Dublin San Ramon Services District

Water, wastewater, recycled water

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

Executive Summary

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Executive Summary

The Dublin San Ramon Services District (DSRSD) provides potable water and recycled water to approximately 91,000 people in the City of Dublin and Dougherty Valley portion of San Ramon. DSRSD produces and distributes recycled water for irrigation uses and purchases potable water from Zone 7 Water Agency (Zone 7). DSRSD also has a groundwater pumping quota (GPQ) from the main groundwater basin, pumped on its behalf by Zone 7, the local groundwater basin manager.

Zone 7 is a State Water Project (SWP) contractor that wholesales treated water to four retail water agencies: DSRSD, City of Livermore, City of Pleasanton, and California Water Service Livermore District. As shown in Figure ES-1, the majority of Zone 7's water supply, and therefore DSRSD's water supply, is imported through the Sacramento-San Joaquin Delta (Delta) via the SWP. Zone 7 also receives local runoff from the Arroyo Valle watershed. In wet and normal years, a portion of Zone 7's surface water supply is stored in the local and non-local groundwater banks and surface water reservoirs. In dry years, Zone 7 withdraws the previously stored water to augment reduced SWP deliveries.

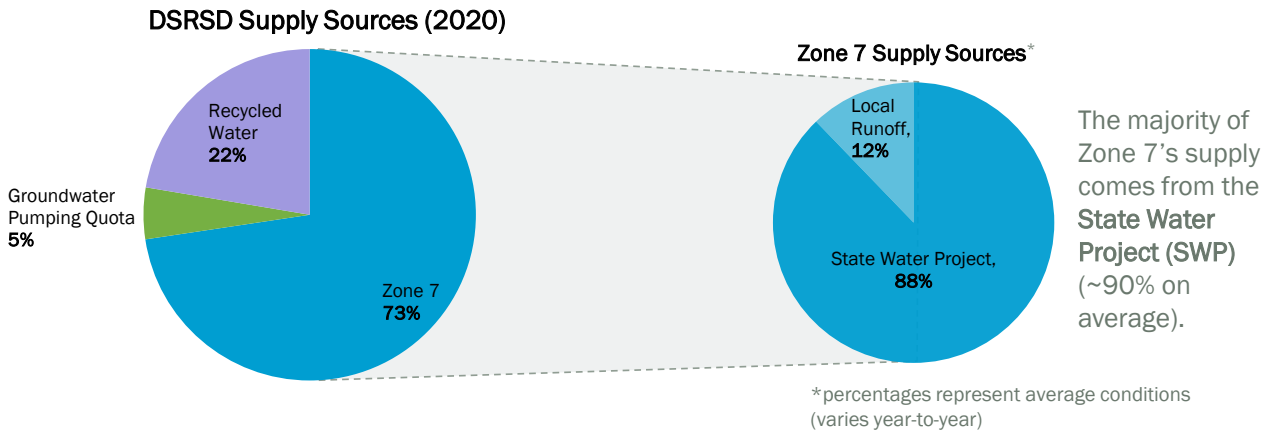

Figure ES-1. DSRSD and Zone 7 water supply sources

Note: Figure represents average conditions; Zone 7's supplies vary year-to-year based on hydrological, regulatory, and operational conditions.

In September 2015, DSRSD completed a Long-Term Alternative Water Supply Study (2015 Study) to identify conceptual alternatives for improving long-term water supply reliability. The 2015 Study was driven by the unprecedented 2012-16 drought and DSRSD's desire to reduce dependence on imported Delta water supply. In 2014, the California Department of Water Resources (DWR) announced an initial SWP allocation of zero percent, which was increased to 5 percent later in the year. The very low 2014 SWP allocation and limitations on the timing and conditions for pumping water from the Delta exposed vulnerabilities with DSRSD's heavy reliance on the SWP for bringing water supplies into the Tri-Valley.

The 2015 Study included a high-level assessment of regional and local supply alternatives that DSRSD could explore collaboratively with other neighboring water and wastewater agencies to diversify water supplies and reduce reliance on imported water supplies through the Delta. The results of the 2015 Study informed and provided the framework for DSRSD's Water Supply, Storage, Conveyance, Quality and Conservation Policy (2015 Water Policy), which was adopted by DSRSD's Board of Directors in October 2015.

Since development of the 2015 Study and 2015 Water Policy, conditions have changed substantially, including lower water demand projections; lower wastewater flows (and therefore less flow available for reuse); advancement of local and regional efforts (e.g., the Bay Area Regional Reliability [BARR] partnership); and new regulations (e.g., pending long-term water use efficiency standards and direct potable reuse [DPR] regulations). Therefore, DSRSD has prepared the *2021 Alternative Water Supply Study* (2021 AWSS)*: A Framework for a Resilient and Sustainable Water Future* to accomplish the following goals and objectives:

- Update the 2015 Study with new and refined information, including input from potential regional partners.
- Provide information to guide and inform the update of the 2015 Water Policy.
- Inform DSRSD's 2020 Urban Water Management Plan (UWMP) update.
- Support DSRSD's strategic plan goal to develop and implement an integrated recycled and potable water program.
- Provide a framework for a resilient and sustainable water future that outlines near-term and long-term strategies, accounting for future uncertainties and decision points, and informs and guides DSRSD advocacy and collaborative efforts.

Future Water Needs

DSRSD's total water demand (potable and recycled) is projected to be nearly 16,000 acre-feet per year (AFY) in 2045, representing an increase of about 3,000 AFY from 2020 (Figure ES-2). Recycled water could potentially offset about 30 percent of this increase (900 AFY) if wastewater is available. However, currently all wastewater treated at DSRSD's wastewater treatment plant (WWTP) is recycled in the peak summer months, which has prompted the DSRSD-EBMUD Recycled Water Authority (DERWA)[1] to request that DSRSD and EBMUD implement a moratorium on new recycled water connections. Augmenting the recycled water supply—either through seasonal storage or a supplemental supply source (e.g., wastewater from a neighboring agency or local groundwater)—would enable expansion of the recycled water program and offset the need for additional potable water.

[1] DERWA is a Joint Powers Authority formed in 1995 by DSRSD and East Bay Municipal Utility District (EBMUD) for the purposes of producing and distributing recycled water through the San Ramon Valley Recycled Water Program. In 2014, DERWA executed agreements to extend recycled water service to the City of Pleasanton.

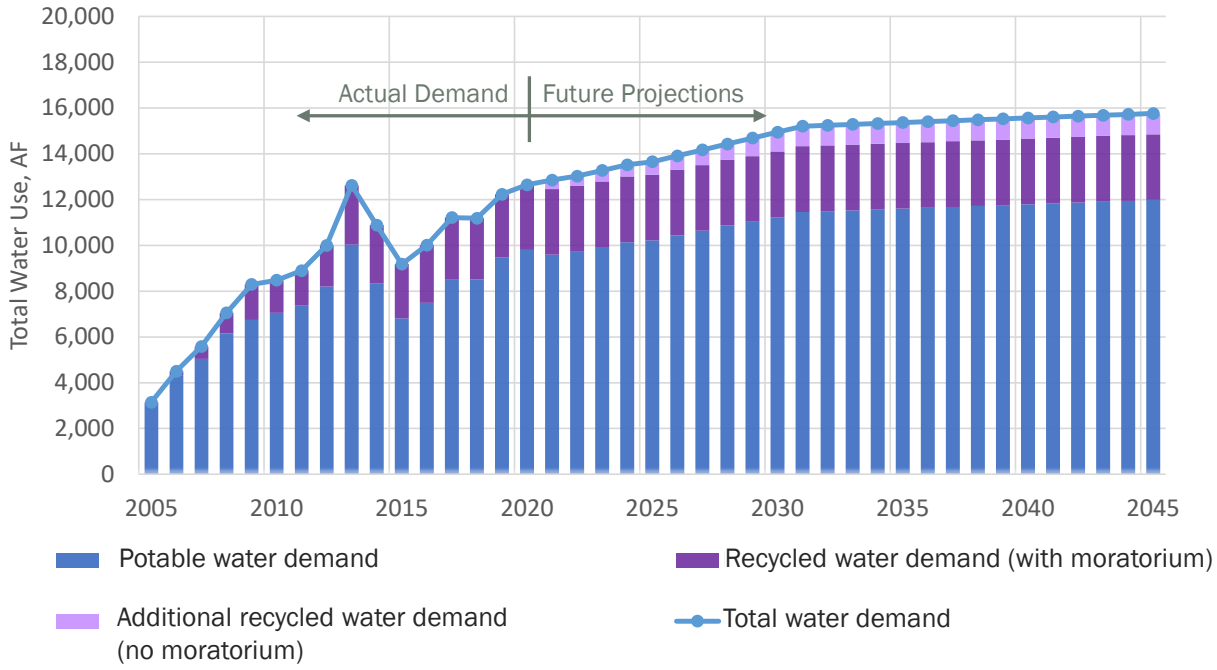

Figure ES-2. DSRSD's historical and projected future water demands

To mitigate risks associated with significant reliance on imported water supply, Zone 7 is continuing to develop local sources of water and diversify its water supply portfolio. In April 2019, Zone 7 completed its 2019 Water Supply Evaluation Update (2019 WSE Update) that documents Zone 7's current water supplies based on new information and experience gained since the 2012-16 drought. The 2019 WSE Update projects shortages of up to 50 to 70 percent by 2040 in dry years under the "no new water supply projects" scenario. These shortages would translate to significant cutbacks for DSRSD, which makes up about 25 percent of Zone 7's direct demand.

The long-term reliability of the SWP, and more generally, the water conveyance capability of the Delta, is also challenged by the instability of aging levees in the Delta (including their vulnerability to seismic events, climate change, and land subsidence), regulatory uncertainty, water quality issues including saltwater intrusion, and the declining health of the Delta ecosystem. These issues directly affect DSRSD's long-term water supply reliability since a majority of Zone 7's water supply is and will continue to be tied to the Delta and SWP system.

Zone 7, in collaboration with other local and regional partner agencies, is exploring a range of new water supply, storage, and conveyance projects, to increase the long-term reliability and resilience of the Tri-Valley's water supplies.

Alternatives

DSRSD identified potential supply, storage, and conveyance options through three steps:

1. Revisited alternatives from the 2015 Study (and either screened them out or carried them forward)
2. Incorporated Zone 7's efforts
3. Explored additional projects that were not previously considered

The alternatives selected for evaluation in the 2021 AWSS are summarized in Figure ES-3. The alternatives include eight options for potable supply, storage, and conveyance—many of which are already being explored by Zone 7—and five options for non-potable supply and storage.

			Supply	Storage	Conveyance
Potable Supply, Storage, and Conveyance					
Currently being explored by Zone 7	**P-1.** DPR via Treated Water Augmentation	The most direct form of reuse, with purified water introduced directly to the drinking water distribution system. This is the only type of potable reuse that DSRSD could pursue independently. Regulations are anticipated in 2023.	✓		
	P-2. Tri-Valley Potable Reuse	Includes all regional potable reuse options (direct and indirect) being explored by Zone 7. Would utilize wastewater from DSRSD and/or Livermore's WWTP.	✓		
	P-3. Regional Desalination	Bay Area Regional Desalination Project that would utilize Contra Costa Water District's (CCWD) existing intake/water right at Mallard Slough Pump Station to treat brackish water.	✓		
	P-4. Water Transfers and Exchanges	Includes short-term transfers (as an interim solution while other projects are being developed) and possible long-term transfers.	✓		
	P-5. Intertie	New intertie between Zone 7 and EBMUD, or possibly the San Francisco Public Utilities Commission (SFPUC). Would provide an alternate means to convey water to the Tri-Valley during emergency conditions.			✓
	P-6. Delta Conveyance	Would help preserve SWP supply by protecting against earthquakes, sea level rise, and other Delta disruptions. Would also increase capacity for transfers.	✓		✓
	P-7. Sites Reservoir	New off-stream storage project northwest of Sacramento that would also provide new supply.	✓	✓	
	P-8. Los Vaqueros Reservoir Expansion and Transfer-Bethany Pipeline	Expansion of CCWD's existing Los Vaqueros Reservoir and new pipeline that would connect the reservoir to the South Bay Aqueduct and Zone 7's system. Zone 7 is exploring the project for storage and conveyance, though there is also potential for new supply.		✓	✓
Non-Potable Supply and Storage					
	NP-1. Recycled Water Storage in Chain of Lakes	Storage of tertiary treated recycled water in Lakes F or G, once Zone 7 acquires the lakes from the gravel mining companies (which may not be for decades).	✓	✓	
	NP-2. Fringe Basin Groundwater	Use of Fringe Basin groundwater (which has limited potable supply potential) to supplement the recycled water supply.	✓		
	NP-3. Groundwater from Hopyard 7 Well	Use of Zone 7's Hopyard 7 well in the Main Basin, which is unsuitable for drinking water due to elevated levels of arsenic, to supplement the recycled water supply (through blending at DSRSD's WWTP).	✓		
	NP-4. Reverse Osmosis (RO) Reject from Zone 7's Groundwater Demineralization Facility	Intercepting the brine stream from Zone 7's groundwater demineralization facility and either treating or diluting it to add to the recycled water system.	✓		
	NP-5. Wastewater from Neighboring Agency	Potential long-term agreement for wastewater from Central Contra Costa Sanitary District (CCCSD) or the City of Livermore. Both agencies are reserving wastewater for other future recycled water projects, so long-term availability is uncertain.	✓		

P = potable; NP = non-potable

Figure ES-3. Summary of 2021 AWSS potable and non-potable water alternatives

Evaluation

Alternatives were evaluated through a multi-step process, as summarized below.

1	As a first step, individual alternatives were evaluated based on their benefits and costs. Benefits and costs were informed by discussions with potential partner agencies.	Two alternatives were screened out at this stage due to low benefit-to-cost ratio: **NP-1** (Recycled Water Storage in Chain of Lakes) and **NP-4** (RO Reject from Zone 7's Groundwater Demineralization Facility)
2	The remaining alternatives were combined into four portfolios, each built around a different overall goal. Each portfolio offers different amounts of supply, storage, and conveyance based on the portfolio's goal. The intent was not to select a single portfolio, but rather to see how combinations of different alternatives perform together. Zone 7's 2020 UWMP sample portfolio was included as a reference point.	Reference Portfolio: Zone 7's 2020 UWMP Sample Portfolio **P-2.** Tri-Valley Potable Reuse **and/or** **P-3.** Regional Desalination, **P-4.** Transfers *(interim)*, **P-5.** Intertie, **P-6.** Delta Conveyance, **P-7.** Sites Reservoir, **P-8.** Los Vaqueros and Transfer-Bethany Portfolio 1: Maximize DSRSD Control **P-1.** DPR via Treated Water Augmentation, **NP-2.** Fringe Basin Groundwater Portfolio 2: Maximize Resilience **P-2.** Tri-Valley Potable Reuse **or** **P-3.** Regional Desalination, **P-4.** Transfers *(interim)*, **P-6.** Delta Conveyance, **P-7.** Sites Reservoir, **P-8.** Los Vaqueros and Transfer-Bethany, **NP-2.** Fringe Basin Groundwater **or** **NP-3.** Hopyard 7 Portfolio 3: Align with DSRSD's 2015 Water Policy (as possible) **P-2.** Tri-Valley Potable Reuse, **P-3.** Regional Desalination, **P-5.** Intertie, **P-6.** Delta Conveyance, **P-7.** Sites Reservoir, **P-8.** Los Vaqueros and Transfer-Bethany, **NP-5.** Wastewater from Neighboring Agency Portfolio 4: Minimize Cost **P-6.** Delta Conveyance, **P-7.** Sites Reservoir, **NP-3.** Hopyard 7
3	The portfolios were tested against different uncertainties to determine relative risk.	**Portfolios 2 and 3** include many of the same elements as Zone 7's 2020 UWMP sample portfolio, with the addition of recycled water alternatives. These two portfolios are most diverse and perform best under uncertainties (e.g., climate change, public acceptance, and regulatory changes), while remaining within a similar cost range. **P-1** (DPR via Treated Water Augmentation) is only included in Portfolio 1, as this portfolio seeks to maximize projects that would be directly under DSRSD's control. **P-4** (Water Transfers and Exchanges) was considered to augment SWP supply in the near-term while other projects are being developed.
4	Feasible implementation timelines for alternatives in the preferred portfolios informed near-term recommendations and the long-term strategy.	As shown in Figure ES-4, some regional projects are well underway and on track to be implemented within the next 5 to 10 years (e.g., Los Vaqueros Reservoir Expansion and Transfer-Bethany Pipeline). Other projects are less certain, with start and/or end dates dependent on various factors. Most non-potable projects could be implemented in less than five years if conditions allow for the project to move forward.

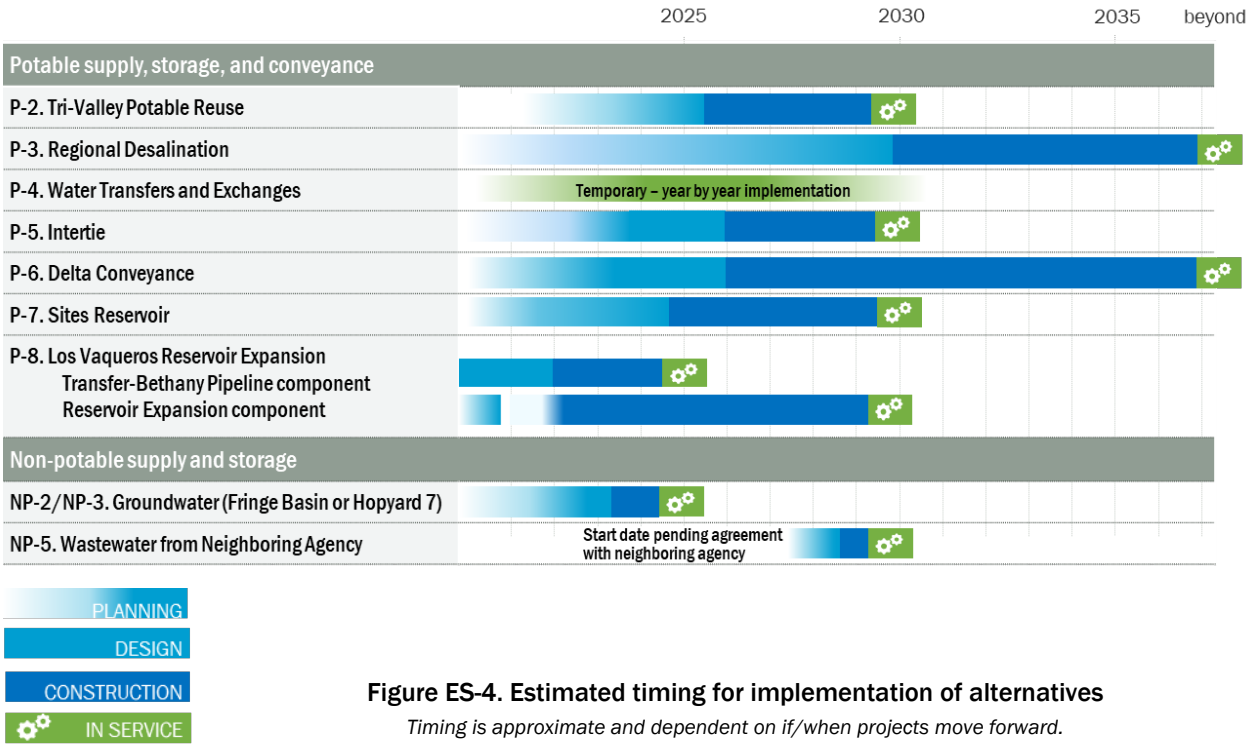

Figure ES-4. Estimated timing for implementation of alternatives

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

Based on the evaluation, the combination of alternatives in Portfolios 2 and 3 (shown to the right) offer multiple benefits and are most resilient to uncertainties. For many of these projects, additional studies are needed to further define the benefits and costs, including impacts to ratepayers. Additionally, Zone 7 plans to update its WSE later in 2021. The WSE Update will include a more robust technical and financial analysis of how various alternatives would complement existing water supplies and infrastructure and increase water resilience for the Tri-Valley. DSRSD will incorporate this information into the next update of the AWSS, which is recommended for 2023.

In the near-term, it is recommended that DSRSD continue to support Zone 7's efforts, seek supplemental non-potable supply to expand the recycled water program, and explore potential near-term pilot projects to gather information and inform longer-term decisions.

Alternatives from preferred portfolios (Portfolios 2 and 3):

P-2. Tri-Valley Potable Reuse

P-3. Regional Desalination

P-4. Intertie

P-6 and P-7. Delta Conveyance and Sites Reservoir *(best when combined)*

P-8. Los Vaqueros Reservoir Expansion and Transfer-Bethany Pipeline

NP-2/NP-3. Groundwater from Fringe Basin or Hopyard 7

NP-5. Wastewater from Neighboring Agency *(requires willing partner)*

P = potable; NP = non-potable

Key near-term recommendations:

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

Recommendations

Recommended near-term actions are described below. These early steps would complement and support Zone 7's ongoing water supply efforts and inform several upcoming milestones, including Zone 7's decisions regarding continued participation in the Los Vaqueros Reservoir Expansion (2021), Sites Reservoir (2021), and Delta Conveyance (2022) projects and DSRSD's water supply contract renewal with Zone 7 (2024).

As shown in the recommended framework (Figure ES-5), DSRSD's long-term strategy will depend on outcomes of these near-term actions and other external triggers. It is recommended that DSRSD review the framework in 2023 to incorporate new information (e.g., from Zone 7's upcoming 2021 WSE Update) and lessons learned from early efforts.

Near-term actions for DSRSD

Support Zone 7's efforts	
Advocate for Zone 7's continued participation in the Los Vaqueros Reservoir Expansion Project (including Transfer-Bethany Pipeline).	Given that this project has already completed environmental review and components can be online in the next 5 to 10 years, it offers near-term reliability and provides more certainty than projects that are still in the early planning stages. Additionally, the Transfer-Bethany Pipeline provides an alternate conveyance method to move water into the Tri-Valley.
Support Sites Reservoir with Delta Conveyance.	Sites Reservoir, a new off-stream storage project located northwest of Sacramento, would provide storage and new supply for the Tri-Valley. Because the reservoir is located north of the Delta, bundling this project with Delta Conveyance (which would help protect against sea level rise, earthquakes, and other Delta disruptions) would enable more reliable access to the supply.
Explore possible near-term pilots	
Potable reuse pilot with Alameda County Water District (ACWD), Union Sanitary District (USD), Zone 7, and the City of Livermore.	This concept would include construction of an advanced water purification pilot facility at DSRSD's WWTP. Purified water would be conveyed to ACWD via Alameda Creek, and ACWD would intercept the flow and divert it to Quarry Lakes for groundwater recharge. This pilot would provide a regional demonstration project, collect data to inform future regional potable reuse projects, and make use of wastewater effluent currently discharged to San Francisco Bay. Longer-term, this project could also include a transfer/exchange, by which ACWD would provide one of its water sources to DSRSD or Livermore (via Zone 7) in exchange for purified water.
Pilot Transfer with Zone 7 and EBMUD.	This pilot transfer would utilize DSRSD's existing emergency interties with EBMUD. Although EBMUD's distribution system has limited capacity and is not designed for long-term, every year wheeling arrangements, a short-term pilot could demonstrate viability of this concept to support future dry-year or emergency transfers and inform possible future projects (e.g., a potential EBMUD-Zone 7 emergency intertie).
Seek supplemental non-potable supply	
Work with Zone 7 to collect more data on the Fringe Basin and Hopyard 7 well.	The Fringe Basin has limited potable supply potential due to high total dissolved solids but could possibly be used to supplement the recycled water supply. Similarly, Zone 7's Hopyard 7 well in the Main Basin is not used for drinking water due to elevated levels of arsenic, though may be suitable for non-potable uses. Further investigations are needed to determine the feasible quantity and quality of groundwater that could be introduced to the recycled water system.

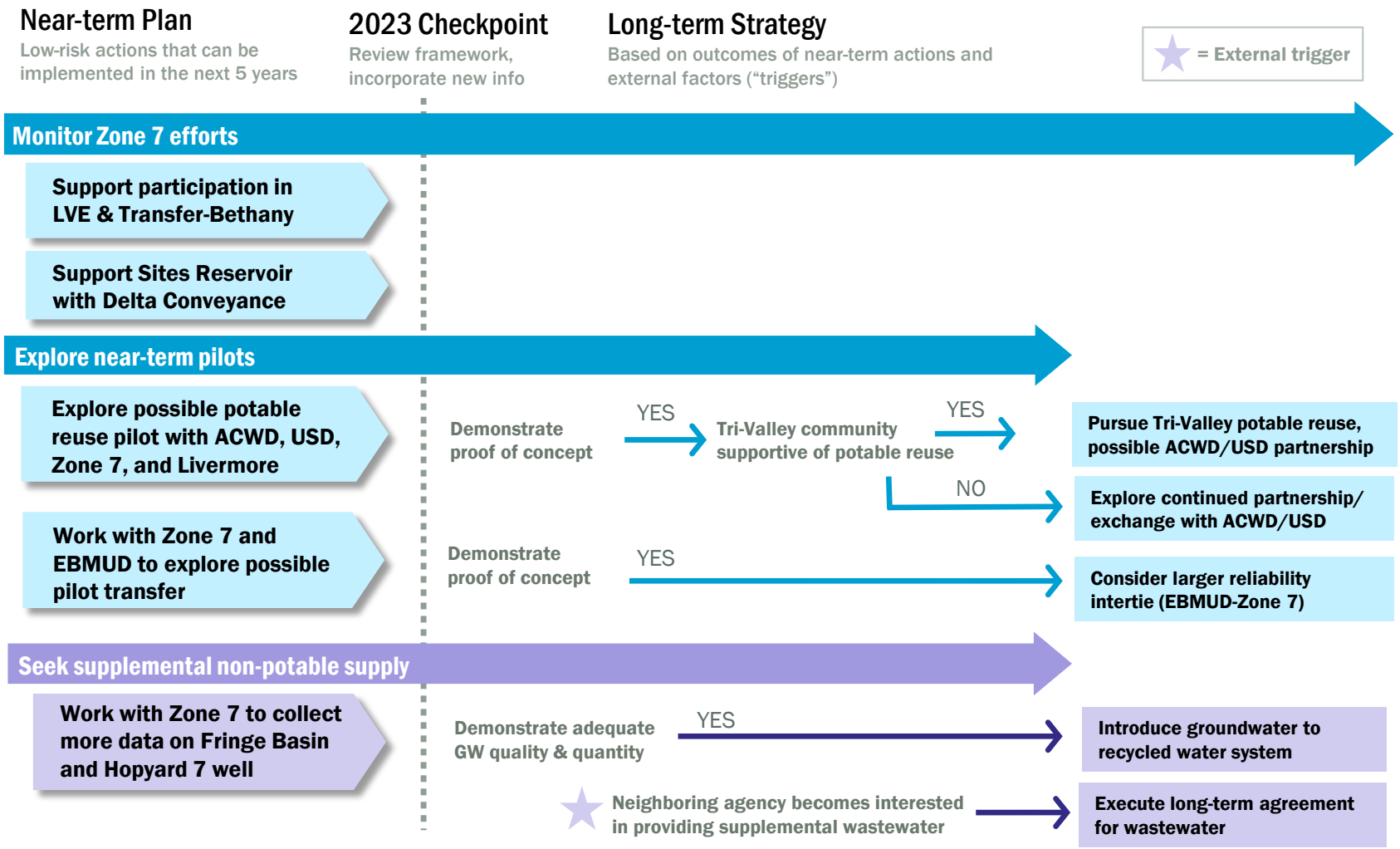

Figure ES-5. Recommended framework

Conclusions

Conditions have changed substantially since 2015. With conservation as a way of life in California, water demand projections are lower, and less wastewater is available for reuse. However, there is still potential for DSRSD to expand its recycled water program if additional supply can be added to the recycled water system. An integrated approach is needed to manage potable and recycled water supplies and make best use of available effluent.

Additionally, diverse portfolios improve resilience, enable flexibility, and reduce risk. A combination of new supply, storage, and conveyance is needed to ensure reliability, and it is recommended that DSRSD continue to pursue an "all of the above" approach towards developing potential water projects. Near-term efforts (e.g., pilot projects, groundwater studies, and Los Vaqueros Reservoir Expansion) can enable progress while longer term projects are being developed. Partnerships are key to success, as collaborative projects offer new opportunities, multiple benefits, and improved regional reliability.

The recommended framework outlines near-term and long-term strategies for a resilient and sustainable water future, accounting for key uncertainties and decision points. It is recommended that DSRSD review and update the framework in 2023 to incorporate new information.

The results of the 2021 AWSS and recommended framework were presented to DSRSD's Board of Directors on April 6, 2021 and informed DSRSD's updated Water Resiliency Policy. The new policy was adopted by DSRSD's Board of Directors on April 20, 2021, replacing the 2015 Water Policy. Key principles in the adopted Water Resiliency Policy include:

- Emphasizing the need for collaborative partnerships for building water resiliency.
- Advocating for an "all of the above approach" to pursuing a diverse portfolio of water supply, storage, and conveyance projects.
- Prioritizing local and sustainable water sources and projects that contribute to regional self-reliance, while moving away from the more prescriptive goals in the 2015 Water Policy that were based on information that has evolved or substantially changed.
- Ensuring Zone 7 water shortage allocations recognize retailer water use efficiency and investments in new water supplies.
- Advancing the development of near-term projects that could be eligible for grant funding.

The 2021 AWSS and Water Resiliency Policy will guide DSRSD efforts to work collaboratively with other partner agencies on developing water projects to address DSRSD's current and future water needs. DSRSD plans to review the 2021 AWSS and Water Resiliency Policy in 2023. As part of that review, DSRSD will evaluate progress made towards building a resilient and sustainable water future for its customers and update the framework to incorporate new information.