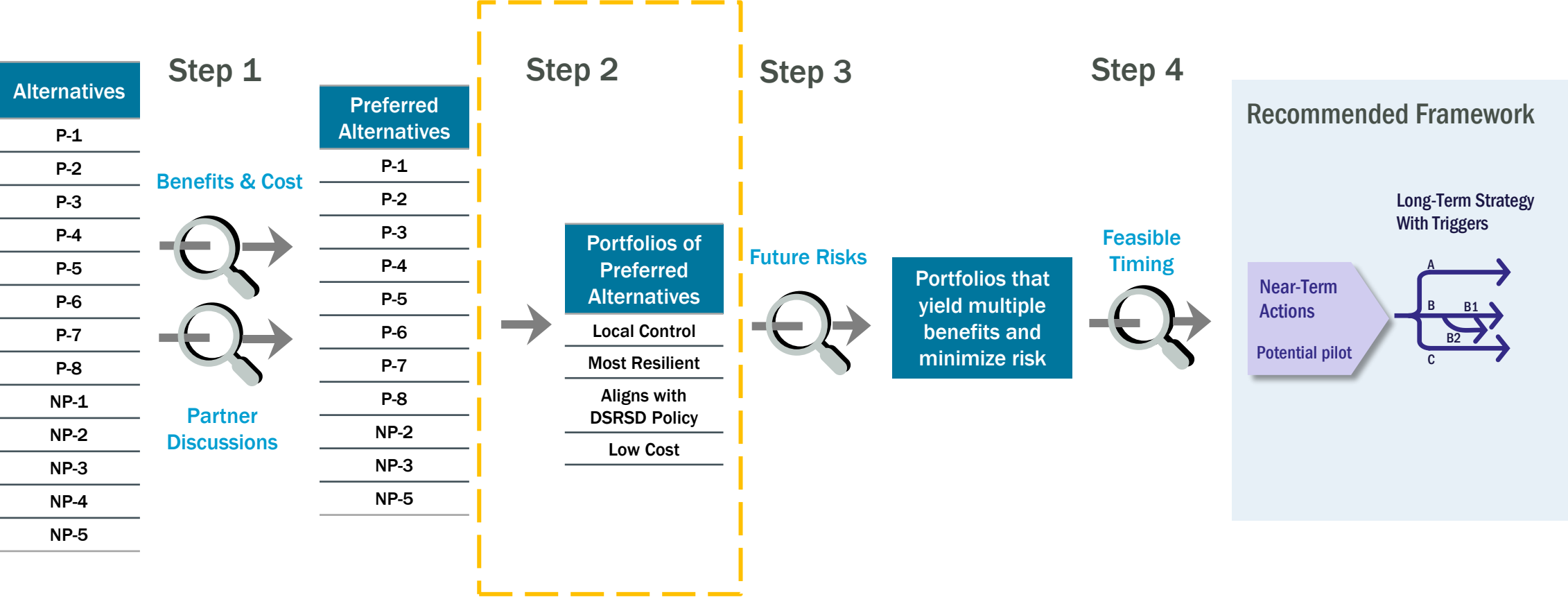
Does not include cost of delivery and treatment, which varies by alternative

# Screening Alternatives: Benefits vs. Costs



Screened out cost-prohibitive options, and incorporated remaining alternatives into different portfolios (Step 2 of evaluation)

# Developing Portfolios



# Identifying Portfolio Themes

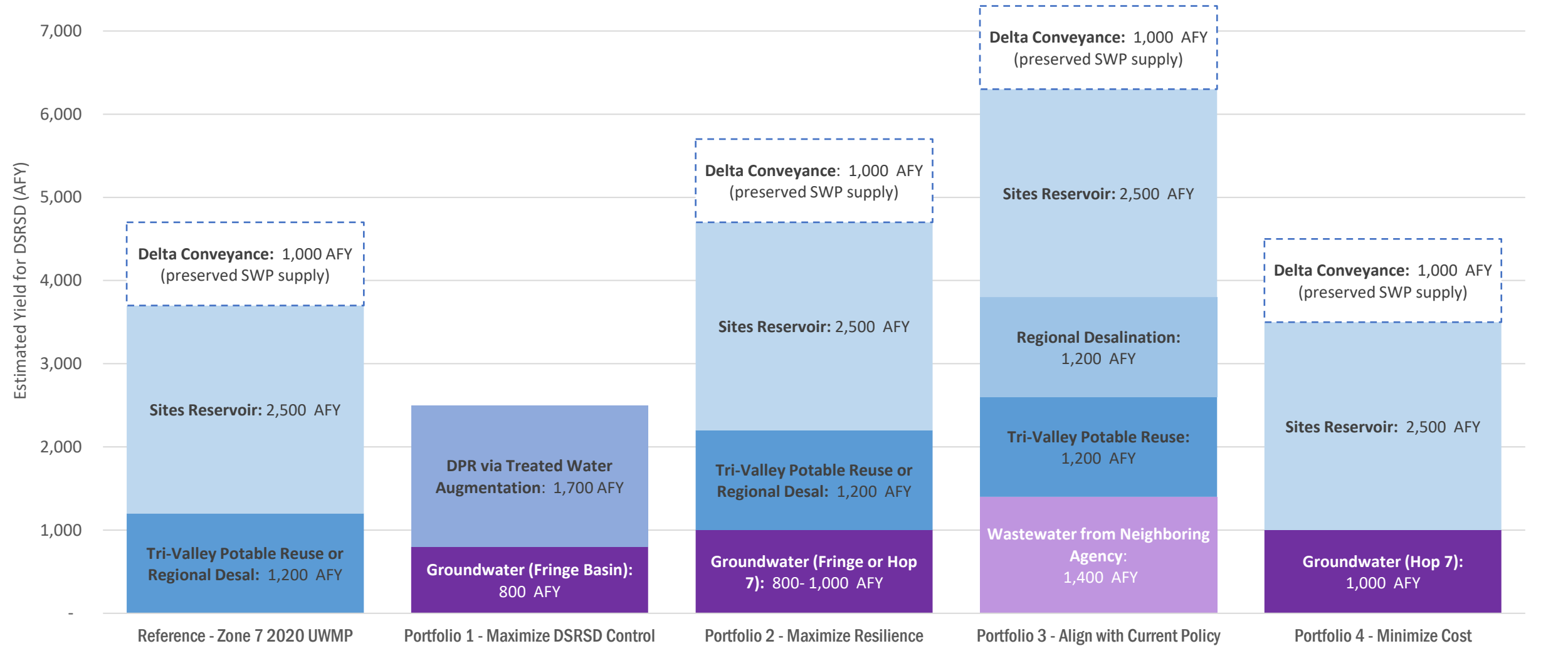
Informed by the benefit-cost analysis, combined preferred alternatives into thematic portfolios, each reflecting a different goal

- **Reference Portfolio:** Zone 7's 2020 UWMP
- **Portfolio 1:** Maximize DSRSD Control
- **Portfolio 2:** Maximize Resilience
- **Portfolio 3:** Align with DSRSD's Current Water Supply Policy (as possible)
- **Portfolio 4:** Minimize Cost

**Each portfolio offers different amounts of supply, storage, and conveyance based on the portfolio's goal.**

# Augmenting Supply, Storage, and Conveyance

<b>Conveyance:</b> Transfer-Bethany, Intertie, Delta Conveyance	n/a	Transfer-Bethany, Delta Conveyance	Transfer-Bethany, Intertie, Delta Conveyance	Delta Conveyance
<b>Storage:</b> Los Vaqueros, Sites Reservoir	n/a	Los Vaqueros, Sites Reservoir	Los Vaqueros, Sites Reservoir	Sites Reservoir

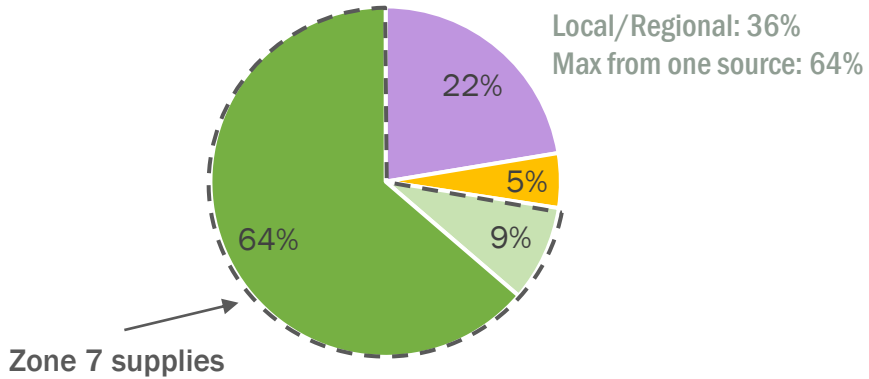




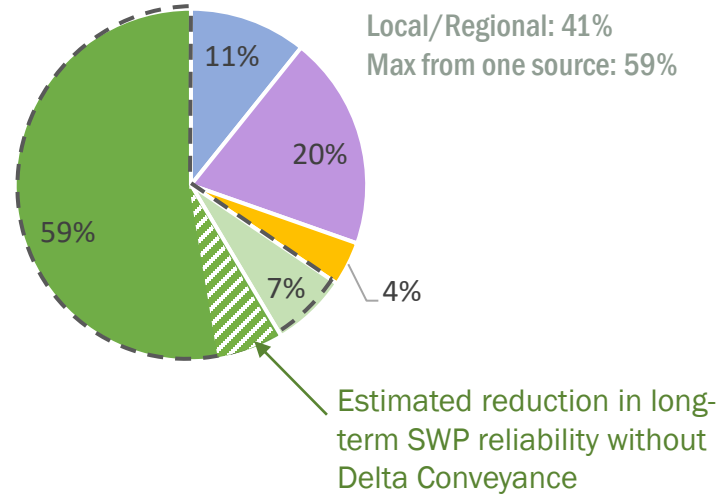
# DSRSD Supply Sources Under Each Portfolio

- DPR via Treated Water Augmentation
- Tri-Valley Potable Reuse or Regional Desalination
- Sites Reservoir
- Recycled Water
- Groundwater pumping quota
- Arroyo Valle (local runoff)
- SWP

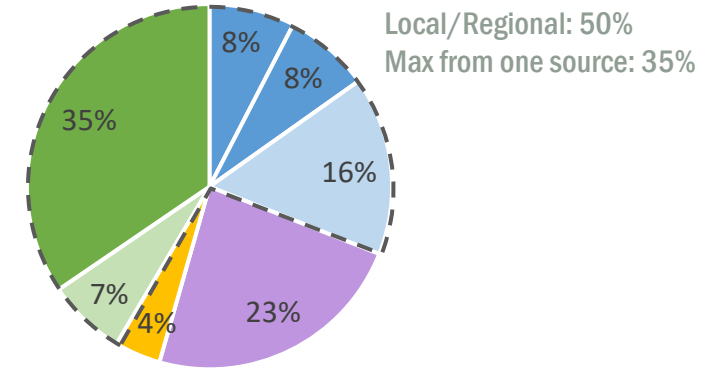
Current DSRSD water supplies (2020)



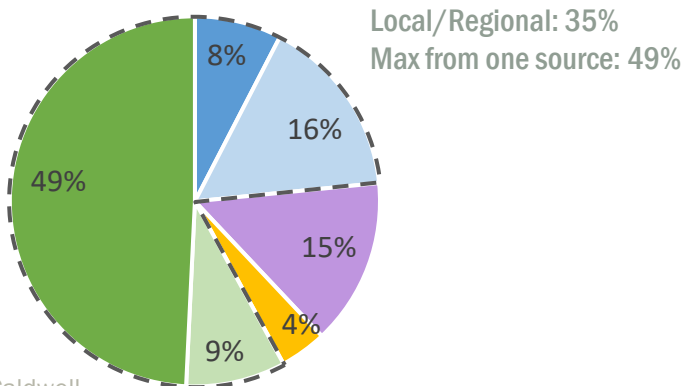
Portfolio 1: Maximize DSRSD Control



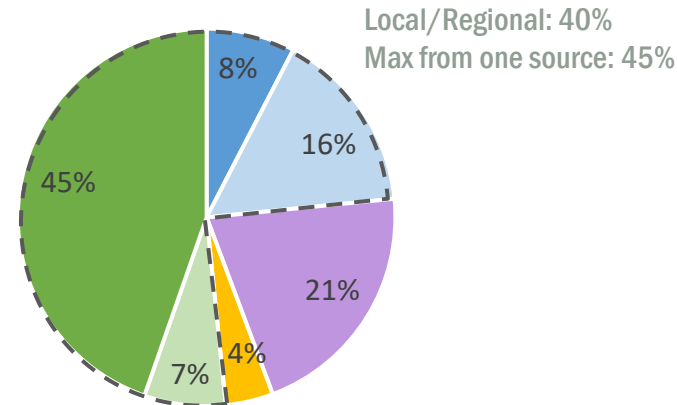
Portfolio 3: Current DSRSD Policy



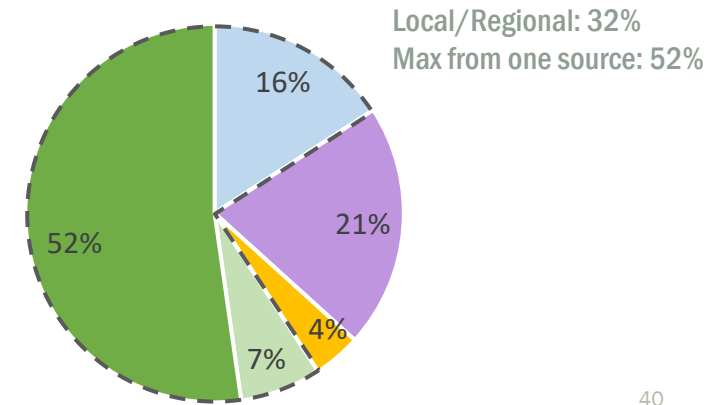
Zone 7's 2020 UWMP Sample Portfolio



Portfolio 2: Maximize Resilience



Portfolio 4: Minimize Cost



# In Summary: Portfolio Yields and Costs

Compared to reference portfolio (Zone 7 2020 UWMP)

Blue font = improved resiliency

Gray font = decreased resiliency

## Reference portfolio

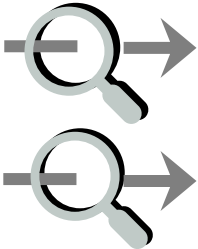
	Zone 7 2020 UWMP	Portfolio 1 – Max. DSRSD Control	Portfolio 2 – Max. Resilience	Portfolio 3 – Current DSRSD Policy	Portfolio 4 – Min. Cost
<b>Estimated yield (AFY)</b> New supply Preserved SWP supply	3,700 1,000	2,500	<b>4,500 to 4,700</b> 1,000	<b>6,300</b> 1,000	3,500 1,000
<b>Capital cost (\$M)</b>	\$415-\$600	\$100	\$365-\$565	\$545-\$690	\$270
<b>Unit cost for new and preserved supply (\$/AF)</b>	\$1,500-\$1,700	\$3,700	\$1,300-\$1,700	\$1,600	\$1,100
<b>Local (or regional) supply</b> (policy goal ≥60%)	35%	<b>41%</b>	<b>40%</b>	<b>50%</b>	32%
<b>Max. supply from single source</b> (policy goal ≤40%)	49%	59%	<b>45%</b>	<b>35%</b>	52%

# Evaluating Relative Risk of Portfolios

Alternatives
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
NP-1
NP-2
NP-3
NP-4
NP-5

Step 1

Benefits & Cost



Partner Discussions

Preferred Alternatives
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
NP-2
NP-3
NP-5

Step 2

Portfolios of Preferred Alternatives
Local Control
Most Resilient
Aligns with DSRSD Policy
Low Cost

Step 3

Future Risks



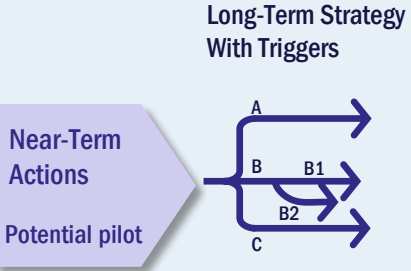
Portfolios that yield multiple benefits and minimize risk
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Step 4

Feasible Timing



## Recommended Framework



# Future uncertainties can impact portfolio performance

Portfolios were evaluated four key uncertainties to determine relative risk:



**Supply availability**



**Regional collaboration**

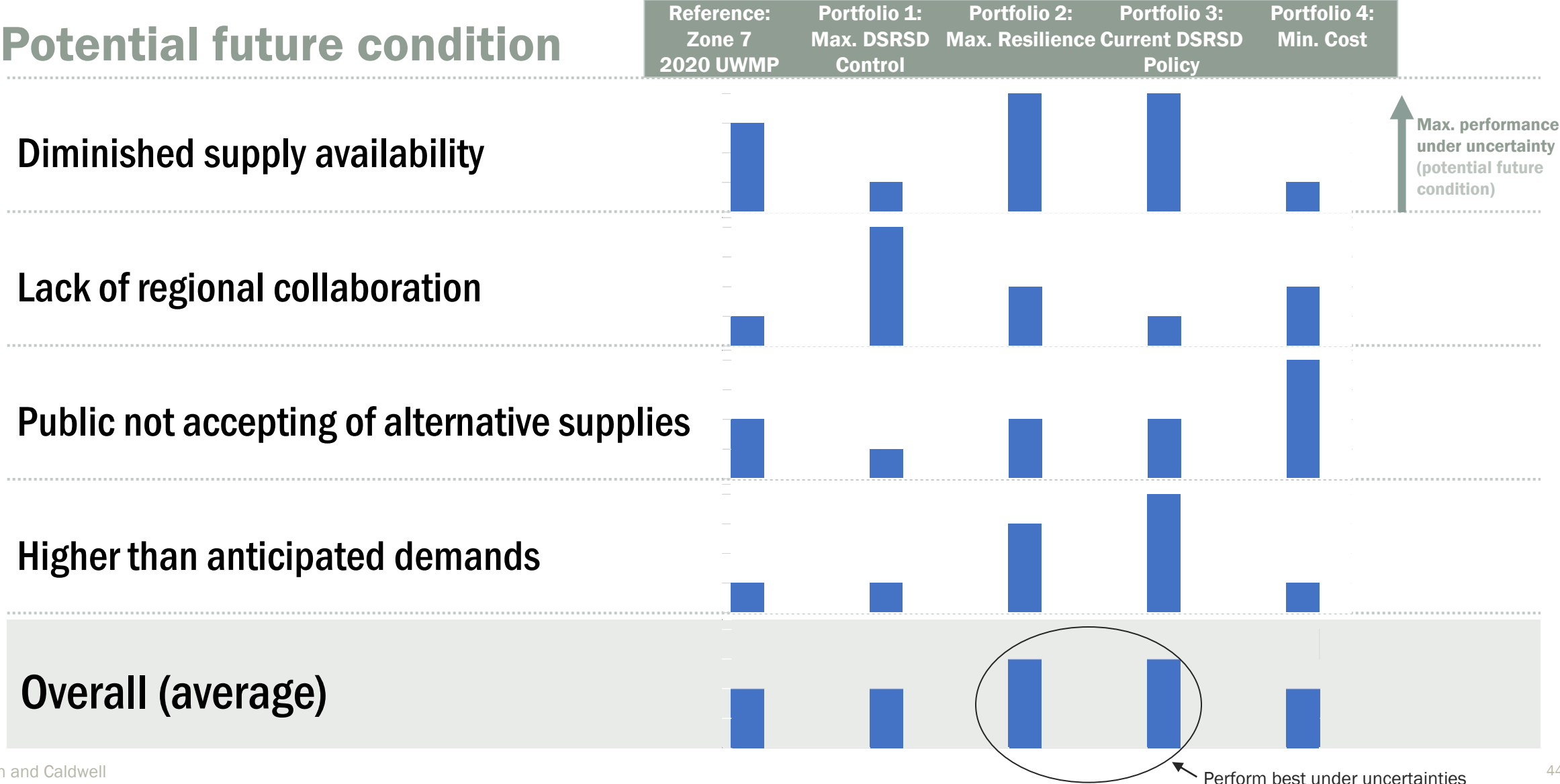


**Public acceptance**



**Future water demands**

# Diverse portfolios perform better under uncertainties



# Key Takeaways

The combination of alternatives in Portfolios 2 and 3 offer multiple benefits and are most resilient to uncertainties.

## Alternatives from preferred portfolios (Portfolios 2 & 3):

- **Delta Conveyance & Sites Reservoir** (best when combined)
- **Los Vaqueros Reservoir Expansion & Transfer-Bethany Pipeline**
- **Tri-Valley Potable Reuse**
- **Regional Desalination**
- **Intertie**
- **Groundwater from Fringe Basin or Hopyard 7**
- **Wastewater from Neighboring Agency** (*requires willing partner*)

## RECOMMENDATIONS

- Support Zone 7's efforts to pursue additional supply, storage, and conveyance.
- Seek supplemental non-potable supplies to expand the recycled water program.
- Explore near-term pilots to gather information and inform longer-term decisions.

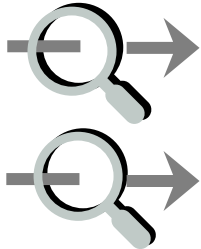
# Recommended Framework

# Developing a Framework

Alternatives
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
NP-1
NP-2
NP-3
NP-4
NP-5

Step 1

Benefits & Cost



Partner Discussions

Preferred Alternatives
P-1
P-2
P-3
P-4
P-5
P-6
P-7
P-8
NP-2
NP-3
NP-5

Step 2

Portfolios of Preferred Alternatives
Local Control
Most Resilient
Aligns with DSRSD Policy
Low Cost

Step 3

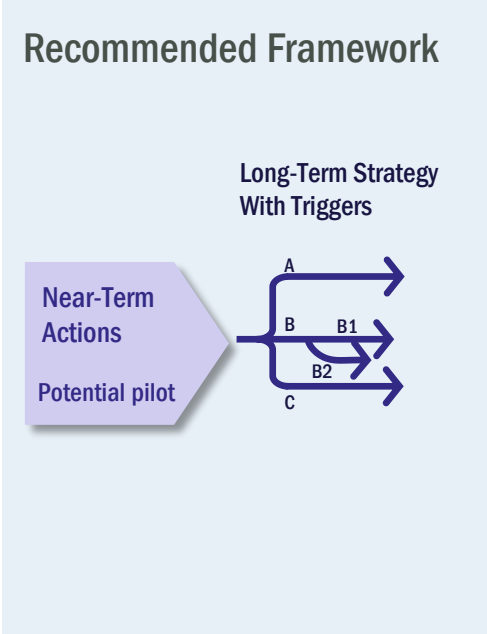
Future Risks



Portfolios that yield multiple benefits and minimize risk
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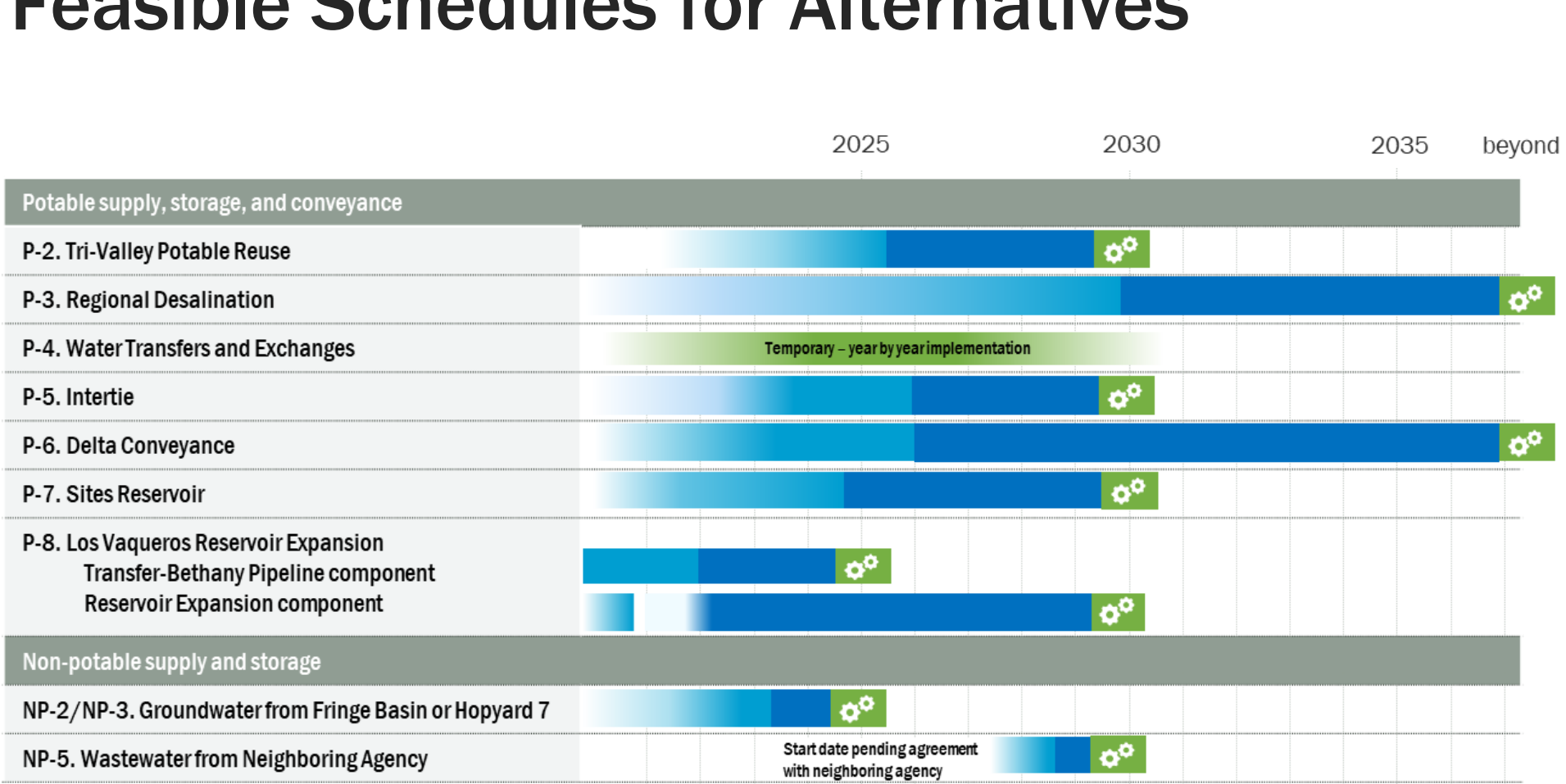
Step 4

Feasible Timing



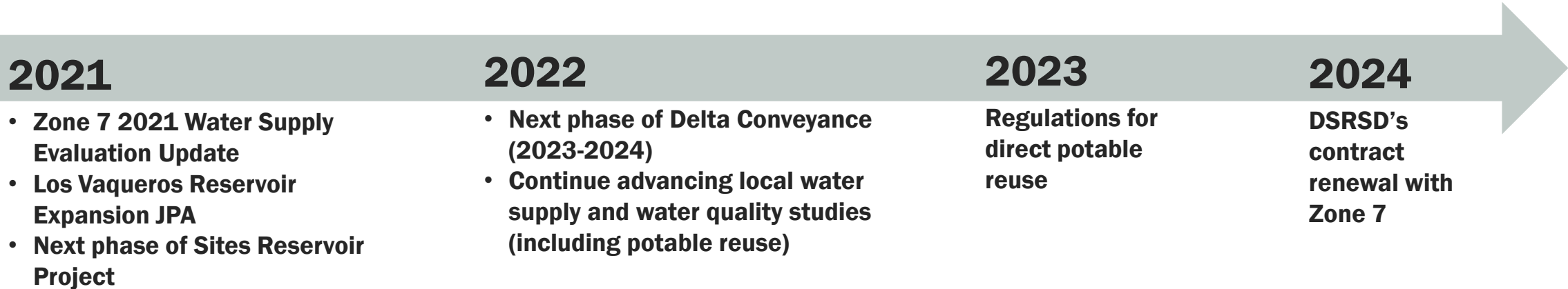


# Feasible Schedules for Alternatives



Timing is approximate and dependent on if/when projects move forward.

# Key Decision Points

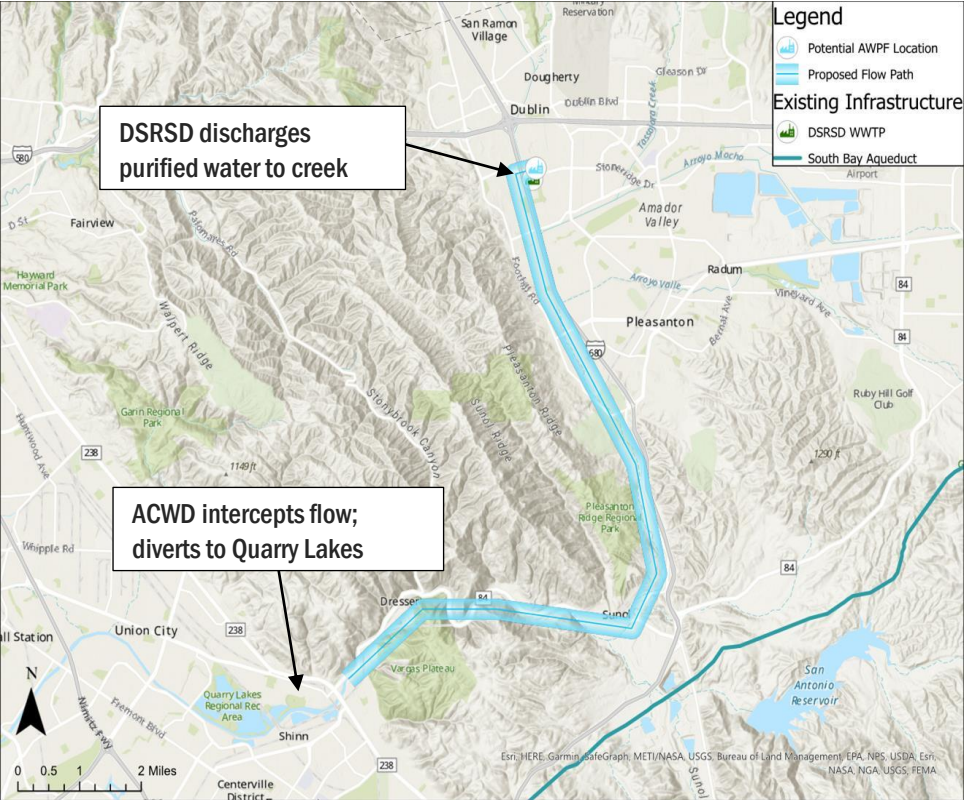


DSRSD can take near-term steps to inform upcoming decision points:

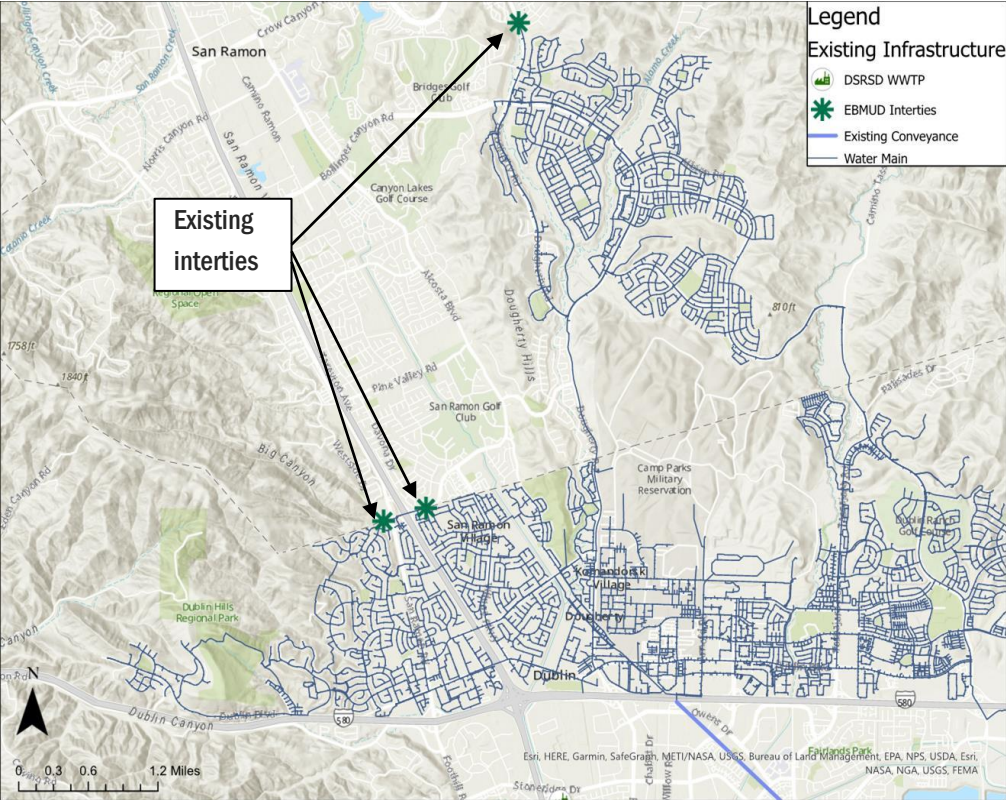
Support Zone 7's efforts:	Explore possible near-term pilots:	Seek supplemental non-potable supply:
LVE and Transfer-Bethany	Potable reuse pilot with ACWD, Zone 7, and Livermore	Work with Zone 7 to explore groundwater
Sites Reservoir and Delta Conveyance	Pilot transfer with Zone 7 and EBMUD	

# Potential Near-Term Pilots

Potable reuse pilot with ACWD (with possible surface water exchange)



Pilot transfer between EBMUD and Zone 7 (via existing EBMUD-DSRSD interties)



# Recommended Framework

## Near-term Plan

Low-risk actions that can be implemented in the next 5 years

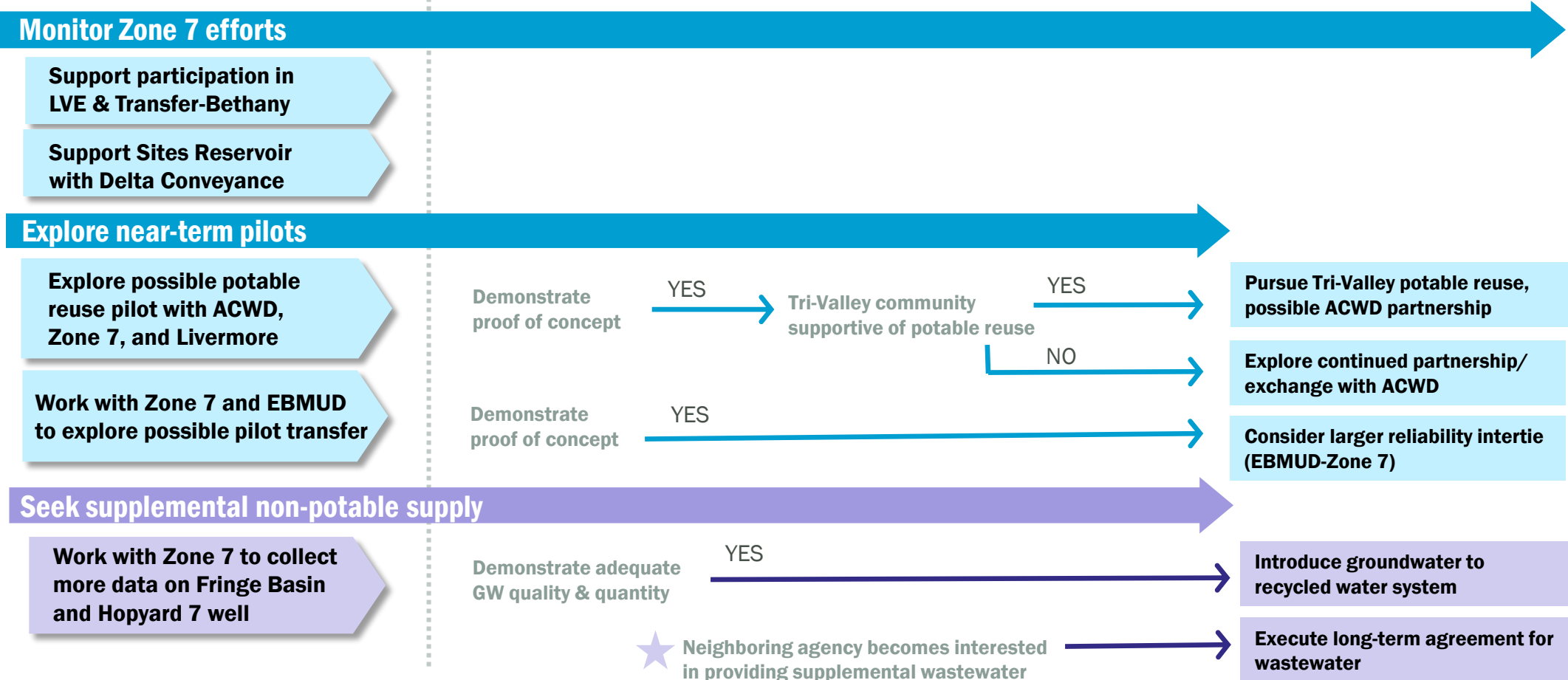
## 2023 Checkpoint

Review framework, incorporate new info

## Long-term Strategy

Based on outcomes of near-term actions and external factors ("triggers")

★ = External trigger



# Conclusions

- Conditions have changed since 2015
- Expanding recycled water benefits potable supply reliability
- Diverse portfolios improve resilience, enable flexibility, and reduce risk
- Partnerships are key to success

## Recommended Next Steps

1. Amend 2015 policy to align with the recommended framework
2. Review framework in 2023 and incorporate new information

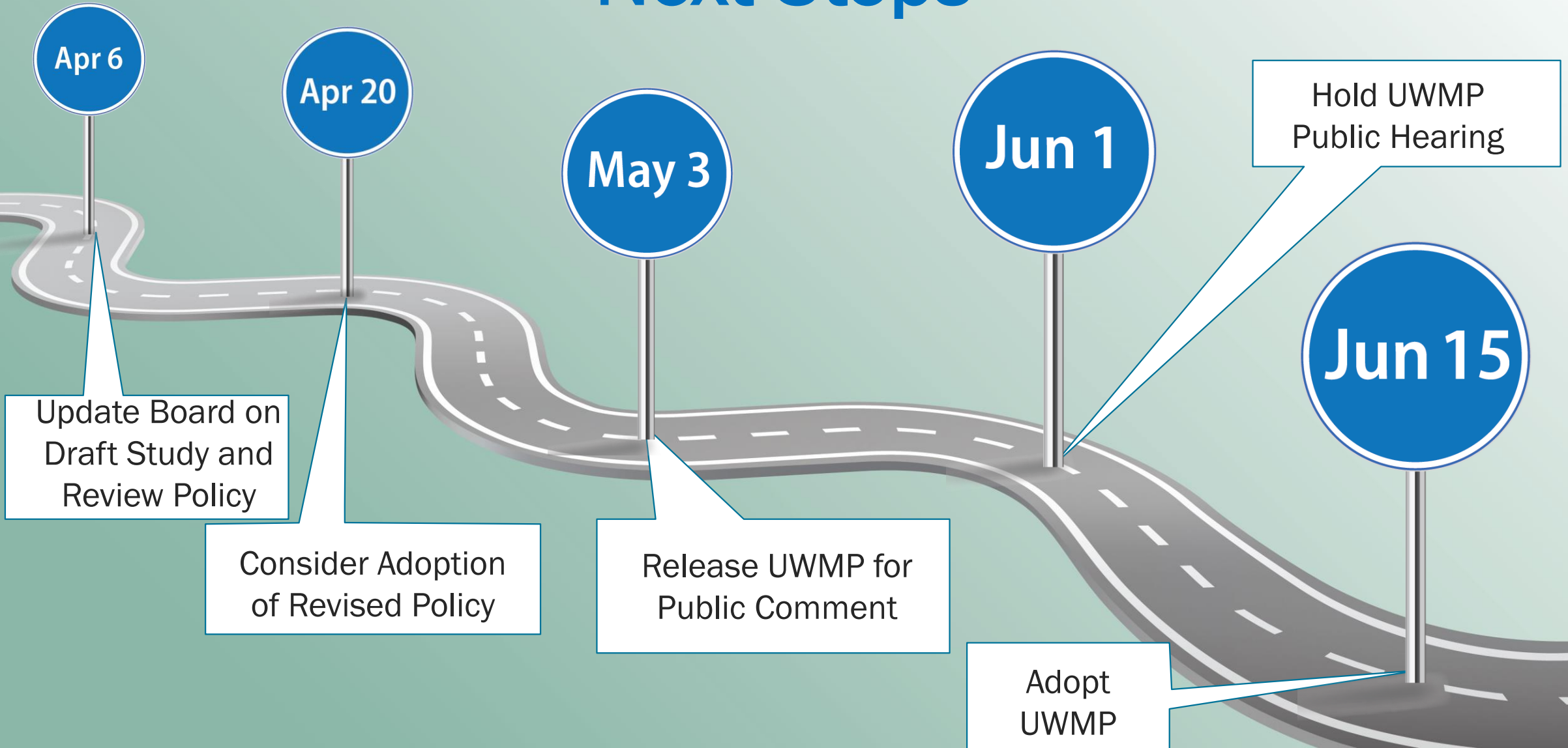


# Proposed Revisions to 2015 Policy

- Align **conservation and water use efficiency** goals with State requirements
- Emphasize **collaborative partnerships** for building water resiliency
- Advocate for “**all of the above approach**” to pursuing a **diverse portfolio** of water supply, storage, and conveyance projects
- Prioritize **local and sustainable water sources** and projects that contribute to **regional self-reliance**
- Engage **District customers** regarding region’s water supply challenges, potential solutions, and costs
- Ensure Zone 7 **water shortage allocations** recognize retailer **water use efficiency** and **investments in new water supplies**



# Next Steps



# Board Discussion and Questions