



Subcommittee on Long-Term Regional Planning Processes and Business Modeling

1/29/2025 LTRPPBM Subcommittee Meeting

3b

Subject

Review Draft Climate Adaptation Master Plan for Water Annual Report

Executive Summary

In February 2023, the Board directed staff to integrate water resources, climate, and financial planning into a Climate Adaptation Master Plan for Water (CAMP4W) and in October 2023, chartered a Joint Task Force of Board Members and Member Agency Managers to facilitate the development of CAMP4W in a timely and transparent process. CAMP4W includes: (1) Climate and Growth Scenarios, (2) Time-Bound Targets, (3) A Framework for Climate Decision-Making and Reporting, (4) Policies, Initiatives, and Partnerships, and (5) Business Models and Funding Strategies. CAMP4W will increase Metropolitan's understanding of the climate risks to water supplies, infrastructure, operations, workforce, and business model. CAMP4W will also provide decision-making tools and long-term planning guidance for adapting to climate change to strengthen Metropolitan's ability to fulfill its mission.

This item introduces a draft of the first CAMP4W Annual Report. This annual report is intended to provide decision-makers with up-to-date data to assist in the decision-making process, summarize advancement of the time-bound targets, and report on progress made toward CAMP4W goals and initiatives. Annual reporting supports adaptive management by providing decision-makers with key information needed to make incremental investment decisions. It provides a means for informing the Board on progress to date in advancing climate resilience and reliability initiatives.

With the significant investments needed to provide Metropolitan with the reliability and resilience needed to deliver on its core mission, it is important that investment decisions are made through an adaptive management process to avoid the risks associated with over or under development. A key aspect of the CAMP4W process involves adhering to an adaptive management process by facilitating incremental investment decisions, maintaining a knowledge base that supports understanding current trends that impact scenario planning projections, and understanding Member Agency needs and adjusting accordingly with a long-term view. Tracking signposts and progress toward time-bound targets is therefore critical, and a key purpose of this annual report.

Fiscal Impact

Not applicable

Applicable Policy

By Minute Item 52776, dated April 12, 2022, the Board adopted the 2020 Integrated Water Resources Plan Needs Assessment.

By Minute Item 52946, dated August 15, 2022, the Board adopted a resolution affirming Metropolitan's call to action and commitment to regional reliability for all member agencies.

By Minute Item 53381, dated September 12, 2023, the Board approved the use of Representative Concentration Pathway (RCP) 8.5 for planning purposes in the Climate Adaptation Master Plan for Water.

By Minute Item 53630, dated May 14, 2024, the Board concurred with the CAMP4W: Draft Year One Progress Report and Next Steps, with the understanding that staff would provide the Board updated data and other information before consideration and approval of any CAMP4W projects.

Related Board Action(s)/Future Action(s)

Staff will issue the final 2024 CAMP4W Annual Report in February, incorporating feedback from this discussion. This first CAMP4W Annual Report serves as the template for future reports.

Details and Background

Background

The CAMP4W Annual Report (**Attachment 1**) will track three core components of the adaptive management process: (1) Signposts, (2) Time-Bound Targets, and (3) Implementation Highlights.

Signposts

As the scenario planning approach helps account for a range of supply gaps and uncertainties, signposts contribute to an updated understanding of how the drivers of change may be shaping actual conditions relative to potential scenarios. Signposts serve as measurable indicators of the direction and trends of the identified drivers of change over time. Tracking signposts involves collecting data over time and analyzing the data to identify patterns, shifts, or movements that impact water supply and demand conditions, track impacts to infrastructure, and inform our assumptions about possible future conditions. Although signposts do not eliminate uncertainty, they offer a data-driven understanding of patterns, helping to contextualize trends over time and enhance decision-making.

Signposts will facilitate the adaptive management approach developed through the CAMP4W process by providing data to the Board on a regular basis to inform decisions on project and program investments, strategy development, and initiatives. This first Annual Report includes ongoing tracking of signposts for water supply and demand. Future CAMP4W Annual Reports will also include infrastructure and financial signposts, as those are further refined over the coming year. The five categories of supply and demand signposts are demographics, climate change, local agency supply, imported supply, and storage.

A summary of each signpost category and assessment is provided within this annual report, with further detailed analyses included in the attached Appendix A. Tracking these signposts is essential for identifying trends that may signal a need to modify or update the Integrated Resources Plan (IRP) Regional Needs Assessment assumptions and/or the CAMP4W Time-Bound Targets. This proactive monitoring supports adaptive management, ensuring that Metropolitan responds effectively to evolving conditions and maintains regional reliability and resilience. Data used to evaluate the supply and demand signposts for 2024 vary by subject and reflect readily available information at the time of publication. This report reflects data available as of November 2024.

Time-Bound Targets

Time-bound targets are used to guide project and program development and support the evaluation of proposed investments. They establish a timeframe for when projects or programs need to be planned and implemented to provide readiness for future scenario conditions and identify emphases to pursue potential co-benefits along with water supply reliability and system resilience. When considering which projects and programs will be assessed through the CAMP4W decision-making framework, staff consider their relevance toward time-bound targets in addition to other screening parameters.

Time-bound targets are divided into resource-based targets that include core supply, storage, and flex supply targets, and policy-based targets. The first Annual Report provides an update on progress to date under each category, and future CAMP4W Annual Reports will include numeric and graphical representations of Metropolitan's progress toward the time-bound targets. This is also an opportunity to report any challenges or anticipated delays in meeting targets.

Implementation Highlights

Each year, staff will report on progress made throughout the agency on climate adaptation strategies, including ongoing and existing efforts such as regional water supply, conveyance and storage, conservation and efficiency and energy resilience. This first report includes updates on the following climate adaptation-related activities:

- Pure Water Southern California
- Drought Mitigation Projects (in State Water Project Dependent Area)
- Community Engagement
- State and Federal Grants
- Future Supply Action Program
- Forest Resilience Bonds
- Battery Energy Storage System Projects

Key Findings of 2024 Annual Report

- Water supply signpost data and trends are tracking within the range of the 2020 IRP Regional Needs Assessment scenarios and will continue to be monitored on an annual basis.
- Metropolitan took several actions toward meeting targets on core supply, storage and flex supply, including accepting grant funds for Pure Water Southern California planning and expansion of the Antelope Valley-East Kern High Desert Water Bank.
- Metropolitan took several actions and made progress on policy-based targets related to equitable supply reliability, demand management, GHG reduction and others.
- Across Metropolitan, implementation of ongoing and newly pursued climate adaptation strategies will advance CAMP4W priorities and Time-Bound Targets.

Working Memorandum 8: Refining Signposts and Time-Bound Targets

Working Memorandum 8 (**Attachment 2**) incorporates comments received (**Attachment 3**). Three key elements critical to the Climate Decision-Making Framework include Evaluative Criteria, Time-Bound Targets, and Signposts. The CAMP4W Year One Progress report stated that each of the key elements would be updated throughout 2024. This Working Memorandum 8 provides an update on the progress made in refining the Signposts and Time-Bound Targets and directly informed the Draft 2024 CAMP4W Annual Report.

Timing and Urgency

The 2024 Annual Report will be finalized following this committee item and will serve as the template for future CAMP4W Annual Reports. Member Agency comments on the Draft 2024 Annual Report are requested by Monday, February 10, 2025.

Project Milestones

January 29, 2025: CAMP4W Task Force: Discuss Draft Annual Report and Climate Adaptation Policy Framework

February 26, 2025: CAMP4W Task Force: Finalize Annual Report and Seek Board Input on Draft Master Plan Implementation Strategy

March 26, 2025: CAMP4W Task Force: Review Climate Adaptation Master Plan Implementation Strategy

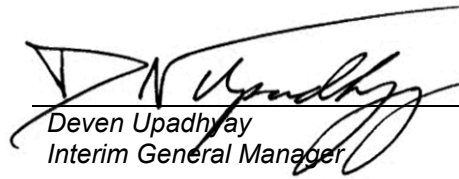
April 14, 2025: Seek Board Approval of Climate Adaptation Master Plan Implementation Strategy



Elizabeth Crosson
Chief Sustainability, Resilience and
Innovation Officer

1/24/2025

Date



Deven Upadhyay
Interim General Manager

1/24/2025

Date

Attachment 1 – CAMP4W Annual Report

Attachment 2 – CAMP4W Working Memorandum #8

Attachment 3 – Comments received for CAMP4W Working Memorandum #8

Ref# sri12701532

DRAFT

**CAMP4W**Climate Adaptation
Master Plan for Water

Annual Report

A summary of Signposts, Time-Bound Targets,
and progress to date in the advancement of
climate adaptation goals.

2024



The Metropolitan Water District
of Southern California

Table of Contents

03 Introduction and Purpose

05 Signposts

11 Time-Bound Targets

14 Implementation Highlights

19 Appendix A

Acknowledgements

This progress report for the Climate Adaptation Master Plan for Water would not be possible except for the dedication of Task Force Members, Metropolitan's Staff, and consultants.

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Introduction and Purpose

This annual report is intended to provide decision makers with up-to-date data to assist in the decision making process, summarize advancement of the time-bound targets, and report on progress made toward CAMP4W goals and initiatives.

In February 2023, the Board directed staff to integrate water resources, climate, and financial planning into a Climate Adaptation Master Plan for Water (CAMP4W) and in October 2023, chartered a Joint Task Force of Board Members and Member Agency Managers to facilitate the development of CAMP4W in a timely and transparent process. CAMP4W includes: (1) Climate and Growth Scenarios, (2) Time-Bound Targets, (3) A Framework for Climate Decision-Making and Reporting, (4) Policies, Initiatives, and Partnerships, and (5) Business Models and Funding Strategies. CAMP4W will increase Metropolitan's understanding of the climate risks to water supplies, infrastructure, operations, workforce, and business model. CAMP4W will also provide decision-making tools and long-term planning guidance for adapting to climate change to strengthen Metropolitan's ability to fulfill its mission.

With the significant investments needed to provide Metropolitan with the reliability and resilience needed to deliver on its core mission, it is important that investment decisions are made through an adaptive management process to avoid the risks associated with over or under development. A key aspect of the CAMP4W process involves adhering to an adaptive management process by facilitating incremental investment decisions, maintaining a knowledge base that supports understanding current trends that impact scenario planning projections, and understanding Member Agency needs and adjusting accordingly with a long-term view. Tracking signposts and progress towards time-bound targets is therefore critical, and a key purpose of this annual report.

The CAMP4W process will also include the development of a roadmap to advance the priorities identified by the Task Force. With the completion of the initial CAMP4W implementation strategy being developed in early 2025, future CAMP4W annual reports will summarize progress on each element defined. This annual report summarizes the progress to date that has occurred concurrently during the initial development of the CAMP4W.

Importance of annual reporting

Annual reporting supports adaptive management by providing decision-makers with key information needed to make incremental investment decisions. It provides a means for informing the Board on progress to date in advancing climate resilience and reliability initiatives.



Lake Mathews June 2024



Signposts

As the scenario planning approach helps account for a range of supply gaps and uncertainties, signposts contribute to an updated understanding of how the drivers of change may be shaping actual conditions relative to potential scenarios. Signposts serve as measurable indicators of the direction and trends of the identified drivers of change over time. Tracking signposts involves collecting data over time and analyzing the data to identify patterns, shifts, or movements that impact water supply and demand conditions, track impacts to infrastructure, and inform our assumptions about possible future conditions. Although signposts do not eliminate uncertainty, they offer a data-driven understanding of patterns, helping to contextualize trends over time and enhance decision-making.

Signposts will facilitate the adaptive management approach developed through the CAMP4W process by providing data to the Board on a regular basis that will inform decisions on project and program investments, strategy development, and initiatives. The following section includes ongoing tracking of signposts for water supply and demand. Future CAMP4W Annual Reports will also include infrastructure and financial signposts, as those are further refined over the coming year. The five categories of supply and demand signposts are demographics, climate change, local agency supply, imported supply, and storage.

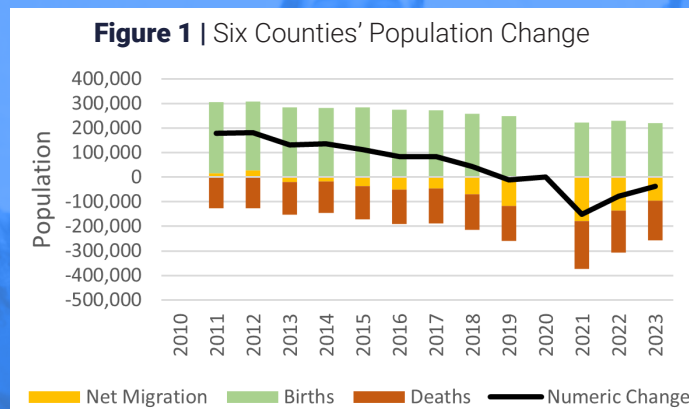
A summary of each signpost category and assessment is provided within this annual report, with further detailed analyses included in the attached Appendix A. Tracking these signposts is essential for identifying trends that may signal a need to modify or update the Integrated Resources Plan (IRP) Regional Needs Assessment assumptions and/or the CAMP4W Time-Bound Targets. This proactive monitoring supports adaptive management, ensuring that Metropolitan responds effectively to evolving conditions and maintains regional reliability and resilience. Data used to evaluate the supply and demand signposts for 2024 vary by subject and reflect readily available information at the time of publication. This report reflects data available as of November 2024.

General Finding: The current trends are tracking within the range of the 2020 IRP Regional Needs Assessment scenarios and will continue to be monitored on an annual basis.

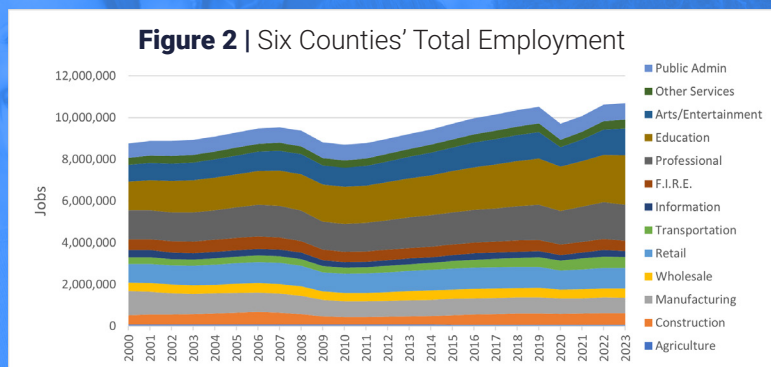
Demographics

Description: Demographic factors (i.e. population, housing, employment) influence water demands. Systemic changes can affect demand/supply gaps (e.g. low birthrate and migration).

Assessment: The region is exhibiting a mixed trend of low growth in terms of population (Figure 1), combined with relatively high growth in terms of employment (Figure 2). Population had fallen every year since 2018 but this trend appears to have abated in 2023. New housing development is increasing steadily. Employment recovered from the COVID-19-induced recession in 2022 and has continued to grow. Metropolitan will continue to track these demographic indicators. Despite short-term disruptions due to the pandemic, long-term prospects for both low- and high-growth futures reflected in the four IRP scenarios remain open.



Source: California Department of Finance (DOF)

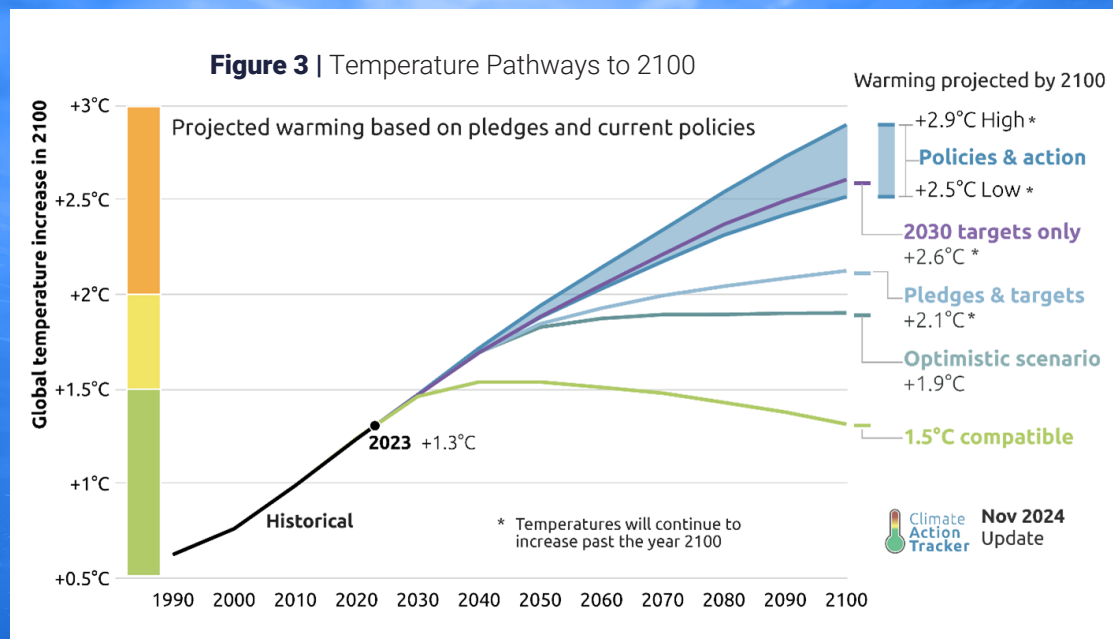


Source: California Department of Finance (DOF)

Climate Change

Description: Emission trends are an indicator of how climate change risk is developing. Evolving science and understanding, and policy and industry changes can also inform the approach to long-term planning for climate change for imported supplies and operations within Metropolitan's service area.

Assessment: The 2020 IRP Needs Assessment incorporated both moderate and severe climate change futures based on Representative Concentration Pathways (RCP) 4.5 and 8.5. RCP 8.5 was approved for use in CAMP4W planning. While current trends suggest that an intermediate climate future consistent with RCP 4.5 is possible, the uncertainty in policy adherence and continuance in achieving emissions targets over the long-term warrants consideration of both moderate and severe climate scenarios at present. Per the Board's direction, Metropolitan will continue to present resource implications in relation to severe climate scenarios while maintaining our ability to use and consider both RCP 4.5 and 8.5 for its modeling efforts. As new information becomes available and industry understanding of future climate change evolves, Metropolitan will make recommendations on any necessary shift to different RCPs or overall approaches to modeling climate change.



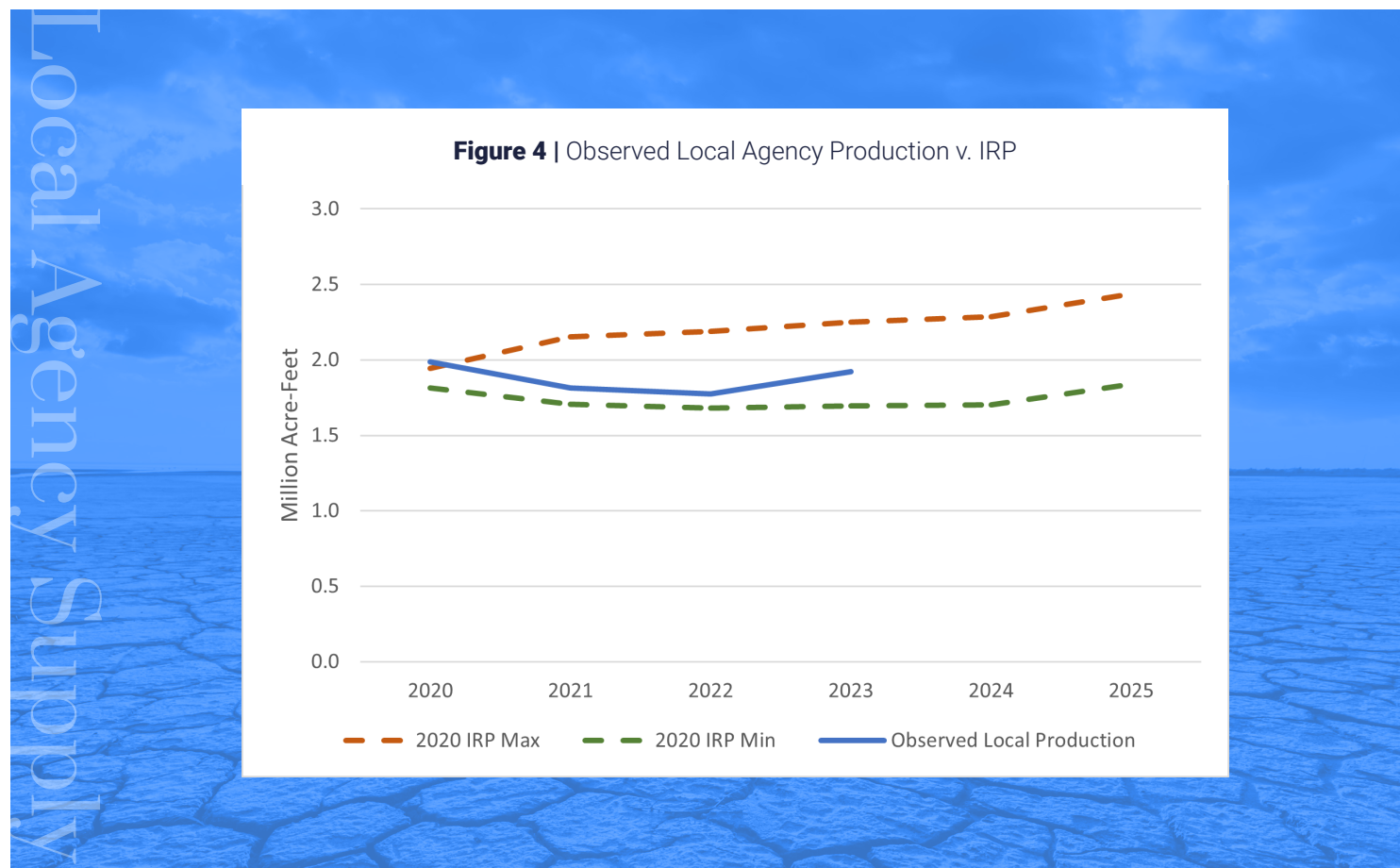
Source: "Warming Projections Global Update" Climate Action Tracker, November 2024

Figure 3 presents the temperature pathways to 2100 presented by Climate Action Tracker as of November 2024. While not directly referencing RCP 4.5 and 8.5, generally the temperature increase of "+2.9°C" depicted in the high end of the "Policies & action" projection aligns with year 2100 temperature assumptions consistent with RCP 4.5. RCP 4.5 results in global temperatures increasing by up to 3 degrees Celsius above preindustrial levels by the end of the century, with emissions peaking around 2040. The more severe RCP 8.5 exceeds warming of 4 degrees with emissions increasing throughout the 21st century.

Local Agency Supply¹

Description: Local agency supply is a key input in modeling demands on Metropolitan. Systemic changes can affect demand/supply gaps (e.g. impaired groundwater basins).

Assessment: Lower retail water demands have led to low local agency water production. Figure 4 shows the observed local agency supply production in 2023 was within the minimum and maximum assumptions across the four scenarios of the 2020 IRP Needs Assessment. More local agency supplies were available in 2023 than were needed to meet retail demand, leading to lower-than-expected local agency production levels. As this low production was demand-induced, it is not considered a loss of local agency supply production. Metropolitan will continue to track production of local agency supplies for significant systemic changes.



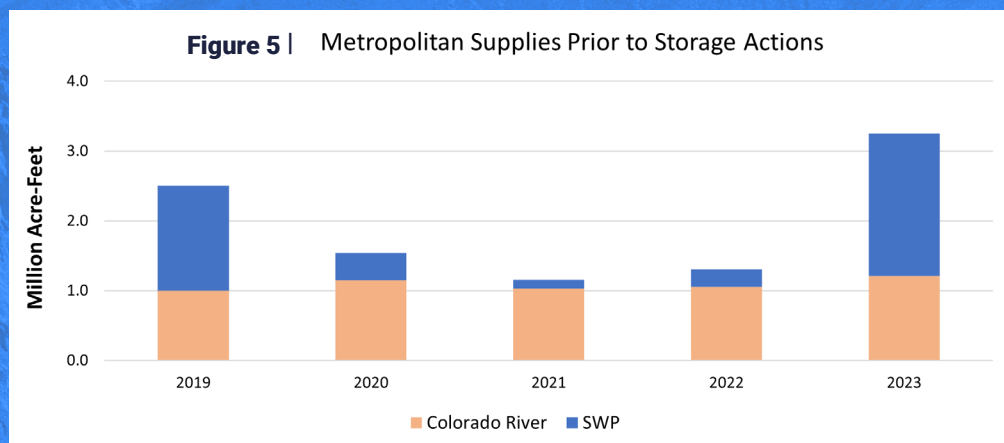
¹ Includes supplies produced and/or managed by local agencies including groundwater replenishment supplies purchased from Metropolitan and commonly referred to as Local Supplies.

Imported Supply

Description: Regulatory and contractual changes may have significant impacts on Metropolitan's imported supplies and demands and are reflected in Metropolitan's modeling.

Assessment: In recent years, Metropolitan's State Water Project (SWP) supplies have fluctuated greatly due to the impacts of weather whiplash and regulatory requirements. Recent modeling conducted by the California Department of Water Resources indicates a further decline in the reliability of SWP supplies. Current projections indicate that Metropolitan will not need to make Drought Contingency Plan (DCP) contributions in calendar year 2025 or in calendar year 2026. However, the uncertainty beyond 2026 has increased. While many agreements that govern the management of the Colorado River are scheduled to expire at the end of 2026, efforts to negotiate replacement agreements have not substantially progressed in the past year. This increases the risk of litigation if no agreement is reached. See Appendix A for additional details.

Figure 5 presents Metropolitan's annual Colorado River and SWP supplies prior to storage actions. See Appendix A for additional discussion.

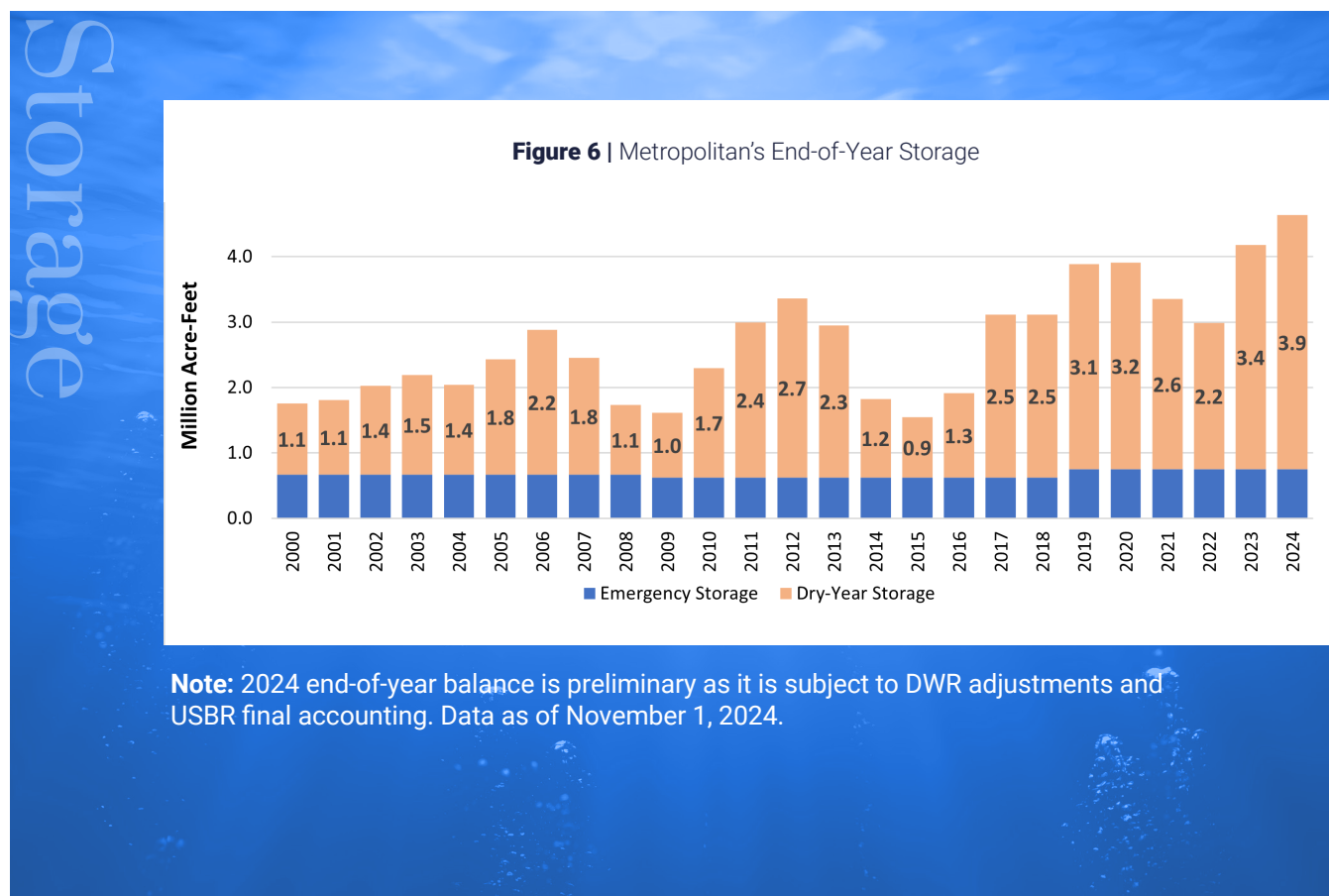


Notes: Graph depicts Metropolitan's annual Colorado River supplies (includes Metropolitan's Basic Apportionment, transfers and exchanges, adjustments for higher priority water use, and Indian and Misc. Present Perfected Rights; does not include water stored for Southern Nevada Water Authority or Imperial Irrigation District) and SWP supplies (includes total allocated Table A supplies, deliveries of Article 21 supplies, SWP transfer deliveries, and Human Health & Safety supplies). Graph does not reflect any operational limitations within either system and does not include puts or takes from Metropolitan's storage accounts.

Storage

Description: Stored water is a core supply needed to balance demand and supply to ensure dry-year reliability. The development, use, and storage capacity of Metropolitan's stored supplies are tracked and evaluated.

Assessment: Metropolitan's storage balances both within and outside of the service area have improved since the 2020 IRP Needs Assessment. An indicator of the effectiveness of Metropolitan's storage portfolio is closely tracking the ability to store water and withdraw it when needed, as well as ensuring the accessibility of these storage programs (particularly for areas dependent on the SWP). Through diverse and expansive storage accounts, Metropolitan is well-positioned for the next potential drought sequence (Figure 6). However, Metropolitan's storage will fluctuate in the coming years depending on hydrologic conditions and on regulations, including the outcome of the ongoing Colorado River negotiations, and the snapshot of today's storage levels does not in itself change the long-term concerns identified in the Needs Assessment. While Metropolitan will continue to manage its storage to support near-term supply and operational demands, it will also pursue additional and improved capacity that may affect our resource planning as that capacity comes online.





Metropolitan and Antelope Valley-East Kern
(AVEK) Water Agency High Desert Water Bank

Time-Bound Targets

Time-Bound Targets are used to guide project and program development and support the evaluation of proposed investments. They establish a timeframe for when projects or programs need to be planned and implemented to provide readiness for future scenario conditions and identify emphases to pursue potential co-benefits along with water supply reliability and system resilience. When considering which projects and programs will be assessed through the CAMP4W decision-making framework, staff consider their relevance toward Time-Bound Targets in addition to other screening parameters.

Time-Bound Targets are divided into resource-based targets that include core supply, storage, and flex supply targets, and policy-based targets. The following provides an update on progress to date under each category.

Updating Time Bound Targets through the Adaptive Management Process

All Time-Bound Targets remain in draft format and are subject to change prior to the completion of the CAMP4W Implementation Strategy in spring 2025. Following approval of the CAMP4W Implementation Strategy, Metropolitan will be documenting any proposed recommendations to revise the Time-Bound Targets based on the trends identified through Signpost tracking. These recommendations will be detailed in this section of future Annual Reports.

Resource-Based Time-Bound Targets

Metropolitan took several actions that advance us toward our targets on core supply, storage and flex supply:



Accepted up to \$125.4 million in grant funding for Pure Water Southern California



Approved investing \$141.6 million for planning and studies related to Delta Conveyance Project







Authorized agreements for water transfer options for three years with agencies in the Sacramento Valley



Accepted up to \$82 million in federal funding to expand the Antelope Valley-East Kern High Desert Water Bank

Future CAMP4W Annual Reports will include graphical representation of Metropolitan's progress toward the Time-Bound Targets.

Future iterations of the Annual Report will also outline challenges Metropolitan has faced in achieving the Time-Bound Targets, how challenges may be resolved, and potential impacts to achieving goals within the defined timeframe.

 Resource-Based Targets Numbers reflect additional supplies unless indicated otherwise	CATEGORY	NEAR TERM	MID TERM	LONG TERM
	 Core Supply ¹	N/A	Identify 300 TAF for potential implementation by 2035. Alternatively, 250 TAF of new storage will reduce core supply need to 200 TAF	Identify 650 TAF for potential implementation by 2045. Alternatively, 250 TAF of new storage will reduce core supply need to 550 TAF or, 500 TAF of new storage will reduce core supply need to 500 TAF
	 Storage	Identify up to 500 TAF for potential implementation by 2035		
	 Flex Supply (Dry Year Equivalent)	Acquire capability for up to 100 TAFY		

Notes

¹ Core Supply sub-targets will be considered and may include targets for groundwater remediation and stormwater capture.

Policy-Based Time-Bound Targets

Metropolitan took several actions and made progress on policy-based targets related to equitable supply reliability, demand management, GHG reduction and others:



Accepted \$5 million in grant funding for Drought Mitigation projects; initiated implementation of Phase 1 projects



Approved investing \$600,000 in Forest Resilience Bond pilot program for forest restoration / watershed resilience



Accepted up to \$95.8 million in federal funding for replacing non-functional turf at commercial, industrial and institutional facilities



Accepted \$2 million in federal funding for water and energy efficiency improvements and turf removal in underserved communities



Progress on zero emission vehicles purchases and charging infrastructure



Added four projects to the Project Labor Agreement, expanding workforce development and equity for underserved communities



Awarded \$247.8 million in four new Local Resources Program projects



Authorized storage of 100,000 acre-feet over two years through the Reverse Cyclic Program



Policy-Based Targets

CATEGORY	NEAR TERM	MID TERM	LONG TERM
Equitable Supply Reliability	Add 160 CFS capacity to the SWPDA by 2027	Implement additional 130 CFS capacity to SWPDA by 2032	Implement capacity, conveyance, supply, and programs for SWPDA by 2045
Local Agency Supply ¹	Maintain 2.09 to 2.32 MAF (under average year conditions)	2.12 to 2.37 MAF (under average year conditions)	2.14 to 2.40 MAF (under average year conditions)
Demand Management ²	Implement structural conservation programs to achieve 300 TAF by 2045		
Regional Water Use Efficiency	Assist Retail Agencies to achieve, or exceed, compliance with SWRCB Water Use Efficiency Standards ³		
	GPCD target for 2030 ⁴	GPCD target for 2035	GPCD target for 2045
Greenhouse Gas Reduction	N/A	40% below 1990 emission levels by 2030	Carbon Neutral by 2045
Surplus Water Management	Develop capability to manage up to 500 TAFY of additional wet year surplus above Metropolitan's Storage Portfolio and WSDM action		
Community Equity*			
Water Quality*			
Imported Water Source Resilience*			

*Time-Bound Targets are in development.

Notes

- 1 This initial target includes existing (and under construction) local agency supplies and can be augmented to include new local agency supply.
- 2 Used to offset the need for additional core supply and using 2024 as a baseline.
- 3 Each retail water supplier will report progress to the State Water Board annually through a Water Use Objective (WUO) equaling the sum of efficiency budgets for a subset of urban water uses: residential indoor water use, residential outdoor water use, real

water loss and commercial, industrial and institutional landscapes with dedicated irrigation meters. Each efficiency budget is calculated using a statewide efficiency standard and local service area characteristics (population, climate, etc.).

- 4 Specific GPCD Time-Bound Targets will be identified based on final SWRCB standards. If the Board wishes to set a higher target, it would be designed to track water use efficiency trends by sector over time and will take local conditions, including climate, into consideration.

Implementation Highlights



Pure Water Southern California (Reliability)

Planning for Pure Water Southern California (PWSC), a regional water recycling program being developed in partnership with the Los Angeles County Sanitation Districts, continued its progress this year. If approved by Metropolitan's Board, PWSC will produce a climate resilient water supply to help meet time-bound targets and address the unpredictability of imported supplies. Early this year Metropolitan participated in a technical workgroup on regional water reuse along with universities, member agencies, and environmental organizations, looking at ways to maximize benefits, reduce impacts, and consider affordability. The summary report was published in June 2024. Metropolitan also investigated program phasing alternatives to reduce initial scope and costs of the first phase and ensure there is large enough capacity to achieve viability. Considering different phasing alternatives underscores the opportunity to adaptively manage and tailor the project to supply needs and financial capacity. With the State Water Board's adoption of Direct Potable Reuse (DPR) regulations in late 2023, Metropolitan developed a research plan to address both raw water augmentation and treated water augmentation, and prepared a white paper which provides background on DPR and how it could be implemented at Metropolitan. In addition, Metropolitan discussed terms for water delivery with member agencies and met regularly with the Southern Nevada Water Authority and with the Central Arizona Project (CAP) to discuss potential investment in PWSC. The agreement with the Los Angeles County Sanitation Districts was amended and restated to address shared responsibility of implementation for a full-scale Advanced Water Purification Facility (the Sanitation Districts will take responsibility for design and operation of the membrane bioreactor and appurtenances), sharing of grants, and partnering in the demonstration plant testing and operation. To date, PWSC has received over \$210 million in state and federal grant funding to support current and future planning efforts.

The Grace P. Napolitano Pure Water Southern California Innovation Center is a partnership between Metropolitan and the Los Angeles County Sanitation Districts providing 500,000 gallons of purified water daily.

Treated wastewater from the Sanitation Districts' A.K. Warren Water Resource Facility passes through the demonstration plant and undergoes a rigorous purification process to ensure it is safe for drinking. The purification process, which combines innovative and proven water treatment technologies, is tested and validated at the demonstration plant. Data collected is used to gain regulatory acceptance of the purification process and provides valuable information for the design needs of a full-scale purification plant.



Drought Mitigation Projects (Reliability, Adaptability and Flexibility)

Metropolitan is investing \$205 million to increase flexibility within its distribution system to improve equitable supply reliability and regional drought resilience for areas dependent on State Water Project supplies. On the western side, Metropolitan is designing and will construct the first stage of two new pump stations along its Sepulveda Feeder to allow delivery of up to 22,000 acre-feet of additional water annually from the Diemer and Weymouth Water Treatment Plants during SWP shortages. This project is scheduled to be operational in 2027. A potential second stage is in the planning process and will be evaluated through the CAMP4W process. On the eastern side, a suite of four projects using existing pipelines and pumping facilities will deliver water from Metropolitan's Diamond Valley Lake in the southern portion of Riverside County up to the Rialto Pipeline in San Bernardino County. These projects received grant funding of \$5 million from the U.S. Bureau of Reclamation and \$50 million from the state of California. The projects are anticipated to be fully operational in 2027.



DECEMBER 2024

CAMP4W | 2024 ANNUAL REPORT



*ReDesign LA Tour and Workshop,
December, 2024*

Listening Sessions/Forums (Equity)

Connecting with the public is a vital element of climate adaptation, for transparency, knowledge-sharing and strengthening communication channels. Metropolitan held five listening sessions and workshops this year along with hosting tours of the Weymouth Water Treatment Plant, Water Quality Lab and the Grace F. Napolitano Pure Water Southern California Innovation Center. Listening sessions with Metropolitan's General Manager focused on community equity, time-bound targets, and evaluative criteria for environmental co-benefits. A forum in January introduced CAMP4W to young civic leaders in the region, seeking their ideas on engagement around climate change and adaptation for Southern California. Another forum, hosted by Eastern Municipal Water District, focused on agricultural interests and priorities, and a third brought forward the priorities of environmental and community-based organizations, as well as their ideas on partnerships and collaborations to accomplish the significant work ahead. Input from each engagement is shared with the CAMP4W Planning Team to inform development of the plan.

Grants (Financial Sustainability and Affordability)

Affordability is a critical focus of Metropolitan with discussions on climate adaptation projects and programs highlighting the importance of this issue. Metropolitan was successful in pursuing grants to further climate adaptation work while easing the future financial impact to water ratepayers across Southern California. Grant awards this year include:

- \$125.4 million from the U.S. Bureau of Reclamation for planning and design of Pure Water Southern California, a project that will make Southern California more resilient to climate change by purifying and reusing cleaned wastewater
- Up to \$178 million from the U.S. Bureau of Reclamation for phase two of the Lower Colorado River Basin System Conservation and Efficiency Program. This includes two programs: Antelope Valley-East Kern High Desert Water Bank and the Turf Replacement Program for commercial, industrial, and institutional properties. These programs will conserve up to 265,296 AF of Colorado River water to be stored in Lake Mead.
- \$2 million from the U.S. Bureau of Reclamation to support Metropolitan's ongoing collaboration with the Southern California Gas Company to provide water and energy efficiency upgrades to single-family residences in disadvantaged communities, and a new, small-scale direct install turf replacement program for single-family residences in disadvantaged communities. These programs will conserve up to 238 AF annually to alleviate current stress on the Lower Colorado River Basin.
- \$20.9 million from the Sacramento-San Joaquin Delta Conservancy to design and construct up to 3,500 acres of managed, flooded wetlands and up to 1,500 acres of rice fields on Webb Tract. The main objectives of the projects are to restore habitat, stop ongoing organic soil subsidence, reduce greenhouse gas emissions, develop sustainable agriculture opportunities, investigate sustainable water management practices, and study how managed wetlands may augment the Delta pelagic food web in line with goals of Metropolitan's Climate Action Plan and the Delta Plan.



*Lake Henshaw Oxygenation Study
(photo courtesy of Vista Irrigation District)*



Future Supply Actions Program (Reliability)

Regional climate adaptation can be advanced through working with member agencies on innovative technologies and approaches. Metropolitan is investing in research through the third round of funding for the Future Supply Actions Program. The Future Supply Actions Program funds technical studies and pilot tests to target barriers to future production of recycled water, stormwater, seawater desalination, and groundwater resources. In 2024 Metropolitan approved \$2.75 million in funding for seven projects that will be led by member agencies:

- Lead agency Las Virgenes Municipal Water District with partnering agencies Calleguas Municipal Water District and Eastern Municipal Water District is conducting the OceanWell: A Climate-Resilient, Eco-Friendly, Submerged Reverse Osmosis System pilot. This pilot will assess the system's performance, effectiveness, and capacity to contribute to the local water supply.
- The Los Angeles Department of Water and Power is leading the Headworks Reservoir Complex Direct Potable Reuse Pilot. Through a series of tests four potential process trains will be evaluated for addressing pathogens and chemical contaminants in direct potable reuse.
- The City of Long Beach is conducting the Ground Water Augmentation, Groundwater Collection System, and New Wells Site Study. This project will update and calibrate the existing Los Angeles USGS Coastal Plan Groundwater Model to further develop a framework for future groundwater enhancement projects.
- The San Diego County Water Authority is leading the Lake Henshaw Oxygenation Pilot Study. This pilot aims to explore the effectiveness of oxygenation as a method to prevent Harmful Algal Blooms by reducing bioavailable nitrogen and phosphorus.
- Lead agency Inland Empire Utilities Agency, along with Three Valleys Municipal Water District and Western Municipal Water District, will investigate the link between well drilling products and PFAS in the Identifying and Removing PFAS Used in Well Drilling Pilot Study. The study will analyze drilling mud products and water samples for PFAS, and pilot chemical well rehabilitation to assess PFAS reduction effectiveness.
- Inland Empire Utilities Agency will also lead the Chino Basin Advanced Water Purification Demonstration Facility. The Demonstration Facility will conduct tests on microfiltration, high-recovery reverse osmosis, and ultraviolet-advanced oxidation processes.
- Foothill Municipal Water District will use Data-Driven Resource Optimization and Planning System (DROPS) to integrate advanced data analytics and artificial intelligence to enhance stormwater management.

DECEMBER 2024

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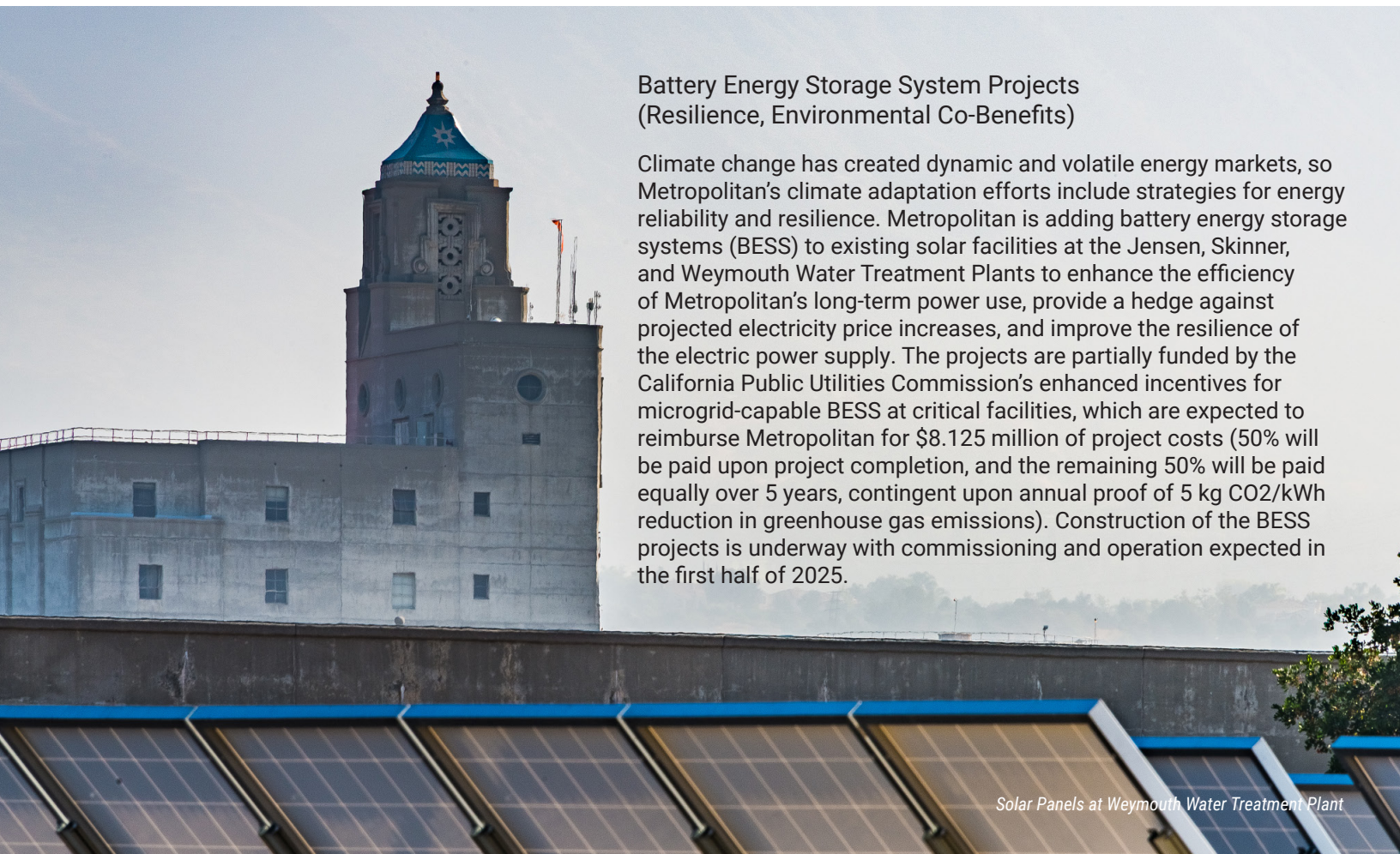
Oroville Spillway Release, March 2024
(photo courtesy of DWR)

Forest Resilience Bonds (Reliability, Resilience, Environmental Co-Benefits)

Metropolitan's water supplies from the Bay-Delta watershed are already facing increasing pressures from the impacts of climate change, including reduced snowpack, increased drought severity and frequency, changing precipitation patterns, degradation of habitat and ecosystems, and sea level rise. In addition, wildfires in the Western United States are becoming more frequent, larger, and more severe due to a combination of climate change and overly dense forest conditions resulting from modern forest management and fire suppression practices. Investments in watershed health in the Bay-Delta watershed could help to protect or enhance, inform, and improve water source resilience for the State Water Project and other supplies from the Bay Delta watershed, such as critical dry year supplemental supplies. In 2024, Metropolitan committed to invest \$200,000 per year for two years in three watershed partnerships using the Forest Resilience Bond conservation model. The bonds finance portions of larger watershed programs and projects being led by the United States Department of Agriculture Forest Service to reduce the risk of wildfire impacts to communities and critical infrastructure (including State Water Project infrastructure). Potential benefits of investments in upper watershed health include resilience to climate variability, enhanced water supply, improved water quality, biodiversity and ecosystem services, carbon sequestration, and fire risk reduction.

Battery Energy Storage System Projects (Resilience, Environmental Co-Benefits)

Climate change has created dynamic and volatile energy markets, so Metropolitan's climate adaptation efforts include strategies for energy reliability and resilience. Metropolitan is adding battery energy storage systems (BESS) to existing solar facilities at the Jensen, Skinner, and Weymouth Water Treatment Plants to enhance the efficiency of Metropolitan's long-term power use, provide a hedge against projected electricity price increases, and improve the resilience of the electric power supply. The projects are partially funded by the California Public Utilities Commission's enhanced incentives for microgrid-capable BESS at critical facilities, which are expected to reimburse Metropolitan for \$8.125 million of project costs (50% will be paid upon project completion, and the remaining 50% will be paid equally over 5 years, contingent upon annual proof of 5 kg CO₂/kWh reduction in greenhouse gas emissions). Construction of the BESS projects is underway with commissioning and operation expected in the first half of 2025.



Solar Panels at Weymouth Water Treatment Plant

*Diamond Valley Lake near capacity,
October 2024*



Appendix A DRAFT

This appendix provides a more robust discussion on the water supply reliability signposts to support the Board's adaptive management and decision-making process.

DRAFT

Appendix A

Supply and Demand Signposts - Detailed Discussion

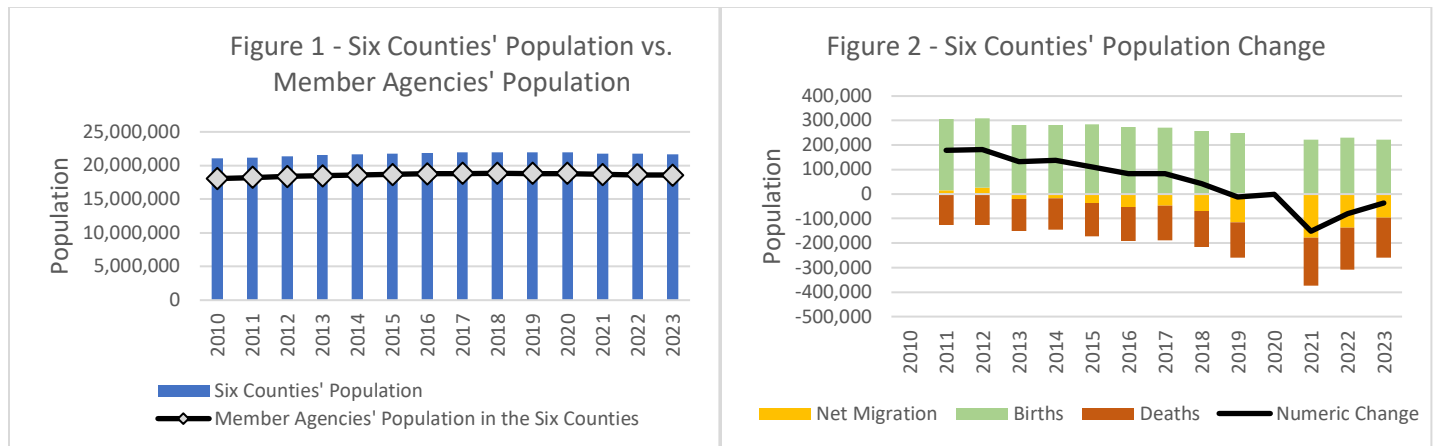
Demographics

Demographic growth is a key driver of water demand. Population, households, and employment are tracked on an annual basis and are used as inputs for Metropolitan's retail demand model. Ongoing monitoring and analysis are crucial for anticipating and adapting to changing water needs. This section provides the latest population, households, and employment estimates from the California Department of Finance and the California Employment Development Department and observations on trends.

Although the Great Recession of 2009 and the COVID-19 pandemic in 2020 were highly disruptive to population growth, new housing development, and employment in Southern California in the short term, growth prospects remain open to both high and low growth outcomes over the long term. In terms of trends, the service area's overall population has experienced low or negative rates of growth in recent years, peaking in 2018 (Figure 1). After falling slightly each year since 2019, in 2023 the overall population began to grow again as net outmigration and accelerated deaths related to the pandemic subsided (Figure 2). The workforce has recovered from the pandemic with the number of people working exceeding pre-pandemic levels and continuing to grow (Figure 3).¹ As shown in Figure 4, more new housing is developed each year.

¹ "State's Population Increases While Housing Grows Per New State Demographic Report", Department of Finance, April 2024, https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-1_2024_Press_Release.pdf

Population



Source: California Department of Finance (DOF)

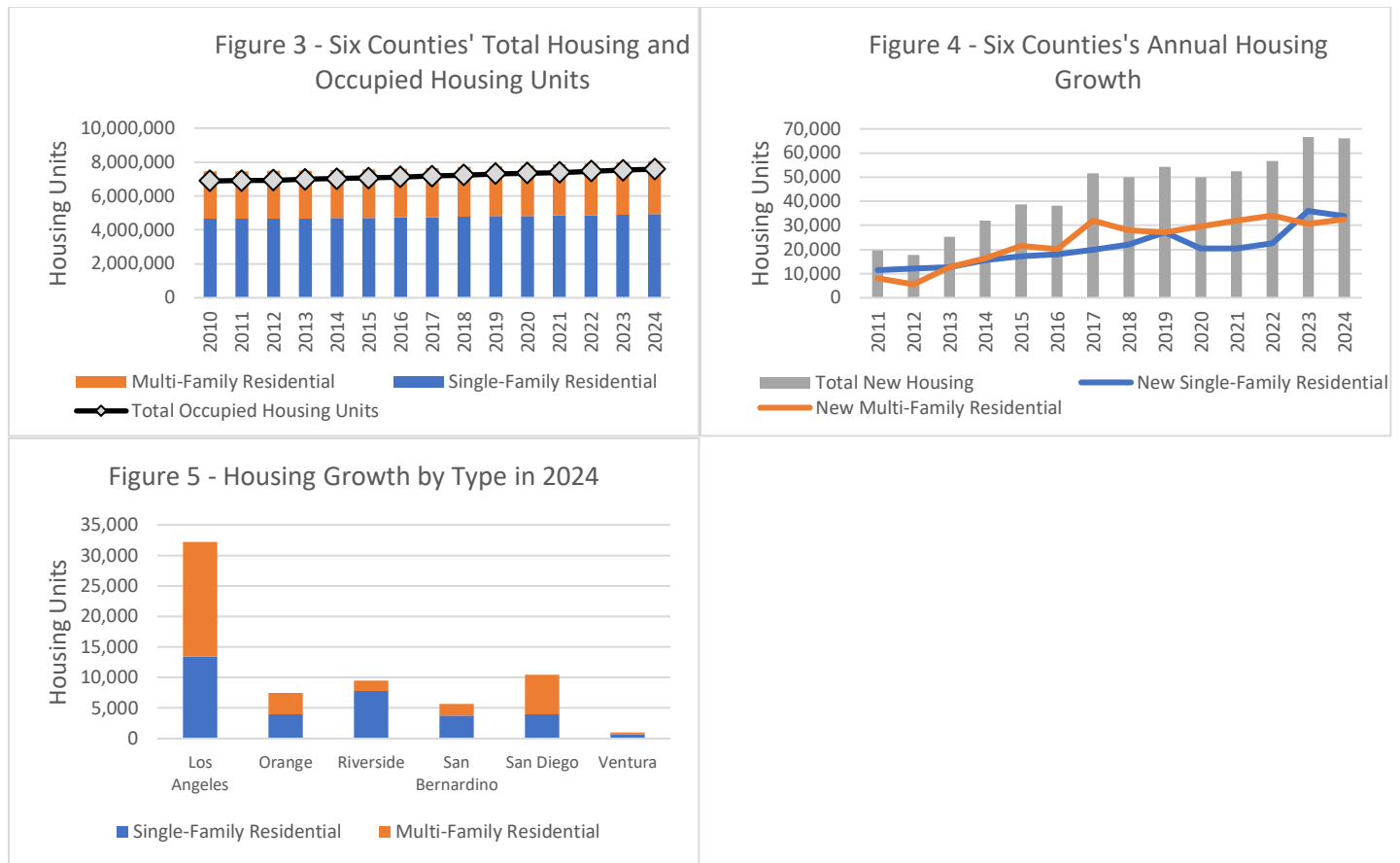
The July 1, 2023 population estimates from the California Department of Finance (DOF) indicate that the six-county region encompassing Metropolitan's service area had a population of 21.6 million. Of this total, approximately 18.5 million people, or about 86 percent, reside within Metropolitan's service area (Figure 1). The six counties within the Metropolitan service area are Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura.

Data detailing population changes are readily available from the DOF at the county level and can be used to analyze population trends. As such, the following observations are based on data from the six-county region.

Observations at the six-county region:

- The number of new births continues to decline, consistent with national and global trends (Figure 2).
- The number of deaths peaked in 2021 at 195,000 because of COVID-19 and has declined to 163,000 in 2023 (Figure 2).
- Since 2013, the six-county region has experienced negative net migration, with more people leaving the region than entering. Negative net migration peaked during the COVID-19 pandemic in 2020-21 (-179,000) with remote work and high housing costs being the main drivers. Since 2021, the net migration has slowed down to roughly -96,000 in 2023 (Figure 2).
- Overall, the population loss trend is reversing with a net loss of -37,000 in 2023 vs. -152,000 in 2021.
- In Figure 2, the 2020 data are not available.

Housing



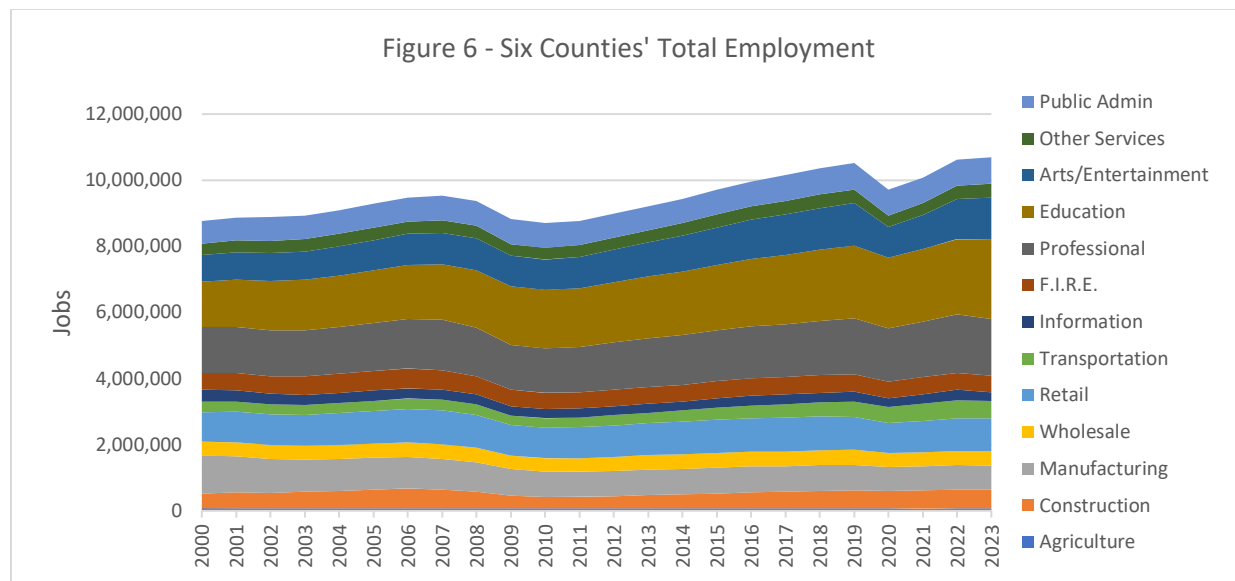
Source: California Department of Finance (DOF)

Housing growth was hampered by the Great Recession of 2009. In 2011 and 2012, new home constructions were less than 20,000 units per year (Figure 4). Since then, new construction has grown steadily, reaching annual growth of more than 66,000 units in 2024. In 2024, there were almost the same number of single-family units built as multi-family units (Figure 4). As SHOWN in Figure 5, there is a diversity in housing types being built across the region. In the Inland Empire, 77 percent of new homes in the last year were single-family units. The rest of the region saw a majority (57 percent) of new housing built as multifamily units. The mix of housing types has implications for growth in outdoor water use, since multifamily units tend to use less water on a per unit basis than single family dwellings. Figure 5 shows that Los Angeles led the region in gaining the most units.

Observations at the six-county level:

- New housing construction reached a new record in 2023 at 66,000 units.
- Housing growth is dependent on many factors, including the state of the economy (interest rates), permits, and affordability. Since 2011, the six-county region has added a total of 620,000 housing units.
- Annual growth has exceeded 300 percent since the Great Recession of 2009, which was caused by sub-prime mortgage lending that led to a slowdown in new home construction.
- Construction of multi-family housing exceeded single-family housing between 2014 and 2022 due to high demand for rental properties as banks tightened their mortgage lending.

Employment



Source: California Employment Development Department (EDD)

The number of jobs fluctuates with cycles of economic expansion and contraction. Following the Great Recession of 2009, employment plummeted by nearly 1 million jobs. It took eight years to recover to the pre-recession employment peak in 2007. In 2020, the COVID-19 pandemic and lockdowns caused employment to plummet (Figure 6). Southern California's economy quickly regained the lost jobs and was exceeding pre-pandemic employment by 2022. As of the time of this writing, there was no indication of recession in the U.S. or in California.

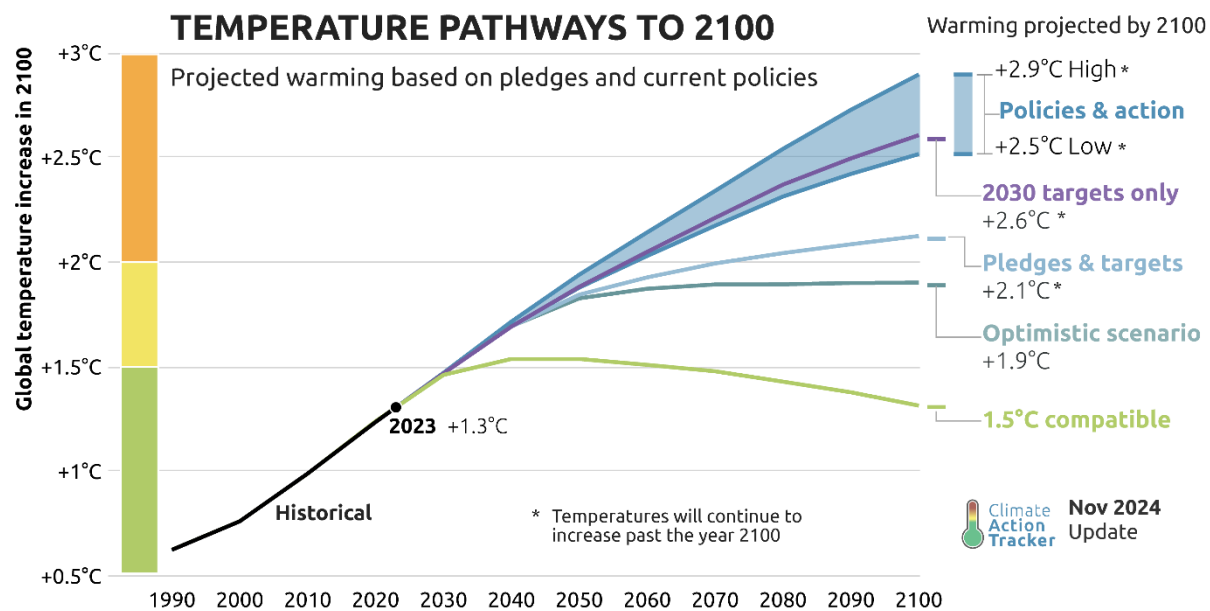
Observations at the six-county level:

- Southern California's employment fell in 2020 during the COVID-19 pandemic but recovered to pre-pandemic levels by 2022.
- Employment growth has continued on an upward trend with no sign of economic recession since 2020.

Climate Change

Climate change is a major source of long-term uncertainty with implications for both water supply and demand. Hotter and drier temperatures reduce available supply while increasing local demands and changes to precipitation and weather patterns are stressing our natural and built systems resulting in unpredictability and water management challenges. Global greenhouse gas emissions and concentrations are widely used to track and assess climate change risk and conditions. To reflect a range of plausible climate change outcomes, the 2020 IRP Needs Assessment scenarios incorporated moderate and severe climate change futures based on Representative Concentration Pathways (RCP) 4.5 and 8.5. RCPs are climate change scenarios adopted by the Intergovernmental Panel on Climate Change that were developed to project future greenhouse gas and aerosol concentrations. The concentrations of greenhouse gases and aerosols are recognized as key drivers of climate change. These pathways, or trajectories, describe how greenhouse gas concentrations and radiative forcing might change in the future due to human activities. RCP scenarios are not intended to reflect specific policies or economic futures and are instead defined by total "solar radiative forcing" by 2100. RCP 4.5 is considered to be a moderate emissions reduction policy-based pathway and can only be achieved by deliberate actions to reduce global emissions. RCP 8.5 is considered a high emissions pathway consistent with continued dependence on fossil fuels. The more moderate RCP 4.5 shows global temperatures increasing by up to 3 degrees Celsius above preindustrial levels by the end of the century, with emissions peaking around 2040. The more severe RCP 8.5 exceeds warming of 4 degrees with emissions increasing throughout the 21st century.

Figure 7 – Temperature Pathways to 2100



Source: “Warming Projections Global Update” Climate Action Tracker, November 2024

In September 2023, the Metropolitan Board approved use of RCP 8.5 for planning purposes in the CAMP4W process. As shown in Figure 7, while international climate change mitigation pledges and actions made so far may make an intermediate warming outcome consistent with RCP 4.5 possible, uncertainty exists as to the extent that emission targets and climate policies will be achieved.² The Governor’s Office of Planning and Research recommended that agencies use RCP 8.5 for analyses considering the impacts through 2050 because of existing gaps between the pledged greenhouse gas emissions reductions and the reductions required to align with the long-term temperature goals.

In terms of global climate change mitigation efforts, there have been mixed signals from global governments and actions. According to a November 2024 report issued by Climate Action Tracker, on the positive side, renewable energy and electric vehicle deployment report record-breaking progress, with energy investments in clean energy now double those for fossil fuels. On the negative side, fossil fuel subsidies remain at an all-time high and funding for fossil fuel prolong projects quadrupled between 2021 and 2022. On the positive side, the current rapid growth of renewable energy now indicates a faster decline after 2030 even with the increase in emissions in recent years. In terms of climate change policy, it remains highly uncertain how governments define their long-term net zero targets and how they may implement them.²

2023 was the hottest year on record with a global average temperature 1.18 degrees Celsius above the 20th century average, with 2024 on track for another record high.³ Additionally, a NOAA Research report indicated that the levels of three of the most important human-caused greenhouse gas emissions (carbon dioxide, methane, and nitrous-oxide) did not show signs of slowing down in 2023.⁴ For the purpose of long-term planning, it is important to keep in mind that recent observations and policies do not necessarily indicate what conditions will be 100, 50, or even 20 years later. Modeling of varying future emissions scenarios remains appropriate for Metropolitan’s scenario planning for water reliability. Metropolitan will continue to monitor climate change developments.

² “Warming Projections Global Update,” Climate Action Tracker, November 2024, https://climateactiontracker.org/documents/1277/CAT_2024-11-14_GlobalUpdate_COP29.pdf

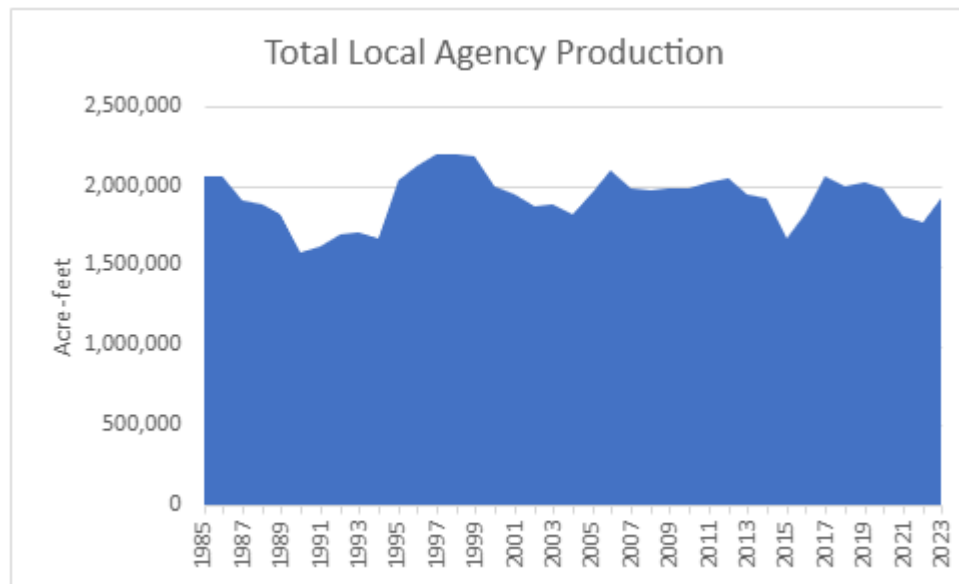
³ “Monthly Global Climate Report for Annual 2023”, NOAA National Centers for Environmental Information, January 2024, <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202313>

⁴ “No sign of greenhouse gases increases slowing in 2023,” NOAA Research, April 2024, <https://research.noaa.gov/2024/04/05/no-sign-of-greenhouse-gases-increases-slowing-in-2023/>

Local Supply⁵

Local supplies are produced to meet individual agency demands and their production and use play a key role in determining the level of Metropolitan's supply required. Maintaining available local supply production levels and development of new local supplies are critical in helping manage demands on Metropolitan. It should be noted that fluctuations in local supply production on a year-to-year basis, can be attributed not only to changes in local supply availability, but also to changes in retail water demand. Decreased local production as a result of low retail demand in a single year is not in itself a notable signpost. However, it is important to observe trends over the longer term. A sustained decline in local production, in the presence of high retail demands, may indicate a higher dependency on Metropolitan supplies. As such, impacts to reliability can also occur if local supply assumptions are not achieved. Therefore, it is important to track the progress of local supply production as a signpost.

Since 1985, local supply production has averaged about 1.93 MAF (Figure 8) and supply availability has typically been the dominant driver of local production. Long-term trends such as the reduction of allowed pumping rights from managed groundwater basins, water quality regulatory restrictions, and environmental regulatory restrictions have affected production from local groundwater basins, surface reservoirs, and the Los Angeles Aqueduct. Development of new supplies through local recycled water, groundwater recovery, and seawater desalination projects have helped maintain overall local production levels despite long-term impacts to groundwater production.



More recently in 2023, extraordinarily low retail water demands have resulted in lower than expected local production. Despite increased local supply availability from an exceptionally wet year in 2023, local supply production only increased by approximately 150,000 acre-feet compared to 2022. Production of hydrologically driven local supplies like the Los Angeles Aqueduct and Local Surface Water increased by nearly 300,000 acre-feet combined, as expected with more supply available for use in wet years. However, groundwater production declined by approximately 125,000 acre-feet. Member agencies indicated that this decline in groundwater production was due to demand-side rather than supply-side causes. Groundwater production was not primarily affected by a loss of supply, such as PFAS contamination. Rather, the low overall retail demands and the above average rainfall allowed agencies to meet their demands with more economical surface water supply in lieu of groundwater pumping. Additionally, non-potable recycled water use declined by approximately 25,000 acre-feet, signaling low water demand for landscape irrigation in 2023. For these reasons, we conclude that in 2023, the availability of local supplies exceeded the demand, resulting in lower-than-anticipated levels of local production.

⁵ Includes supplies produced and/or managed by local agencies including groundwater replenishment supplies purchased from Metropolitan.

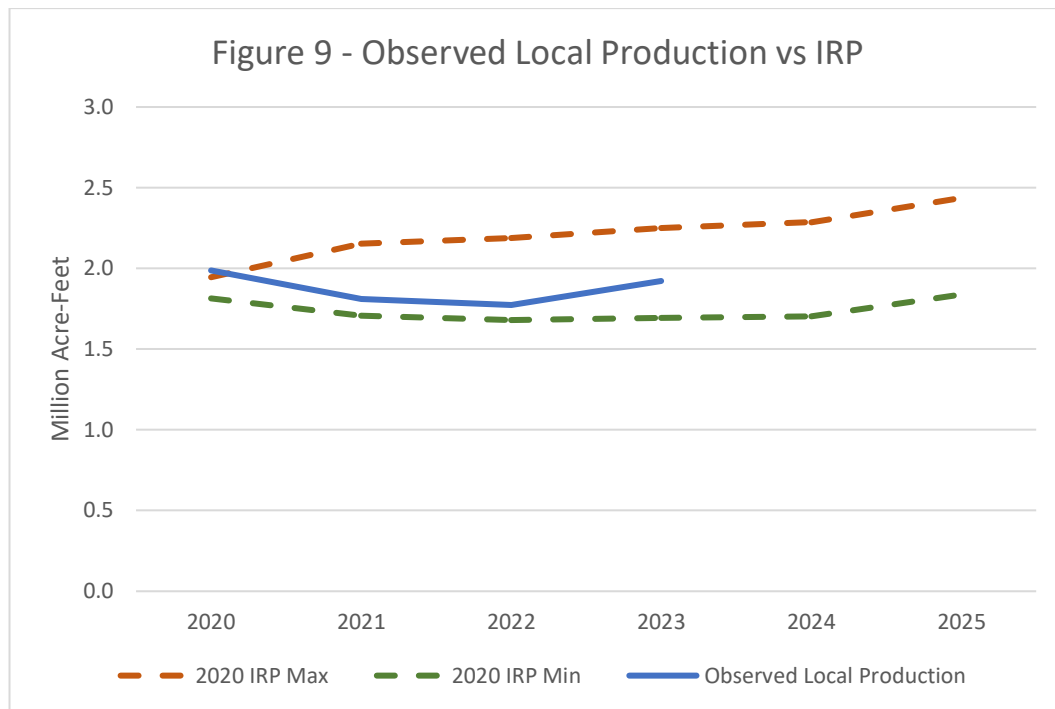


Figure 9 shows the observed local supply production in 2023 was within the minimum and maximum assumptions across the four scenarios of the 2020 IRP Needs Assessment. Metropolitan will continue to monitor local supply production for any significant changes.

Imported Supply (Risks & Regulations)

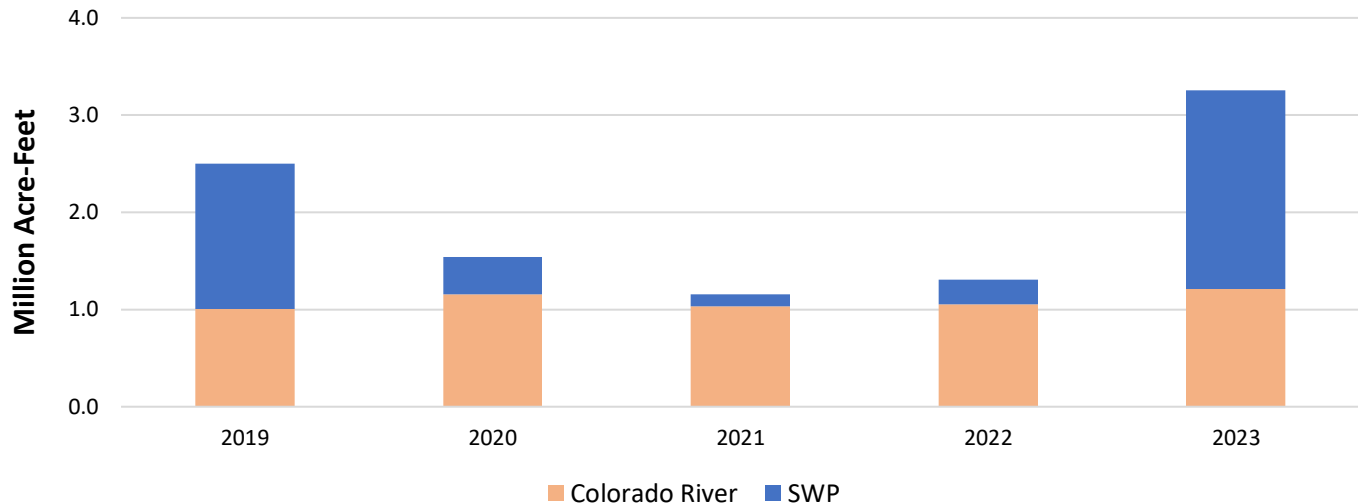
During the past several years, there has been significant fluctuation in the availability of total imported supplies. Although these fluctuations have so far been primarily caused by volatility in the State Water Project (SWP), the outlook for Metropolitan's Colorado River Aqueduct supplies also face uncertainty into the future. Figure 10 below reflects the amount of imported supply made available each year from calendar years 2019-2023, prior to any storage actions.

Beginning in the fall of 2019, the SWP watersheds received very low precipitation and runoff. SWP Table A allocations for 2020, 2021, 2022 were only 20, 5, and 5 percent, respectively. Despite substantial precipitation in October and December 2021, precipitation in Northern California from January through March 2022 fell to the driest levels on record. In 2022, for the first time in history, the California Department of Water Resources (DWR) used a provision of the SWP Contract to allocate water on a basis other than Table A to meet minimum demands of contractors for human health and safety needs. Despite extraordinary efforts by Metropolitan to maximize available resources through operational drought actions, Metropolitan did not have a sufficient amount of SWP supplies available to meet normal demands in the SWP Dependent Area for the remainder of 2022. Metropolitan thus implemented the Emergency Water Conservation Program from June 2022 to March 2023 to conserve limited SWP supplies. Despite a low initial allocation for 2023, the extraordinary wet conditions at the end of 2022 into the beginning of 2023 resulted in the 2023 SWP Table A allocation rising to 100 percent. In calendar year 2024, the SWP watersheds received above average snowpack and near-normal precipitation and runoff. However, the presence of threatened and endangered fish species near SWP pumping facilities affected the ability to move water from the Delta and resulted in a final SWP Table A allocation of 40 percent. The shift from extreme dry conditions to extreme wet conditions in a short time period, along with the impact of various regulations over these past few years has shown the ongoing challenges faced by Metropolitan's SWP supplies.

During water years 2020, 2021, and 2022, the Colorado River Basin experienced three of the lowest consecutive years of inflow on record. During this time, the combined storage of Lake Powell and Lake Mead declined from about 50 percent to 25 percent of total live capacity. The Lower Basin experienced its first ever shortage conditions, which impacted both Arizona and Nevada, but not California, per stipulations set forth in the 2007 Interim Guidelines. To address concerns over low reservoir levels and hydrologic conditions, the U.S. Bureau of Reclamation developed and adopted the 2024 Supplement to the 2007 Colorado River Guidelines for Lower Basin Operations and the Coordination Operations for Lake Powell and Lake Mead Record of Decision (2024 ROD). Similar to conditions in California, water year 2023 was also extraordinarily wet in the Colorado River Basin. Between the favorable hydrologic conditions and the system conservation efforts implemented to achieve the conservation goals set in the 2024 ROD, the combined storage of Lake Powell and Lake Mead increased to 35 percent of total live capacity by the

end of calendar year 2023. Due to this increase in storage, Lower Basin shortage levels decreased from a Level 2 Shortage in 2023 to a Level 1 Shortage in 2024. In 2024, the Colorado River Basin received an above average snowpack and near-average precipitation, with runoff at 82 percent of normal. System conservation efforts have continued, and the Lower Basin is expected to conserve approximately 2 MAF of its 3 MAF goal by the end of 2024, which includes water from Metropolitan programs that were turned over for system water creation through 2026. However, several important water management decisions that govern the operation of Colorado River facilities and management of Colorado River water are scheduled to expire at the end of 2026. Negotiations on these water management agreements are underway. Due to long-term drought conditions on the Colorado River, it is possible that California and/or Metropolitan may face future supply reductions. There is no consensus alternative at this time.

Figure 10 - Metropolitan Supplies Prior to Storage Actions



Notes: Graph depicts Metropolitan's annual Colorado River supplies (includes Metropolitan's Basic Apportionment, transfers and exchanges, adjustments for higher priority water use, and Indian and Misc. Present Perfected Rights; does not include water stored for SNWA or IID) and SWP supplies (includes total allocated Table A supplies, deliveries of Article 21 supplies, SWP transfer deliveries, and Human Health & Safety supplies). Graph does not reflect any operational limitations within either system and does not include puts or takes from Metropolitan's storage accounts.

SWP Outlook

Forecasts of SWP supplies for the 2020 IRP Needs Assessment were based on modeling studies produced by DWRs' CALSIM-II model. CALSIM-II simulates SWP and Central Valley Project operations under a range of historical hydrologic conditions. DWR publishes updated CALSIM forecasts of SWP deliveries in its biennial SWP Delivery Capability Report (DCR). The 2019 DCR was used in the 2020 IRP Needs Assessment and provided estimates of the existing (2019) and future (2040) SWP delivery capability for Metropolitan. These estimates incorporated regulatory requirements in accordance with U.S. Fish and Wildlife Service and National Marine Fisheries Service biological opinions. In addition, the estimates of future capability also reflected potential impacts of climate change and sea level rise.

The impacts of climate change were incorporated into the modeled SWP deliveries for all four 2020 IRP Needs Assessment scenarios. The 2019 DCR future condition included SWP deliveries with climate change impacts associated with RCP 8.5 and 1.5 feet of sea level rise. This more severe climate future was incorporated into scenarios C and D. In addition, it was determined that further degradation of SWP deliveries should be included in Scenarios C and D to account for future regulatory uncertainty, which was not included in the 2019 DCR, and unaccounted for climate impacts. A moderate level of climate change (RCP 4.5) was incorporated into scenarios A and B by interpolating between the existing and future (RCP 8.5) modeling studies in the 2019 DCR without an additional degradation of SWP deliveries.

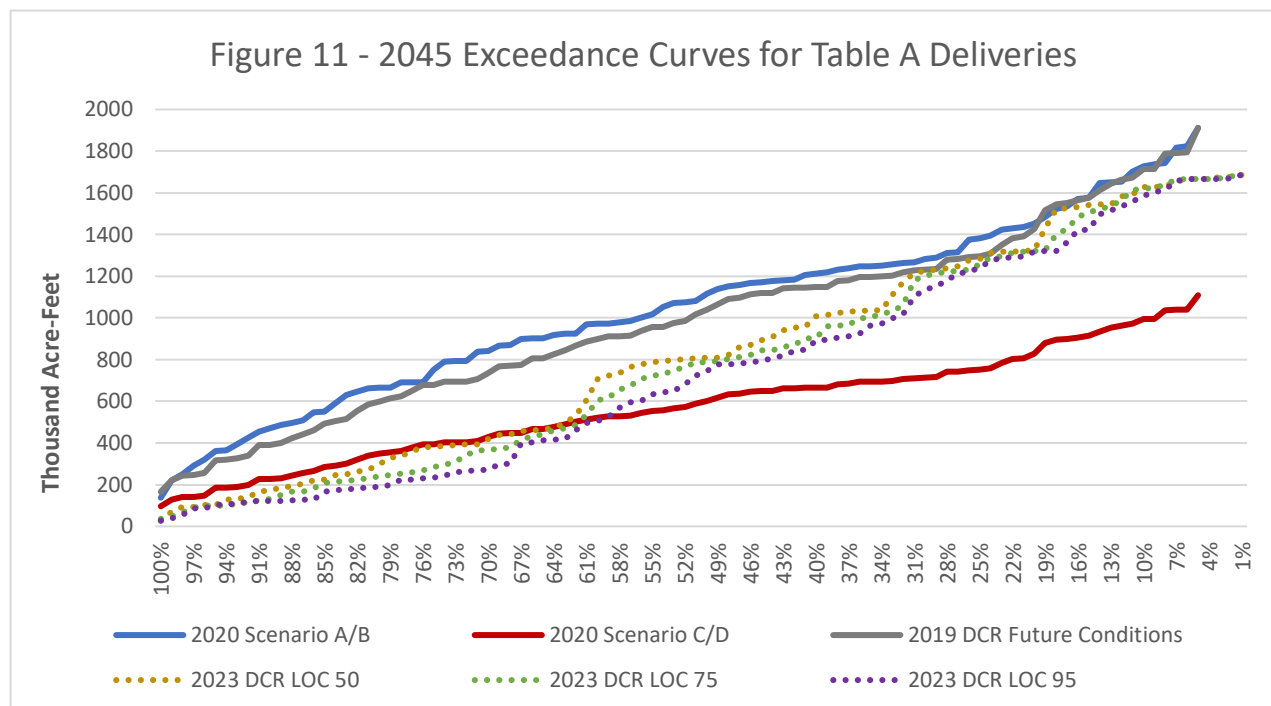
2023 Delivery Capability Report

Since first published in the early 2000s, the DCR has shown a long-term trend of steadily declining water supply reliability. Since 2005, average modeled SWP deliveries have decreased by over 600,000 acre-feet, equivalent to about a 15% SWP allocation⁶. These reductions are largely due to new regulatory requirements such as the 2008/2009 Federal Biological Opinions and increased regulatory responsibilities stemming from changes to the 2018 Coordinated Operations Agreement. The most recent declines shown in the 2023 DCR are due to the use of an adjusted historical hydrology with extended dry periods and more precipitation falling earlier in the year as rain instead of snow.

The 2023 DCR utilizes CALSIM 3 instead of CALSIM-II. There are several differences between the models, perhaps most importantly the inclusion of enhanced physical modeling, particularly the implementation of stream-groundwater interaction. In addition to the change in models, the 2023 DCR also uses an extended hydrology in its studies, 1922-2021 compared to 2019 DCR's 1922-2015.

The biggest difference between the 2023 DCR and the 2019 DCR is the approach to modeling climate change. The 2019 DCR included the existing condition study and only one future condition (RCP 8.5). The 2023 DCR includes the existing condition, the existing condition adjusted for climate change, and three climate “futures” identified as levels of concern (LOC50, LOC75, LOC90)⁷. While these LOCs do not represent specific RCPs, they are compatible with the 2020 IRP Needs Assessment methodology in terms of modeling climate-impacted SWP deliveries, as both methodologies associate SWP deliveries with specific future temperature increases.

Like the 2019 DCR, the 2023 DCR does not include any future regulatory uncertainty or further restrictions. Figure 11 compares the 2045 exceedance curves of modeled SWP deliveries for the 2020 IRP scenarios and those in the 2023 DCR. This figure shows that the 2020 IRP Scenarios C and D have lower deliveries in wetter years than those found in the 2023 DCR LOCs. This is mainly due to the inclusion of the additional SWP delivery degradation associated with regulatory uncertainty and unknown climate impacts. The new modeling studies will be incorporated into the next IRP update.



⁶ Figure 6-1, “Risk-Informed Future Climate Scenario Development for the State Water Project Delivery Capability Report”, Department of Water Resources, December 2023

⁷ “Risk-Informed Future Climate Scenario Development for the State Water Project Delivery Capability Report”, Department of Water Resources, December 2023, <https://data.cnra.ca.gov/dataset/finaldcr2023/resource/e41f531d-dace-4d37-b52e-35a6ddd2224e>

BiOps/ITP

Updates to State and Federal permits for the Long-Term Operations of the Central Valley and State Water Projects have been underway for the last four years. An updated State Incidental Take Permit and Federal Biological Opinion were released in November and December of 2024, respectively. The most significant changes are adjustments to the Spring outflow requirement and new flow-based offramps to early water year Old and Middle River (OMR) actions such as the turbidity bridge. Modeling in the draft permits showed minor increases to State Water Project deliveries.

Water Quality Control Plan

The State of California is currently in the process of updating its Bay-Delta Water Quality Control Plan, which identifies, balances, and protects beneficial uses of water – including municipal, agricultural, and environmental uses. The plan does this by adopting numerical and narrative water quality objectives to reasonably protect those uses. On October 25, 2024, the State Water Board (Water Board) released draft updates to the Bay-Delta Plan and a proposed program of implementation, based on staff alternatives described in the Water Board's September 2023 draft Staff Report that are centered around unimpaired flow. This newly released document also includes proposed updates based on the Agreements to Support Healthy Rivers and Landscapes (HRL), also known as voluntary agreements, which would provide additional flows as well as habitat restoration. As reported in the 2023 draft Staff Report, the Water Board staff's preferred alternative of 55% unimpaired flow would on average, result in estimated annual reductions to Southern California's water supply of about 450 TAF. Five public workshops led by State Water Board staff are planned through early next year and the Water Board is expected to make a final decision on the Bay-Delta Plan update by the end of Q2 2025.

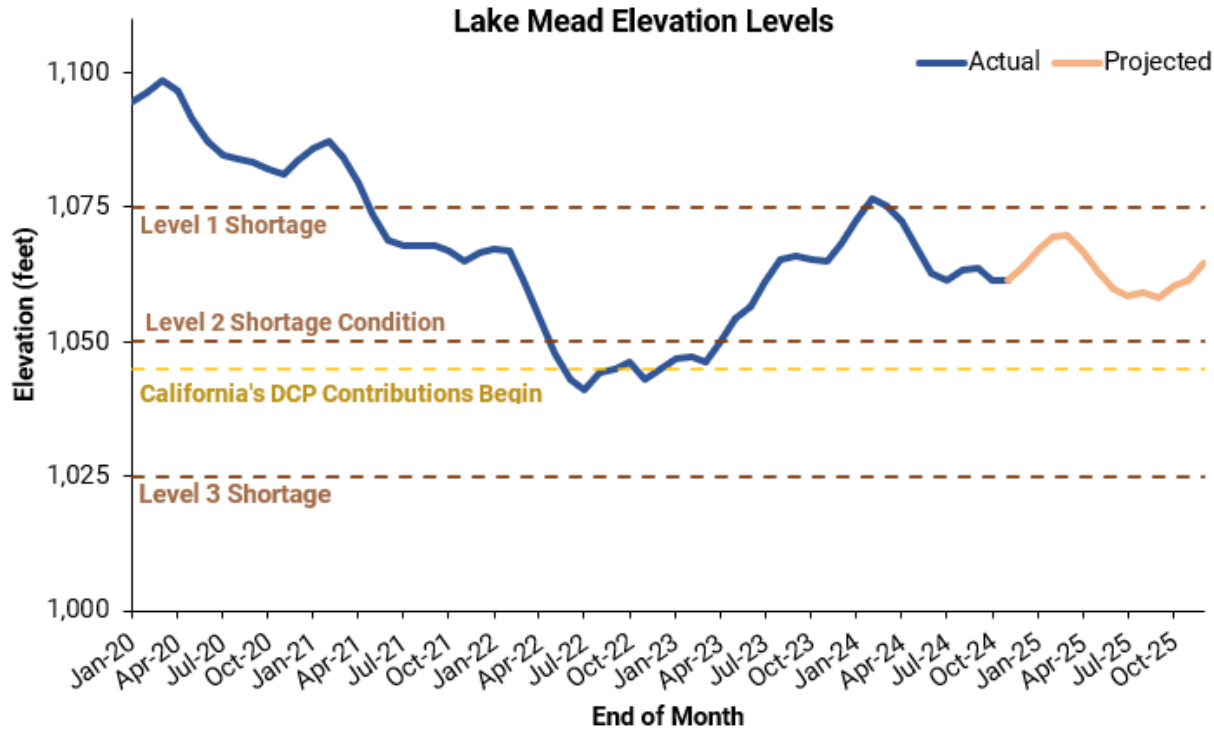
CRA Outlook

While the Colorado River remains in a decades-long drought, Lake Mead's elevation levels have shown signs of improvement since reaching a historic low in 2022, as shown in Figure 12. Continuing from calendar year 2024, Lake Mead will operate in a Tier 1 Shortage Condition during calendar year 2025. Metropolitan's water supplies are not impacted during a Tier 1 shortage. Thus, in the short term, there are no anticipated impacts to Metropolitan's Colorado River supplies; current projections indicate that no DCP contributions are expected to be required in calendar year 2026.

However, the long-term outlook still contains a significant degree of uncertainty. Several reservoir and water management decisional documents and agreements that govern the operation of Colorado River facilities and management of the Colorado River are scheduled to expire at the end of 2026. These include the 2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead (2007 Interim Guidelines), the 2019 Drought Contingency Plans, as well as international agreements between the United States and Mexico pursuant to the United States-Mexico Treaty on Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande (1944 Water Treaty).

The United States Bureau of Reclamation is undertaking a multi-year NEPA process that will identify a range of alternatives and determine operations for Lake Powell and Lake Mead and other water management actions post-2026 that could last for potentially decades into the future. To address unknown future conditions in the face of climate change, this process will consider a wide range of potential hydrologic conditions informed by historical conditions, paleontological records, climate-model based ensembles, and climate science. Reclamation has stated that they plan to release the set of alternatives that will be evaluated in the Draft EIS for post-2026 Colorado River operations by the end of calendar year 2024 and would undertake the analysis and development of the Draft EIS in the first half of 2025. The outcome of that process is uncertain, however all alternative proposals submitted by basin stakeholders have included reductions in the Lower Basin that have the potential to impact Metropolitan's supplies. While no consensus alternative has been developed to date, the seven Colorado River Basin States and others will continue to work towards the development of a consensus alternative that can be evaluated in the Final EIS. When a consensus alternative has been determined, it will be incorporated into IRPSIM modeling.

Figure 12 – Lake Mead Elevation Levels



Notes: Metropolitan is required to make Drought Contingency Plan (DCP) contributions in the following year if the August 24-month Study projects Lake Mead's elevation to be at or below 1,045 feet on January 1. Since the August 2024 24-month Study projected Lake Mead's elevation to be above 1,045 feet on January 1, 2025, Metropolitan is not required to make DCP contributions in 2025. This figure reflects the latest 24-month study (November 2024) available at the time of this report.

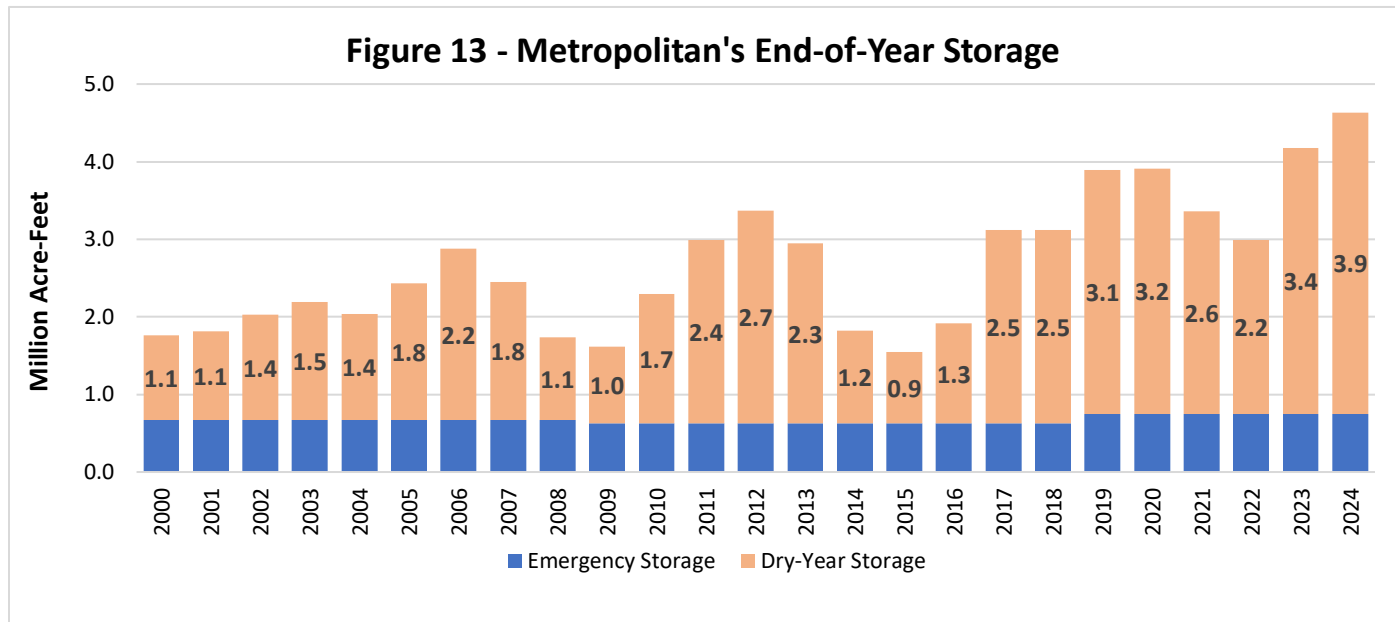
Storage

While Metropolitan's storage is cyclical, the state of storage balances has significant implications for water reliability in both the near term and long term. Stored water is essential in helping Metropolitan balance demand and supply in a given year or within a drought sequence. Since the 2020 IRP, Metropolitan has made great strides with its storage efforts. In particular, Metropolitan has worked to develop operational flexibility and additional SWP storage programs to help further ensure SWP reliability, most notably with the start of operations with the Antelope Valley – East Kern Water Agency (AVEK) High-Desert Water groundwater banking program. Metropolitan continues to explore storage opportunities both within and outside of Metropolitan's service area.

As detailed in Figure 13 below, Metropolitan's dry-year storage levels have experienced significant fluctuations over the past five years, driven by varying hydrologic conditions and the corresponding withdrawals and puts into storage. During the previous drought sequence, Metropolitan withdrew roughly a million acre-feet from its dry-year storage accounts and faced emergency drought restrictions within the SWP Dependent Area. The restrictions within the SWP Dependent Area were a result of historic dry conditions within California, as well as limited access to stored supplies for the SWP Dependent Area.

Metropolitan's storage balance is on track to begin 2025 with higher starting storage balances than had been assumed in the 2020 Needs Assessment. Wet and above normal water years in water years 2022/2023 and 2023/2024, respectively, enabled significant puts into Metropolitan's storage accounts, in particular within the SWP Dependent Area. As a result, Metropolitan ended calendar year 2023 with a record high amount of storage and is projected to end calendar year 2024 with another record high, with around 3.9 MAF of dry-year storage. Metropolitan's storage actions in calendar year 2024 include putting water into Diamond Valley Lake, Metropolitan's Intentionally Created Surplus account in Lake Mead, and San Luis Reservoir carryover supplies. Additionally, Metropolitan's groundwater banking programs are expected to have four years of dry-year storage by the end of 2024, with the exception of the AVEK High-Desert Water Bank program, as it remains a relatively new program. More information on the current estimates of Metropolitan's storage accounts and the maximum put and take capacities for these storage accounts can be found in the Water Surplus and Drought Management Update report, Attachment 1, dated December 10, 2024.

Through Metropolitan's diverse and expansive storage accounts, Metropolitan is well positioned for the next drought sequence that may arise. More specifically, Metropolitan's storage at the end of calendar year 2025 will allow Metropolitan to sustain a repeat of the recent drought sequence, if such a period were to occur. SWP transfer supplies and new storage opportunities will continue to be pursued by Metropolitan to help ensure a reliable water supply for the SWP Dependent Area in the coming years. Storage of Metropolitan's Colorado River supplies will continue to be monitored and evaluated in light of the current post-2026 negotiations, which may impact Metropolitan's Lake Mead ICS stored supplies.



Note:

2024 end-of-year balance is preliminary as it is subject to DWR adjustments and USBR final accounting. Data as of November 1, 2024.



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Climate Adaptation Master Plan for Water (CAMP4W)

WORKING MEMORANDUM 8

REFINING SIGNPOSTS AND TIME-BOUND TARGETS

January 2025

1 Introduction

Extreme weather conditions in recent years have presented Southern Californians with an unsettling preview of the challenges ahead. In addition to the highly variable year-to-year hydrologic conditions inherent in the western United States, climate change has fueled extreme water events further challenging water management in California. The State abruptly swings from periods of severe and extended drought to record-setting wet seasons. This is putting mounting pressure on the management of the region's available and potential water resources. The Climate Adaptation Master Plan for Water (CAMP4W) ensures Metropolitan's commitment to assess and respond to the climate risks to water supplies, water quality, infrastructure, operations, workforce, public health, and financial sustainability.

CAMP4W is an adaptive management approach to integrated resource planning, and it provides a roadmap to guide future capital investments while considering the risks and impacts of climate change. The 2024 Climate Adaptation Master Plan for Water (CAMP4W) Year One Progress Report presents the Climate Decision-Making Framework (**Figure 1**). The framework is intended to define a consistent, stepwise process to help the Board make project and program investment decisions based on the best available information. It is critical that investments are driven by informed, educated, and intentional decisions. Metropolitan's priorities, as defined through the CAMP4W planning process, emphasize the need to remain reliable and resilient into the future, while considering financial sustainability, affordability, and equity. Metropolitan must balance the need to be prepared for the future with the need to balance costs and not over-build or create stranded assets.

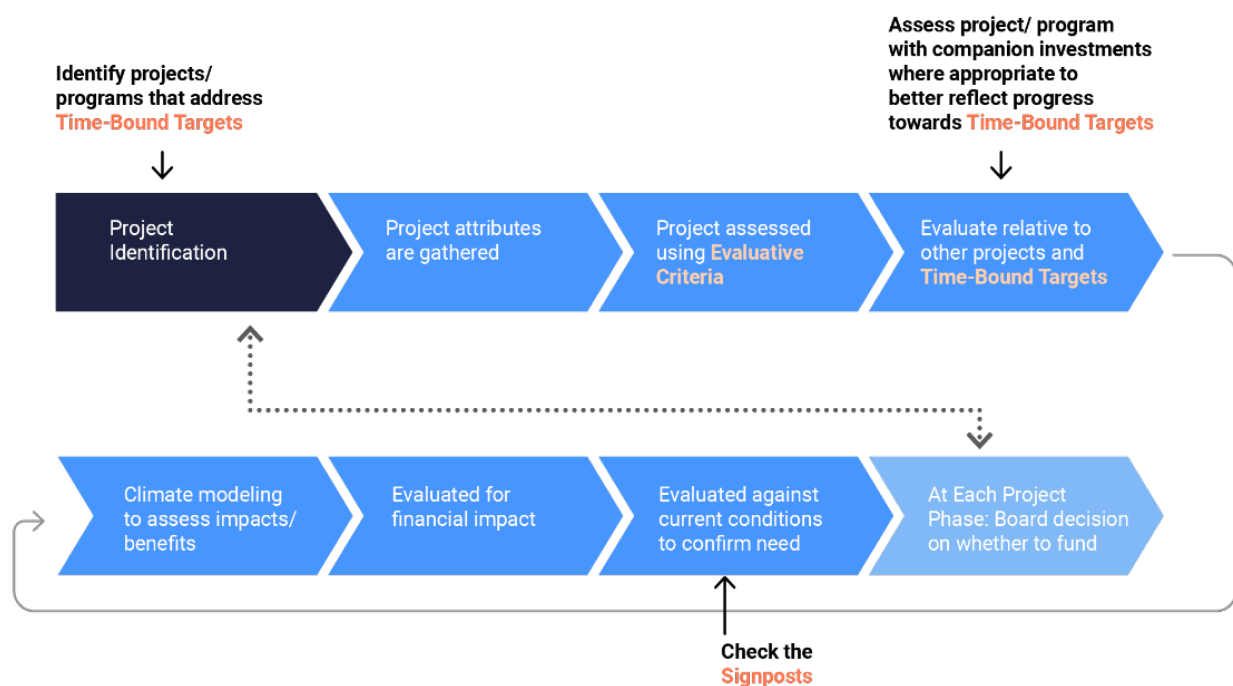


Figure 1. Climate Decision-Making Framework

Interplay between Time-Bound Targets and Signposts. Time-Bound Targets and Signposts will work hand in hand to support the Board’s deliberation process and investment decisions. While Evaluative Criteria facilitate the assessment of projects and programs based on their merits, Time-Bound Targets identify the resource- and policy-based objectives that guide project development and investments to be reliable and resilient into the future. Through near-, mid- and long-term Time-Bound Targets, Metropolitan will measure progress towards CAMP4W objectives and specific priorities set by the Board. Tracking and updating Signposts will provide regular reporting of key real-world metrics that, over the long-term planning horizon and driven by trends rather than short-term fluctuations, may suggest the need to update the Time-Bound Targets.

Working Memorandum 8 Content. Three key elements critical to the Climate Decision-Making Framework, which include Evaluative Criteria, Time-Bound Targets, and Signposts, are defined in **Figure 2**. The CAMP4W Year One Progress report stated that each of the key elements would be updated throughout 2024. **This Working Memorandum 8 provides an update on the progress made in refining the Signposts and Time-Bound Targets** and presents the next steps. Evaluative Criteria are being developed simultaneously and will be presented to the Task Force separately.

Glossary of Terms. This Working Memorandum utilizes additional terms that are defined in **Figure 3** for reference.

As Metropolitan prepares for the future through **planning under deep uncertainty**, it is as important as ever that we make informed, educated, and intentional decisions on where and how we invest. We must balance the need to be prepared for the future, with the need to balance costs and not over build or create stranded assets. As an agency responsible for supplying water to our 26 Member Agencies, who serve the 19-million person service area across 5,200 square miles, the impacts of our decisions are far reaching.

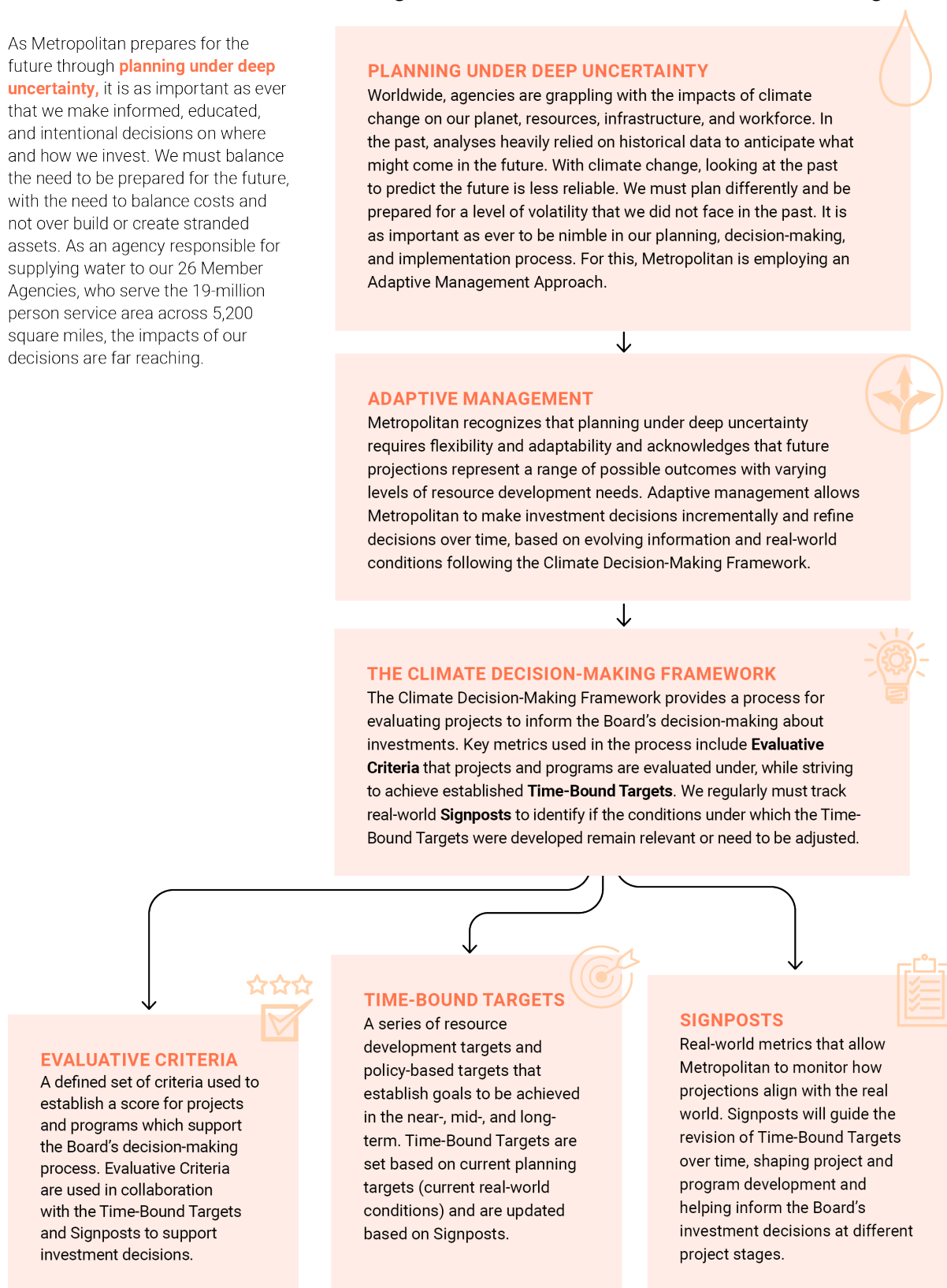


Figure 2. Adaptive Management Process defined in the CAMP4W Year One Progress Report

Drivers of change

- Specific factors whose future values and outcomes are uncertain but significantly impact future water supply reliability and system resilience

Scenario

- A singular view of the future under specific assumptions and outcomes

Supply/Demand Gap

- An analysis performed for each scenario to determine the frequency, timing, and geography of net shortage conditions

Time-Bound Targets

- Resource development and policy goals set by the Board to address future reliability needs identified by the supply/demand gap analysis and other objectives to help Metropolitan best meet its mission

Signposts

- Measurable indicators of the direction and trends of identified drivers of change

Figure 3. Glossary of Terms

2 Signposts

The CAMP4W Year One Progress Report provides a list of proposed Signposts across four categories, which include Demand, Supply, Infrastructure, and Financial Signposts (**Figure 4**). **This Working Memorandum 8 focuses on refinements to the Signposts that have been made since the issuing of the Year One Progress Report.**

DEMAND	SUPPLY	INFRASTRUCTURE	FINANCIAL
Population	Climate Change Indicators	Unexpected Shutdowns	O&M Trends
Economy	Regulations	Infrastructure Loss	Capital Cost Trends
Local Agency Supply	Storage	Emergency Response	Emergency Response Costs
Demand Management	Water Quality	Power Interruptions	
Regulations		Connectivity and Robustness	
Figure 6-2 Proposed Signpost Metrics		Infrastructure Capability	

Figure 4. Initial Signposts Proposed in the 2024 CAMP4W Year One Progress Report

2.1 Understanding Signposts

As the scenario planning approach helps account for a range of supply gaps and uncertainties, Signposts contribute to an updated understanding of how the drivers of change may be shaping actual conditions relative to potential scenarios. Signposts serve as measurable indicators of the direction and trends of the identified drivers of change over time. Tracking signposts will involve collecting data over time and analyzing the data to identify patterns, shifts or movements that impact water supply and demand conditions, track impacts to infrastructure, and inform our assumptions about possible future conditions. Although signposts do not eliminate uncertainty, they offer a data-driven understanding of patterns, helping to contextualize trends over time and enhance decision-making.

2.1.1 Integrated Water Resources Plan Needs Assessment

Metropolitan's [Integrated Water Resources Plan \(IRP\)](#) is a key planning effort towards establishing a long-term, comprehensive water resources strategy.

1/29/2025 LTRPPBM Subcommittee Meeting
The IRP is adaptive and as regional water resource issues evolve, so does the IRP. Since the inaugural IRP in 1996, Metropolitan routinely monitors conditions and measures progress in achieving the plan's objectives. As such, the IRP has been periodically updated to expand Metropolitan's strategy to address changing conditions that affect water resource reliability.

The 2020 IRP planning process featured a regional needs assessment that evaluated the impacts of uncertainties including climate change on water resource reliability. This effort resulted in a comprehensive list of findings to help guide actions to address those uncertainties. The 2020 IRP Needs Assessment is summarized in [Working Memorandum #3](#).

3b

Attachment 2, Page 6 of 15

Role of Scenarios and Signposts

Scenarios are not intended to control, select or predict the likelihood of uncertainties or predict the future but rather to allow Metropolitan to exercise awareness of potential future challenges and ensure Metropolitan remains prepared.

Signposts support tracking and quantifying trends over time. Tracking them is not intended to eliminate uncertainty but rather to inform assumptions about possible future conditions and support decision-making with the most up-to-date information available.

2.1.2 Drivers of Change and IRP Scenarios

The supply and demand Signposts outlined below and referred to as Water Supply Reliability Signposts, are derived from the comprehensive IRP analysis that identified drivers of change. Drivers such as climate change, regulatory requirements, and growth, have uncertain but potentially significant effects on both water supply and demands in Southern California (**Figure 5**). The IRP Needs Assessment quantified these uncertainties and their potential effects on future supply and demand. Metropolitan then developed separate sets of assumptions for the drivers of change. These sets of assumptions became the basis for the IRP scenarios (A, B, C, and D) which are shown in **Figure 6**. These scenarios serve to represent the range of potential future outcomes and allow for investigations of the major sources of uncertainty and the impacts of those uncertainties on supply and demand.

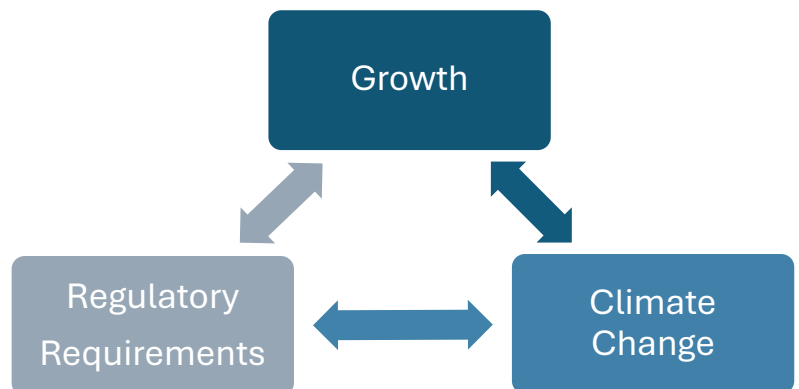


Figure 5. Drivers of Change for Water Supply Reliability

Drivers of change for infrastructure and financial Signposts outlined in this memorandum focus on evaluating the trends in impacts to Metropolitan's infrastructure over time from climate related conditions and events.



Figure 6. IRP Needs Assessment Planning Scenarios A, B, C and D

2.1.3 Need for Signposts

Signposts are a tool in the CAMP4W process, employed to track and quantify trends and changes in drivers over time. They provide context for decision-making by monitoring trends across multiple years and provide visibility of these trends to the Board through regular updates. Tracking Signposts ensures that Board decisions are informed by the current information. While not all data can be updated with the same frequency—especially data tracked by external entities—Signposts provide insight to long-term shifts which have more significance than short-term variations.

Signposts do not eliminate uncertainty, but they support a structured and evidence-based decision-making process. It is important to note that the trends tracked by Signposts take time to develop, and require analysis and context.

2.1.4 Signposts Inform the Long-Term Strategic Planning Cycle

Combining IRP Scenario planning and Signposts tracking creates a disciplined planning methodology. Although IRP updates are intended to occur generally every five years, the tracking of Signposts will be reported on an annual basis and certain conditions might necessitate earlier reviews. A few of these conditions may include:

- A structural or systemic change in the underlying uncertainties (e.g., rule and regulation changes to the Colorado River)
- New data or insights that indicate the cause-and-effect relationship made for underlying drivers of change are different than originally assumed
- Certain factors become more certain/known than originally evaluated, which may impact the range of future conditions (e.g., climate change impacts on groundwater basins and replenishment; extreme heat events increase the frequency of infrastructure failures)

IRP updates, which will be presented for Board approval roughly every five years, will include revising assumptions, planning model inputs, updating the reliability analysis, and updating the needs assessment. While updating the Time-Bound Targets will be at the discretion of the Board, it would be practical to include revisiting them as part of the five-year process when supply and demand gaps are updated. Metropolitan's long-term strategic planning cycle is presented in **Figure 7**. Key components that are considered annually include:

- Assessments of Signpost data and evaluation of information to inform the CAMP4W Annual Report
- Local Agency Supply surveys to track assumptions made in scenarios
- Report out on storage conditions (which are tracked more frequently as well)
- Scenario check-in to confirm assumptions align with current information and observations

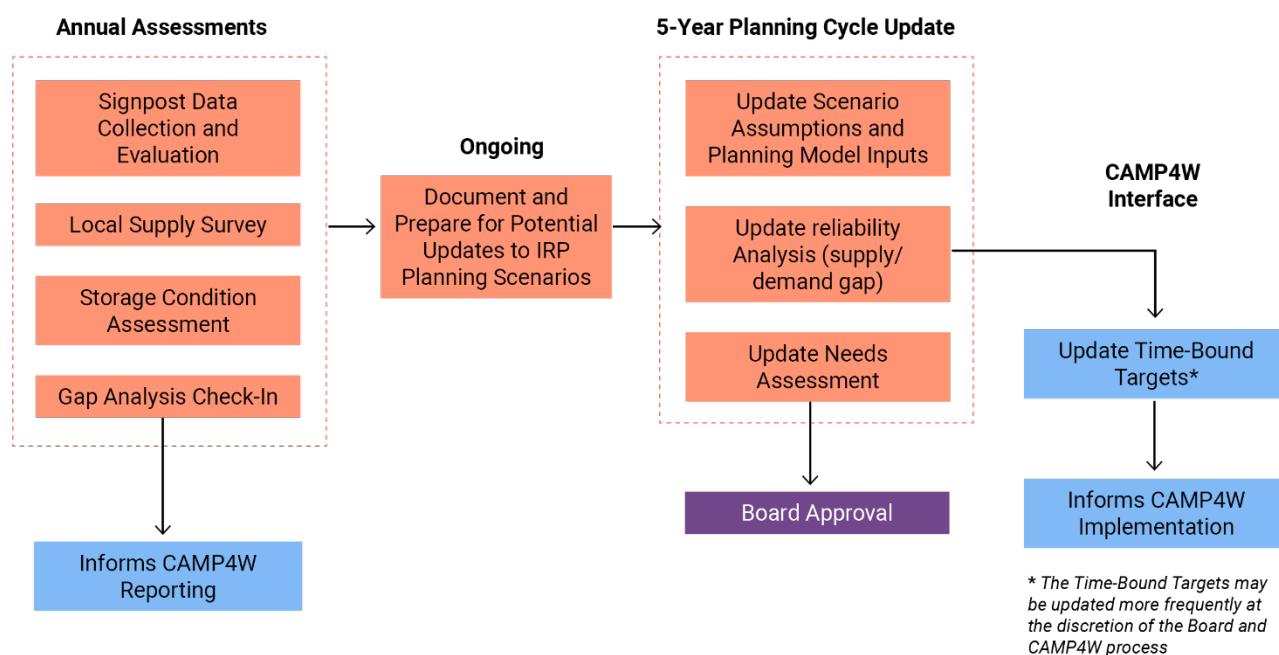


Figure 7. Metropolitan's Long-Term Strategic Planning Cycle

2.2 Identifying and Interpreting Signposts

Signposts should be effective, meaningful, and not overly complex to avoid potentially delaying any decision-making processes. It is also important that they be based on objective factors that are verifiable and transparent. The following section describes the process used to identify Signposts.

2.2.1 Approach for Identifying and Interpreting Water Supply Reliability

Signposts

Signpost data necessarily involves the establishment and analysis of trends over time to ascertain relevance and insights for Time-Bound Targets and Metropolitan’s investment decisions. **Signposts do not trigger actions.** Actions will be triggered by Board direction and policy decisions, where Signposts are one tool used to ensure decision-making is based on the best available information.

To identify the appropriate Water Supply Reliability Signposts, a set of screening parameters are reflected in the following questions:

- **Is it measurable?**
- **Does it have an impact on supply or demand?**
- **Can it be reflected in a modeling approach?**
- **Is the impact of the Signpost persistent and not transitory (i.e., systemic)?**
- **Is it reflected indirectly in other signposts?**

Using these screening parameters, the Water Supply Reliability Signposts were refined to include those described in Table 1.

Table 1. Summary of Proposed Water Supply Reliability Signposts

	Data and Sources	Importance	Limitations
Demographic Signpost	Population and Household: <i>Department of Finance, Census, SCAG, SANDAG</i> Employment: <i>CA Employment Development Department</i>	Key inputs in modeling retail demand Systemic changes can affect demand/supply gaps (e.g. low birthrate and migration)	Annual data are estimates by governmental agencies and are subject to revision Signs of systemic change can take a long time (Census)
Climate Change Signpost	GHG emissions Annual California Hydroclimate Report Intergovernmental Panel on Climate Change National Oceanic and Atmospheric Administration CALSIM III (DWR’s modeling tool) CRSS (USBR’s modeling tool)	Emission trends are an indicator of how climate change risk is developing RCPs are reflected in MWDs modeling CALSIM III includes RCP modeling Estimated climate impacts associated with RCPs are applied to the CRSS inputs	Difficulty in downscaling impacts to local areas The impacts of climate change take years to be established Climate models incorporate the latest thinking, but climate science continues to evolve

	Data and Sources	Importance	Limitations
Local Agency Supply Signpost	Member agency coordination/ Local Supply Survey Groundwater basin reports	Key inputs in modeling Metropolitan's demand Systemic changes can affect demand/supply gaps (e.g. impaired groundwater basins)	Local Supply is also dependent on weather variation Data is not available in real-time (year plus delay) Data is provisional and subject to reconciliation and revisions
Imported Supply Signpost	DWR's Delivery Capability Report (CALSIM III) SWP BiOps USBR 24-Month Study Reporting CRA Post-2026 Operating Guidelines Source Water Constituents of Concerns Title 22 Primary and Secondary Drinking Water Regulations	Regulations may have significant impacts on Metropolitan's core supplies and demands Regulatory parameters are reflected in Metropolitan's modeling	Implementation and effectiveness of regulations may be uncertain May be subject to legal challenges and negotiations
Metropolitan Storage Signpost	Metropolitan's storage accounting <ul style="list-style-type: none"> • Put/take capacity • Accessible storage by region • End-of-year storage balances 	Stored water is a core supply needed to balance demand and supply.	Storage balances can fluctuate from year-to-year

2.2.2 Approach for Identifying and Interpreting Infrastructure and Financial Signposts

Metropolitan performs regular rehabilitation and repair to its infrastructure as a normal course of business. Climate change puts additional stress on Metropolitan's facilities and causes additional replacement and repair projects to maintain the system during and after extreme events. Understanding the increased frequency and extent of infrastructure repair and replacement projects due to climate change is a critical factor in understanding how climate change is impacting Metropolitan as well as the needed investments. Metropolitan will also strive to track the financial impacts related to infrastructure investments needed to address climate impacts and projections. **Tracking these trends over time will provide valuable data to support investment decisions.**

Infrastructure and financial Signposts provide Metropolitan with data that shows how climate is impacting infrastructure in terms of losses, interruptions, and useful life, as well as the corresponding financial impacts. To track the information needed to report on these Signposts, Metropolitan will need to implement additional tracking and reporting procedures. The development of appropriate Signposts must therefore be based on the potential availability of data and other factors, discussed below.

At the individual asset level, there are benefits to tracking trends. As an example, tracking the impact of

heat on electrical assets in the desert can inform the best timing for investing in repair or eventually replacement, if needed. In this case, the increased frequency of occurrence would be an infrastructure metric that could indicate this particular asset is in need of a more permanent solution. The financial signpost that corresponds to this example would include tracking the capital and O&M expenditures for these repairs. When trends indicate the increased frequency of this repair as well as the magnitude of damages, expressed as time spent or the equivalent costs, this could validate the increased expense to more permanently address this climate impact.

In addition to the direct relationship between the example at the asset level and the decision to fund an infrastructure project to mitigate the impacts of climate change on that asset, tracking this kind of information would provide Metropolitan with a method of evaluating system-wide climate impacts. Over time, data collected could inform design standards and repair and replacement schedules, and foster opportunities for infrastructure and operational innovation.

Implementing these kinds of Signposts would be done by expanding Metropolitan's asset management program to track additional climate related impacts. Currently, Metropolitan operations staff perform regularly scheduled and unexpected repairs and replacements based on work orders and tracking within Metropolitan's digital system. The proposed pathway to tracking the impacts of climate change would require additional metrics to link observations and actions to climate conditions, where applicable. Additionally, tracking the cost would provide detailed information on how these efforts impact Metropolitan financially.

To identify the appropriate Infrastructure and Financial Signposts, a similar set of screening parameters to those identified for Water Supply Reliability Signposts are reflected in the following questions:

- **Is it measurable?**
- **Does it have an impact on infrastructure or the cost to maintain infrastructure?**
- **Is the impact of the Signpost persistent and not transitory (i.e., systemic)?**
- **Is it reflected indirectly in other Signposts?**

The CAMP4W Task Force and staff identified potential infrastructure and financial Signposts to track and help facilitate decision-making. These were included in the CAMP4W Year One Progress Report and are listed below:

Initial Draft Infrastructure Signposts:	Initial Draft Financial Signposts:
<ul style="list-style-type: none"> • Infrastructure Loss • Power Interruptions • Connectivity and Robustness • Infrastructure Capability • Unexpected Shutdowns • Emergency Response 	<ul style="list-style-type: none"> • O&M Trends • Capital Cost Trends • Emergency Response Costs

A refined set of Infrastructure and Financial Signposts are presented in Table **Table 2. Infrastructure and Financial Signposts**², including the addition of a potential affordability Signpost.

Table 2. Infrastructure and Financial Signposts

Signpost	Infrastructure Metrics	Financial Metrics
Infrastructure Loss	Frequency of infrastructure loss or failure (R&R) related to climate impacts: tracking of work hours, time	Capital and O&M cost to repair or replace
Infrastructure Capability	Frequency and duration of a service area receiving inadequate water supplies due to climate impacts and/or infrastructure limitations, tracking of time and allocated supply	Capital and O&M costs to secure and deliver emergency water supplies; costs and impacts to implement emergency conservation programs and communications
Power Interruptions	Frequency and duration of interruptions due to climate impacts; tracking of work hours, time	Capital and O&M cost to provide alternative power supply or financial impact of not having power
Unexpected Shutdowns	Frequency of loss of use related to climate impacts: tracking of work hours, time	Capital and O&M cost to repair or replace
Emergency Response	Frequency and duration of emergency response; tracking of work hours, time	Capital and O&M cost to associated with emergency response
Affordability	Trends in affordability of rates throughout service area (Further recommendations TBD)	

In addition to tracking how climate change is impacting assets, Metropolitan is interested in methodologies for tracking affordability metrics. To understand the feasibility of tracking this metric as a Signpost, staff will look to industry standards and practices, including experiences and input from Member Agencies, and return to the Board with options in 2025.

3 Time-Bound Targets

3.1 Understanding Time-Bound Targets

Time-Bound Targets are policy and resource management goals which are established by the Board to guide project and program development and support the evaluation of proposed investments in pursuit of climate adaptation and the CAMP4W objectives. As discussed in Section 0, Time-Bound Targets work in collaboration with Signposts and Evaluative Criteria to form the basis of the Adaptive Management process (see **Figure 2**).

Time-Bound Targets are informed by the findings of resource planning in the IRP process and other data analysis. Similar to criteria used in the General Manager's Business Plans, Metropolitan seeks Time-Bound Targets that are specific, measurable, and achievable. The Time-Bound Targets proposed herein are based on these criteria and have been drafted to reflect Board indicated priorities.

The Board establishes Time-Bound Targets and may update them at its discretion. Because many of the Time-Bound Targets are based on the IRP planning process, updating and refining them at a similar interval to the IRP updates may be practical. Regardless, long-term trends rather than short-term variation in real-world conditions, as reflected by Signposts, IRP planning, and other holistic analyses, should form the basis for updating the Time-Bound Targets.

3.2 Identifying Time-Bound Targets

The Time-Bound Targets outlined in the CAMP4W Year One Progress Report were developed to reflect Board priorities as discussed in the Task Force meetings. **Figure 8** presents the Time-Bound Targets defined in the CAMP4W Year One Progress Report.

 Resource-Based Targets Numbers reflect additional supplies unless indicated otherwise	CATEGORY	NEAR TERM	MID TERM	LONG TERM
	Core Supply ¹	N/A	Identify 300 TAF for potential implementation by 2035. Alternatively, 250 TAF of new storage will reduce core supply need to 200 TAF	Identify 650 TAF for potential implementation by 2045. Alternatively, 250 TAF of new storage will reduce core supply need to 550 TAF or, 500 TAF of new storage will reduce core supply need to 500 TAF
	Storage	Identify up to 500 TAF for potential implementation by 2035		
	Flex Supply (Dry Year Equivalent)	Acquire capability for up to 100 TAFY		
 Policy-Based Targets	CATEGORY	NEAR TERM	MID TERM	LONG TERM
	Equitable Supply Reliability	Add 160 CFS capacity to the SWPDA by 2026	Implement additional 130 CFS capacity to SWPDA by 2032	Implement capacity, conveyance, supply, and programs for SWPDA by 2045
	Local Agency Supply ²	Maintain 2.09 to 2.32 MAF (under average year conditions)	2.12 to 2.37 MAF (under average year conditions)	2.14 to 2.40 MAF (under average year conditions)
	Demand Management ³	Implement structural conservation programs to achieve 300 TAF by 2045		
	Regional Water Use Efficiency	Assist Retail Agencies to achieve, or exceed, compliance with SWRCB Water Use Efficiency Standards ⁴		
		GPCD target for 2030 ⁵	GPCD target for 2035	GPCD target for 2045
	Greenhouse Gas Reduction	N/A	40% below 1990 emission levels by 2030	Carbon Neutral by 2045
	Surplus Water Management	Develop capability to manage up to 500 TAFY of additional wet year surplus above Metropolitan's Storage Portfolio and WSDM action		

Figure 8. Time-Bound Targets as defined in the CAMP4W Year One Progress Report

In addition, the Year One Progress Report identified six categories of additional Time-Bound Targets for future consideration:

- **Community Equity:** Focus on investing in underserved communities, affordability measures and providing meaningful community engagement.
- **New Local Supply:** Targets around local and Member Agency supply and/or program development.
- **Water Quality:** Invest in necessary research and innovation to address emerging contaminants of concern and new regulatory requirements.
- **Infrastructure Resilience:** Investments necessary for existing and future infrastructure to be able to meet growing climate-driven vulnerabilities during and after disruptions.
- **Imported Water Source Resilience:** Investment in protecting source watersheds and existing infrastructure to reduce risks presented by accelerated climate change.
- **Ecosystem Health:** Invest in natural systems that provide measurable improvements and value, in the areas of resilience, and regulatory benefits to water supplies.

Potential targets for Community Equity, Water Quality, and Imported Water Source Resilience were presented at the July 24, 2024 Task Force meeting. **Table 3** presents the draft Time-Bound Targets for those categories that were presented to the Task Force, with revisions based on the discussion at the meeting and subsequent feedback.

Further data collection and analyses will continue to set new or refine existing Time-Bound Targets as conditions change, progress is made, Signposts are reviewed, the IRP is updated, and Board direction is provided.

Table 3. Draft Time-Bound Targets for Community Equity, Water Quality, and Improved Water Source Resilience

Category	Near Term	Mid Term	Long Term
Community Equity <i>Focus on investing in underserved communities, affordability measures and providing meaningful community engagement to address the impacts of climate change.</i>	Develop and promote water conservation programs, rebates, and incentives for low-income and disadvantaged communities (DAC), as defined in Water Code 79505.5, to increase program participation and regional water conservation.		
	Work with member agencies and legislative sponsors for continuous state and federal funding for low-income rate assistance programs (LIRA).	Develop equity metrics and conduct community equity analyses on Metropolitan infrastructure investments, operations, and conservation programs.	
	Gather regional information about impacts of water rates on DACs to support member agencies.	Develop a Water Affordability & Environmental Justice Policy to inform community investment associated Metropolitan projects and programs.	

Category	Near Term	Mid Term	Long Term
Water Quality <i>Invest in necessary research and innovation, to address emerging contaminants of concern and new regulatory requirements.</i>	Develop research, mitigation, and response plans and management tools to address highest priority climate-induced water quality impacts such as: <ul style="list-style-type: none"> • Increased Salinity • Elevated Turbidity and Pollutant Concentrations • Increased Nutrient Pollution • More Frequent Reservoir Anoxia • Increased Chlorine Demand and Microbial Activity 		
	Update nitrification action plan and response indicators by end of 2025	Implement new tools and infrastructure modifications to minimize climate impacts on water quality	
Imported Water Source Resilience <i>Investment in protecting source watersheds and existing infrastructure to reduce risks presented by accelerated climate change.</i>	Participate in pilot projects to assess climate adaptation strategies that build watershed resilience and their benefits to protection of water supply	Develop and implement a program for supporting the protection of source watersheds from climate change-drive risks to water supply	

3.3 Use of Time-Bound Targets

Time-Bound Targets will be used to guide project and program development and support the evaluation of proposed investments. They will establish a timeframe for when projects or programs need to be planned and implemented to provide readiness for future scenario conditions and identify emphases to pursue potential co-benefits along with water supply reliability and system resilience.

When considering which projects and programs will be assessed through the CAMP4W decision-making framework, staff will consider their relevance toward Time-Bound Targets among the screening questions.

4 Conclusion and Next Steps

Signposts and Time-Bound Targets are important components of an adaptive management approach to resource planning and investment, which enhances flexibility and responsiveness amid the dynamic conditions and uncertainties of climate change. They support the Board's decision making about investments, using the best available information and emphasizing Board established priorities. Signposts and Time-Bound Targets are intended to be adaptive as well, and staff will continue to revise them, and any changes will be presented for Board consideration.

The refined set of Water Supply Reliability Signposts have been included in the Draft 2024 CAMP4W Annual Report, and future Annual Reports will include the infrastructure and financial signposts discussed, as well as any new ones identified. The initial set of Time-Bound Targets will be incorporated into the CAMP4W Implementation Strategy with next steps on the additional, future Time-Bound Targets, at the discretion of the CAMP4W Task Force and Board.

Category	Near Term	Mid Term	Long Term
Water Quality <i>Invest in necessary research and innovation, to address emerging contaminants of concern and new regulatory requirements.</i>	Develop research, mitigation, and response plans and management tools to address highest priority climate-induced water quality impacts such as: <ul style="list-style-type: none"> • Increased Salinity • Elevated Turbidity and Pollutant Concentrations • Increased Nutrient Pollution • More Frequent Reservoir Anoxia • Increased Chlorine Demand and Microbial Activity 		
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December 18, 2024

Ms. Liz Crosson, Sustainability, Resiliency and Innovation Officer
Metropolitan Water District of Southern California
700 N. Alameda Street
Los Angeles, CA 90012
Electronic copy via email Camp4Water@mwdh2o.com

RE: CAMP4W Taskforce Schedule and Draft Working Memorandum #8

Dear Ms. Crosson,

We appreciate the opportunity to provide comments on CAMP4W Working Memo #8 and look forward to continued discussions among the member agencies and board members. We have the following high-level comments based on the draft memo, Water Authority prior comments, and also a number of comments by board members at the December 10, 2024, Finance and Asset Management (FAM) Committee meeting that we hope will be addressed by staff.

1. The time-bound targets should be updated to recognize reduced demand for MWD water, increased conservation, member agency local projects and other current data (e.g., population). Several signposts indicate the need for such an update, which in turn, would also adjust the relevant planning scenario accordingly. Current demands are tracking below the bookends established by all four of the 2020 IRP-NA scenarios, which is perhaps the most critical signpost indicating the need for this update. Staff may already be planning to provide this update. We suggest sharing the timeline for this update with the board and member agencies.
2. Climate adaptation needs, resource needs, and financial (business model, rates, and budget) outcomes should be functionally integrated and based on consistent assumptions. While Working Memo #8 suggests this integration will be done, it does not explain how or when it will occur. We suggest the draft memo be updated to clearly explain how the integration will be done, including the use of consistent assumptions.
3. There should be discussion on how investments will be prioritized, including a timeline for deliberation and potential implementation. Many board members have commented on the fiscal reality that it is not possible to “do everything” at the same time. As well-stated by Director Seckel at the December 2024 FAM Committee:
“...based on where we are at today, we might not need a whole lot of new supplies coming in the next couple of years, but that has yet to be determined. And so, the CAMP4W process that will tee up and maybe reform what our needs are; I am really looking forward to that. I hope that we see that sometime again

in the early springtime of 2025, how that process will help us make decisions among the options that are confronting us because I think that will be key to this process."

At a more detailed level, the various working memos have different descriptions of what CAMP4W is, which makes it difficult to focus on its intended outcomes and assess its progress. All working memos (and CAMP4W related documents) should have a consistent statement of CAMP4W's purpose and intention. Until the board refines the existing proposed time-bound targets as suggested above, we do not suggest developing additional ones.

We look forward to continued discussion and refinement of Working Memo #8 and again, appreciate your continued and collective efforts to complete this historic process.

Sincerely,



Dan Denham
General Manager



BUILDING A STRONGER L.A.

Board of Commissioners
Richard Katz, President
George S. McGraw, Vice President
Nurit D. Katz
Mia Lehrer
Wilma J. Pinder
Chante L. Mitchell, Secretary

Janisse Quiñones, Chief Executive Officer and Chief Engineer

December 13, 2024

Mr. Deven Upadhyay
Interim General Manager
Metropolitan Water District of Southern California
700 N. Alameda Street
Los Angeles, California 90012

Dear Mr. Upadhyay:

Subject: Climate Adaptation Master Plan for Water – Evaluative Criteria, Signposts,
Time-Bound Targets

The Los Angeles Department of Water and Power (LADWP) appreciates the continued opportunities to collaborate with the Metropolitan Water District of Southern California (Metropolitan) Board members and fellow Member Agency Managers during the Climate Adaptation Master Plan for Water (CAMP4W) Joint Task Force.

We appreciate Metropolitan including the CAMP4W Comprehensive Assessment Guidance Document as Attachment 2 to Working Memo #9 on Project, Program and Portfolio Assessment. Clarity in scoring metrics and definitions used in the assessment are fundamental. It is important to ensure Member Agency involvement in reviewing the Metropolitan Evaluation Committee's first cut of rating projects using the CAMP4W Assessment Form. Member Agencies should be able to confirm alignment with their needs and future plans.

Consistency in assumptions used for financial analyses (sales) and water supply needs (demands) is also important to ensure comprehensive, holistic review of the region's needs and long-term financial position. For example, if Metropolitan is assuming low sales in the future, low water demands should be a consistent assumption for water supply needs.

Location matters, yet the assessment examples were silent on the direct benefits to specific areas, such as westside State Water Project Dependent Areas. We encourage the use of studies and evaluations of Metropolitan's system/infrastructure and delivery capacity, such as the System Overview and Integrated Area Studies, to support the

Mr. Deven Upadhyay
Page 2
December 13, 2024

assessment. Additionally, Time-Bound Targets need to be re-evaluated using the latest data and trends.

Draft Working Memo #8 on Refining Signposts and Time-Bound Targets proposes changes/additions that appear to be new and should be discussed with the Member Agency Managers and CAMP4W Task Force. For example, several new Time-Bound Targets were proposed to be included, however we recommend focusing on addressing concerns/questions of the established ones first, before adding more.

LADWP appreciates Metropolitan's work in ensuring that this CAMP4W process is open and transparent so that the Board can make informed, educated, and intentional decisions on where and when investments are made. We look forward to the continued engagement and collaboration with Metropolitan staff and our fellow Member Agencies Managers.

If you have any questions or if further information is required, please call me at (213) 367-1022, or have your staff contact Mr. David R. Pettijohn, Director of Water Resources, at (213) 367-0899 or by email at David.Pettijohn@ladwp.com.

Sincerely,



Anselmo G. Collins
Senior Assistant General Manager – Water System

ST:lj

c: Mr. Adán Ortega, Jr., Metropolitan Board Chair

Metropolitan Subcommittee on Long-Term Regional Planning Processes and
Business Modeling Committee Members and CAMP4W Task Force Members

Ms. Liz Crosson, Metropolitan Chief Sustainability, Resilience and Innovation Officer

Mr. David R. Pettijohn, LADWP

Climate Adaptation Master Plan for Water (CAMP4W)

MWDOC Comments

WORKING MEMORANDUM 8

REFINING SIGNPOSTS AND TIME-BOUND TARGETS

August 2024

1 Introduction

Extreme weather conditions in recent years have presented Southern Californians with an unsettling preview of the challenges ahead. In addition to the highly variable year-to-year hydrologic conditions inherent in the western United States, climate change has fueled extreme water events further challenging water management in California. The State abruptly swings from periods of severe and extended drought to record-setting wet seasons. This is putting mounting pressure on the management of the region's available and potential water resources. The Climate Adaptation Master Plan for Water (CAMP4W) ensures Metropolitan's commitment to assess and respond to the climate risks to water supplies, water quality, infrastructure, operations, workforce, public health, and financial sustainability.

CAMP4W is an adaptive management approach to integrated resource planning, and it provides a roadmap to guide future capital investments while considering the risks and impacts of climate change. The 2024 Climate Adaptation Master Plan for Water (CAMP4W) Year One Progress Report presents the Climate Decision-Making Framework (**Figure 1**). The framework is intended to define a consistent, stepwise process to help the Board make project and program investment decisions based on the best available information. It is critical that investments are driven by informed, educated, and intentional decisions. Metropolitan's priorities, as defined through the CAMP4W planning process, emphasize the need to remain reliable and resilient into the future, while considering financial sustainability, affordability, and equity. Metropolitan must balance the need to be prepared for the future with the need to balance costs and not over-build or create stranded assets.

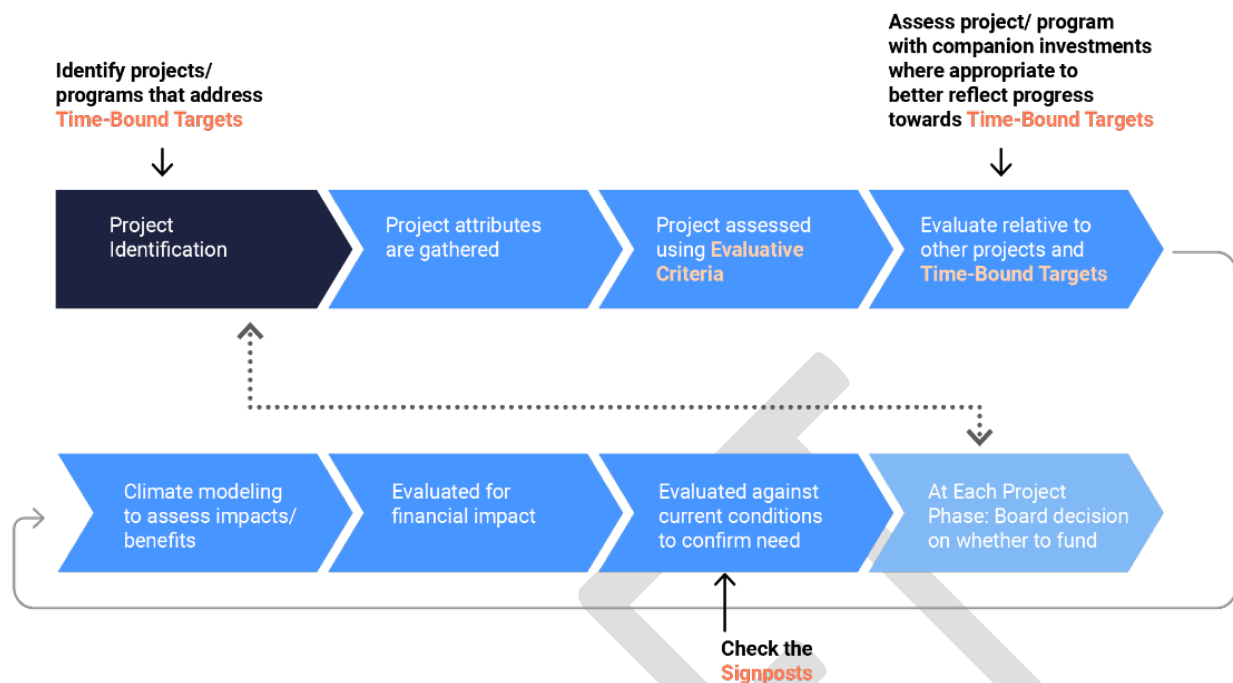


Figure 1. Climate Decision-Making Framework

Interplay between Time-Bound Targets and Signposts. Time-Bound Targets and Signposts will work hand in hand to support the Board’s deliberation process and investment decisions. While Evaluative Criteria facilitate the assessment of projects and programs based on their merits, Time-Bound Targets identify the resource- and policy-based objectives that guide project development and investments to be reliable and resilient into the future. Through near-, mid- and long-term Time-Bound Targets, Metropolitan will measure progress towards CAMP4W objectives and specific priorities set by the Board. Tracking and updating Signposts will provide regular reporting of key real-world metrics that, over the long-term planning horizon and driven by trends rather than short-term fluctuations, may suggest the need to update the Time-Bound Targets.

Working Memorandum 8 Content. Three key elements critical to the Climate Decision-Making Framework, which include Evaluative Criteria, Time-Bound Targets, and Signposts, are defined in **Figure 2**. The CAMP4W Year One Progress report stated that each of the key elements would be updated throughout 2024. **This Working Memorandum 8 provides an update on the progress made in refining the Signposts and Time-Bound Targets** and presents the next steps. Evaluative Criteria are being developed simultaneously and will be presented to the Task Force separately.

Glossary of Terms. This Working Memorandum utilizes additional terms that are defined in **Figure 3** for reference.

As Metropolitan prepares for the future through **planning under deep uncertainty**, it is as important as ever that we make informed, educated, and intentional decisions on where and how we invest. We must balance the need to be prepared for the future, with the need to balance costs and not over build or create stranded assets. As an agency responsible for supplying water to our 26 Member Agencies, who serve the 19-million person service area across 5,200 square miles, the impacts of our decisions are far reaching.

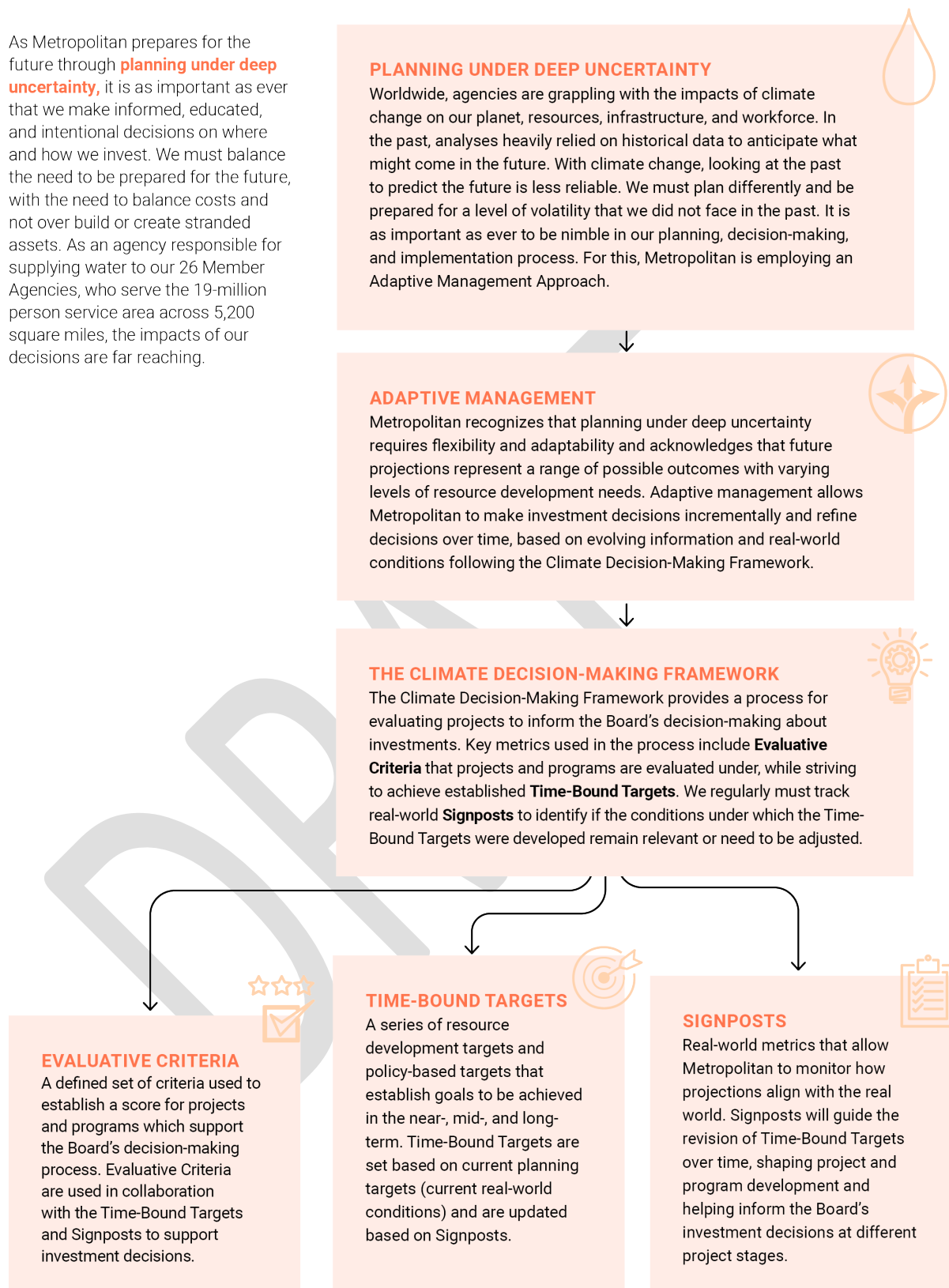


Figure 2. Adaptive Management Process defined in the CAMP4W Year One Progress Report

Drivers of change

- Specific factors whose future values and outcomes are uncertain but significantly impact future water supply reliability and system resilience

Scenario

- A singular view of the future under specific assumptions and outcomes

Supply/Demand Gap

- An analysis performed for each scenario to determine the frequency, timing, and geography of net shortage conditions

Time-Bound Targets

- Resource development and policy goals set by the Board to address future reliability needs identified by the supply/demand gap analysis and other objectives to help Metropolitan best meet its mission

Signposts

- Measurable indicators of the direction and trends of identified drivers of change

Figure 3. Glossary of Terms

2 Signposts

The CAMP4W Year One Progress Report provides a list of proposed Signposts across four categories, which include Demand, Supply, Infrastructure, and Financial Signposts (**Figure 4**). **This Working Memorandum 8 focuses on refinements to the Signposts that have been made since the issuing of the Year One Progress Report.**

DEMAND	SUPPLY	INFRASTRUCTURE	FINANCIAL
Population	Climate Change Indicators	Unexpected Shutdowns	O&M Trends
Economy	Regulations	Infrastructure Loss	Capital Cost Trends
Local Agency Supply	Storage	Emergency Response	Emergency Response Costs
Demand Management	Water Quality	Power Interruptions	
Regulations		Connectivity and Robustness	
Figure 6-2 Proposed Signpost Metrics		Infrastructure Capability	

Figure 4. Initial Signposts Proposed in the 2024 CAMP4W Year One Progress Report

2.1 Understanding Signposts

As the scenario planning approach helps account for a range of supply gaps and uncertainties, Signposts contribute to an updated understanding of how the drivers of change may be shaping actual conditions relative to potential scenarios. Signposts serve as measurable indicators of the direction and trends of the identified drivers of change over time. Tracking signposts will involve collecting data over time and analyzing the data to identify patterns, shifts or movements that impact water supply and demand conditions, track impacts to infrastructure, and inform our assumptions about possible future conditions. Although signposts do not eliminate uncertainty, they offer a data-driven understanding of patterns, helping to contextualize trends over time and enhance decision-making.

2.1.1 Integrated Water Resources Plan Needs Assessment

Metropolitan's [Integrated Water Resources Plan \(IRP\)](#) is a key planning effort towards establishing a long-term, comprehensive water resources strategy.

The IRP is adaptive and as regional water resource issues evolve, so does the IRP. Since the inaugural IRP in 1996, Metropolitan routinely monitors conditions and measures progress in achieving the plan's objectives. As such, the IRP has been periodically updated to expand Metropolitan's strategy to address changing conditions that affect water resource reliability.

The 2020 IRP planning process featured a regional needs assessment that evaluated the impacts of uncertainties including climate change on water resource reliability. This effort resulted in a comprehensive list of findings to help guide actions to address those uncertainties. The 2020 IRP Needs Assessment is summarized in [Working Memorandum #3](#).

Role of Scenarios and Signposts

Scenarios are not intended to control, select or predict the likelihood of uncertainties or predict the future but rather to allow Metropolitan to exercise awareness of potential future challenges and ensure Metropolitan remains prepared.

Signposts support tracking and quantifying trends over time. Tracking them is not intended to eliminate uncertainty but rather to inform assumptions about possible future conditions and support decision-making with the most up-to-date information available.

2.1.2 Drivers of Change and IRP Scenarios

The supply and demand Signposts outlined below and referred to as Water Supply Reliability Signposts, are derived from the comprehensive IRP analysis that identified drivers of change. Drivers such as climate change, regulatory requirements, and growth, have uncertain but potentially significant effects on both water supply and demands in Southern California (**Figure 5**). The IRP Needs Assessment quantified these uncertainties and their potential effects on future supply and demand. Metropolitan then developed separate sets of assumptions for the drivers of change. These sets of assumptions became the basis for the IRP scenarios (A, B, C, and D) which are shown in **Figure 6**. These scenarios serve to represent the range of potential future outcomes and allow for investigations of the major sources of uncertainty and the impacts of those uncertainties on supply and demand.

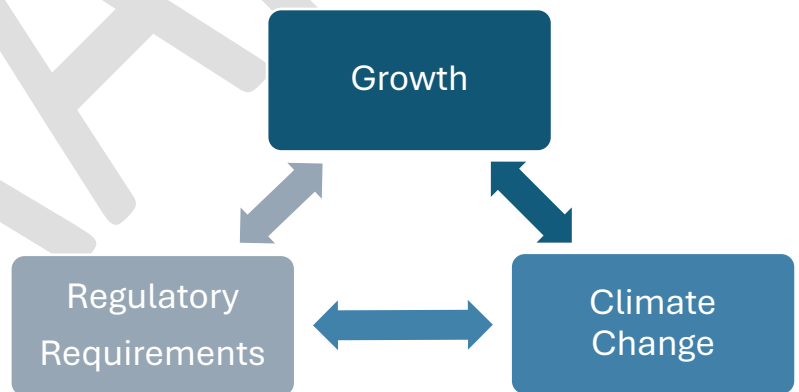


Figure 5. Drivers of Change for Water Supply Reliability

Drivers of change for infrastructure and financial Signposts outlined in this memorandum focus on evaluating the trends in impacts to Metropolitan's infrastructure over time from climate related conditions and events.

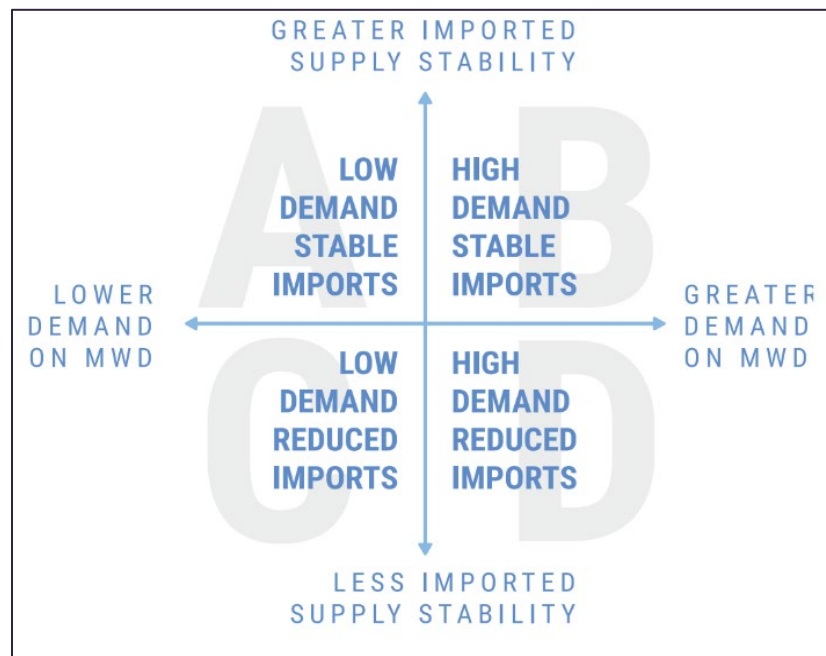


Figure 6. IRP Needs Assessment Planning Scenarios A, B, C and D

2.1.3 Need for Signposts

Signposts are a tool in the CAMP4W process, employed to track and quantify trends and changes in drivers over time. They provide context for decision-making by monitoring trends across multiple years and provide visibility of these trends to the Board through regular updates. Tracking Signposts ensures that Board decisions are informed by the current information. While not all data can be updated with the same frequency—especially data tracked by external entities—Signposts provide insight to long-term shifts which more significance than short-term variations.

Signposts do not eliminate uncertainty, but they support a structured and evidence-based decision-making process. It is important to note that the trends tracked by Signposts take time to develop, and require analysis and context.

2.1.4 Signposts Inform the Long-Term Strategic Planning Cycle

Combining IRP Scenario planning and Signposts tracking creates a disciplined planning methodology. Although IRP updates are intended to occur generally every five years, the tracking of Signposts will be reported on an annual basis and certain conditions might necessitate earlier reviews. A few of these conditions may include:

- A structural or systemic change in the underlying uncertainties (e.g., rule and regulation changes to the Colorado River)
- New data or insights that indicate the cause-and-effect relationship made for underlying drivers of change are different than originally assumed

- Certain factors become more certain/known than originally evaluated, which may impact the range of future conditions (e.g., climate change impacts on groundwater basins and replenishment; extreme heat events increase the frequency of infrastructure failures)

IRP updates, which will be presented for Board approval roughly every five years, will include revising assumptions, planning model inputs, updating the reliability analysis, and updating the needs assessment. While updating the Time-Bound Targets will be at the discretion of the Board, it would be practical to include revisiting them as part of the five-year process when supply and demand gaps are updated. Metropolitan's long-term strategic planning cycle is presented in **Figure 7**. Key components that are considered annually include:

- Assessments of Signpost data and evaluation of information to inform the CAMP4W Annual Report
- Local Agency Supply surveys to track assumptions made in scenarios
- Report out on storage conditions (which are tracked more frequently as well)
- Scenario check-in to confirm assumptions align with current information and observations

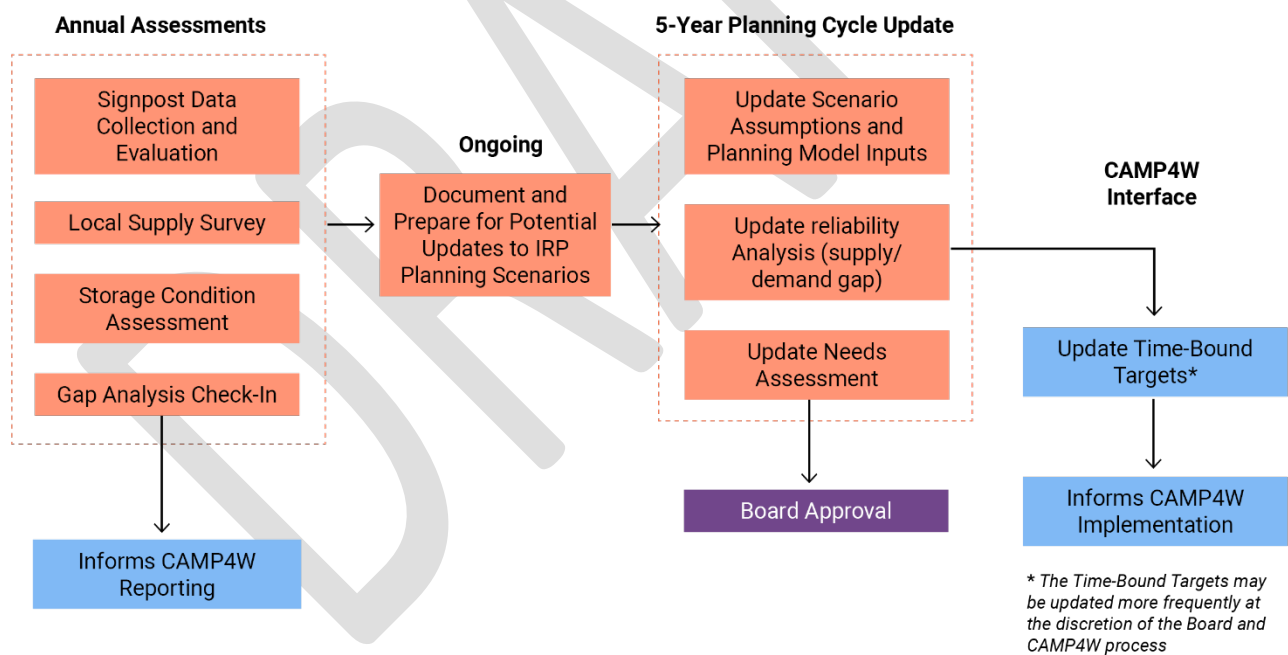


Figure 7. Metropolitan's Long-Term Strategic Planning Cycle

2.2 Identifying and Interpreting Signposts

Signposts should be effective, meaningful, and not overly complex to avoid potentially delaying any decision-making processes. It is also important that they be based on objective factors that are verifiable and transparent. The following section describes the process used to identify Signposts.

2.2.1 Approach for Identifying and Interpreting Water Supply Reliability Signposts

Signpost data necessarily involves the establishment and analysis of trends over time to ascertain relevance and insights for Time-Bound Targets and Metropolitan's investment decisions. **Signposts do not trigger actions.** Actions will be triggered by Board policy decisions and Board deliberation, where Signposts are one tool used to ensure decision-making is based on the best available information.

To identify the appropriate Water Supply Reliability Signposts, a set of screening parameters are reflected in the following questions:

- **Is it measurable?**
- **Does it have an impact on supply or demand?**
- **Can it be reflected in a modeling approach?**
- **Is the impact of the Signpost persistent and not transitory (i.e., systemic)?**
- **Is it reflected indirectly in other signposts?**

Using these screening parameters, the Water Supply Reliability Signposts were refined to include those described in Table 1.

Table 1. Summary of Proposed Water Supply Reliability Signposts

	Data and Sources	Importance	Limitations
Demographic Signpost	Population and Household: <i>Department of Finance, Census, SCAG, SANDAG</i> Employment: <i>CA Employment Development Department</i>	Key inputs in modeling retail demand Systemic changes can affect demand/supply gaps (e.g. low birthrate and migration)	Annual data are estimates by governmental agencies and are subject to revision Signs of systemic change can take a long time (Census)
Climate Change Signpost	GHG emissions Annual California Hydroclimate Report Intergovernmental Panel on Climate Change National Oceanic and Atmospheric Administration	Emission trends are an indicator of how climate change risk is developing RCPs are reflected in MWDs modeling CALSIM III includes RCP modeling	Difficulty in downscaling impacts to local areas The impacts of climate change take years to be established Climate models incorporate the latest thinking, but

	Data and Sources	Importance	Limitations
	CALSIM III (DWR's modeling tool) CRSS (USBR's modeling tool)	Estimated climate impacts associated with RCPs are applied to the CRSS inputs	climate science continues to evolve
Local Agency Supply Signpost	Member agency coordination/ Local Supply Survey Groundwater basin reports	Key inputs in modeling Metropolitan's demand Systemic changes can affect demand/supply gaps (e.g. impaired groundwater basins)	Local Supply is also dependent on weather variation Data is not available in real-time (year plus delay) Data is provisional and subject to reconciliation and revisions
Rules & Regulation Signpost	DWR's Delivery Capability Report (CALSIM III) SWP BiOps USBR 24-Month Study Reporting CRA Post-2026 Operating Guidelines CRA Constituents of Concerns	Regulations may have significant impacts on Metropolitan's core supplies and demands Regulatory parameters are reflected in Metropolitan's modeling	Implementation and effectiveness of regulations may be uncertain May be subject to legal challenges and negotiations
Metropolitan Storage Signpost	Metropolitan's storage accounting • Put/take capacity • Accessible storage by region • End-of-year storage balances	Stored water is a core supply needed to balance demand and supply.	Storage balances can fluctuate from year-to-year

2.2.2 Approach for Identifying and Interpreting Infrastructure and Financial Signposts

Metropolitan performs regular rehabilitation and repair to its infrastructure as a normal course of business. Climate change puts additional stress on Metropolitan's facilities and causes additional replacement and repair projects to maintain the system during and after extreme events. Understanding the increased frequency and extent of infrastructure repair and replacement projects due to climate change is a critical factor in understanding how climate change is impacting Metropolitan as well as the needed investments. Metropolitan will also strive to track the financial impacts related to infrastructure investments needed to address climate impacts and projections. **Tracking these trends over time will provide valuable data to support investment decisions.**

Infrastructure and financial Signposts provide Metropolitan with data that shows how climate is impacting infrastructure in terms of losses, interruptions, and useful life, as well as the corresponding financial impacts. To track the information needed to report on these Signposts, Metropolitan will need to implement additional tracking and reporting procedures. The development of appropriate Signposts must

therefore be based on the potential availability of data and other factors, discussed below.

At the individual asset level, there are benefits to tracking trends. As an example, tracking the impact of heat on electrical assets in the desert can inform the best timing for investing in repair or eventually replacement, if needed. In this case, the increased frequency of occurrence would be an infrastructure metric that could indicate this particular asset is in need of a more permanent solution. The financial signpost that corresponds to this example would include tracking the capital and O&M expenditures for these repairs. When trends indicate the increased frequency of this repair as well as the magnitude of damages, expressed as time spent or the equivalent costs, this could validate the increased expense to more permanently address this climate impact.

In addition to the direct relationship between the example at the asset level and the decision to fund an infrastructure project to mitigate the impacts of climate change on that asset, tracking this kind of information would provide Metropolitan with a method of evaluating system-wide climate impacts. Over time, data collected could inform design standards and repair and replacement schedules, and foster opportunities for infrastructure and operational innovation.

Implementing these kinds of Signposts would be done by expanding Metropolitan's asset management program to track additional climate related impacts. Currently, Metropolitan operations staff perform regularly scheduled and unexpected repairs and replacements based on work orders and tracking within Metropolitan's digital system. The proposed pathway to tracking the impacts of climate change would require additional metrics to link observations and actions to climate conditions, where applicable. Additionally, tracking the cost would provide detailed information on how these efforts impact Metropolitan financially.

To identify the appropriate Infrastructure and Financial Signposts, a similar set of screening parameters to those identified for Water Supply Reliability Signposts are reflected in the following questions:

- **Is it measurable?**
- **Does it have an impact on infrastructure or the cost to maintain infrastructure?**
- **Is the impact of the Signpost persistent and not transitory (i.e., systemic)?**
- **Is it reflected indirectly in other Signposts?**

The CAMP4W Task Force and staff identified potential infrastructure and financial Signposts to track and help facilitate decision-making. These were included in the CAMP4W Year One Progress Report and are listed below:

Initial Draft Infrastructure Signposts:	Initial Draft Financial Signposts:
<ul style="list-style-type: none"> • Infrastructure Loss • Power Interruptions • Connectivity and Robustness • Infrastructure Capability • Unexpected Shutdowns • Emergency Response 	<ul style="list-style-type: none"> • O&M Trends • Capital Cost Trends • Emergency Response Costs

A refined set of Infrastructure and Financial Signposts are presented in Table **Table 2. Infrastructure and Financial Signposts**², including the addition of a potential affordability Signpost.

Table 2. Infrastructure and Financial Signposts

Signpost	Infrastructure Metrics	Financial Metrics
Infrastructure Loss	Frequency of infrastructure loss or failure (R&R) related to climate impacts: tracking of work hours, time	Capital and O&M cost to repair or replace
Power Interruptions	Frequency and duration of interruptions due to climate impacts; tracking of work hours, time	Capital and O&M cost to provide alternative power supply or financial impact of not having power
Unexpected Shutdowns	Frequency of loss of use related to climate impacts: tracking of work hours, time	Capital and O&M cost to repair or replace
Emergency Response	Frequency and duration of emergency response; tracking of work hours, time	Capital and O&M cost to associated with emergency response
Affordability	Trends in affordability rates throughout service area (Further recommendations TBD)	

In addition to tracking how climate change is impacting assets, Metropolitan is interested in methodologies for tracking affordability metrics. To understand the feasibility of tracking this metric as a Signpost, staff will look to industry standards and practices, including experiences and input from Member Agencies, and return to the Board with options in 2025.

3 Time-Bound Targets

3.1 Understanding Time-Bound Targets

Time-Bound Targets are policy and resource management goals which are established by the Board to guide project and program development and support the evaluation of proposed investments in pursuit of climate adaptation and the CAMP4W objectives. As discussed in Section 0, Time-Bound Targets work in collaboration with Signposts and Evaluative Criteria to form the basis of the Adaptive Management process (see **Figure 2**).

Time-Bound Targets are informed by the findings of resource planning in the IRP process and other data analysis. Similar to criteria used in the General Manager's Business Plans, Metropolitan seeks Time-Bound Targets that are specific, measurable, and achievable. The Time-Bound Targets proposed herein are based on these criteria and have been drafted to reflect Board indicated priorities.

The Board establishes Time-Bound Targets and may update them at its discretion. Because many of the Time-Bound Targets are based on the IRP planning process, updating and refining them at a similar interval to the IRP updates may be practical. Regardless, long-term trends rather than short-term variation in real-world conditions, as reflected by Signposts, IRP planning, and other holistic analyses, should form the basis for updating the Time-Bound Targets.

3.2 Identifying Time-Bound Targets

The Time-Bound Targets outlined in the CAMP4W Year One Progress Report were developed to reflect Board priorities as discussed in the Task Force meetings. **Figure 8** presents the Time-Bound Targets defined in the CAMP4W Year One Progress Report.



 Resource-Based Targets Numbers reflect additional supplies unless indicated otherwise	CATEGORY	NEAR TERM	MID TERM	LONG TERM
	Core Supply ¹	N/A	Identify 300 TAF for potential implementation by 2035. Alternatively, 250 TAF of new storage will reduce core supply need to 200 TAF	Identify 650 TAF for potential implementation by 2045. Alternatively, 250 TAF of new storage will reduce core supply need to 550 TAF or, 500 TAF of new storage will reduce core supply need to 500 TAF
	Storage	Identify up to 500 TAF for potential implementation by 2035		
	Flex Supply (Dry Year Equivalent)	Acquire capability for up to 100 TAFY		
 Policy-Based Targets	CATEGORY	NEAR TERM	MID TERM	LONG TERM
	Equitable Supply Reliability	Add 160 CFS capacity to the SWPDA by 2026	Implement additional 130 CFS capacity to SWPDA by 2032	Implement capacity, conveyance, supply, and programs for SWPDA by 2045
	Local Agency Supply ²	Maintain 2.09 to 2.32 MAF (under average year conditions)	2.12 to 2.37 MAF (under average year conditions)	2.14 to 2.40 MAF (under average year conditions)
	Demand Management ³	Implement structural conservation programs to achieve 300 TAF by 2045		
	Regional Water Use Efficiency	Assist Retail Agencies to achieve, or exceed, compliance with SWRCB Water Use Efficiency Standards ⁴		
		GPCD target for 2030 ⁵	GPCD target for 2035	GPCD target for 2045
	Greenhouse Gas Reduction	N/A	40% below 1990 emission levels by 2030	Carbon Neutral by 2045
	Surplus Water Management	Develop capability to manage up to 500 TAFY of additional wet year surplus above Metropolitan's Storage Portfolio and WSDM action		

Figure 8. Time-Bound Targets as defined in the CAMP4W Year One Progress Report

In addition, the Year One Progress Report identified six categories of additional Time-Bound Targets for future consideration:

- Community Equity: Focus on investing in underserved communities, affordability measures and providing meaningful community engagement.
- New Local Supply: Targets around local and Member Agency supply and/or program development.
- Water Quality: ~~Ensuring Invest in necessary research, and innovation, and progress into~~ addressing emerging contaminants of concern and new regulatory requirements.
- Infrastructure Resilience: Investments necessary for existing and future infrastructure to be able to meet growing climate-driven vulnerabilities during and after disruptions.
- Imported Water Source Resilience: Investment in protecting source watersheds and existing infrastructure to reduce risks presented by accelerated climate change.
- Ecosystem Health: ~~Invest in Measurable improvements to~~ natural systems that provide measurable improvements and value, in the areas of resilience, and regulatory benefits to water supplies.

Potential targets for Community Equity, Water Quality, and Imported Water Source Resilience were presented at the July 24, 2024 Task Force meeting. **Table 3** presents the draft Time-Bound Targets for

those categories that were presented to the Task Force, with revisions based on the discussion at the meeting and subsequent feedback.

Further data collection and analyses will continue to set new or refine existing Time-Bound Targets as conditions change, progress is made, Signposts are reviewed, the IRP is updated, and Board direction is provided.

Table 3. Draft Time-Bound Targets for Community Equity, Water Quality, and Improved Water Source Resilience

Category	Near Term	Mid Term	Long Term
Community Equity <i>Focus on investing in underserved communities, affordability measures and providing meaningful community engagement to address the impacts of climate change.</i>	Develop and promote water conservation programs, rebates, and incentives for low-income and disadvantaged communities (DAC), as defined in Water Code 79505.5, to increase program participation and regional water conservation.		
	Work with member agencies and legislative sponsors for continuous state and federal funding for low-income rate assistance programs (LIRA). Gather regional information about impacts of water rates on DACs to support member agencies.	Develop equity metrics and conduct community equity analyses on Metropolitan infrastructure investments, operations, and conservation programs. Develop a Water Affordability & Environmental Justice Policy to inform community investment associated Metropolitan projects and programs.	
Water Quality <u>Invest in necessary research and innovation, to address emerging contaminants of concern and new regulatory requirements. Ensuring research, innovation, and progress in addressing emerging contaminants of concern and new regulatory requirements.</u>	Develop research, mitigation, and response plans and management tools to address highest priority climate-induced water quality impacts such as: <ul style="list-style-type: none"> • Increased Salinity • Elevated Turbidity and Pollutant Concentrations • Increased Nutrient Pollution • More Frequent Reservoir Anoxia • Increased Chlorine Demand and Microbial Activity 		
	Update nitrification action plan and response indicators by end of 2025	Implement new tools and infrastructure modifications to minimize climate impacts on water quality	
Imported Water Source Resilience <i>Investment in protecting source watersheds and existing infrastructure to reduce risks presented by accelerated climate change.</i>	Participate in pilot projects to assess climate adaptation strategies that build watershed resilience and their benefits to protection of water supply	Develop and implement a program for supporting the protection of source watersheds from climate change-drive risks to water supply	

3.3 Use of Time-Bound Targets

Time-Bound Targets will be used to guide project and program development and support the evaluation of proposed investments. They will establish a timeframe for when projects or programs need to be

planned and implemented to provide readiness for future scenario conditions and identify emphases to pursue potential co-benefits along with water supply reliability and system resilience.

When considering which projects and programs will be assessed through the CAMP4W decision-making framework, staff will consider their relevance toward Time-Bound Targets among the screening questions.

DRAFT

4 Conclusion and Next Steps

Signposts and Time-Bound Targets are important components of an adaptive management approach to resource planning and investment, which enhances flexibility and responsiveness amid the dynamic conditions and uncertainties of climate change. They support the Board's decision making about investments, using the best available information and emphasizing Board established priorities. Signposts and Time-Bound Targets are intended to be adaptive as well, and staff will continue to revise them, and any changes will be presented for Board consideration.

4.1 Next Steps for Signposts

Through the remainder of 2024, the next steps to complete the initial development of the Signposts includes the following tasks:

- Refine the identified Water Supply Reliability Signposts and identify new Signposts if necessary,
- Refine Infrastructure and Financial Signposts and identify new Signposts if necessary, and
- Include available Water Supply Reliability Signpost data in the First CAMP4W Annual Report.

4.2 Next Steps for Time-Bound Targets

Time-Bound Targets will continue to be identified and refined as CAMP4W is implemented in 2025. Next steps include:

- Further refinement of the Time-Bound Targets based on Board direction, data analyses and/or feedback from CAMP4W implementation,
- Development of proposed Time-Bound Targets for Infrastructure Resilience and Ecosystem Health, and
- Consider New Local Agency Supply as a possible future policy-based target depending on Local Agency Supply conditions and in support of Core Supply needs.

Climate Adaptation Master Plan for Water (CAMP4W)
Comments from the Las Virgenes Municipal Water District
December 13, 2024

Working Memorandum 8

Refining Signposts and Time-Bound Targets dated August 2024

- Pages 9 and 10, Table 1. Summary of Proposed Water Supply Reliability Signposts, Rules & Regulations Signpost.
 - Data and Sources: Consider adding California Title-22 Primary and Secondary Drinking Water Regulations. Also, replace CRA Constituents of Concern with Source Water Constituents of Concern.
- Page 12, Table 2. Infrastructure and Financial Signposts. Previously, LVMWD recommended signposts addressing infrastructure capability, connectivity, and robustness to help facilitate decision-making. The extreme drought conditions of 2022 presented an infrastructure Signpost: Metropolitan's existing distribution system could not provide adequate water supplies to the six agencies in the SWP-dependent areas. A Call to Action and Commitment to Regional Reliability were adopted by the Board in August 2022 to address this issue. Please consider the following additions to Table 2.
 - Signpost: Add - Infrastructure Capability.
 - Infrastructure Metrics: Add - Frequency and duration of a service area receiving inadequate water supplies due to climate impacts and infrastructure limitations; tracking of time and allocated supplies.
 - Financial Metrics: Add - Capital and O&M costs to secure and deliver emergency water supplies; costs and impacts to implement area-specific Emergency Water Conservation Programs (EWCPs).