APPENDIX P: 2026 WATER SUPPLY RELIABILITY – ADDITIONAL CLIMATE RESULTS

TECHNICAL MEMORANDUM

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SUBJECT: SCV Water 2026 Water Supply Reliability Analysis – Additional Climate Results

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1. Introduction

The Santa Clarita Valley Water Agency (SCV Water) conducted an additional climate change reliability assessment to support the 2025 Urban Water Management Plan (UWMP) and long-term water resources planning. This assessment was prepared to evaluate SCV Water's ability to meet projected demands through 2050 under a range of future climate conditions described in the Department of Water Resources (DWR) 2025 Draft Delivery Capability Report (DCR). The assessment evaluates two supply scenarios based on projected local supply availability and reliability, with each scenario evaluated using the baseline demand forecast with passive conservation.

The 2025 Draft DCR provides estimates of the State Water Project (SWP) reliability under existing and future conditions, including climate change scenarios that reflect different levels of concern (LOC) tied to SWP reliability. As part of planning, SCV Water reviewed the climate change scenarios provided in the 2025 Draft DCR to better understand the potential effects of reduced imported water supply availability on overall reliability.

This assessment evaluated two climate change scenarios from the 2025 Draft DCR:

- 2043 future condition, 50th percentile LOC, with 15 cm of sea level rise.
- 2043 future condition, 95th percentile LOC, with 30 cm of sea level rise.

The results indicate that SCV Water is projected to meet demands through 2050 under both climate scenarios. No shortages were identified, including under the more severe climate condition evaluated.

1.1 State Water Project Supply Reliability

The 2025 Draft DCR includes estimates of SWP water supply availability under both existing conditions and future conditions. The future condition scenarios are intended to reflect the cumulative effects of climate change on hydrology and SWP operations. These effects generally include changes in runoff timing, increased hydrologic variability, and reduced operational flexibility in the state's reservoir system.

The 2025 Draft DCR evaluates multiple risk-informed future climate scenarios for year 2043, including 50%, 75%, and 95% LOCs. These LOCs represent climate-informed system performance conditions of increasing concern, with higher LOC values reflecting more adverse future conditions for SWP reliability. For instance, a 50% LOC scenario depicts a future where

50% percent of model-informed climate outcomes result in better SWP system reliability. The 50 percent LOC can be interpreted as the most likely 2043 future (a 50th percentile where half of futures are worse [hotter/dryer] and half are better with respect to SWP reliability). Similarly, a 95% LOC scenario represents a future condition in which 95% of model-informed climate outcomes would result in better SWP system reliability than the scenario shown.

In the 2025 Draft DCR, DWR estimates that SCV Water's SWP Table A supply, on a long-term average basis, is approximately 50 percent of SCV Water's maximum Table A amount of 95,200 AF under existing conditions. This corresponds to an average annual Table A delivery of approximately 47,600 AF.

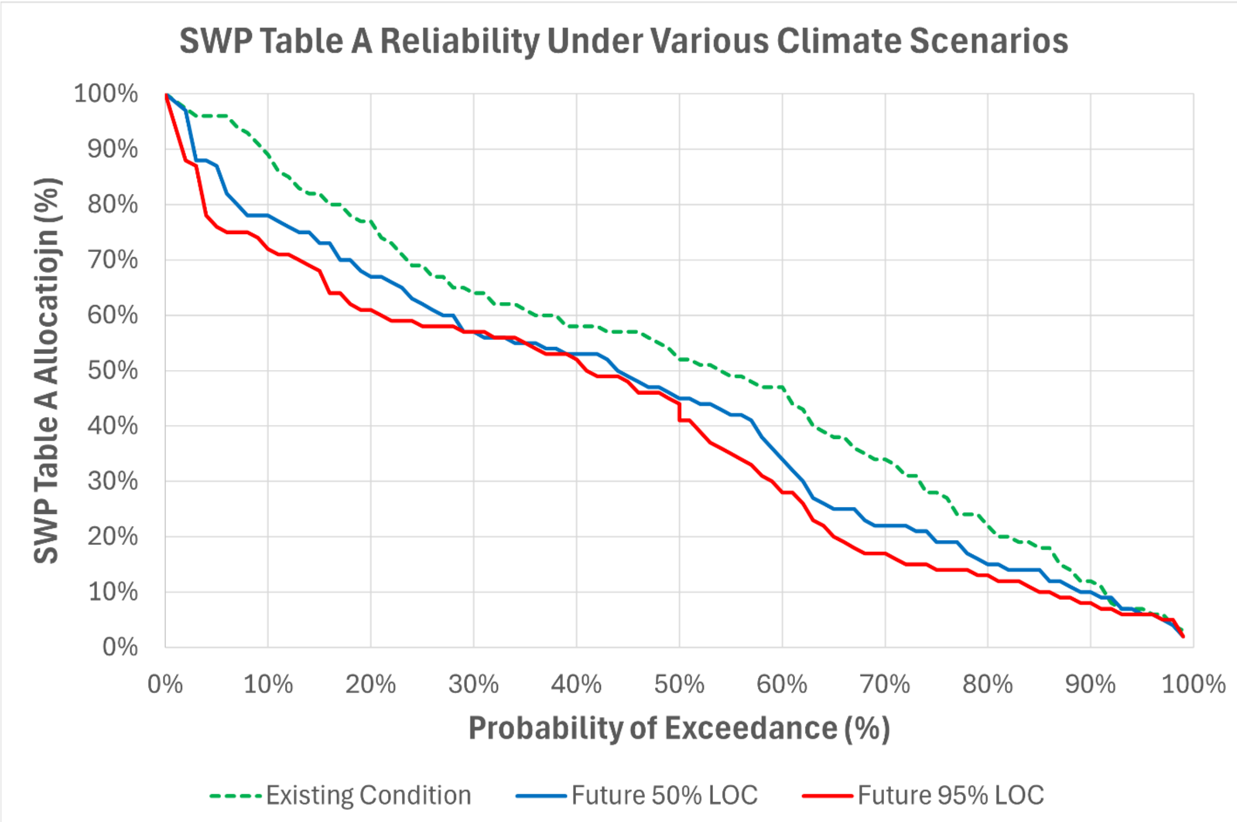
Under the 2043 50% LOC future climate scenario, DWR estimates that SCV Water's average SWP Table A supply would decline to approximately 43 percent of SCV Water's maximum Table A amount, or approximately 40,936 AF. Under the most severe future climate scenario evaluated, the 2043 95% LOC , DWR estimates that SCV Water's average SWP Table A supply would decline to approximately 39% or 37,128 AF. The 2043 75% LOC future climate scenario results for SCV Water were not available at the time of this analysis and therefore were not modeled. These average Table A assumptions are summarized in Table 1.

Table 1: Existing and Future SCV Water SWP Table A Supply Assumptions (Draft 2025 DCR)

Climate Scenario	Average Percent of Maximum Table A
Existing Condition	50% (47,600 AF)
2043, 50% LOC	43% (40,936 AF)
2043, 95% LOC	39% (37,128 AF)

For this assessment, reliability analyses are conducted using the entire 100-year hydrologic period used in DWR's model studies. DWR's model study results for the future 2043 conditions are included in Figure 1, which shows SWP Table A supply allocations projected to be available to SWP contractors under the scenarios evaluated. The graph can be interpreted as the probability of SWP Table A allocations exceeding a given percentage. At the 50 percent probability exceedance level, SWP Table A allocations are approximately 52 percent under existing conditions, 45 percent under the 2043 50% LOC future climate scenario, and 41 percent under the 2043 95% LOC future climate scenario.

Figure 1: 2025 Draft DWR Results for SCV Water SWP Table A Allocations for Existing and Future Conditions



1.2 Climate Scenario Water Supply Reliability Analysis

SCV Water completed a water supply reliability assessment to evaluate whether projected demands could be met through 2050 under the two future climate scenarios. (2043 - 50% LOC and 2043 - 95% LOC). The analysis considered projected demands, local supplies, imported supplies, storage programs, and operating assumptions over the planning period.

To reflect uncertainty in future hydrologic conditions, multiple hydrologic sequences are considered based on historical hydrology from water years 1922 through 2021. These sequences represent a range of wet, average, dry, and critically dry conditions that could occur during the planning period. The use of multiple hydrologic sequences allows for the evaluation of reliability across a range of potential future water supply conditions rather than relying on a single assumed hydrologic pattern.

For each climate scenario, monthly supply and demand conditions were evaluated through 2050. The results were then summarized by year and compiled across the hydrologic sequences to develop exceedance curves. These curves provide a statistical summary of the range of potential outcomes for a given year.

The primary reliability metric used in this assessment was the remaining supply surplus or shortfall after accounting for storage program operations. This metric reflects whether SCV Water has sufficient available supplies, including the use of storage programs, to meet projected demands in a given year. A positive value indicates that supplies are sufficient to meet demands after storage program operations. A negative value would indicate a potential shortage.

2. General Methodology

The Water Resources Integrated Model (or "Model") is a water portfolio operations simulation model developed by SCV Water that was used to analyze water supply reliability for this assessment. The Model performs monthly water operations for the SCV Water service area over a specified study period, which for this assessment is the 25-year period from 2026 through 2050.

Inputs to the Model include:

- Monthly service area demands with passive conservation, as they are projected to increase over the study period;
- Monthly base supplies (existing and planned) anticipated to be available to meet those demands, including any planned changes in supply during the study period, consistent with the 2025 UWMP assumptions;
- Storage programs available to SCV Water, including maximum storage and extraction capacities and beginning (2026) storage balances; and
- Local weather-based demand adjustments, which increase demands during dry years and reduce demands during wet years based on the hydrologic sequence.

The Model steps through each month of the study period, compares monthly base supplies to demands, and operates SCV Water's supply portfolio, including its storage programs as needed, adding to storage in years when base supplies exceed demand and withdrawing from storage when demand exceeds base supplies.

To reflect the uncertainty in what hydrology might occur over the study period, the Model looks at multiple hydrologic sequences. In this analysis, the sequences are based on historical hydrology from 1922 through 2021, and the Model uses 100 hydrologic sequences. The hydrologic sequences affect certain supplies (i.e., SWP and groundwater), as well as demands during the study period. The Model steps through monthly operations over the study period for each of the 100 hydrologic sequences. The results from the 100 sequences are then compiled for each year of the study period and are summarized to provide a statistical assessment of various parameters.

For example, the reliability of SCV Water's supplies and storage programs to meet its projected demands for a particular year, such as year 2030, would be assessed by compiling the overall supply surplus or shortfall that occurred in Model results for 2030 from each of the 100 hydrologic sequences. Those 100 supply results for 2030 would then be sorted from large to small to provide a probability of exceedance distribution for overall supplies for that year.

2.1 Approach Used in this Reliability Assessment

The approach used in this analysis is similar to the approach used in the 2021 update of the Reliability Plan. This approach retains the wet and dry periods that occurred during the 100-year period of hydrologic record from 1922 through 2021, with the effect of those periods on SWP deliveries taken directly from CalSim model runs. As a result, the analysis preserves the sequence and variability of historical hydrologic conditions as represented in CalSim.

In this assessment, two future climate change supply scenarios are analyzed using the baseline demand forecast with passive conservation. The two scenarios are based on different 2025 Draft DCR CalSim model runs: one representing 2043 future climate conditions at the 50 percent LOC, and one representing 2043 future climate conditions at the 95 percent LOC.

The use of the 100-year hydrologic record associated with each climate scenario provides a broad range of hydrologic sequences for evaluating SCV Water system operations. The hydrologic sequences developed from this record are considered adequate to assess system performance and reliability.

Furthermore, as shown in Tables 2 and 3 below, the SCV Water model actually operates SCV Water's storage programs over the study period. This allows an assessment not only of whether there is adequate take capacity to meet demands in supply-limited years, but whether there is adequate supply and put capacity in years of excess to store those supplies for eventual dry-year withdrawals.

Table 2: SCV Water - Water Resources Integrated Model (WRIM) Variability in Demand and Supplies

Parameter	Study Period Variations		Hydrologic Variations	
	Change over Study Period?	Reason for Change	Variation due to Hydrology?	Reason for Variation
Demands				
Demands	Yes	Increases due to population growth	Yes	Higher outdoor use in locally dry years, and lower use in wet years
Supplies				
Alluvial pumping	Yes	Increases due to conversion of agricultural pumping to M&I use	Yes	Reduced availability in locally dry years
Saugus pumping	Yes	Increased capacity due to restored, replacement, and planned wells	Yes	Increased usage in years that are dry in northern California
Recycled water	Yes	Increases resulting from planned distribution system and future supply demand growth	No	-
SWP Table A	No	-	Yes	Northern California hydrology effects on supply availability and Delta requirements
Buena Vista-Rosedale	No	-	No	-
Nickel Water Newhall Land	No	-	No	-

Table 3: SCV Water: Water Resources Integration Model Storage Program Use Priorities

SUPPLY SURPLUS PRIORITIES Additions to Storage in year(s) when Supplies Exceed Demand	**SUPPLY SHORTFALL PRIORITIES** Withdrawals from Storage in year(s) when Supplies Less Than Demand
1. SWP flexible storage 2. SWP carryover in San Luis Reservoir 3. Rosedale-Rio Bravo Banking Program 4. Remainder of surplus supplies allocated proportionally to Semitropic Banking Program and Semitropic – Newhall Land and Farming Banking Program to maximize their use over the remainder of their lifetime.	1. Yuba Accord (dry-year water purchase) 2. Nickel Water 3. Proportional withdrawals from the following programs to maximize recovery: - United Water Conservation District Exchange - Semitropic Banking Program surcharge[(1)] - Semitropic Banking Program - Semitropic – Newhall Land Banking Program 4. Rosedale-Rio Bravo Banking Program 5. SWP carryover in San Luis Reservoir 6. SWP flexible storage

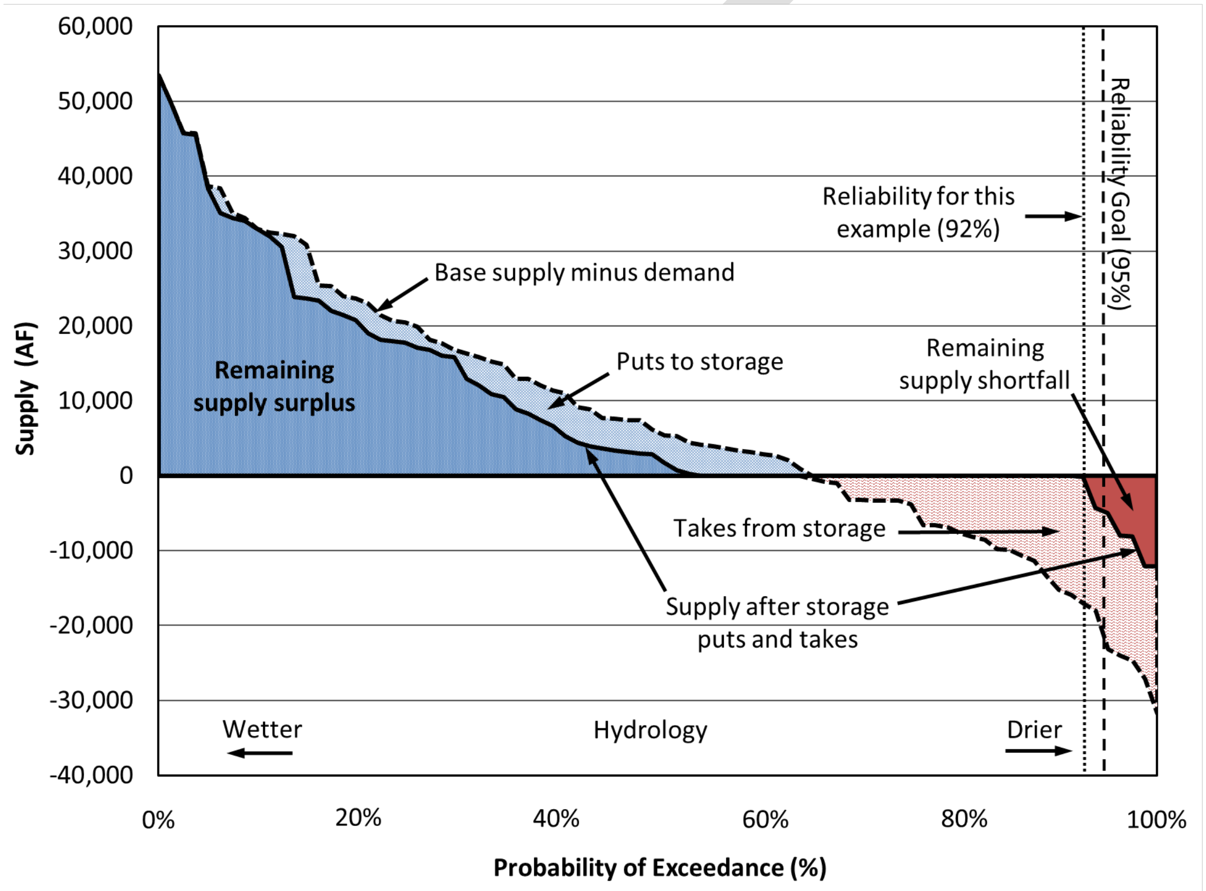
Note:
(1) Semitropic Banking Program surcharge is the remaining balance of water SCV Water stored in 2002 and 2004 under a temporary storage agreement with Semitropic. In 2015, SCV Water entered into a long-term banking program with Semitropic (labeled here as "Semitropic Banking Program") with specified storage, put, and take capacities. The balance of the previously stored water was transferred into the Semitropic Banking Program and is in addition to the water that may be stored under that new program (thus the label here as "surcharge"). This water is still available for withdrawal by SCV Water, but uses Semitropic Banking Program withdrawal capacity. Furthermore, there can be no additions to the amount "surcharged" in the Semitropic Banking Program.

2.2 Interpretation of Water Operations Model Results

The Model produces graphs for a number of parameters calculated within the Model, generally presented in the form of probability of exceedance graphs. The parameters of primary interest for this assessment include: (1) Base supply minus demand (i.e., the supply surplus or shortfall for a given year after summing all base supplies and subtracting weather-adjusted demand); and (2) Supply after storage program puts and takes (i.e., the remaining supply surplus or shortfall for a given year after any additions to (puts) or withdrawals from (takes) storage programs). Base supplies are considered to be supplies that are available every year, such as supplies from the SWP, groundwater, recycled water, Buena Vista/Rosedale-Rio Bravo, and Nickel Water. Storage programs, as used here, include SWP flexible storage, groundwater banking programs, and any other dry-year supplies, such as water under the Yuba Accord and exchange programs.

An example of these two parameters for a given year in the study period is shown in Figure 2, with "Base supply minus demand" represented by the black dashed line, and "Supply after storage puts and takes" represented by the solid black line. The area between these two lines that is above zero on the supply (vertical) axis represents the amount of water put into storage programs; whereas, the area between the two lines that is below zero represents the amount of takes from storage programs. The darker blue area (below the "Supply after storage puts and takes" line that is above zero on the supply axis) indicates the amount of surplus water that remains after all possible puts to storage programs, where puts may be constrained by storage space available or by put capacity. This remaining supply would be available for water sales, exchanges, or storage in new programs, or would otherwise remain unused. The darker rust-colored area (above the "Supply after storage puts and takes" line that is below zero on the supply axis) indicates the amount of supply shortfall that remains after all possible takes from storage programs, where takes may be constrained by the amount of water stored or by take capacity. The reliability for this scenario is the probability of exceedance at the point where the left side of the darker rust-colored area crosses zero on the supply axis (shown as the dotted vertical line in this graph). For this particular example, that occurs at about 92 percent and is interpreted as a 92-percent probability that remaining supplies after puts and takes would be zero or greater for this example's supply and demand scenario and study period year; or in other words, has a reliability of 92 percent. The reliability in this example does not meet the 95-percent reliability goal (shown as the dashed vertical line in this graph), and so would require additional programs or supplies to achieve that goal.

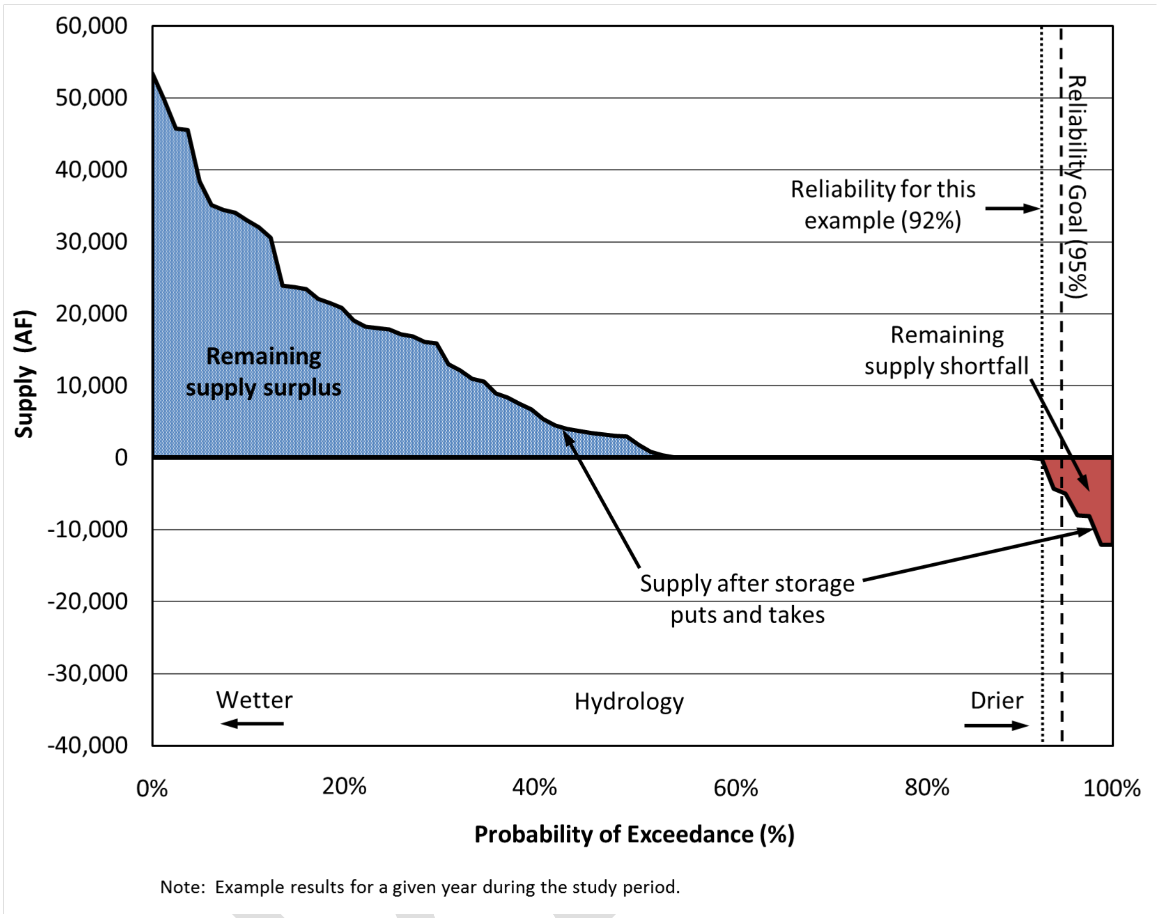
Figure 2: Interpretation of Model Results



Note: Example results for a given year during the study period.

In this assessment, it is the supply that remains after operation of the storage programs that is of primary interest. Therefore, the figures throughout the remainder of this section showing supplies show only the "Supply after storage puts and takes" line and so are of the form shown in Figure 3. The supply figures in the rest of this section do not include the shading of surplus and shortfall, as shown in Figure 3, but are interpreted as shown here.

Figure 3: Form of Model Results Presented



3. Scenarios Analyzed

This assessment analyzed two scenarios composed of the water supply components discussed below. The mix of component water supplies is also summarized in Table 4. Both scenarios were evaluated using the Baseline Demand Forecast (BDF) with passive conservation.

Alluvial and Saugus supplies used in the analysis are consistent with the 2025 UWMP assumptions for normal, locally dry, and dry-year conditions which are aligned with the Groundwater Sustainability Agency's (GSA) basin operating plan. SWP supplies throughout the 25-year study period are based on DWR's Draft 2025 DCR, using the 2043 climate change studies. Existing banking programs are consistent with the 2025 UWMP.

This assessment includes an evaluation of the following two scenarios:

2043 Future Climate Condition - 50% LOC, 15 cm Sea Level Rise:
Represents the elements of the SCV Water portfolio that currently exist, as described in the 2025 UWMP, under 2043 future climate conditions at the 50 percent level of concern and 15 cm of sea level rise.

2043 Future Climate Condition - 95% LOC, 30 cm Sea Level Rise:
Represents the elements of the SCV Water portfolio that currently exist, as described in the 2025 UWMP, under 2043 future climate conditions at the 95 percent level of concern and 30 cm of sea level rise.

Table 4: Summary of Model Scenario Assumptions

Supplies and Banking/Exchange Programs	2043 Future Climate Condition 50% LOC	2043 Future Climate Condition 95% LOC
SWP Allocations	2043 50% LOC[1]	2043 95% LOC[2]
Alluvium	X	X
Base Saugus	X	X
Dry Year Saugus 3-4	X	X
Recycled Water	X	X
Article 56	X	X
SWP/Castaic flexible storage	X	X
BVRRB	X	X
Nickel Water	X	X
Yuba	X	X
Semitropic	X	X
Semitropic NLF	X	X
Rosedale Rio Bravo	X	X
Rosedale Rio Bravo Exchange	X	X
UWCD Exchange	X	X

[1]CalSim 3 Model for 2043 - 50% LOC - 15 cm sea level rise

[2]CalSim 3 Model for 2043 - 95% LOC - 30 cm sea level rise

For both scenarios, imported supplies include SWP supplies based on 2043 climate conditions pursuant to DWR's CalSim modeling for the Draft 2025 DCR, the firm Buena Vista Rosedale Transfer, and, if necessary, in dry years, SWP Flexible Storage, Nickel Water, and Yuba Accord water. Both scenarios also include existing banking programs, specifically existing Rosedale Banking supplies at the existing 10,000 AFY of recovery, SCV Water's Semitropic Banking Program, and access to Newhall Land and Farming Semitropic Banking Program . These banking programs are drawn upon during years when the other previously identified supplies are insufficient to meet demands.

4. Analysis Results

The results of the reliability assessment indicate that SCV Water is projected to meet demands with passive conservation through 2050 under both climate scenarios evaluated. No supply shortfalls were identified in any year of the planning period under either the 2043 Future Climate Condition - 50% Level of Concern, 15 cm sea level rise scenario or the 2043 Future Climate Condition - 95% Level of Concern, 30 cm sea level rise scenario.

Summary results are presented as bar charts (Figure 4) and detailed results are presented as exceedance curves showing supply after storage program puts and takes (Figures 5 and 6). This metric represents the remaining supply surplus or shortfall after accounting for additions (puts) to, or withdrawals (takes) from, storage programs. Values above zero indicate that supplies are sufficient to meet demands after storage operations, while values below zero would indicate a potential shortage.

Although available SWP supplies decrease under increasingly severe climate conditions, the exceedance curves remain at or above zero across the hydrologic sequences evaluated (Figures 4 and 5). Stated another way, the assessment indicates 100 percent reliability through 2050 under both climate scenarios evaluated (Figure 4).

Figure 4: Summary of Reliability of All Scenarios Under Demand with Passive Conservation

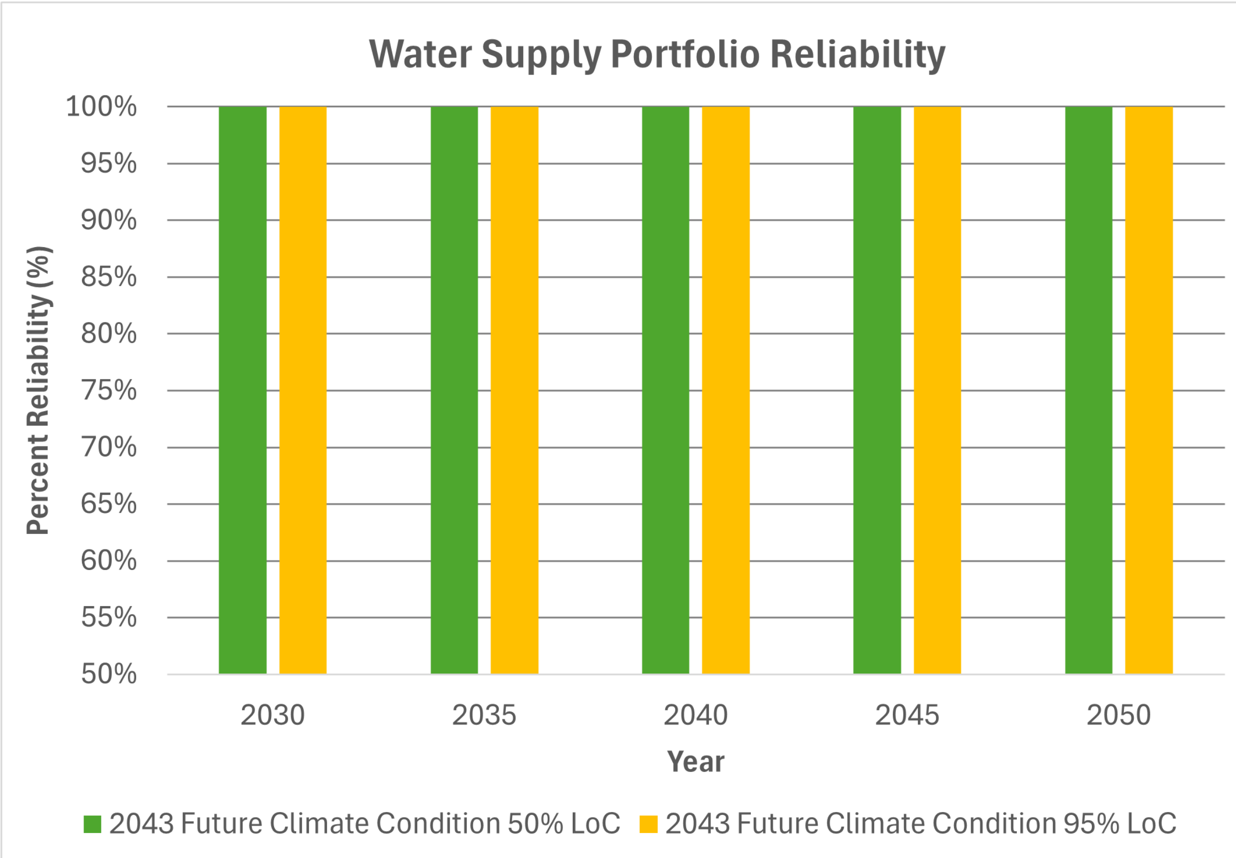


Figure 5: Water Supply Reliability under Demand with Passive Conservation for the 50% LOC Climate Scenario

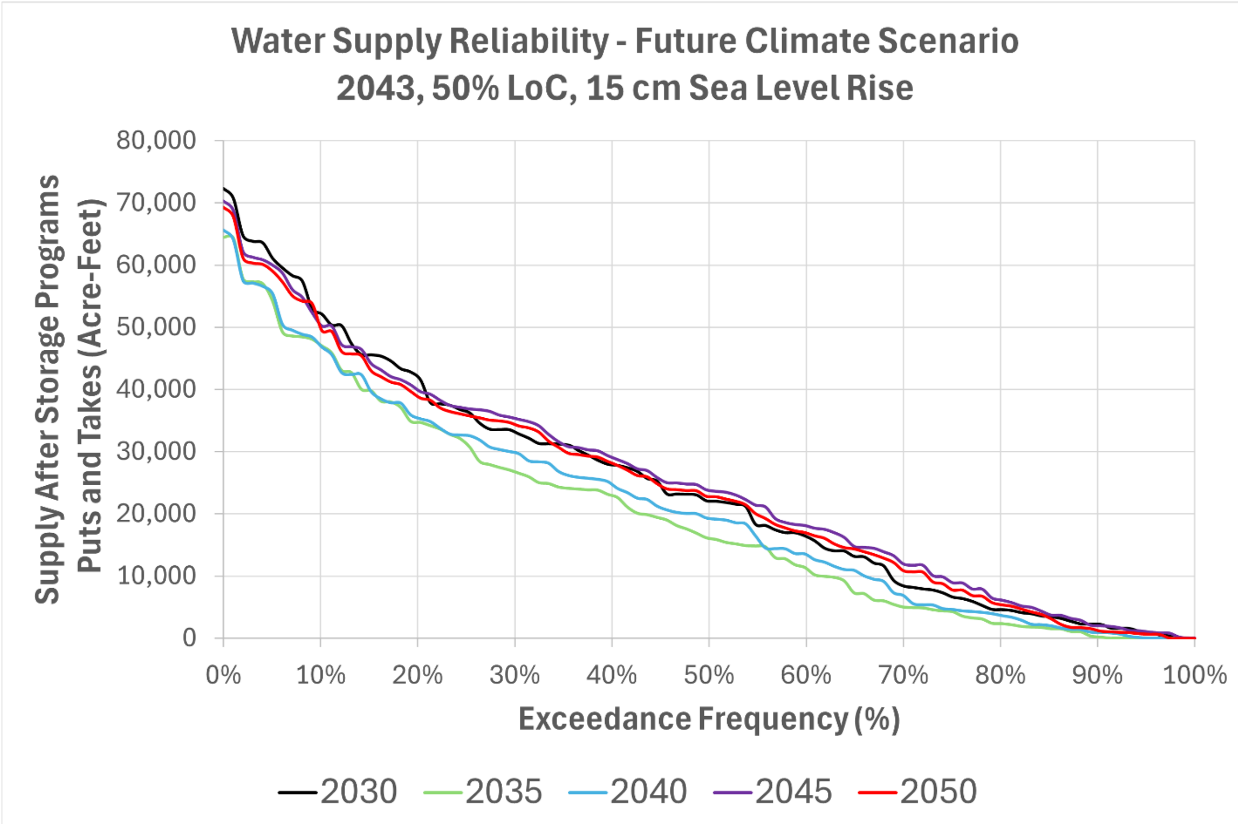


Figure 6: Water Supply Reliability under Demand with Passive Conservation for the 95% LOC Climate Scenario