Santa Clara Valley Water District
Board of Directors Meeting

Teleconference Zoom Meeting

12:00 PM SPECIAL MEETING
AGENDA

Friday, October 22, 2021
12:00 PM

District Mission: Provide Silicon Valley safe, clean water for a healthy life, environment and economy.

DISTRICT BOARD OF DIRECTORS
Tony Estremera, Chair - District 6
Gary Kremen, Vice Chair - District 7
John Varela - District 1
Barbara Keegan - District 2
Richard P. Santos - District 3
Linda J. LeZotte - District 4
Nai Hsueh - District 5

During the COVID-19 restrictions, all public records relating to an open session item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body, will be available to the public through the legislative body agenda web page at the same time that the public records are distributed or made available to the legislative body, or through a link in the Zoom Chat Section during the respective meeting. Santa Clara Valley Water District will make reasonable efforts to accommodate persons with disabilities wishing to participate in the legislative body's meeting. Please advise the Clerk of the Board Office of any special needs by calling (408) 265-2600.

RICK L. CALLENDER, ESQ.
Chief Executive Officer

MICHELE L KING, CMC
Clerk of the Board
(408) 265-2600
Fax (408) 266-0271
www.valleywater.org

Note: The finalized Board Agenda, exception items and supplemental items will be posted prior to the meeting in accordance with the Brown Act.

THIS PAGE INTENTIONALLY LEFT BLANK

Santa Clara Valley Water District
Board of Directors

12:00 PM SPECIAL MEETING
AGENDA

Friday, October 22, 2021	12:00 PM	Teleconference Zoom Meeting

IMPORTANT NOTICES

This meeting is being held in accordance with the Brown Act as currently in effect and Santa Clara Valley Water District Resolution 21-85, adopted on September 28, 2021, in compliance with the provisions of AB361 (Rivas), that allows attendance by members of the Board of Directors, Board Committees, District staff, and the public to conduct and participate in meetings of the legislative bodies by teleconference, videoconference, or both.

In accordance with the requirements of Gov. Code Section 54954.3(a), members of the public wishing to address the Board/Committee at a video conferenced meeting, during public comment or on any item listed on the agenda, should use the "Raise Hand" tool located in the Zoom meeting link listed on the agenda, at the time the item is called. Speakers will be acknowledged by the Board Chair in the order requests are received and granted speaking access to address the Board.

Santa Clara Valley Water District (District), in complying with the Americans with Disabilities Act (ADA), requests individuals who require special accommodations to access and/or participate in District Board meetings to please contact the Clerk of the Board's office at (408) 630-2711, at least 3 business days before the scheduled District Board meeting to ensure that the District may assist you.

This agenda has been prepared as required by the applicable laws of the State of California, including but not limited to, Government Code Sections 54950 et. seq. and has not been prepared with a view to informing an investment decision in any of Valley Water's bonds, notes or other obligations. Any projections, plans or other forward-looking statements included in the information in this agenda are subject to a variety of uncertainties that could cause any actual plans or results to differ materially from any such statement. The information herein is not intended to be used by investors or potential investors in considering the purchase or sale of Valley Water's bonds, notes or other obligations and investors and potential investors should rely only on information filed by the District on the Municipal Securities Rulemaking Board's Electronic Municipal Market Access System for municipal securities disclosures and Valley Water's Investor Relations website, maintained on the World Wide Web at https://emma.msrb.org/ and https://www.valleywater.org/how-we-operate/financebudget/investor-relations, respectively.

Under the Brown Act, members of the public are not required to provide identifying information in order to attend public meetings. Through the link below, the Zoom webinar program requests entry of a name and email address, and Valley Water is unable to modify this requirement. Members of the public not wishing to provide such identifying information are encouraged to enter "Anonymous" or some other reference under name and to enter a fictional email address (e.g., attendee@valleywater.org) in lieu of their actual address. Inputting such values will not impact your ability to access the meeting through Zoom.

Join Zoom Meeting:
https://valleywater.zoom.us/j/87868264271
Meeting ID: 8786 8264 271
Join by Phone:
1 (669) 900-9128, 87868264271#

1. CALL TO ORDER:

1.1. Roll Call.

1.2. Pledge of Allegiance/National Anthem.

1.3. Time Open for Public Comment on any Item not on the Agenda.
Notice to the public: Members of the public who wish to address the Board on any item not listed on the agenda should access the "Raise Hand" tool located in Zoom meeting link listed on the agenda. Speakers will be acknowledged by the Board Chair in order requests are received and granted speaking access to address the Board. Speakers comments should be limited to three minutes or as set by the Chair. The law does not permit Board action on, or extended discussion of, any item not on the agenda except under special circumstances. If Board action is requested, the matter may be placed on a future agenda. All comments that require a response will be referred to staff for a reply in writing. The Board may take action on any item of business appearing on the posted agenda.

2. TIME CERTAIN:

12:00 PM

2.1. Water Supply Master Plan Monitoring and Assessment Program Update 2021. 21-1045

Recommendation: Receive and discuss information on the annual Water Supply Master Plan Monitoring and Assessment Program evaluation.

Manager: Kirsten Struve, 408-630-3138

Attachments: Attachment 1: Project Costs
Attachment 2: Climate Change Assessment
Attachment 3: Project Risk Assessment Report
Attachment 4: Powerpoint

Est. Staff Time: 20 Minutes

3. ADJOURN:

3.1. Clerk Review and Clarification of Board Requests.

3.2. Adjourn to 4:00 p.m. Closed Session 6:00 p.m. Regular Meeting on October 26, 2021, to be called to order in compliance with the Brown Act as currently in effect and Santa Clara Valley Water District Resolution 21-85, adopted on September 28, 2021, in compliance with the provisions of AB361 (Rivas).

THIS PAGE INTENTIONALLY LEFT BLANK

Santa Clara Valley Water District

File No.: 21-1045

Agenda Date: 10/22/2021
Item No.: 2.1.

BOARD AGENDA MEMORANDUM

SUBJECT:
Water Supply Master Plan Monitoring and Assessment Program Update 2021.

RECOMMENDATION:
Receive and discuss information on the annual Water Supply Master Plan Monitoring and Assessment Program evaluation.

SUMMARY:
The Water Supply Master Plan 2040 (Master Plan) Monitoring and Assessment Program (MAP) provides Santa Clara Valley Water District (Valley Water) a mechanism to evaluate and report to the Board how new water supply and demand data, modeling, and project information may influence Valley Water's future water supply reliability. The goal of MAP is to ensure the Board has the necessary information to make investment and policy decisions.

The MAP 2020 report provided updated demands that consider the 2012-2016 drought rebound and new growth and development information. Forecasted demands are lower than had been modeled in the Master Plan and are not expected to exceed historic water use, even when considering the potential impacts of climate change. However, Valley Water is still considering investing in new water supplies to mitigate potential impacts of climate change and future regulations on existing supplies. This MAP 2021 memorandum expands upon the MAP 2020 analysis by summarizing Valley Water's evaluation of how different projects may help ensure Valley Water maintains a reliable water supply into the future considering future climate, regulations, and updated project design and operation information. In addition, this memorandum provides updated project cost information and findings from an updated project risk assessment.

Water Supply Project and Portfolio Evaluation
Valley Water collaborated with internal and external stakeholders to maintain an accurate understanding of the existing system and forecasted demands, and to support the development of new water supply projects. Updated system and project information is then included in Valley Water's planning model to evaluate how different projects could provide Valley Water a resilient and reliable water supply in the future.

The project and portfolio evaluation assumes that Valley Water's conservation program and current Capital Improvement Plan (CIP) projects would be fully implemented between 2030 and 2040. The

conservation program includes achieving 110 thousand acre-feet (TAF) of conservation by 2040. Valley Water is on track for meeting the 2040 conservation program goal and recently completed a Conservation Strategic Plan to ensure the success continues. Key CIP projects include the seismic dam retrofits, Vasona Pump Plant Upgrade (Vasona), and Rinconada Water Treatment Plant Reliability Improvement (Rinconada).

To address potential supply shortages in the future from climate and regulatory changes, staff evaluated Master Plan projects that Valley Water is actively pursuing to achieve the Master Plan "Ensure Sustainability" strategy or allow for adjustments of the Master Plan investment approach considering future climate, demand, and regulatory uncertainties. Below is a list of evaluated projects, those that are bolded are included in Valley Water's current groundwater production rate forecast per the Master Plan specified:

1) **Delta Conveyance Project (DCP)**
2) Direct Potable Reuse (DPR)
3) Lexington Pipeline
4) **Los Vaqueros Reservoir Expansion (LVE)**
5) **Pacheco Reservoir Expansion Project (Pacheco)**
6) **Indirect Potable Reuse at Los Gatos Ponds (IPR)**
7) Refinery Recycled Water Exchange Project (RRWE)
8) Sites Reservoir (Sites)

Attachment 1 summarizes the preliminary cost estimates for the above projects and provides brief project descriptions. IPR and DPR was evaluated considering plant sizes of 11.2 TAF and 24 TAF. LVE was evaluated assuming investing in only expanded conveyance (e.g., Transfer Bethany Pipeline) or also 30 TAF storage while Pacheco Reservoir Expansion was evaluated assuming a 55 TAF share of storage. Sites was evaluated with a 3.2% participation. Compared to the MAP 2020 analysis, the RRWE plant capacity was reduced since one of the oil refineries the project requires has shifted operations, thereby reducing its water demands from the RRWE plant.

All active projects were included in the planning model evaluation except for the Delta Conveyance Project (DCP). The DCP is in early stages and there is insufficient information on proposed operations to model and quantitatively evaluate water supply benefits to Valley Water. Staff evaluated the benefits of all the other projects and project portfolios under a range of climate change scenarios. This memo presents a subset of those individual projects and portfolio combinations. Portfolio combinations presented in the memo were selected with a focus on combinations of projects that are a new supply with either additional storage or conveyance. A baseline scenario was evaluated in which Valley Water only invests in the conservation program and key CIP projects (seismic retrofits, Vasona, and Rinconada). A comparison with this baseline can be used to determine the impacts from a specific project or portfolio of projects.

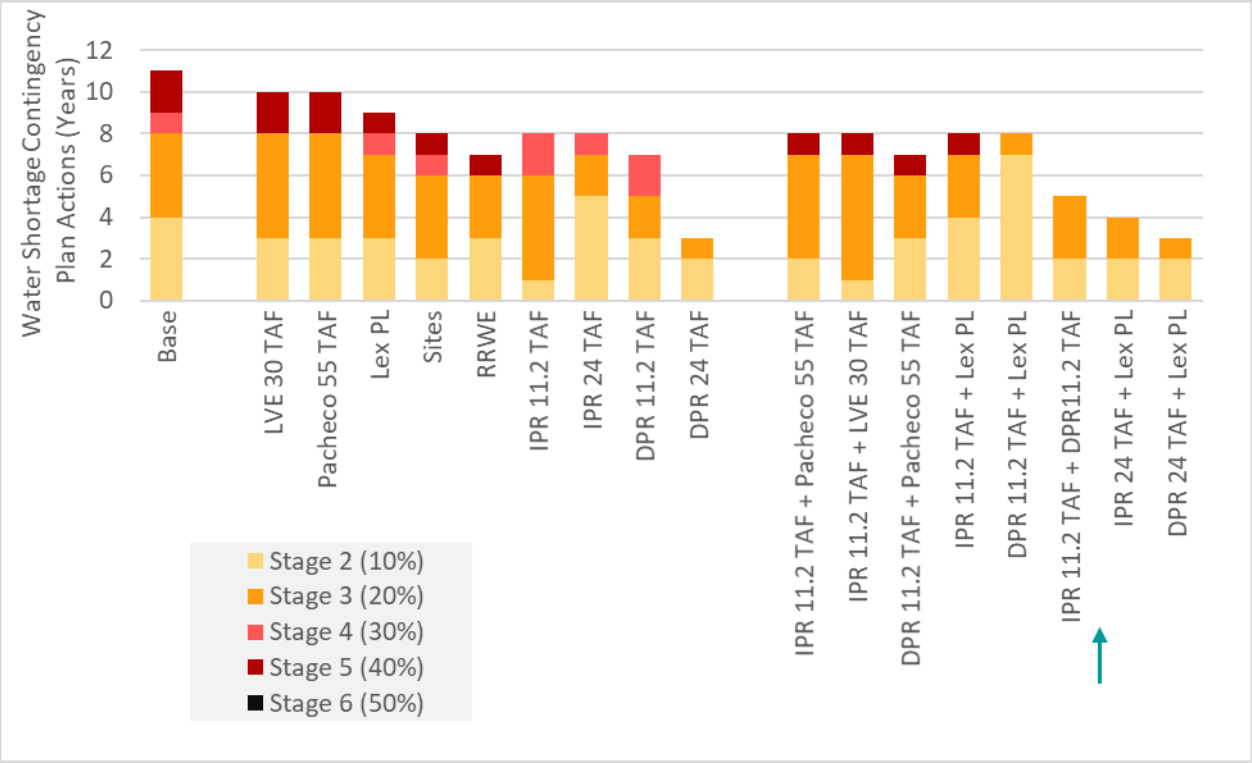
Valley Water worked with Dr. Edward Maurer, a researcher from Santa Clara University who is a climate change expert and hydrologist, to evaluate the impacts of climate change on local reservoir inflows and evaporation, precipitation, temperature, and demands for integration into Valley Water's planning model. Valley Water used empirical analysis and published studies from the California Department of Water Resources (DWR) to develop an imported water scenario that accounts for

potential future climate change and regulations. A summary of the key findings related to climate change are in Attachment 2 and below summarizes the findings on how projects and portfolios could help mitigate climate change impacts on water supply reliability.

Water Supply Analysis Results

The water supply modeling indicates that locally developed and renewable water supplies are the most drought and climate resilient projects and portfolios (Figure 1). Lexington Pipeline, which allows Valley Water to make better use of its local Lexington Reservoir supplies, coupled with direct or indirect potable reuse could help Valley Water maintain a reliable water supply in the face of climate change and could also help maintain storage in the face of potentially decreasing imported water supplies. Both potable reuse and Lexington Pipeline help increase local groundwater recharge and free up imported water supplies to be put in regional storage facilities that would have otherwise been used for in-county recharge.

Figure 1. Water supply reliability results for year 2045 under a median climate change scenario. Bars shown indicated the number and severity of water shortage contingency plan (WSCP) actions. For example, stage 2 equals a 10% water use reduction per the WSCP. Volumes associated with storage projects are their assumed storage capacities. Volumes associated with the potable reuse projects are assumed plant production capacity. "Lex PL" is Lexington Pipeline.



The analysis also indicates that with climate change and future regulations, Valley Water may have difficulty in filling its existing storage (Figure 2). Modeling indicates that the "put" capacities in the Semitropic Storage Bank limit operational flexibility to fill the bank in wet years. Since climate change

is expected to bring infrequent very wet years, Valley Water is evaluating whether diversifying its storage portfolio could help increase Valley Water's ability to maximize the utilization of its storage under future conditions. Having a storage portfolio that maximizes "put" and "take" capacities can allow Valley Water to store more water during the wet periods without increasing actual storage capacity and "take" more water during droughts. Table 1 summarizes different storage options Valley Water is considering to diversify its storage portfolio. While the list in Table 1 is not comprehensive since not all potential storage projects are sufficiently developed, it shows the breadth of options being considered.

Figure 2. Modeled use of storage compared to existing storage capacity for the year 2045 under a median climate change scenario. Volumes associated with storage projects are the assumed storage capacities. Volumes associated with the potable reuse projects are assumed plant production capacity. "Lex PL" is Lexington Pipeline.

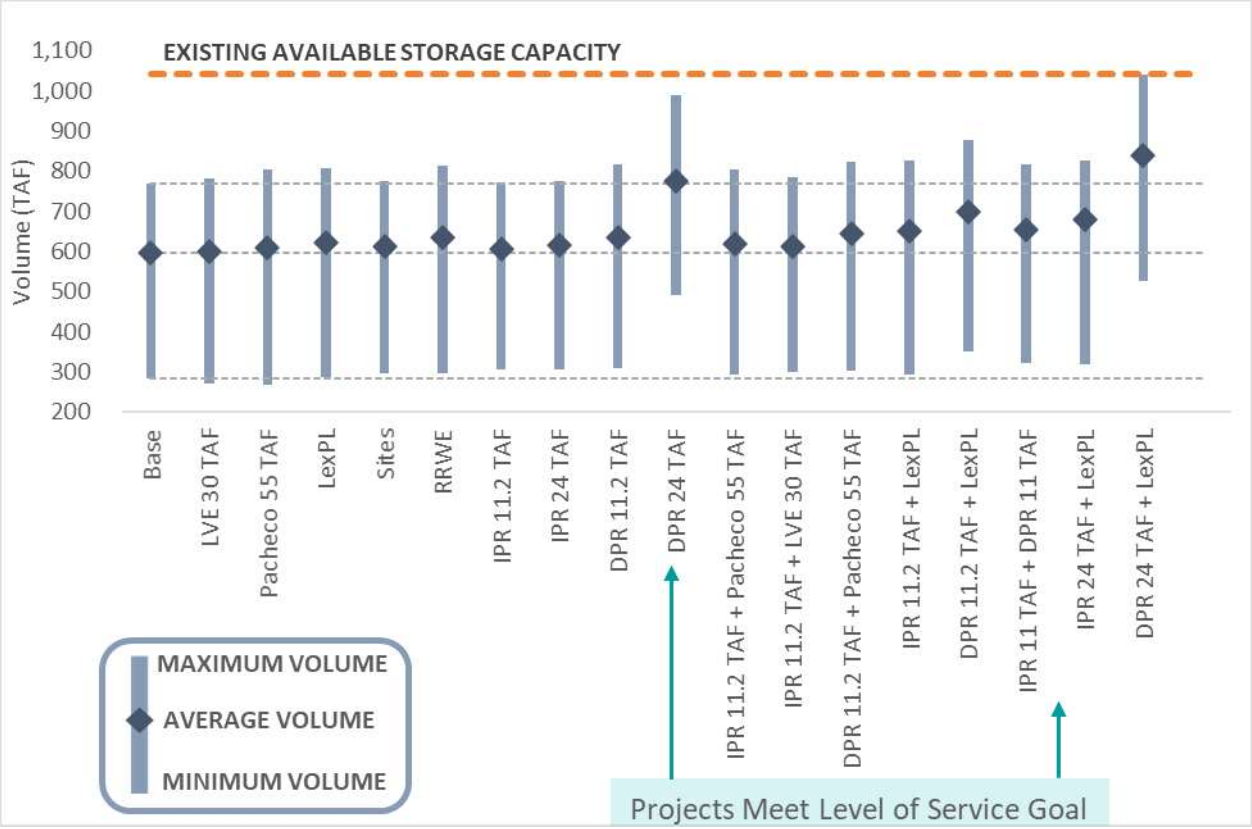


Table 1. Storage Diversification Options. The Semitropic Bank is our existing regional storage that could be diversified using one or more of the example banking projects listed below.

Banking Project	2021$/AF Storage Space[4]	Max Annual Put	Max Annual Take	Percent Loss	Key Constraint
Semitropic Bank (350 TAF)	$250	32 TAF	31.5-78 TAF	10%, 1 time	SWP exchange capacity + KCWA approval[1]
Typical New Groundwater Bank (225 TAF)	$770	60 TAF	40 TAF	10%, 1 time	Regulatory Approval + Water Quality
Los Vaqueros (30 TAF)	$8,250	30 TAF	30 TAF	6%, annually	Available conveyance capacity
Pacheco (55 TAF)[3]	$18,800	55 TAF	55 TAF	5%, annually	San Luis Reservoir temperature

[1]Kern County Water Agency (KCWA) needs to approve exchange requests and the State Water Project (SWP) needs to have the capacity to provide Valley Water the exchanged supply.
[2]Central Valley Project (CVP) exchange approval needs to be obtained before completing a groundwater banking project that uses CVP supplies and infrastructure.
[3]Assumes 35% of the reservoir is shared with partner(s) and 25% of the reservoir is for ecological benefits as required by the Water Storage and Infrastructure (WSIP) grant award.
[4]Preliminary cost estimates that could change materially pending ongoing project development.

Valley Water is working with external partners on developing the Delta Conveyance Project. Currently, modeling results are not available to quantitatively evaluate how the project may support water supply reliability and how it could influence Valley Water's ability to exercise its storage. However, it is expected to provide increased imported water deliveries, especially during wet years. This project could help improve our ability to exercise Valley Water's storage capacity, especially if Valley Water diversifies its storage portfolio to provide for greater "put" capacities.

Project Risk Assessment
The goal of the project risk assessment was to have a diverse team of experts independently evaluate project risks that could reduce project success, including risks associated with a project's ability to be completed on time and provide the needed benefits throughout its lifecycle. Ten units from across Valley Water's business areas participated in the risk assessment. Each unit rated the likelihood and severity between 1-5 (higher rating representing greater risk) of each risk category impacting each project's success in providing needed benefits. Staff then compiled all risk ratings to evaluate total risk (Figure 3) and risk by category (Figure 4). The results of the risk assessment indicate that larger infrastructure projects have greater risk based on cost, political, and implementation criteria. In addition, projects which are dependent on imported water were found to have higher risk in the water supply reliability and climate change risk categories. An important exception is Los Vaqueros Reservoir Expansion, which is a large infrastructure project that relies on imported supplies which may be impacted by climate change but is rated as a moderate risk. The projects found to have the highest risk include the Delta Conveyance Project, Refinery Recycled Water Exchange, Pacheco Reservoir, Regional Desalination, and Sites Reservoir. See Attachment 3 for more details on the risk assessment findings. Overall, the risk assessment helps identify project

risk areas so that Valley Water can work to mitigate the risks where feasible.

Figure 3. Project Risk Matrix

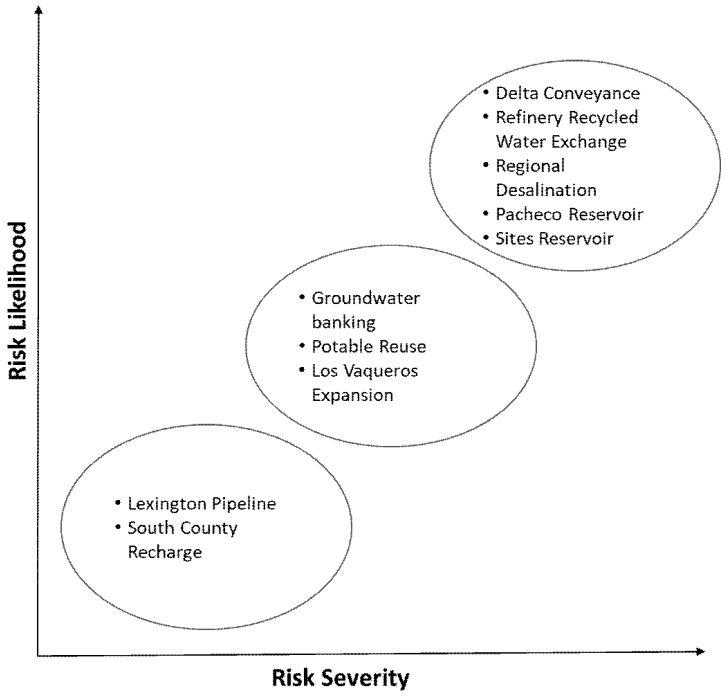
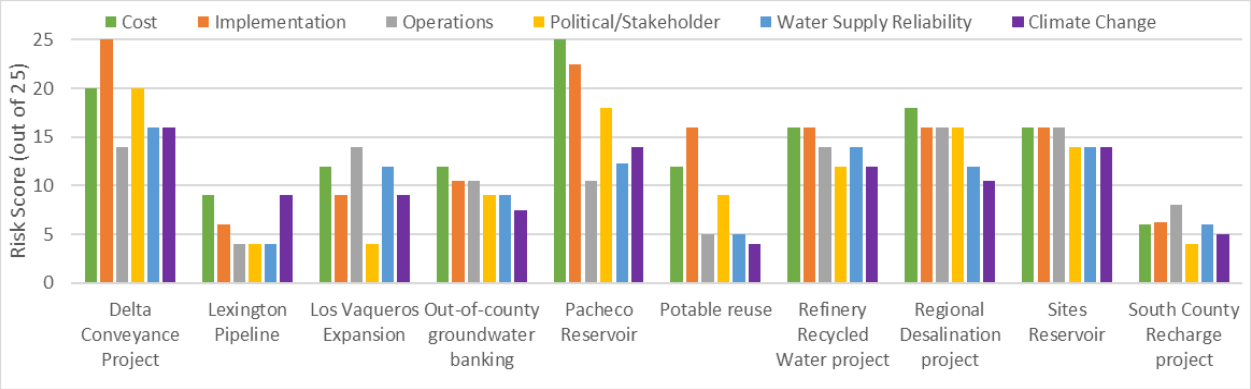


Figure 4. Project Risk by Risk Category.



Next Steps

Valley Water will continue to evaluate the impacts of climate change and future regulatory changes on existing supplies, proposed projects, and forecasted demands. Analyses will also be informed by feedback from the Board on projects and project combinations. Staff will continue to actively participate in water supply projects that could support Valley Water's "Ensure Sustainability" strategy and regularly evaluate how new project information impacts Valley Water's interests and needs from the project. A MAP update is brought to the Board as needed and at least annually.

FINANCIAL IMPACT:
Depending on the participation level and ongoing project development, the financial impact of the recommended projects in the Water Supply Master Plan (Delta Conveyance Project, Los Vaqueros Reservoir Project, Pacheco Reservoir Expansion, and Indirect Potable Reuse via a Public-Private Partnership) will be reflected in the CIP in the years the Board makes decisions related to these projects. The financial impact of projects that are not currently incorporated in the CIP (i.e., direct potable reuse, refinery recycled water exchange and Sites reservoir) will be evaluated as part of the annual MAP process.

CEQA:
The recommended action does not constitute a project under CEQA because it does not have a potential for resulting in direct or reasonably foreseeable indirect physical change in the environment.

ATTACHMENTS:
Attachment 1: Project Costs
Attachment 2: Climate Change Assessment
Attachment 3: Project Risk Assessment Report
Attachment 4: PowerPoint

UNCLASSIFIED MANAGER:
Kirsten Struve, 408-630-3138

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE 1. PROJECT COSTS			
Project	**Capital Cost (2020$)[1]**	**Annual O&M (2020$)**	**Lifespan**
Direct Potable Reuse: Uses effluent from the SJ/SC Regional Wastewater Facility to feed a new Advanced Water Purification Facility adjacent to the existing Silicon Valley Advanced Water Purification Center (water from Sunnyvale and Palo Alto is considered in other portfolios). The purified water is then blended with treated water at the Penitencia Water Treatment Plan. Assumes up to 24,000 AFY of advanced treated recycled water would be available by FY28.	$570 Million	$22 Million	50 years
Indirect Potable Reuse to Los Gatos Ponds: Uses effluent from the SJ/SC Regional Wastewater Facility to feed a new Advanced Water Purification Facility adjacent to the existing Silicon Valley Advanced Water Purification Center (water from Sunnyvale and Palo Alto is considered in other portfolios). The purified water is then recharged in the existing Los Gatos ponds. Assumes up to 24,000 AFY of advanced treated recycled water would be available for groundwater recharge by FY28. This is portfolio 1a in the CWRMP.	$700 Million (24 TAF) $500 Million (11 TAF)	$20 Million (24 TAF) $10 Million (11 TAF)	50 years
Lexington Pipeline: Constructs a pipeline between Lexington Reservoir (or Vasona Reservoir) and the raw water system to provide greater flexibility in using local water supplies. The pipeline would allow surface water from Lexington Reservoir to be put to beneficial use elsewhere in the county, increasing utilization of existing water rights. In addition, the pipeline will enable Valley Water to capture some wet-weather flows that would otherwise flow to the Bay. Water quality issues would require pre-treatment/management.	$100 Million	<$1 Million	75-150 years

[1] Costs are presented in current dollars. Only Valley Water costs, after grants and other funding sources, are included. All costs are subject to change pending additional planning and analysis.

TABLE 1. PROJECT COSTS			
Project	**Capital Cost (2020$)[1]**	**Annual O&M (2020$)**	**Lifespan**
Los Vaqueros Reservoir: Expansion of Los Vaqueros Reservoir from 160TAF to 275TAF. Transfer Bethany Pipeline would connect Contra Costa Water District's (CCWD's) system to Bethany Reservoir, which serves the South Bay Aqueduct and the California Aqueduct. Valley Water can participate in conveyance only or have 30 TAF of dedicated storage in the reservoir. The project will be operated by a Joint Powers Authority.	$165 Million (30 TAF storage) $35 Million (Conveyance Only)	$2 Million (30 TAF storage) <$1 Million (Conveyance Only)	75-150 years
Pacheco Reservoir: Enlarges Pacheco Reservoir from about 5,500 AF to 140,000 AF and connect the reservoir to the Pacheco Conduit. The primary water sources to fill the expanded reservoir would be natural creek inflows and CVP supplies.	$1.7 Billion $1 Billion (55TAF storage)	$5 Million $3 Million	75-150 years
Refinery Recycled Water Exchange: A regional recycled water project between Valley Water, Central Contra Costa Sanitary District (Central San), and Contra Costa Water District (CCWD). The project will allow Central San to provide recycled water to two oil refineries in Contra Costa County in lieu of CCWD's CVP water. CCWD will then provide its freed-up CVP supply to Valley Water. The project may make available up to 11,000 AFY of water on average.	$210 Million	$9 Million	50 years
Sites Reservoir: Construction of a 1,500 TAF off-stream water supply reservoir north of the Delta that would collect flood flows from the Sacramento River. Potential to provide dry year yield and storage benefits. The project would be operated in coordination with the SWP and CVP.	$10 Million (0.2% share) $140 Million (3.2% share)	<$1 Million	75-150 years

TABLE 1. PROJECT COSTS			
Project	**Capital Cost (2020$)[1]**	**Annual O&M (2020$)**	**Lifespan**
Delta Conveyance Project: Constructs alternative conveyance capable of diverting up to 6,000 cfs from the Sacramento River north of the Delta and delivering it to the SWP pumps at the southern end of the Delta. The project purpose is restore and protect the reliability of SWP water deliveries and, potentially, CVP water deliveries south of the Delta, consistent with the State's Water Resilience Portfolio. Objectives include addressing sea level rise, minimizing public health and safety impacts from a major earthquake that causes Delta levee failure, protecting the ability of the SWP to deliver water when hydrologic conditions and regulations allow, and providing operational flexibility to improve aquatic habitat in the Delta. This project is in the early planning phase, so costs and yields have not been determined.	TBD	TBD	75-150 years

THIS PAGE INTENTIONALLY LEFT BLANK

Climate Change Assessment

Valley Water worked with Dr. Edward Maurer, a researcher from Santa Clara University, to evaluate the impacts of climate change on local reservoir inflows, precipitation, and temperature. The climate change analysis evaluated 16 global climate models (also referred to as General Circulation Models; GCM) to determine the range of potential impacts to forecasted water demands and local water supply availability. From those 16 models, Valley Water with the support of Dr. Maurer chose a subset of five GCMs to represent the range of potential impacts Valley Water may experience from climate change. The subset includes models that best represent the range of potential outcomes for California. The choice of model in the subset were informed by the significant work completed by the Department of Water Resources (DWR) Climate Change Technical Advisory Group (CCTAG). CCTAG was a 14-member group of the leading California climate change scientists. The findings reported hereafter are based on modeling from the five GCMs plus a low impact scenario used only in the demand modeling that assumes climate change impacts do not increase from present. Valley Water also reviewed scientific studies that evaluated potential climate change impacts to the State Water Project (SWP) and Central Valley Project (CVP) supplies.

In general, climate change may increase annual demands to approximately 360,000-375,000 acre-feet (AF) by mid-century primarily by increasing outdoor irrigation needs across all water use sectors and cooling needs in the commercial, industrial, and institutional sector. While this is approximately 20,000-35,000 AF per year greater than the low climate change impact scenario, it is still within the range of historical water use. Historical water use was generally between 360,000-390,000 AF per year prior to the 2012-2016 drought (Table 1). Demands are not projected to exceed historic water use by mid-century primarily because Valley Water continues to invest in conservation and Santa Clara County residents continue to make water conservation a way of life.

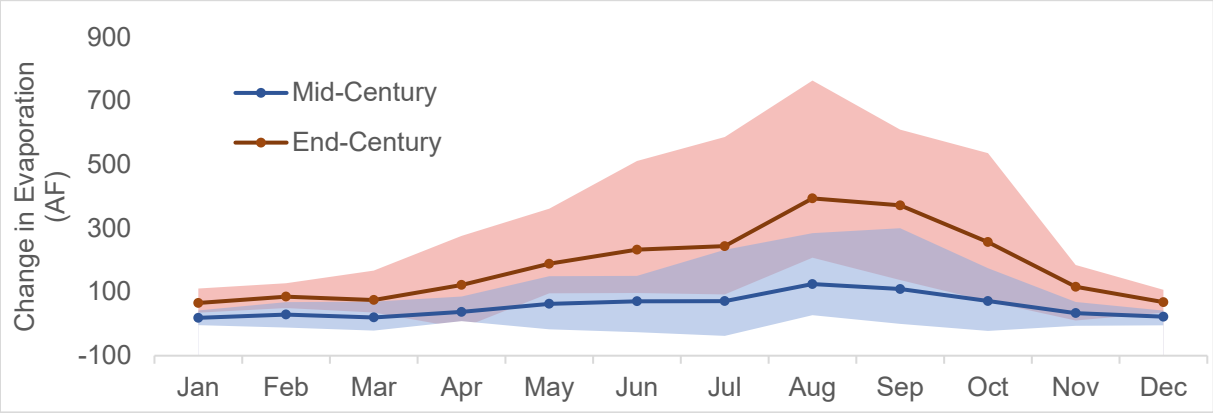
Table 1. Demands Considering Climate Change Compared to Historic Demands

Climate Change Impact	Demands (Acre-feet)
Low Impact	340,000
Moderate Impact	360,000
High Impact	375,000
Historic Demands (pre-drought)	360,000-390,000

The results of Valley Water's work with Santa Clara University show that climate change will impact water supply through changing the volume, timing, and quality of water that is available. There is high certainty that increased temperatures will shift Sierra Nevada Mountain precipitation from snowfall to rainfall and increase reservoir evaporation statewide. The Santa Clara University analysis shows the potential increases in local reservoir evaporation due to increased temperatures (Figure 1). Similar impacts of temperature on evaporation would be expected throughout the state. Groundwater storage could potentially become more important into the future to minimize evaporative losses of stored water both locally and statewide and provide large enough storage space to capture the potential increase in Sierra Nevada rainfall. In addition, increased

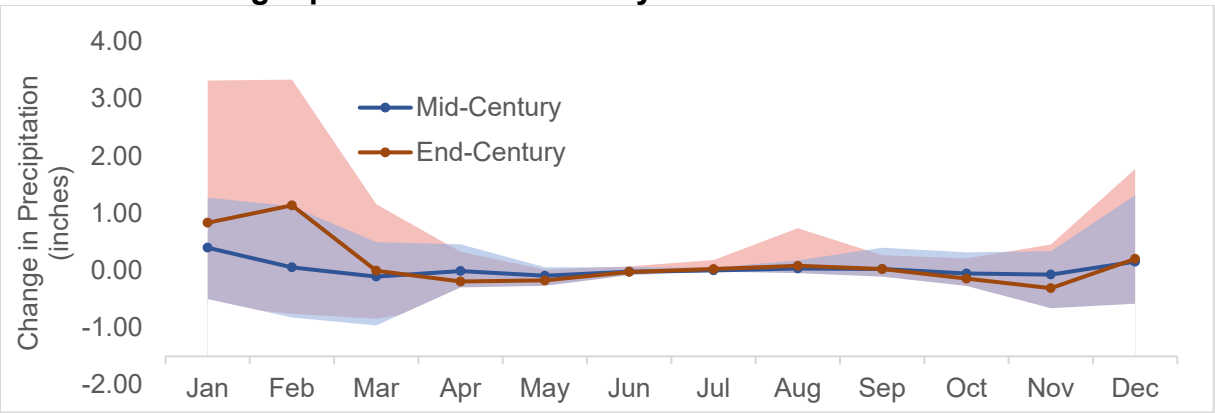
temperatures could make surface reservoir water quality management more difficult as warmer temperatures tend to support greater algal growth and create other water quality issues.

Figure 1 Projected Increase in Santa Clara County Monthly Reservoir Evaporation due to Climate Change. The bands represent the range of projected evaporation change from current based on downscaled climate models while the lines represent the average across models. Blue lines and shading represent mid-century and red lines and shading represent end of century conditions.



Per the climate change analysis, droughts and wet periods are expected to become more severe. In other words, future precipitation is likely to come as large storm events within a wet period that is punctuated by severe and potentially prolonged dry periods. There is significant uncertainty whether average precipitation is expected to increase or decrease since it will depend on the specific track that atmospheric rivers take (e.g., will they tend to track to the north and cover the Pacific Northwest or to the south and cover California more consistently). Figure 2 shows the potential change in local precipitation based on the downscaled global climate models.

Figure 2 Change in Average Santa Clara County Monthly Precipitation due to Climate Change. The bands represent the range of projected precipitation change from current based on downscaled climate models while the lines represent the average across models. Blue lines and shading represent mid-century and red lines and shading represent end of century conditions.



Valley Water input the climate change projections into its water supply planning model to evaluate how water supply and conservation projects and programs could help mitigate the impacts of climate change on water supply reliability. The modeled expected increased drought severity makes drought resilient water supplies (e.g., potable reuse and conservation) more important to mitigate the potential climate change and regulatory related decrease in existing supplies. Maintaining storage infrastructure may also help maximize the benefits of climate change-related increases in storm severity. Groundwater storage is a storage approach that could help lessen the negative impacts of increased temperatures on water evaporation and water quality. Through MAP, Valley Water will continue to evaluate projects and update climate change assumptions as more information is available to help the Board determine which reuse, conservation, storage, or other supply projects will best meet Valley Water's needs.

THIS PAGE INTENTIONALLY LEFT BLANK

MONITORING AND ASSESSMENT PROGRAM 2021 – PROJECT RISK ASSESSMENT

Table of Contents

INTRODUCTION

The 2040 Water Supply Master Plan (Master Plan) is Santa Clara Valley Water District's (Valley Water) strategy for providing a reliable and sustainable water supply in a cost-effective manner for current and future generations. Adopted in November 2019, the Master Plan informs investment decisions by describing the type and level of water supply investments Valley Water is planning to make through 2040, the anticipated schedule, the associated costs and benefits, and how the plan will be monitored and adjusted through the Master Plan's Monitoring and Assessment Program (MAP). Through MAP, Valley Water integrates new data, modeling, and project information as it is available into the Master Planning process to determine if the recommended projects will still achieve the level of service goal by providing Valley Water a reliable water supply that is resilient to future uncertainties. As part of MAP 2021, Valley Water is updating the project risk assessment that was performed to support the Master Plan in 2017 to address Valley Water's updated understanding of water supply projects. **The goal of the risk assessment is to determine where and what types of risk exist for projects so that Valley Water can mitigate or adapt to the risks.**

The risk assessment brings together a diverse team of experts to provide an independent and consistent review of project risks that could reduce project success, including a project's ability to be completed on time and provide the expected benefits throughout its lifecycle. In the risk assessment, Valley Water evaluated risk severity and likelihood for 10 projects or groups of projects in which Valley Water is actively engaging in planning and implementation (Figure 1). For the purposes of the risk assessment, certain projects are being considered as a group if they are similar in form and function and individual project definitions are still being refined (e.g., out-of-county groundwater banking projects and south county recharge projects). This risk assessment is evaluating a diverse array of projects with varying benefits; for example, some projects are conveyance (e.g., Lexington Pipeline) while others develop new supplies (e.g., potable reuse). Therefore, not all projects are interchangeable nor necessarily comparable. This report summarizes the MAP 2021 risk assessment approach and results.

FIGURE 1. PROJECTS CONSIDERED IN THE 2021 RISK ASSESSMENT

- Delta Conveyance Project*
- Lexington Pipeline
- Los Vaqueros Expansion*
- Out-of-County Groundwater Banking
- Pacheco Reservoir Expansion*
- Potable Reuse*
- Refinery Recycled Water Exchange
- Regional Desalination Plant
- Sites Reservoir
- South County Recharge*

* Projects recommended in the Master Plan. The Master Plan only recommends the Transfer Bethany Pipeline portion of the Los Vaqueros Expansion. The Master Plan also recommends water conservation, which was not included in the risk assessment.

APPROACH

The risk assessment evaluates the likelihood and severity of a risk materializing that would negatively impact the benefits a project could provide. The Water Supply Planning and Conservation Unit (WSPC) led the development and implementation of the risk assessment, soliciting feedback from internal Valley Water stakeholders throughout the process. Using the Master Plan risk assessment as a starting point, the WSPC developed a list of risk sources that could impact project success. Those risk sources were then organized into six risk categories, which were used to evaluate each project's risk (Table 1). Project managers shared information about their projects with risk assessment participants so that each participant had a thorough understanding of projects prior to completing the assessment. The risk assessment participants completed an online survey that requested participants to rate risk likelihood and severity on a five-point scale by category for each project.

Risk assessment participants were a subset of the broader MAP internal stakeholder group and included the project owners of the ten projects as well as representatives from units with applicable expertise, including:

- Raw Water Operations Unit
- Groundwater Management Unit
- Asset Management Unit
- Imported Water Unit
- Pacheco Project Delivery Unit
- Recycled and Purified Water Unit
- Treasury and Debt Management Unit
- Water Supply Planning and Conservation Unit
- Treatment Plant Process and Commissioning Unit
- Environmental Monitoring and Mitigation Unit

Once WSPC had a draft risk assessment approach, WSPC held a kick-off meeting on January 6, 2021 with stakeholders to discuss the risk assessment goal; propose an approach including the risk categorization, project information exchange, survey, and project list; and determine what stakeholder actions would be needed. After the kick-off meeting, stakeholders had the opportunity to review and provide comments on the proposed survey approach, risk sources, categories, and request more or different project background information. WSPC integrated all comments to create the final risk elements and sources list and risk survey. WSPC also provided project managers the opportunity to exchange information with risk assessment participants.

Final risk categories included cost, implementation, operations, political/stakeholder, water supply reliability, and climate change (Table 1). Valley Water expanded on the four risk categories used in the 2017 risk assessment to add water supply reliability and climate change to acknowledge the importance they have in impacting a project's ability to meet Valley Water's long-term water supply needs. There is inherently overlap among all six risk categories. The risk sources associated with each category were used by stakeholders in considering risk to minimize the potential overlap among the categories during the assessment.

TABLE 1. CATEGORIZED RISK SOURCES

Risk Category	Risk Sources
Costs	• Uncertainty in cost estimate • Construction, operational and/or maintenance cost increases • Cost-sharing/partner reliability • Financing and funding security • Costs related to uncertainty of regulatory and permitting requirements • Undesirable water rate impacts • Economic fluctuations and instability • Scheduling issues • Potential for stranded assets
Political / Stakeholders	• Public support/perception (includes rate payers, the public, NGO's, environmental groups, etc.) • Internal stakeholder concerns • External stakeholder opposition • Partnership coordination and negotiation • Changes in State or federal goals/participation/negotiation position • Board approval • External media communications

Risk Category	Risk Sources
Implementation	• Maturity of planning and design (e.g., early vs. late stage of implementation) • Land ownership/availability to purchase • Regulatory and permitting requirements altering project benefits and schedule prior to full operation • Lack of phasing potential • Project duration and schedule • Reoperation requirements • Additional infrastructure/capacity needed for existing system • Constructability (e.g., structural issues, technology, complexity) • Partnership agreements • Staff knowledge and resource availability • Water rights uncertainties • Project delivery method (e.g., design-bid-build vs. public-private partnership)
Operations	• Project inter-dependency • Ongoing environmental and water quality regulations and permitting • Lack of local control • Asset failure(s) • Conveyance reliability during droughts or other water shortages • Emergency impacts to water supply system elements (e.g., earthquakes, floods, levee failures, etc.) • Environmental impacts/adaptive management requirements
Water Supply Reliability	• Water quality issues • Volume uncertainty • Timing uncertainty • Delivery reliability • Lack of drought resilience or access during drought • Ongoing regulatory/permitting requirements and adaptive management
Climate Change (Impacts of climate change on project success)	• Warmer temperatures – surface storage evaporation, evapo-transpiration, water quality • Sea level rise • More frequent and/or more extreme droughts • More frequent and/or more extreme wildfires • More frequent and/or more extreme rain events • Hydrological variations (ex. less frequent but larger flows, seasonal variability) • Reduced snowpack volume • Changes in timing and rate of snowpack melt

Stakeholders completed the risk assessment survey considering the shared project information and the categorized risk source table. The survey requested each stakeholder to rate the severity and likelihood of each risk category for each project. The likelihood and severity ratings were each on a five-point scale. Risk severity was defined as the magnitude of consequence to the project while risk likelihood was defined as the probability the risk would materialize. One risk survey was completed per Valley Water unit, with nine responses total.

To obtain a category risk score by project, Valley Water multiplied the median risk scores for likelihood and severity. The total scores across all categories were combined to rank projects as lower, moderate, and higher risk projects.

RESULTS

Each project total risk score for likelihood and severity is reported in Figure 2. Risk score for each project by risk category is in Figure 3.

HIGHER RISK PROJECTS

The risk assessment results indicate that larger infrastructure projects have greater risk based on cost, political, and implementation criteria. In addition, projects which are dependent on imported water were found to have higher risk in the water supply reliability and climate change risk categories. An important exception is Los Vaqueros Reservoir Expansion, which is a large infrastructure project that relies on imported supplies but is rated as a moderate risk. The high-risk projects include the Delta Conveyance Project, Refinery Recycled Water Exchange, Pacheco Reservoir, Regional Desalination, and Sites Reservoir.

Valley Water investments are primarily needed to improve drought year supply reliability, especially in the face of climate change where droughts are expected to be more severe. The quantity of imported water available during multi-year droughts is greatly reduced compared to wet years, which may impact reliability of projects that rely on imported water allocations such as Refinery Recycled Water Exchange. While surface storage projects help mitigate the impacts of drought on imported supplies, particularly when operated in conjunction with other types of projects, their storage capabilities may be limited and thus may not provide sufficient water supplies throughout each year of a multi-year drought. Moreover, increased temperatures from climate change will increase evaporative losses from surface storage reservoirs. To provide sufficient storage to respond to the increased drought severity and reduced imported water allocations during dry years, several storage projects would likely be needed to succeed based on the current proposed project size and Valley Water project share. The Delta Conveyance Project can help protect the imported water conveyance system from sea level rise or future levee failures, which is an important benefit. However, the water supply benefit from the project may be mostly in non-drought years, and thus, the project may need to be paired with storage projects to provide a more

reliable drought year supply. The co-dependency of projects introduces implementation and operation risks since multiple projects will need to succeed and be coordinated among to achieve significant drought benefits.

MODERATE RISK PROJECTS

The risk assessment indicated that Los Vaqueros Reservoir Expansion, out of county groundwater banking, and potable reuse may have moderate risk. Los Vaqueros Reservoir Expansion may be lower risk than other imported water surface storage projects because Valley Water's storage share is relatively small and the reservoir has been expanded before successfully. However, Los Vaqueros Reservoir does have relatively high evaporative losses and may provide less storage capacity than other storage projects. Los Vaqueros may also have risks associated with conveyance capabilities.

Out-of-county groundwater banking was rated as lower risk because it requires significantly less infrastructure than all the projects in the higher risk category, which causes less cost and implementation uncertainty. While groundwater banks do generally require participants to "leave behind" a percentage of the water they store in the bank, that "leave behind" volume can be significantly less than the evaporation that would be experienced in surface water reservoirs. Evaporation from surface storage is expected to increase significantly from climate change. Also, groundwater banking projects generally have greater storage capacities than surface storage projects to store excess wet year supplies, and thus may provide supplies throughout more years of a multi-year drought. However, the risk assessment does indicate it has moderate risk for each risk category, indicating risks will persist throughout its planning and operational lifecycle. Risks are primarily associated with conveyance capabilities for putting and taking supplies from the groundwater bank and groundwater contaminant concerns. Of the groundwater banking risk scores, cost imparted the greatest risk because the projects are early in development.

The risk assessment indicated that potable reuse may have less risk than large infrastructure projects that are dependent on imported supplies. The risk assessment indicated an equal amount of risk for potable reuse and groundwater banking, but with slight differences in the risk attributed to each category. Potable reuse is a drought resilient supply that may be less impacted by climate change compared to the other projects in the risk assessment. Because of its drought and climate change resilience, the risk assessment indicated lower risks for the project once implemented when compared to other projects. However, the risk assessment did indicate that potable reuse may have significant cost and implementation risks on par with the other large infrastructure projects. These risks are primarily related to securing source water supply contracts, cost uncertainties related to plant design and procurement process, and public acceptance. Therefore, project planning and implementation may have the greatest sources of risk for potable reuse.

LOWER RISK PROJECTS

Smaller infrastructure projects that are in-county were found to be lower risk, including Lexington Pipeline and a south county recharge facility. This is primarily because Valley Water may have greater control over the implementation and operations of local projects and the smaller size of the project reduce risks associated with cost increases and project administrative requirements (e.g., easements, regulations/permits, etc.). However, the projects still have potential risks associated with source supply availability. Lexington Pipeline relies on wet year flows into the Lexington Reservoir which could become less frequent because of climate change. The water supply reliability of a new south county recharge facility is dependent on water availability which could be impacted by future regulations and climate change.

FIGURE 2. TOTAL PROJECT RISK

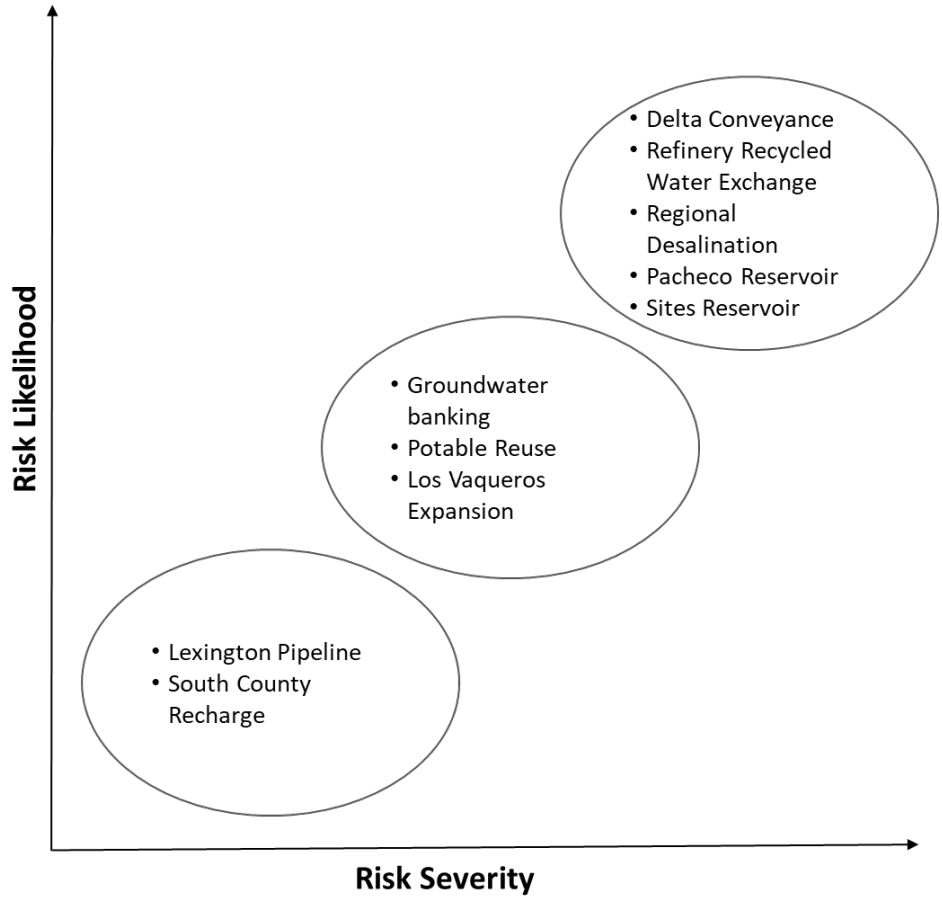
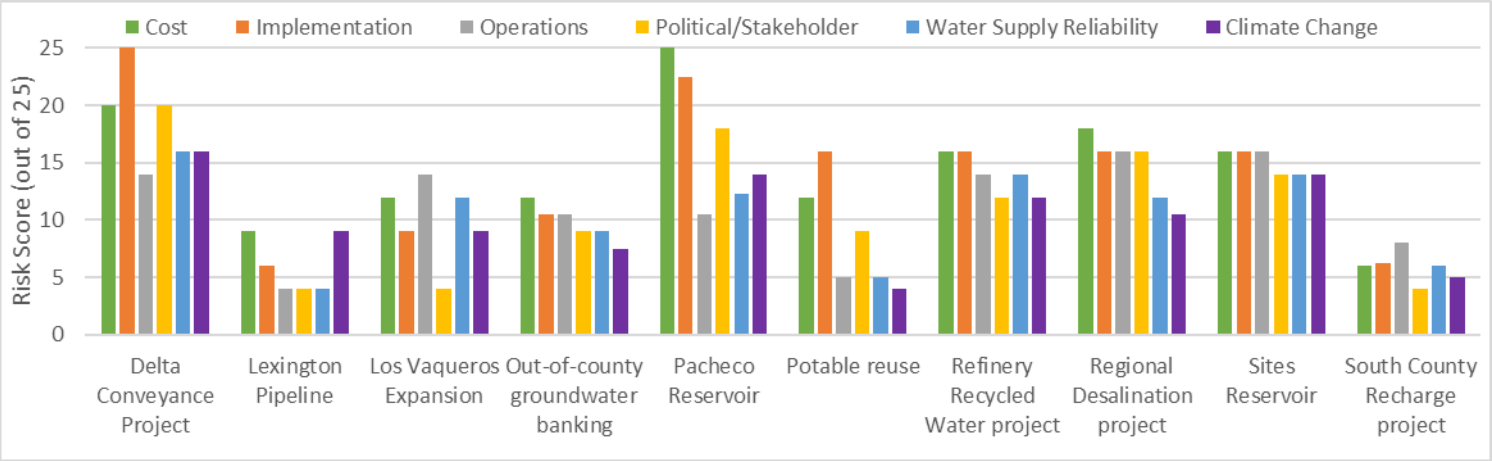


FIGURE 3. PROJECT RISK SCORE BY CATEGORY.



NEXT STEPS

This project risk assessment was performed as part of the annual MAP program that supports the Master Plan implementation. Understanding potential project risks supports Valley Water's project evaluations so that Valley Water can invest in appropriate projects to achieve its mission of securing a reliable water supply for the future. Valley Water will continue to track project risks and inform the Board of any changes in project descriptions through Board committee meetings and full Board presentations. Valley Water will also continue to mitigate potential project risks that were identified through this risk assessment and other risks that may materialize in the future. MAP is presented to the Water Conservation and Demand Management Committee and individual projects are presented to the appropriate Board committee based on project type.

Water Supply Master Plan 2040 Monitoring and Assessment Program Annual Update

Presented by: **Samantha Greene, Ph.D., Water Supply Planning and Conservation Unit**

Water Supply “Ensure Sustainability” Strategy

Secure

- Capital Improvement Program Projects
- Delta Conveyance Project

Expand

- Water Conservation
- Stormwater Capture
- Potable Reuse

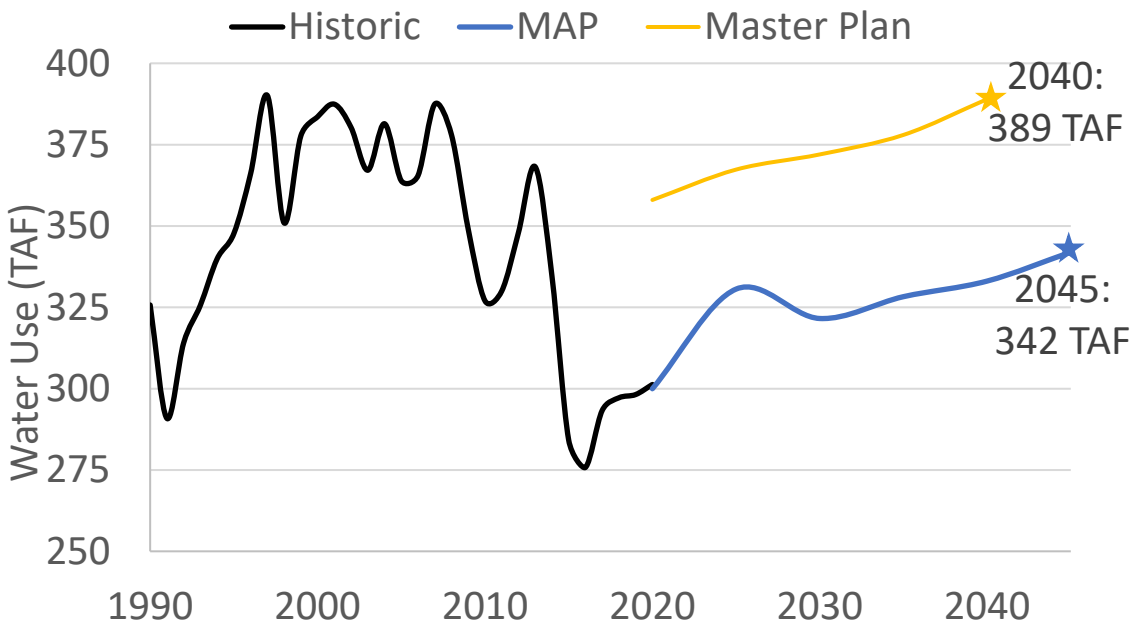
Optimize

- Pacheco Reservoir Expansion
- Transfer-Bethany Pipeline
- South County Recharge

MAP PURPOSE AND 2021 GOALS

Track Water Supply Master Plan implementation and provide mechanism to update the implementation strategy as needed.

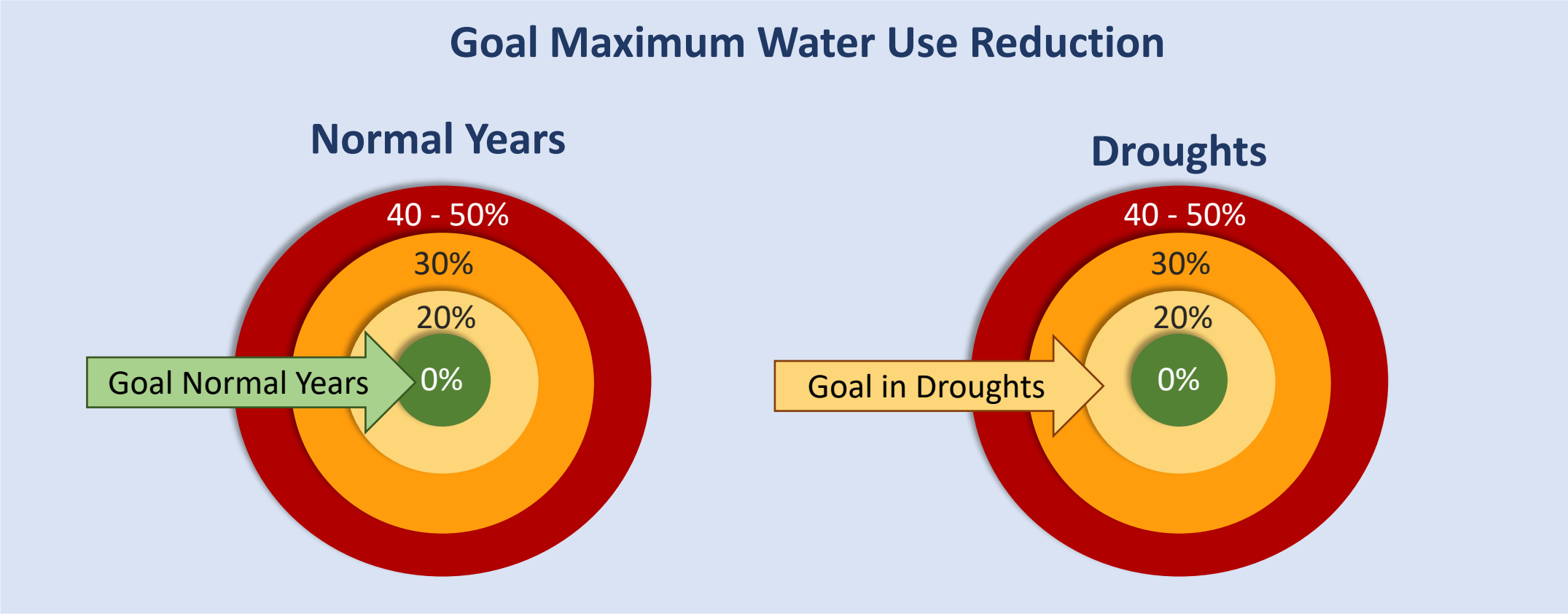
Historic and Forecasted Demands



MAP 2021 Goals

Level of Service Goal

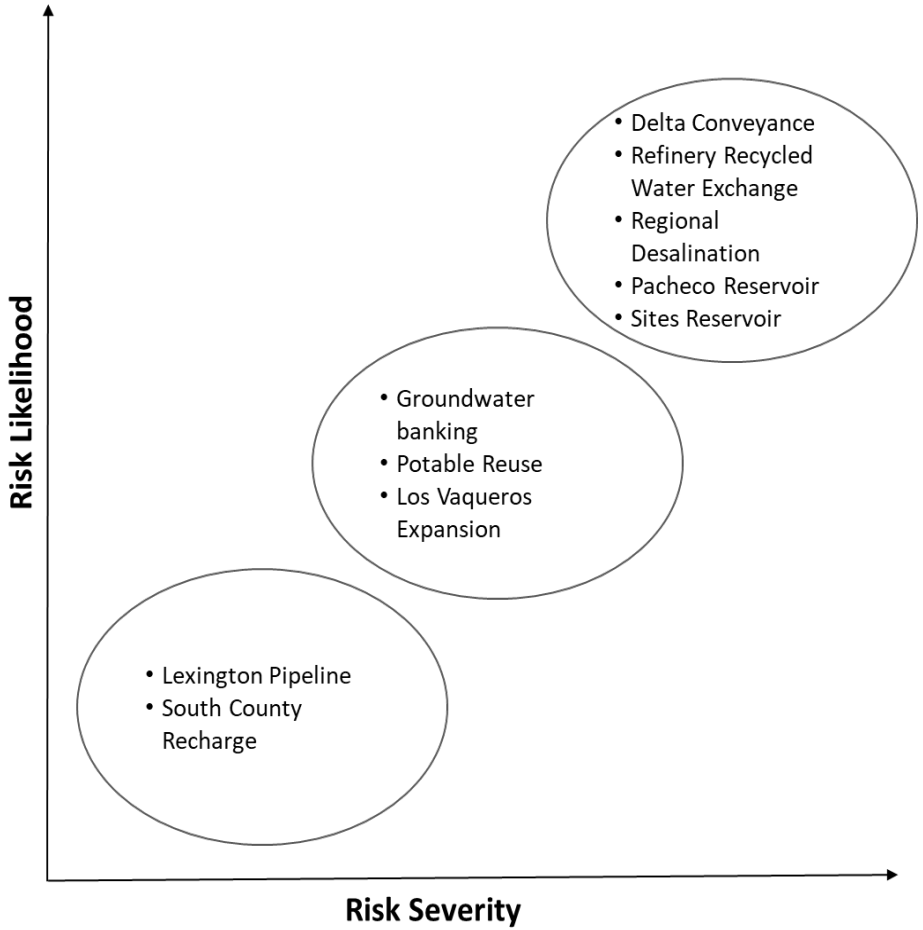
Not exceed a 20% water use reduction call during water shortages



2021 RISK ASSESMENT

RISK ASSESMENT GOAL

Evaluated risks that may reduce project success
-> Timely project completion
-> Provides needed benefits



Risk Assessment Progress

Internal stakeholder meetings to discuss risk assessment approach and results

10 internal units evaluated risks to projects

Completed risk assessment report

Next Step: work with project leads to mitigate identified risks

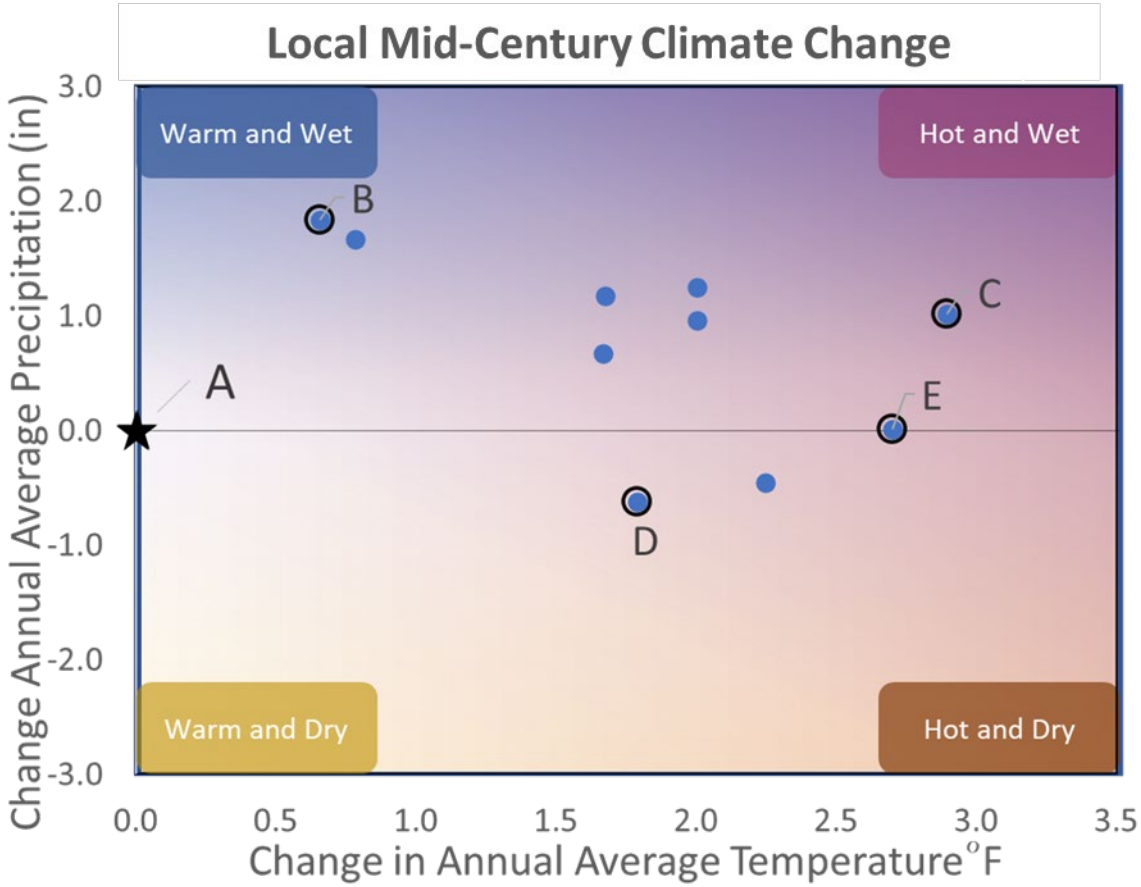
CLIMATE CHANGE APPROACH

LOCAL WATER SUPPLY IMPACTS

- Local reservoir inflows and evaporation, water use, precipitation, and natural groundwater recharge
- Used 4 climate models that bracket the range of local impacts

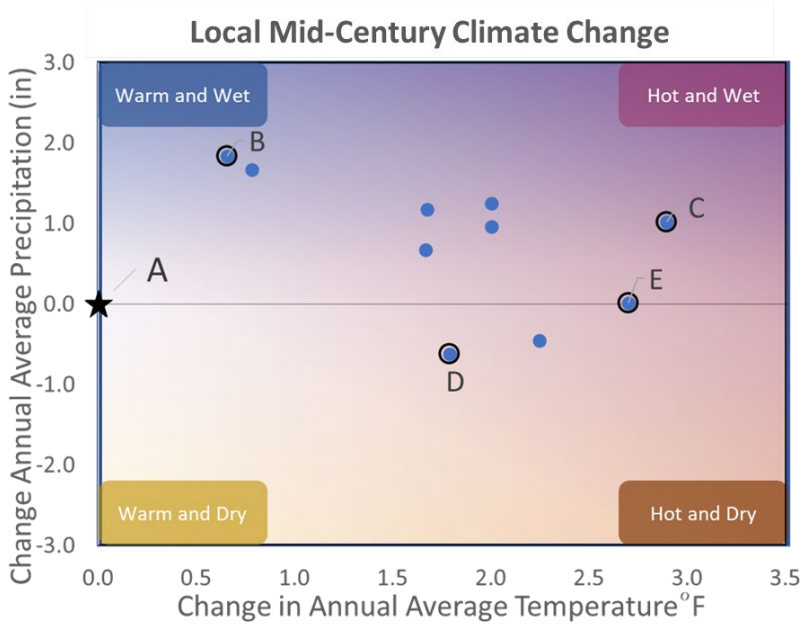
IMPORTED WATER SUPPLY IMPACTS

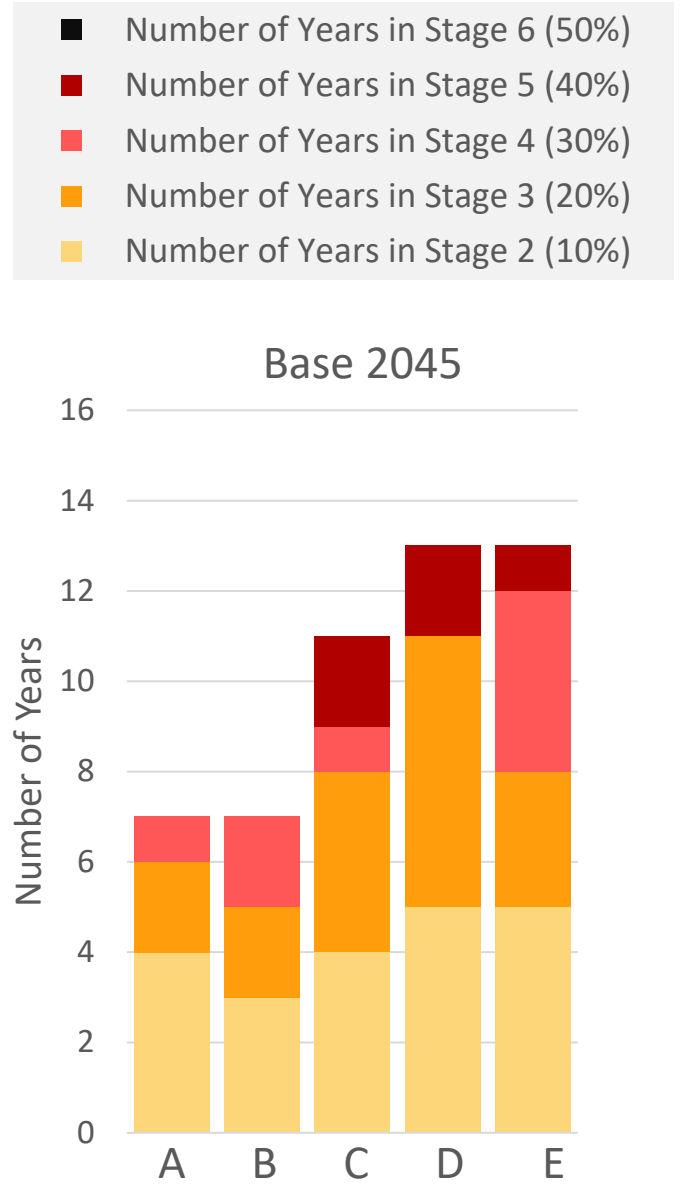
- Updated DWR CalSim II DCR 2019 future scenario to consider climate change
- Update informed by DWR climate change studies and historic data
- Forecasting a 25% decrease in imported water supplies



MODELING ANALYSIS APPROACH

- **Aim: meet countywide demands**
- **94-yr simulation**
- **Model includes:**
  - **Supplies**
  - **Storage**
  - **Recharge facilities**
  - **Treatment plants**
  - **Conveyance facilities**
- **Five climate scenarios**
- **Examine water supply reliability**

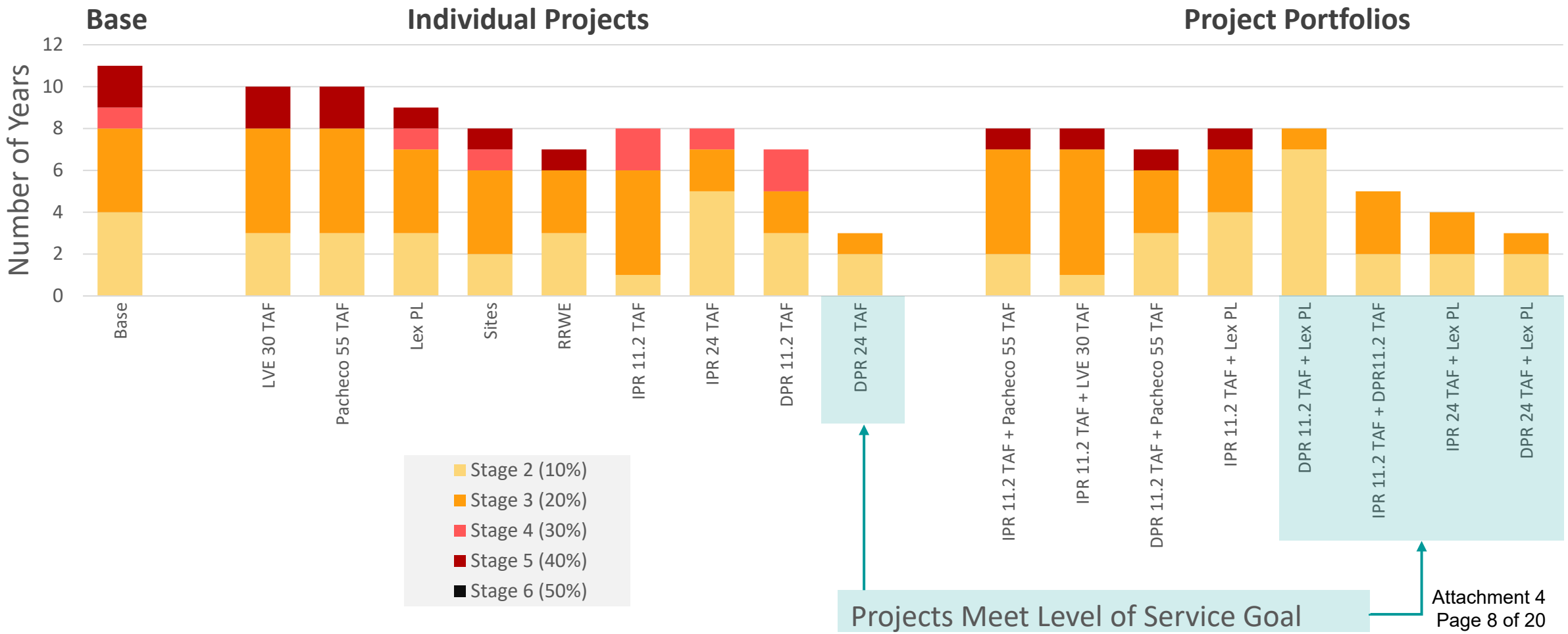




MAP 2021 PROGRESS – WATER SUPPLY PLANNING

Water Shortage Contingency Years for Moderate Climate Change Scenario in 2045

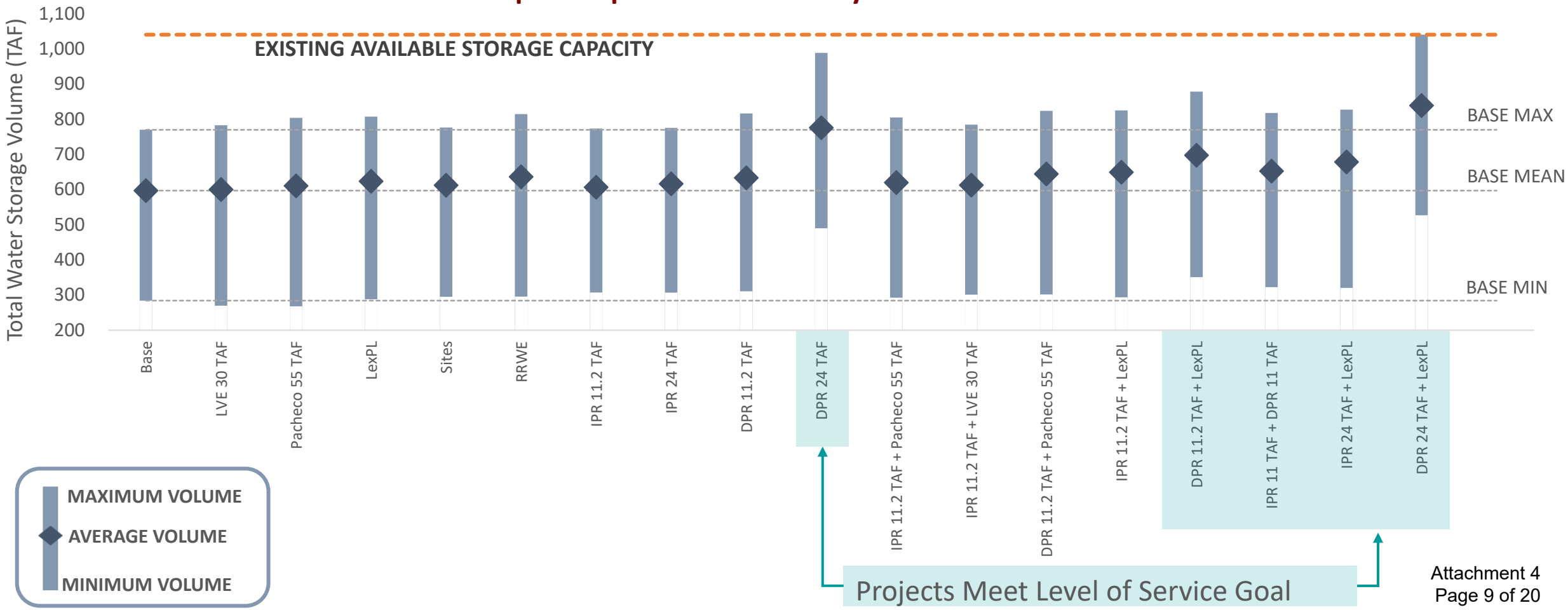
- **Level of service goal is to not exceed stage 2 (orange)**
- **Locally renewable water supplies are the most drought and climate change resilient**



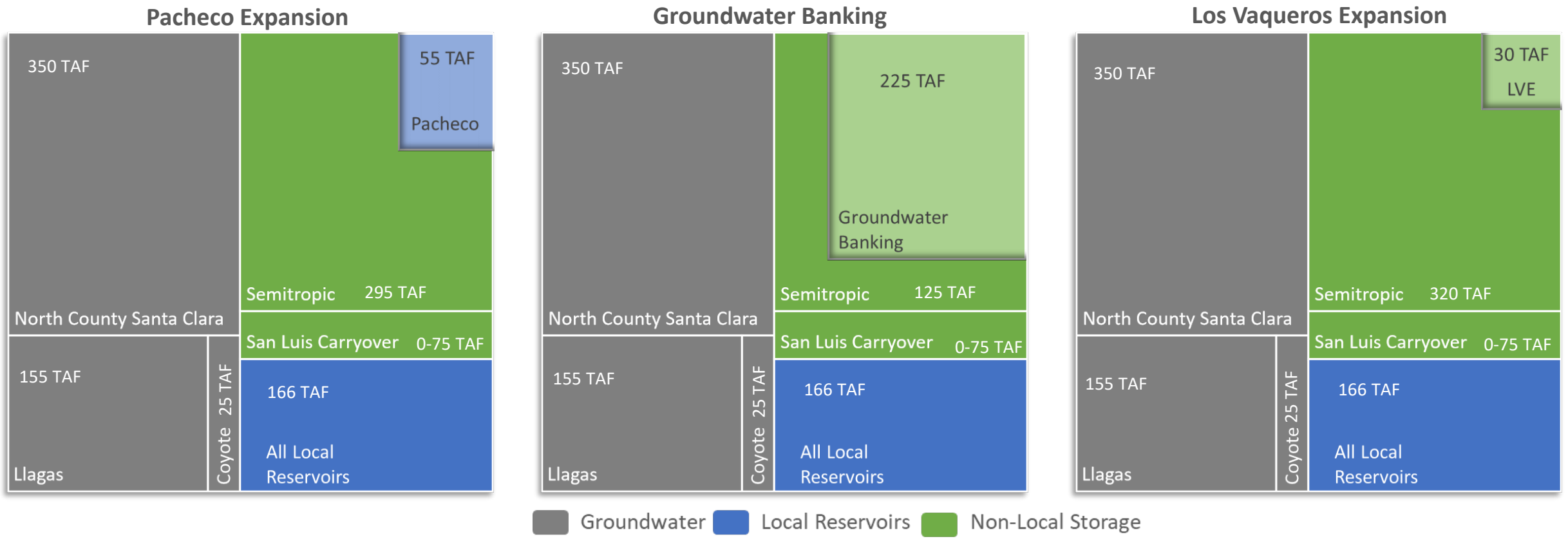
MAP 2021 PROGRESS – WATER SUPPLY PLANNING

Total Water Storage Volume for Moderate Climate Change Scenario in 2045

- **Analysis indicates existing available storage may be sufficient in future**
- **Future infrequent wet years with prolonged drier periods indicate potential difficulty in filling storage**
  - **Potable reuse increases storage, reinforcing its drought resiliency**
  - **Diversification could improve operational flexibility**



Storage Diversification Scenarios



Banking Project	2021$/AF Storage	Max Annual Put	Max Annual Take	Percent Loss	Key Constraint
Semitropic Bank (350 TAF)	$250	32 TAF	31.5-78 TAF	10%, 1 time	SWP exchange capacity + KCWA approval
Typical New Groundwater Bank	$770	60 TAF	40 TAF	10%, 1 time	Regulatory Approval + Water Quality
Los Vaqueros	$8,250	30 TAF	30 TAF	6%, annually	Available conveyance capacity
Pacheco	$18,800	55 TAF	55 TAF	5%, annually	San Luis Reservoir temperature

Note: Slide for discussion purposes only. Scenarios are preliminary

Project Cost Comparison (2020$)

Project	Capital Cost[1]	Annual Average O&M[1]	Typical Lifespan
Direct Potable Reuse (24 TAF)	570 Million	22 Million	50 years
Indirect Potable Reuse (11-24 TAF)	500-700 Million	10-20 Million	50 years
Lexington Pipeline	100 Million	<1 Million	75-150 years
Los Vaqueros Reservoir 30 TAF (Transfer-Bethany 5% Share Only)	165 Million (35 Million)	2 Million (<1 Million)	75-150 years
Pacheco Reservoir 140 TAF (55 TAF storage share)	1.7 Billion[2] (1 Billion)	5 Million (3 Million)	75-150 years
Refinery Recycled Water Exchange[3]	210 Million	9 Million	50 years
Sites Reservoir (0.2-3.2% share)	10-140 Million	<1 Million	75-150 years
Delta Conveyance Project	TBD	TBD	75-150 years

[1]All costs are levelized to 2020 dollars

[2]Pacheco Reservoir capital cost accounts for Water Storage Infrastructure Program funding that reduces the capital cost.

[3]Costs assume a 50% cost share with Contra Costa Central Sanitary District

CONCLUSIONS AND NEXT STEPS

Modeling Conclusions

- Analysis indicates total existing storage capacity may be sufficient
- Storage diversification may help improve storage utility
- LOS goal is met with projects that help reliably exercise storage

Next Steps

- Receive feedback from the Board of Directors
- Integrate Board feedback into MAP analysis

QUESTIONS

System Configuration

Sources

140 TAF/yr
Local Supplies

146 TAF/yr
Delta Imported Supplies

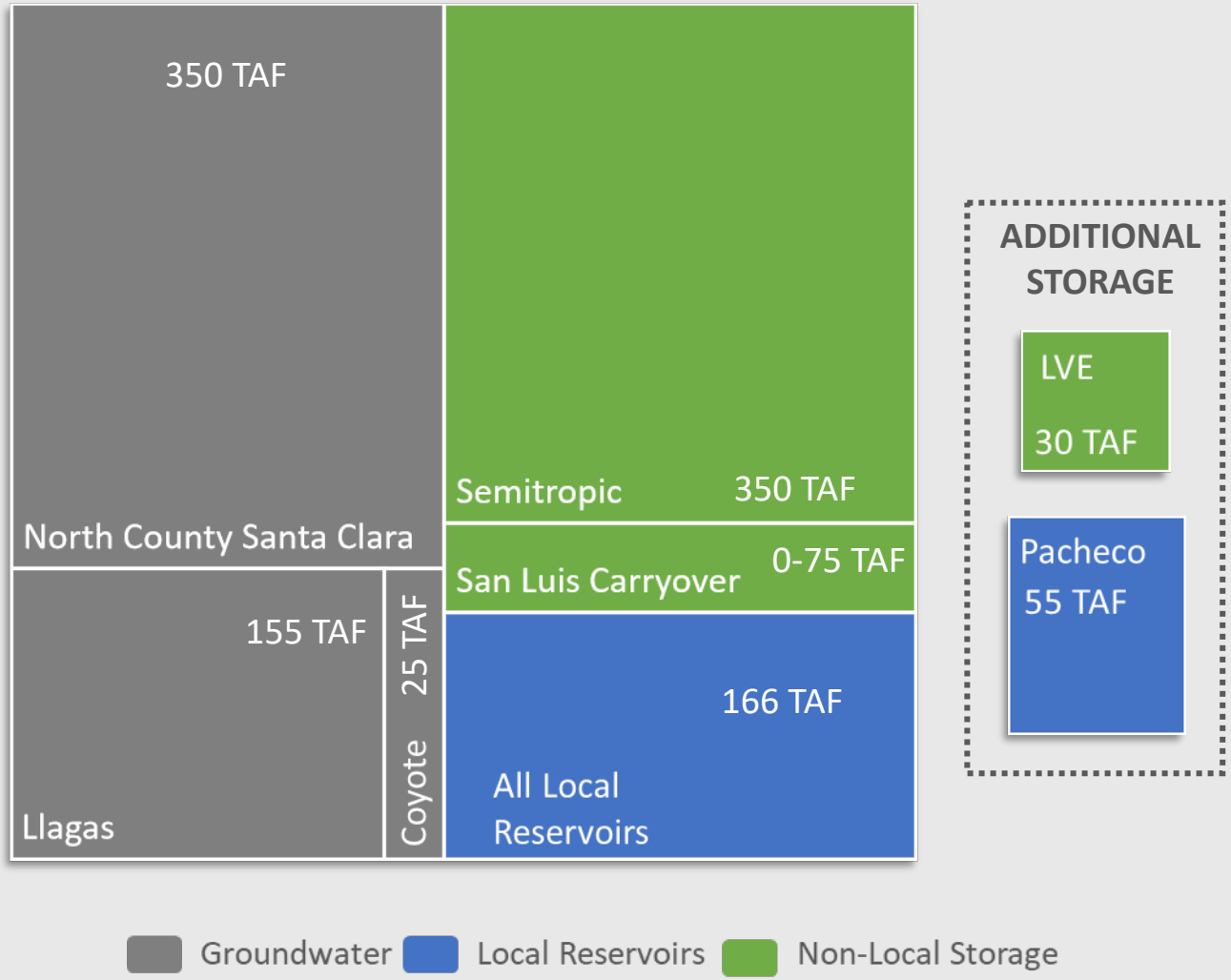
Hetch Hetchy Supplies 48 TAF/yr

Recycling 18 TAF/yr

ADDITIONAL SUPPLY

IPR/DPR 24 TAF/yr

Available Storage



ADDITIONAL STORAGE

LVE
30 TAF

Pacheco
55 TAF

Water Use

75 TAF/yr
Conservation

315 TAF/yr
County Wide Demand

System Configuration

Sources

140 TAF/yr
Local Supplies

133 TAF/yr
Delta Imported Supplies

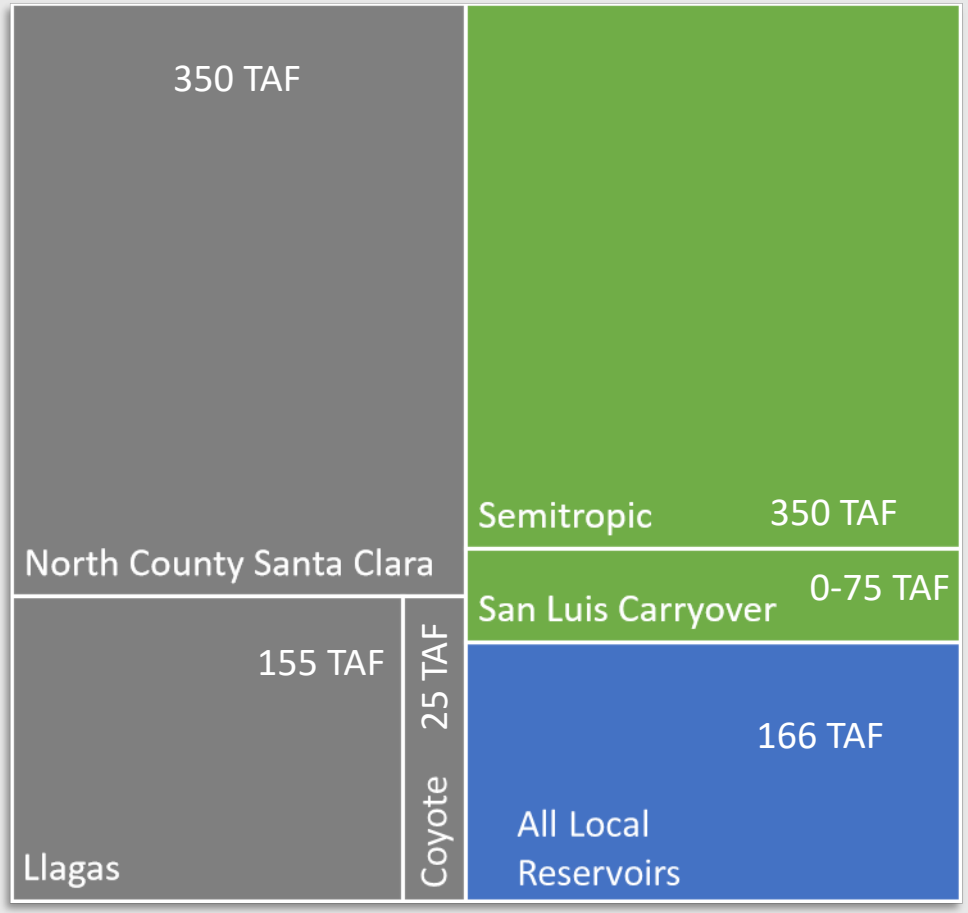
Hetch Hetchy Supplies — 48 TAF/yr

Recycling — 18 TAF/yr

ADDITIONAL SUPPLY

IPR/DPR — 24 TAF/yr

Available Storage



ADDITIONAL STORAGE

LVE
30 TAF

Pacheco
55 TAF

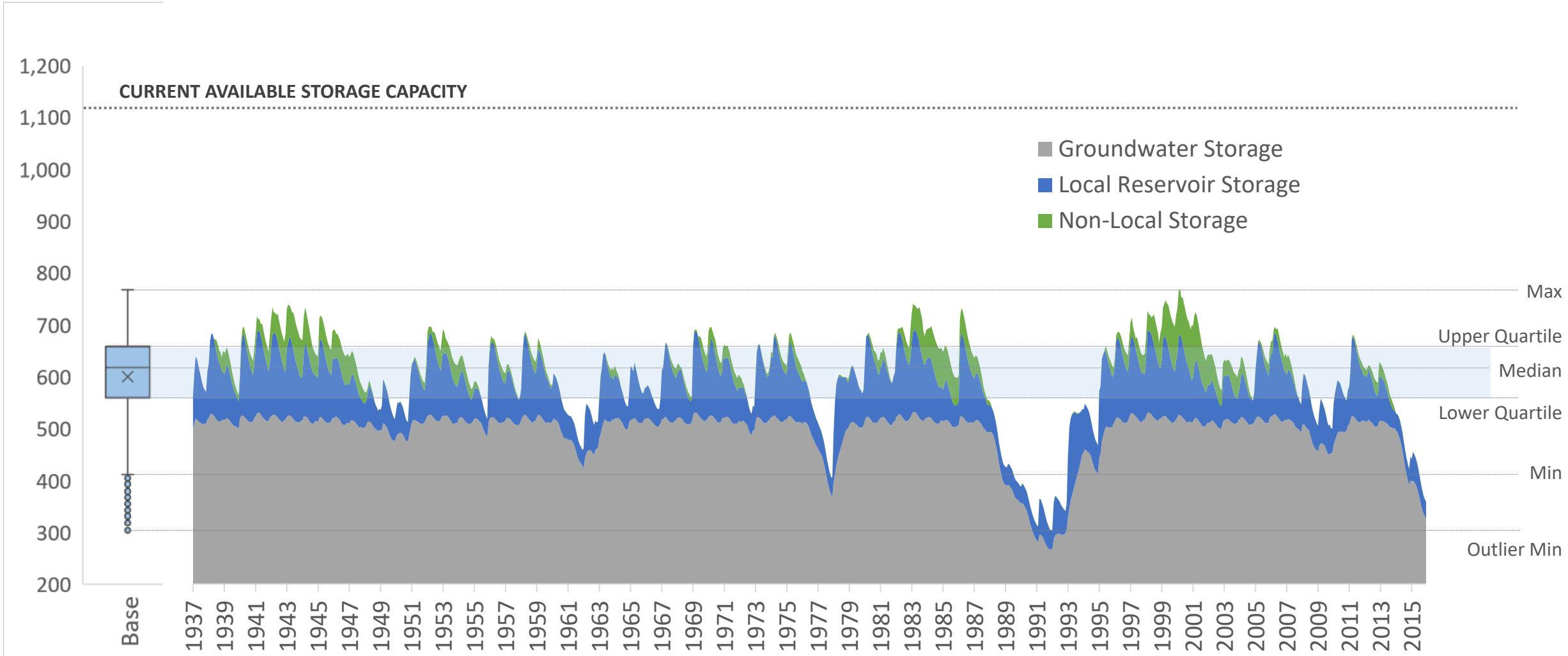
Groundwater | Local Reservoirs | Non-Local Storage

Water Use

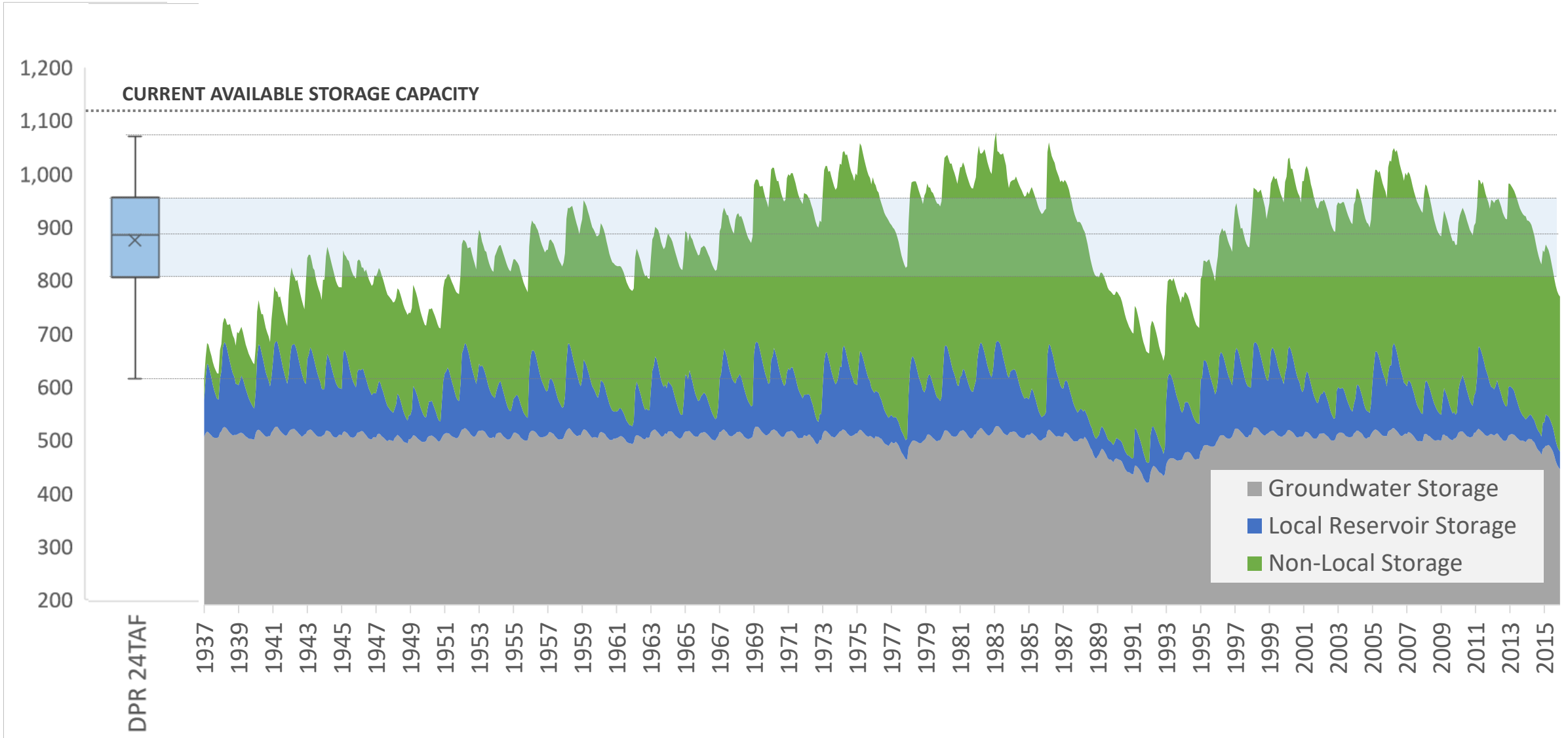
75 TAF/yr
Conservation

315 TAF/yr
County Wide Demand

Total Water Storage Volume



Total Water Storage Volume

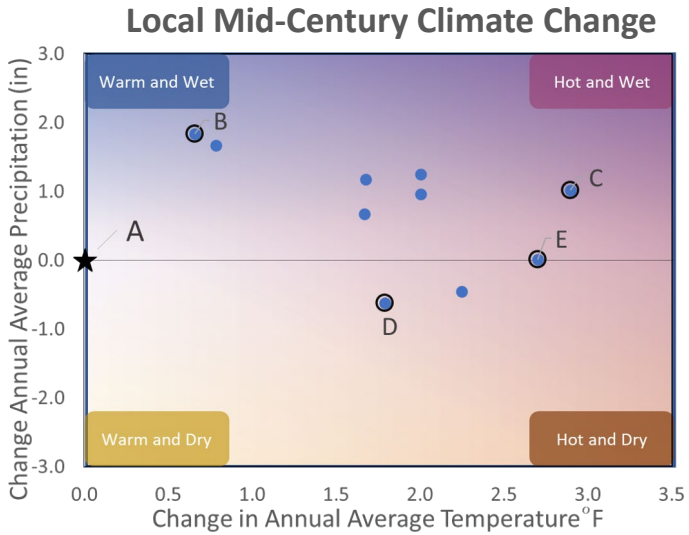


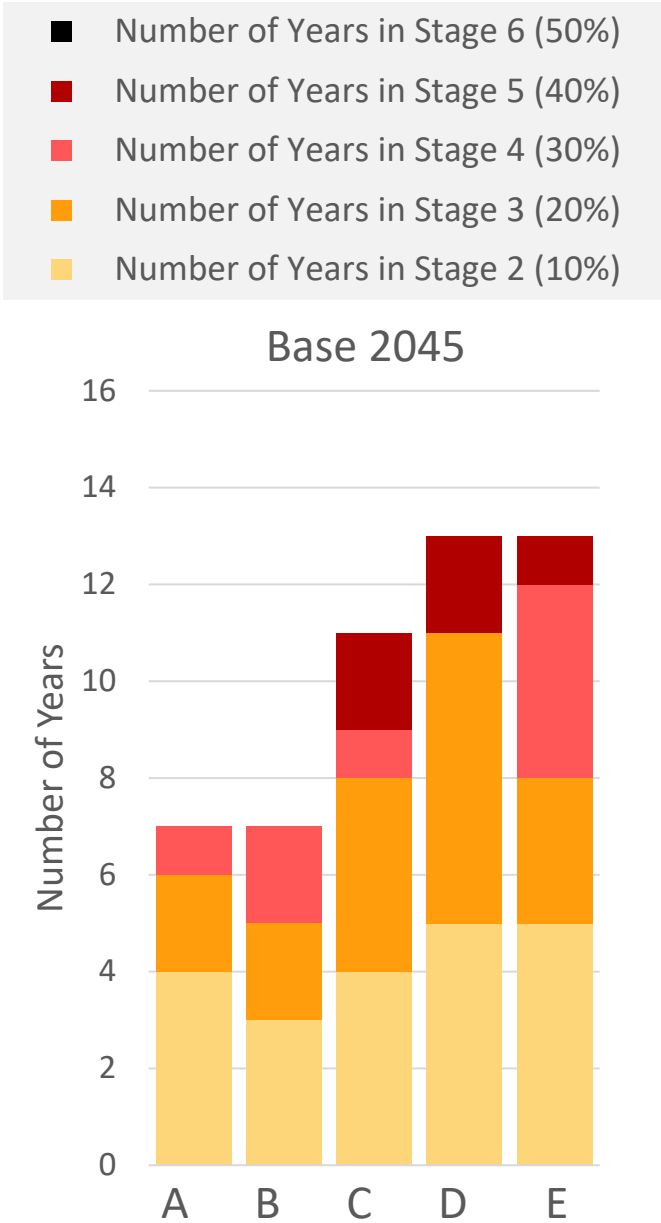
Planning Objectives

1. Increase valley water's resiliency to climate change
2. Utility during non-drought emergencies
3. Utility during prolonged droughts and/or shorter severe droughts (meets LOS goal)
4. District influence over supplies/operations
5. Reduces reliance on delta – operationally and imported water supply
6. Improves groundwater quality
7. Minimize lifecycle cost impacts to water rates
8. Minimize environmental impacts or increase environmental benefits

Water Supply Planning Modeling Analysis

- Ran Valley Water's water supply planning operational model for a 94-year period
- Model simulates Valley Water operations to meet retailer and non-retailer demands and regulatory requirements
- Model includes supplies, storage, recharge facilities, treatment plants, and conveyance facilities
- Hydrologic conditions and water demands representative of five potential mid-century climate scenarios
- Examined water supply reliability outcomes





MAP 2021 PROGRESS – WATER SUPPLY PLANNING

Water Shortage Contingency Years for Moderate Climate Change Scenario in 2045

- **Level of service goal is to not exceed stage 2 (orange)**
- **Locally renewable water supplies are the most drought and climate change resilient**