Data Collection and Evaluation Report for Fiscal Year 2022/2023

PREPARED FOR

Chino Basin Watermaster

PREPARED BY

WEST YOST
Water. Engineered.

Data Collection and Evaluation Report for Fiscal Year 2022/2023

Prepared for

Chino Basin Watermaster

Project No. 941-80-23-33

Project Manager: Garrett Rapp, PE

QA/QC Review: Andy Malone, PG

WEST YOST
Water. Engineered.

DRAFT REPORT | MAY 2024

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Table of Contents

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

2020 SYR Projection	2020 Safe Yield Recalculation
2020 SYR Report	*2020 Safe Yield Recalculation Report*
2023 RMPU	2023 Recharge Master Plan Update
af	Acre-Feet
afy	Acre-Feet Per Year
Arrowhead	Arrowhead Mountain Spring Water Company
ASR	Aquifer Storage and Recovery
CBWCD	Chino Basin Water Conservation District
CC	Carbon Canyon
CDA	Chino Desalter Authority
Chino	City of Chino
Chino Hills	City of Chino Hills
CVM	Chino Valley Model
CVWD	Cucamonga Valley Water District
DIPAW	Deep infiltration of precipitation and applied water
DWR	California Department of Water Resources
DYYP	Dry-Year Yield Program
ET	Evapotranspiration
FWC	Fontana Water Company
FY	Fiscal Year
GSWC	Golden State Water Company
IEUA	Inland Empire Utilities Agency
JCSD	Jurupa Community Services District
MS4	Municipal Separate Storm Sewer System
MVWD	Monte Vista Water District
MZ	Management Zone
Niagara	Niagara Bottling, LLC
Norco	City of Norco
OBMP	Optimum Basin Management Program
Ontario	City of Ontario
OWDS	On-Site Waste Disposal System
Pomona	City of Pomona
SARWC	Santa Ana River Water Company
SAWCo	San Antonio Water Company
SGMA	Sustainable Groundwater Management Act
State Board	State Water Resources Control Board
SYR	Safe Yield Recalculation
Upland	City of Upland
WSP	Water Supply Plans
WVWD	West Valley Water District

CHAPTER 1
Background and Objectives

This third annual report on *Data Collection and Evaluation – Fiscal Year 2022/2023* describes and documents the required data collection and evaluation pursuant to the April 28, 2017 Court Order on the Safe Yield of the Chino Basin (2017 Court Order).[1] This chapter describes background information on the Court requirements to prepare this annual report, the scope of work of this effort, and the organization of this report.

1.1 2017 COURT ORDER REQUIREMENTS

The 2017 Court Order that set the Safe Yield at 135,000 acre-feet per year (afy) for the period fiscal year (FY) 2011 through 2020[2] also included requirements to guide future model updates and Safe Yield recalculations (SYR) and resets. These requirements, which were later affirmed by the Court in March 2019,[3] are listed below verbatim from pages 15 through 17 of the 2017 Court Order:

- 4.3 – *Interim Correction*. In addition to the scheduled reset [of the Safe Yield effective July 1, 2020 that will continue until June 30, 2030], the Safe Yield may be reset in the event that, with the recommendation and advice of the Pools and Advisory Committee and in the exercise of prudent management discretion described in Paragraph 4.5(c), below, Watermaster recommends to the court that the Safe Yield must be changed by an amount greater (more or less) than 2.5 percent of the then-effective Safe Yield.
- 4.4 – *Safe Yield Reset Methodology*. The Safe Yield has been reset effective July 1, 2010 and shall be subsequently evaluated pursuant to the methodology set forth in the Reset Technical Memorandum [(WEI, 2015)[4]]. The reset will rely upon long-term hydrology and will include data from 1921 to the date of the reset evaluation. The long-term hydrology will be continuously expanded to account for new data from each year, through July 2030, as it becomes available. This methodology will thereby account for short-term climatic variations, wet and dry. Based on the best information practicably available to the Watermaster, the Reset Technical Memorandum sets forth a prudent and reasonable professional methodology to evaluate the then prevailing Safe Yield in a manner consistent with the Judgement, the Peace Agreements, and the OBMP Implementation Plan. In furtherance of the goal of maximizing the beneficial use of the waters of the Chino Basin, Watermaster, with the recommendation and advice of the Pools and Advisory Committee, may supplement the Reset Technical Memorandum's methodology to incorporate future advances in best management practices and hydrologic science as they evolve over the term of this order.

[1] *Orders for Watermaster's Motion Regarding the 2015 Safe Yield Reset Agreement, Amendment of Restated Judgment, Paragraph 6*, Superior Court for the County of San Bernardino (2017).

[2] On July 10, 2020, the Court updated the Safe Yield to 131,000 afy for the period FY 2021 to 2030. *Order re Chino Basin Watermaster Motion Regarding 2020 Safe Yield Reset, Amendment of Restated Judgment, Paragraph 6*, Superior Court for the County of San Bernardino (2020).

[3] *Order Regarding the Appeal Parties Motion*, Superior Court for the County of San Bernardino (2019).

[4] WEI. (2015*). Methodology to Reset Safe Yield Using Long-Term Average Hydrology and Current and Projected Future Cultural Conditions.* Prepared for the Chino Basin Watermaster, August 2015.

- 4.5 – *Annual Data Collection and Evaluation*. In support of its obligations to undertake the reset in accordance with the Reset Technical Memorandum and this order, Watermaster shall annually undertake the following actions:

  (a) Ensure that, unless a Party to the Judgment is excluded from reporting, all production by all Parties to the Judgment is metered, reported, and reflected in Watermaster's approved Assessment Packages;

  (b) Collect data concerning cultural conditions annually with cultural conditions including, but not limited to, land use, water use practices, production, and facilities for the production, generation, storage, recharge, treatment, or transmission of water;

  (c) Evaluate the potential need for prudent management discretion to avoid or mitigate undesirable results including, but not limited to, subsidence, water quality degradation, and unreasonable pump lifts. Where the evaluation of available data suggests that there has been or will be a material change from existing and projected conditions or threatened undesirable results, then a more significant evaluation, including modeling, as described in the Reset Technical Memorandum, will be undertaken; and,

  (d) As part of its regular budgeting process, develop a budget for the annual data collection, data evaluation, and any scheduled modeling efforts, including the methodology for the allocation of expenses among the Parties to the Judgment. Such budget development shall be consistent with section 5.4(a) of the Peace Agreement.

- 4.6 – *Modeling.* Watermaster shall cause the Basin Model to be updated and a model evaluation of Safe Yield, in a manner consistent with the Reset Technical Memorandum, to be initiated no later than January 1, 2024, in order to ensure that the same may be completed by June 30, 2025.
- 4.7 – *Peer Review.* The Pools shall be provided with reasonable opportunity, no less frequently than annually, for peer review of the collection of data and the application of data collected in regard to the activities described in Paragraphs 4.4, 4.5, and 4.6 above.

This report addresses the requirements in "4.5 – *Annual Data Collection and Evaluation*" for the period FY 2019 through 2030.

1.2 SCOPE OF THE ANNUAL DATA COLLECTION AND EVALUATION

The scope of work for the annual data collection and evaluation for FY 2024 is the following:

- **Data collection.** Watermaster will collect the following datasets pursuant to pages 16 and 17 of the 2017 Court Order:
  - Groundwater pumping
  - Water supply plans (from major Appropriative Pool parties)
  - Land use
  - Data to estimate indoor and outdoor urban water use
  - Managed groundwater recharge
  - Information on regional water infrastructure (from major Appropriative Pool parties)

For each of these datasets, Watermaster will collect historical data since the last recalculation of the Safe Yield (2019-23 Actual Data) and the necessary information to prepare an updated projection of these datasets for the remaining period of the then-current Safe Yield (2024 Projection). The 2024 Projection spans the period FY 2024-2030.

- **Data evaluation.** Watermaster will compare the 2019-23 Actual Data and the 2024 Projection to the data and assumptions that were used in the projection scenario for the 2020 Safe Yield Recalculation (2020 SYR Projection), which was documented in the *2020 Safe Yield Recalculation Report* (2020 SYR Report).[5] Specifically, the comparison includes:
  - 2020 SYR Projection for FY 2019-2023 versus 2019-23 Actual Data
  - 2020 SYR Projection versus 2024 Projection (FY 2024-2030)

  These comparisons are meant to answer the two questions posed by the 2017 Court Order:

  1) *Is there a potential for undesirable results that were not identified in the 2020 SYR?* Specifically, is there a **"**potential need for prudent management discretion to avoid or mitigate undesirable results including, but not limited to, subsidence, water quality degradation, and unreasonable pump lifts"? (2017 Court Order, p. 17)
  2) *Is there a reasonable likelihood that the cumulative impact of the differences between the new datasets/projections (i.e., the 2019-23 Actual Data and the 2024 Projection) and the data and assumptions in the 2020 SYR would result in the actual Safe Yield being greater than 2.5 percent (more or less) than the current Safe Yield?* (2017 Court Order, p. 15-16). This question is evaluated over the period of the current Safe Yield, which is FY 2021-30.

  Answers to these questions are qualitative and based on professional judgement, an understanding of the Chino Basin, and prior modeling investigations. An affirmative answer to either of the above questions "suggests that there has been or will be a material change from existing and projected conditions or threatened undesirable results," which would necessitate "a more significant evaluation." (2017 Court Order, p. 17). In this case, Watermaster will describe the scope of work and cost estimates of any further evaluations required.
- **Reporting.** Watermaster will prepare an annual report to document the data collection and evaluation process and will include recommendations for improvements to subsequent annual data collection and evaluation efforts.
- **Peer review.** Watermaster will provide the parties opportunity for review and comment on the collected data, the evaluations of the data, and the draft report, and will respond to written comments from the parties in an appendix to the final report.

1.2.1 Nexus to 2025 Safe Yield Reevaluation and Change in Scope

If "more significant evaluation, including modeling, as described in the Reset Technical Memorandum" than this annual data collection process is required, such analysis could not practicably occur prior to the 2025 Safe Yield Reevaluation (2025 SYR), scheduled for completion by June 30, 2025, pursuant to the 2017 Court Order. The 2025 SYR involves updating the CVM to include more recent historical data, recalibrating

[5] WEI. *2020 Safe Yield Recalculation*. Prepared for the Chino Basin Watermaster. May 2020.

the CVM through FY 2022, completing an uncertainty analysis, and simulating multiple projection scenarios based on current planning data, some of which is documented in this report. The 2025 SYR constitutes the "more significant evaluation, including modeling, as described in the Reset Technical Memorandum" described in the 2017 Court Order. Therefore, more detailed analysis and documentation of the annual data collection and evaluation (e.g., land use, regional water infrastructure) will be part of the report that will be developed documenting the 2025 SYR, which is expected to be published in spring 2025. The budget for this work is outlined in the Watermaster Engineering budget for FY 2024/25.

1.3 REPORT ORGANIZATION

Chapter 2 – Groundwater Pumping. Chapter 2 describes the collection and evaluation of the data characterizing the groundwater pumping patterns and water supply plans in the Chino Basin.

Chapter 3 – Urban Outdoor Water Use. Chapter 3 describes the collection and evaluation of the data characterizing the urban outdoor water use practices in the Chino Basin.

Chapter 4 – Managed Groundwater Recharge. Chapter 4 describes the collection and evaluation of managed groundwater recharge in the Chino Basin, which includes data and projections for the recharge of stormwater, imported water, and recycled water.

Chapters 2 through 4 describe:

- A summary of the data type.
- Use of the data in the Chino Valley Model (CVM).
- A description of the data that were collected for this report and the assumptions for the development of the 2020 SYR Projection and the 2024 Projection.
- A comparison of the 2020 SYR Projection versus the 2019-23 Actual Data.
- A comparison of the 2020 SYR Projection versus an updated 2024 Projection for FY 2024-30.
- An evaluation of these comparisons to identify (i) the potential for undesirable results or (ii) the potential for a significant difference in the current expectations for net recharge during FY 2021-30 compared to the current Safe Yield for FY 2021-30.

Chapter 5 – Conclusions and Recommendations. Chapter 5 describes the cumulative assessment of all the data types evaluated in this report, including the evaluation of Managed Storage, and the main conclusions and recommendations derived from these evaluations.

Appendix A – Metering and Reporting of Groundwater Pumping for FY 2023. Appendix A describes the wells in the Chino Basin for FY 2023, including descriptions of wells that were added or went out of service in the reporting year and information on wells that are not metered.

CHAPTER 2
Groundwater Pumping

Chapter 2 documents the collection and evaluation of data and information on groundwater pumping in the Chino Basin.

2.1 SUMMARY AND APPLICATION TO MODEL

Groundwater pumping is the largest discharge component of the Chino Basin water budget, comprising roughly 83 percent of the total discharge from the Chino Basin from FY 1978 through 2018. The magnitude and location of groundwater pumping can affect groundwater levels, groundwater-flow directions, and the groundwater/surface-water interactions between the Chino Basin and the Santa Ana River and Prado Basin.

Groundwater pumping data is input into the CVM through the Well Package (McDonald et al., 1988)[1] of the groundwater model code, MODFLOW-NWT. The Well Package is used to simulate the withdrawal of groundwater from aquifers using a constant flow rate for each monthly stress period of the CVM.

Historical groundwater pumping data is one of several datasets used to calibrate the CVM. The CVM is calibrated over the period of July 1, 1977 through June 30, 2018 by adjusting model parameters to produce the best match between simulated and observed system responses, including the historical time series of surface water discharge in Prado Basin and groundwater levels at wells.[2]

Projections of future groundwater pumping are used to develop the model projection scenarios that are then simulated with the CVM to estimate the future water budget of the Chino Basin, including net recharge.

2.2 COLLECTION OF DATA AND INFORMATION

This section describes how the data and information for groundwater pumping were collected and compiled for this report.

2.2.1 2019-23 Actual Data

2019-23 Actual groundwater pumping data were developed from Watermaster's database of quarterly groundwater pumping data records and estimates. All members of the Appropriative and Overlying Non-Agricultural Pools, including the Chino Basin Desalter Authority (CDA), meter, record, and report pumping from their own wells. Wells owned by members of the Overlying Agricultural Pool are required to be metered if their pumping is greater than 10 afy (i.e., non-Minimal Producers), although metering is not feasible at all wells. Watermaster applies a water duty method to estimate the pumping for wells that are not metered.

[1] McDonald, Michael G. and Harbaugh, Arlen W. 1988. MODFLOW, *A modular three-dimensional finite difference ground-water flow model*. Reston, Virginia: U. S. Geological Survey, 1988.

[2] More information on the calibration process of the CVM can be found in Section 6 of the 2020 SYR Report.

2.2.2 2020 SYR Projection

As part of the development of the Storage Framework Investigation in 2017, Watermaster submitted a comprehensive data request to each Appropriative Pool party and some of the larger Overlying Non-Agricultural Pool pumpers, including:

- Arrowhead Mountain Spring Water Company (Arrowhead)
- City of Chino (Chino)
- City of Chino Hills (Chino Hills)
- City of Norco (Norco)
- City of Ontario (Ontario)
- City of Pomona (Pomona)
- City of Upland (Upland)
- Cucamonga Valley Water District (CVWD)
- Fontana Water Company (FWC)
- Golden State Water Company (GSWC)
- Jurupa Community Services District (JCSD)
- Marygold Mutual Water Company
- Monte Vista Irrigation Company
- Monte Vista Water District (MVWD)
- Niagara Bottling, LLC (Niagara)
- Santa Ana River Water Company (SARWC)
- San Antonio Water Company (SAWCo)
- San Bernardino County – Olympic Shooting Park
- West Valley Water District (WVWD)

The data request included future water supply plans, which represented the parties' best estimates of monthly demands and associated water supplies for the planning period of FY 2019 through 2050, including projections of groundwater pumping. In 2019, Watermaster asked the Parties to provide updates to their projections in preparation of the 2020 SYR Projection. Three Parties (Chino Hills, Pomona, and MVWD) updated their pumping projections. The data request also included a request for an updated list of active wells, well capacities, and the priority use for each well. This information was combined with the monthly water supply plans to distribute annual projected groundwater pumping to monthly projected pumping at each of the parties' wells to prepare the 2020 SYR Projection.

The 2020 SYR Projection of pumping for the smaller Overlying Non-Agricultural Pool parties was estimated using historical patterns. Pumping projections for the Agricultural Pool parties were based on a combination of historical data, projected land use changes, and projected water supply plans. The projected recharge and pumping operations for the Dry-Year Yield Program (DYYP) were uncertain and therefore not included in the 2020 SYR Projection.

2.2.3 2024 Projection

In late 2023 and early 2024, as part of the current data collection and evaluation effort, Watermaster submitted a request to the municipal Appropriative Pool parties, the CDA, and the larger Overlying Non-Agricultural Pool parties for updated projected monthly demands and water supply plans (WSP), current and future well information, and other information described in later sections. The projected monthly demands and WSPs were provided for FY 2025 and FY 2030. Watermaster developed the 2024 Projection for each Party's WSP based on their responses to the data request, interpolating between 2023, 2025, and 2030.

The 2024 Projection for the Agricultural Pool and Overlying Non-Agricultural Pool pumping was developed based on a comparison of the 2020 SYR Projection and the 2019-23 Actual pumping to determine whether the differences suggested that the 2024 Projection should differ from the 2020 SYR Projection.

2.3 EVALUATION

This section compares the 2020 SYR Projection for groundwater pumping to 2019-23 Actual pumping and the 2024 Projection for pumping, including an evaluation of any differences.

2.3.1 2019-23 Actual Pumping versus 2020 SYR Projection

Figure 2-1 is a bar chart comparing 2019-23 Actual pumping to the 2020 SYR Projection for pumping by Pool, including the groundwater pumped for the DYYP. Figure 2-1 shows:

- On average, 2019-23 Actual pumping was greater than the 2020 SYR Projection by 5,400 afy. This was primarily due to pumping from the DYYP account in FY 2020, 2021, and 2022, which was not included in the 2020 SYR Projection.
- Not including the DYYP pumping, 2019-23 Actual pumping by the Agricultural Pool, Overlying Non-Agricultural Pool,[3] and the Appropriative Pool were less than the 2020 SYR Projection by about 1,600 afy, 1,100 afy, and 4,500 afy, respectively.

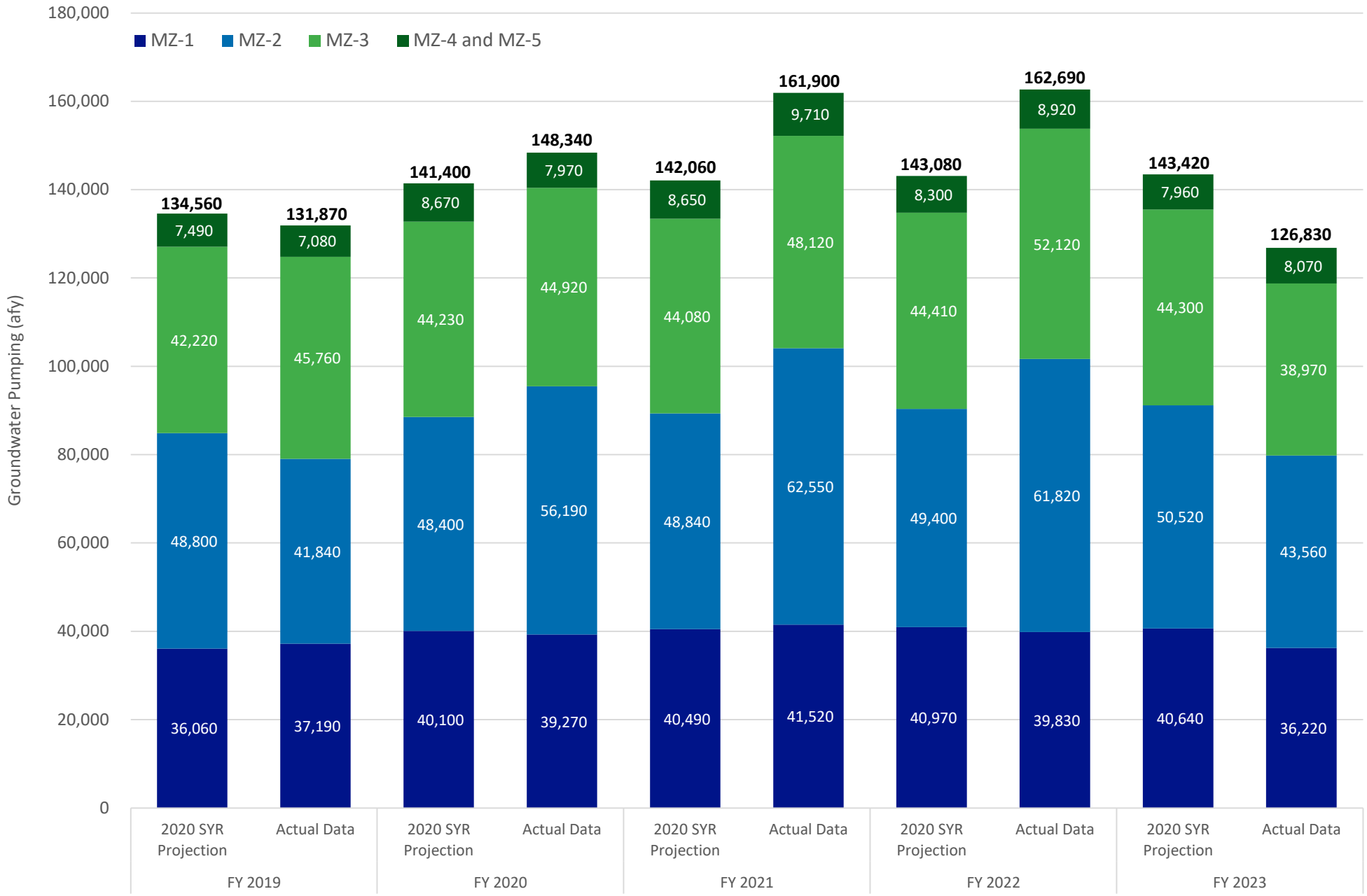
Figure 2-2 is a bar chart comparing 2019-23 Actual pumping to the 2020 SYR Projection for pumping by Management Zone (MZ). Groundwater pumping is aggregated for MZ-4 and MZ-5. Figure 2-2 shows:

- 2019-23 Actual pumping in MZ-1 was less than the 2020 SYR Projection by about 800 afy.
- 2019-23 Actual pumping in MZ-2 and MZ-3 was greater than the 2020 SYR Projection by about 6,100 afy. This was primarily due to pumping from the DYYP account in FY 2020, 2021, and 2022, which was not included in the 2020 SYR Projection.
- 2019-23 Actual pumping in MZ-4 and MZ-5 was about equal to the 2020 SYR Projection.

[3] Annual groundwater pumping by General Electric is net zero because the agency injects the equivalent volume of groundwater pumped.

Figure 2-1. Comparison of 2019-23 Actual Data versus 2020 SYR Projection for Groundwater Pumping by Pool, FY 2019-2023

Figure 2-2. Comparison of 2019-23 Actual Data versus 2020 SYR Projection for Groundwater Pumping by Management Zone, FY 2019-2023



2.3.2 2024 Projection versus 2020 SYR Projection

Figure 2-3 is a bar chart comparing the 2020 SYR Projection to the 2024 Projection for pumping by Pool for FY 2025 and FY 2030. Figure 2-3 shows:

- The 2024 Projection for pumping is less than the 2020 SYR Projection by 1,400 afy in FY 2025 and greater than the 2020 SYR Projection by 3,900 afy in FY 2030. These differences are due to higher pumping projections provided by the Appropriative Pool Parties for the 2024 Projection and pumping projections for the Agricultural and Overlying Non-Agricultural Pools that is lower than the 2020 SYR Projection.
- The 2024 Projection for pumping by the Overlying Non-Agricultural Pool is 830 to 850 afy less than the 2020 SYR Projection. 2019-23 Actual pumping for the Overlying Non-Agricultural Pool has been consistently less than the 2020 SYR Projection; in addition, one Overlying Non-Agricultural Pool member (California Speedway Corporation) indicated in 2024 that projected pumping would be less than historical pumping. Hence, the 2024 Projection for Overlying Non-Agricultural Pool pumping is less than the 2020 SYR Projection.

Figure 2-4 is a bar chart comparing 2020 SYR Projection to the 2024 Projection for pumping by MZ for FY 2025 and FY 2030. Figure 2-4 shows:

- The greatest difference between the 2024 Projection and the 2020 SYR occurs in MZ-1. The 2024 Projection for pumping is greater than the 2020 SYR Projection in MZ-1 by 8,300 afy for FY 2025 and by 9,200 afy in FY 2030. These differences are due to higher pumping projections provided by the Appropriative Pool parties in MZ-1 for the 2024 Projection.

Figure 2-3. Comparison of 2020 SYR Projection versus 2024 Projection for Groundwater Pumping by Pool, FY 2025-2030

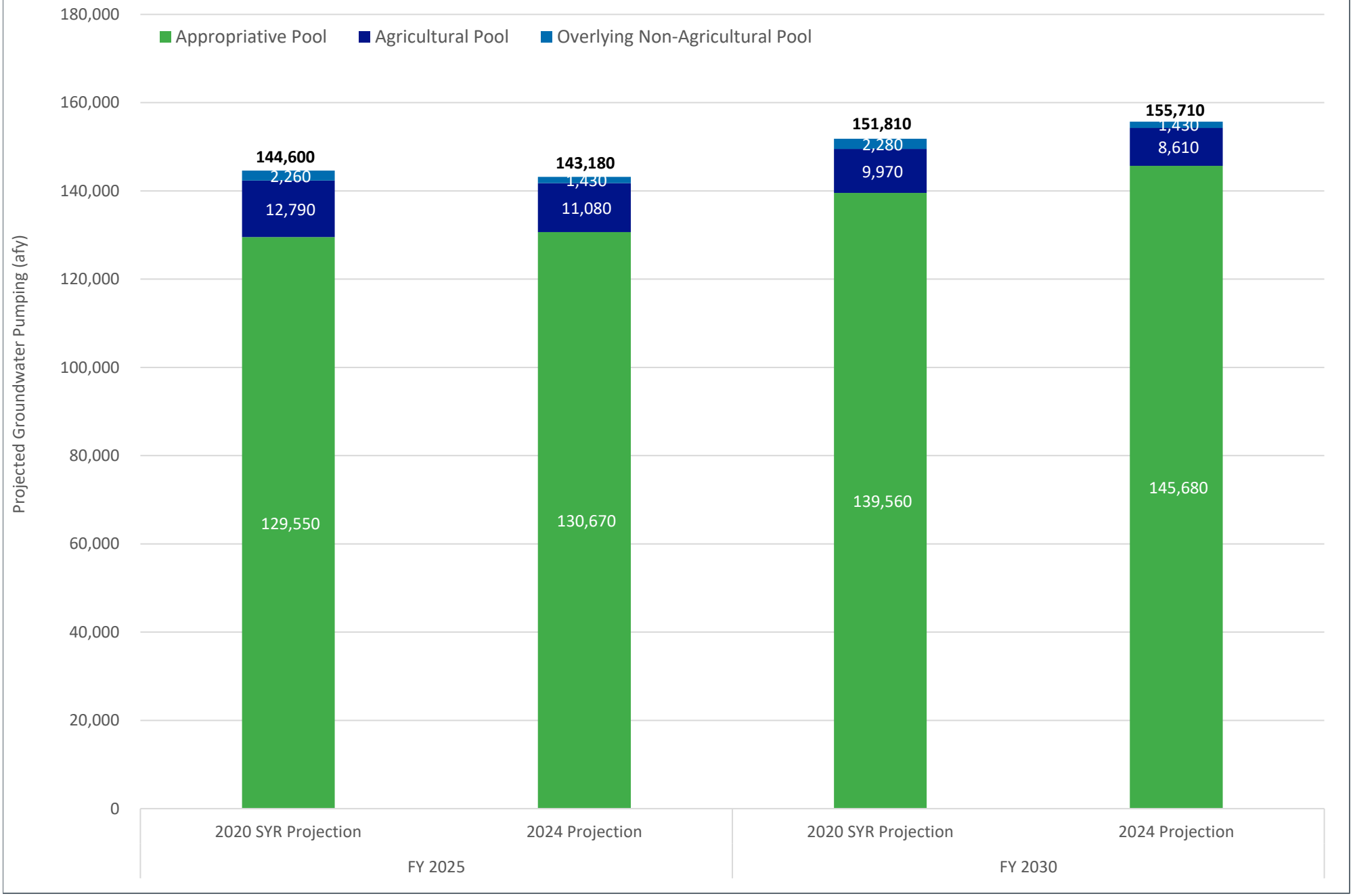
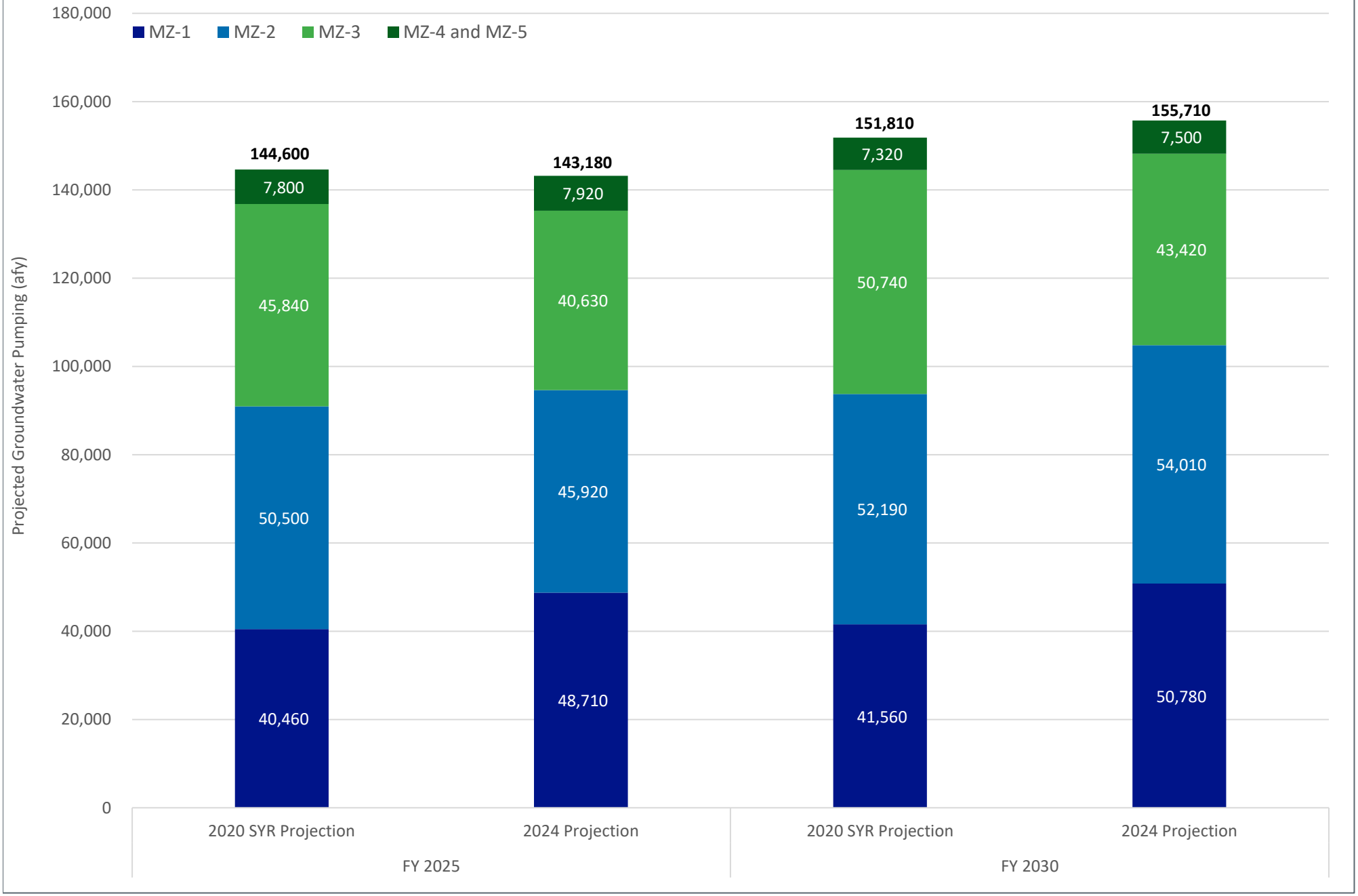


Figure 2-4. Comparison of 2020 SYR Projection versus 2024 Projection for Groundwater Pumping by Management Zone, FY 2025-2030



2.3.3 Summary

The main observations and conclusions from this section are:

- **The 2019-23 Actual pumping was greater than assumed in the 2020 SYR Projection**. The 2019-23 Actual pumping was greater than the 2020 SYR Projection by about 5,400 afy. This difference is primarily due to the groundwater pumping for the DYYP in FY 2020, 2021, and 2022, which generally occurred in northern MZ-2. Not including the DYYP pumping, 2019-23 Actual pumping by the Agricultural Pool, Overlying Non-Agricultural Pool, and the Appropriative Pool were less than the 2020 SYR Projection by about 1,600 afy, 1,100 afy, and 4,500 afy, respectively.
- **The 2024 Projection pumping is similar to the 2020 SYR Projection.** The 2024 Projection for pumping is less than the 2020 SYR Projection by 1,400 afy in FY 2025 and greater than the 2020 SYR Projection by 3,900 afy in FY 2030. The differences between the 2024 Projection and the 2020 SYR Projection for groundwater pumping are not expected to significantly impact net recharge.
- **Differences between the 2024 Projection and the 2020 SYR Projection for pumping indicate the potential for increased risk of future undesirable results related to land subsidence.** The 2024 Projection for pumping is greater than the 2020 SYR Projection in MZ-1 by 8,300 afy for FY 2025 and by 9,200 afy in FY 2030. Some of the areas where the 2024 Projection for groundwater pumping is greater than the 2020 SYR Projection overlie the Northwest MZ-1 Area of Subsidence Concern where Watermaster is currently developing a subsidence management plan. These differences indicate the potential for an increased risk of future land subsidence. It should be noted that Watermaster currently conducts monitoring and management to address potential land subsidence through the implementation of the OBMP.

CHAPTER 3
Urban Outdoor Water Use

Chapter 3 documents the collection and evaluation of data and information on outdoor urban water use practices in the Chino Basin.

3.1 SUMMARY AND APPLICATION TO MODEL

Urban outdoor water use and the fate of these waters after use are a major driver of recharge in the Chino Basin. Typically, pervious urban landscapes are either covered with vegetation that is irrigated (e.g., lawns) or are unplanted and not irrigated. The soil underlying irrigated vegetation is usually moist, allowing some of the irrigation water and precipitation to infiltrate past the root zone to recharge the underlying groundwater basin. Changes in urban irrigation practices in response to climate, water conservation mandates, or other drivers affect the rates and volumes of infiltration of irrigation and precipitation past the root zone.

Urban outdoor water use was included in the CVM via the R4 model, which is used to calculate the deep infiltration of precipitation and applied water (DIPAW).[1] The R4 model estimates applied water based on soil type, vegetation type, irrigation method, precipitation, and ET. The R4 model calculates the soil moisture available for use by vegetation and determines the rates/volumes of applied water needed for irrigation. The R4 model estimates the infiltration of applied water and precipitation past the root zone that constitutes DIPAW. The R4 model was calibrated to match urban outdoor water use patterns in areas where there are sufficient data to estimate urban outdoor water use; specifically, these areas are tributary to Inland Empire Utilities Agency's (IEUA) major wastewater treatment plants (sewersheds) from FY 1991 through 2018.

For the 2020 SYR, the R4 model was calibrated by comparing estimated actual potable urban outdoor water use with the model-simulated applied water on residential, commercial, and industrial land uses. Recycled water applied for irrigation was not considered in the calibration because it had historically been a small portion of the irrigation water applied to these land uses. Land uses such as parks, golf courses, and schools were excluded from the calibration, as they are generally irrigated with recycled water.

Projections of future urban outdoor water use using the R4 model rely on projections of future precipitation, evapotranspiration (ET), land use, and irrigation behavior. Trends in urban outdoor water use are important to understand as they affect DIPAW, which affects groundwater levels and the water budget, including net recharge.

3.2 COLLECTION OF DATA AND INFORMATION

This section describes how the data and information for urban outdoor water use were collected and compiled for this report.

3.2.1 2019-23 Actual Data

Estimates for actual urban outdoor water use are derived from data collected from IEUA's two major sewersheds that cover most of the Chino Basin, which are the RP1/RP4 and Carbon Canyon (CC)/RP5 sewersheds. The methodology to derive estimates of urban outdoor water use was:

[1] See Appendix A of the 2007 CBWM Groundwater Model Documentation and Evaluation of the Peace II Project Description (WEI, 2007).

1. Obtain data from IEUA for monthly recycled water deliveries to customers in the sewershed that use recycled water for outdoor irrigation.
2. Obtain data from IEUA (and/or the Parties overlying the sewershed) for monthly potable water deliveries to the sewershed.
3. Obtain from each Party overlying the sewershed the annual estimates of the potable water delivery losses.
4. Obtain from IEUA the monthly sewage inflow to the wastewater treatment plants (i.e., estimated indoor water use).
5. Estimate the monthly dry-weather discharge using available discharge estimates from the USGS gage on Cucamonga Creek.
6. Estimate the monthly discharge from on-site waste disposal systems (OWDS) overlying the sewershed.
7. Calculate the monthly urban outdoor water use by using the formula:

   Urban Outdoor Water Use = [Water delivered to watershed] – [Water not used for irrigation]

   or

   Urban Outdoor Water Use = [(1) + (2)] – [(3) + (4) + (5) + (6)]

3.2.2 2020 SYR Projection

In the 2020 SYR, projected urban outdoor water use was estimated with the R4 model based on the calibrated parameters and the following assumptions:

- **Average expected-value hydrology adjusted for climate change.** The methodology used for the 2020 SYR calls for the use of the "long-term historical record of precipitation falling on current and projected future land uses to estimate the long-term average net recharge to the Basin" (WEI, 2015). Future precipitation and ET datasets used in the R4 model were based on the historical datasets for the period FY 1950 through 2011, which were adjusted for future climate conditions based on the method recommended by the California Department of Water Resources (DWR) for use in groundwater models to simulate future water budgets pursuant to the Sustainable Groundwater Management Act (SGMA) (DWR, 2018).[2,3]
- **The impact of current and future urban outdoor water use conservation legislation was not included.** On April 1, 2015, Governor Jerry Brown released Executive Order B-29-15, which mandated a statewide reduction in urban potable water usage of 25 percent through February 2016. Additionally, in 2018 the California legislature passed, and the Governor signed, two pieces of legislation (AB 1668 & SB 606) that led to the "Making Conservation a California Way of Life" regulation (Conservation Regulation)[4] to establish new water efficiency standards for purveyors in response to the California drought. At its inception, the

[2] More detail on the development of future hydrology can be found in Section 7 of the 2020 SYR Report.

[3] DWR. Resource Guide - DWR-provided Climate Change Data and Guidance for Use During Groundwater Sustainability Plan Development. 2018.

[4] Making Conservation a California Way of Life Fact Sheet

legislation would require water suppliers to meet agency-specific urban water use objectives beginning in 2027. Details on the implementation of this legislation were insufficient at the time to include in the 2020 SYR Projection. The 2020 SYR Projection assumed that outdoor water use patterns for legacy urban areas would reflect recent historical patterns. Areas projected for future development would implement more efficient outdoor water use consistent with the guidance provided in the DWR's 2015 Model Water Efficient Landscape Ordinance.[5]

The methodology to calculate the annual 2020 SYR Projection of FY 2019-23 actual urban outdoor water use was:

1. For 2018 and 2030 cultural conditions[6]:
   - The HSPF and R4 models are executed with historical data from 1950 through 2011. For the 2030 cultural conditions, the historical data was modified to account for climate change.
   - The average monthly urban outdoor water use for each sewershed was calculated based on the results of the HSPF and R4 simulations. For example, the average urban outdoor water use for the month of January is the average of every January over the 1950-2011 period.
2. The projected urban outdoor water use[7] for Fiscal Year 2019 through Fiscal Year 2023 was calculated by linearly interpolating the average monthly outdoor water use between 2018 and 2030 cultural conditions.

3.2.3 2024 Projection

The 2024 Projection for urban outdoor water use was developed by reexamining the assumptions used to develop the 2020 SYR Projection, reviewing historical patterns, and reviewing the status of the Conservation Regulation to predict its impact on urban outdoor water use.

In addition, as part of the 2025 Safe Yield Reevaluation (2025 SYR) scenario development, Watermaster has had discussions with the parties regarding projected future water supply plans and urban outdoor water use patterns.

3.3 EVALUATION

This section compares the 2020 SYR Projection to the 2019-23 Actual Data and the 2024 Projection for urban outdoor water use and evaluates the significance of the differences.

3.3.1 2019-23 Actual Data versus 2020 SYR Projection

Figure 3-1 compares the FY 2019-23 Actual urban outdoor water use to the 2020 SYR Projection. The 2019-23 Actual urban outdoor water use varies from year to year due to weather, population growth, water

[5] DWR. *Model Water Efficient Landscape Ordinance*. Accessed March 25, 2022.

[6] See Section 7.3 of the 2020 SYR Report for a detailed description of the present and projected future cultural conditions.

[7] The projected urban outdoor water use includes applied water on residential, commercial, industrial, and municipal land uses. This includes parks, golf courses, and schools.

conservation measures, infrastructure improvements, and economic factors. In contrast, the 2020 SYR Projection remains relatively constant since it is based on an average expected-value hydrology. From FY 2019 to FY 2023, the Actual urban water use was consistently less than the 2020 SYR Projection by about 21,100 afy. Multiple drivers may account for this difference, including systemic behavioral changes following Executive Order B-29-15 and infrastructure improvements. The historical period of comparison included three years with less-than-average precipitation (2020 through 2022) and two years with greater-than-average precipitation (2019 and 2023), so the influence of wet/dry years on urban outdoor water use should approximately offset.

3.3.2 2024 Projection versus 2020 SYR Projection

Since 2018, the State Water Resources Control Board (State Board) and the DWR have been developing new water use efficiency standards for urban retail water suppliers. In October 2023, the State Board released the first draft of the proposed Conservation Regulation. Following comments from the public, the State Board released a revised draft[8] in March 2024 and is expected to consider the adoption of the Conservation Regulation in summer 2024; if adopted, it will take effect in January 2025, with compliance expected to be assessed beginning in 2027.

The proposed Conservation Regulation requires the calculation of a budget for residential outdoor water use, incorporating a landscape efficiency factor linked to irrigable area, with future reductions slated for 2035 and 2040 to promote water-efficient landscaping practices. The parties that would be subject to the Conservation Regulation have indicated significant uncertainty in their customers' responses to the Conservation Regulation. Through scenario design workshops for the 2025 SYR, parties underscored the substantial impact of policy and regulation on water supply planning, particularly emphasizing uncertainties stemming from the Conservation Regulation.[9]

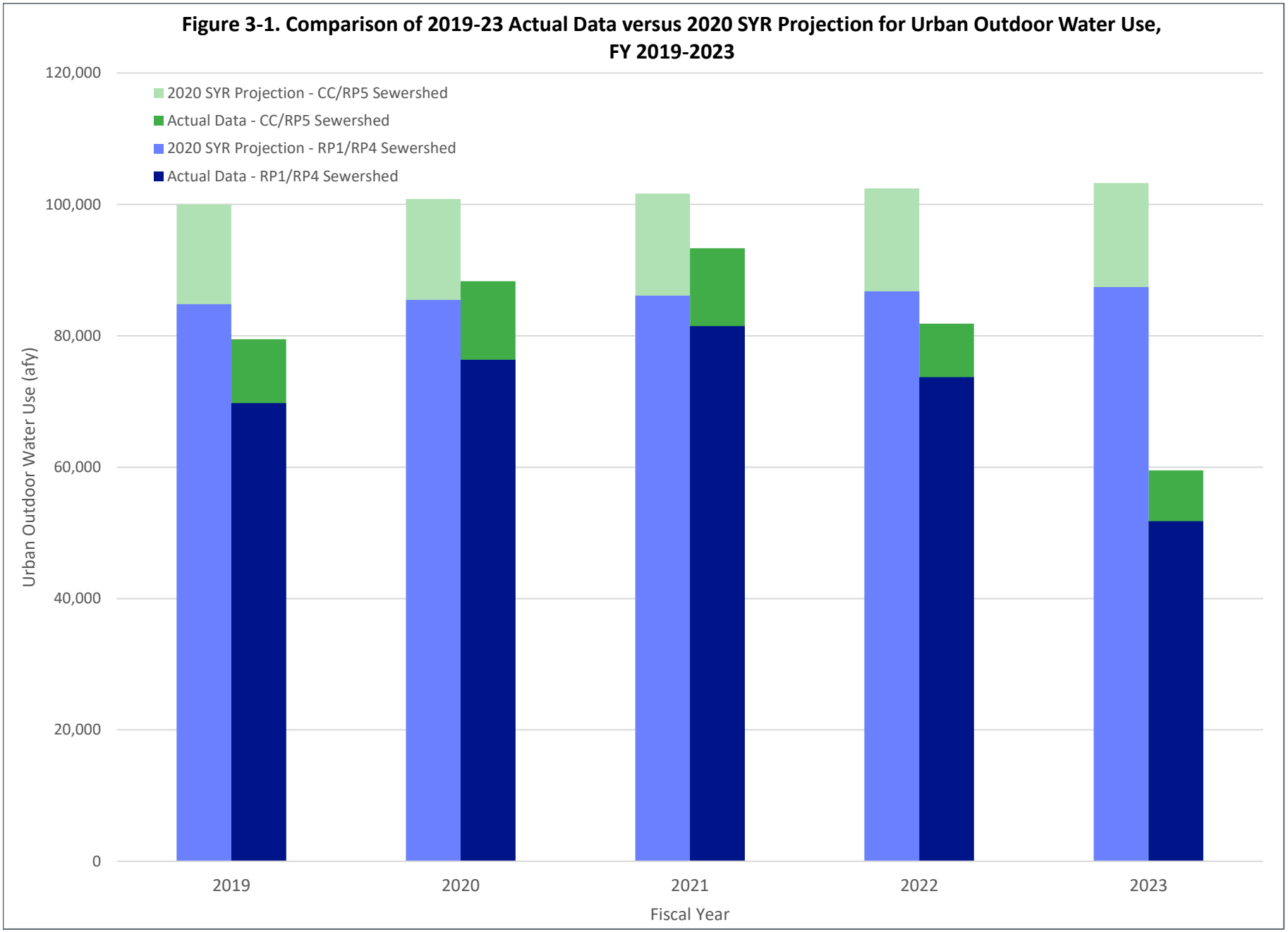
The parties' continued input and available data are being used to develop multiple future scenarios to encompass the range of potential outcomes and uncertainties surrounding future urban outdoor water use. This process is ongoing and is expected to be completed in summer 2024.

A precise 2024 Projection for urban outdoor water use was not possible for this report because (1) the proposed Conservation Regulation is not final and (2) there remains a high degree of uncertainty in agencies' responses to the Conservation Regulation and other unrelated changes in urban outdoor water use. However, the expected impacts from the proposed Conservation Regulation suggest a probable reduction in future urban outdoor water use compared to both the 2019-23 Actual Data and the 2020 SYR Projection.

[8] March 12, 2024 revised draft Conservation Regulation text; Making Conservation a California Way of Life Draft Regulation Revision

[9] Slides from 2025 SYR Scenario Design Workshop #1

Figure 3-1. Comparison of 2019-23 Actual Data versus 2020 SYR Projection for Urban Outdoor Water Use, FY 2019-2023



3.3.3 Summary

The main observations and conclusions of this section are:

- **The cumulative impacts of differences in outdoor urban water use may result in reduced net recharge compared to the current Safe Yield.** The average 2020 SYR Projection for urban outdoor water use between 2019 and 2023 was 21,100 afy greater than the average 2019-23 Actual urban outdoor water use within the IEUA service area. These differences will likely result in less DIPAW to the vadose zone than was simulated in the 2020 SYR. While a more precise estimate of the impacts of these differences requires the use of the CVM, the impact can be approximated with the following assumptions:

  1. Similar reductions in urban outdoor water use are likely beyond the IEUA service area. The IEUA service area covers about 80 percent of the Chino Basin, but its total service area is similar to the size of the Chino Basin. Therefore, the difference in FY 2019-23 urban outdoor water use compared to the 2020 SYR Projection could be around -21,100 afy across the Basin.

  2. The differences in urban outdoor water use result from increased irrigation efficiency compared to the 2020 SYR Projection.[10] A general estimate for irrigation efficiency for urban outdoor water use is 80 percent, which is consistent with a mix of sprinkler irrigation and drip irrigation.[11] An 80 percent irrigation efficiency means that about 20 percent of the applied water results in DIPAW to the vadose zone.

  Combining these assumptions, the DIPAW to the vadose zone could be on the order of 4,000 afy (21,100 afy * 20 percent) less than that simulated in the 2020 SYR over FY 2019-23. While a precise 2024 Projection for urban outdoor water use was not possible, based on the available information and the 2019-23 Actual Data, it is likely that future urban outdoor water use will continue to be less than the 2020 SYR Projection. Although the impacts of these differences will have a delayed impact on the net recharge due to the travel time through the vadose zone, these differences may result in the average net recharge over the current decade to decline below the current Safe Yield.

[10] The differences in urban outdoor water use could result from multiple behavioral changes, including increased irrigation efficiency (e.g., replacing sprinklers with drip irrigation), replacing current vegetation with vegetation that requires less water (i.e., a lower crop coefficient), or reducing irrigated area. Each of these changes will have a different impact on DIPAW relative to the change in applied water.

[11] Sandoval-Solis, S., et al. (2013). *Spatial Analysis of Irrigation Efficiency for the State of California.* 10.13140/RG.2.2.22516.55686

CHAPTER 4
Managed Groundwater Recharge

Chapter 4 documents the collection and evaluation of data and information on managed groundwater recharge in the Chino Basin.

4.1 SUMMARY AND APPLICATION TO MODEL

Managed groundwater recharge (also known as managed aquifer recharge or managed recharge) is the deliberate recharge of surface water to an aquifer. Watermaster has collaborated with the Parties and local agencies to enhance managed recharge in the Chino Basin through the implementation of Program Element 2 of the Optimum Basin Management Program (OBMP), which is to develop and implement a comprehensive recharge program.

The types of water recharged in the Chino Basin include stormwater and supplemental water. Stormwater is the runoff generated from rainfall within the Chino Basin watershed, some of which can be routed to recharge facilities within the Chino Basin. Stormwater recharge varies from year to year, and the volume of recharge is dependent on precipitation, which is highly variable, and the capacity and operation of the recharge facilities. Supplemental water includes recycled water and water that originates from outside the Chino Basin (i.e., imported water from the State Water Project). Supplemental water recharge is also highly variable and is dependent on the water-supply plans of the Parties, actions and coordination with outside agencies recharging in the Chino Basin (e.g., MWD's DYYP), the availability of supplemental water supplies, and the capacity and operation of the recharge facilities.

Managed recharge occurs in the Chino Basin via spreading of surface water at recharge basins, injection at aquifer storage and recovery (ASR) facilities, infiltration at Municipal Separate Storm Sewer System (MS4) facilities, and in-lieu recharge, all of which are documented in detail in the 2023 Recharge Master Plan Update (2023 RMPU).[1] Each method for managed recharge is listed below, including a description of how each of these recharge terms are input into the CVM:

- **Recharge Basins.** Recharge basins are the flood control and conservation basins that the IEUA, Chino Basin Water Conservation District (CBWCD), and the San Bernardino County Flood Control District own and operate. Recharge at these basins is input to the CVM as a specified inflow at the model cells corresponding to the recharge basins. Figure 4-1 shows the locations of the recharge basins in the Chino Basin where managed recharge occurs.
- **Aquifer Storage and Recovery Facilities.** ASR facilities are wells that are equipped for the injection of surface water and extraction of groundwater. Data for the injection and extraction of water from the ASR facilities are input into the CVM as a specified inflow at the location of the ASR well. Figure 4-1 shows the locations of the current and known future ASR facilities in the Chino Basin.
- **MS4 Facilities.** MS4 facilities include facilities to capture stormwater runoff in an urban area. Los Angeles, San Bernardino, and Riverside Counties, and/or the cities within these counties, have MS4 facilities in the Chino Basin. A reconnaissance-level study completed during the development of the 2023 RMPU estimated that there were 193 known MS4 facilities that have been constructed in the Chino Basin through FY 2021 that included infiltration features that would contribute to stormwater recharge in the Chino Basin. The data that has been collected on the performance and maintenance of the MS4 facilities has been insufficient to quantify

[1] West Yost. 2023 Recharge Master Plan Update. Prepared for the Chino Basin Watermaster. September 2023.

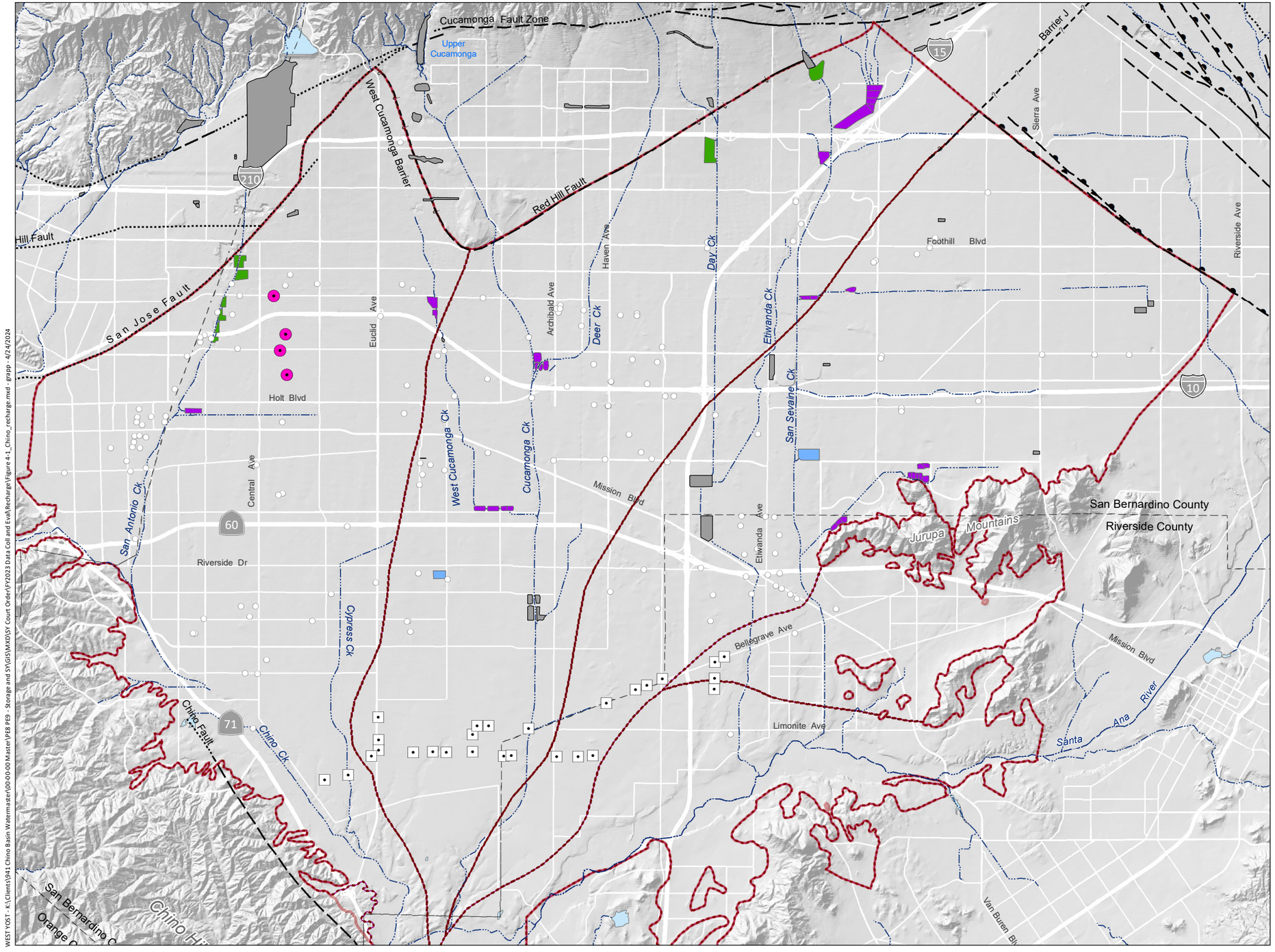
the historical or projected contribution of these facilities to new recharge in the Chino Basin. The CVM does not explicitly account for recharge at these facilities.

- **In-lieu Recharge.** In-lieu recharge can occur when a Party with pumping rights in the Chino Basin uses supplemental water for direct use in lieu of pumping Chino Basin groundwater. The ability of a Party to conduct in-lieu recharge depends on the extent of a Party's access to treatment and conveyance facilities for imported water. In-lieu recharge is reflected in a Party's water supply plan and is not a direct input into the CVM.

Historical data on managed recharge is one of several input datasets in the CVM calibration scenario. The CVM's R4 surface water model is calibrated to match the IEUA's estimates of stormwater recharge at recharge basins. The CVM groundwater model was calibrated over the period of July 1, 1977 through June 30, 2018 by adjusting model parameters to produce the best match between simulated and observed system responses, including the time series of surface water discharge into the Prado Dam reservoir and groundwater levels at wells.[2]

Projections of future managed recharge are used to develop the model projection scenarios, that are then simulated with the CVM to estimate the future water budget of the Chino Basin, including net recharge. Managed recharge patterns (magnitude and location) are important as they affect groundwater levels, water budget components, and net recharge in the Chino Basin.

[2] More information on the calibration process of the CVM can be found in Section 6 of the 2020 SYR Report.



Facilities Used for Managed Recharge

Spreading Basins

- Storm, Imported and Recycled Water
- Storm and Imported Water
- Stormwater

ASR Wells

- MVWD ASR Wells

- Other Stormwater Facilities Not Used for Managed Recharge (Incidental Recharge Only)
- Appropriative Pool Pumping Wells
- Chino Desalter Wells

OBMP Management Zones

Streams & Flood Control Channels

Faults

- Location Certain
- Location Approximate
- Approximate Location of Groundwater Barrier
- Location Concealed
- Location Uncertain

Prepared by:

WEST YOST

0 1 2 3 Miles

N

0 2 4 6 Km

Prepared for:

Chino Basin Watermaster
Data Collection and Evaluation
FY 2022/23

Managed Recharge in the Chino Basin

Figure 4-1

4.2 COLLECTION OF DATA AND INFORMATION

This section describes how the data and information for managed recharge were collected and compiled for this report.

4.2.1 Stormwater Recharge

4.2.1.1 2019-23 Actual Data

Stormwater recharge is metered at each recharge basin by the IEUA. The IEUA provides Watermaster the daily and monthly measurements of stormwater diverted to each recharge basin. Watermaster maintains these data in a database.

4.2.1.2 2020 SYR Projection

For the 2020 SYR, projections of stormwater recharge at recharge basins were estimated with the R4 model based on the following assumptions:

- **Average expected-value hydrology adjusted for climate change.** The Safe Yield Reset methodology employed for the 2020 SYR calls for the use of the "long-term historical record of precipitation falling on current and projected future land uses to estimate the long-term average net recharge to the Basin." Future precipitation and ET datasets used in the R4 model are based the historical datasets for the period of FY 1950 through 2011, which were adjusted for future climate conditions based on the method recommended by the DWR for model simulations of future water budgets pursuant to the SGMA (DWR, 2018).[3] The average stormwater recharge calculated based on historical precipitation and ET datasets represents the expected-value stormwater recharge that was used for the 2020 SYR Projection.
- **2013 RMPU projects would be fully operational by FY 2023.** During the development of the 2020 SYR Projection, the design and construction of the approved recharge enhancement projects in the 2013 RMPU were underway. The assumptions in the 2020 SYR Projection were that all approved 2013 RMPU projects would be completed by FY 2023, at which point the expected stormwater recharge increases by the R4-estimated volumes for each project.

4.2.1.3 2024 Projection

The 2024 Projection was developed by reexamining the assumptions used to develop the 2020 SYR Projection. Since the development of the 2020 SYR Projection, there is no updated information that would necessitate a change in the data or methods used to develop the expected-value hydrology used in the 2020 SYR Projection. Two of the 2013 RMPU projects were delayed past FY 2023: (1) Montclair Basin improvements and (2) Wineville/Jurupa/RP3 Basin pump station and improvements (Project 23a). As of this writing, the Montclair Basin improvements and Project 23a are expected to be completed by the end of December 2025 and fully operational in FY 2027. The expected stormwater recharge benefits of the Montclair Basin improvements and Project 23a are 96 afy and 2,921 afy, respectively. There are no additional stormwater recharge projects planned for construction through FY 2030.

[3] More detail on the development of future hydrology can be found in Section 7 of the 2020 SYR Report.

4.2.2 Recycled Water Recharge

4.2.2.1 2019-23 Actual Data

Recycled water recharge is metered at each recharge basin by the IEUA. The IEUA provides Watermaster the daily and monthly measurements of recycled water delivered to each recharge basin, adjusted for evaporative losses. Watermaster maintains these data in a database.

4.2.2.2 2020 SYR Projection

The IEUA provided projections of future annual recycled water recharge at each recharge basin. The Watermaster Engineer reduced the IEUA projections for the 2020 SYR Projection to be more consistent with the then-recent history of recycled water recharge that occurred prior to FY 2019.

4.2.2.3 2024 Projection

The IEUA provided updated recycled water recharge projections in 2024.

4.2.3 Imported Water Recharge

4.2.3.1 2019-23 Actual Data

Imported water recharge is metered at each recharge basin by the IEUA. The IEUA provides Watermaster the daily and monthly measurements of imported water delivered to each recharge basin, adjusted for evaporative losses. Volumes of imported water injected into ASR wells in the Chino Basin are reported to Watermaster quarterly by the well owners. Watermaster maintains these data in a database.

4.2.3.2 2020 SYR Projection

For the 2020 SYR Projection, estimates of future imported water recharge were based on the following:

- **Storage and Recovery Programs.** The only active Storage and Recovery Program in the Chino Basin is the DYYP. This program involves the recharge of imported water in the Chino Basin for later extraction via Chino Basin wells. At the end of the calibration period (June 30, 2018), the DYYP had a balance of about 41,380 af. The future operations of the DYYP were uncertain beyond the calibration period, so no recharge for the DYYP was included in the 2020 SYR Projection.
- **Peace II Agreement requirements.** Pursuant to the Peace II Agreement, 6,500 afy of supplemental water must be recharged in MZ-1 through 2030. The 2020 SYR Projection assumed that "this obligation will be satisfied through the recharge of imported water for the [DYYP] that has already occurred and recycled water recharge planned to occur in MZ1 through 2030." (2020 SYR Report).
- **Replenishment obligations.** Imported water was assumed to be recharged in the future to satisfy the replenishment obligations of the Parties. To estimate the volume of

replenishment obligations and Managed Storage,[4] Watermaster compared estimates of future pumping to future pumping rights, as summarized below.[5]

- Projections of future pumping rights were based on the Safe Yield (through FY 2020), projected average net recharge (for each decade after FY 2020), Reoperation water, and projected recycled water recharge.
- If projected pumping was greater than projected pumping rights, the difference was the replenishment obligation. It was assumed that the replenishment obligation would be satisfied 80 percent by debits from Managed Storage accounts and the remaining 20 percent by wet-water (imported water) recharge.

- **Projected imported water recharge at ASR wells.** No imported water was assumed to be recharged via ASR wells in the 2020 SYR.

The projected imported water recharge was allocated to specific recharge basins based on the recommendation in the 2023 RMPU (West Yost, 2023), which stated the following:

> *"West Yost's recommendation to Watermaster regarding the location and magnitude of supplemental water recharge for replenishment has been to maximize recharge to MZ1 up to its spreading capacity, then to maximize recharge in MZ3 up to its recharge capacity, and then to recharge in MZ2. Given that the long-term land subsidence management plan for Northwest MZ1 has not yet been completed and there are no projected recharge-related pumping substantiality challenges which can be practically mitigated through recharge, the existing strategy and the facilities on which it relies are sufficient at least until the next RMPU occurs in 2028. This includes continuing the recharge of at least 6,500 afy of supplemental water in MZ1 until the next RMPU occurs in 2028 or the MZ1 subsidence management plan is completed."*

4.2.3.3 2024 Projection

For the 2024 Projection, estimates of future imported water recharge were based on the following:

- **Storage and Recovery Programs.** The only active Storage and Recovery Program remains the DYYP, which had a balance of about 7,900 af at the end of FY 2023. No recharge for the DYYP was included in the 2024 Projection.
- **Peace II Agreement requirements.** The Peace II Agreement requirements remain unchanged, thus 6,500 afy of supplemental water must continue to be recharged in MZ-1 through 2030. It is still assumed that "this obligation will be satisfied through the recharge of imported water for the [DYYP] that has already occurred and recycled water recharge planned to occur in MZ1 through 2030."
- **Replenishment obligations.** The 2024 Projection for Managed Storage and replenishment obligations is based on the same methods as prior years. In 2022, as part of Watermaster's data request to the Appropriative Pool Parties, Watermaster requested 20-year operating plans for groundwater pumping, transfers, and the use of Managed Storage to meet any

[4] Managed Storage, as used herein, refers to water stored by the Parties and other entities, and includes Carryover, Local Storage, and Supplemental Water held in storage accounts by the Parties, and Storage and Recovery Programs.

[5] More detail on the methods to calculate the replenishment obligation can be found in Section 7.3.1.2 of the 2020 SYR Report.

future replenishment obligations. Based on the Parties' responses, the average percentage[6] of future replenishment obligations that the Parties expected to meet through debits from Managed Storage accounts was about 90 percent, with the other 10 percent expected to be met with imported water recharge. Most of the Parties expressed some uncertainty in these estimates, noting that future availability and cost of imported water has been more volatile in recent years. Future work to develop scenarios for the 2025 Safe Yield Reevaluation will consider an approach that considers each party's individual responses to use Managed Storage to meet replenishment obligations.

- **Projected imported water recharge at ASR wells.** The Parties indicated that no imported water should be assumed to be recharged via ASR wells in the 2024 Projection.

4.3 EVALUATION

This section compares the 2020 SYR Projection to the 2019-23 Actual Data and the 2024 Projection for managed recharge and evaluates the significance of the differences. Figure 4-2 compares the 2019-23 Actual Data, 2020 SYR Projection, and the 2024 Projection for managed recharge by type for FY 2019-2030.

4.3.1 Stormwater Recharge

4.3.1.1 2019-23 Actual Data versus 2020 SYR Projection

Year-to-year, the 2019-23 Actual stormwater recharge was sometimes greater and sometimes less than stormwater recharge in the 2020 SYR Projection, which is to be expected given the interannual variability in precipitation. On average, the 2019-23 Actual stormwater recharge was about the same as the 2020 SYR Projection (11,200 afy).

4.3.1.2 2024 Projection versus 2020 SYR Projection

Due to the delay of the completion of the Montclair Basin improvements and Project 23a, the 2024 Projection of stormwater recharge is less than the 2020 SYR Projection. A minor portion of Project 23a is complete as of FY 2023/24 (the construction of a new cell at RP3); however, the reduced recharge opportunity due to the project delays is uncertain due to project design and hydrologic conditions. Assuming that the lost recharge opportunity due to project delays is about 2,000 afy over three years (FY 2024-26), the 2024 Projection for stormwater recharge averages 13,400 afy, about 900 afy less than the 2020 SYR Projection (14,300 afy).

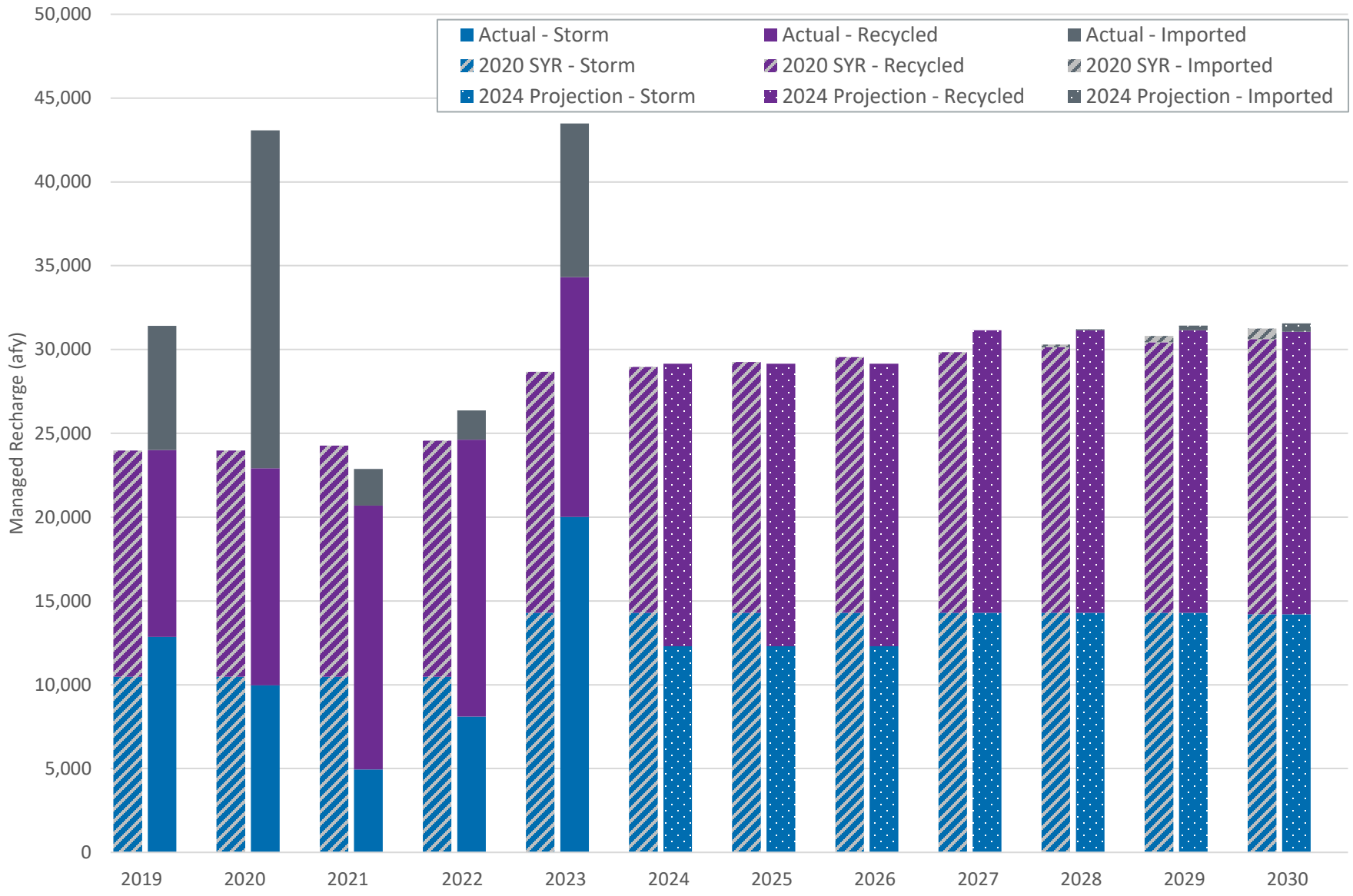
4.3.2 Recycled Water Recharge

4.3.2.1 2019-23 Actual Data versus 2020 SYR Projection

On average, the 2019-23 Actual recycled water recharge was 14,130 afy, about 280 afy greater than the 2020 SYR Projection (13,850 afy).

[6] A volume-weighted average percentage was calculated based on each Party's respective Managed Storage account balance at the end of FY 2022.

Figure 4-2. Comparison of 2019-23 Actual Data and Projected Managed Recharge in the Chino Basin, FY 2019-2030



4.3.2.2 2024 Projection versus 2020 SYR Projection

The 2024 Projection for recycled water recharge is 16,850 afy, or about 1,300 afy greater than the 2020 SYR Projection (15,550 afy).

4.3.3 Imported Water Recharge

4.3.3.1 2019-23 Actual Data versus 2020 SYR Projection

On average, the 2019-23 Actual imported water recharge was greater than the 2020 SYR Projection by about 8,100 afy. This is almost entirely due to imported water recharge for the DYYP during FY 2019, 2020, and 2023.

4.3.3.2 2024 Projection versus 2020 SYR Projection

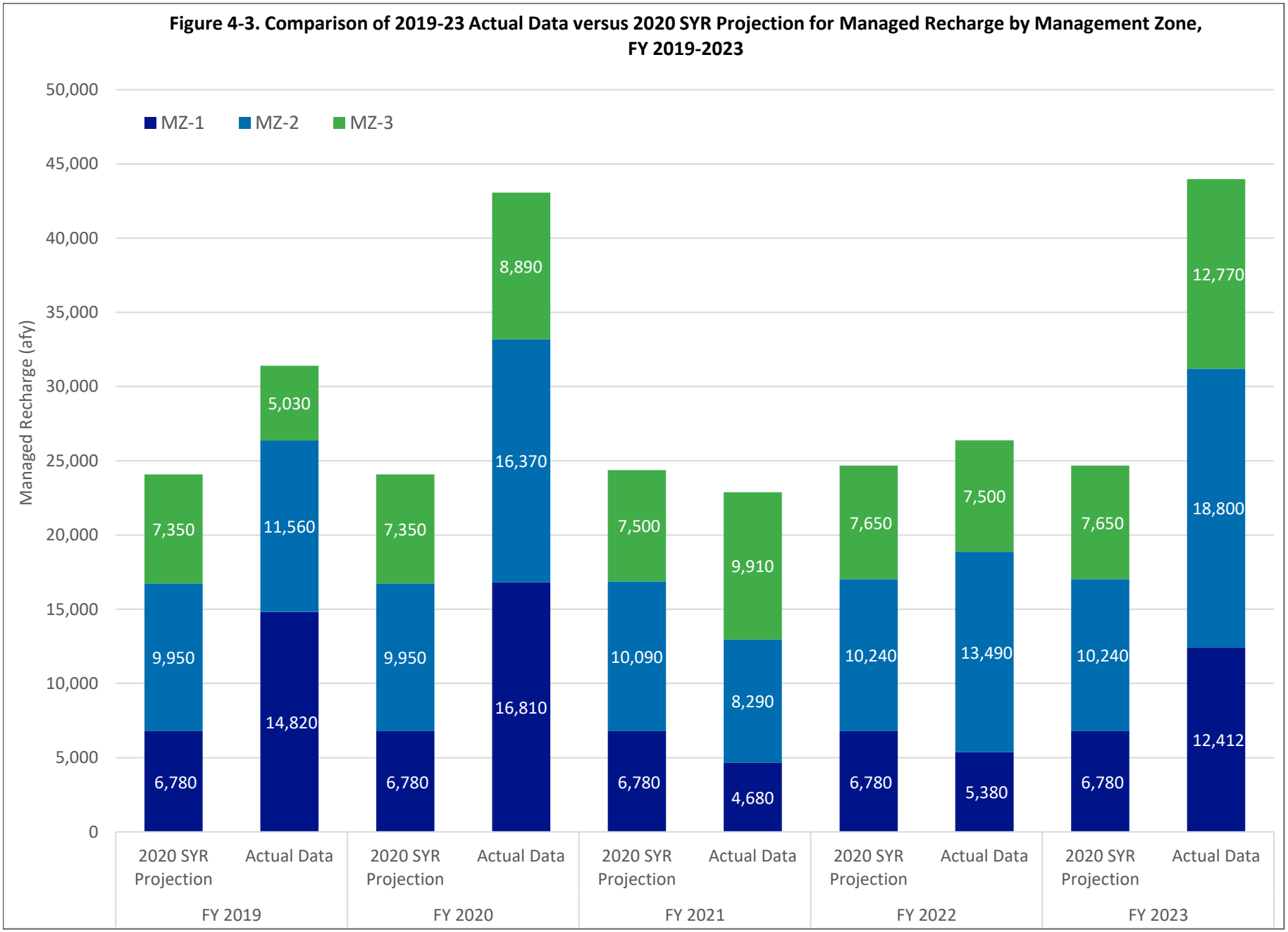
The 2024 Projection for imported water recharge during FY 2024 through 2030 is about 120 afy, slightly lower than the 2020 SYR Projection, which was about 170 afy.

4.3.4 Summary

The main observations and conclusions from this section are:

- **The 2019-23 Actual managed recharge in MZ-1 was greater than assumed in the 2020 SYR Projection.** Figure 4-3 compares the 2019-23 Actual managed recharge to the 2020 SYR Projection by MZ. The 2019-23 Actual managed recharge was greater than the 2020 SYR Projection by an average of about 3,000 afy, including 4,000 afy in MZ-1. This was largely due to the imported water recharged for the DYYP. The facilities for managed recharge in MZ-1 are all located in the northwest portion of MZ-1, where persistent land subsidence has been occurring for decades and the Watermaster is currently developing a subsidence management plan. The greater volumes of managed recharge in MZ-1 can help support groundwater levels in this area and help mitigate the occurrence of land subsidence.
- **The 2019-23 Actual stormwater recharge was about the same as the 2020 SYR Projection.** The 2019-23 Actual stormwater recharge in the Chino Basin and the 2020 SYR Projection both averaged about 11,200 afy. Differences between actual and projected stormwater recharge are to be expected because (i) precipitation and runoff are highly variable and (ii) the projections are based on long-term expected average hydrology adjusted for climate change. Over longer time periods, Actual stormwater recharge should become approximately equal to the projections assuming stationary climate conditions. The greater-than-average stormwater recharge during the wet years of FY 2019 and FY 2023 offset the less-than-average stormwater recharge during the dry years of FY 2020 through 2022.
- **The 2024 Projection for stormwater recharge is less than the 2020 SYR Projection.** Due to the delays in the implementation of two recharge projects identified in the 2013 RMPU, the 2024 Projection for stormwater recharge is about 13,400 afy, about 900 afy less than the 2020 SYR Projection over the period of FY 2024 through 2030.

Figure 4-3. Comparison of 2019-23 Actual Data versus 2020 SYR Projection for Managed Recharge by Management Zone, FY 2019-2023



CHAPTER 5
Conclusions and Recommendations

Chapter 5 documents conclusions of the cumulative evaluation of the data collected for this report and recommendations for further evaluation.

5.1 CONCLUSIONS

This section discusses the cumulative evaluation of the differences between the 2020 SYR Projection versus the 2019-23 Actual Data and the 2024 Projection. The evaluation considers the cumulative impacts on net recharge and the potential for Material Physical Injury. Table 5-1 summarizes the findings and conclusions described in prior chapters and this evaluation of cumulative impacts.

5.1.1 Managed Storage

Groundwater pumping (Chapter 2) and managed recharge (Chapter 4) are components of the calculation of Managed Storage. Managed Storage can affect groundwater levels and the net recharge in the Chino Basin. For example, higher Managed Storage can result in higher groundwater levels, and hence, lower net recharge because of the groundwater/surface-water interactions in the southern Chino Basin.

Table 5-2 shows: (i) 2019-23 Actual Data for Managed Storage which was derived from Watermaster Assessment Packages and (ii) the calculation of the 2024 Projection for Managed Storage. Figure 5-1 is a time-series chart that compares the 2020 SYR Projection to the 2019-23 Actual and 2024 Projection for Managed Storage through FY 2030. Figure 5-1 shows that the 2019-23 Actual Data and the 2024 Projection is sometimes less than and sometimes greater than the 2020 SYR Projection. By the end of FY 2030, the 2024 Projection is about 14,000 af less than the 2020 SYR Projection for Managed Storage. Based on the current understanding of the relationship between Managed Storage and basin conditions, a difference of 14,000 af in Managed Storage is unlikely to have a significant effect on net recharge or groundwater levels by FY 2030. [1,2]

5.1.2 Potential Deviation from Current Safe Yield

This report analyzed four potential factors that can affect the net recharge to the Chino Basin, and hence, can cause a deviation from the current 2020 Safe Yield that has been set for the period 2021-2030. These factors included: groundwater pumping, urban outdoor water use, managed recharge, and Managed Storage. The analysis indicated that actual (FY 2019-23) and projected (FY 2024-30) urban outdoor water use is substantially less than was projected in the 2020 SYR, which may materially impact the DIPAW to the saturated zone, and hence, may result in average net recharge to decline below the current Safe Yield over the Safe Yield period FY 2021-2030.

Specifically, the DIPAW to the vadose zone over FY 2019-23 was estimated to be on the order of 4,000 afy less than that simulated in the 2020 SYR. If this current trend continues, or if urban outdoor water use continues to decline relative to the 2020 SYR Projection, an annual difference of DIPAW to the vadose

[1] WY. *Evaluation of the Local Storage Limitation Solution*. Prepared for the Chino Basin Watermaster, February 2021.

[2] See Figure 3-1 in the *Evaluation of the Local Storage Limitation Solution* report (WY, 2021). Based on these results, the estimated impact of a 14,000 af difference in Managed Storage may result in net recharge increasing by less than 200 afy, or less than 0.2 percent of the Safe Yield.

zone of 4,000 afy or more from FY 2019-30 could result in a reduction in DIPAW to the saturated zone[3] of more than 3,300 afy, which is greater than 2.5 percent of the current Safe Yield (131,000 afy).

In addition, the analysis found that the 2024 Projection for stormwater recharge is about 900 afy less than the 2020 SYR Projection. Over the Safe Yield period of FY 2021 through 2030, this could result in about 600 afy less stormwater recharge than projected, which directly impacts net recharge.

5.1.3 Potential Material Physical Injury

The 2019-23 Actual Data and 2024 Projection for groundwater pumping indicate the potential for undesirable results related to increased risk of new land subsidence in Northwest MZ-1 that were not identified in the 2020 SYR.

5.2 RECOMMENDATIONS

As discussed in section 1, if this report concludes that (1) "there has been or will be a material change from existing and projected conditions" or (2) where there has been or will be "threatened undesirable results," Watermaster must conduct "more significant evaluation, including modeling, as described in the Reset Technical Memorandum." (2017 Court Order, p. 17.) Accordingly, the recommendations resulting from this FY 2022/23 Annual Report are as follows:

1. **Through Watermaster's existing programs, address the potential for new undesirable results resulting from the 2024 Projection for groundwater pumping exceeding the 2020 SYR Projection.** The comparison of the 2020 SYR Projection to the 2024 Projection for groundwater pumping indicated the increased risk for new land subsidence in MZ-1. To address this, we recommend that Watermaster and the parties complete and implement a subsidence management plan for MZ-1. This process is already underway as part of Watermaster's Ground-Level Monitoring Program. The continued development of a subsidence management plan should include a more precise evaluation of the potential impacts of future pumping and recharge to inform groundwater management strategies that would allow continued pumping from MZ-1 without increasing the risk of land subsidence.
2. **Reevaluate the current Safe Yield consistent with the 2017 Court Order.** This report supports the necessity to conduct additional evaluation through the 2025 Safe Yield Reevaluation (2025 SYR), due to two primary findings:

    — The results from this report have improved our understanding of the relationship between hydrologic and cultural conditions. The five years of historical data evaluated herein include two wet years of greater-than-average precipitation (FY 2019 and FY 2023) and three dry years of less-than-average precipitation (FY 2020 through 2022). As demonstrated in the FY 2019-23 Actual Data, hydrology has a significant impact on pumping, recharge, and urban outdoor water use.

    — Based on the findings regarding the differences in urban outdoor water use and projected stormwater recharge, there is a reasonable likelihood that the cumulative impact of these

[3] DIPAW to the saturated zone accounts for the lag time of DIPAW through the vadose zone and is one of the primary recharge components of the Chino Basin.

differences would result in the actual Safe Yield being less than the current Safe Yield by more than 2.5 percent, suggesting the possibility for "a material change from existing and projected conditions" (2017 Court Order, p. 17).

The current Safe Yield Reset methodology, which will be executed for the first time during the 2025 SYR, involves developing multiple projection scenarios to quantify the uncertainty in future hydrology and cultural conditions (such as the implementation of Conservation Regulations and their impact on DIPAW). This data collection and evaluation process has provided valuable insight to assist in the development of the projection scenarios. Ultimately, the projection scenarios will be evaluated with the CVM to: (i) estimate the net recharge to the Chino Basin; (ii) characterize the associated uncertainty in the net recharge estimates; and (iii) provide information to the Watermaster parties on whether it is necessary or advisable to revise the Safe Yield.

Table 5-1. Summary of Observations and Conclusions

Cultural Condition (Chapter)	Main Findings	Main Conclusions
Groundwater Pumping (2)	The 2019-23 Actual Data was greater than the 2020 SYR Projection of groundwater pumping by about 5,400 afy.	The greater pumping in the 2019-23 Actual Data is not expected to result in a significantly different net recharge compared to the 2020 SYR Projection.
	The 2024 Projection for pumping is less than the 2020 SYR Projection by 1,400 afy in FY 2025 and greater than the 2020 SYR Projection by 3,900 afy in FY 2030.	The differences between the 2024 Projection and the 2020 SYR Projection for groundwater pumping are not expected to result in a significantly different net recharge compared to the 2020 SYR Projection.
	Some of the areas where the 2024 Projection for groundwater pumping is greater than the 2020 SYR Projection overlie the Northwest MZ-1 Area of Subsidence Concern where Watermaster is currently developing a subsidence management plan.	The differences between the 2024 Projection for groundwater pumping and the 2020 SYR Projection in the Northwest MZ-1 Area of Subsidence Concern indicate the potential for an increased risk of future land subsidence.
Urban Outdoor Water Use (3)	The 2020 SYR Projection exceeds the 2019-23 Actual Data for urban outdoor water use by 21,100 afy.	The differences between the 2019-23 Actual Data and the 2020 SYR Projection suggest that DIPAW to the vadose zone may be about 5,300 afy less than the 2020 SYR Projection over this period. The cumulative impact of these differences may materially impact the DIPAW to the saturated zone, potentially resulting in average net recharge over the current decade falling below the current Safe Yield.
	Based on the available information on future patterns of urban outdoor water use and the 2019-23 Actual Data, it is likely that future patterns of urban outdoor water use will be less than the 2020 SYR Projection.	
Managed Recharge (4)	2019-23 Actual Data was greater than the 2020 SYR Projection for managed recharge in MZ-1 by about 4,000 afy.	The greater volumes of managed recharge in the 2019-23 Actual Data compared to the 2020 SYR Projection in MZ-1 can help support groundwater levels in this area and help mitigate the occurrence of land subsidence.
	2019-23 Actual Data was about the same as the 2020 SYR Projection for stormwater recharge in the Chino Basin, averaging about 11,200 afy.	Differences in stormwater recharge between the 2019-23 Actual Data and the 2020 SYR Projection are to be expected because (i) precipitation and runoff are highly variable and (ii) the projections are based on long-term expected average hydrology adjusted for climate change. Over longer time periods, actual stormwater recharge should become approximately equal to the projections. The greater-than-average stormwater recharge during the wet years of FY 2019 and FY 2023 offset the less-than-average stormwater recharge during the dry years of FY 2020 through 2022.
	The 2024 Projection for stormwater recharge is less than the 2020 SYR Projection by about 900 afy.	Due to the delays in the implementation of two recharge projects identified in the 2013 RMPU, the 2024 Projection for stormwater recharge is about 13,400 afy, about 900 afy less than the 2020 SYR Projection over the period of FY 2024 through 2030.
Cumulative Impact	**Based on 2019-23 Actual Data and the 2024 Projection for groundwater production and managed recharge, the 2024 Projection for Managed Storage is 14,000 af less than the 2020 SYR Projection for Managed Storage at the end of FY 2030.**	**The 2019-23 Actual Data and 2024 Projection for Managed Storage do not indicate the potential for net recharge to be significantly different than the current Safe Yield.**
		The cumulative impact of differences between the 2020 SYR Projection and the 2019-23 Actual Data/2024 Projection may materially impact the DIPAW and stormwater recharge to the saturated zone, potentially resulting in average net recharge over the current decade falling below the current Safe Yield by more than 2.5 percent.
		The 2024 Projection for groundwater pumping indicates the potential for undesirable results related to increased risk of new land subsidence in Northwest MZ-1 that was not identified in the 2020 SYR.

Table 5-2. Projected Groundwater Pumping, Pumping Rights, Replenishment and End-of-Year Volume in Managed Storage – 2019-23 Actual Data and 2024 Projection

FY	2024 Projection Groundwater Production[a]	Pumping Rights				Net Replenishment Obligation[c]	Replenishment from Storage[d]	Replenishment with Wet-Water Recharge	Net Change in DYYP Storage Account Balance	End-of-Year Managed Storage[e]
		Safe Yield[b]	Reoperation Water Use to Offset the Desalter Replenishment Obligation	Recycled Water Recharge	Total					
(1)	(2)	(3)	(4)	(5)	(6) = (3)+(4)+(5)	(7) = (2)-(6)	(8)	(9)	(10)	$(11)_t = (11)_{t-1} - (7)_t + (9)_t + (10)_t$
2019									-	549,243
2020									(8)	587,806
2021									(23,032)	589,875
2022									(22,929)	586,310
2023									7,939	626,752
2024	141,546	131,000	12,500	16,420	159,920	(18,374)	0	0	0	645,126
2025	148,891	131,000	12,500	16,420	159,920	(11,029)	0	0	0	656,155
2026	150,929	131,000	5,000	16,420	152,420	(1,491)	0	0	0	657,645
2027	153,036	131,000	5,000	16,420	152,420	616	555	62	0	657,091
2028	155,207	131,000	5,000	16,420	152,420	2,787	2,508	279	0	654,582
2029	157,431	131,000	5,000	16,420	152,420	5,011	4,510	501	0	650,072
2030	159,703	131,000	5,000	16,420	152,420	7,283	6,555	728	0	643,517

(a) -- Equals projected groundwater pumping plus projected Voluntary Agreements for Pool 1 producers.

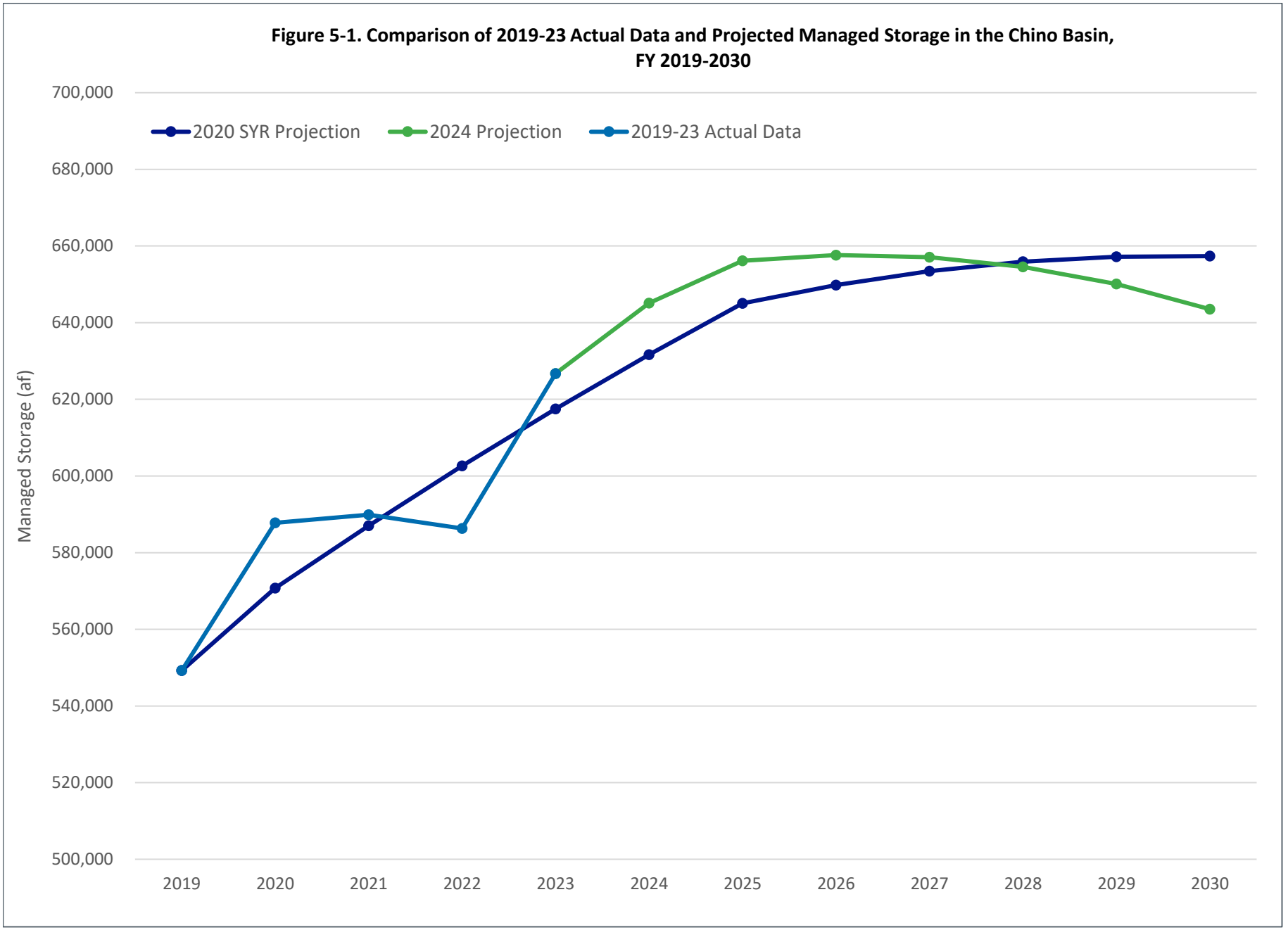
(b) -- Safe yield estimate from net recharge estimated in the 2020 SYR Report.

(c) -- Negative values mean aggregate underproduction and an increase in stored water accounts.

(d) -- 90 percent of a positive replenishment obligation is satisfied from storage and 10 percent is satisfied by wet-water recharge.

(e) -- Includes the DYYP storage account balance. Values through FY 2023 are actual values based on Watermaster's Assessment Packages.

Figure 5-1. Comparison of 2019-23 Actual Data and Projected Managed Storage in the Chino Basin, FY 2019-2030



Appendix A

Metering and Reporting of Groundwater Pumping for FY 2023

Appendix A
Metering and Reporting of Groundwater Pumping

Appendix A responds to the requirement of the 2017 Court Order that Watermaster must "[e]nsure that, unless a Party to the Judgment is excluded from reporting, all production by all Parties to the Judgment is metered, reported, and reflected in Watermaster's approved Assessment Packages." (2017 Court Order, p. 16). This chapter characterizes the wells in the Chino Basin for FY 2023, including descriptions of wells that were added or went out of service in the reporting year and information on wells that are not metered.

Chino Basin Production Wells in FY 2023

Watermaster staff maintains a database of wells and groundwater pumping data, which is updated on a quarterly basis. Metered pumping data are collected from most Chino Basin Parties who pump more than 10 afy (a Minimal Producer as defined in the Judgment pumps less than 10 afy[1]). In some cases, metered pumping data are unavailable due to lack of access to the meter, a broken meter, or for other reasons. For wells where no metered data are available, Watermaster staff applies a water duty method to estimate the quarterly pumping. The water duty method is based on such factors as: irrigated area; crop type; irrigation efficiency; livestock populations; number of domestic users; or other factors. The water duty method is currently being documented and will be included in a future report.

Figure A-1 shows all active pumping wells in the Chino Basin during FY 2023. These wells are symbolized by meter status, wells owned by Minimal Producers, and whether the well was brought online or decommissioned in FY 2023. There were 458 wells that were active during FY 2023, as summarized below in Table A-1.

Table A-1. Summary of Pumping Wells in the Chino Basin in FY 2023

Well Category	Number of Wells Meeting Criteria in FY 2023	Total FY 2023 Production[(a)]
Well Status		
Active for entire year	440	122,321
Brought online in FY 2023	2	5,281
Decommissioned in FY 2023	16	34
Meter Status		
Metered	316	123,822
Unmetered, Non-Minimal Producer	57	3,564
Minimal Producer	85	250
Total	**458**	**127,636**

(a) Includes pumping from General Electric's wells, not accounting for injection.

Table A-2 includes a comprehensive list of the active wells in Watermaster's database for FY 2023.

[1] Chino Basin Judgment Section I.4.j

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0600496	Well 1	BlueTriton Brands, Inc.	3	34.04610	-117.52873	N	N	Metered	-	0.0
0600923	Well 2	BlueTriton Brands, Inc.	3	34.04583	-117.52581	N	N	Metered	-	276.6
0600487	01B	Chino Hills, City Of	3	33.98964	-117.68942	N	N	Metered	-	0.0
0600488	15B	Chino Hills, City Of	3	33.98977	-117.69319	N	N	Metered	-	25.0
0600489	16	Chino Hills, City Of	3	34.00489	-117.70742	N	N	Metered	-	0.0
0600499	17	Chino Hills, City Of	3	34.00528	-117.69218	N	N	Metered	-	0.0
0600500	19	Chino Hills, City Of	3	34.00249	-117.68788	N	N	Metered	-	0.0
0600689	05	Chino Hills, City Of	3	33.97513	-117.69114	N	N	Metered	-	0.0
3601911	01A	Chino Hills, City Of	3	33.98984	-117.68945	N	N	Metered	-	0.0
3601916	07A	Chino Hills, City Of	3	34.00071	-117.70984	N	N	Metered	-	0.0
3601917	07B	Chino Hills, City Of	3	34.00075	-117.71050	N	N	Metered	-	0.0
0600417	11	Chino, City Of	3	34.02990	-117.66045	N	N	Metered	-	0.0
0600467	12	Chino, City Of	3	34.04712	-117.69159	N	N	Metered	-	0.0
0600478	13	Chino, City Of	3	34.01168	-117.66540	N	N	Metered	-	1948.7
0600482	14	Chino, City Of	3	34.05802	-117.68165	N	N	Metered	-	0.0
0601026	16	Chino, City Of	3	34.00153	-117.64018	N	N	Metered	-	0.0
0601183	18	Chino, City Of	3	34.01473	-117.65118	N	N	Metered	-	249.1
0601194	19	Chino, City Of	3	34.01027	-117.66711	N	N	Metered	-	231.5
3601618	04	Chino, City Of	3	34.00815	-117.69029	N	N	Metered	-	0.0
3601752	05	Chino, City Of	3	34.03868	-117.68144	N	N	Metered	-	674.4
3602105	06	Chino, City Of	3	34.00812	-117.69461	N	N	Metered	-	0.0
3602666	09	Chino, City Of	3	34.03823	-117.68287	N	N	Metered	-	2317.5
3602680	10	Chino, City Of	3	34.04650	-117.68991	N	N	Metered	-	147.6
0600598	07A	City Of Upland	3	34.09555	-117.64335	N	N	Metered	-	170.6
0600659	20	City Of Upland	3	34.13393	-117.64412	N	N	Metered	-	340.2
0601070	21A	City Of Upland	3	34.09586	-117.67202	N	N	Metered	-	0.0
3600180	03	City Of Upland	3	34.09789	-117.67977	N	N	Metered	-	0.0
3600359	08	City Of Upland	3	34.09501	-117.68130	N	N	Metered	-	297.1
0600479	30	Cucamonga Valley Water District	3	34.08913	-117.59315	N	N	Metered	-	896.2
0600680	38	Cucamonga Valley Water District	3	34.08908	-117.59183	N	N	Metered	-	997.2
0600905	39	Cucamonga Valley Water District	3	34.11819	-117.51669	N	N	Metered	-	1007.7
0600906	40	Cucamonga Valley Water District	3	34.11882	-117.51485	N	N	Metered	-	462.4
0600907	41	Cucamonga Valley Water District	3	34.08814	-117.56687	N	N	Metered	-	1077.9
0600908	42	Cucamonga Valley Water District	3	34.08775	-117.56541	N	N	Metered	-	1294.0
0601033	43	Cucamonga Valley Water District	3	34.10775	-117.51630	N	N	Metered	-	2784.9
0601143	46	Cucamonga Valley Water District	3	34.08749	-117.57181	N	N	Metered	-	2111.2
3600475	04	Cucamonga Valley Water District	3	34.09005	-117.59178	N	N	Metered	-	130.1
3601174	01	Cucamonga Valley Water District	3	34.08816	-117.59241	N	N	Metered	-	674.7
3601373	03	Cucamonga Valley Water District	3	34.08448	-117.58492	N	N	Metered	-	0.0
3602000	05	Cucamonga Valley Water District	3	34.08881	-117.58426	N	N	Metered	-	2067.6
0300258	Chino I #06	Desalter Authority	3	33.96790	-117.60924	N	N	Metered	-	422.5
0300259	Chino I #07	Desalter Authority	3	33.96823	-117.60689	N	N	Metered	-	146.5
0300454	Chino I #13	Desalter Authority	3	33.96769	-117.59213	N	N	Metered	-	1268.4
0300455	Chino I #14	Desalter Authority	3	33.96773	-117.58522	N	N	Metered	-	2579.3
0300456	Chino I #15	Desalter Authority	3	33.96839	-117.58024	N	N	Metered	-	2726.2
0300457	Chino II #01	Desalter Authority	3	33.98256	-117.57614	N	N	Metered	-	2650.1
0300458	Chino II #04	Desalter Authority	3	33.98917	-117.55785	N	N	Metered	-	2575.2
0300460	Chino II #06	Desalter Authority	3	33.99355	-117.54086	N	N	Metered	-	1995.4
0300461	Chino II #07	Desalter Authority	3	33.98931	-117.54111	N	N	Metered	-	1402.8
0300462	Chino II #08	Desalter Authority	3	33.98639	-117.54091	N	N	Metered	-	455.6
0300463	Chino II #09A	Desalter Authority	3	33.99515	-117.53782	N	N	Metered	-	1860.9
0300590	Chino II #10	Desalter Authority	3	33.97958	-117.58559	N	N	Metered	-	2479.2

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0600648	Chino I #01	Desalter Authority	3	33.97821	-117.65016	N	N	Metered	-	10.7
0600649	Chino I #02	Desalter Authority	3	33.97209	-117.65005	N	N	Metered	-	0.0
0600650	Chino I #03	Desalter Authority	3	33.96940	-117.65003	N	N	Metered	-	117.4
0600651	Chino I #04	Desalter Authority	3	33.96877	-117.63872	N	N	Metered	-	0.0
0600652	Chino I #05	Desalter Authority	3	33.96894	-117.61948	N	N	Metered	-	1453.8
0600653	Chino I #08	Desalter Authority	3	33.97392	-117.61962	N	N	Metered	-	1138.6
0600654	Chino I #09	Desalter Authority	3	33.97621	-117.61804	N	N	Metered	-	1381.1
0600655	Chino I #10	Desalter Authority	3	33.97624	-117.61441	N	N	Metered	-	1635.0
0600656	Chino I #11	Desalter Authority	3	33.97557	-117.60145	N	N	Metered	-	1153.3
0600925	Chino II #02	Desalter Authority	3	33.98616	-117.56675	N	N	Metered	-	2316.3
0600926	Chino II #03	Desalter Authority	3	33.98738	-117.56299	N	N	Metered	-	2963.5
0601108	Chino I #16	Desalter Authority	3	33.96121	-117.66746	N	N	Metered	-	244.6
0601121	Chino I #17	Desalter Authority	3	33.96285	-117.65982	N	N	Metered	-	43.9
0601145	Chino I #20	Desalter Authority	3	33.96889	-117.63306	N	N	Metered	-	625.8
0601146	Chino I #21	Desalter Authority	3	33.96889	-117.62806	N	N	Metered	-	304.4
0601197	Chino II #11	Desalter Authority	3	33.97792	-117.59291	N	N	Metered	-	2782.8
0601202	Chino II #12	Desalter Authority	3	33.99344	-117.59881	Y	N	Metered	-	3063.3
0600486	F17B	Fontana Water Company	3	34.07699	-117.48725	N	N	Metered	-	110.1
0600490	F07A	Fontana Water Company	3	34.10260	-117.48924	N	N	Metered	-	4.7
0600492	F23A	Fontana Water Company	3	34.06468	-117.45567	N	N	Metered	-	754.5
0600502	F24A	Fontana Water Company	3	34.12319	-117.43991	N	N	Metered	-	368.2
0600504	F26A	Fontana Water Company	3	34.12465	-117.43399	N	N	Metered	-	7.4
0600562	F17C	Fontana Water Company	3	34.07616	-117.48746	N	N	Metered	-	18.1
0600696	F44A	Fontana Water Company	3	34.10828	-117.46915	N	N	Metered	-	671.4
0600697	F44B	Fontana Water Company	3	34.10816	-117.46922	N	N	Metered	-	11.7
0600698	F44C	Fontana Water Company	3	34.10883	-117.46989	N	N	Metered	-	1705.9
0601035	F07B	Fontana Water Company	3	34.10219	-117.48997	N	N	Metered	-	1581.7
0601181	F21B	Fontana Water Company	3	34.06179	-117.48052	N	N	Metered	-	756.0
0601203	F31B	Fontana Water Company	3	34.12095	-117.45166	Y	N	Metered	-	2217.6
3600584	F31A	Fontana Water Company	3	34.12111	-117.45265	N	N	Metered	-	513.8
0601182	2	Golden State Water Company	3	34.08100	-117.70764	N	N	Metered	-	921.7
3601764	1	Golden State Water Company	3	34.08138	-117.70753	N	N	Metered	-	0.0
0300114	HighSchool	Jurupa Community Services District	3	34.00392	-117.52367	N	N	Metered	-	91.7
0300188	W11	Jurupa Community Services District	3	34.01214	-117.51647	N	N	Metered	-	0.0
0300190	W12	Jurupa Community Services District	3	34.01372	-117.51934	N	N	Metered	-	0.0
0300200	W13	Jurupa Community Services District	3	34.03299	-117.52184	N	N	Metered	-	1356.9
0300202	W15	Jurupa Community Services District	3	34.01785	-117.52005	N	N	Metered	-	154.0
0300204	W14	Jurupa Community Services District	3	34.01740	-117.52386	N	N	Metered	-	6.1
0300205	W16	Jurupa Community Services District	3	34.01454	-117.52128	N	N	Metered	-	476.3
0300206	W24 (GA 6)	Jurupa Community Services District	3	34.00682	-117.50299	N	N	Metered	-	0.0
0300207	W17	Jurupa Community Services District	3	34.02814	-117.52025	N	N	Metered	-	991.1
0300208	W18	Jurupa Community Services District	3	34.02334	-117.52146	N	N	Metered	-	0.0
0300262	W40	Jurupa Community Services District	3	33.95696	-117.57962	N	N	Metered	-	37.9
0300263	W41	Jurupa Community Services District	3	33.95245	-117.58939	N	N	Metered	-	4.7
0300264	W22	Jurupa Community Services District	3	34.02435	-117.52742	N	N	Metered	-	0.5
0300267	W23	Jurupa Community Services District	3	34.01221	-117.52910	N	N	Metered	-	0.0
0300268	W25	Jurupa Community Services District	3	34.02153	-117.53196	N	N	Metered	-	3605.2
0300269	W42	Jurupa Community Services District	3	33.96936	-117.54593	N	N	Metered	-	0.0
0300582	W27	Jurupa Community Services District	3	34.01725	-117.53225	N	N	Metered	-	0.0
0300583	W28	Jurupa Community Services District	3	34.01898	-117.54329	N	N	Metered	-	0.0
3301743	W06	Jurupa Community Services District	3	34.03321	-117.52472	N	N	Metered	-	0.0
3301895	W08	Jurupa Community Services District	3	34.01097	-117.51439	N	N	Metered	-	202.3

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
3302030	W19	Jurupa Community Services District	3	34.03322	-117.53251	N	N	Metered	-	594.9
3302031	W20	Jurupa Community Services District	3	34.03060	-117.53283	N	N	Metered	-	0.0
0601091	6	Marygold Mutual Water Company	3	34.07743	-117.41788	N	N	Metered	-	540.8
0601092	7	Marygold Mutual Water Company	3	34.07734	-117.41792	N	N	Metered	-	19.0
3600194	3	Marygold Mutual Water Company	3	34.07748	-117.41796	N	N	Metered	-	0.0
3600195	2	Marygold Mutual Water Company	3	34.07746	-117.43509	N	N	Metered	-	0.0
3600196	4	Marygold Mutual Water Company	3	34.07754	-117.40667	N	N	Metered	-	0.0
0600415	19	Monte Vista Water District	3	34.07947	-117.70883	N	N	Metered	-	1611.3
0600674	27 (MVWD/CH)	Monte Vista Water District	3	34.09203	-117.68536	N	N	Metered	-	470.0
0600675	26 (MVWD/CH)	Monte Vista Water District	3	34.08751	-117.70307	N	N	Metered	-	885.4
0600684	28 (MVWD/CH)	Monte Vista Water District	3	34.08101	-117.70866	N	N	Metered	-	1535.5
0601029	30 (MVWD/CH)	Monte Vista Water District	3	34.07740	-117.68286	N	N	Metered	-	1024.4
0601068	32 (MVWD/CH)	Monte Vista Water District	3	34.07082	-117.68053	N	N	Metered	-	238.1
0601071	31	Monte Vista Water District	3	34.09534	-117.69883	N	N	Metered	-	909.0
0601072	33 (MVWD/CH)	Monte Vista Water District	3	34.08178	-117.68112	N	N	Metered	-	0.0
0601104	34 (MVWD/CH)	Monte Vista Water District	3	34.08047	-117.70530	N	N	Metered	-	0.0
3601357	04 (MVWD/CH)	Monte Vista Water District	3	34.09192	-117.68471	N	N	Metered	-	271.0
3601358	05	Monte Vista Water District	3	34.09214	-117.69618	N	N	Metered	-	541.5
3601359	06	Monte Vista Water District	3	34.08698	-117.69828	N	N	Metered	-	0.0
3601362	09	Monte Vista Water District	3	34.07719	-117.68274	N	N	Metered	-	0.0
3601363	10	Monte Vista Water District	3	34.07781	-117.69670	N	N	Metered	-	0.0
0600683	Concours #1	Niagara Bottling, LLC	3	34.07409	-117.53185	N	N	Metered	-	0.0
0600909	Concours #2	Niagara Bottling, LLC	3	34.07410	-117.53225	N	N	Metered	-	530.5
0600910	Philadelphia #1	Niagara Bottling, LLC	3	34.03126	-117.59779	N	N	Metered	-	433.1
0601034	Philadelphia #2	Niagara Bottling, LLC	3	34.03132	-117.59588	N	N	Metered	-	437.7
0600420	ELEC/IRR	No Longer Ag Owner	3	34.01880	-117.56272	N	N	Metered	-	0.0
0300172	09 W	Norco, City Of	3	33.98458	-117.55773	N	N	Metered	-	0.0
0300173	10 E	Norco, City Of	3	33.98460	-117.55490	N	N	Metered	-	0.0
0300199	11 M	Norco, City Of	3	33.98459	-117.55629	N	N	Metered	-	0.0
0600453	29	Ontario, City Of	3	34.06498	-117.60088	N	N	Metered	-	377.5
0600454	30	Ontario, City Of	3	34.06047	-117.54113	N	N	Metered	-	344.6
0600455	31	Ontario, City Of	3	34.05553	-117.52732	N	N	Metered	-	0.6
0600476	34	Ontario, City Of	3	34.04714	-117.63707	N	N	Metered	-	0.0
0600493	35	Ontario, City Of	3	34.06049	-117.64231	N	N	Metered	-	4121.5
0600494	36	Ontario, City Of	3	34.04808	-117.59369	N	N	Metered	-	706.6
0600551	37	Ontario, City Of	3	34.06563	-117.55756	N	N	Metered	-	139.3
0600585	38	Ontario, City Of	3	34.07412	-117.58091	N	N	Metered	-	1002.8
0600690	39	Ontario, City Of	3	34.06678	-117.55580	N	N	Metered	-	0.0
0600920	41	Ontario, City Of	3	34.08042	-117.60208	N	N	Metered	-	2624.8
0600922	40	Ontario, City Of	3	34.06408	-117.62501	N	N	Metered	-	646.6
0600956	50	Ontario, City Of	3	34.01861	-117.56416	N	N	Metered	-	0.0
0601011	42	Ontario, City Of	3	34.07001	-117.56065	N	N	Metered	-	0.0
0601012	43	Ontario, City Of	3	34.06140	-117.57978	N	N	Metered	-	0.0
0601013	44	Ontario, City Of	3	34.07620	-117.63090	N	N	Metered	-	109.8
0601014	45	Ontario, City Of	3	34.06861	-117.64156	N	N	Metered	-	2897.3
0601015	46	Ontario, City Of	3	34.09188	-117.61700	N	N	Metered	-	19.8
0601016	47	Ontario, City Of	3	34.07502	-117.56038	N	N	Metered	-	3545.1
0601017	48	Ontario, City Of	3	34.04907	-117.57501	N	N	Metered	-	0.0
0601018	49	Ontario, City Of	3	34.04928	-117.56161	N	N	Metered	-	200.6
0601019	51	Ontario, City Of	3	34.05670	-117.56641	N	N	Metered	-	0.0
0601099	52	Ontario, City Of	3	34.07776	-117.62941	N	N	Metered	-	0.2
3600010	25	Ontario, City Of	3	34.06819	-117.58953	N	N	Metered	-	0.0

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
3600012	26	Ontario, City Of	3	34.06290	-117.57604	N	Y	Metered	-	0.0
3601777	09	Ontario, City Of	3	34.08678	-117.65033	N	N	Metered	-	0.0
3601778	11	Ontario, City Of	3	34.05527	-117.62481	N	Y	Metered	-	0.0
3601952	27	Ontario, City Of	3	34.04786	-117.55677	N	N	Metered	-	0.0
3602051	15	Ontario, City Of	3	34.05028	-117.67009	N	Y	Metered	-	0.0
3602107	17	Ontario, City Of	3	34.05902	-117.62932	N	Y	Metered	-	0.0
3602267	20	Ontario, City Of	3	34.07894	-117.55863	N	N	Metered	-	0.0
3602457	24	Ontario, City Of	3	34.06951	-117.57521	N	N	Metered	-	196.3
1901715	06	Pomona, City Of	3	34.05767	-117.72935	N	N	Metered	-	778.4
1901719	10	Pomona, City Of	3	34.05938	-117.71993	N	N	Metered	-	1399.3
1901722	14	Pomona, City Of	3	34.05093	-117.73063	N	N	Metered	-	0.0
1901723	15	Pomona, City Of	3	34.05081	-117.72825	N	N	Metered	-	27.5
1901724	16	Pomona, City Of	3	34.05707	-117.72751	N	N	Metered	-	20.9
1901725	17	Pomona, City Of	3	34.05364	-117.72629	N	N	Metered	-	842.6
1901726	18	Pomona, City Of	3	34.05227	-117.73018	N	N	Metered	-	0.0
1902804	21	Pomona, City Of	3	34.04384	-117.75269	N	N	Metered	-	389.4
1902875	23	Pomona, City Of	3	34.04742	-117.73269	N	N	Metered	-	1100.6
1903016	02	Pomona, City Of	3	34.05926	-117.72471	N	N	Metered	-	425.2
1903063	25	Pomona, City Of	3	34.04444	-117.73130	N	N	Metered	-	1397.6
1903079	26	Pomona, City Of	3	34.04525	-117.72620	N	N	Metered	-	580.4
1903113	27	Pomona, City Of	3	34.07560	-117.71319	N	N	Metered	-	1122.3
1903126	29	Pomona, City Of	3	34.02615	-117.72956	N	N	Metered	-	0.0
1903156	30	Pomona, City Of	3	34.06670	-117.71703	N	N	Metered	-	0.0
1904001	34	Pomona, City Of	3	34.05784	-117.72029	N	N	Metered	-	0.0
1904002	35	Pomona, City Of	3	34.06122	-117.72865	N	N	Metered	-	0.0
1904003	36	Pomona, City Of	3	34.05075	-117.73778	N	N	Metered	-	1152.9
1904004	05B	Pomona, City Of	3	34.05903	-117.72909	N	N	Metered	-	960.3
0600589	San Antonio 16	San Antonio Water Company	3	34.14668	-117.64440	N	N	Metered	-	458.6
3601561	12	San Antonio Water Company	3	34.08508	-117.63447	N	N	Metered	-	0.0
3601563	15	San Antonio Water Company	3	34.14681	-117.64465	N	N	Metered	-	0.3
0600468	SS2	San Bernardino, County of (Shooting Park)	3	33.93701	-117.65645	N	N	Metered	-	17.6
0600469	SS1	San Bernardino, County of (Shooting Park)	3	33.93714	-117.65644	N	N	Metered	-	0.0
3300973	03	Santa Ana River Water Company	3	34.00181	-117.51507	N	N	Metered	-	0.0
3301945	01A	Santa Ana River Water Company	3	33.97421	-117.53566	N	N	Metered	-	0.0
3302078	03A	Santa Ana River Water Company	3	34.00160	-117.51502	N	N	Metered	-	0.0
0600524	#37	West Valley Water District	3	34.06611	-117.43007	N	N	Metered	-	0.0
1902353	Alt 2	ANG II (Multi) LLC	2	34.05960	-117.74483	N	N	Metered	-	25.8
0600660	INFIELD WELL	California Speedway Corporation	2	34.08862	-117.50017	N	N	Metered	-	175.0
3601364	1-Race track Use	California Speedway Corporation	2	34.08967	-117.50989	N	N	Metered	-	99.2
3601365	2	California Speedway Corporation	2	34.08448	-117.50985	N	N	Metered	-	1057.5
3601159	Deep Well No. 3	California Steel Industries, Inc.	2	34.07843	-117.50580	N	N	Metered	-	0.0
3601719		CalMat Co.	2	34.09534	-117.69936	N	N	Metered	-	0.0
0600677	EW-2	General Electric Company	2	34.05003	-117.65214	N	N	Metered	-	376.4
0600931	EW-1	General Electric Company	2	34.04059	-117.65573	N	N	Metered	-	421.6
0601093	IW-01	General Electric Company	2	34.03650	-117.63689	N	N	Metered	-	3.6
0601101	IW-02	General Electric Company	2	34.03655	-117.63518	N	N	Metered	-	3.2
0601103	IW-03	General Electric Company	2	34.03579	-117.63519	N	N	Metered	-	3.8
0601021	DOM	Riboli Family and San Antonio Winery, Inc.	2	34.02211	-117.55919	N	N	Metered	-	1.8
3600555	1	TAMCO	2	34.09322	-117.52832	N	N	Metered	-	0.0
0300021		ABG Group LLC	1	33.93598	-117.59102	N	N	Estimated	Y	3.6
0300053	offc/lndscp	Ag Pool Misc	1	33.93339	-117.60954	N	N	Estimated	Y	1.8
0300154		Ag Pool Misc	1	33.98339	-117.47364	N	N	Estimated	Y	1.8

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0300240		Ag Pool Misc	1	33.96307	-117.60223	N	N	Estimated	Y	1.8
0600029		Ag Pool Misc	1	34.00433	-117.63028	N	N	Estimated	Y	3.6
0600042	1 home/lndscp	Ag Pool Misc	1	34.01456	-117.61581	N	N	Estimated	Y	5.4
0600106	dom/5 horses	Ag Pool Misc	1	34.01160	-117.63675	N	N	Estimated	Y	3.6
0600107	Dom/Sm Nursery	Ag Pool Misc	1	34.01550	-117.65150	N	N	Estimated	Y	3.6
0600110	DOM	Ag Pool Misc	1	34.00846	-117.62788	N	N	Estimated	Y	1.8
0600114	Dom	Ag Pool Misc	1	34.01554	-117.60173	N	N	Estimated	Y	8.5
0600120		Ag Pool Misc	1	33.99373	-117.65811	N	N	Estimated	Y	5.4
0600152	MILK PROCESSING	Ag Pool Misc	1	34.03662	-117.72499	N	N	Estimated	Y	0.0
0600191	Dairy/Dom	Ag Pool Misc	1	33.99919	-117.66324	N	N	Estimated	N	28.8
0600330		Ag Pool Misc	1	33.99402	-117.63753	N	N	Estimated	Y	4.3
0600392	20-30K Chickens	Ag Pool Misc	1	34.00037	-117.62872	N	N	Estimated	Y	4.7
0600614		Ag Pool Misc	1	33.95760	-117.64926	N	N	Estimated	N	49.7
0601030		Ag Pool Misc	1	34.02320	-117.58368	N	N	Estimated	Y	2.9
0601150		Ag Pool Misc	1	33.99301	-117.64950	N	N	Estimated	Y	2.9
0601201	0	Ag Pool Misc	1	34.01463	-117.73263	N	N	Estimated	Y	7.0
0810009		Ag Pool Misc	1	34.01750	-117.63745	N	N	Estimated	Y	3.6
3600821	DAIRY	Ag Pool Misc	1	34.00453	-117.63126	N	N	Estimated	Y	2.5
3602605		Ag Pool Misc	1	34.00837	-117.64927	N	N	Estimated	Y	3.5
0600580	IRR	Ambrosia Farms	1	34.04500	-117.70130	N	N	Estimated	Y	1.8
0600618	Dom	Archibald Ranch Community Church	1	34.01124	-117.59338	N	N	Estimated	Y	4.6
0600134	IRR	Bishop Of San Bernardino Corp. Sole	1	34.02430	-117.62738	N	N	Estimated	Y	2.8
0600366		Bohlander & Holmes	1	34.00029	-117.66365	N	N	Estimated	Y	9.8
0810004	Dom	C & N Cattle	1	34.01270	-117.63299	N	N	Estimated	Y	3.6
0600528	Dairy/Dom	Central Eleven	1	34.01417	-117.63334	N	N	Estimated	Y	1.4
0600016		Crossroads Auto Dismantlers	1	34.01983	-117.55517	N	N	Estimated	Y	1.4
0300161	DOM	Galleano Winery Inc	1	34.01069	-117.54168	N	N	Estimated	Y	5.4
0600530	DOM	Grooman's Pump	1	33.95377	-117.63268	N	N	Estimated	Y	0.7
0601097	0	JLC Markets, Inc.	1	34.01303	-117.59730	N	N	Estimated	Y	3.2
0600639	Dom 300 heifers	JRJ Investments LP	1	34.00537	-117.63383	N	N	Estimated	Y	1.8
0600570		Louisa Thorsheim	1	33.99722	-117.65113	N	N	Estimated	Y	1.8
0300033		No Longer Ag Owner	1	33.95916	-117.57527	N	N	Estimated	Y	3.6
3600064	DAIRY	No Longer Ag Owner	1	33.99801	-117.64734	N	N	Estimated	Y	4.3
3602209	1 hse 11 ac nursery	No Longer Ag Owner	1	33.99813	-117.63050	N	N	Estimated	Y	1.8
0300011	PED5071	None	1	33.99555	-117.47585	N	N	Estimated	Y	1.8
0300229	DOM	None	1	33.97746	-117.49800	N	N	Estimated	Y	1.9
0600004	DOM	None	1	34.00072	-117.59846	N	N	Estimated	Y	9.8
0600011	DI	None	1	33.99868	-117.62846	N	N	Estimated	Y	5.4
0600119	Dom	None	1	33.99786	-117.65026	N	N	Estimated	Y	1.8
0600402	Dom/1 house	None	1	34.00574	-117.62974	N	N	Estimated	Y	1.8
3601097		None	1	33.99872	-117.65175	N	N	Estimated	Y	2.1
0600217	DOM	Paul A. Briano Separate Property Trust	1	34.01337	-117.62844	N	N	Estimated	N	36.0
0600222		Prologis L.P.	1	33.98357	-117.60887	N	N	Estimated	Y	0.0
0600367	Nursery	Robinson Calf Ranch	1	33.99820	-117.62290	N	N	Estimated	N	19.6
3602086	Crawford Cyn	Unitex Corporation	1	34.14701	-117.48397	N	N	Estimated	Y	0.0
0600606	DOM	Victory Baptist Church	1	33.99724	-117.65877	N	N	Estimated	Y	3.6
0300052	IRR	Goose Creek Golf Club	1	33.96426	-117.53215	N	N	Estimated	N	467.0
0300169	STN4800	Skyline Construction Services	1	33.99938	-117.46579	N	N	Estimated	Y	6.8
0300211	DOM	No Longer Ag Owner	1	33.99215	-117.54503	N	N	Estimated	Y	4.0
0300231	CMG/PTI/J&A	Orange County Flood Control District	1	33.93227	-117.60962	N	N	Estimated	Y	0.0
0300249	DOM-New	Goose Creek Golf Club	1	33.96387	-117.53263	N	N	Metered	-	2.0
0300250	#2-IRR	Goose Creek Golf Club	1	33.96577	-117.53173	N	N	Metered	-	0.0

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0300571		Leal Ranches	1	33.98230	-117.56468	N	N	Estimated	Y	3.4
0300581		Goose Creek Golf Club	1	33.96474	-117.53158	N	N	Estimated	N	137.4
0300591	Raahauge	OCWD	1	33.92400	-117.61868	N	N	Estimated	N	15.0
0600002	Dom TV3	No Longer Ag Owner	1	34.01193	-117.60876	N	N	Metered	-	50.6
0600003	Dairy	Ag Pool Misc	1	33.99878	-117.62773	N	N	Estimated	Y	3.6
0600006		DM Thousand Oaks	1	33.99854	-117.59360	N	N	Estimated	Y	4.9
0600010	Calves	None	1	34.00562	-117.64453	N	N	Metered	-	0.8
0600013	Dairy	No Longer Ag Owner	1	34.00051	-117.64513	N	N	Metered	-	29.8
0600019	Dairy/Barn	No Longer Ag Owner	1	33.99718	-117.62061	N	N	Metered	-	100.5
0600022	Domestic	Trustor Resources	1	34.00530	-117.63329	N	N	Estimated	Y	4.4
0600026	DOM	No Longer Ag Owner	1	33.99737	-117.62271	N	N	Metered	-	119.8
0600027	Dry-Dom	Ag Pool Misc	1	33.99724	-117.62476	N	N	Metered	-	47.5
0600033	Dairy	No Longer Ag Owner	1	33.99330	-117.62748	N	N	Metered	-	12.4
0600036	Dom	Legend Dairy Farms #2	1	33.99072	-117.63921	N	N	Metered	-	15.1
0600049	IRR/Dom	Ontario Christian School	1	34.03202	-117.66508	N	N	Metered	-	64.6
0600067	BACKUP	Basque American Dairy	1	34.00535	-117.62013	N	N	Estimated	Y	7.4
0600102	Dairy/Dom	Ag Pool Misc	1	34.00455	-117.61169	N	N	Metered	-	6.7
0600103	Dom	Bangma Brothers Dairy	1	34.00455	-117.61298	N	N	Metered	-	17.6
0600104	DOM	Ag Pool Misc	1	34.00552	-117.63118	N	N	Metered	-	10.9
0600115	DOM	Ag Pool Misc	1	33.99483	-117.64966	N	N	Metered	-	0.0
0600116	IRR	Ag Pool Misc	1	33.99652	-117.64952	N	N	Metered	-	7.7
0600129	DAIRY-640C	Ag Pool Misc	1	33.99375	-117.61808	N	N	Estimated	N	62.5
0600136	Dairy/Dom	Henry De Haan Dairy	1	34.00478	-117.60749	N	N	Estimated	N	54.8
0600147	DOM	G H Dairy	1	33.99713	-117.62991	N	N	Metered	-	103.3
0600148	DOM	Costa View Farmer	1	33.99228	-117.63658	N	N	Metered	-	17.2
0600150	IRR	Ag Pool Misc	1	34.00127	-117.62157	N	N	Metered	-	10.3
0600151	Dairy	Ag Pool Misc	1	34.00053	-117.61990	N	Y	Estimated	Y	0.0
0600154	DOM	Ontario, City Of	1	33.99045	-117.58558	N	N	Metered	-	0.0
0600158	Fire Logs	The Davenport Group	1	34.01261	-117.62267	N	N	Metered	-	6.1
0600171	main well	Ag Pool Misc	1	33.95942	-117.65040	N	N	Estimated	N	62.6
0600176	DAIRY-640C	Ag Pool Misc	1	34.01161	-117.64251	N	N	Estimated	N	88.1
0600179	DOM	No Longer Ag Owner	1	33.99992	-117.60776	N	N	Estimated	N	34.6
0600183	DOM	No Longer Ag Owner	1	34.00444	-117.64189	N	N	Estimated	Y	1.4
0600188	Dairy/Dom	R & V Dairy	1	34.01171	-117.62990	N	N	Metered	-	97.6
0600192	Dairy/Dom	Whitegold Ventures	1	33.99197	-117.62862	N	N	Metered	-	82.7
0600193	DOM	Costa View Farmer	1	33.99543	-117.63662	N	N	Estimated	N	27.9
0600194	irr/3 ac misc plnts	Paul A. Briano Separate Property Trust	1	34.01185	-117.63941	N	N	Estimated	N	102.9
0600200	Dairy/Dom	County Of San Bernardino	1	33.98981	-117.63923	N	N	Metered	-	17.6
0600201	Dom/Irr	Hogg Brothers	1	34.01264	-117.62503	N	N	Metered	-	18.0
0600202	IRR	Ag Pool Misc	1	34.00444	-117.62227	N	N	Metered	-	0.0
0600203	DAIRY/DOM	Legend Dairy Farms #2	1	34.01149	-117.60549	N	N	Estimated	Y	7.3
0600208	DOM	Veenendaal Dairy	1	34.00774	-117.63742	N	N	Estimated	N	57.2
0600209	IRR-SCH/VYD	No Longer Ag Owner	1	34.01583	-117.61473	N	N	Estimated	N	70.7
0600212	IRR	H & R Barthelemy Dairy	1	33.95545	-117.64182	N	N	Metered	-	28.4
0600214	Dairy/IRR	H & R Barthelemy Dairy	1	33.95719	-117.63394	N	N	Metered	-	5.1
0600216	Irr/Dy	Ag Pool Misc	1	34.00964	-117.62760	N	N	Metered	-	3.0
0600223	Dairy	County Of San Bernardino	1	34.00033	-117.63619	N	N	Metered	-	23.0
0600225	DAIRY	Ag Pool Misc	1	34.00458	-117.60993	N	N	Metered	-	0.0
0600226	Dairy/Dom	Ag Pool Misc	1	33.98623	-117.62873	N	Y	Metered	-	8.8
0600228	Dairy/Dom	No Longer Ag Owner	1	34.01571	-117.64091	N	N	Estimated	N	19.4
0600229	Dairy/Dom	Ag Pool Misc	1	33.96110	-117.64869	N	N	Estimated	N	10.6
0600230	Dairy	Basque American Dairy	1	34.00792	-117.61989	N	N	Metered	-	1.4

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0600232	Dairy-in shed	No Longer Ag Owner	1	33.99698	-117.64429	N	N	Metered	-	12.2
0600233	Dairy	No Longer Ag Owner	1	33.99687	-117.64338	N	N	Estimated	N	25.5
0600245	Dairy/Dom	Ag Pool Misc	1	34.00472	-117.62765	N	N	Estimated	Y	6.2
0600246	IRR - 2	Calvary Church	1	33.99925	-117.65847	N	N	Metered	-	37.9
0600247	Dairy - 3	Calvary Church	1	34.00097	-117.65149	N	N	Estimated	N	28.4
0600263	Dairy	Eagle Livestock, Inc.	1	34.00823	-117.62769	N	N	Metered	-	6.6
0600272	Dairy/Dom	Ag Pool Misc	1	34.01639	-117.61471	N	N	Estimated	N	17.6
0600275	Irr	Pete Vanderham Dairy Inc	1	34.00951	-117.61930	N	N	Estimated	N	78.7
0600276	Dairy/Dom	Pete Vanderham Dairy Inc	1	34.00730	-117.61895	N	N	Estimated	N	69.8
0600284	Dairy/Dom	Whitegold Ventures	1	34.01169	-117.63404	N	N	Estimated	Y	2.5
0600301	Dairy/Dom	Ag Pool Misc	1	34.00430	-117.60060	N	N	Metered	-	4.5
0600327		Manalisco Growers	1	34.01720	-117.64094	N	N	Metered	-	12.9
0600337	Dairy/Dom	No Longer Ag Owner	1	33.99661	-117.56970	N	N	Metered	-	6.8
0600341	IRR	Bollema Dairy	1	34.00492	-117.62396	N	N	Metered	-	23.7
0600342	Dairy/Dom	Bollema Dairy	1	34.00449	-117.62491	N	N	Metered	-	0.0
0600345	DOM	Ag Pool Misc	1	34.00413	-117.63743	N	N	Metered	-	35.5
0600358	DOM	Ag Pool Misc	1	34.00244	-117.62753	N	N	Metered	-	10.7
0600370	Dairy/IRR	Ag Pool Misc	1	33.99868	-117.60246	N	N	Estimated	N	122.5
0600372	Dairy/Dom	No Longer Ag Owner	1	33.99685	-117.57739	N	N	Estimated	N	19.0
0600391	Lake Dischg	El Prado Golf Course	1	33.95373	-117.66208	N	N	Metered	-	209.9
0600397	Dairy	No Longer Ag Owner	1	33.99672	-117.57382	N	N	Estimated	N	136.7
0600400	GAS/ BCKUP	No Longer Ag Owner	1	34.01859	-117.57237	N	N	Metered	-	0.0
0600404	DOM	Legend Dairy Farms #2	1	34.01914	-117.60251	N	N	Metered	-	194.1
0600418	IRR-25P	Ag Pool Misc	1	34.01190	-117.64391	N	N	Metered	-	10.3
0600419	1500C	No Longer Ag Owner	1	34.01811	-117.57267	N	N	Estimated	Y	5.4
0600422	GH #2	Joseph A. Borba Trust	1	33.98991	-117.64244	N	N	Metered	-	120.6
0600429	DAIRY-400C	Haringa Farms	1	33.98421	-117.62865	N	Y	Estimated	N	18.4
0600432	Dairy/Dom	Bas Van Dam & Sons Dairy	1	33.98947	-117.57807	N	Y	Estimated	Y	0.0
0600438	Dairy/Dom	Legend Dairy Farms #2	1	34.01446	-117.64947	N	N	Metered	-	0.0
0600444	DOM	Ag Pool Misc	1	34.00975	-117.61904	N	N	Metered	-	0.0
0600446	Dairy/Dom	Falloncrest Farms	1	34.00531	-117.64330	N	N	Estimated	N	44.4
0600447	Dairy	Basque American Dairy	1	34.00530	-117.62009	N	N	Metered	-	0.0
0600459	Dairy - 1	Coelho Dairy	1	34.00050	-117.61896	N	N	Estimated	N	83.8
0600460	IRR - 2	Coelho Dairy	1	34.00130	-117.61863	N	N	Estimated	N	31.9
0600461	Dairy/Dom-North	Heims Pride Dairy	1	34.00980	-117.61986	N	N	Estimated	N	34.4
0600462	Office Bldg	Unitex Corporation	1	34.14195	-117.48666	N	N	Metered	-	0.1
0600470	PARKS DEPT 2	San Bernardino County Regional Parks	1	33.93725	-117.65477	N	N	Estimated	N	30.7
0600472	DOM-2 homes	No Longer Ag Owner	1	33.99730	-117.55943	N	N	Estimated	Y	1.5
0600481	DOM	No Longer Ag Owner	1	33.99144	-117.62752	N	N	Estimated	Y	3.6
0600503	DOM-#1 West	Ag Pool Misc	1	34.00481	-117.61742	N	N	Metered	-	0.0
0600508	Dairy-#2	Ag Pool Misc	1	34.00726	-117.60653	N	N	Estimated	N	90.9
0600519	DAIRY	SD Farms II	1	34.01171	-117.64714	N	N	Metered	-	229.1
0600531	HOUSE	Ag Pool Misc	1	34.00536	-117.64376	N	N	Metered	-	0.0
0600532		Ag Pool Misc	1	33.99868	-117.60222	N	N	Metered	-	10.9
0600540	DAIRY/DOM	None	1	34.00571	-117.64100	N	N	Metered	-	6.8
0600542	DOM	Lizze Custom Processing	1	33.95676	-117.64558	N	N	Metered	-	7.6
0600544	DAIRY/DOM	Marquez Dairy	1	33.95562	-117.64363	N	N	Metered	-	10.7
0600559	Nursery/crops	Ag Pool Misc	1	34.01265	-117.62690	N	N	Estimated	N	37.6
0600575		Ag Pool Misc	1	34.01333	-117.64775	N	N	Metered	-	30.3
0600608	4	State Of CA/CIW	1	33.94618	-117.63661	N	Y	Estimated	Y	0.0
0600616	Dairy/Dom	Basque American Dairy	1	34.00654	-117.62755	N	N	Metered	-	7.2
0600620		No Longer Ag Owner	1	33.99664	-117.57073	N	N	Estimated	Y	0.7

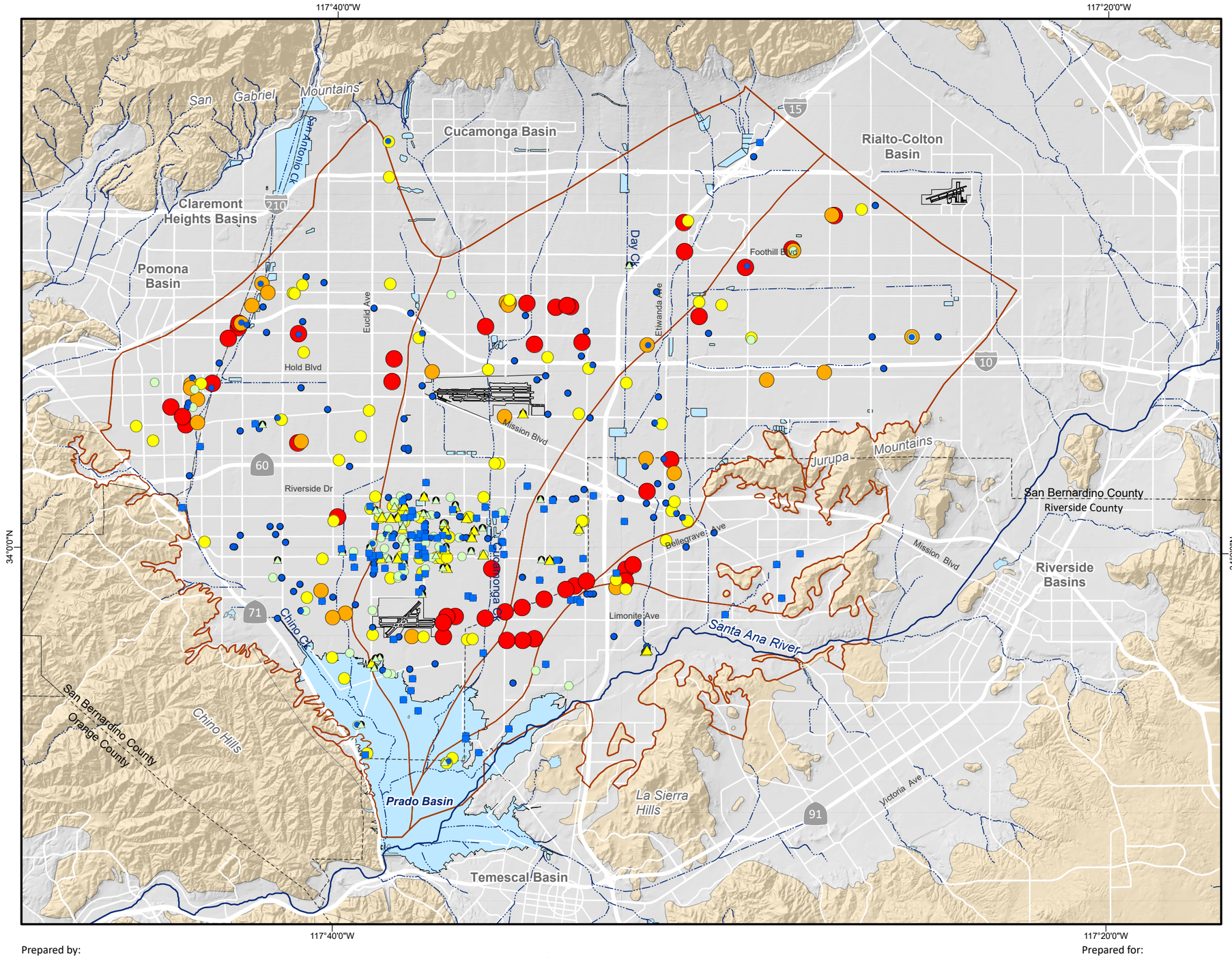
Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
0600622	Dairy/Dom	Ag Pool Misc	1	34.01208	-117.61227	N	N	Metered	-	0.0
0600623	Dom	None	1	33.94223	-117.63020	N	N	Estimated	Y	1.4
0600632	IRR	Barth Farms	1	34.01379	-117.59471	N	N	Metered	-	15.8
0600634	8Ac/Nursery	Falloncrest Farms	1	33.99128	-117.64996	N	N	Metered	-	6.9
0600661	DAIRY	Ag Pool Misc	1	34.00435	-117.62235	N	N	Estimated	Y	2.5
0600664	DOM	OCWD	1	33.92411	-117.61697	N	N	Metered	-	0.0
0600679		No Longer Ag Owner	1	33.96781	-117.64105	N	Y	Estimated	Y	0.0
0600691	CIM 14	State Of CA CIM	1	33.97792	-117.68103	N	N	Metered	-	0.0
0600692	CIM 15	State Of CA CIM	1	33.97791	-117.67903	N	N	Metered	-	40.4
0600694	CIM 16	State Of CA CIM	1	33.98511	-117.67242	N	N	Metered	-	596.7
0600695		De Groot Family Trust	1	33.99712	-117.63948	N	N	Estimated	N	107.5
0600921		G H Dairy	1	33.92539	-117.61528	N	N	Metered	-	399.2
0600924	0	Kellogg Supply	1	34.00477	-117.61726	N	N	Metered	-	59.4
0601022	Bldg A East	Fuji Natural Foods	1	34.01081	-117.55938	N	N	Metered	-	197.9
0601023	Bldg A West	Fuji Natural Foods	1	34.01079	-117.55999	N	N	Metered	-	195.3
0601024	Bldg B North	Fuji Natural Foods	1	34.00804	-117.56133	N	N	Estimated	N	104.6
0601025	Bldg B South	Fuji Natural Foods	1	34.00719	-117.56133	N	N	Metered	-	48.5
0601031		Manalisco Growers	1	34.00117	-117.63051	N	Y	Estimated	Y	0.0
0601032		None	1	34.04329	-117.69954	N	N	Metered	-	0.0
0601067	0	None	1	34.04236	-117.70779	N	N	Metered	-	7.8
0601094		None	1	34.04481	-117.69812	N	N	Estimated	N	19.6
0601102	0	The Root 66 Garden	1	34.10281	-117.54016	N	N	Estimated	N	17.5
0601112		Ag Pool Misc	1	34.01580	-117.63673	N	N	Estimated	N	57.1
0601114		None	1	33.98290	-117.60676	N	N	Estimated	Y	1.8
0601122	PT IRR	Hogg Brothers	1	34.01397	-117.61535	N	N	Estimated	N	40.5
0601126	0	TDN Land Company	1	33.99615	-117.69125	N	N	Estimated	N	21.4
0601127		San Bernardino County Regional Parks	1	33.92635	-117.65288	N	N	Estimated	Y	1.9
0601128		San Bernardino County Regional Parks	1	33.92688	-117.65204	N	N	Metered	-	102.6
0601149		None	1	34.01495	-117.57642	N	Y	Estimated	Y	0.0
0601170	West Irr	Artesia Sawdust Products Inc.	1	34.00813	-117.60302	N	N	Estimated	N	13.6
0601171	East Irr	Artesia Sawdust Products Inc.	1	34.00814	-117.60280	N	N	Estimated	N	13.6
1902981	IRR	Pomona Cemetery Association	1	34.03870	-117.74535	N	N	Metered	-	135.0
3300195	D-1	Ag Pool Misc	1	33.95155	-117.56524	N	N	Metered	-	22.3
3300749	E/IRR-road	Leal Ranches	1	33.98251	-117.56181	N	N	Estimated	Y	0.0
3300833	BEHIND OFFICE	No Longer Ag Owner	1	33.98982	-117.54508	N	N	Metered	-	223.0
3300834	#3-WINEVILLE	Ag Pool Misc	1	33.98707	-117.54510	N	N	Metered	-	629.8
3300863	IRR-50AC/ALF	OCWD	1	33.92349	-117.61777	N	N	Metered	-	306.9
3301443	E/Dairy-submersible	Leal Ranches	1	33.98157	-117.56055	N	N	Estimated	Y	0.0
3301536	IRR-150HP-Gas Pwr	Riverside Cnty Reg Park & Open Sp Dist	1	33.92734	-117.60402	N	N	Estimated	Y	1.5
3600050	IRR-5P	Haringa Farms	1	33.98485	-117.63019	N	Y	Estimated	Y	0.0
3600127	Dom TV3	No Longer Ag Owner	1	34.01170	-117.60979	N	N	Estimated	N	75.1
3600162	Dairy/Dom - 6	Ag Pool Misc	1	33.99781	-117.61169	N	N	Metered	-	11.3
3600239	IRR	Artevel of California LLC	1	34.00217	-117.65034	N	N	Metered	-	0.0
3600318	DAIRY-ESIDE-650C	No Longer Ag Owner	1	33.99703	-117.64647	N	N	Estimated	N	98.0
3600324	IRR 2	De Groot Family Trust	1	33.99749	-117.63792	N	N	Metered	-	101.4
3600339	01	State Of CA CIM	1	33.98745	-117.68155	N	N	Metered	-	0.0
3600340	03	State Of CA CIM	1	33.99667	-117.67191	N	N	Metered	-	246.9
3600345	10--Field 14	State Of CA CIM	1	33.98290	-117.66732	N	N	Metered	-	0.0
3600346	09	State Of CA CIM	1	33.97561	-117.66728	N	N	Metered	-	522.5
3600348	07--Field 11	State Of CA CIM	1	33.98136	-117.67194	N	N	Estimated	Y	0.0
3600406	Dairy/Dom	G H Dairy	1	33.99750	-117.63653	N	N	Estimated	Y	3.6
3600421	Dairy/Dom	Ag Pool Misc	1	34.00326	-117.59462	N	N	Estimated	Y	1.7

Table A-1. Pumping Wells in the Chino Basin in FY 2023

CBWM Well ID	Name	Owner[a]	Pool	Latitude	Longitude	New in FY 2023	Abandoned/ Destroyed in FY 2023	Metered/ Estimated	Minimal Producer (if estimated)	FY 2023 Production
3600423	Dairy-in shed	Ag Pool Misc	1	33.99018	-117.63026	N	Y	Estimated	Y	6.7
3600432	DAIRY-640C	Ag Pool Misc	1	33.99736	-117.61810	N	N	Metered	-	50.8
3600433	#7 - IRR	J.G.J. Joint Venture	1	34.01795	-117.62308	N	N	Estimated	N	40.5
3600434	1-IRR	J.G.J. Joint Venture	1	34.01935	-117.62820	N	N	Estimated	N	242.0
3600437	3-IRR	J.G.J. Joint Venture	1	34.01913	-117.64924	N	N	Metered	-	126.0
3600446	Dom	Maclin Markets Inc	1	34.01883	-117.64360	N	N	Metered	-	4.9
3600460	IRR - 50 HP	County Of San Bernardino	1	33.99030	-117.63699	N	N	Metered	-	0.0
3600502	BARN #2	Loyola Properties I	1	33.95917	-117.62304	N	N	Metered	-	9.8
3600629	Dom/IRR	Ag Pool Misc	1	34.01924	-117.63835	N	N	Metered	-	15.1
3600811	IRR	Legend Dairy Farms #2	1	34.01436	-117.64904	N	N	Estimated	N	11.7
3600858	Dairy/Dom	No Longer Ag Owner	1	33.99377	-117.61982	N	N	Estimated	N	34.1
3600900	Alf-Jun-Sep	Bidart Family Trust	1	34.01350	-117.63713	N	N	Metered	-	70.4
3600975	CWW	Knudsen Brothers	1	34.01897	-117.61687	N	N	Metered	-	33.9
3601111	Dairy/Dom	No Longer Ag Owner	1	34.00289	-117.59416	N	N	Estimated	Y	0.0
3601212	Irr-400' E/Bon View	Ag Pool Misc	1	34.01907	-117.63495	N	N	Metered	-	0.0
3601246	1	State Of CA/CIW	1	33.94945	-117.63338	N	Y	Estimated	Y	0.0
3601399	IRR	Falloncrest Farms	1	34.01201	-117.63191	N	N	Metered	-	20.2
3601400	Dairy	Dou Family Trust	1	34.01019	-117.63677	N	N	Metered	-	115.1
3601625	Dairy/Dom	Artevel of California LLC	1	34.00220	-117.65013	N	N	Metered	-	32.6
3601698	IRR/Dom	Hofer Ranch	1	34.04938	-117.58570	N	N	Estimated	N	175.5
3601824	IRR - 2	Boys Republic	1	34.00244	-117.72279	N	N	Metered	-	98.9
3601827	01A	State Of CA CIM	1	33.98271	-117.67845	N	N	Metered	-	426.2
3602043	Dairy/Dom	Ag Pool Misc	1	34.01567	-117.64163	N	N	Metered	-	88.4
3602077	Backup	Ag Pool Misc	1	34.01209	-117.61284	N	N	Metered	-	0.0
3602078	IRR	Ag Pool Misc	1	34.01854	-117.63684	N	N	Metered	-	0.0
3602214	IRR	County Of San Bernardino	1	33.99339	-117.64492	N	N	Estimated	Y	3.6
3602332	S IRR-1	Heman G Stark Youth Correctional Facilit	1	33.98023	-117.65759	N	N	Metered	-	0.0
3602461	11A	State Of CA CIM	1	33.98484	-117.68427	N	N	Metered	-	1.1
3602480	DAIRY	Artevel of California LLC	1	34.00442	-117.64667	N	N	Metered	-	20.3
3602532	ANIMALS	Ag Pool Misc	1	34.00749	-117.64344	N	N	Metered	-	14.4
3602534	IRR-in shed	Ag Pool Misc	1	34.00854	-117.63721	N	N	Estimated	N	31.6
3602535	Dairy-in garage	Ag Pool Misc	1	34.00989	-117.63734	N	N	Metered	-	18.4
3602540	Dairy/Dom	No Longer Ag Owner	1	33.99726	-117.62735	N	N	Estimated	Y	3.6
3602584	Irr	No Longer Ag Owner	1	34.01864	-117.57791	N	N	Estimated	N	47.8
3602590	Chickens/Nursery	Hohberg Nursery	1	34.01317	-117.63604	N	N	Estimated	N	37.0
3602597	Dairy/Dom	Ag Pool Misc	1	33.96151	-117.64685	N	N	Estimated	N	11.8
3602602	Dairy	County Of San Bernardino	1	34.00449	-117.63318	N	N	Estimated	N	20.1
3602603	IRR/DOM	County Of San Bernardino	1	34.00304	-117.63587	N	N	Estimated	N	38.7
3602604	IRR	SD Farms II	1	34.01192	-117.64628	N	N	Estimated	N	90.0
3602608	Dairy #2	Loyola Properties I	1	33.99330	-117.56867	N	N	Estimated	Y	9.7
3602609	out of svs	No Longer Ag Owner	1	33.96783	-117.64093	N	Y	Estimated	Y	0.0
3602691	13--Field 24	State Of CA CIM	1	33.97715	-117.66183	N	N	Metered	-	543.2

(a) Well owners are current as of the end of FY 2023. A well whose owner is listed as "No Longer Ag Owner" indicates a well in a developing area where the property ownership, well ownership, and water use can change multiple times within a year. The ownership of these wells is uncertain as of the end of FY 2023.



Prepared by:

WEST YOST
Water. Engineered.

Author: LS

Date: 5/3/2024

File Name: Appendix_A_GWPumpingWells.mxd

0 3 6 Miles

0 4 8 Km

Prepared for:

Chino Basin Watermaster
Data Collection and Evaluation
FY 2022/23

Active Groundwater Pumping Wells in FY 2023

Measurement Method
Symbolized by shape

- Metered
- Unmetered, Non-Minimal Producer
- Unmetered, Minimal Producer

Groundwater Production in FY 2023 (af)
Symbolized by size and color

- 0 - 10
- 10 - 50
- 50 - 500
- 500 - 1,000
- > 1,000

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

- Undifferentiated Pre-Tertiary to Early Pleistocene Igneous, Metamorphic, and Sedimentary Rocks

Hydrology

- Streams & Flood Control Channels
- Flood Control & Conservation Basins

OBMP Management Zones

Active Pumping Wells in the Chino Basin by Measurement Method
FY 2023

Figure A-1