FINAL REPORT | SEPTEMBER 2023

2023 Recharge Master Plan Update

PREPARED FOR

Chino Basin Watermaster

PREPARED BY

West Yost

Water. Engineered.

2023 Recharge Master Plan Update

Prepared for

Chino Basin Watermaster

Project No. 941-80-22-11

09/22/23

Project Manager: Carolina Sanchez, PE | Date

09/22/23

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LIST OF ACRONYMS AND ABBREVIATIONS

af	Acre-Feet
afy	Acre-Feet Per Year
AMP	Asset Management Plan
BASIN	Chino Basin
CBFIP	Chino Basin Facilities Improvement Program
CBWCD	Chino Basin Conservation District
CDA	Chino Basin Desalter Authority
CIM	California Institution for Men
DCE	Data Collection and Evaluation
DCV	Design Capture Volume
DWR	Department of Water Resources
ET	Evapotranspiration
FWC	Fontana Water Company
GLMC	Ground Level Monitoring Committee
JCSD	Jurupa Community Service District
Judgement	Stipulated Judgment
Metropolitan	Metropolitan Water District of Southern California
mgd	Million Gallons Per Day
MVWD	Monte Vista Water District
O&M	Operation and Maintenance
OBMP	Optimum Basin Management Program
Parties	Chino Basin Parties
R&R	Renewal and Replacement
Regional Board	Santa Ana Regional Water Quality Control Board
RMP	Recharge Master Plan
RMPU	Recharge Master Plan Update
RTS	Readiness To Serve
RUL	Remaining Useful Life
SBCFCD	San Bernadino County Flood Control District
SMP	Subsidence Management Plan
SRF	State Revolving Fund
SWP	State Water Project
SWRCB	State Water Resources Control Board
SYR	Safe Yield Recalculation
TAF	Thousand Acre Feet
TDS	Total Dissolved Solids
TVMWD	Three Valley's Municipal Water District
UL	Useful Life
USACE	US Army Corps of Engineers
WEI	Wildermuth Environmental, Inc.
WFA	Water Facilities Authority

CHAPTER 1
Introduction

This chapter describes the background of the recharge master plan (RMP) process and the objectives and requirements of the Recharge Master Plan Update (RMPU). It also provides the report organization that will satisfy the requirements.

1.1 BACKGROUND

Figure 1-1 is a location map of the Chino Basin (Basin). The Basin lies within the counties of Los Angeles, San Bernadino, and Riverside; includes the cities of Chino, Chino Hills, Eastvale, Fontana, Ontario, Pomona, Rancho Cucamonga, Upland, and several other communities; and covers about 235 square miles.

The Basin is an integral part of the regional and statewide water supply system and is one of the largest groundwater basins in Southern California, containing about 12 million acre-feet (af) of water in storage and an unused storage capacity of over 1,000,000 af. Multiple cities and other water-supply entities pump groundwater from the Basin to satisfy all or part of their municipal and industrial demands. Agricultural users also pump groundwater from the Basin.

Production and storage rights in the Basin are defined in the Stipulated Judgment[1] (Judgment), issued in 1978 (Chino Basin Municipal Water District vs. the City of Chino et al. [SBSC Case No. RCV RS51010]). Since that time, the Basin has been sustainably managed as required by the Judgment under the direction of a Court-appointed Watermaster. The Judgment declares that the Safe Yield[2] of the Chino Basin is 140,000 acre-feet per year (afy[3]), which is allocated among three pools of right holders as follows:

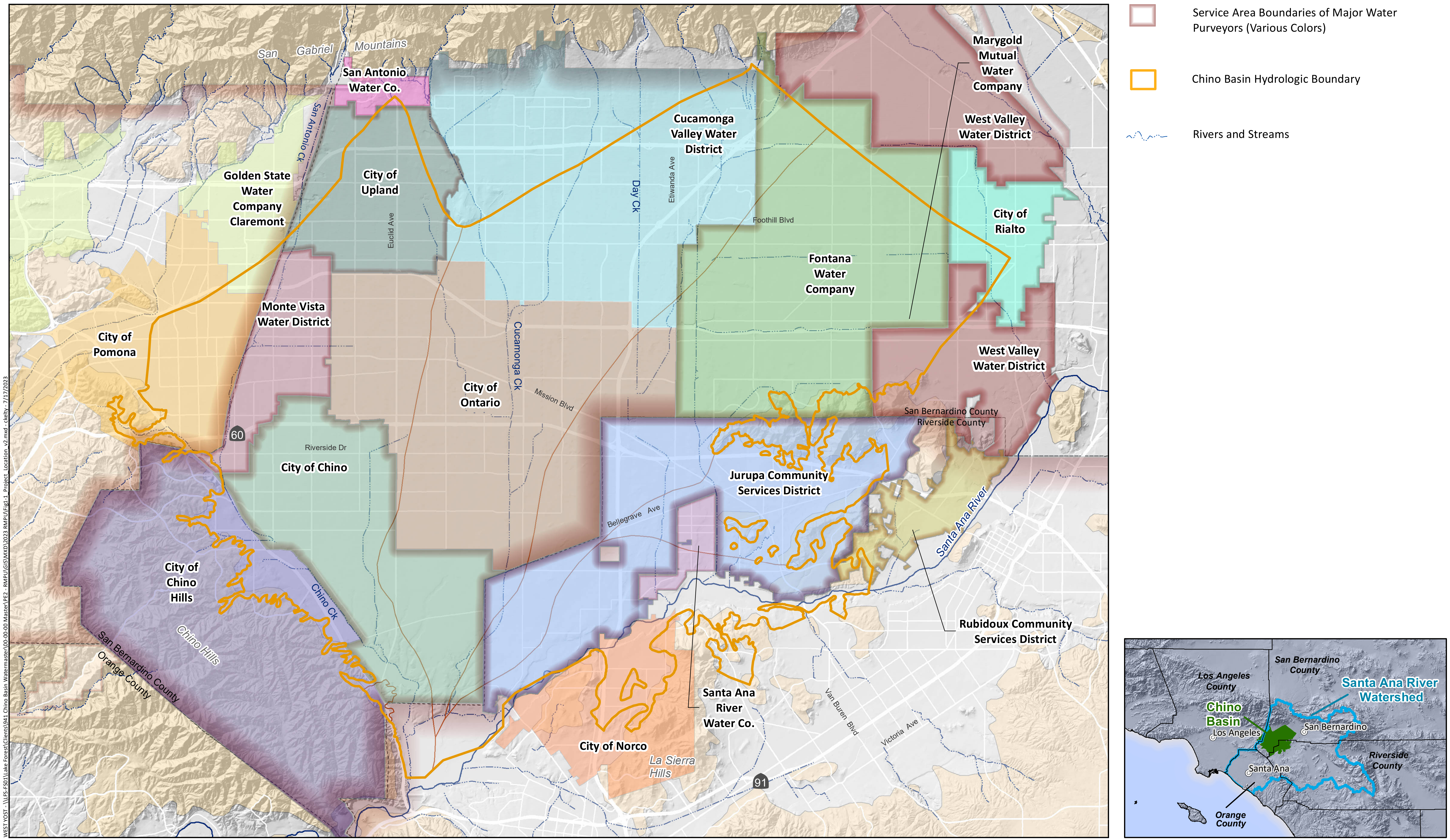
Overlying agricultural pool	82,800 afy
Overlying non-agricultural pool	7,366 afy
Appropriative pool	49,834 afy

A fundamental premise of the Judgment is that all Basin water users are allowed to pump sufficient water from the Basin to meet their requirements. To the extent that pumping by a party exceeds its share of the Safe Yield, assessments are levied by Watermaster to replace overproduction. The Judgment also recognizes that there exists a substantial amount of available unused groundwater storage capacity in the Basin that can be utilized for storage and the conjunctive use of supplemental and local waters. Utilization of this storage is subject to Watermaster control and regulation. The Judgment provides that any person or public entity, whether a party to the Judgment or not, may make reasonable beneficial use of the available storage, provided that no such use shall be made except pursuant to a written storage agreement with Watermaster.

[1] Original judgement in Chino Basin Municipal Water District vs. City of Chino, et al., signed by Judge Howard B. Weiner, Case No. 164327. File transferred August 1989, by order of the Court and assigned new case number RCV51010. The restated Judgement can be found here.

[2] "Safe Yield" is a defined term in the Judgment.

[3] The Safe Yield was recalculated in 2020 to be 131,000 afy for the period of 2021 through 2030.



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CHINO BASIN WATERMASTER Partners in Basin Management

Location of the Chino Basin

Figure 1-1

1.1.1 Optimum Basin Management Program

The Judgment gave Watermaster the authority to develop an optimum basin management program (OBMP) for the Basin, including both water quantity and quality considerations. Watermaster, with direction from the Court, began the development of the OBMP in 1998 and completed it in July 2000 (2000 OBMP). The 2000 OBMP was developed in a public collaborative process, consisting of the development of a set of management goals, the identification of impediments to those goals, and the identification of a series of actions that could be taken to remove the impediments and achieve the management goals. The goals of the 2000 OBMP include:

1. Enhance Basin Water Supplies
2. Protect and Enhance Water Quality
3. Enhance Management of the Basin
4. Equitably Finance the OBMP

The 2000 OBMP consists of nine program elements or initiatives that contain actions that remove the impediments to the goals and enable their achievement. These include:

- Program Element 1 – Develop and Implement Comprehensive Monitoring Program
- Program Element 2 – Develop and Implement Comprehensive Recharge Program
- Program Element 3 – Develop and Implement Water Supply Plan for the Impaired Areas of the Basin
- Program Element 4 – Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1
- Program Element 5 – Develop and Implement Regional Supplemental Water Program
- Program Element 6 – Develop and Implement Cooperative Programs with the Regional Water Quality Control Board, Santa Ana Region (Regional Board) and Other Agencies to Improve Basin Management
- Program Element 7 – Develop and Implement Salt Management Program
- Program Element 8 – Develop and Implement Groundwater Storage Management Program
- Program Element 9 – Develop and Implement Conjunctive-Use Programs

The Court approved the 2000 OBMP and its implementation agreement, hereafter the Peace Agreement,[4] in October 2000. Each program element contains an implementation plan and schedule. The implementation plan and schedule are included in both the 2000 OBMP report (Wildermuth Environmental, Inc. [WEI], 1999) and the Peace Agreement. The 2000 OBMP implementation plan was updated in 2007 and implemented through the Peace II Agreement. The parties to the Peace Agreement and the Peace II Agreement were bound to implement them and have done so under Court supervision.

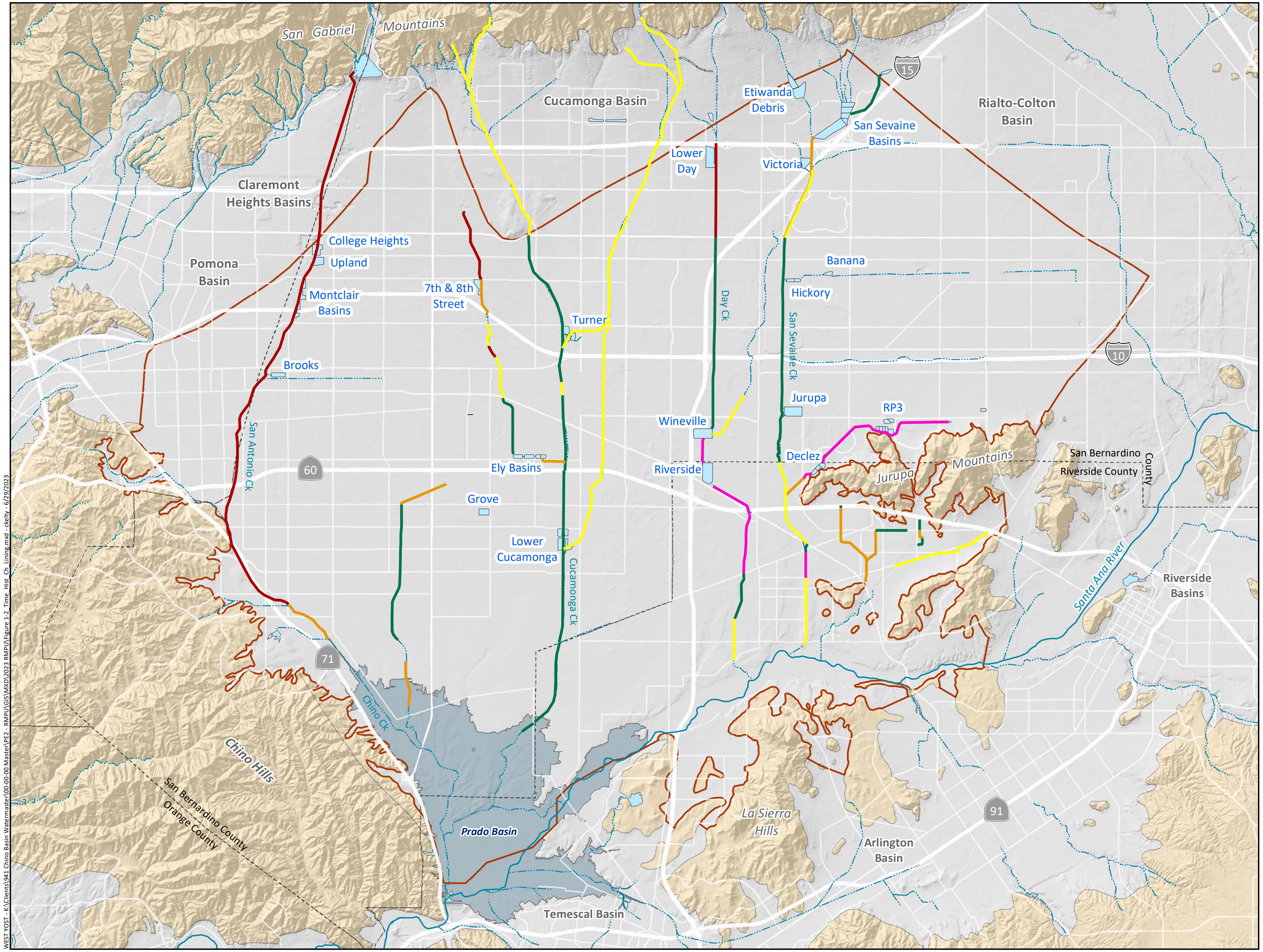
The OBMP was updated in 2020 (2020 OBMPU) which retained the same goals and program elements as the 2000 OBMP. However, the implementation plan for the 2020 OBMPU has not been developed.

[4] The Peace Agreement is located here: http://www.cbwm.org/docs/legaldocs/Peace_Agreement.pdf

1.1.2 Recharge Planning

The IEUA, Watermaster, and many other stakeholders have collaborated to implement the OBMP program elements. *Program Element 2 – Develop and Implement Comprehensive Recharge Program* is fundamental to achieving the first two OBMP goals (1—Enhance Basin Water Supplies and 2—Protect and Enhance Water Quality). Prior to the OBMP, in response to rapid urbanization, the San Bernardino County Flood Control District (SBCFCD) and the US Army Corps of Engineers (USACE) constructed flood control projects that efficiently capture and convey stormwater to the Santa Ana River to reduce potential flooding, effectively eliminating the groundwater recharge that formerly took place in the stream channels and flood plains that cross the Basin. These flood control projects consisted of concrete lining of major drainages across the Basin and the construction of retention basins to temporarily store stormwater and release it in 24 hours or less. Some provisions were made to mitigate the loss of recharge from these flood control projects at that time, but these provisions failed to achieve the groundwater recharge that took place prior to the construction of these flood control projects. Figure 1-2 shows the locations of the major channels that cross the Chino Basin from the San Gabriel Mountains to the Santa Ana River and the time history of their concrete lining. Figure 1-3 shows the time history of stormwater recharge in the channels. The loss in recharge to the Basin due to the construction of the concrete-lined channels is estimated to be about 15,000 afy. Also, there were no mitigation efforts to preserve recharge when land uses were converted from native and agricultural uses (which are highly pervious) to urban uses (which are highly impervious). Concrete lining of the channels and the changes in land uses resulted in a decline in recharge to the Basin, and hence, a decline in the yield of the Basin. Program Element 2 was developed to reverse the loss in recharge and Basin yield.

Capturing and recharging stormwater and dry-weather runoff improves water quality in the Santa Ana River by reducing contributions of metals, nutrients, pathogens, and other constituents of concern, which is a regional benefit to other Santa Ana River Watershed parties and habitat. These contaminants are eliminated during recharge through soil-aquifer treatment processes and thus are not a concern for groundwater-quality degradation. In fact, the total dissolved solids (TDS) and nitrogen concentrations in stormwater recharge are very low, and hence, increasing stormwater recharge lowers the TDS and nitrate concentrations in groundwater.



Time Periods in Which Channel Segments Were Lined

- 1950 - 1959
- 1960 - 1969
- 1970 - 1979
- 1980 - 1989
- 1990 - 1999

Groundwater Management Zone (GMZ)

- Chino Basin

Hydrology

- Streams and Flood Control Channels
- Lakes and Flood Control Basins

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

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

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Time History of Channel Lining in the Chino Basin

Figure 1-2

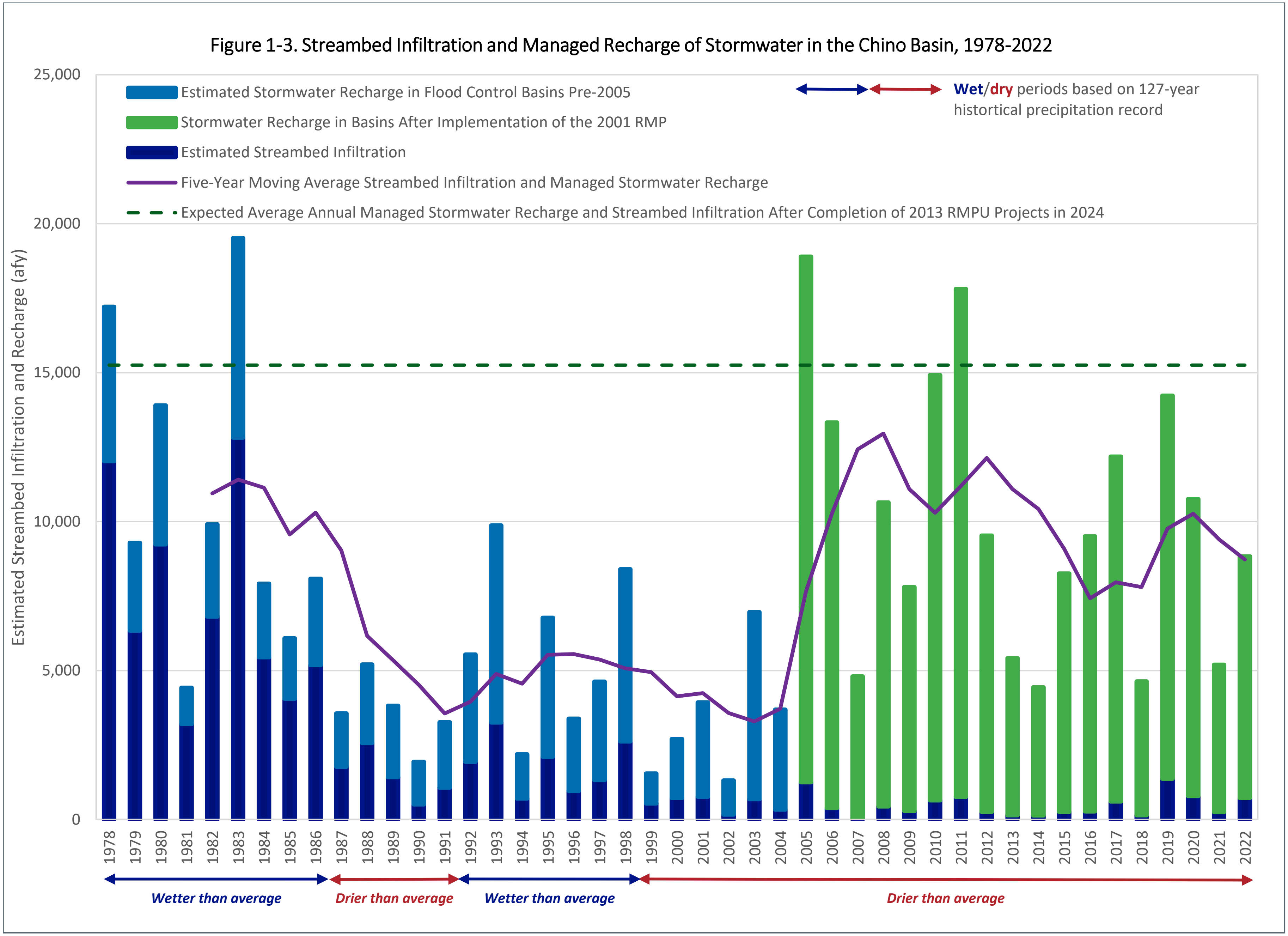


Figure 1-3. Streambed Infiltration and Managed Recharge of Stormwater in the Chino Basin, 1978-2022
Estimated Stormwater Recharge in Flood Control Basins Pre-2005
Stormwater Recharge in Basins After Implementation of the 2001 RMP
Estimated Streambed Infiltration
Five-Year Moving Average Streambed Infiltration and Managed Stormwater Recharge
Expected Average Annual Managed Stormwater Recharge and Streambed Infiltration After Completion of 2013 RMPU Projects in 2024
Wet/dry periods based on 127-year historical precipitation record
Estimated Streambed Infiltration and Recharge (afy)
25,000
20,000
15,000
10,000
5,000
0
1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
Wetter than average
Drier than average
Wetter than average
Drier than average

1.1.3 Recharge Master Plan Activities and Project Implementation

Watermaster, IEUA, Chino Basin Conservation District (CBWCD), and SBCFCD are partners in conducting recharge in the Chino Basin. The four agencies have an agreement to implement the existing recharge program.[5] Watermaster, IEUA, CBWCD, and SBCFCD completed a recharge master plan in 2001 (2001 RMP) and began its implementation in 2001 with construction occurring between 2004 and 2014. As a result, seventeen existing flood-retention facilities were modified to increase diversion rates, increase conservation storage, and subsequently increase the recharge of stormwater and dry-weather runoff. Two new recharge facilities were also constructed as part of these efforts. Figure 1-4 shows these facilities. Watermaster has permits from the State Water Resources Control Board (SWRCB) to divert surface water to the recharge facilities shown in Figure 1-4, store the recharged water in the Chino Basin, and subsequently recover it for beneficial use.[6] Watermaster holds these permits in trust for all entities that rely on groundwater from the Chino Basin.

The cost of the 2001 RMP recharge improvements was about $60 million, of which about half was grant funded and half was paid by Watermaster and IEUA. Based on monitoring recharge performance and numerical model investigations, the aggregate average annual stormwater and dry-weather runoff recharge due to the implementation of the 2001 RMP is estimated to be about 9,500 afy.

Watermaster, IEUA, CBWCD, and SBCFCD collaborated to develop the 2010 Recharge Master Plan Update and amended it in 2013. The 2010 Recharge Master Plan Update and its 2013 amendment (hereafter, collectively called the 2013 RMPU) were developed in a public, transparent process. The 2013 RMPU contains two types of recharge projects: yield-enhancement and production-sustainability projects. A steering committee was created to assist Watermaster and IEUA in preparing the 2013 RMPU. The steering committee issued a "call for projects" to all entities with an interest in stormwater and dry-weather runoff management and groundwater management in the Basin. The steering committee developed screening criteria to evaluate and rank the recharge projects. In total, 39 yield enhancement projects and nine production sustainability projects were identified and evaluated by the steering committee to determine average annual stormwater recharge and recycled water recharge capacities. The steering committee meetings were open to all stakeholders with an interest in stormwater and dry-weather runoff management and groundwater management in the Chino Basin.

The 2013 RMPU was completed pursuant to a Court order in September 2013 (WEI, 2013), filed with the Court in November 2013, and subsequently approved by the Court in its entirety in April 2014. The 2013 RMPU contains recommendations to construct ten new recharge facilities and an implementation plan to plan, design, and construct them. Table 1-1 lists the 2013 RMPU projects that were recommended for implementation, and Figure 1-4 shows their locations. Since the completion of the 2013 RMPU, the IEUA and Watermaster have executed Task Orders to plan, design, and construct the recommended

[5] Agreement for Operation and Maintenance of Facilities to Implement the Chino Basin Recharge Master Plan. The effective dates of the agreement are from January 23, 2003 to December 31, 2032.

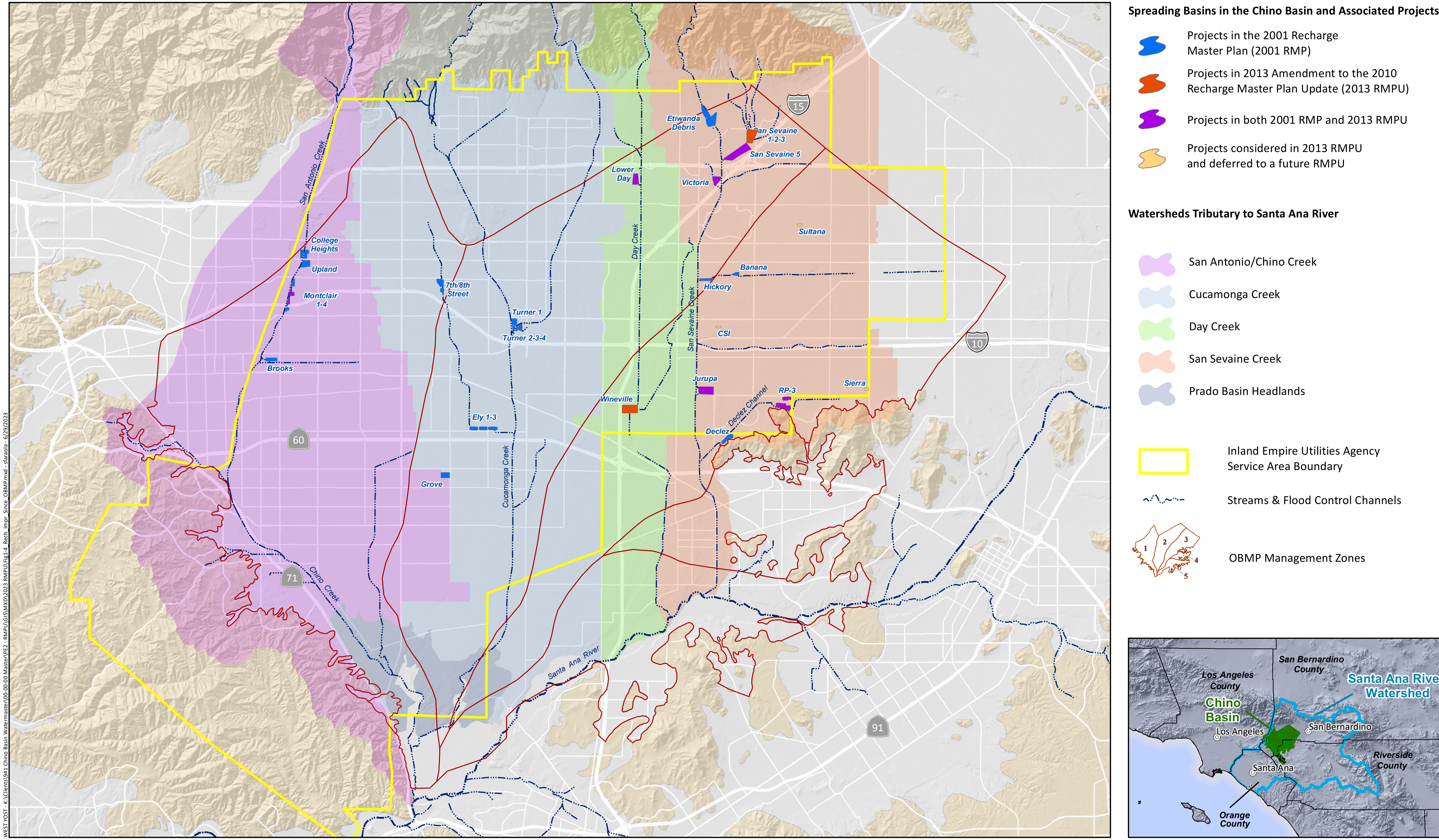
[6] Watermaster holds three permits with the SWRCB for the diversion and recharge of stormwater in trust for the Parties. The SBCFCD is a co-permittee for two of these permits, 19895 and 20753. Each permit defines a maximum diversion limit and the period over which diversions are allowed to occur each year (diversion season): (1) Permit 19895 has a diversion limit of 15,000 acre-feet (af) from November 1 to April 30, (2) Permit 20753 has a diversion limit of 27,000 af from October 1 to May 1, and (3) Permit 21225 has a diversion limit of 68,500 af from January 1 to December 31.

facilities. During planning and preliminary design, the recommended 2013 RMPU projects were substantially refined. Half of the projects were found infeasible and were subsequently not implemented. Table 1-1 lists the 2013 RMPU projects that will be constructed and their expected annual stormwater recharge and supplemental water recharge capacity. With completion of the 2013 RMPU projects, stormwater recharge is projected to increase by 4,800 afy, and recycled water recharge capacity is projected to increase by 7,100 afy. The IEUA has applied for and been awarded grants and low-interest State Revolving Fund (SRF) loans to pay for some of the construction costs. As of this writing (summer 2023), three of the five 2013 RMPU projects have been constructed: Lower Day Basin, Victoria Basin, and San Sevaine Basin improvements. The Wineville/Jurupa/RP3 project is expected to be completed at the end of 2023 and the Montclair Basin project is expected to begin construction in 2024 with an estimated completion in 2024. The construction cost of the 2013 RMPU projects, after savings from grants acquired by IEUA, is expected to be about $30 million, and the expected unit cost of the new stormwater recharge is about $400 per af.[7] For comparison, the cost to purchase untreated State Water Project (SWP) water from the Metropolitan Water District of Southern California (Metropolitan) in 2023 is about $855 per af (including readiness to serve charges).

The 2013 RMPU implementation also included a process to create a database of all known local stormwater and dry-weather runoff management projects implemented through the municipal separate storm sewer system (MS4) permits in the Los Angeles, Riverside, and San Bernardino County parts of the Chino Basin. The project types, physical characteristics, and time histories of maintenance are being stored in a database for periodic review with the intent of incorporating them into the surface water and groundwater models that Watermaster uses for planning (see Chapter 4.3).

Watermaster, IEUA, CBWCD, and SBCFCD collaborated to develop the 2018 RMPU. The 2018 RMPU did not include recommendations to construct new recharge facilities.

[7] Recharge Investigations and Projects Committee Meeting, July 20, 2023.
https://cbwm.syncedtool.com/shares/folder/PaauzoQapiZ/?folder_id=449162369



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Recharge Improvements in the Chino Basin Since Implementation of the OBMP and the 2001 RMP

Figure 1-4

Table 1-1. 2013 RMPU Recharge Projects

Project ID	Project Name	Project Benefits as Documented in the 2013 RMPU Report			Project Benefits Based on Project Design Developed During Implementation		
		New Stormwater Recharge (afy)	Recycled Water (afy)	Stormwater Recharge Unit Cost ($/af)	New Stormwater Recharge (afy)	Recycled Water (afy)	Stormwater Recharge Unit Cost ($/af)
14	Turner Basin	66	-	$ 916	Projects did not move to implementation.		
15a	Ely Basin	221	-	$ 981			
17a	Lower San Sevaine Basin	1,221	-	$ 1,239			
18a	CSI Stormwater Basin	81	-	$ 388			
25a	Sierra Basin	64	-	$ 537			
27	Declez Basin	241	-	$ 1,135			
2	Montclair Basin	248	-	$ 415	96	-	$ 1,384
7	San Sevaine Basins	642	1,911	$ 217	669	4,100	$ 384
11	Victoria Basin	43	120	$ 151	75	120	$ 112
12	Lower Day Basin	789	-	$ 242	993		$ 285
23a	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements	3,166	2,905	$ 500	2,921	2,905	$ 406
	Total	6,782	4,936	$ 612	4,754	7,125	$ 391

1.2 SCOPE OF RECHARGE MASTER PLAN REQUIRED BY THE PEACE AGREEMENT, PEACE II AGREEMENT, AND COURT ORDERS

This Chapter describes the requirements of the Recharge Master Plans pursuant to the Peace Agreement, Peace II Agreement, and Special Referee's December 2007 Report.

Pursuant to these guiding documents, the general objectives of the RMPU are to:

1. Achieve and maintain long-term balance of recharge and discharge in every area and subarea of the Basin (Peace I Agreement Section 5.1 (e)[8])
2. Avoid material physical injury (MPI) (Peace I Agreement Section 5.1 (e) and Peace II Agreement Article 8.4[9])
3. Ensure there is enough recharge capacity and supplemental water available to meet future replenishment and recharge obligations (Peace I Agreement Section 5.1 (e) and Peace II Agreement Article 8.1, Special Referee's December 2007 Report[10])
4. Protect and enhance the Safe Yield (Peace I Agreement Section 5.1 I and, Special Referee's December 2007 Report Sections VI, VII and VIII)

To meet these objectives, the RMPUs must consider and address recharge requirement projections, the availability of storm and supplemental waters for recharge and replenishment, and the physical means to satisfy these recharge projections. To the extent that new or modified facilities are required to meet the objectives, the RMPUs include a schedule for the planning, design, and construction of recharge improvements.

1.3 ORGANIZATION OF THIS REPORT

This report documents an investigation conducted by the Chino Basin Watermaster (Watermaster) and Inland Empire Utilities Agency (IEUA) pursuant to the Court's direction to update the Recharge Master Plan (RMP) every five years. The 2018 Recharge Master Plan Update (RMPU) was completed on time and submitted to the Court in October 2018. This 2023 RMPU, like past updates, was prepared consistent with the requirements of the Peace Agreement, the Peace II Agreement, the December 2007 Court Order that approved the Peace II Agreement, and the Special Referee's December 2007 Report. The background and objectives of the RMPU are described in Chapters 1.1 and 1.2. The remainder of this report is organized as follows:

Chapter 2 – Existing and Planned Recharge Facilities. This chapter provides an inventory of recharge facilities and activities in the Chino Basin since the implementation of the OBMP and the 2001 RMP. It also provides a description of the recharge capacity of the recharge facilities, which can subsequently be compared to the recharge needs discussed in Chapter 5. Existing and planned recharge facilities include spreading basins, aquifer storage and recovery (ASR) wells, and MS4

[8] Peace Agreement

[9] Peace II Agreement

[10] Part of the *Final Report and Recommendations on Motion for Approval of the Peace II Documents*

facilities. In-lieu recharge capabilities exist when the capacity to treat and serve imported water exceeds the imported water demands of the parties that have pumping rights.

Chapter 3 – Basin Response to Historical Recharge Activities. This chapter describes basin response to historical recharge activities since the implementation of the OBMP and changes that have occurred since the 2018 RMPU was completed. The basin response is described in terms of groundwater-level changes, hydrologic balance and hydraulic control. This information is used to determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

Chapter 4 – Planning Projections. This chapter establishes planning assumptions for the completion of the 2023 RMPU. These projections of water supply, recharge, and replenishment are based on the most up to date information available to Watermaster developed through Watermaster's Data Collection and Evaluation efforts (West Yost, 2023). This chapter also describes changes in the availability and cost of replenishment sources. This information is used to evaluate the basin response to planning projections (Chapter 5) and determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

Chapter 5 – Basin Response to Planning Projections. This chapter describes the basin response to the planning projections. The basin response is described in terms of groundwater-level changes, hydrologic balance and hydraulic control. This information is used to determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

Chapter 6 – Future Recharge Capacity Needs to Meet Future Obligations. This chapter identifies future needs for recharge capacity in the Chino Basin and compares the need to the available recharge capacity. Chapter 5 documents the conclusion that the existing recharge strategy, and the facilities on which it relies, are sufficient through 2045.

Chapter 7 – Renewal and Replacement Plan. This chapter presents the renewal and replacement planning effort that was completed for Chino Basin recharge system assets.

Chapter 8 – 2023 Recharge Master Plan. This chapter defines the 2023 RMPU, including the conclusions of the report, recommendations for future activities, and an implementation plan for the 2023 RMPU to meet the RMP objectives.

Chapter 9 – References.

Appendix A – In-Lieu Recharge Calculations for Appropriative Pool Parties. Appendix A details the in-lieu recharge capacity calculations as described in Chapter 2.

Appendix B – Renewal and Replacement Projection Details (10-year period). Appendix B details the renewal and replacement costs by year and asset, for the 10-year period, for all recharge facility assets.

Appendix C – Review Comments and Responses. Appendix C contains comments and responses on the draft 2023 RMPU Report.

The 2023 RMPU was developed through a stakeholder process. Watermaster convened several workshops with the Steering Committee through the Recharge Investigation & Projects Committee (RIPComm) over the course of developing the 2023 RMPU (from October 2022 to August 2023). At these workshops, the important assumptions and interim work products of the RMPU were presented. The presentations developed for these workshops were posted on the Watermaster's website.[11]

As part of the stakeholder process, the development of 2023 RMPU was open to comments by all stakeholders, and all comments were responded to and/or addressed. Appendix C contains the comments and responses.

[11] https://www.cbwm.org/pages/meetings/special_committees/

CHAPTER 2
Existing Recharge Facilities and Activities

This chapter provides an inventory of recharge facilities and activities in the Chino Basin since the implementation of the OBMP and the 2001 RMP. It also provides a description of the recharge capacity of the recharge facilities, which can subsequently be compared to the recharge needs discussed in Chapter 6. Existing and planned recharge facilities include spreading basins, ASR wells, and MS4 facilities. In-lieu recharge capabilities exist when the capacity to treat and serve imported water exceeds the imported water demands of the parties that have pumping rights.

2.1 SPREADING BASINS

Pursuant to the OBMP, Peace Agreement, and other agreements, Watermaster, the IEUA, CBWCD, and SBCFCD completed the 2001 RMP (Black and Veatch, 2001) and constructed spreading basin improvements from 2004 through 2014. These improvements were referred to as the Chino Basin Facilities Improvement Program (CBFIP). Seventeen existing flood retention facilities were modified, and two new spreading facilities were constructed. The waters recharged at these facilities include recycled imported and stormwaters, and dry-weather runoff. Figure 1-4 shows the location of these facilities.

2.1.1 Spreading Basin Description

Table 2-1 lists the spreading basins with the historical average stormwater recharge and supplemental water recharge capacity.[12] From an operational perspective, there are two types of recharge basins within the Chino Basin: conservation and multipurpose basins. Conservation basins do not have a primary flood control function and they are operated to recharge storm and supplemental water. Multipurpose basins are operated primarily for flood control and secondarily for recharging storm and supplemental water.

Table 2-1 shows the average annual storm and supplemental water recharge capacities of the spreading basins based on current conditions. Stormwater recharge varies by year, based on hydrologic conditions, and averaged about 9,200 afy from FY 2004/05 through FY 2021/22. Supplemental water recharge occurs during non-storm periods and the projected supplemental water recharge capacity averages about 56,600 afy.

[12] Appendix A of the 2018 RMPU documents the information and computations were used to estimate the supplemental water recharge capacity (WEI, 2018b).

Table 2-1. Average Stormwater Recharge and Supplemental Water Recharge Capacity Estimates

Recharge Facility	Average Stormwater Recharge FY 2003/04 through FY 2021/22 (afy)	Supplemental Water Recharge Capacity (afy)
Management Zone 1		
Brooks Street Basin	462	1,658
College Heights Basin - East	63	5,816
College Heights Basin - West		2,064
Montclair Basin 1	952	409
Montclair Basin 2		2,940
Montclair Basin 3		400
Montclair Basin 4		915
Eighth Street Basin	872	3,426
Seventh Street Basin		1,170
Upland Basin	390	891
Subtotal Management Zone 1	*2,739*	*19,689*
Management Zone 2		
Ely	1,217	4,501
Grove Basin	279	-
Etiwanda Debris Basin	183	2,908
Hickory Basin East	303	856
Hickory Basin West		1,420
Lower Day Basin Cell 1	427	983
Lower Day Basin Cell 2		
Lower Day Basin Cell 3		
San Sevaine No. 1	758	114
San Sevaine No. 2		2,869
San Sevaine No. 3		2,226
Turner Basin No. 1	1,335	577
Turner Basin No. 2		227
Turner Basin No. 3		418
Turner Basin No. 4A		981
Turner Basin No. 4B		164
Turner Basin No. 4C		191
Victoria Basin	317	2,279
Subtotal Management Zone 2	*4,819*	*20,713*
Management Zone 3		
Banana Basin	226	1,790
Declez Basin Cell 1	566	1,235
Declez Basin Cell 2		823
Declez Basin Cell 3		770
IEUA RP3 Basin Cell 1	877	4,653
IEUA RP3 Basin Cell 3		3,266
IEUA RP3 Basin Cell 4		3,669
Subtotal Management Zone 3	*1,668*	*16,204*
Totals	9,226	56,606

2.1.2 Historical Recharge Activity

Figure 2-1 shows the estimated annual recharge volume in the Chino Basin by water type since the implementation of the OBMP and the 2001 RMP for the period of 2006 through 2022. Figure 2-1 is based on IEUA's monitoring of the recharge facilities.[13] This information is documented in monthly reports prepared by IEUA and annual reports prepared by Watermaster, the latter of which are submitted to the SWRCB. Prior to 2004, managed stormwater recharge by the CBWCD and incidental recharge at SBCFC's flood control basins averaged about 3,000 afy (see Figure 1-3) (WEI, 2020), and recycled water recharge was about 500 afy.

Since the installation of supervisory control and data acquisition (SCADA) in 2004, data have been tracked for the recharge of all types of water at each spreading basin. Watermaster maintains a database of the monthly recharge volumes by water type and recharge location. Figure 2-1 shows the annual recharge of recycled water, stormwater, and dry-weather runoff since the initiation of the recharge program in FY 2004/05. Table 2-2 is a tabulation of the annual recharge by water type and recharge location for FY 2003/04 through FY 2021/22. Through FY 2021/22, the recharge improvements constructed by Watermaster and the IEUA have enabled them to recharge about 500,000 af of storm and supplemental water into the Chino Basin. During most of this period, stormwater recharge was suppressed by drought and the recycled system was expanding. The amount of storm and recycled water recharge due to the 2001 RMP is expected to increase as the land use converts fully to urban uses.

Recycled water has become a significant portion of annual recharge, increasing from about 50 af in FY 2003/04 to about 15,000 af in FY 2021/22. The sum of stormwater and recycled water recharged in the Chino Basin from FY 2003/04 to FY 2021/22 is about 339,000 af.

The magnitude of imported water recharge fluctuates significantly due to its availability and recharge needs. Historically, imported water recharge has occurred in the Chino Basin for two reasons: replenishment of overproduction and Storage and Recovery projects. Watermaster meets its replenishment obligations by purchasing and recharging imported water from Metropolitan or by purchasing unproduced production rights or Managed Storage from the parties.

[13] Several of Watermaster's permitted points of diversion are not monitored; diversion and recharge at these unmeasured points are estimated using the Wasteload Allocation Model (WLAM).

Figure 2-1 Recharge of Recycled Water, Stormwater, and Dry-Weather Runoff in the Chino Basin Since Implementation of the ORMP and the 2001 Recharge Master Plan

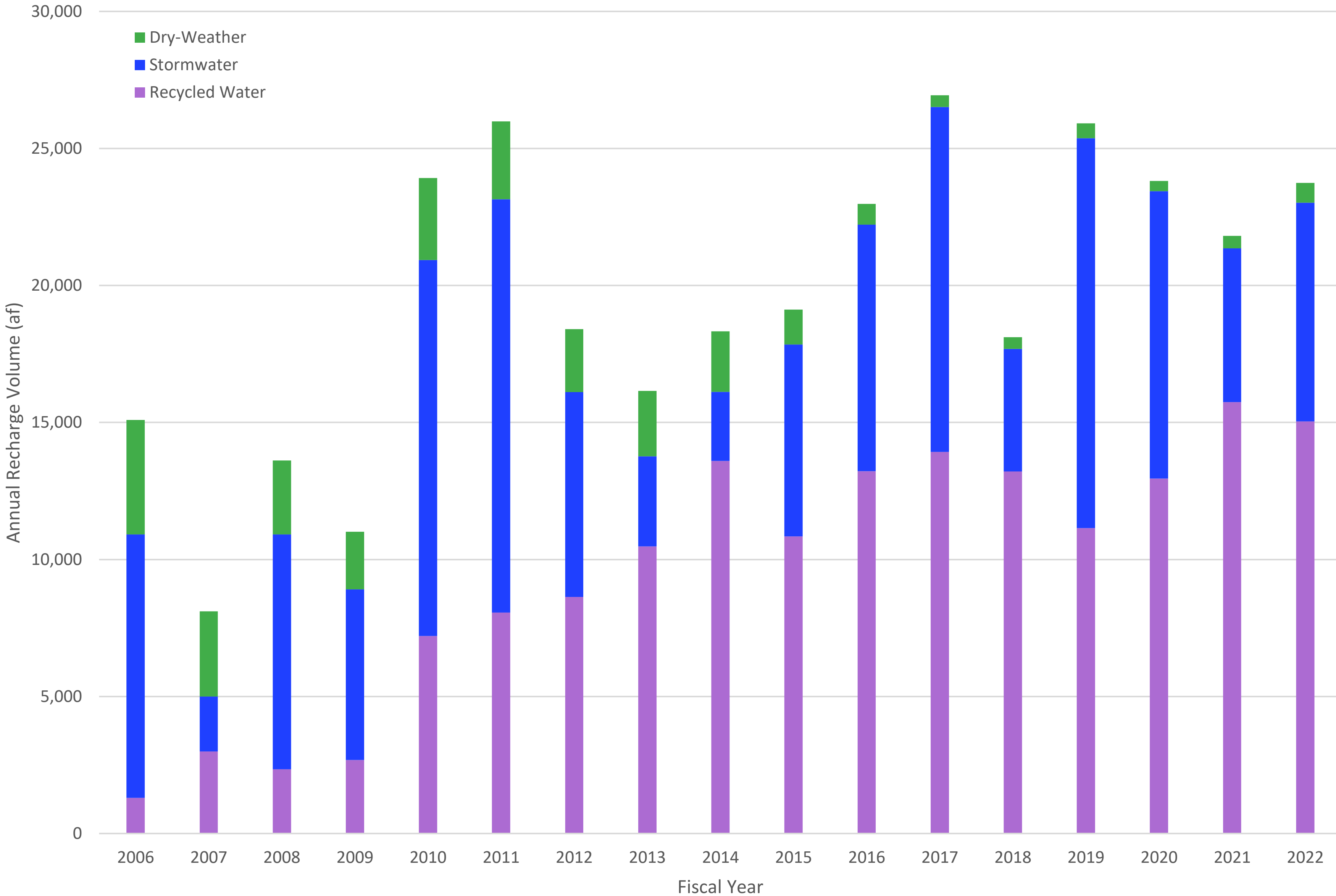


Table 2-2. Summary of Annual Wet-Water Recharge Records in the Chino Basin, afy

MVWD ASR Well

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	0	0	0
2005/2006	0	0	0	0
2006/2007	0	0	0	0
2007/2008	0	0	0	0
2008/2009	0	0	0	0
2009/2010	0	0	0	0
2010/2011	186	0	0	186
2011/2012	889	0	0	889
2012/2013	0	0	0	0
2013/2014	0	0	0	0
2014/2015	0	0	0	0
2015/2016	0	0	0	0
2016/2017	0	0	0	0
2017/2018	2,495	0	0	2,495
2018/2019	891	0	0	891
2019/2020	2,051	0	0	2,051
2020/2021	0	0	0	0
2021/2022	0	0	0	0
Total	6,511	0	0	6,511

College Heights Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	0	0	0
2005/2006	5,326	108	0	5,434
2006/2007	3,125	1	0	3,126
2007/2008	0	172	0	172
2008/2009	0	0	0	0
2009/2010	382	65	0	447
2010/2011	559	593	0	1,152
2011/2012	578	4	0	582
2012/2013	0	0	0	0
2013/2014	0	4	0	4
2014/2015	0	0	0	0
2015/2016	0	0	0	0
2016/2017	2,179	70	0	2,249
2017/2018	7,819	24	0	7,842
2018/2019	1,683	116	0	1,799
2019/2020	1,829	13	0	1,843
2020/2021	509	1	0	509
2021/2022	0	30	0	30
Total	23,989	1,201	0	25,160

Upland Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	100	0	100
2004/2005	0	989	0	989
2005/2006	5,986	214	0	6,200
2006/2007	7,068	195	0	7,263
2007/2008	0	312	0	312
2008/2009	0	274	0	274
2009/2010	0	532	0	532
2010/2011	899	1,308	0	2,207
2011/2012	2,118	222	0	2,340
2012/2013	0	119	0	119
2013/2014	0	95	0	95
2014/2015	0	325	0	325
2015/2016	0	425	0	425
2016/2017	2,575	583	0	3,158
2017/2018	1,547	155	0	1,702
2018/2019	1,217	687	0	1,904
2019/2020	1,132	445	0	1,578
2020/2021	426	127	0	552
2021/2022	0	299	0	299
Total	22,968	7,407	0	30,075

Montclair Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	7582.3	1,730	0	9,312
2004/2005	7,887	3,350	0	11,237
2005/2006	5,579	1,296	0	6,875
2006/2007	10,681	355	0	11,036
2007/2008	0	859	0	859
2008/2009	0	611	0	611
2009/2010	4,592	937	0	5,529
2010/2011	3,672	1,762	0	5,434
2011/2012	11,893	703	0	12,596
2012/2013	0	204	0	204
2013/2014	0	416	0	416
2014/2015	0	411	0	411
2015/2016	0	441	0	441
2016/2017	6,149	1,046	0	7,195
2017/2018	11,253	292	0	11,545
2018/2019	2,279	1,458	0	3,737
2019/2020	6,080	1,096	0	7,176
2020/2021	1,055	333	0	1,388
2021/2022	0	788	0	788
Total	78,703	18,089	0	96,003

Brooks Street Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	550	0	550
2004/2005	0	1,776	0	1,776
2005/2006	2,032	524	0	2,556
2006/2007	1,604	205	0	1,809
2007/2008	0	475	0	475
2008/2009	0	434	1,605	2,039
2009/2010	0	666	1,695	2,361
2010/2011	0	628	1,373	2,001
2011/2012	561	363	836	1,760
2012/2013	0	115	1,505	1,620
2013/2014	0	112	1,308	1,420
2014/2015	0	198	1,011	1,209
2015/2016	0	182	1,215	1,397
2016/2017	188	673	385	1,246
2017/2018	197	81	1,268	1,546
2018/2019	0	824	1,381	2,204
2019/2020	151	568	898	1,616
2020/2021	0	156	933	1,088
2021/2022	67	251	463	782
Total	4,799	8,780	15,875	28,673

7th and 8th Street Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	120	0	120
2004/2005	0	620	0	620
2005/2006	0	1,271	0	1,271
2006/2007	0	640	0	640
2007/2008	0	959	1,054	2,013
2008/2009	0	1,139	352	1,491
2009/2010	6	1,744	1,067	2,817
2010/2011	543	1,583	1,871	3,997
2011/2012	572	1,047	641	2,260
2012/2013	0	751	2,261	3,012
2013/2014	5	441	1,423	1,869
2014/2015	0	841	48	889
2015/2016	0	921	1,470	2,391
2016/2017	18	955	2,271	3,244
2017/2018	1,130	353	1,037	2,520
2018/2019	58	1,363	2,864	4,285
2019/2020	948	623	978	2,549
2020/2021	0	402	738	1,139
2021/2022	270	786	2,082	3,138
Total	3,281	15,773	18,074	37,128

Ely Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	2,000	49	2,049
2004/2005	0	2,010	158	2,168
2005/2006	0	1,531	188	1,719
2006/2007	0	631	466	1,097
2007/2008	0	1,603	562	2,165
2008/2009	0	927	364	1,291
2009/2010	0	1,164	246	1,410
2010/2011	83	1,415	757	2,255
2011/2012	885	1,096	393	2,374
2012/2013	0	568	1,378	1,946
2013/2014	0	548	3,298	3,846
2014/2015	0	1,087	1,751	2,838
2015/2016	0	1,506	1,012	2,518
2016/2017	0	1,378	1,491	2,869
2017/2018	9	715	1,511	2,234
2018/2019	0	1,255	1,388	2,643
2019/2020	100	1,758	2,061	3,919
2020/2021	0	632	1,188	1,820
2021/2022	94	1,306	657	2,057
Total	1,170	23,131	18,918	41,162

Grove Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	0	0	0
2005/2006	0	133	0	133
2006/2007	0	166	0	166
2007/2008	0	326	0	326
2008/2009	0	405	0	405
2009/2010	0	351	0	351
2010/2011	0	431	0	431
2011/2012	0	400	0	400
2012/2013	0	177	0	177
2013/2014	0	258	0	258
2014/2015	0	481	0	481
2015/2016	0	471	0	471
2016/2017	0	363	0	363
2017/2018	0	204	0	204
2018/2019	0	421	0	421
2019/2020	0	321	0	321
2020/2021	0	165	0	165
2021/2022	0	223	0	223
Total	0	5,297	0	5,073

Turner Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	310	1,428	0	1,738
2005/2006	346	2,575	0	2,921
2006/2007	313	406	1,237	1,956
2007/2008	0	1,542	0	1,542
2008/2009	0	1,200	171	1,371
2009/2010	0	2,220	397	2,617
2010/2011	0	2,308	53	2,361
2011/2012	199	1,879	1,034	3,112
2012/2013	0	1,120	176	1,296
2013/2014	0	596	1,565	2,161
2014/2015	0	1,289	948	2,237
2015/2016	0	1,616	1,958	3,574
2016/2017	290	1,667	1,236	3,193
2017/2018	299	695	1,526	2,520
2018/2019	0	1,364	526	1,890
2019/2020	0	1,446	191	1,638
2020/2021	195	829	564	1,588
2021/2022	311	1,192	615	2,117
Total	1,952	24,181	12,197	37,715

Lower Day Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	100	0	100
2004/2005	107	2,798	0	2,905
2005/2006	2,810	624	0	3,434
2006/2007	2,266	78	0	2,344
2007/2008	0	303	0	303
2008/2009	0	168	0	168
2009/2010	3	540	0	543
2010/2011	894	703	0	1,597
2011/2012	1,439	158	0	1,597
2012/2013	0	106	0	106
2013/2014	28	114	0	142
2014/2015	0	341	0	341
2015/2016	0	281	0	281
2016/2017	292	449	0	741
2017/2018	3,033	138	0	3,172
2018/2019	417	601	0	1,018
2019/2020	2,228	288	0	2,516
2020/2021	0	102	0	102
2021/2022	0	216	0	216
Total	13,516	8,108	0	21,408

Etiwanda Debris Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	2,137	0	0	2,137
2005/2006	2,488	20	0	2,508
2006/2007	1,160	0	0	1,160
2007/2008	0	10	0	10
2008/2009	0	28	0	28
2009/2010	7	775	0	782
2010/2011	147	1,213	0	1,360
2011/2012	567	100	0	667
2012/2013	0	33	0	33
2013/2014	0	45	0	45
2014/2015	0	27	0	27
2015/2016	0	83	0	83
2016/2017	281	426	0	707
2017/2018	1,249	59	0	1,308
2018/2019	0	308	0	308
2019/2020	848	191	0	1,040
2020/2021	0	0	0	0
2021/2022	0	158	0	158
Total	8,884	3,476	0	12,202

Victoria Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	0	0	0
2005/2006	0	330	0	330
2006/2007	0	260	0	260
2007/2008	0	427	0	427
2008/2009	0	250	0	250
2009/2010	2	494	0	496
2010/2011	69	461	773	1,303
2011/2012	281	221	665	1,167
2012/2013	0	94	842	936
2013/2014	0	192	1,379	1,571
2014/2015	0	306	931	1,237
2015/2016	0	343	635	978
2016/2017	128	642	1,621	2,391
2017/2018	575	112	793	1,480
2018/2019	0	1,016	1,780	2,796
2019/2020	1,085	352	1,050	2,487
2020/2021	0	148	1,008	1,156
2021/2022	256	367	1,694	2,317
Total	2,395	6,015	13,171	19,265

San Sevaine

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	1,621	2,830	0	4,451
2005/2006	9,172	2,072	0	11,244
2006/2007	5,749	244	0	5,993
2007/2008	0	749	0	749
2008/2009	0	225	0	225
2009/2010	0	993	0	993
2010/2011	1,707	1,049	396	3,152
2011/2012	1,228	436	513	2,177
2012/2013	0	147	575	722
2013/2014	0	162	274	436
2014/2015	0	330	1	331
2015/2016	0	585	0	585
2016/2017	540	785	0	1,325
2017/2018	3,388	305	0	3,693
2018/2019	857	1,170	0	2,027
2019/2020	1,702	1,025	0	2,727
2020/2021	0	444	2,631	3,075
2021/2022	270	847	3,197	4,313
Total	26,232	13,552	7,587	43,904

Hickory Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	197	298	0	495
2005/2006	636	438	586	1,660
2006/2007	212	536	647	1,395
2007/2008	0	949	567	1,516
2008/2009	0	199	46	245
2009/2010	7	700	856	1,563
2010/2011	10	371	776	1,157
2011/2012	515	258	783	1,556
2012/2013	0	199	874	1,073
2013/2014	13	171	1,920	2,104
2014/2015	0	243	2,034	2,277
2015/2016	0	184	575	759
2016/2017	0	142	136	278
2017/2018	1,472	216	1,399	3,087
2018/2019	0	271	181	451
2019/2020	1,056	186	483	1,725
2020/2021	0	150	235	385
2021/2022	78	246	992	1,316
Total	4,196	5,757	13,089	21,726

Banana Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	425	0	425
2005/2006	193	300	529	1,022
2006/2007	783	226	643	1,652
2007/2008	0	278	157	435
2008/2009	0	383	40	423
2009/2010	0	416	898	1,314
2010/2011	0	149	267	416
2011/2012	0	247	1,915	2,162
2012/2013	0	114	670	784
2013/2014	24	87	1,071	1,182
2014/2015	0	197	1,148	1,345
2015/2016	0	365	2,106	2,471
2016/2017	0	166	500	666
2017/2018	485	193	2,131	2,809
2018/2019	0	132	297	429
2019/2020	0	248	877	1,125
2020/2021	0	218	843	1,061
2021/2022	43	145	517	704
Total	1,528	4,289	14,608	19,721

RP-3 Basins

Fiscal Year	IW	SW	RW	Total
2003/2004	0	0	0	0
2004/2005	0	1,105	0	1,105
2005/2006	0	767	0	767
2006/2007	0	802	0	802
2007/2008	0	511	0	511
2008/2009	0	613	106	719
2009/2010	1	1,902	2,051	3,954
2010/2011	882	2,201	1,799	4,882
2011/2012	1,724	1,339	1,789	4,852
2012/2013	0	994	2,198	3,192
2013/2014	350	717	1,355	2,422
2014/2015	0	1,030	2,968	3,998
2015/2016	0	1,226	3,282	4,508
2016/2017	386	1,437	5,339	7,162
2017/2018	1,153	300	2,960	4,413
2018/2019	0	399	1,110	1,509
2019/2020	379	622	5,649	6,649
2020/2021	0	401	6,664	7,065
2021/2022	301	297	4,200	4,798
Total	4,874	16,365	37,271	58,510

Declez Basin

Fiscal Year	IW	SW	RW	Total
2003/2004	0	100	0	100
2004/2005	0	19	0	19
2005/2006	0	737	0	737
2006/2007	0	0	0	0
2007/2008	0	730	0	730
2008/2009	0	656	0	656
2009/2010	0	774	0	774
2010/2011	0	877	0	877
2011/2012	0	798	65	863
2012/2013	0	530	0	530
2013/2014	374	341	0	715
2014/2015	0	895	0	895
2015/2016	0	607	969	1,576
2016/2017	99	607	945	1,651
2017/2018	131	574	588	1,294
2018/2019	0	744	1,619	2,363
2019/2020	0	644	765	1,409
2020/2021	0	526	940	1,467
2021/2022	53	588	625	1,266
Total	658	10,747	6,517	16,656

Totals

Fiscal Year	IW	SW	RW	Total
2003/2004	7,582	4,700	49	12,331
2004/2005	12,259	17,648	158	30,065
2005/2006	34,567	12,940	1,303	48,810
2006/2007	32,960	4,745	2,993	40,698
2007/2008	0	10,205	2,340	12,545
2008/2009	0	7,512	2,684	10,196
2009/2010	5,000	14,273	7,210	26,483
2010/2011	9,650	17,052	8,065	34,767
2011/2012	23,449	9,271	8,634	41,354
2012/2013	0	5,271	10,479	15,750
2013/2014	795	4,299	13,593	18,687
2014/2015	0	8,001	10,840	18,841
2015/2016	0	9,236	13,222	22,458
2016/2017	13,125	11,389	13,924	38,438
2017/2018	36,235	4,417	13,212	53,864
2018/2019	7,401	12,129	11,145	30,675
2019/2020	19,588	9,827	12,953	42,368
2020/2021	2,184	4,633	15,744	22,561
2021/2022	1,742	7,740	15,042	24,524
Total	206,538	175,288	163,589	545,415

2.2 ASR FACILITIES

ASR refers to the process of recharge, storage, and recovery of water in an aquifer. ASR wells function as injection and recovery wells: water that meets drinking water standards is injected into an aquifer and recovered later when needed. JCSD, City of Chino Hills (Chino Hills) and MVWD own ASR wells. The MVWD owns and operates the only active ASR wells in the Chino Basin. These ASR wells (Wells 4, 30, 32, and 33) can recharge up to 5,480 afy and subsequently recover a volume of groundwater equal to the injected water within the same year. Figure 2-2 shows the location of the ASR wells, and Table 2-3 lists the wells and their respective injection and extraction capacities. MVWD typically uses these wells for injection in the seven-month period of October through April and for recovery in the five-month period of May through September. Table 2-2 shows the annual recharge at the ASR wells from FY 2003/04 through FY 2021/22. Since these wells were installed in 2006, the MVWD has recharged a total of 6,511 af. The majority of recharge occurred in FY 2017/18 to FY 2019/20.

2.3 IN-LIEU RECHARGE

In-lieu recharge can occur when a Chino Basin party with pumping rights in the Chino Basin elects to use supplemental water directly in lieu of pumping some or all its rights in the Chino Basin. Normally, this type of in-lieu recharge is classified as carryover water and if unused in the subsequent year is reclassified as excess carryover water in the case of the appropriative pool or water in the local storage account for the overlying non-agricultural pool. In certain cases, in-lieu recharge water is classified as supplemental water recharge (e.g., recharge for the Metropolitan Cyclic Storage Program and DYYP).

2.3.1 Facilities Used to Effectuate In-Lieu Recharge

The facilities used to effectuate in-lieu recharge include surface water treatment plants and conveyance facilities that convey imported water to Chino Basin parties. The IEUA is a wholesaler of imported water from Metropolitan to some of the Chino Basin parties. Three agencies purchase untreated imported water from the IEUA: the Water Facilities Authority (WFA), CVWD, and FWC.

- The WFA treats imported water purchased from the IEUA at the Agua de Lejos treatment plant (WFA plant) and delivers it to the cities of Chino, Chino Hills, Ontario, and Upland, and to the MVWD. Each of these WFA member agencies has a contracted share of the plant's total capacity of 81 million gallons per day (mgd) (90,700 afy).
- The CVWD treats imported water purchased from the IEUA at the Lloyd W. Michael treatment plant. The plant has a capacity of 60 mgd (67,200 afy).[14]
- The FWC treats imported water purchased from IEUA and the San Bernardino Valley Municipal Water District at the Sandhill treatment plant. The Sandhill plant has a total capacity of 29 mgd (32,500 afy).

Pomona receives imported water through the TVMWD. Pomona's capacity to receive imported water from TVMWD is about 6,800 afy.

[14] The CVWD stopped treating imported water at its Royer Nesbit plant in 2017 (communication with CVWD staff on August 31, 2023).

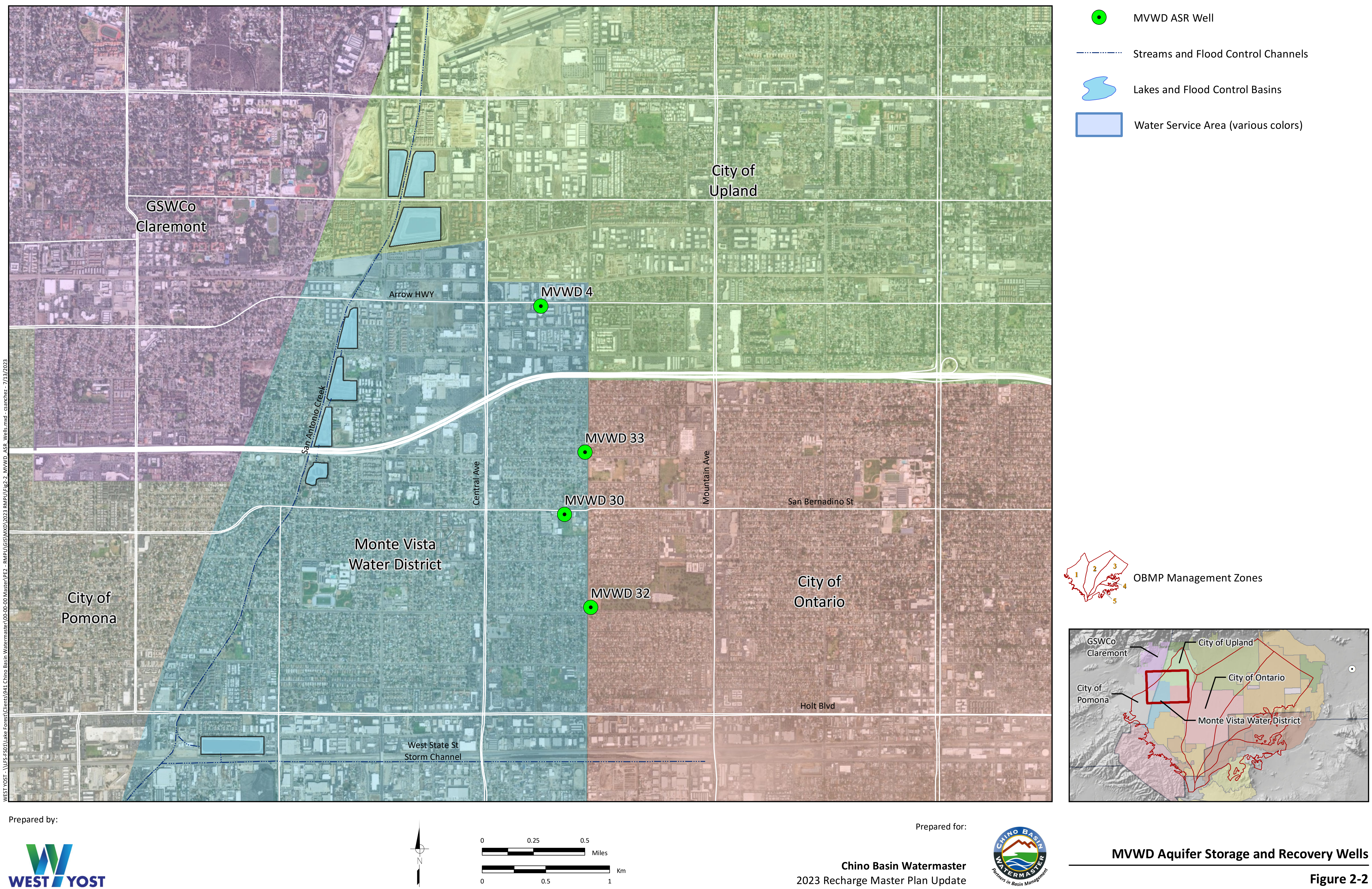
Table 2-3. MVWD ASR Injection and Extraction Capacity[1]

ASR Well	Injection Capacity[2]		Extraction Capacity[2]	
	(gpm)	(afy)	(gpm)	(afy)
MVWD-4	400	645	400	645
MVWD-30	1,000	1,613	2,000	3,226
MVWD-32	1,000	1,613	2,000	3,226
MVWD-33	1,000	1,613	2,000	3,226
Total	3,400	5,484	6,400	10,323

1. All of the existing ASR wells are owned by the Monte Vista Water District (MVWD) with the exception being MVWD-33, which is co-owned by the City of Chino.

2. The injection and extraction capacities assume the wells are operating 24 hours a day for 30 days.

gpm = gallons per minute



Prepared by:

WEST YOST

Prepared for:

Chino Basin Watermaster
2023 Recharge Master Plan Update

MVWD Aquifer Storage and Recovery Wells

Figure 2-2

2.3.2 Historical In-Lieu Recharge Activity

The total in-lieu recharge for the period of FY 1977/78 through FY 2017/18 was about 430,000 af (WEI, 2018b).[15] Since FY 2017/18, an additional 78,000 af of in-lieu recharge has occurred, bringing the total in-lieu recharge over the Judgment period to about 508,000 af.

2.3.3 In-Lieu Capacity

In-lieu recharge capabilities exist when the capacity to treat and serve imported water exceeds the imported water demands of the parties that have pumping rights. The projected in-lieu recharge capacity for each agency with access to imported water was estimated based on planning data compiled for the SYR data collection and evaluation analyses (West Yost, 2023). Each party's in-lieu recharge capacity was limited by the lessor of the following:

- Capacity of treatment plant(s) to treat and serve imported water or party's capacity to receive imported water, less the party's projected imported water demand
- Party's Chino Basin pumping rights
- Party's Chino Basin pumping

The appropriator parties capable of in-lieu recharge include the Cities of Chino, Chino Hills, Ontario, Pomona, and Upland, and the CVWD, FWC and MVWD. Each party's capacity was calculated monthly for planning years 2025, 2030, 2035, 2040, and 2045 based on existing facilities and projected water supplies (see Chapter 4). Table 2-4a shows the estimated annual in-lieu capacities for each of the parties under current conditions. Note that the WFA plant's current sustainable capacity is less than its rated capacity of 81 mgd (90,700 afy) due to solids handling limitations.[16] According to WFA, the current capacity of the WFA plant is about 50 mgd in the summer months and about 25 mgd in the winter months.[17] As shown in Table 2-4a the total in-lieu recharge capacity in the Chino Basin, under the current capacity limitations of the WFA plant, ranges from about 26,700 afy in 2025 to about 29,800 afy in 2040. Table 2-4b shows the in-lieu recharge estimates without the WFA capacity limitations. Without the WFA limitations, the total in-lieu recharge capacity in the Chino Basin ranges from approximately 45,000 afy in 2025 to about 50,200 afy in 2045. Additional details on the estimation of in-lieu recharge capacity are included in Appendix A.

[15] In-lieu recharge from 2013 to 2018 was estimated by comparing imported water deliveries to excess carryover from under-production. The lesser of the two values is assumed to be the amount of in-lieu recharge. In-lieu recharge prior to 2013 was estimated by IEUA and documented in the 2013 RMPU.

[16] Email from Terry Catlin, April 10, 2018.

[17] Email from Van Jew, August 21, 2023.

Table 2-4a. Estimated In-Lieu Recharge Capacities for Appropriative Pool Parties Under Current Conditions (afy)						
Appropriative Pool Party	Treatment Plant	Maximum In-Lieu Recharge Capacity				
		2025	2030	2035	2040	2045
CVWD	CVWD	10,250	14,773	16,331	17,630	17,630
Pomona	TVMWD	1,982	1,982	1,982	1,982	1,982
Chino	WFA	131	131	50	50	50
Chino Hills	WFA	2,043	2,075	2,126	2,132	2,137
MVWD	WFA	4,041	3,968	3,863	3,863	3,863
Ontario	WFA	3,416	2,381	1,395	769	769
Upland	WFA	4,813	4,409	3,746	3,412	3,153
Total		26,675	29,718	29,493	29,838	29,585
Note: The WFA plant's current capacity is less than its rated capacity of 81 mgd due to solids handling limitations, therefore it is assumed that parties that receive water from WFA have no in-lieu recharge capacity under current conditions.						

Table 2-4b. Estimated In-Lieu Recharge Capacities for Appropriative Pool Parties Under Design Conditions (afy)						
Appropriative Pool Party	Treatment Plant	Maximum In-Lieu Recharge Capacity				
		2025	2030	2035	2040	2045
CVWD	CVWD	10,250	14,773	16,331	17,630	17,630
Pomona	TVMWD	1,982	1,982	1,982	1,982	1,982
Chino	WFA	2,611	2,611	1,966	1,966	1,966
Chino Hills	WFA	2,093	2,132	2,196	2,204	2,213
MVWD	WFA	7,461	7,793	8,404	8,666	8,935
Ontario	WFA	15,083	14,140	12,857	11,726	11,726
Upland	WFA	5,743	5,743	5,743	5,743	5,743
Total		45,222	49,174	49,479	49,917	50,194
Note: This assumes the WFA plant capacity is restored to design capacity.						

2.4 MS4 FACILITIES

The Court's Order on April 25, 2014 approved Chapter 5 of the 2013 RMPU and ordered Watermaster to compile MS4 project-related information from appropriative pool parties within the Chino Basin in order to compute net new stormwater recharge. Net new stormwater recharge (net new recharge) is defined in the 2013 RMPU (WEI, 2013) as follows:

> "The net new recharge from the implementation of the 2010 MS4 permit is equal to the stormwater recharge caused by the implementation of stormwater management projects pursuant to the MS4 permit minus the decrease in recharge at existing stormwater management facilities minus the incidental deep infiltration of precipitation that would have occurred in the pre-project condition."

This net new stormwater recharge calculation approved by Watermaster and the Court is described in Chapter 5 as follows:

> "Watermaster staff would annually acquire and store electronic versions of MS4 project-related reports and maintenance verification databases. When scoping a future Safe Yield re-determination, Watermaster would use its judgment and discretion to determine if there has been a significant potential increase in MS4 project-related recharge. If judged significant, the Watermaster would explicitly incorporate significant MS4 projects into the modeling and other technical activities required to re-determine Safe Yield. The calibration process for the groundwater model used in the Safe Yield re-determination would be used to refine the MS4 recharge estimates. Net new recharge would be estimated by rerunning the calibration without the new MS4 facilities and comparing both simulations."

On July 31, 2014, Watermaster started its first annual MS4 data request and sent a letter to each appropriative pool party requesting MS4-related information. The annual data request includes:

- Water Quality Management Plan (WQMP) reports
- Design reports
- As-built drawings[18]
- Maintenance verification

Watermaster has continued to request MS4 data each fiscal year since July 31, 2014. The data requests are sent out in July or August, and the data are due in October of each fiscal year.

[18] At the March 19, 2015 RMPU Steering Committee meeting, the Appropriator Parties informed Watermaster that they may not be able to provide as-built drawings. As-built drawings are important to Watermaster because they include what was constructed and the construction completion date. In the absence of as-built drawings, Watermaster requires certification that the facilities were constructed as represented in the WQMP and design reports. Watermaster staff has developed a form that can be used by Appropriator Parties if they cannot furnish as-built drawings for an MS4 or other local storm water management project constructed during and after FY 2011. Finally, Watermaster also requires records of maintenance performed on each constructed MS4 project or other local storm water management projects from the Appropriator Parties.

MS4 projects with WQMP reports submitted to the Watermaster are compiled in a database. West Yost reviews the WQMP reports for projects constructed after FY 2010/11[19] and extracts the following information:

- Location of the MS4 project
- Project's overall drainage area
- Project's total drainage area that flows into constructed infiltration feature(s)[20]
- Design capture volume (DCV)[21] of the constructed infiltration feature(s)

At the end of FY 2020/21, Watermaster analyzed the data compiled in the database. Table 2-5 summarizes the information received by Watermaster up to FY 2020/21, and Figure 2-3 shows the locations of the MS4 projects. Table 2-5 shows that at the end of FY 2020/21, Watermaster had received almost 360 WQMP reports for projects constructed during the period of FY 2010/11 to FY 2020/21, of which 338 were within the Chino Basin. 233 other projects were identified by agencies in their data request but did not provide WQMP reports to Watermaster. Additionally, Watermaster received 89 WQMP reports for projects whose construction completion was uncertain. These were not included in Table 2-5 or Figure 2-3.

2.4.1 Historical MS4 Recharge Activity

Once the projects within the basin were identified, the projects were separated into two categories: projects compliant with MS4 through infiltration features and projects compliant with MS4 through non-infiltration features. A total of 266 of the 338 projects within the Chino Basin were identified as complying with MS4 through MS4 Recharge Capacities infiltration features. These projects have an aggregate drainage area of 3,836 acres.

To prepare a reconnaissance-level estimate of the potential net new recharge of these 266 projects under idealized conditions,[22] West Yost assumed that these projects would create net new recharge at the same expected rate developed during the 2013 RMPU for Chino Fire Station No. 1. Based on this analysis, it was determined that the total reconnaissance-level estimate of net new storm water recharge is 842 afy.

[19] The WQMP approval date was used when the construction date was not available.

[20] Infiltration features are specifically designed to capture and infiltrate storm water runoff to comply with MS4 permits. Infiltration features could include offsite and onsite infiltration basins, infiltration trenches, infiltration pits, underground infiltration, drywells, gravel bedding infiltration, and bioretention with no underdrain.

[21] For San Bernardino and Riverside Counties, design capture volume (DCV) is the volume of storm water runoff resulting from the 85th percentile, 24-hr storm event that the designed infiltration feature is constructed to capture. For LA County, DCV is (1) the 0.75-inch, 24-hour storm event, or (2) the 85th percentile, 24-hour storm event, whichever is greater.

[22] Idealized conditions means that the infiltration feature performs as it was designed, and that maintenance is performed to ensure that the infiltration feature performs as originally designed.

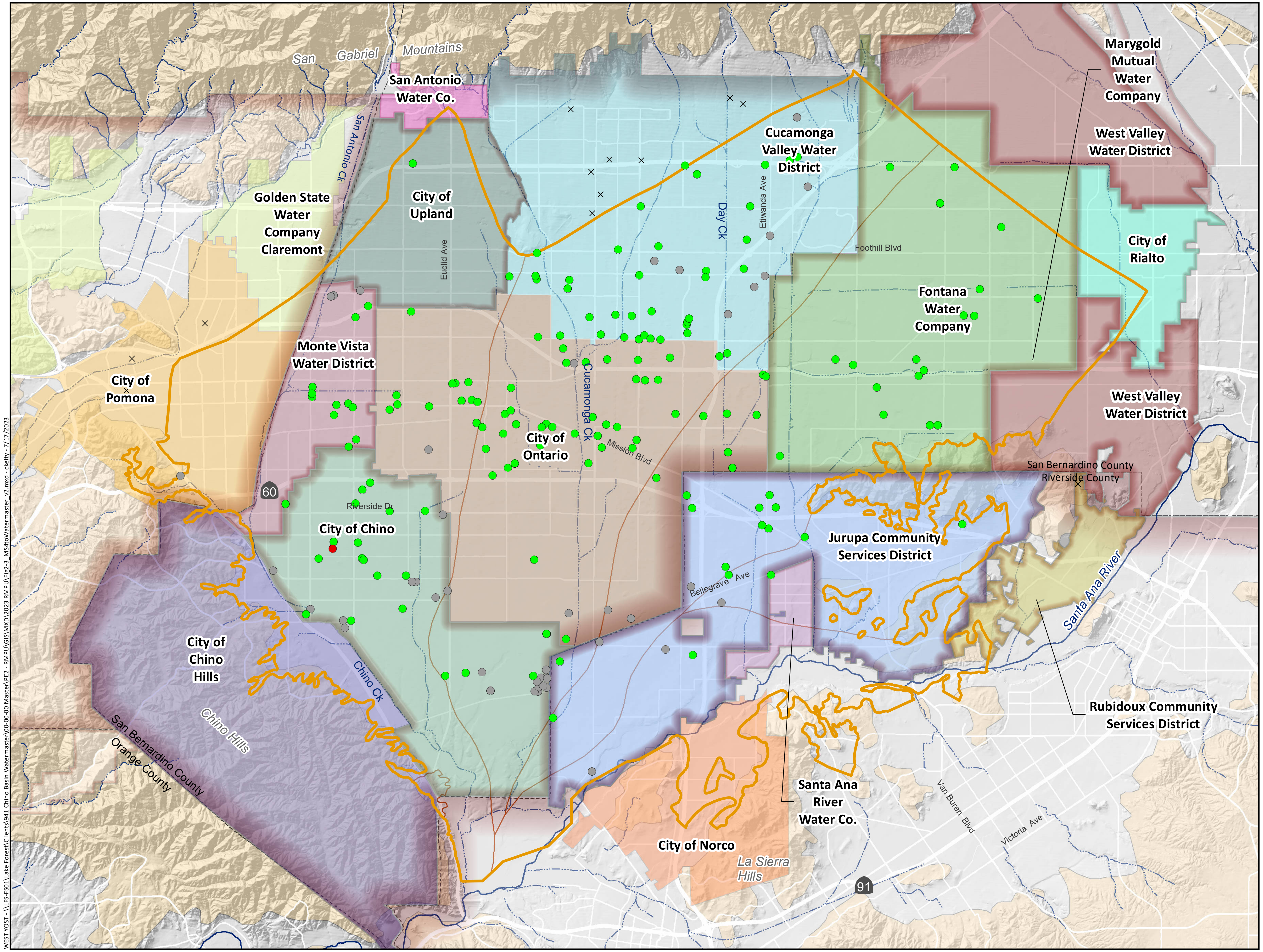
Table 2-5. Summary of Compliance with Section 5 of the 2013 Amendment to the 2010 RMPU for Projects Constructed during FY 2010/11 to FY 2020/21

Appropriative Pool Party	All MS4 Projects		MS4 Projects that Utilize Infiltration Features for MS4 Compliance[1]				Confirmed Approval Date	Confirmed Construction Date	Confirmed Maintenance
	Number of Projects	Total Drainage Area (acres)	Number of Projects	Total Drainage Area (acres)	Design Capture Volume (af)	Reconnaissance Estimate of Stormwater Recharge under Idealized Conditions (afy)			
All MS4 Projects Submitted to Watermaster									
Chino, City of	82	1,557	50	1,251	81	274	50	12	13
Chino Hills, City of [1]	0	0	0	0	0	0	0	0	0
Ontario, City of	92	1,137	86	1,038	92	228	62	74	63
Pomona, City of [2]	10	93	7	67	3	15	4	4	3
Upland, City of	6	23	6	23	1	5	1	6	0
CVWD [2]	55	561	44	284	21	62	10	38	0
FWC	54	545	52	527	46	116	43	54	1
JCSD	28	1,050	19	799	26	175	1	1	5
MMWC	1	3	1	3	0	1	0	1	1
MVWD	22	73	14	60	3	13	15	17	1
Riverside County	0	0	0	0	0	0	0	0	0
San Bernadino County [3, 4]	6	10	3	9	1	2	0	0	0
SAWCo [1]	0	0	0	0	0	0	0	0	0
Total	356	5,053	282	4,062	275	891	186	207	87
Submitted MS4 Projects within the Chino Basin									
Chino, City of	82	1,557	50	1,251	81	274	50	12	13
Chino Hills, City of [1]	0	0	0	0	0	0	0	0	0
Ontario, City of	91	1,134	85	1,034	91	227	62	73	62
Pomona, City of [2]	8	66	5	41	2	9	3	3	2
Upland, City of	6	23	6	23	1	5	1	6	0
CVWD [2]	47	370	38	261	20	57	10	33	0
FWC	47	373	45	354	28	78	38	47	1
JCSD	28	1,050	19	799	26	175	1	1	5
MMWC	1	3	1	3	0	1	0	1	1
MVWD [3]	22	73	14	60	3	13	15	17	1
Riverside County [4, 5]	0	0	0	0	0	0	0	0	0
San Bernadino County	6	10	3	9	1	2	0	0	0
SAWCo [1]	0	0	0	0	0	0	0	0	0
Total	338	4,659	266	3,836	255	842	180	193	85

Notes:

CVWD: Cucamonga Valley Water District
FWC: Fontana Water Company
JCSD: Jurupa Company Services District
af: acre-feet
MMWC: Marygold Mutual Water Company
MVWD: Monte Vista Water District
SAWCo: San Antonio Water Company
afy: acre-feet per year

1. Not required to comply with the court order because their service area is mostly located outside of the Chino Basin boundary.
2. The CVWD informed Watermaster that they are in communication with the City of Rancho Cucamonga, and their data collection is in process.
3. Riverside County provided a GIS database, showing Riverside County's drainage facilities within the Chino Basin, which include all drainage facilities, not just MS4 facilities. The county informed Watermaster that they do not have specific data on MS4 projects and that Watermaster should request MS4 data from the cities within the county.
4. Riverside and San Bernardino Counties prepare annual reports that include a database of all MS4 projects within their jurisdiction. A comparison of these databases to the data submitted to Watermaster indicates that Watermaster has received only a subset of MS4 projects in each Appropriator Party service area. Watermaster cannot use these county databases directly because they do not contain the information required to estimate stormwater recharge.
5. Infiltration features could include offsite or onsite infiltration basins, infiltration trenches, infiltration pits, underground infiltration, drywells, gravel bedding infiltration, and bioretention with no underdrain.
6. For San Bernardino and Riverside Counties, design capture volume (DCV) is the volume of storm water runoff resulting from the 85th percentile, 24-hr storm event that the designed infiltration feature is constructed to capture. For LA County, DCV is either the 0.75-inch, 24-hour storm event, or the 85th percentile, 24-hour storm event, whichever is greater.
7. Estimated based on the assumption that all projects are similar to the Chino Fire Station No. 1 and Training Center MS4 project evaluated in Section 5 of the 2013 Amendment to the 2010 RMPU. Note that because precipitation is expected to increase north of Chino Fire Station No.1 and the majority of MS4 projects submitted to Watermaster are north of the Fire Station, this estimate is conservatively low. Idealized conditions mean that the infiltration feature performs as it was designed and that maintenance is performed to ensure that the infiltration feature performs as originally designed.



MS4 Compliance Through

Infiltration Features
Infiltration features could include offsite or onsite infiltration basins, infiltration trenches, infiltration pits, underground infiltration, drywells, gravel bedding infiltration, and bioretention with no underdrain.

Non-Infiltration Features
Non-infiltration features could include pervious pavement, vegetated swales, retention basins, and biotreatment.

Chino Fire Station No. 1
See Footnote 7 in Table 4-6.

MS4 Project Outside of Chino Basin Boundary
Note: Only projects with a known project completion and readily available project location information have been plotted. 86 projects with infiltration features and 32 projects with non-infiltration features have been completed, but no location information has been provided. Additionally, 227 projects are missing key project information required to document available information on MS4 compliance measures.

Service Area Boundaries of Major Water Purveyors (Various Colors)

Chino Basin Hydrologic Boundary

Rivers and Streams

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0 2 4 Miles

0 4 8 Km

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MS4 Projects Submitted to Watermaster
FY 2010/11 through FY 2021/22

Figure 2-3

2.4.2 Deficiencies in MS4 Facilities Documentation and Reporting

To determine the completeness of Watermaster's MS4 projects database, it was compared to the WQMP Inventories from the NPDES Phase I MS4 Permit Annual Report FY 2014 (SBCFCD, 2015) prepared by San Bernardino and Riverside Counties.[23] This comparison indicated that Watermaster had received a subset of MS4 projects from each of the appropriative pool parties. In addition, few appropriative pool parties submitted the documentation required by Chapter 5 of the 2013 RMPU. 53 percent (180 out of 338 MS4 projects within the Chino Basin) of the submitted MS4 projects have confirmed WQMP approval dates, 57 percent (193 out of 338 MS4 projects within the Chino Basin) have documentation on the project construction dates, and 25 percent (85 out of 338 MS4 projects within the Chino Basin) have documentation on the maintenance performed.

The main conclusions and recommendations given the analysis summarized in Table 2-5 were:

- The appropriative pool parties have not provided a comprehensive dataset of the projects within their service area.
- Watermaster does not have all the data required to compute the net new recharge created by these projects.[24]
- There is potential for at least 840 afy of net new recharge if these projects are maintained to perform as originally designed.

Watermaster continues to collect and analyze MS4 data to determine if there has been a significant potential increase in MS4-project related recharge. If judged significant, and if the data deficiencies are addressed, Watermaster will explicitly incorporate significant MS4 projects into the modeling and other technical activities required to recalculate Safe Yield; the calibration process for the groundwater model used in the Safe Yield recalculation would be used to refine the MS4 recharge estimates. Watermaster will continue to update Figure 2-3 and Table 2-5 to document available information on MS4 compliance measures.

2.5 PLANNED RECHARGE FACILITIES CURRENTLY BEING IMPLEMENTED

The 2013 RMPU contained recommendations to improve 10 recharge facilities and an implementation plan for planning, design, and construction. Since completion of the 2013 RMPU, the IEUA and Watermaster have entered into agreements to plan, design, and construct five of the recommended facility improvements. Table 1-1 lists the 2013 RMPU projects that could be constructed, their expected annual stormwater recharge, and their supplemental water recharge benefits. With completion of these

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[23] Watermaster can only use the WQMP Inventory from the NPDES Phase I MS4 Permit FY 2014 Annual Report to estimate the number of MS4 projects in San Bernardino and Riverside Counties. Watermaster cannot use the Inventory to determine the new net storm water recharge because the inventory does not contain the information required to estimate storm water recharge.

[24] Per Section 5 of the 2013 RMPU, the Steering Committee recommended that, if the Appropriator Parties do not consistently provide data to Watermaster or if the submitted data are incomplete, Watermaster compute net new recharge using the method described in Alternative 2 in Section 5 of the 2013 RMPU. In this alternative, the net new recharge from determining Safe Yield would be automatically incorporated into the Safe Yield, and the direct estimation of net new recharge would not be made.

2013 RMPU projects, stormwater recharge is projected to increase by 4,800 afy, and recycled water recharge capacity is projected to increase by 7,100 afy.

2.6 SUMMARY OF EXISTING AND PLANNED RECHARGE CAPACITY

Table 2-6 summarizes the existing recharge capacity (2023 conditions), the recharge capacity expected when the 2013 RMPU projects are online in 2024, and the expected recharge capacity based on 2023 conditions if the WFA treatment plant capacity is restored to its original design capacity. The supplemental water recharge capacity is about 88,680 afy in 2023 and will not change after the planned 2013 RMPU projects are online.

Table 2-6. Estimated Recharge Capacities in the Chino Basin (afy)				
Water Type	Recharge Type	2023 Conditions	2023 Conditions after 2013 RMPU Recharge Projects Are Completed	2023 Conditions Plus Current Recommended 2013 RMPU Projects and Restoration of WFA Capacity
Stormwater	Average Stormwater Recharge in Spreading Basins	9,600	14,700	14,700
	Average Expected Recharge of MS4 Projects	840	840	840
	Subtotal	*10,440*	*15,540*	*15,540*
Supplemental Water	Spreading Capacity for Supplemental Water	56,600	56,600	56,600
	ASR Injection Capacity	5,480	5,480	5,480
	In-Lieu Recharge Capacity	26,600	26,600	45,200
	Subtotal	*88,680*	*88,680*	*107,280*
	Total	99,120	104,220	122,820

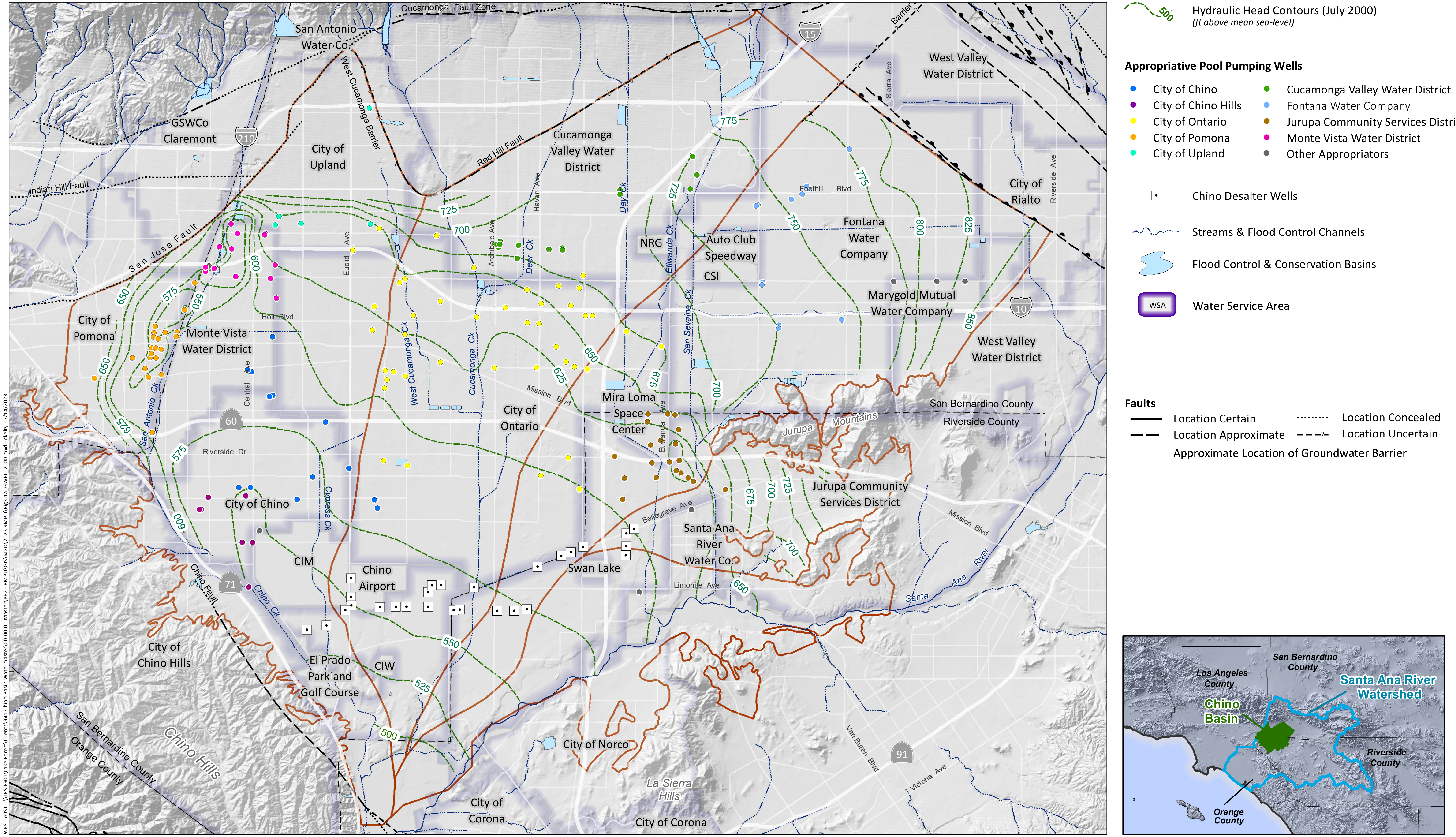
CHAPTER 3
Basin Response to Historical Recharge Activities

This chapter describes basin response to historical recharge activities since the implementation of the OBMP and changes that have occurred since the 2018 RMPU was completed. The basin response is described in terms of groundwater-level changes, hydrologic balance and hydraulic control. This information is used to determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

3.1 GROUNDWATER-LEVEL CHANGES

Figures 3-1a, 3-1b, and 3-1c are groundwater-elevation contour maps for the shallow aquifer system for spring 2000, 2018, 2022, respectively, based on measured data. The main observations and conclusions drawn from these maps are:

- Groundwater generally flows from higher to lower elevations, with flow perpendicular to the equal-elevation contours. These maps show that groundwater generally flows in a south-southwest direction from the northern parts of the basin toward the Prado Basin in the south (an area of shallow groundwater discharge to the land surface and the Santa Ana River). This general pattern of groundwater flow has been consistent over the period of OBMP implementation.
- In 2000, there were notable pumping depressions in the groundwater surface that interrupted the general patterns groundwater flow in the vicinity of the wells fields of the Monte Vista Water District (MVWD), City of Pomona, and the Jurupa Community Services District's (JCSD). The Peace Agreement requirement to recharge 6,500 afy of supplemental water in MZ1 was, in part, meant to address the pumping depression in MZ1 (Peace II Agreement Article 8.4). Pumping at the Chino Basin Desalter Authority's (CDA) wells had not yet begun as of July 2000, so groundwater flow was in the southern portion of the basin was uninterrupted towards the Prado Basin (i.e., areas of groundwater discharge).
- By 2018, the pumping depression in the MVWD and Pomona well fields was shallower but remained. Pumping at the CDA well fields had commenced in 2000 and increased significantly by 2018. As a result, a new pumping depression in the groundwater surface developed from the northern part of the JCSD service area extending southwest to California Institution for Men (CIM), indicating the achievement of hydraulic control across the southern portion of the basin.
- By 2022, groundwater levels changed slightly, but the depressions in the groundwater surface, directions of groundwater flow, and hydraulic gradients remain similar to 2018.



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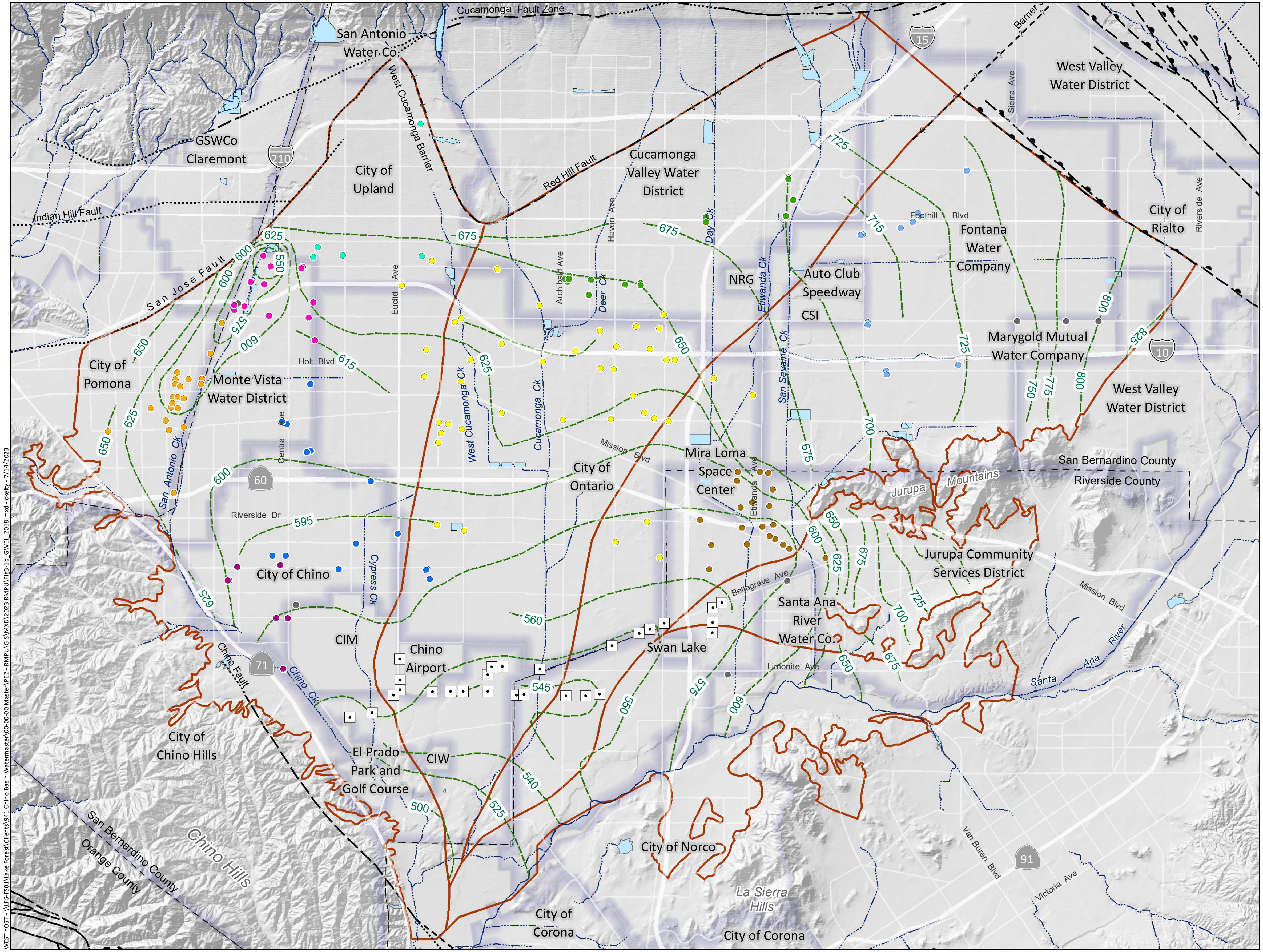
Groundwater Elevation Contours - Shallow Aquifer, 2000

Chino Basin Groundwater Model - Spring 2000

Figure 3-1a



Hydraulic Head Contours (July 2018)
(ft above mean sea-level)

Appropriative Pool Pumping Wells

- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Chino Desalter Wells

Streams & Flood Control Channels

Flood Control & Conservation Basins

WSA Water Service Area

Faults

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

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0 2 4 Miles
0 3 6 Km

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Groundwater Elevation Contours - Shallow Aquifer, 2018
Chino Basin Groundwater Model - Spring 2018

Figure 3-1b

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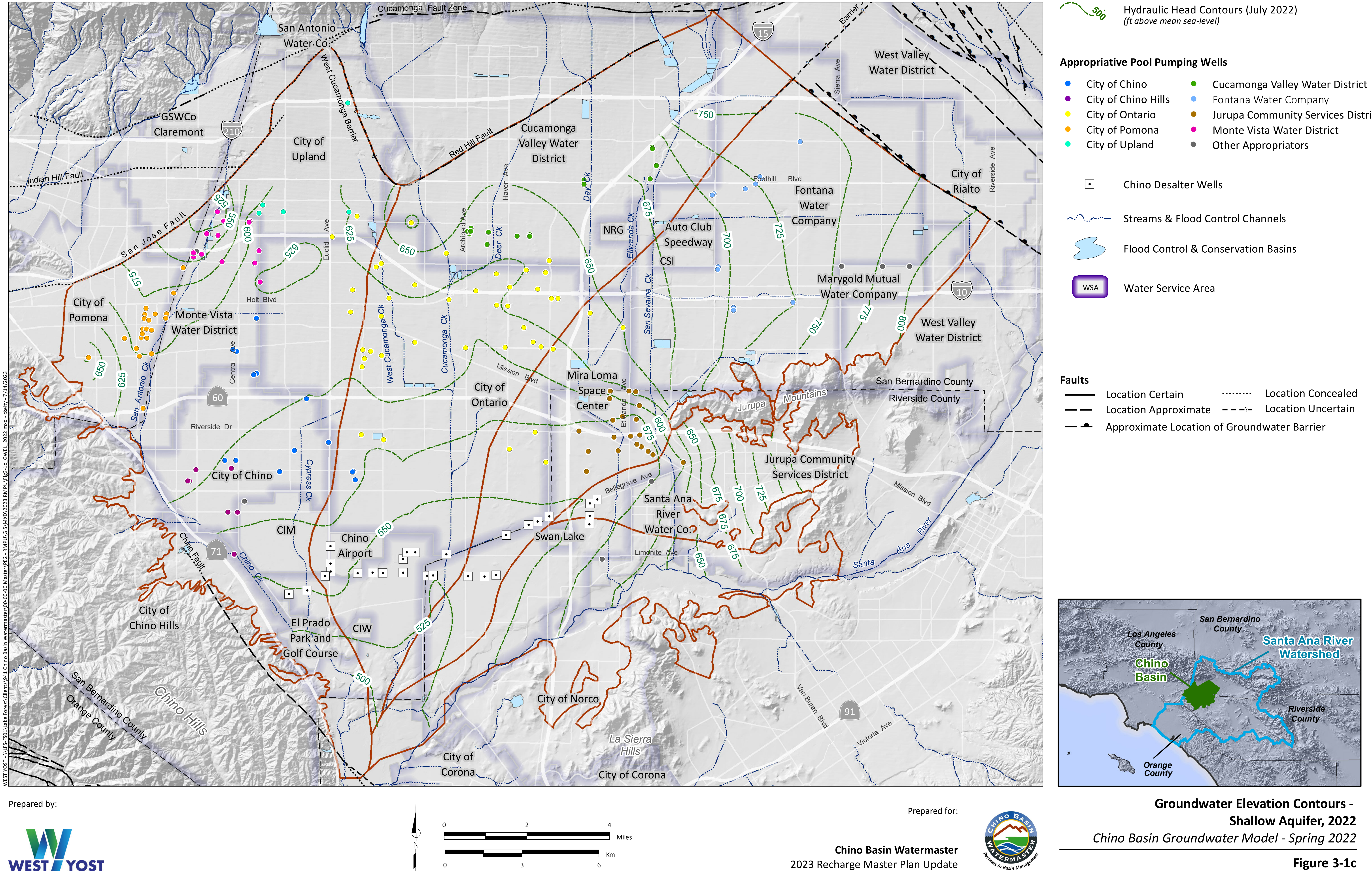

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Partners in Basin Management

Groundwater Elevation Contours - Shallow Aquifer, 2022

Chino Basin Groundwater Model - Spring 2022

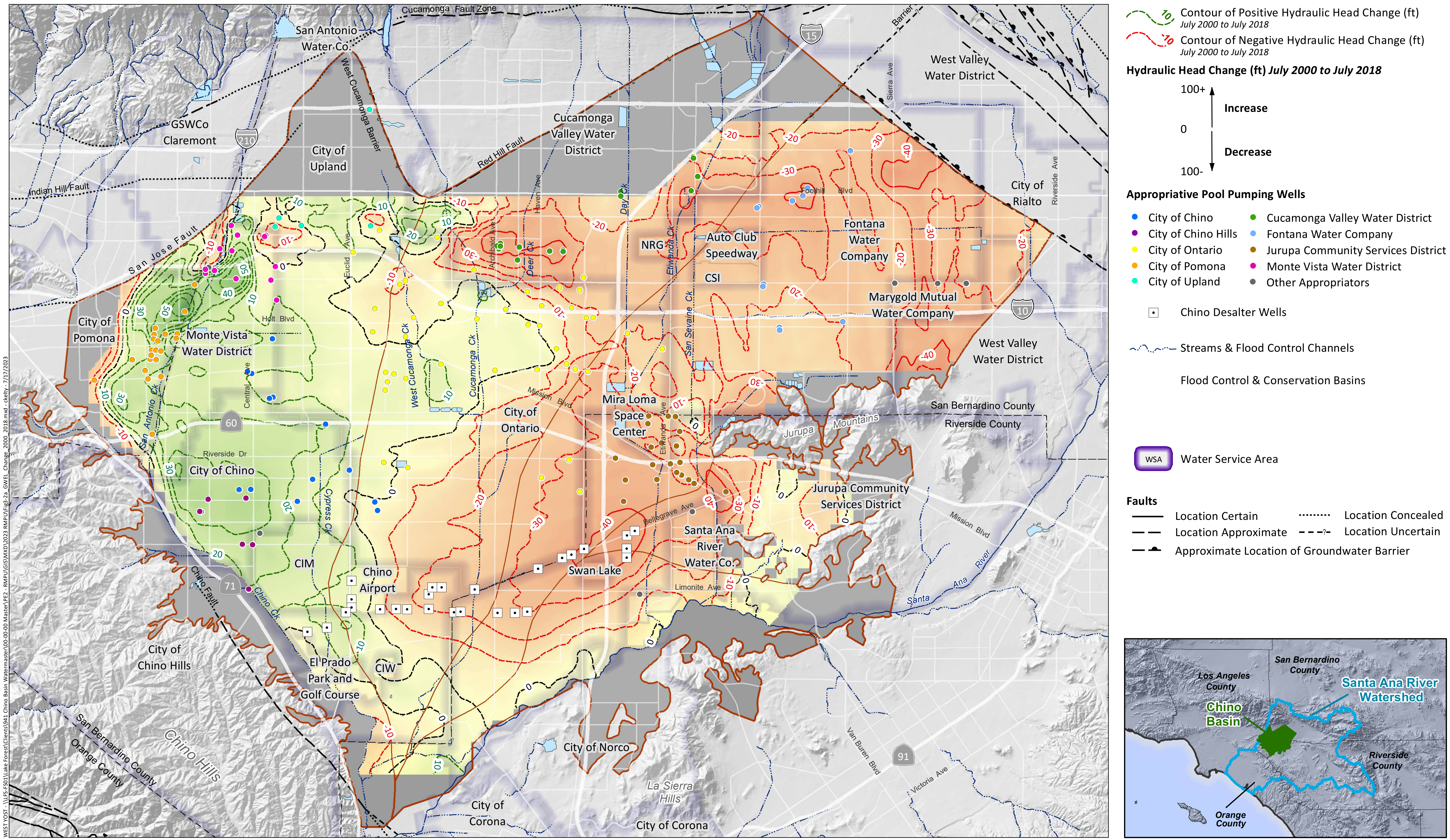
Figure 3-1c

Figures 3-2a, 3-2b, and 3-2c show the changes in groundwater elevation between 2000 and 2018, between 2018 and 2022, and between 2000 and 2022, respectively. The following are the main observations and conclusions from these maps:

- From 2000 to 2018:
  - Generally, groundwater levels decreased in the eastern portion of the basin and generally increased in the western part of the basin.
  - Groundwater levels declined by as much as 40 feet within parts of the JCSD service area, across the eastern portion of the CDA well field, and within the Fontana Water Company (FWC) service area.
  - Groundwater levels increased in the western part of the basin by about 10 to 50 feet.
- From 2018 to 2022, groundwater levels continued to change in the same general patterns as occurred from 2000-2018.
- From 2000 to 2022:
  - Generally, groundwater levels decreased in the eastern portion of the basin and generally increased in the western part of the basin.
  - Groundwater levels declined by as much as 50 feet in the northeast portion of the basin within the FWC and CVWD service areas.
  - Groundwater levels increased in the western part of the basin by about 10 to 40 feet.

One of the goals of the OBMP was to use recharge to increase groundwater levels in MZ1 to ensure sustainable pumping and minimize the occurrence of land subsidence. A primary goal of the Peace II Agreement was to achieve hydraulic control of the southern portion of the Basin through CDA pumping. Figures 3-2a, 3-2b, and 3-2c demonstrate progress towards achieving these goals.

Currently, subsidence is occurring across Northwest MZ1 and northern MZ2. Therefore, Watermaster recommends that recharge continue to be prioritized in MZ1 and to update its Subsidence Management Plan to address the ongoing subsidence that is occurring in these areas.



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0 2 4 Miles

0 3 6 Km

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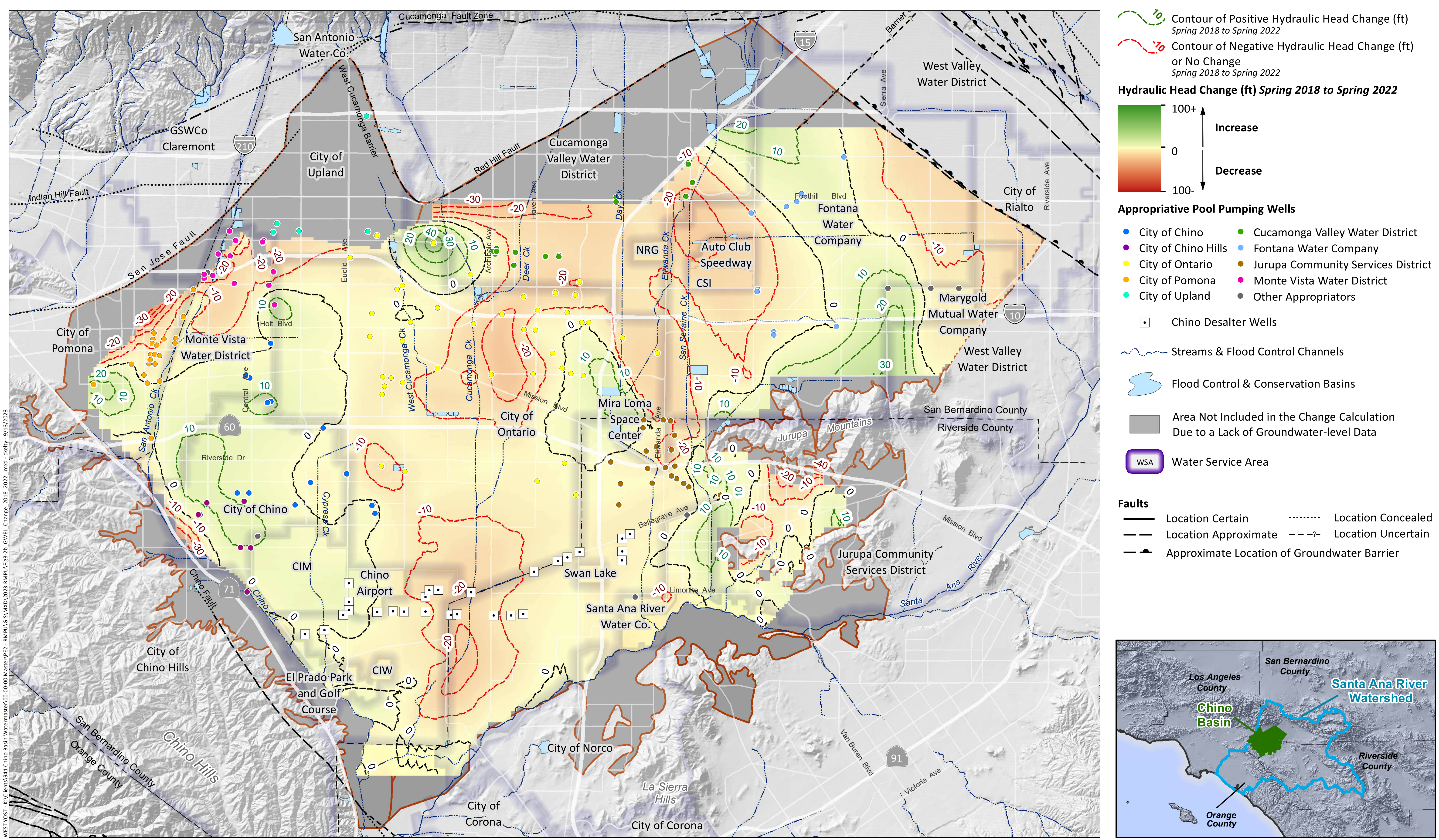
Chino Basin Watermaster

2023 Recharge Master Plan Update

Groundwater Elevation Change - 2000 to 2018

Chino Basin Groundwater Model - July 2000-2018

Figure 3-2a



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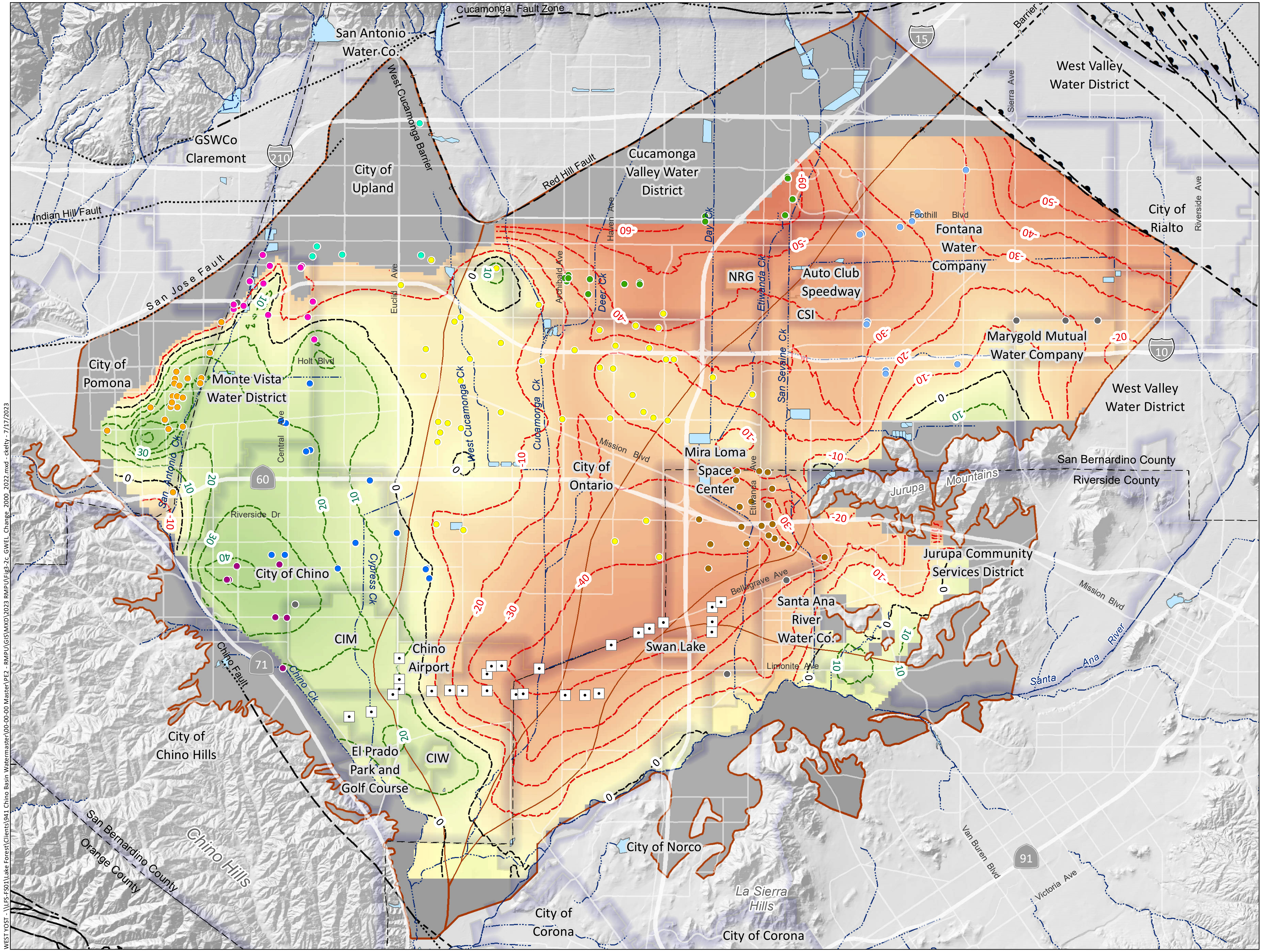
Groundwater Elevation Change - 2018 to 2022
Chino Basin Groundwater Model - Spring 2018-2022

Figure 3-2b



Contour of Positive Hydraulic Head Change (ft) *Spring 2000 to Spring 2022*

Contour of Negative Hydraulic Head Change (ft) or No Change *Spring 2000 to Spring 2022*

Hydraulic Head Change (ft) ***July 2000 to July 2022***

100+ — **Increase**

0

100- — **Decrease**

Appropriative Pool Pumping Wells

- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Chino Desalter Wells

Streams & Flood Control Channels

Flood Control & Conservation Basins

Area Not Included in the Change Calculation Due to a Lack of Groundwater-level Data

WSA — Water Service Area

Faults

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

Prepared by:

WEST YOST

0 2 4 Miles

0 3 6 Km

Prepared for:

Chino Basin Watermaster

2023 Recharge Master Plan Update

Groundwater Elevation Change - 2000 to 2022

Chino Basin Groundwater Model - Spring 2000-2022

Figure 3-2c

3.2 HYDROLOGIC BALANCE

Table 3-1 shows the time history of the hydrologic balance for MZ1, MZ2, and MZ3, based on groundwater model simulations of historical data for the period of fiscal 2000/01 through 2021/22. The term hydrologic balance refers to total recharge minus the total discharge: if positive, the storage will be increasing in a MZ, and if negative, it will be decreasing.

The cumulative balance of recharge and discharge in MZ1 from FY 2000/01 through 2021/22 is positive (storage increased) at 7,500 af, averaging about 340 afy. In contrast, the cumulative balances of recharge and discharge in MZ2 and MZ3 from FY 2000/01 through 2021/22 were about -127,800 af and -137,200 af, respectively (storage declining), averaging about -5,800 afy and -6,200 afy, respectively.

The historical decline in storage is due to:

- the 5,000 afy of controlled overdraft permitted in the Judgment (through 2017),
- reoperation and other water in storage dedicated to offset the desalter replenishment obligation permitted in the Peace II Agreement; and
- the likely use of Managed Storage to offset the desalter replenishment obligation.

The existence of controlled overdraft permitted by the Judgment and the Peace II Agreement means that it is impossible to maintain a balance of recharge and discharge in each MZ if the controlled overdraft is pumped: the balance has to be negative in some MZs and storage will decline. The physical decline in storage permitted in the Peace II Agreement is required to achieve hydraulic control (WEI, 2007).

The historical state of the balance of recharge and discharge for MZ1 is consistent with the Peace Agreements. As stated previously, Watermaster has an obligation pursuant to Chapter 8.4 of the Peace II Agreement to recharge 6,500 afy of supplemental water in MZ1 for the duration of the Peace Agreement (until June 30, 2030). Table 3-2 shows the time history of supplemental water recharge in MZ1, MZ2, MZ3 from FY 2000/01 through fiscal 2021/22. From FY 2000/01 through fiscal 2021/22, the cumulative supplemental water recharge in MZ1 has exceeded the cumulative obligation for supplemental water recharge by about 53,082 af (or 2,412 afy).

Table 3-1. Historical Change in Storage in MZ1, MZ2, and MZ3

Fiscal Year	MZ1		MZ2		MZ3		Total	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2001	-549	-549	-14,006	-14,006	-14,566	-14,566	-29,121	-29,121
2002	-2,484	-3,033	-12,595	-26,600	-10,723	-25,289	-25,801	-54,922
2003	-5,016	-8,049	-12,672	-39,273	-12,539	-37,828	-30,227	-85,149
2004	-363	-8,412	-11,759	-51,031	-11,863	-49,691	-23,985	-109,134
2005	6,260	-2,152	-1,649	-52,680	-11,795	-61,485	-7,184	-116,318
2006	19,159	17,007	8,022	-44,658	-1,208	-62,694	25,973	-90,345
2007	15,633	32,640	-4,584	-49,243	-2,077	-64,771	8,972	-81,373
2008	-13,845	18,796	-11,518	-60,760	-12,461	-77,231	-37,824	-119,196
2009	-12,582	6,214	-15,312	-76,072	-12,196	-89,427	-40,090	-159,286
2010	-8,243	-2,030	-10,770	-86,843	-8,343	-97,770	-27,357	-186,643
2011	9,607	7,577	2,609	-84,234	2,454	-95,316	14,670	-171,973
2012	5,127	12,704	4,258	-79,977	2,258	-93,058	11,642	-160,331
2013	-10,855	1,848	-9,620	-89,597	-7,254	-100,312	-27,730	-188,061
2014	-13,918	-12,070	-7,031	-96,628	-12,035	-112,347	-32,984	-221,045
2015	-7,954	-20,024	-4,160	-100,787	-3,425	-115,772	-15,539	-236,584
2016	3,556	-16,468	-12,543	-113,331	-2,501	-118,274	-11,488	-248,072
2017	14,488	-1,980	-1,221	-114,551	-2,591	-120,864	10,677	-237,396
2018	15,725	13,745	5,216	-109,336	-1,774	-122,638	19,167	-218,229
2019	4,669	18,414	6,995	-102,340	-3,185	-125,823	8,479	-209,750
2020	4,103	22,517	-3,851	-106,191	2,917	-122,906	3,169	-206,580
2021	-7,934	14,583	-13,084	-119,276	-4,236	-127,143	-25,255	-231,835
2022	-7,092	7,491	-8,482	-127,757	-10,061	-137,204	-25,635	-257,470
Average	341		-5,807		-6,237		-11,703	

Table 3-2. Historical Supplemental Water Recharge in MZ1, MZ2, and MZ3

Fiscal Year	Supplemental Water Recharge (af)			
	MZ1	MZ2	MZ3	Total
2001	6,530	500	0	7,030
2002	6,500	505	0	7,005
2003	6,499	185	0	6,684
2004	7,582	49	0	7,631
2005	7,887	4,530	0	12,417
2006	18,923	16,226	722	35,870
2007	22,477	12,050	1,426	35,953
2008	1,054	1,129	157	2,340
2009	1,957	535	192	2,684
2010	7,742	1,518	2,950	12,210
2011	9,103	5,664	2,948	17,715
2012	18,088	8,502	5,493	32,083
2013	3,766	3,845	2,868	10,479
2014	2,736	8,477	3,175	14,388
2015	1,059	5,666	4,116	10,841
2016	2,685	4,180	6,357	13,222
2017	13,766	4,791	8,518	27,076
2018	26,746	15,253	7,471	49,470
2019	10,372	5,148	3,026	18,546
2020	14,067	10,804	8,236	33,107
2021	3,660	5,821	8,448	17,928
2022	2,883	8,163	5,739	19,010
Total	196,082	123,539	71,841	393,688

3.3 HYDRAULIC CONTROL

The attainment of hydraulic control is demonstrated through mapping of groundwater-elevation data that all groundwater north of the CDA well field is captured by the CDA well field (total hydraulic containment standard) or through groundwater modeling that the groundwater discharge past the CDA well field is, in aggregate, less than 1,000 afy (de minimis standard). The Regional Board has agreed that compliance with the de minimis standard will be determined from the results of periodic calibrations of the Watermaster groundwater-flow model and interpretations of the calibration results.

Mapping of groundwater-elevation data shows that groundwater is discharging past the CDA well field in the area between the Chino Hills and CDA well I-20. Figure 3-3 is a time-history chart that shows the historical volume of groundwater discharge across the line of control from 2005 to 2018 based on modeling estimates (WEI, 2020). Over this period, the groundwater discharge across the line of control ranges from 170 to 740 afy, averages 560 afy, and is always less than the *de minimis* discharge threshold of 1,000 afy. Hydraulic control has been maintained through 2018 as shown in Figure 3-3 and through 2022 as demonstrated in the Chino Basin OBMP Maximum Benefit Annual Reports.[25]

[25] https://www.cbwm.org/pages/reports/engineering/

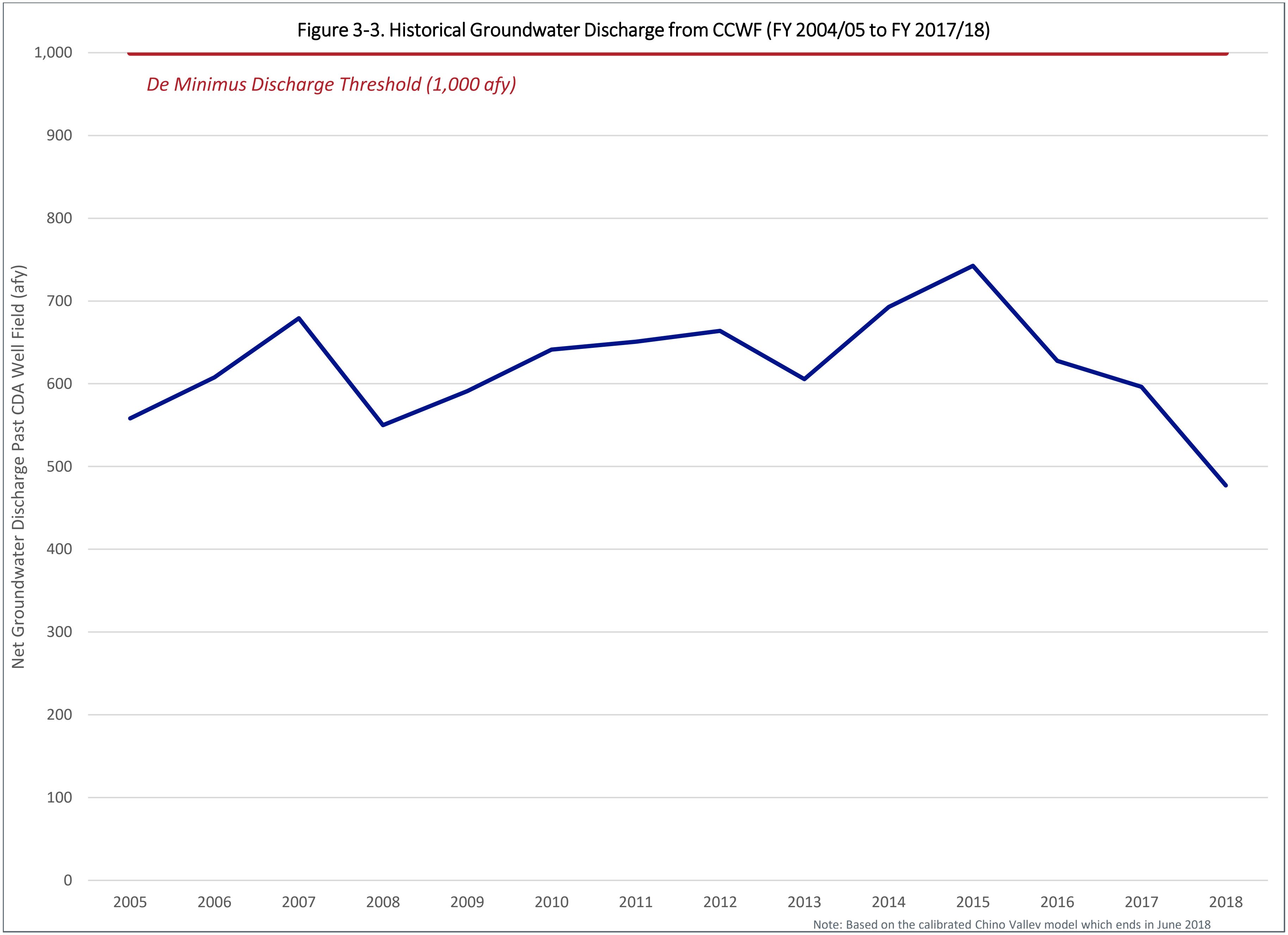


Figure 3-3. Historical Groundwater Discharge from CCWF (FY 2004/05 to FY 2017/18)
De Minimus Discharge Threshold (1,000 afy)
Net Groundwater Discharge Past CDA Well Field (afy)
1,000
900
800
700
600
500
400
300
200
100
0
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Note: Based on the calibrated Chino Valley model which ends in June 2018

CHAPTER 4
Planning Projections

This chapter establishes planning assumptions for the completion of the 2023 RMPU. These projections of water supply, recharge, and replenishment are based on the most up to date information available to Watermaster developed through Watermaster's Data Collection and Evaluation efforts (West Yost, 2023). This chapter also describes changes in the availability and cost of replenishment sources. This information is used to evaluate the basin response to planning projections (Chapter 5) and determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

4.1 PROJECTED WATER DEMANDS AND SUPPLIES

In May 2020, the Watermaster performed the *2020 Safe Yield Recalculation*[26] (2020 SYR) which utilized computer-simulation groundwater-flow modeling to calculate the water budget of the Chino Basin under a future planning scenario. The 2020 SYR planning scenario was based on the planning work reported in the *2018 Storage Framework Investigation* and the *2020 Storage Management Plan*, the water demands and water supply plans provided by the Watermaster Parties, planning hydrology that incorporates climate change impacts on precipitation and evapotranspiration (ET_0), and assumptions regarding future cultural conditions and replenishment obligations.

Work completed since the 2020 SYR has helped refine and develop recommendations related to recharge that inform the 2023 RMPU. Pursuant to the April 28, 2017 Court Order on the Safe Yield of the Chino Basin[27], Watermaster annually collects, evaluates, and develops reports on data regarding cultural conditions in the Chino Basin. Cultural conditions include, but are not limited to, land use, water use practices, production, and facilities for the production, generation, storage, recharge, treatment, or transmission of water. In these reports, Watermaster compares actual data and updated projections to the data and assumptions that were used in the 2020 SYR. Watermaster recently completed the second annual report on *Data Collection and Evaluation – Fiscal Year 2021/2022* (DCE Report) which documents the required data collection and evaluation through Fiscal Year 2021/22 (West Yost, 2022).

Figure 4-1 shows the projected aggregate water demand developed for several current and past planning studies including: the DCE Report, 2020 SYR, 2018 Storage Framework Investigation (WEI, 2018a), 2013 Safe Yield Recalculation (WEI, 2015), Peace II (WEI, 2009), and OBMP development (WEI, 1999). The projected aggregate demands for the DCE Report are less than those projected in the prior planning investigations. Total water demand is projected to grow from about 330,000 afy in 2020 to about 395,000 afy by 2040. The projected growth in water demand by the Appropriative Pool parties drives the increase in water demands as several parties are projected to serve new urban water demands caused by the conversion of agricultural and vacant land uses to urban.

Figure 4-2 and Table 4-1 show the projected water supplies for the Watermaster Parties based on the projected aggregate water demand and supply plan for all Chino Basin parties updated by the Parties in 2022 (West Yost, 2023). Table 4-1 also shows the projected demands for the 2020 SYR, which are about one percent higher than the DCE Report. The impacts of the difference between the planning projections are described in Chapter 5.4.

[26] *2020 Safe Yield Recalculation* (WEI 2020).

[27] 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).

Table 4-1. Projected Aggregate Water Supply for Watermaster Parties and the CDA (afy)					
Water Source	2025	2030	2035	2040	2045
Chino Basin Groundwater	150,800	164,500	175,000	186,600	186,900
Non-Chino Basin Groundwater	62,800	64,800	66,600	68,600	70,400
Local Surface Water	17,100	17,100	17,100	17,100	17,100
Imported Water from Metropolitan	92,900	95,900	99,800	102,500	103,000
Other Imported Water	3,300	3,400	3,500	3,500	3,500
Recycled Water for Direct Reuse	25,900	27,900	29,200	30,800	31,300
Total	352,800	373,600	391,200	409,100	412,200
2020 SYR Total	358,000	376,400	396,200	416,600	

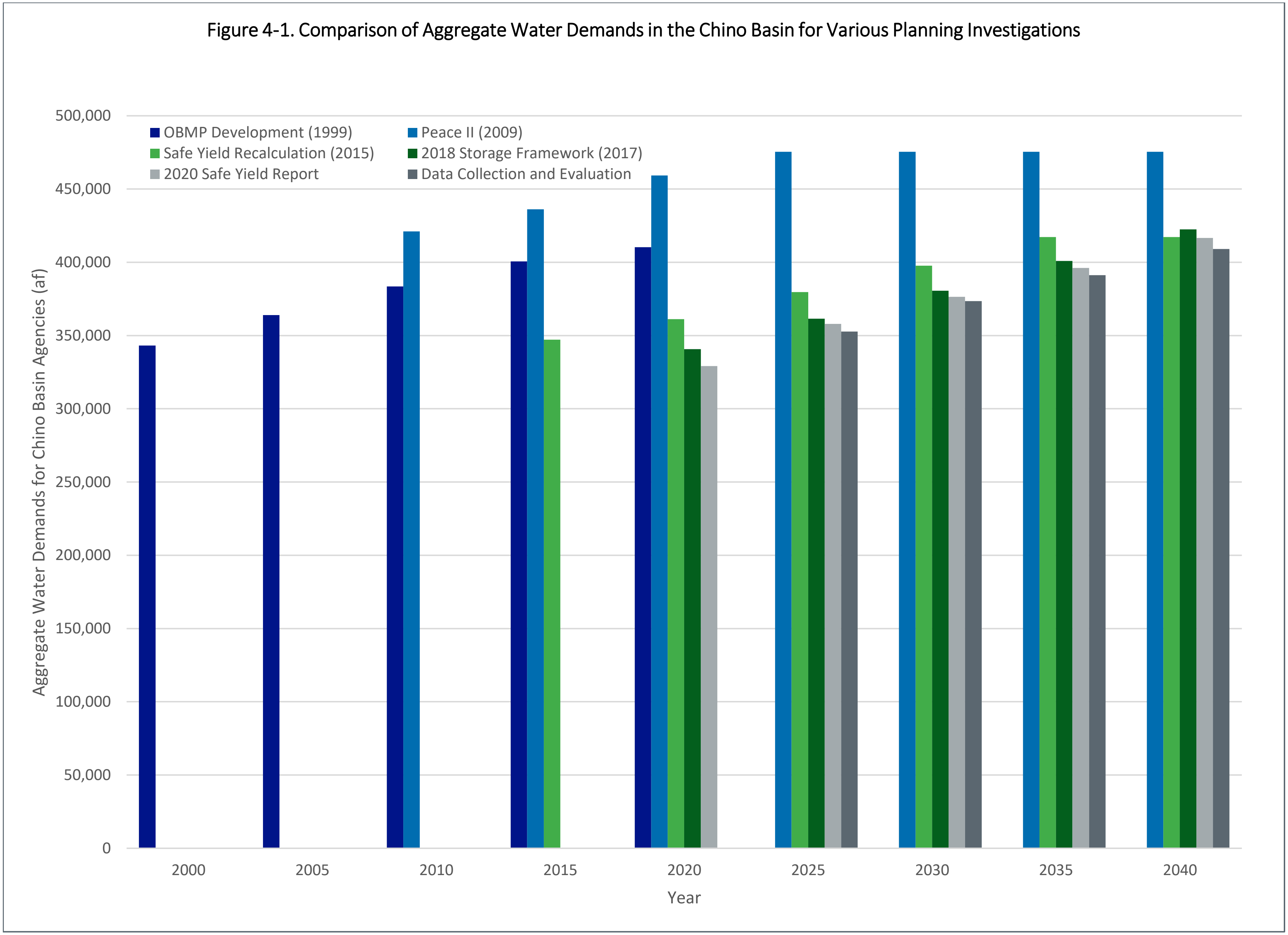
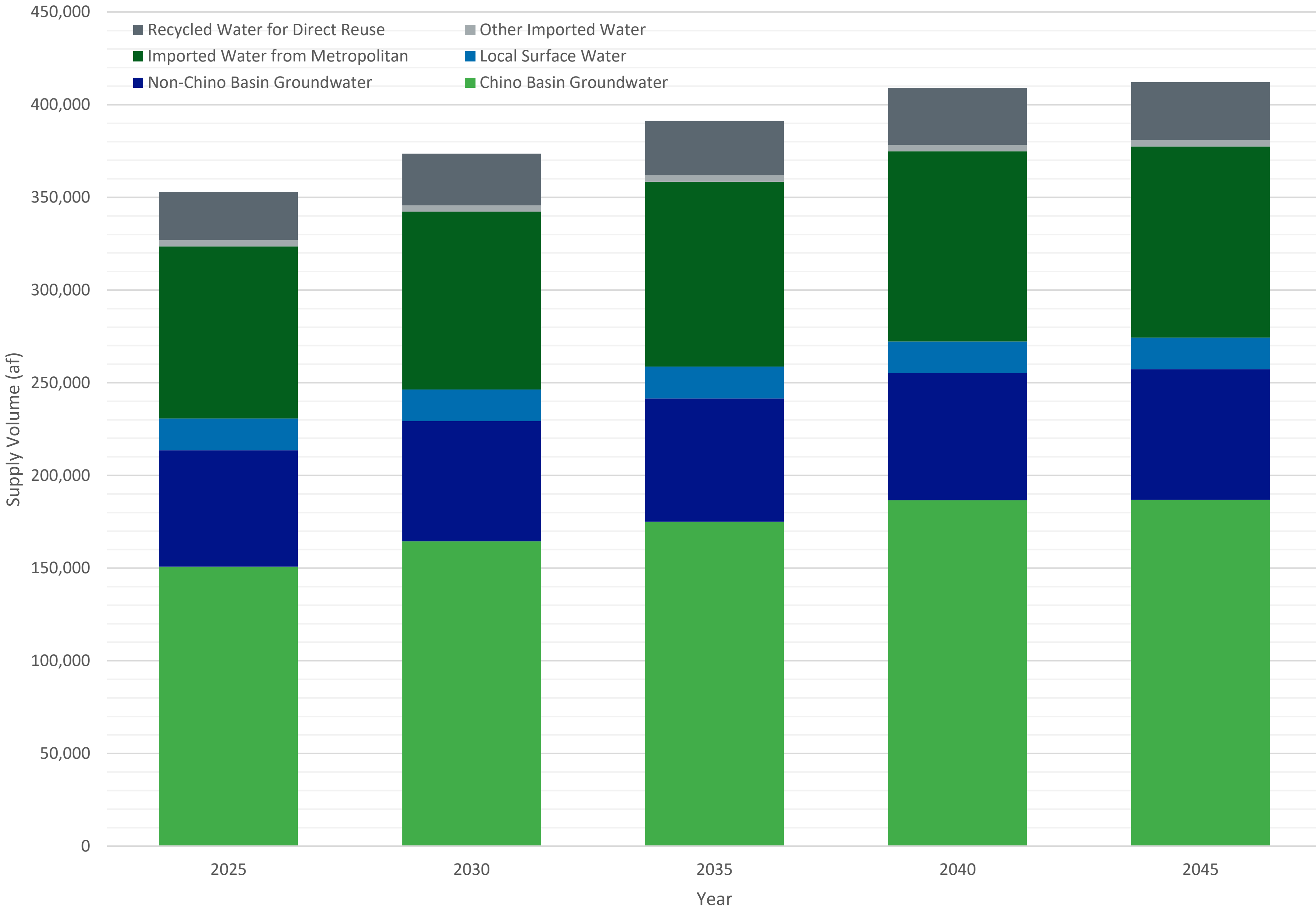


Figure 4-1. Comparison of Aggregate Water Demands in the Chino Basin for Various Planning Investigations
OBMP Development (1999)
Peace II (2009)
Safe Yield Recalculation (2015)
2018 Storage Framework (2017)
2020 Safe Yield Report
Data Collection and Evaluation
Aggregate Water Demands for Chino Basin Agencies (af)
500,000
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
Year

Figure 4-2. Aggregate Water Supply Plan for Chino Basin Parties



4.2 PROJECTED RECHARGE OF RECYCLED WATER

The IEUA has been recharging recycled water in the Chino Basin in various amounts since it acquired all municipal wastewater plants in the 1970s. Starting in the mid-1970s, the IEUA abandoned most of its recycled water recharge activities and discharged its treated effluent to the Santa Ana River. At the start of the OBMP in 2000, the IEUA was recharging about 500 afy of recycled water in the Basin. Beginning in 2005, the IEUA started a new program to increase the recharge of recycled water. Currently, the IEUA uses its recycled water for direct use, groundwater recharge, and discharges to Chino and Cucamonga Creek, which are tributaries to the Santa Ana River. Table 4-2 shows the IEUA's projected recycled water recharge by recharge facility, through 2035. Recycled water recharge is projected to increase to about 16,420 afy and remain constant thereafter.[28]

For the foreseeable future, the IEUA projects that it will recharge at least 3,490 afy of recycled water in MZ1. Using an obligation of 6,500 afy, this yields a residual MZ1 recharge obligation of 3,010 afy of imported water recharge through 2030.

4.3 PROJECTED REPLENISHMENT OBLIGATION AND RECHARGE OF IMPORTED WATER TO SATISFY IT

Figure 4-3 shows the projected replenishment obligations from 2023 through 2045. The replenishment obligations are calculated by comparing the projected groundwater pumping from the Chino Basin to the available pumping rights. Available pumping rights include safe yield, reoperation water use to offset the desalter replenishment obligation and recycled water recharge. Figure 4-3 also shows the 6,500 afy supplemental water recharge obligation for MZ1 through 2030. For this effort, it is assumed that a portion of the MZ1 recharge obligation is met through recharge from replenishment obligations.

Through 2045, the maximum annual replenishment obligation occurs in 2040 at about 14,000 afy. The Parties project that 90 percent of a replenishment obligation is satisfied from storage and 10 percent is satisfied by wet-water recharge via spreading and injection based (West Yost, 2023). Thus, the projected annual replenishment obligation assumed to be satisfied by wet-water recharge is less than the total obligation.

[28] Note that this represents the annual average expected recycled water recharge. However, the value can fluctuate depending on hydrologic conditions.

Table 4-2. Recycled Water Recharge Projections, 2023-2045

Basin	Recycled Water Recharge Projections[1]
Brooks Street Basin	2,000
College Heights Basins	0
Montclair Basins 1-4	0
Seventh and Eighth Street Basins	1,490
Upland Basin	0
Subtotal Management Zone 1	3,490
Ely Basins	1,100
Grove Basin	0
Etiwanda Debris Basin	0
Hickory Basin	1,650
Lower Day Basin	0
San Sevaine Basins 1-5	840
Turner Basins 1-2	360
Turner Basins 3-4	750
Victoria Basin	1,530
Subtotal Management Zone 2	6,230
Banana Basin	1,050
Declez Basin	1,250
IEUA RP3 Ponds	4,400
Subtotal Management Zone 3	6,700
Total	16,420

Notes:

1 - Source - Andy Campbell, IEUA, February 2022.

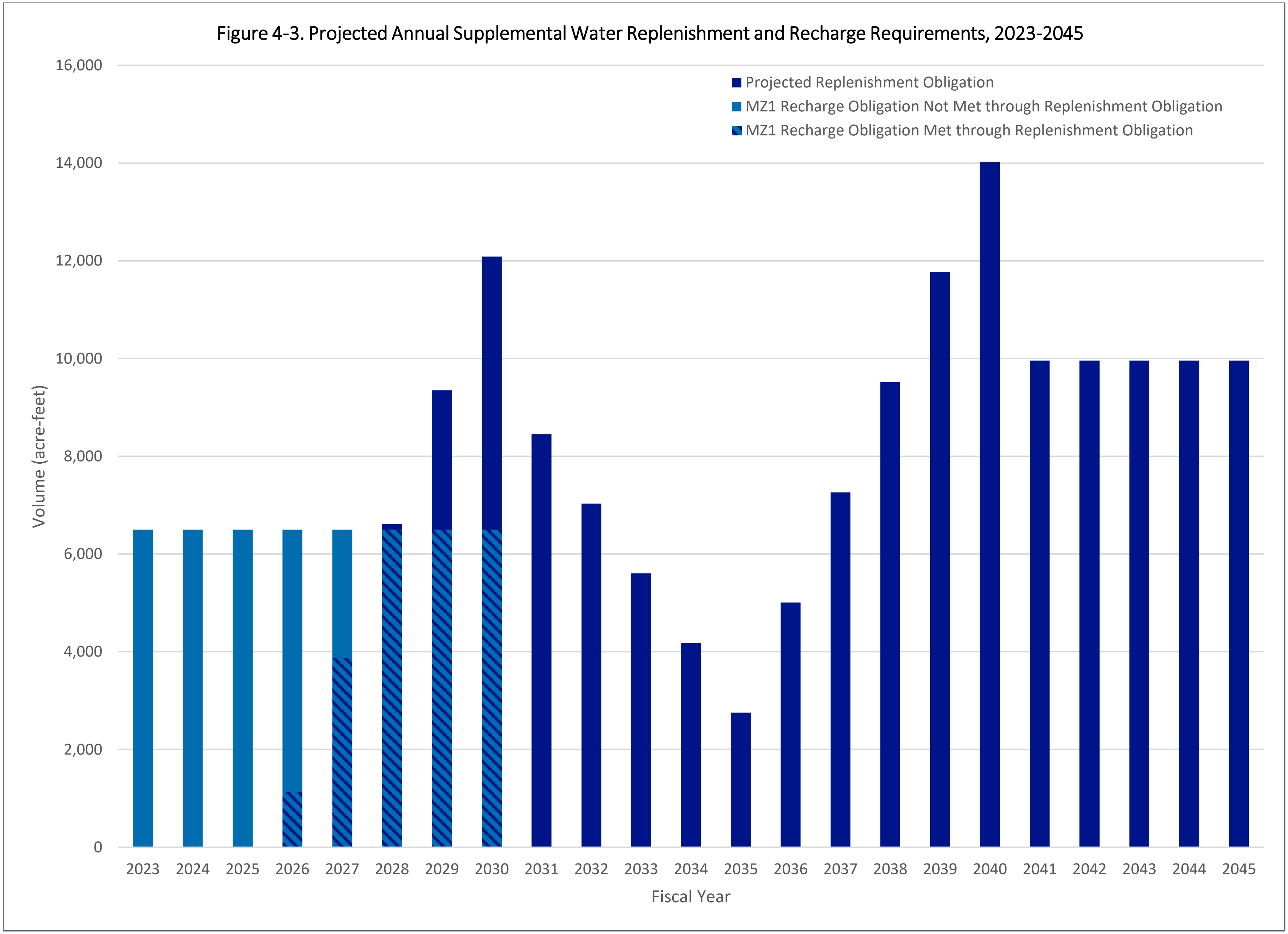


Figure 4-3. Projected Annual Supplemental Water Replenishment and Recharge Requirements, 2023-2045
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Volume (acre-feet)
Projected Replenishment Obligation
MZ1 Recharge Obligation Not Met through Replenishment Obligation
MZ1 Recharge Obligation Met through Replenishment Obligation
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
Fiscal Year

4.4 MANAGED STORAGE

"Managed Storage" as used herein refers to the total water held in storage accounts plus carryover water. Pursuant to the Judgment, Watermaster levies and collects assessments each year in amounts sufficient to purchase replenishment water to replace overproduction by a Party or Parties during the preceding year. Overproduction occurs when an Appropriative Pool or Overlying Non-Agricultural Pool party's annual production exceeds its production rights. Parties within the Appropriative Pool and Overlying Non-Agricultural Pool can transfer stored water and/or unused Safe Yield rights within their respective pool, with Watermaster approval, to minimize their individual replenishment obligations or for other reasons. Parties in both pools can use water in their Managed Storage accounts to satisfy their replenishment obligations. After the completion of a fiscal year, Watermaster compiles pumping and transfer records from all parties to determine replenishment obligations for the year.

Managed storge can also be used for Storage and Recovery programs. Metropolitan's DYYP is a groundwater Storage and Recovery Program where supplemental water is stored in the Chino Basin during surplus years and extracted during years when the availability of supplemental water is limited or as otherwise determined by Metropolitan. The DYYP was developed jointly by the Watermaster, IEUA, Three Valleys Municipal Water District (TVMWD)), and Metropolitan. The DYYP has a maximum storage capacity of 100,000 af with maximum puts (water added into storage) of 25,000 afy and maximum takes (water extracted from storage) of 33,000 afy. The term of the DYYP agreement expires in 2028. As of June 2022, there is a zero balance in the DYYP storage account. The nexus of the DYYP to the 2023 RMPU is that the DYYP uses existing supplemental water recharge capacity in the basin.

Some of the Watermaster parties are contemplating other Storage and Recovery Programs in the Chino Basin. As of this writing, these other programs are not definitive enough to include in this report. The nexus of these other storage programs to the 2023 RMPU is that they may use existing supplemental water recharge capacity in the basin.

Figure 4-4 shows historical and projected changes in managed storage for the period of July 1, 2000 through June 30, 2050. Managed storage is projected to peak at 657,000 af in 2031 and decline to about 455,000 af by 2050. The difference between historical and projected managed storage in fiscal years 2019 through 2022 is due to differences between actual pumping and managed recharge and the 2020 SYR projections.[29]

[29] For additional details, refer to the *Data Collection and Evaluation Report for Fiscal Year 2021/2022* (West Yost, 2023)

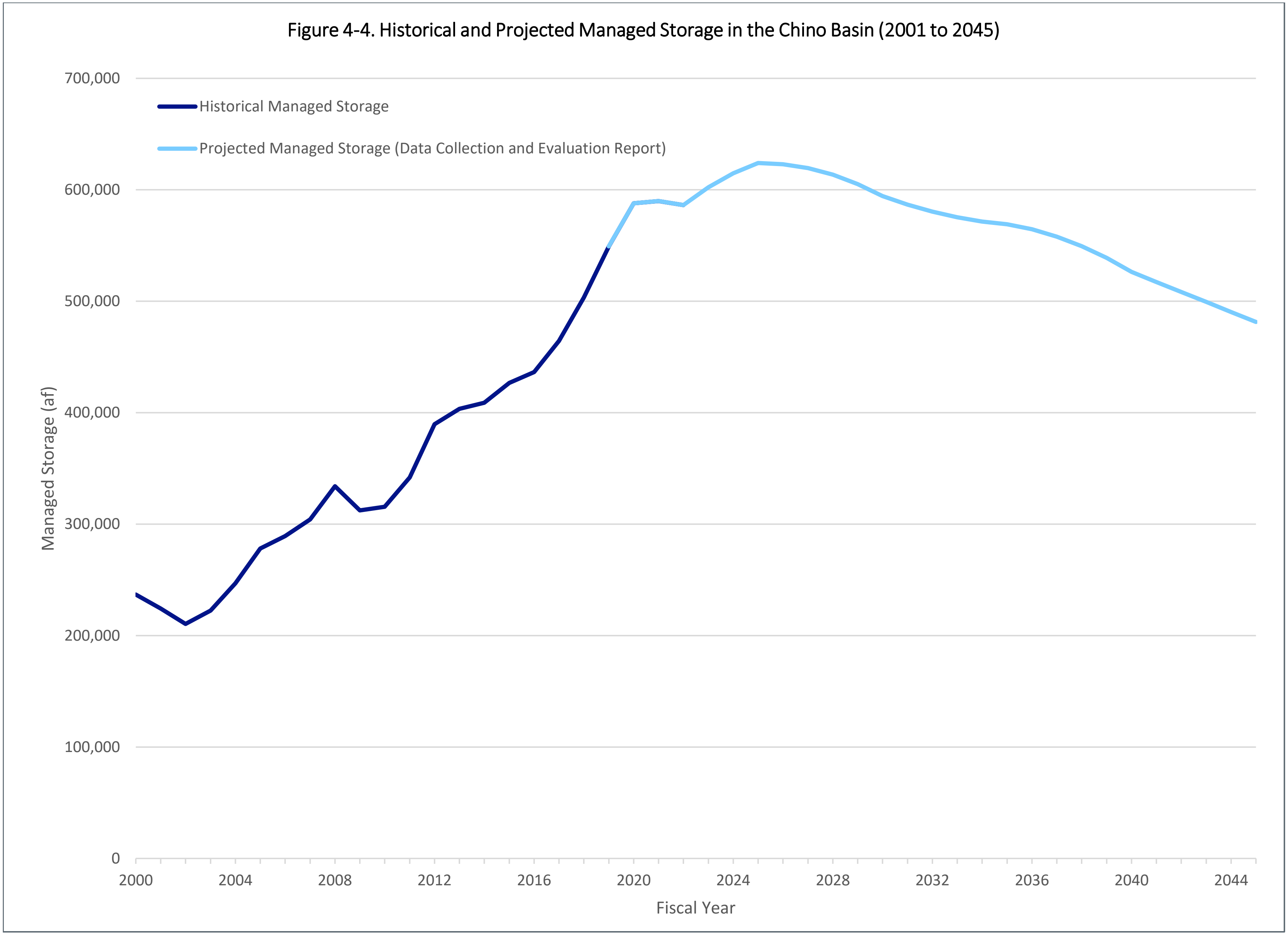


Figure 4-4. Historical and Projected Managed Storage in the Chino Basin (2001 to 2045)
Historical Managed Storage
Projected Managed Storage (Data Collection and Evaluation Report)
Managed Storage (af)
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
2000
2004
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
Fiscal Year

4.5 RECHARGE AND REPLENISHMENT WATER SOURCES, AVAILABILITY, AND COST

Watermaster has historically met its replenishment obligations through the purchase and recharge of SWP water from the IEUA which it obtains from Metropolitan and/or the purchase of stored water from appropriative pool parties. This report documents the availability and includes cost estimates for Metropolitan's water. Metropolitan does not differentiate between sources for its rate structure, however, availability varies between sources. Thus, the availability analysis is based on SWP water, instead of Metropolitan's full water portfolio which includes CRA, recycled, and local waters.

Table 4-4 summarizes the projected cost of imported water for untreated direct and replenishment uses. The cost to purchase water for replenishment is projected to increase over time by about five to seven percent per year from about $855 per af in 2023 to about $1,512 per af in 2032. This cost projection includes Metropolitan's projected Tier 1 and Readiness-to-Serve (RTS) charges and excludes Metropolitan's Capacity charge and the IEUA's administrative cost. This cost projection is based on Metropolitan's Biennial Budget for Fiscal Years 2022/23-2023/24[30] which adopted water rates for calendar years 2023 through 2032, recent historical water purchase information from the IEUA, and projected water purchases developed in Watermaster's Storage Framework Investigation. This cost projection does not include the projected cost of the California WaterFix tunnel project.

In December 2021, the Department of Water Resources (DWR) published the *Draft State Water Project Delivery Capability Report 2021*, which describes the likelihood of water delivery of a given amount of SWP Table A water. Over the past 10 years (from 2011-2020), annual Table A deliveries have not exceeded 3,100 thousand acre-feet (TAF). According to the report, there is a 23 percent likelihood that more than 3,000 TAF/year of Table A water will be delivered under the current estimates. For the purposes of the 2023 RMPU, it has been assumed that Watermaster will be able to purchase water from Metropolitan for replenishment purposes in one out of five years (20 percent of the time). The implications of these shortage assumptions are discussed in Chapter 6.1 of this report.

Additional sources of supplemental water that could be used for replenishment or other recharge programs include:

- Imported water from Metropolitan
- Groundwater and surface water supplies in the Santa Ana Watershed that can be supplied to the Chino Basin directly through existing or new conveyance facilities or by exchange
- Recycled water from the Western Riverside County Regional Wastewater Authority plant located in the Chino Basin
- Groundwater and surface water supplies from the Central Valley, conveyed to the Chino Basin through imported water conveyance facilities
- Groundwater and surface water supplies from the Colorado River Basin conveyed to the Chino Basin through Metropolitan facilities

The availability and cost of all other supplemental water sources are unknown at this time.

[30] Biennial Budget – FY 2022/23 and 2023/24, including Ten-Year Financial Forecast and Resolutions, under Budget, Rates & Charges. See pdf page 226 for Ten-Year Forecast. https://www.mwdh2o.com/budget-finance/

Table 4-3. Projected Cost to Purchase Imported Water from Metropolitan Water District of Southern California (Metropolitan) Excluding Capacity and Metropolitan Member Agency Imposed Charges

Year	Tier 1 ($/af)	Readiness to Serve (RTS) Charges						Total Metropolitan Imported Water Cost ($/af)
		Metropolitan System-Wide RTS Charge ($/y)	RTS Cost					
			IEUA Share of Metropolitan Water Purchased[1]	Projected 10-yr Rolling Average of Metropolitan Purchases[1, 2] (afy)	Annual IEUA Share of RTS ($/y)	Projected Water Purchases[2] (afy)	RTS Unit Cost ($/af)	
2023	$ 855	$ 154,000,000	4.01%	59,498	$ 6,181,000.00	69,908	$ 88.42	$ 943
2024	$ 903	$ 167,000,000	4.01%	60,587	$ 6,702,000.00	73,940	$ 90.64	$ 994
2025	$ 972	$ 167,000,000	4.06%	61,275	$ 6,781,000.00	77,971	$ 86.97	$ 1,059
2026	$ 1,037	$ 167,000,000	4.06%	63,182	$ 6,781,000.00	78,135	$ 86.79	$ 1,124
2027	$ 1,110	$ 167,000,000	4.16%	67,823	$ 6,948,000.00	78,300	$ 88.74	$ 1,199
2028	$ 1,190	$ 178,000,000	4.16%	71,445	$ 7,405,000.00	78,464	$ 94.37	$ 1,284
2029	$ 1,272	$ 187,000,000	4.16%	72,371	$ 7,780,000.00	78,629	$ 98.95	$ 1,371
2030	$ 1,350	$ 193,000,000	4.26%	73,911	$ 8,222,000.00	78,793	$ 104.35	$ 1,454
2031	$ 1,434	$ 194,000,000	4.26%	75,146	$ 8,265,000.00	79,010	$ 104.61	$ 1,539
2032	$ 1,512	$ 209,000,000	4.26%	75,903	$ 8,904,000.00	79,226	$ 112.39	$ 1,624

Notes:

These cost projections are estimates based on assumptions for future Tier 1 costs, RTS charges, and IEUA purchases from Metropolitan.
They are based on Metropolitan's Biennial Budget for Fiscal Years 2022/23-2023/24 which adopted water rates for calendar years 2023 through 2032, recent historical water purchase information from the IEUA, and projected water purchases developed in Watermaster's Storage Framework investigationInvestigation. This cost projection does not include the projected cost of the California WaterFix tunnel project.

1 - Estimates were provided by John Russ on February 2, 2023.

2 - Imported water purchases based on historical purchases and 2020 UWMP imported water projections.

CHAPTER 5
Basin Response to Planning Projections

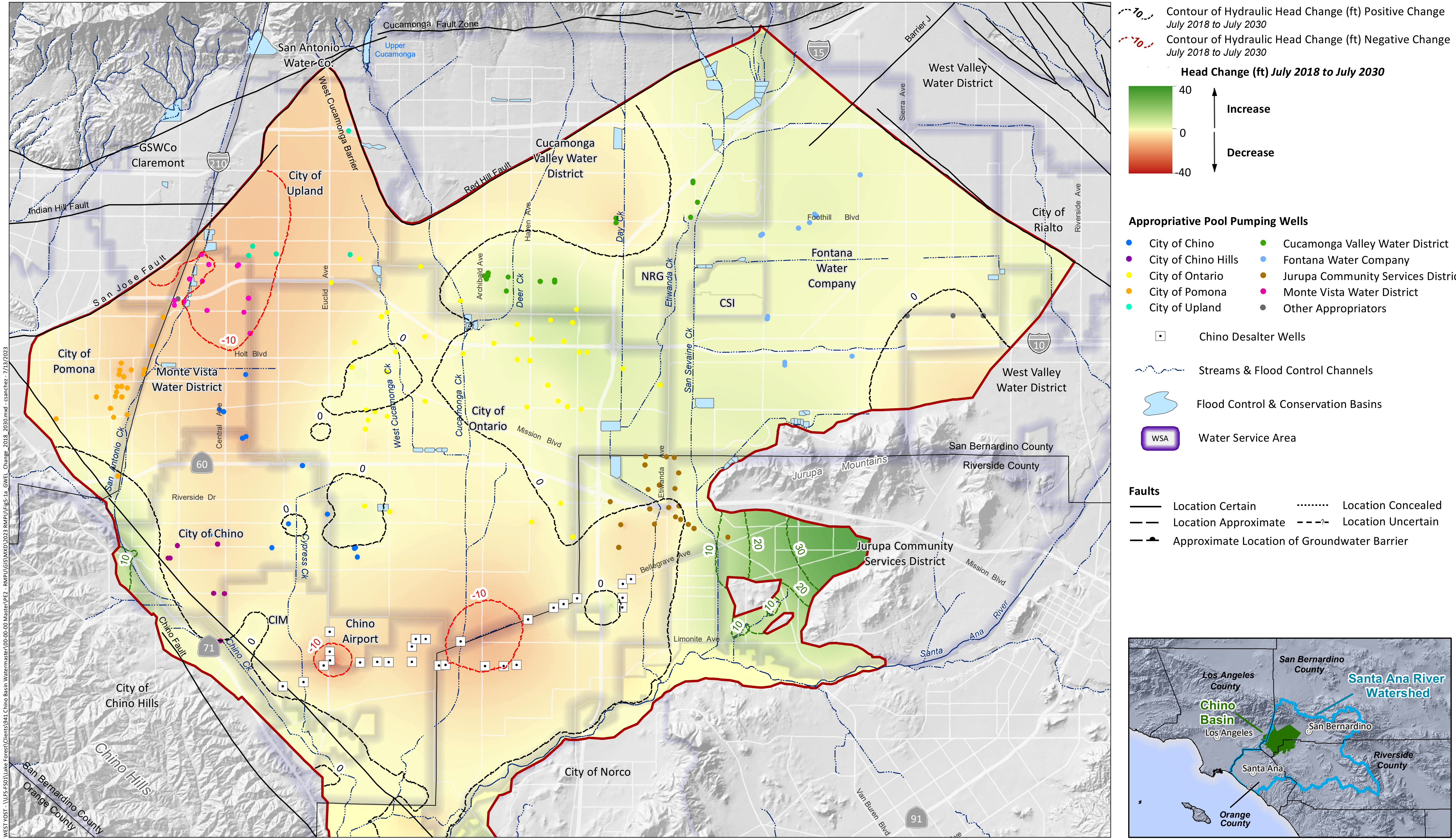
This chapter describes the basin response to the planning projections. The basin response is described in terms of groundwater-level changes, hydrologic balance and hydraulic control. This information is used to determine the effectiveness of storm and supplemental water recharge activities in achieving OBMP goals and to inform Watermaster's decision on the location and magnitude of future supplemental water recharge.

5.1 PROJECTED GROUNDWATER-LEVEL RESPONSE

Future changes in groundwater levels under the 2020 SYR planning scenario were projected from July 2018 through June 2050. Figures 5-1a through 5-1d show the projected changes in groundwater levels for 2018 through 2030, 2030 through 2040, 2040 through 2050, and 2018 through 2050, respectively. Recall from Figure 4-4, mentioned above, that the managed storage peaks during the planning period in 2031 and declines thereafter. Managed storage roughly parallels the total storage in the Basin. The increasing managed storage through 2029 can be observed in the change in groundwater levels in Figure 5-1a, and the subsequent decline in managed storage can be seen in Figures 5-1b and 5-1c. The trends in groundwater level changes by period are as follows:

- From 2018 to 2030, groundwater levels are projected to:
  - decrease in the western part of the basin by up to 10 feet in the MVWD service area
  - decrease in southern part of the basin by about 10 feet in the vicinity of the CDA well field
- From 2030 to 2040, groundwater levels are projected to:
  - decrease by about 10 feet or more in the Ontario, FWC, CVWD, and JCSD service areas
  - remain largely unchanged across the rest of the Basin
- From 2040 to 2050, groundwater levels are projected to:
  - decrease by about 10 feet or more in the Ontario, FWC, CVWD, and JCSD service areas
  - remain largely unchanged across the rest of the Basin
- Cumulatively, from 2018 to 2050, groundwater levels are projected to:
  - decrease by about 10-25 feet across the eastern portion of the Basin, including the services areas of FWC, CVWD, JCSD, and eastern Ontario
  - decrease by about 10 feet or more across the western portion of the Basin, including the services areas of the Pomona, Upland, Chino, MVWD, and western Ontario
  - remain largely unchanged in the southernmost portion of the Basin, including along the Santa Ana River and Prado Basin

These changes in groundwater levels can influence the occurrences and magnitudes of land subsidence and/or pumping sustainability challenges.



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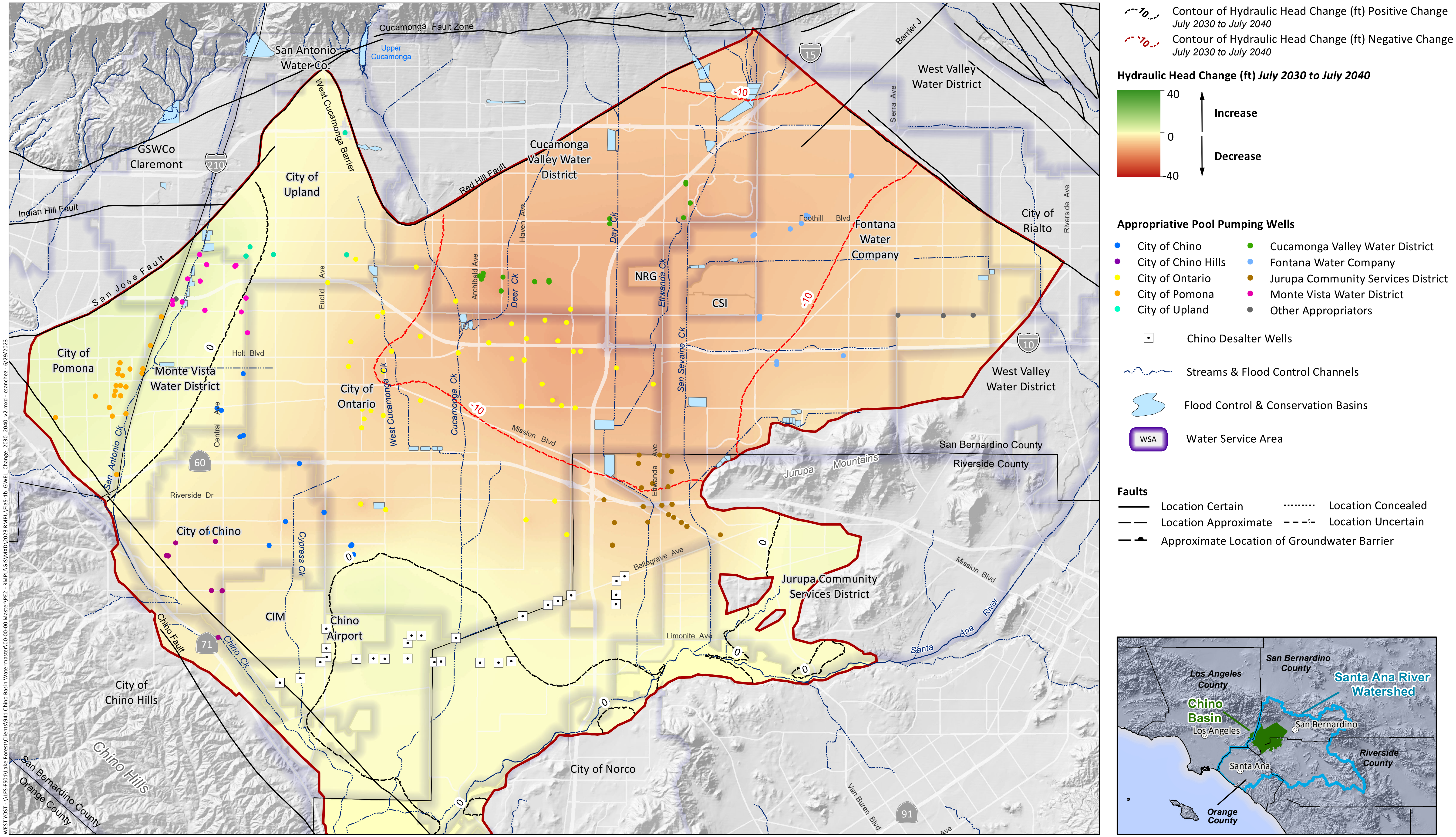
WEST YOST

Prepared for:

Chino Basin Watermaster
2023 Recharge Master Plan Update

Groundwater Elevation Change – Layer 1
2020 SYR1 Groundwater Model from 2018 to 2030

Figure 5-1a



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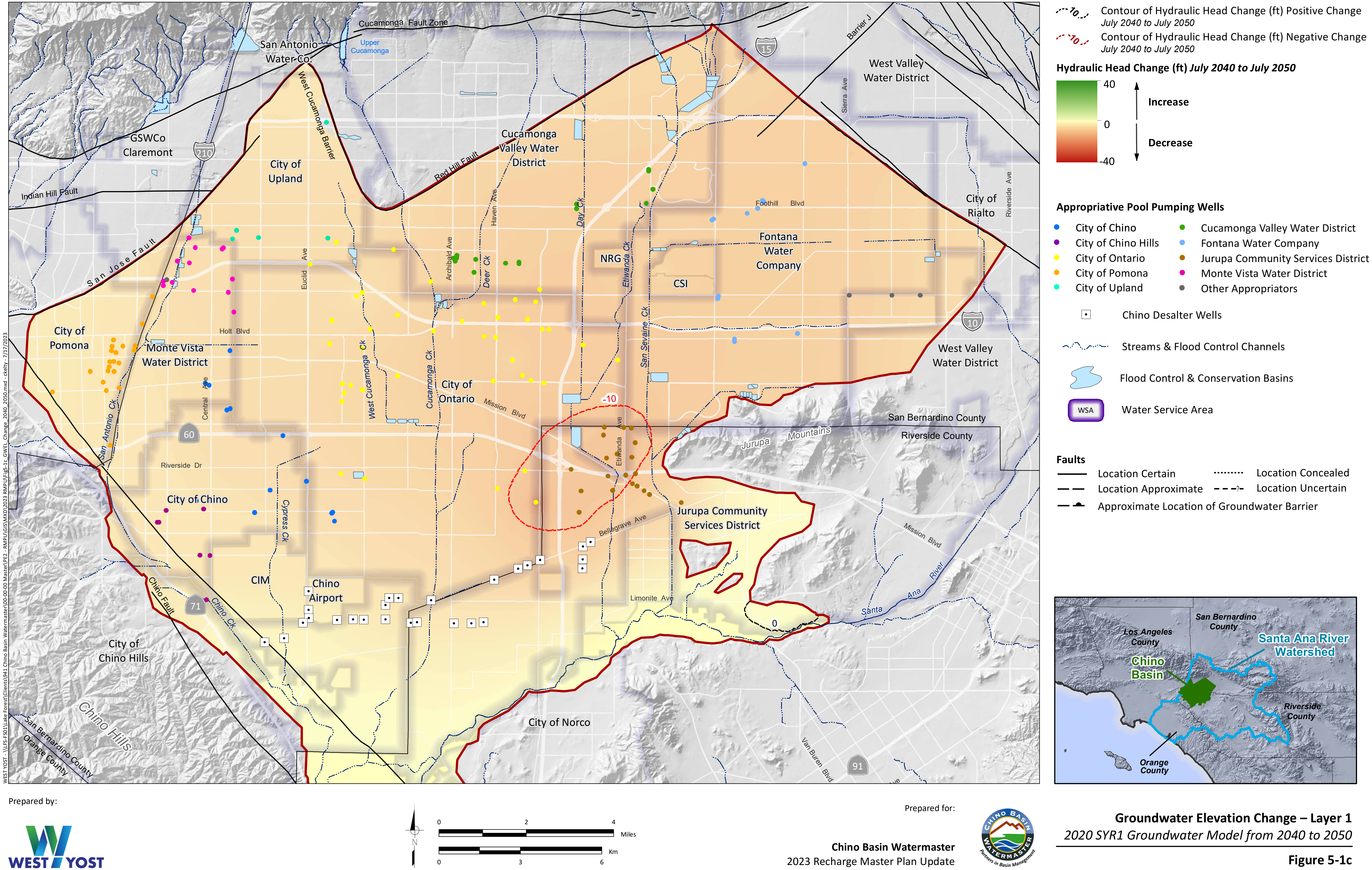
Groundwater Elevation Change – Layer 1
2020 SYR1 Groundwater Model from 2030 to 2040

Figure 5-1b



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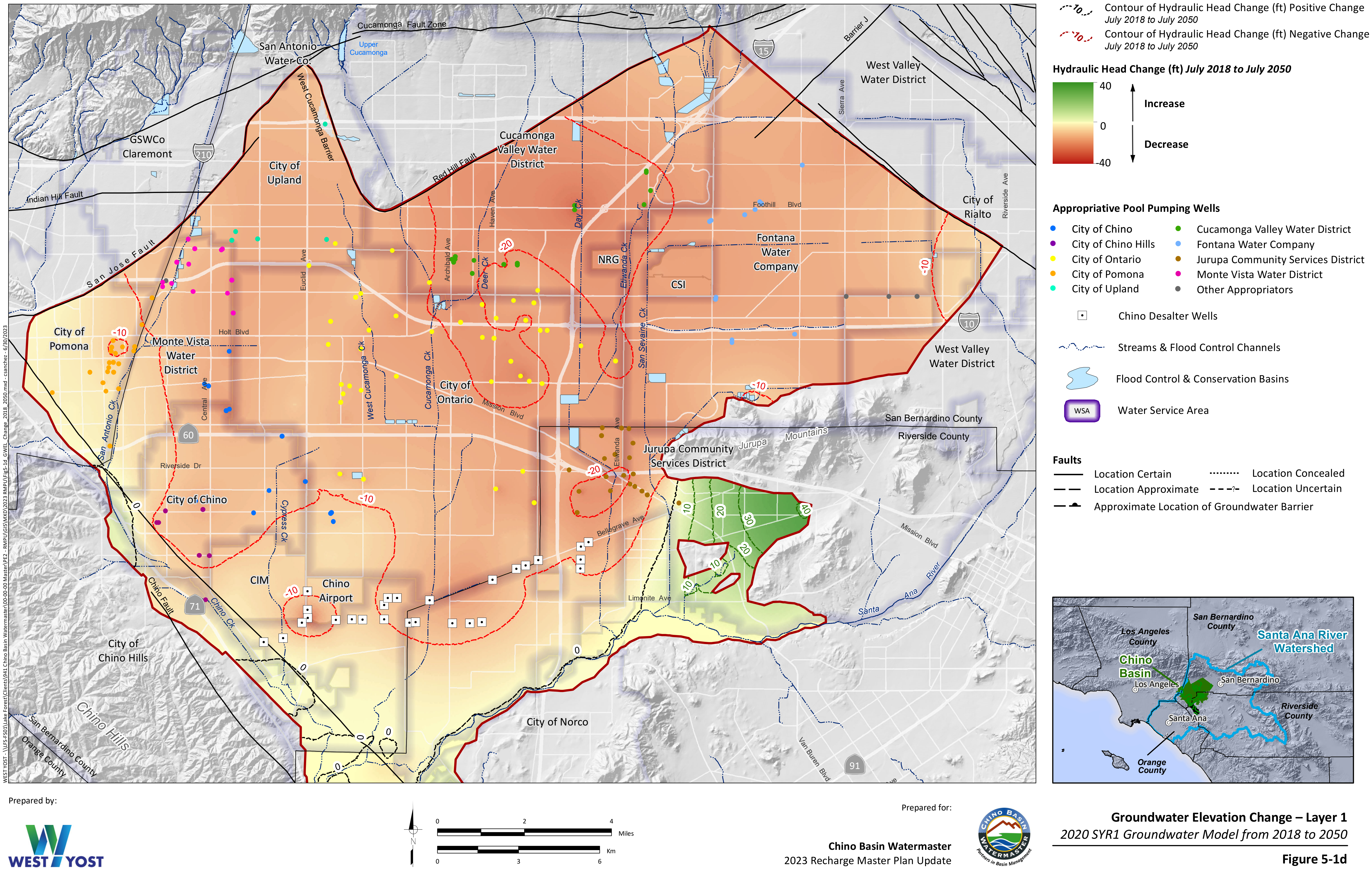
Groundwater Elevation Change – Layer 1

2020 SYR1 Groundwater Model from 2040 to 2050

Figure 5-1c



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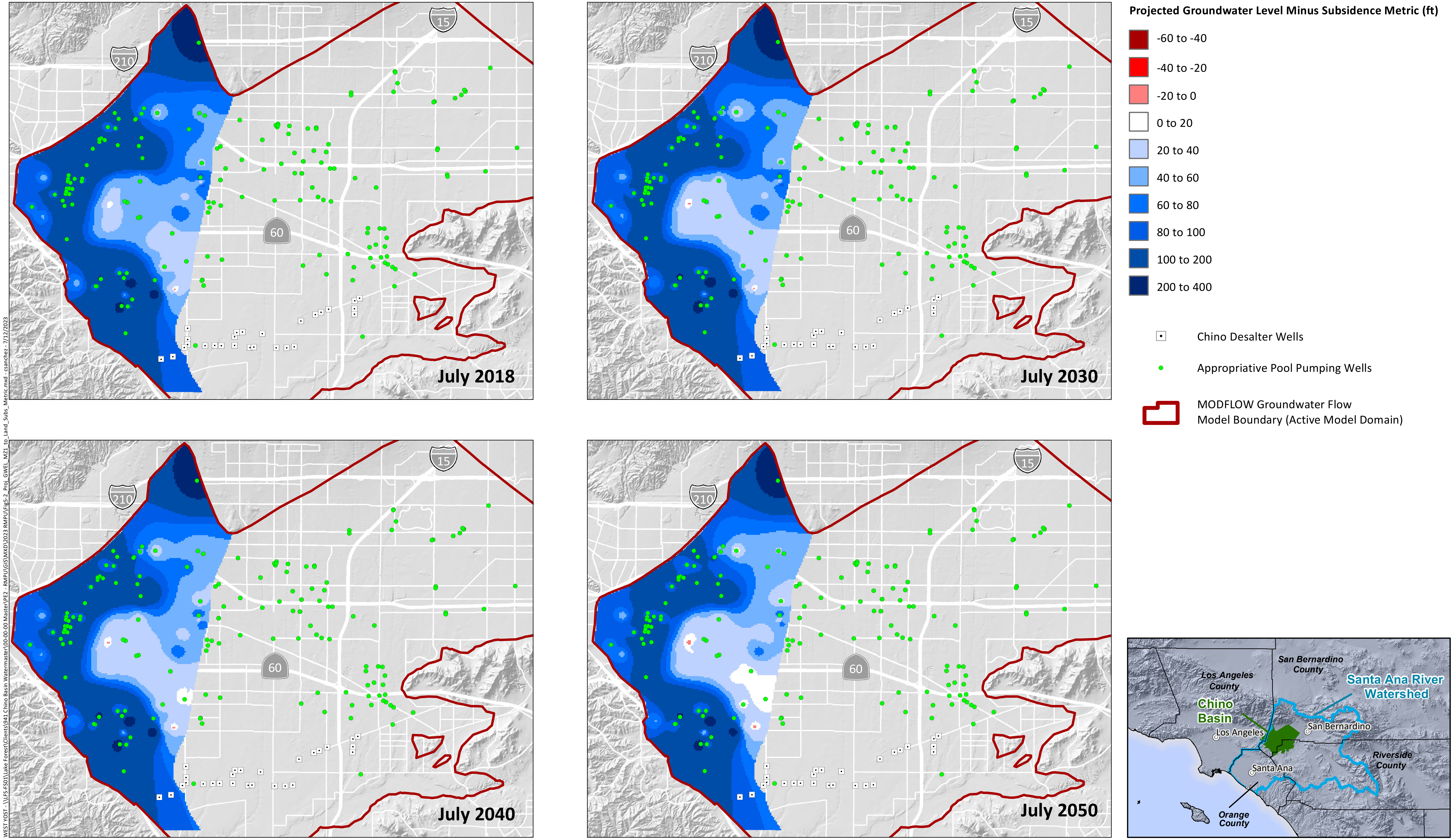
Groundwater Elevation Change – Layer 1
2020 SYR1 Groundwater Model from 2018 to 2050

Figure 5-1d

5.1.1 New Land Subsidence

Historically, portions of the Basin have experienced aquifer-system compaction and associated land subsidence, which has caused damage to the land surface and its overlying infrastructure. These areas include most of MZ1 and the western portion of MZ2. The land subsidence was caused by the historical lowering of groundwater levels due to groundwater pumping (WEI, 2017). During subsidence, the pressure heads in fine-grained sediment layers are greater than the heads in surrounding course-grained sediments, which causes the pore water within the fine-grained layers to discharge into the coarse--grained layers with an immediate reduction in thickness of the fine-grained layers. Due to post-Judgment and post-OBMP decreases in pumping and increases in groundwater levels, long-term trends of land subsidence in the Basin have slowed but have not stopped. Watermaster has developed and implements a Subsidence Management Plan to guide pumping and recharge activities in the Basin to minimize or abate the future occurrence of land subsidence. Presently, the Watermaster is updating the Subsidence Management Plan to specifically address an acute area of land subsidence occurring in Northwest MZ1.

In this report, “new land subsidence” refers to land subsidence caused by lowering of groundwater levels below historical low groundwater levels in areas that are susceptible to land subsidence (i.e., in MZ1). Historical groundwater-level data and model-estimated historical groundwater levels were reviewed to develop a map of historical low groundwater levels across MZ1. This groundwater-level surface was used to assess the potential for new land subsidence, assuming no new land subsidence occurs if groundwater levels are maintained above the historical low groundwater levels (referred to as the constraint surface). Figure 5-2 shows the current (2018) and projected groundwater levels (as estimated by the 2020 SYR model) relative to the new land subsidence constraint surface for MZ1. Areas shown in white or blue identify where groundwater levels are above the constraint surface and new land subsidence is unlikely to occur. Areas that are pink or red identify where groundwater levels are lower than the constraint surface and new land subsidence is projected to occur. Review of the maps indicate that projected groundwater elevations are above the constraint surface except for two small areas centered on wells where groundwater pumping can be modified to ensure no new land subsidence. Therefore, Watermaster recommends that recharge continue to be prioritized in MZ1 and to update its Subsidence Management Plan to address the ongoing subsidence that is occurring in these areas.



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0 4 8 Miles

0 6 12 Km

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Evaluation of Potential for Future Land Subsidence 2018-2050
Compared to New Land Subsidence Metric

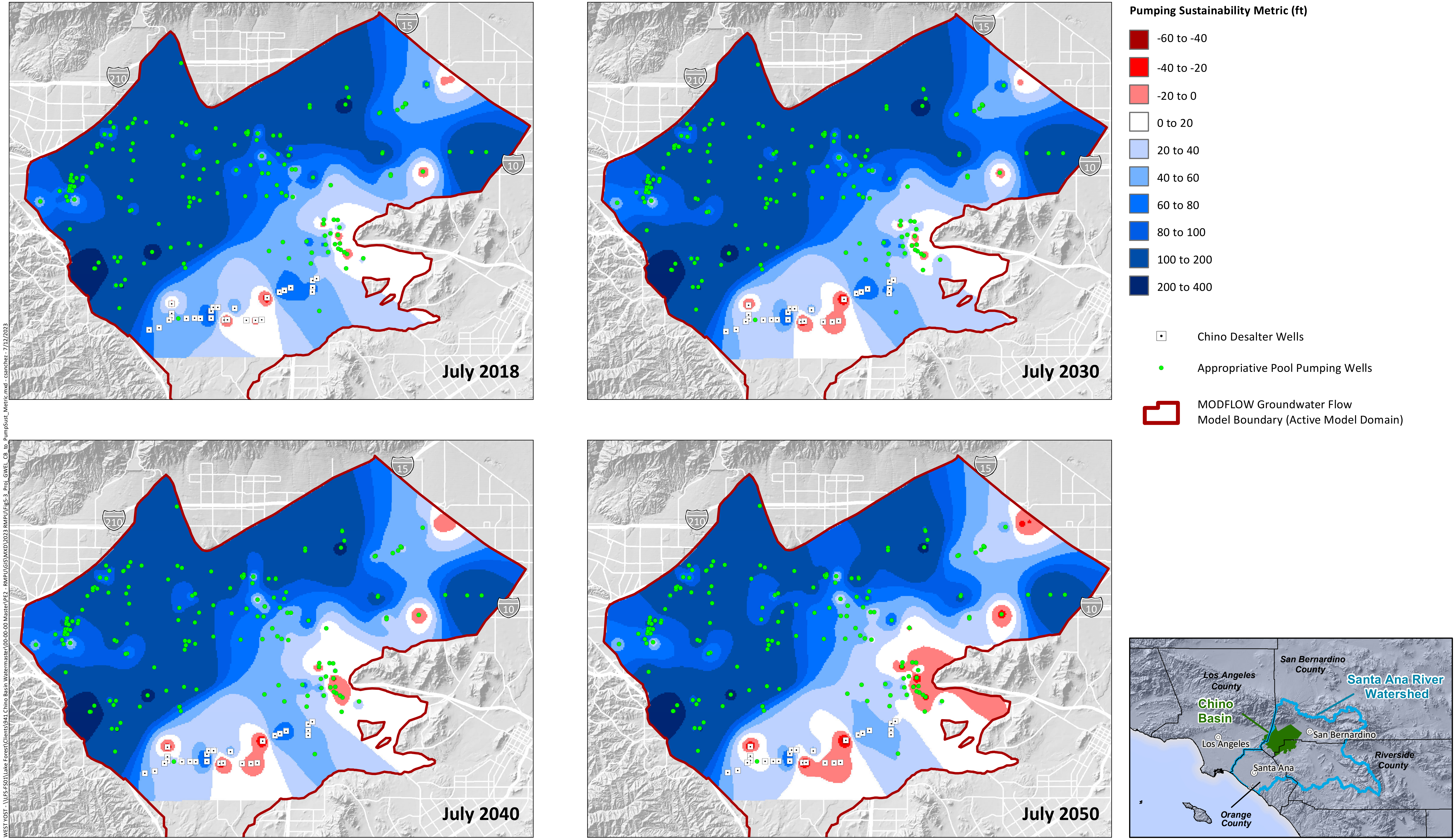
Figure 5-2

5.1.2 Pumping Sustainability

The term pumping sustainability, as used herein, refers to the ability to pump water from a specific well at a desired production rate, given the groundwater level at that well, and its specific well construction and equipping details. It has no nexus to the Judgment or Peace Agreements. "Pumping sustainability metrics" are defined for each well by the well owner and are updated periodically. Groundwater pumping at a well is presumed to be sustainable if the model-projected groundwater levels at that well location are above the well's pumping sustainability metric. If the groundwater level falls below the sustainability metric, the owner will either need to lower the pumping equipment in their well or reduce the well's pumping rate.

During the development of the OBMP, the parties that pump groundwater from MZ1 expressed concern that more recharge was required for sustainable pumping. To address the concern, the Peace Agreement provided for 6,500 afy of supplemental water recharge in MZ1 (discussed above). Pumping sustainability in MZ3 in the JCSD and CDA well fields was a concern expressed during the development of the 2013 RMPU.

Pumping sustainability was evaluated in the 2020 SYR report, and this work is incorporated into the 2023 RMPU. Parties provided Watermaster the maximum depth to groundwater required to maintain sustainable pumping rates for each of their wells. A constraint surface was created by interpolating these values at wells across the Basin. Pumping sustainability is a concern if groundwater levels fall below the pumping sustainability constraint surface. Figure 5-3 shows a series of maps that describe the time history of current (2018) and projected groundwater levels relative to the pumping sustainability constraint surface across the Chino Basin. White to dark blue areas represent where groundwater levels are projected to be above the pumping sustainability constraint surface. Pink to red areas represent where groundwater levels are projected to be below the pumping sustainability constraint surface. Groundwater levels are projected to be above the sustainability surface through 2050 over most of the Basin except for the CDA and JCSD well fields and two wells in the FWC service area. Groundwater levels are projected to decline in these areas during 2018-2050 which could increase the pumping sustainability challenges at these wells over time.



Prepared by:

WEST YOST

0 4 8 Miles

0 6 12 Km

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Chino Basin Watermaster
2023 Recharge Master Plan Update

Evaluation of Potential for Future Pumping Sustainability Challenges 2018-2050
Compared to Sustainability Metric

Figure 5-3

5.2 PROJECTED HYDROLOGIC BALANCE

Table 5-1 shows the time history of the hydrologic balance for MZ1, MZ2, and MZ3, based on groundwater model simulations of historical data for the period of fiscal 2000/01 through 2021/22 and for planning scenario 2020 SYR for the period fiscal of 2022/2023 through 2029/2030 (West Yost, 2021). The cumulative balance of recharge and discharge in all MZs is expected to decline between 2023 and 2030.

As described in Chapter 3.2, the existence of controlled overdraft permitted by the Judgment and the Peace II Agreement means that it is impossible to maintain a balance of recharge and discharge in each MZ if the controlled overdraft is pumped: the balance has to be negative in some MZs and storage will decline. The physical decline in storage permitted in the Peace II Agreement is required to achieve hydraulic control (WEI, 2007).

The cumulative balance of recharge and discharge in MZ1 is expected to decline from about 7,500 af in 2023 to about -3,500 in 2030. Therefore, Watermaster recommends that recharge be prioritized in MZ1.

5.3 PROJECTED HYDRAULIC CONTROL

Figure 5-4 shows the current (2018) and projected groundwater discharge past the CDA well field as estimated by the 2020 SYR model under the 2020 SYR planning scenario. The figure shows that groundwater discharge past the CDA well field is projected to be less than 1,000 afy through 2045, and hence, hydraulic control is projected to be maintained under the 2020 SYR planning scenario.

Table 5-1. Historical and Projected Change in Storage in MZ1, MZ2, and MZ3

Fiscal Year	MZ1		MZ2		MZ3		Total	
	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative	Annual	Cumulative
2001	-549	-549	-14,006	-14,006	-14,566	-14,566	-29,121	-29,121
2002	-2,484	-3,033	-12,595	-26,600	-10,723	-25,289	-25,801	-54,922
2003	-5,016	-8,049	-12,672	-39,273	-12,539	-37,828	-30,227	-85,149
2004	-363	-8,412	-11,759	-51,031	-11,863	-49,691	-23,985	-109,134
2005	6,260	-2,152	-1,649	-52,680	-11,795	-61,485	-7,184	-116,318
2006	19,159	17,007	8,022	-44,658	-1,208	-62,694	25,973	-90,345
2007	15,633	32,640	-4,584	-49,243	-2,077	-64,771	8,972	-81,373
2008	-13,845	18,796	-11,518	-60,760	-12,461	-77,231	-37,824	-119,196
2009	-12,582	6,214	-15,312	-76,072	-12,196	-89,427	-40,090	-159,286
2010	-8,243	-2,030	-10,770	-86,843	-8,343	-97,770	-27,357	-186,643
2011	9,607	7,577	2,609	-84,234	2,454	-95,316	14,670	-171,973
2012	5,127	12,704	4,258	-79,977	2,258	-93,058	11,642	-160,331
2013	-10,855	1,848	-9,620	-89,597	-7,254	-100,312	-27,730	-188,061
2014	-13,918	-12,070	-7,031	-96,628	-12,035	-112,347	-32,984	-221,045
2015	-7,954	-20,024	-4,160	-100,787	-3,425	-115,772	-15,539	-236,584
2016	3,556	-16,468	-12,543	-113,331	-2,501	-118,274	-11,488	-248,072
2017	14,488	-1,980	-1,221	-114,551	-2,591	-120,864	10,677	-237,396
2018	15,725	13,745	5,216	-109,336	-1,774	-122,638	19,167	-218,229
2019	4,669	18,414	6,995	-102,340	-3,185	-125,823	8,479	-209,750
2020	4,103	22,517	-3,851	-106,191	2,917	-122,906	3,169	-206,580
2021	-7,934	14,583	-13,084	-119,276	-4,236	-127,143	-25,255	-231,835
2022	-7,092	7,491	-8,482	-127,757	-10,061	-137,204	-25,635	-257,470
2023	-2,888	4,603	-288	-128,045	1,281	-135,923	-1,895	-259,365
2024	-2,230	2,373	94	-127,951	1,136	-134,787	-1,000	-260,365
2025	-1,324	1,049	215	-127,736	1,247	-133,540	138	-260,227
2026	-1,209	-160	-123	-127,860	930	-132,610	-402	-260,630
2027	-1,134	-1,294	-378	-128,238	255	-132,355	-1,257	-261,887
2028	-1,060	-2,355	-950	-129,187	-546	-132,901	-2,556	-264,443
2029	-917	-3,272	-1,021	-130,208	-1,426	-134,327	-3,364	-267,807
2030	-208	-3,480	-1,188	-131,396	-1,927	-136,254	-3,322	-271,129
Average (2023-2030)	-1,371		-455		119		-1,707	

Gray cells indicate projections from 2020 SYR1 as documented in the 2020 Safe Yield Recalculation Report (WEI, 2020).

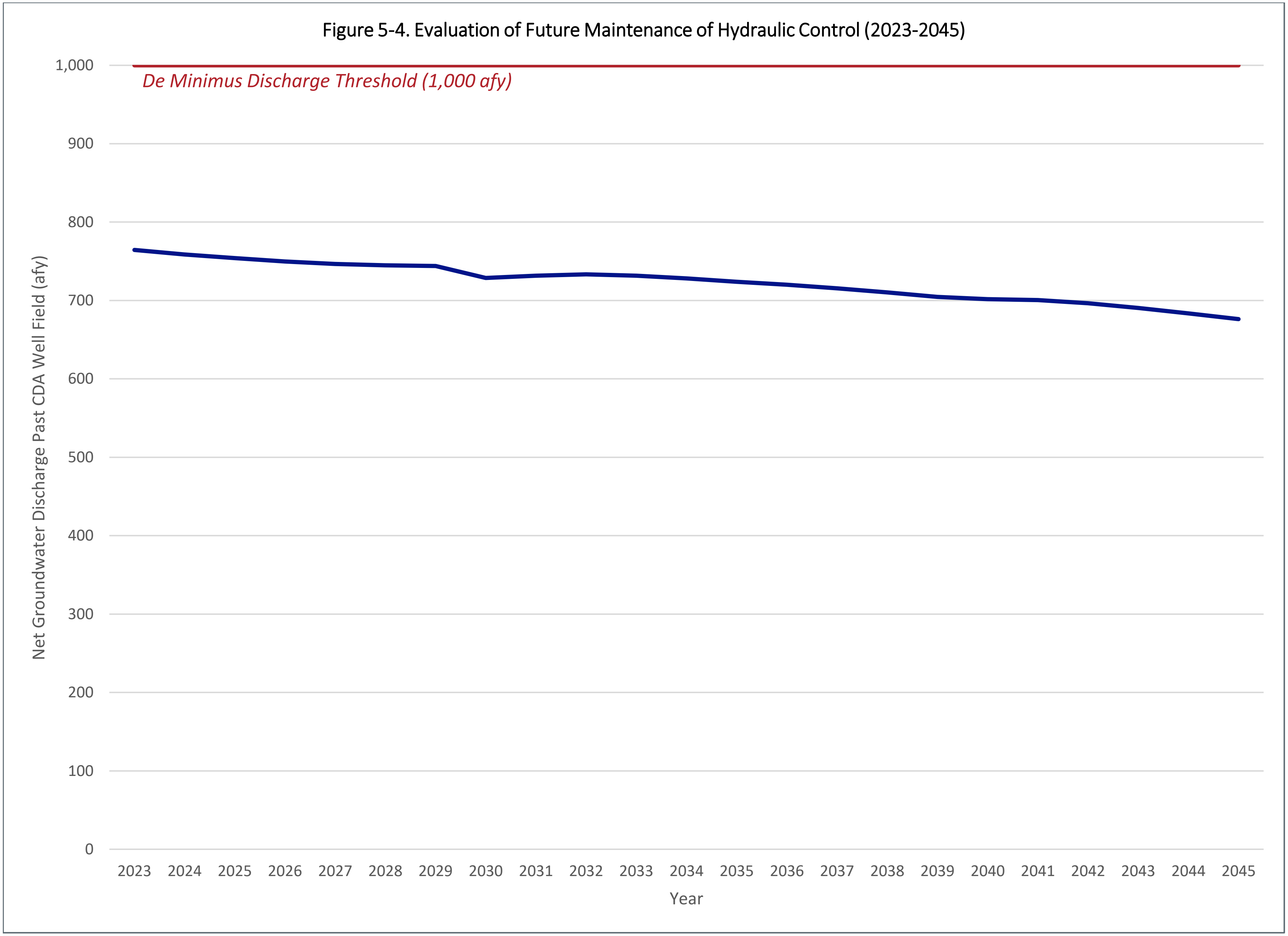


Figure 5-4. Evaluation of Future Maintenance of Hydraulic Control (2023-2045)
1,000
900
800
700
600
500
400
300
200
100
0
De Minimus Discharge Threshold (1,000 afy)
Net Groundwater Discharge Past CDA Well Field (afy)
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
Year

5.4 DATA COLLECTION AND EVALUATION FINDINGS RELATED TO THE RMPU

As described in Chapter 4.1 Watermaster recently completed the DCE Report which describes and documents the required data collection and evaluation through Fiscal Year 2021/22 (West Yost, 2022). In these reports, Watermaster compares actual data and updated projections to the data and assumptions that were used in the 2020 SYR Projection. These datasets are compared to "[e]valuate prudent management discretion to avoid or mitigate undesirable results including, but not limited to, subsidence, water quality degradation, and unreasonable pump lifts."[31] Several findings of the DCE Report are related to the recharge master planning process as follows:

- The actual data (FY 2018/19 through FY 2021/22) and updated projections (FY 2022/23 through FY 2029/30) for groundwater pumping indicate that pumping in the Chino Basin is higher than the 2020 SYR assumptions
- The increase production has the potential for undesirable results related to increased risk of new land subsidence in Northwest MZ1 and pumping sustainability challenges near the JCSD well field
- This finding further emphasizes the need to direct recharge in these areas or employ alternative groundwater management projects/programs to support groundwater levels in these areas

Currently, the JCSD can operate its wells at the desired production rates.[32] While the findings of the DCE Report indicate the potential for pumping sustainability challenges in the JCSD well field, the precise nature of the future pumping sustainability challenges is unknown. In the forthcoming reevaluation of the Safe Yield that will be completed in FY 2024/25 (2025 Safe Yield Reevaluation), Watermaster will update the groundwater-flow model to simulate multiple future water supply plans and climate scenarios. The results of this effort will be used to define the extent and causes of pumping sustainability challenges in the Chino Basin and improve the ability to identify precise and effective actions to mitigate pumping sustainability challenges, building on prior studies.[33]

[31] 2017 Court Order, p. 17

[32] Conversation with Bryan Smith, June 2023.

[33] A study documented in the 2013 RMPU (WEI, 2013) evaluating the potential mitigation actions for pumping sustainability challenges in the JCSD well field suggested that "reducing production or relocating production away from the JCSD well field is more hydraulically efficient than recharge," but that recharge measurably improved pumping sustainability in the JCSD well field.

CHAPTER 6
Recharge Capacity Needs to Meet Future Obligations

This chapter of the report describes the need for new recharge capacity. The need for new recharge capacity is based on a comparison of projected future recharge requirements and physical capacity to achieve the required recharge. As with all planning projections, uncertainty increases with longer horizons. This report focuses on the recharge capacity needs through 2045.

6.1 FUTURE RECHARGE AND REPLENISHMENT PROJECTIONS

Chapter 4 describes the updated projected water demands, water supply plans, and associated replenishment obligations. Independent of replenishment obligations, Watermaster is obligated to recharge at least 6,500 afy of supplemental water in MZ1 through 2030 per the Peace II Agreement. A portion of the 6,500 afy of supplemental water obligation is projected to be satisfied through recycled water recharge. The remainder of the water that must be recharged in MZ1 can also be used to satisfy a replenishment obligation. The sum of the projected replenishment obligation and the additional supplemental water that must be recharged in MZ1 (through 2030) is Watermaster's total projected recharge obligation.

Figure 4-3 shows Watermaster's projected total recharge obligations from 2023 through 2045 based on the DCE Report. Through 2045, the maximum annual replenishment obligation is about 3,800 afy. The Parties project that 90 percent of a replenishment obligation is satisfied from storage and 10 percent is satisfied by wet-water recharge via spreading and injection based on the Data Collection and Evaluation Report for Fiscal Year 2021/2022 (West Yost, 2023). Thus, the projected annual replenishment obligation assumed to be satisfied by wet-water recharge is less than the total obligation. Table 6-1 shows the:

- Projected annual replenishment obligation
- Projected annual replenishment obligation assumed to be satisfied by wet-water recharge
- Projected annual recharge obligation in MZ1
- Projected recharge requirements (*i.e.,* the maximum of the two items above, which assumes that the MZ1 recharge obligation is partly met through the recharge from replenishment obligations)

The maximum projected total recharge requirement is about 4,200 afy, and it's expected to occur in 2030.

6.1.1 Availability of Supplemental Water for Replenishment

Chapter 4.2 described the amount of recycled water available – about 16,420 afy of recycled water is projected to be available currently and through 2045. Chapter 4.5 described the availability of imported water to meet Watermaster's recharge and replenishment obligations. For the purposes of the 2023 RMPU, it has been assumed that Watermaster will be able to purchase water from Metropolitan for replenishment purposes in one out of five years (20 percent of the time).

Table 6-1. Supplemental Wet-Water Recharge Capacity, Projected Replenishment Obligation, and Recharge Capacity Required to Meet Replenishment Obligations Under Cumulative Adverse Conditions

FY 2020-2045; acre-feet per year

Fiscal Year	Projected annual replenishment obligation	Projected annual replenishment obligation assumed to be satisfied by wet-water recharge	Projected annual recharge obligation in MZ1	Projected total recharge requirements	Supplemental wet-water recharge capacity	Recharge capacity required to meet replenishment obligation under cumulative adverse conditions			Excess supplemental wet-water recharge capacity under worst-case scenario
						If imported water is available one out of five years	If reoperation were discontinued	If DYYP recharge occurs on the same year through 2028	
(a)	*(b)*	*(c) = 0.1*(b)*	*(d)*	*(e) = max (c) or (d)*	*(f)*	*(f)*	*(g) = (f) + reoperation offset*	*(h) = (g) + 25,000*	*(i) = (h) - (e)*
2023	0	0	3,010	3,010					
2024	0	0	3,010	3,010					
2025	0	0	3,010	3,010		15,050	27,470	52,470	19,790
2026	1,129	113	3,010	3,010					
2027	3,869	387	3,010	3,010					
2028	6,608	661	3,010	3,010					
2029	9,348	935	3,010	3,010					
2030	12,088	1,209	3,010	3,010		15,050	43,354	43,354	28,906
2031	8,454	845	0	845					
2032	7,029	703	0	703					
2033	5,604	560	0	560					
2034	4,180	418	0	418	72,260				
2035	2,755	275	0	275		2,802	2,802	2,802	69,458
2036	5,009	501	0	501					
2037	7,264	726	0	726					
2038	9,518	952	0	952					
2039	11,772	1,177	0	1,177					
2040	14,027	1,403	0	1,403		4,759	4,759	4,759	67,501
2041	9,959	996	0	996					
2042	9,959	996	0	996					
2043	9,959	996	0	996					
2044	9,959	996	0	996					
2045	9,959	996	0	996		4,979	4,979	4,979	67,281

(b) Assumes 90 percent of a replenishment obligation is satisfied from storage and 10 percent is satisfied by wet-water recharge via spreading and injection based on the Data Collection and Evaluation Report for Fiscal Year 2021/2022 (West Yost, 2023)

(c) The total obligation to MZ1 is 6,500 afy. 3,490 afy is projected to be recharged in MZ1 with recycled water per IEUA.

(e) Supplemental wet-water recharge capacity is assumed to be the total supplemental water recharge capacity in 2023 conditions per Table 2-6 (88,680 af) minus the capacity expected to be used for recycled water (16,420 af).

6.1.2 Future Recharge Capacity Requirements for Supplemental Water

Requirements for future supplemental water recharge capacity are estimated by assessing the future supplemental water recharge projections in the context of the availability of supplemental water for recharge. Recycled water is assumed 100-percent reliable, and therefore the recharge capacity requirement to recharge recycled water is equal to its projected supply. The Metropolitan supply is assumed to be 20 percent reliable therefore, the recharge capacity required to meet recharge and replenishment obligations with imported water supplied by Metropolitan is five times the projected recharge and replenishment requirement. Figure 6-1 shows the supplemental water recharge capacity available at spreading basins (less that used for recycled water recharge), in-lieu recharge capacity, and ASR recharge capacity as a stacked bar chart—the total supplemental capacity being the sum of these recharge capacities (72,260 af). Figure 6-1 also shows the time history of the supplemental water recharge capacity required to recharge imported water from Metropolitan under cumulative adverse conditions:

- If imported water is available one out of five years (*i.e.,* 20 percent of the time)
- If reoperation were discontinued (*i.e.*, if there is not reoperation water to offset the desalter replenishment obligation)
- If DYYP recharge occurs on the same year (additional 25,000 af of capacity required)

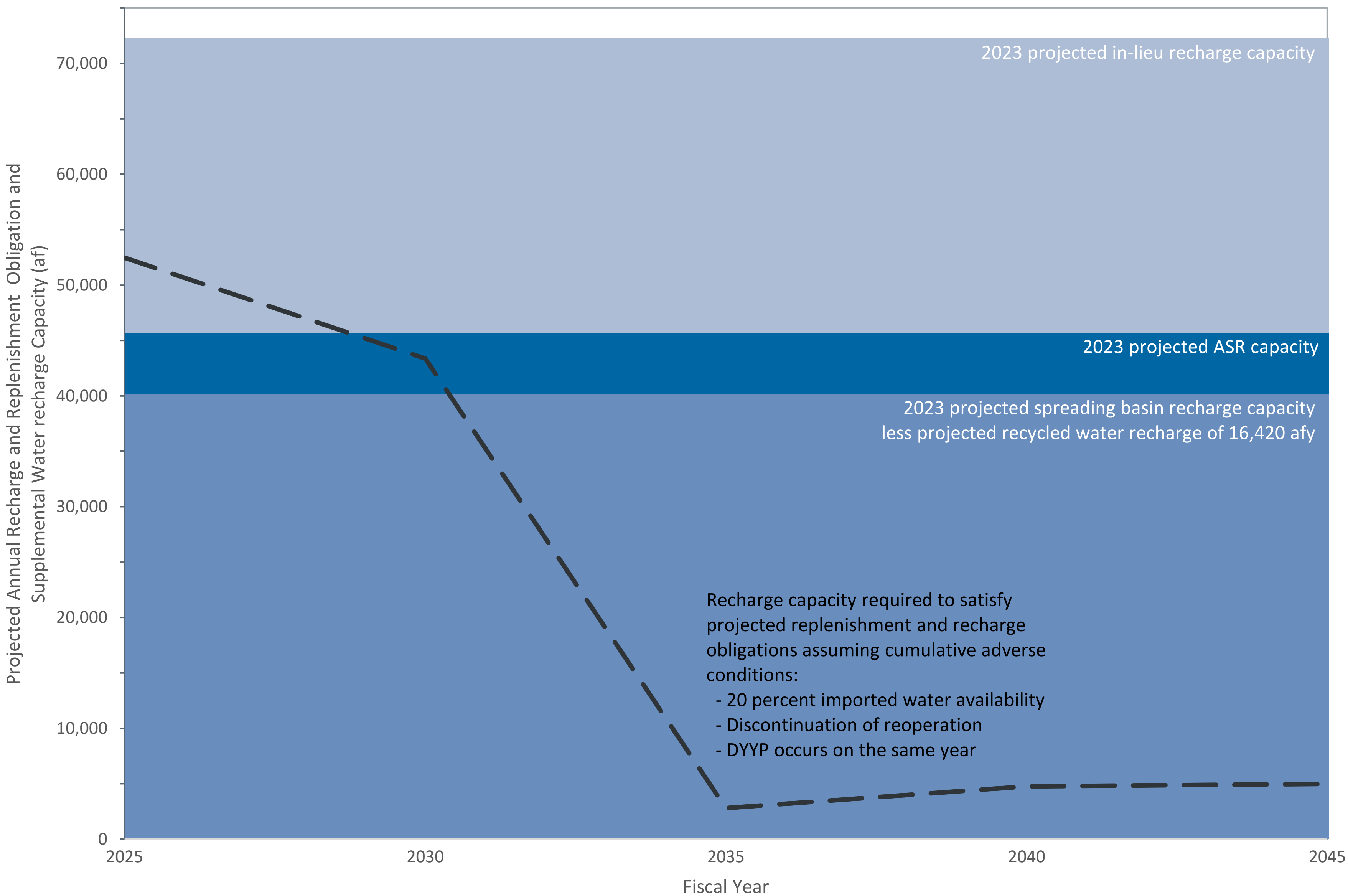
The projected maximum required recharge capacity is shown in Figure 6-1 and Table 6-1 through 2045. Watermaster and IEUA are projected to have enough recharge capacity available to them to meet all their recharge and replenishment obligations through 2045.

6.2 FUTURE RECHARGE CAPACITY REQUIREMENTS TO FACILITATE STORAGE AND RECOVERY PROGRAMS

There are no current Storage and Recovery Programs in the Chino Basin other than the DYYP, the contract for which expires in 2028. Future Storage and Recovery Programs in the Chino Basin are subject to Watermaster's review and approval to ensure that water stored and recovered in the Chino Basin will not cause MPI to a party or the Basin, pursuant to the OBMP and the Peace Agreement.

In FY 2023/24, the Watermaster initiated the development of a Storage and Recovery Master Planning process pursuant to the 2020 OBMP Update. The objective of the Storage and Recovery Master Plan is to facilitate the development, implementation, and optimization of Storage and Recovery Programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality. For future Storage and Recovery Programs, recharge magnitudes and capacities are unknown. The availability of existing recharge capacity and the need for new recharge capacity will be determined by the operational plan of the Storage and Recovery Program, the results of Watermaster's evaluation of the Basin response to the Storage and Recovery Program, and any mitigation actions identified by Watermaster. Further detail on the potential need for additional recharge capacity due to the implementation of Storage and Recovery Programs will be included in the Storage and Recovery Master Plan and will be summarized in a future RMPU.

Figure 6-1. Comparison of Projected Annual Recharge and Replenishment Obligation to Supplemental Water Recharge Capacity



6.3 RECHARGE TO MANAGE LAND SUBSIDENCE AND PUMPING SUSTAINABILITY

Projections of new land subsidence and pumping sustainability were evaluated in the 2020 Safe Yield Report for a range of potential groundwater pumping and recharge scenarios (WEI, 2020). Pumping sustainability refers to maintaining groundwater levels high enough to ensure that the planned pumping from wells can be achieved. The 2020 SYR1 model was used to determine the potential for new land subsidence and pumping sustainability challenges under different scenarios. Model results concluded that there are no new projected pumping sustainability challenges which could be practically managed with recharge.

Trends in land subsidence in MZ-1 are being closely monitored. Since 1992, long-term trends of gradual land subsidence have been noted in annual reports produced for the Ground Level Monitoring Committee (GLMC). However, in recent years, observations from InSAR estimates of ground motion have shown that long-term trends of land subsidence have slowed. This is largely due to the decreases in pumping and increases in recharge that have caused heads to stabilize or increase, therefore slowing the drainage and compaction of the aquitards. In 2017, the GLMC modeled the effects of decreased pumping and increased recharge on successfully mitigating subsidence with a one-dimensional aquifer-system compaction model in Northwest MZ-1. Observations over the past few years with decreased pumping and increased recharge have generally confirmed these model results. An update to the Subsidence Management Plan (SMP) is expected in FY 2023/24 and will incorporate the preferred subsidence-management alternative for Northwest MZ-1 into the existing SMP.

6.4 RECHARGE TO ENSURE THE BALANCE OF RECHARGE AND DISCHARGE

For the period of FY 2000/01 through FY 2021/22, the balance of recharge and discharge averaged about 341 afy, -5,800 afy, and -6,200 afy for MZ1, MZ2, and MZ3, respectively. A positive balance means that recharge exceeds discharge. The positive balance in MZ1 is, in part, the result of the 6,500 afy supplemental water recharge provided for in the Peace agreements. The negative balances for MZ2 and MZ3 are the result, in part, of planned and permitted reductions in storage.

The balance of recharge and discharge for FY 2022/23 through FY 2026/27 (2027/28 is the year the next RMPU will be completed) is projected to average -1,760 afy, -100 afy, and 970 afy for MZ1, MZ2, and MZ3, respectively. These balances are based on the 2020 SYR1 model, which does not account for the recharge associated with the DYYP that has occurred since July 2018. The implication of not including the DYYP recharge is that the projected balance estimates are biased low. The changes in balances from the historical period are due to projected pumping by the parties.

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.

CHAPTER 7
Renewal and Replacement Plan

This chapter presents the renewal and replacement (R&R) planning effort that was completed for Chino Basin recharge system assets. The R&R planning effort included a desktop study to estimate the remaining useful life (RUL) recharge system assets based on asset installation date and an assumed asset useful life. RUL results were used to forecast R&R needs over a 10-year period. Prior to this effort, recharge system assets were not included in any Basin-wide R&R planning, which meant that assets were experiencing failure, with no plan or budget to replace them. The forecast presented in this chapter is intended to be incorporated into future planning and budgeting so recharge system assets can be refurbished, rehabilitated, or replaced proactively, prior to failure.

The methodology employed for the desktop study included four main steps, listed below, and detailed in following Chapters of this chapter:

1. **Asset Inventory** – Development of an asset inventory of Chino Basin recharge system assets and their associated attributes.
2. **Useful Life and Remaining Useful Life Estimates** – Assignment of estimated useful life values for all asset types; calculation of remaining useful life for all assets.
3. **Unit Cost Estimates** – Development of unit costs for all asset types.
4. **Renewal and Replacement Planning** – Development of renewal intervals and associated costs for all asset types; projection of renewal or replacement date based on age/installation date; and development of a 10-year R&R forecast.

7.1 ASSET INVENTORY

To develop an asset inventory, several databases and existing reports were obtained and reviewed. Information from various sources was consolidated to develop a planning level inventory of Chino Basin recharge system assets and their associated attributes (e.g., age, size, owner, etc.). Note that asset owners include IEUA, CBWCD, and SBCFCD. Watermaster has obligations for operation and maintenance of Chino Basin recharge system assets but does not own any of the assets.

IEUA provided two databases with asset data in August 2022, including:

- Operation & Maintenance (O&M) asset list export from SAP, IEAU's enterprise resource planning software. According to IEUA, assets included in the SAP O&M listing are those which can potentially require a work order notification for maintenance. The SAP O&M listing included 600 records.
- Finance asset list export from SAP. According to IEUA, assets included in the SAP Finance listing are those which require capitalization. The SAP Finance listing (Fund 10300) included 222 records.

The SAP O&M listing served as the primary source of data for the asset inventory. The inventory was verified and revised as necessary using existing reports and the SAP Finance listing. Reports included the *IEUA FY 2016/17 Asset Management Plan* (IEUA AMP) and the *Chino Basin Recharge Facilities Operations Procedures* (Groundwater Recharge Coordinating Committee, April 2019).

The consolidated asset inventory consists of 512 entries and associated asset attributes. Assets were categorized based on type into a classification (class), and a subclass if necessary. Due to incomplete data, certain assumptions were made to complete the inventory; those assumptions included:

- Asset owner
  - Asset owner for the Basins was assigned based on asset owners identified in the IEUA AMP Asset Profiles (e.g., IEUA, SBCFCD, etc.).
  - Other assets within/at each Basin were assumed to be the same as the Basin owner, unless otherwise specified. IEUA provided clarification on certain assets such as intermediate wells, power assets, and rubber dams which were in some cases different than the Basin owner.[34]
  - All communication and level sensor assets are owned by IEUA.
- Asset age
  - Age was initially obtained from the basin as-builts and IEUA AMP.
  - Additional age information was obtained from the IEUA AMP Asset Profiles – History of Select Assets table, which lists completed capital improvement activities. The more recent of these two dates was selected for asset age.
  - Level transmitter age was obtained from the level transmitter inventory which is updated annually as part of the Annual Progress Report for Water Rights to the State Board.
- Size/Capacity
  - Asset size (e.g., diameter) or capacity (e.g., acre-feet) were populated based on best available information. Many assets were quantified using aerial imagery such as culverts (length), berm (length and width), and (spillway area).
  - Berms were assumed to be triangular, 5-feet tall by 10-feet wide
  - Box culvert concrete was assumed to be 10-inches thick.

Table 7-1 presents a summary of the assets by unique asset class and subclass. The full asset inventory was provided electronically.

[34] Email correspondence from Andy Campbell, IEUA (October 21, 2022 and December 1, 2022)

Table 7-1. Chino Basin Asset Inventory Summary		
Class - Subclass	Asset Type (Description)	Count of Assets
BASIN-FLOW	Basin Type Flow-Through	18
BASIN-OFFCH	Basin Type Off-Channel	26
LAND	Land/Property	31
WELL-MONITOR	Monitoring Well	8
WELL-RECHARGE	Recharge Well	7
COMM-RADIO	Communication Radio Antenna	28
CONTROL-HMI	Human Machine Interface (HMI)	14
CONTROL-RTU	Remote Terminal Unit (RTU)	10
CONTROL-I/O	Input/Output Hub	28
CONTROL-PLC	Programmable Logic Controller (PLC)	26
CONTROL-PANEL	Control Panel	17
INST-LEVEL	Level Transmitter	52
INST-PRESSURE	Pressure Transmitter	11
INST-AIR	Air Pressure Transmitter	4
INST-FLOW	Flow Transmitter	6
INST-FLOWMETER	Flow Meter	12
STRUC-GATEA	Automated Gate Valve	45
STRUC-GATEM	Manual Gate Valve	23
STRUC-VALVE	Miscellaneous Valve	33
STRUC-CLVRT MINOR	Culvert, under 48" diameter	25
STRUC-CLVRT MAJOR BOX	Box Culvert, Multiple Channels	6
STRUC-CLVRT MINOR BOX	Box Culvert, Single Channel	9
STRUC-BERM	Basin Boundary Berm	22
STRUC-SPILL	Concrete Spillway	13
STRUC-ROCKSPILL	Rock Spillway	5
STRUC-BLDG	Concrete/CMU Control Building	6
STRUC-DAM	Rubber Dam	6
STRUC-PIPE	Pipeline	4
HVAC	HVAC Unit	1
PMP	Pump	3
PMP-SUMP	Sump Pump	2
BLOW	Blower	6
ELEC-GEN	Generator	1
ELEC-TRANSFRM	Transformer	4
	Total	**512**

7.2 USEFUL LIFE AND REMAINING USEFUL LIFE ESTIMATES

Asset useful life (UL) is the time that an asset provides valued service, after which it does not meet its intended service level. End of life is not necessarily indicative of catastrophic failure, and in most cases an asset can still hold functionality (but with a reduced level of service) when it has reached the end of its useful life. Asset remaining useful life (RUL) can be estimated by comparing the actual age of assets (determined from installation date) to a standard useful life expectancy. In the absence of condition or performance data, this approach provides an initial determination of assumed condition and can be used to project estimated renewal needs. Municipal utility system assets vary by type, manufacture, design, construction, and quality. They have different characteristics in how they operate and, consequently, will have different profiles of how they perform and ultimately fail. Standard useful life expectancies are documented by the American Water Works Association, Water Environment Research Foundation, in addition to other industry associations. Useful life expectancies were developed for the recharge system assets using these industry standards. Each asset type within the recharge system was assigned an estimated useful life, as presented in Table 7-2.

RUL was calculated for each asset by subtracting the asset age (how long the asset has been installed) from its estimated useful life (UL). For example, an asset with a 50-year useful life that has been in service 35 years would have a RUL of 15 years.

Eqn. 7-1: RUL = UL – age

7.3 UNIT COST ESTIMATES

Unit costs were developed for each asset type to estimate future R&R costs. Appendix D of the 2013 RMPU developed unit costs and assumptions for many recharge system assets. These unit costs were escalated to 2023 costs[35] and used where possible. For assets not included in the 2013 RMPU, unit costs were developed using West Yost cost databases and input from IEAU staff. Some assets such as basins and spillways vary greatly in size and construction and could not be assigned a standard unit cost; these are noted with ‘NA’ in the unit cost column and were calculated differently for R&R cost projections (discussed in Section 7.4). Unit costs are shown in Table 7-2.

[35] Unit costs were escalated from 2013 to 2023 using the ENR City Cost Index – Los Angeles

Table 7-2. Useful Life and Unit Cost of Recharge System Assets

Asset Type (Description)	Useful Life, years	Units	Unit Cost, dollars
Civil/Site Assets			
Basin Type Flow-Through	120	AF	NA[(a)]
Basin Type Off-Channel	120	AF	NA[(a)]
Land/Property	NA	acres	NA
Monitoring Well	25	EA	20,000
Recharge Well	40	EA	50,000
Culvert, under 48-inch diameter	100	linear feet	520
Box Culvert, Multiple Channels	75	cu.yd.	1,855
Box Culvert, Single Channel	75	cu.yd.	1,600
Basin Boundary Berm	50	cu.yd.	45
Concrete Spillway	100	sq.ft.	NA[(a)]
Rock Spillway	50	sq.ft.	NA[(a)]
Concrete/CMU Control Building	60	sq.ft.	465
Rubber Dam	30	EA	150,000
Pipeline	75	linear feet	415
Electrical, Instrumentation and Controls Assets			
Communication Radio	25	EA	35,000
HMI (Human Machine Interface)	10	EA	10,000
RTU (Remote Terminal Unit)	15	EA	25,000
Input/Output Hub	15	EA	25,000
PLC (Programmable Logic Controller)	15	EA	25,000
Control Panel	20	EA	50,000
Level Transmitter	15	EA	5,000
Pressure Transmitter	15	EA	5,000
Air Pressure Transmitter	15	EA	5,000
Flow Transmitter	15	EA	5,000
Transformer	25	EA	25,000
Flow Meter	20	inch-diameter	1,500
Generator	20	EA	50,000
Mechanical Assets			
Automated Gate Valve	20	inch-diameter	1,380
Manual Gate Valve	30	inch-diameter	920
Miscellaneous Valve	20	inch-diameter	485
HVAC Unit	20	EA	25,000
Pump	20	horsepower	700
Sump Pump	15	EA	5,000
Blower	20	EA	7,500

(a) Asset type varied greatly in size or construction so a standard unit cost could not be estimated. See Chapter 7.4 for details on R&R projection for these asset types.

7.4 RENEWAL AND REPLACEMENT PLANNING

R&R planning is a forecast of planned effort and expenditures for improvement of an asset and ultimately the replacement of the asset. Maintenance activities are not included in R&R forecast. This forecast may be used for planning and budgeting and could be improved based on the findings of condition assessment studies and/or validation with field and maintenance records. The approach to developing the R&R forecast is described below.

7.4.1 Renewal and Replacement Intervals

In order to develop R&R projections, the frequency of required renewal or replacement for each asset type must be established. These renewal and replacement intervals can be applied over the selected study period (10-years in this case) to project associated renewal or replacement costs for each asset.

7.4.1.1 Replacement

As discussed above, each asset class has an estimated useful life. At the end of the UL, the asset is expected to require replacement in full. For example, Table 7-2 shows that the *Pump* asset class has a useful life of 20 years, which means its replacement interval is also 20 years. Replacement needs were forecast based on Eqn. 6-1 for all assets.

7.4.1.2 Renewal

In between replacement intervals, assets require renewal or rehabilitation investments to maximize the life of the asset and ensure continued performance at the required service level. This renewal effort is outside of regular maintenance such as inspection, oil changes, cleaning, etc. Table 7-3 presents the renewal intervals for all asset classes, along with the cost criteria for renewal in terms of percent of total asset replacement cost. Some asset types are grouped if they have the same renewal details (e.g., all valves). Assets that could not be assigned a standard unit cost (see Table 7-2) were assigned a direct renewal cost based on size – see notes a) and b) in Table 7-3.

Table 7-3. Renewal Interval Details

Asset Type (Description)	Renewal Interval, years	Renewal Description	Renewal Cost as Percent of Replacement Cost or Dollars
Civil/Site Assets			
Basin Type Flow-Through	20	Drain, inspect, and address minor issues	\$55/AF[(a)]
Basin Type Off-Channel	30	Drain, inspect, and address minor issues	\$55/AF[(a)]
Land/Property	NA	Does not require renewal	NA
Monitoring Well, Recharge Well	10	Inspect, repair	2
Culvert, under 48" diameter	25	Inspect and address minor issues	2
Box Culverts (all types)	20	Inspect and address minor issues	2
Basin Boundary Berm	15	Drain, inspect, and address minor issues	2
Concrete Spillway	30	Drain, inspect, and address minor issues	\$40/sq.ft.[(b)]
Rock Spillway	20	Drain, inspect, and address minor issues	\$10/sq.ft.[(b)]
Concrete/CMU Control Building	15	Drain, inspect, and address minor issues	2
Rubber Dam	15	Drain, inspect, and address minor issues	2
Pipeline	15	Drain, inspect, and address minor issues	2
Electrical, Instrumentation and Controls Assets			
Communication Radio	NA	Asset operational strategy is run-to-failure and/or asset will be obsolete by end of life; no renewal is recommended. Replace at end of useful life.	NA
HMIs, RTUs, I/O Hubs, PLCs, Control Panels, All Transmitters			
Transformer			
Flow Meter	10	Mechanical Rebuild/Overhaul	2
Generator	10	Mechanical Rebuild/Overhaul	2
Mechanical Assets			
Valves (all types)	10	Mechanical Rebuild/Overhaul	2
HVAC Unit	10	Mechanical Rebuild/Overhaul	2
Pump	10	Mechanical Rebuild/Overhaul	2
Sump Pump	NA	Asset operational strategy is run-to-fail; no renewal is recommended. Replace at end of useful life.	NA
Blower	10	Mechanical Rebuild/Overhaul	2

(a) Costs were developing using 2013 RMPU unit costs for Basin operation and maintenance per AF. Renewal is calculated in dollars per AF of Basin storage.

(b) Costs were developed using West Yost cost databases. Renewal is calculated in dollars per square feet of spillway area.

7.4.2 10-Year R&R Forecast

A 10-year forecast of R&R needs was developed based on the renewal and replacement (UL) intervals. Assumptions made in development of the forecast include:

- Replacement occurs at the end of each asset's UL, based on installation date. Once replacement occurs, the replacement and renewal intervals restart.
- Total replacement costs include soft costs, applied as a percentage of the calculated asset replacement cost. Soft costs are shown in Table 7-4 and were developed in the 2013 RMPU.
- Renewal is assumed to have occurred at the specified renewal interval since the installation date (i.e., renewal is not specified based on actual renewal completed by the parties, or lack thereof).
- Costs are escalated at 3 percent per year.

Table 7-4. Replacement Soft Costs (applied to Replacements only)

Soft Cost Category	Project Replacement Cost[a]		
	<$1M	$1-2M	>$2M
Mobilization	5	5	5
Contingency	20	15	10
Engineering/Administrative	20	15	10
Construction Management	20	15	10
Total	**65%**	**50%**	**35%**

(a) Shown in percent

Figure 7-1, Figure 7-2, and Table 7-5 present the R&R forecast for a 10-year period. In Figure 7-1, replacement costs are shown as the blue bar and renewal costs are shown as the orange bar. Assets that were already beyond their UL in 2023 are shown in the grey column in the first year (year zero). The five-year rolling average is shown as the gold line. In Figure 7-2, total costs (replacement, renewal, and overdue costs) are grouped and shown by the asset discipline categories in Table 7-3 (civil/site; electrical, instrumentation and controls; and mechanical).

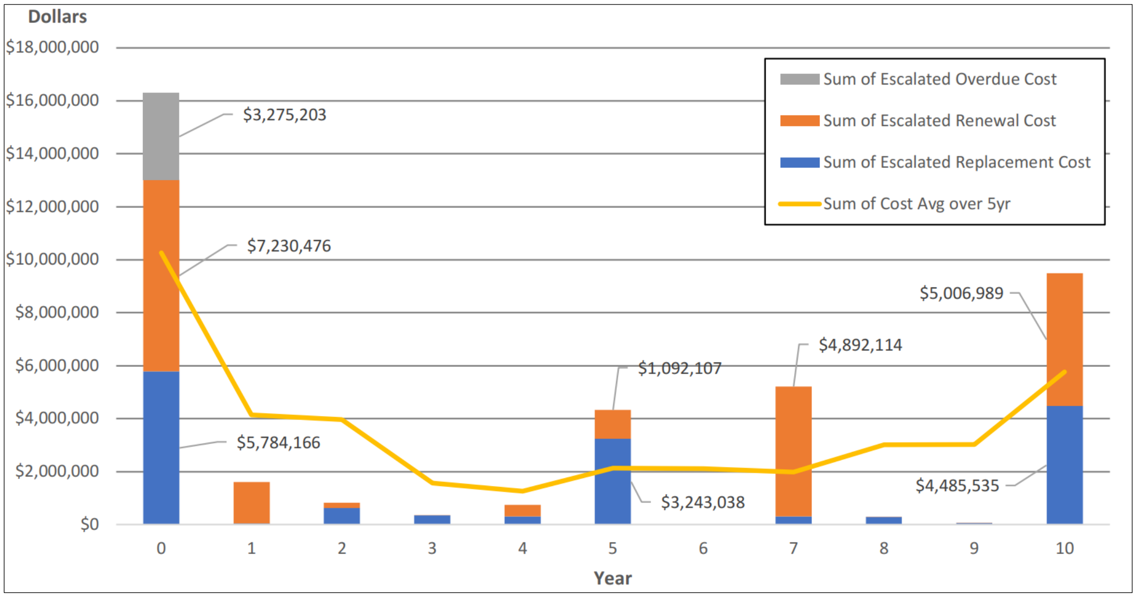


Figure 7-1. Summary of R&R 10-Year Forecast

Excluding the overdue replacements, the average R&R cost over the next 10-years is estimated at $3.3M per year. The total overdue replacements are shown in the first year of projections and total $3.3M. The majority of the overdue replacements include electrical, instrumentation, and controls assets which have a relatively short UL or are already beyond their UL. Appendix B details the renewal and replacement costs by year and asset, for the 10-year period.

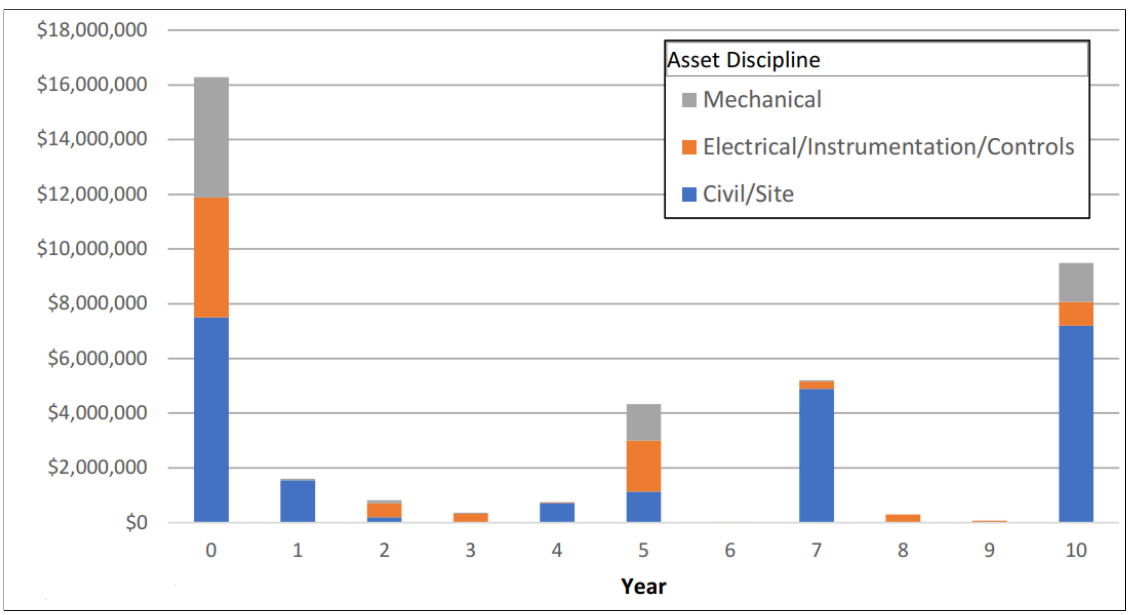


Figure 7-2. Summary of R&R 10-Year Forecast by Asset Discipline

Table 7-5. Summary of R&R 10-Year Forecast			
Year	Renewal Cost, dollars	Replacement Cost, dollars	Total R&R, dollars (Rounded)
0	7,230,476	5,784,166 plus 3,275,203[a]	16,290,000
1	1,554,810	50,413	1,610,000
2	193,046	630,937	830,000
3	4,997	352,307	360,000
4	430,369	315,508	750,000
5	1,092,107	3,243,038	4,340,000
6	-	22,315	30,000
7	4,892,114	315,666	5,210,000
8	5,007	284,086	290,000
9	9,657	60,960	80,000
10	5,006,989	4,485,535	9,500,000
Total (Rounded)	**$20,420,000**	**$18,830,000**	**$39,250,000**

(a) Overdue replacements are assets already beyond their UL (grey bar in Figure 7-1)

7.4.3 R&R Implementation Plan

The R&R projections developed in this chapter are intended to provide guidelines for long term budgeting and planning. There are various options to address the overdue replacements and program funding.

After the R&R projections are finalized, the focus should be to develop a comprehensive implementation plan that considers the estimated overdue costs, total renewal and replacement costs, and high peak costs over 10 years. The implementation plan should prioritize the replacements, budget for the costs, secure the necessary funding, execute the program, and monitor the progress to ensure that the assets are renewed to the required standard and at the appropriate time.

Assets or asset groups that meet any of the following criteria can be prioritized for renewal/replacement:

- Have a high risk of failure and would have significant consequences if they fail.
- Are heavily utilized and their failure would have a significant impact on users.
- Have operational or maintenance costs that are higher than expected.
- Have the potential to reduce life cycle costs by being replaced with a modern equivalent asset that can provide the same level of service[36].

A budgeting strategy can consider the estimated total replacement costs and the high peak costs. By developing a budget for each year of the program, Chino Basin Watermaster can ensure that the funding

[36] Based on IPWEA, 2015, IIMM, Sec 3.4.5, p 3|97

is available to execute the program according to the plan. The budget should also consider alternative financing options that may be available to supplement the available funding and spread the financial burden over a longer period.

By following these strategies, Chino Basin Watermaster can optimize the useful life of its assets, reduce the risk of failure, and provide the required level of service to its customers. Therefore, a robust implementation plan is critical to the success of the renewal and replacement program and should be developed with great care and attention to detail.

The implementation plan should include the following phases or steps:

1. **Confirm Asset Registry** – The asset registry developed for this RMPU was based on data provided by Watermaster Chino Basin parties and was developed at a high level. An asset registry that includes assets down to the major equipment level or managed asset level will provide greater granularity for evaluating infrastructure needs and forecast investment requirements. A criticality and risk assessment should be performed for assets in the confirmed asset registry. Criticality is a measure of the consequence of assets failure to perform at its prescribed level of service.
2. **Perform Condition Assessment** – Commission an assessment of asset condition based on the confirmed asset registry. The condition assessment should include, at a minimum, a review of maintenance records and other available data related to asset failure and performance, a visual inspection of each asset, in-depth testing where required based on the visual inspection and review of data. The condition assessment will provide a more accurate assessment of RUL and R&R requirements based on actual asset condition. With this, the R&R forecast should be updated.
3. **Investment Strategy** – Based on the condition assessment and an updated R&R forecast an investment strategy should be developed to identify annual funding requirements to meet renewal and replacement needs.

CHAPTER 8
Conclusions and Implementation Plan

This chapter summarizes the conclusions from the 2023 RMPU and includes recommendations for future actions and an implementation plan for the 2023 RMPU.

8.1 CONCLUSIONS

The following are the primary conclusions from the 2023 RMPU:

1. The MS4 information collection program included in Chapter 5 of the 2013 RMPU has been partially implemented. Based on the information collected through June 2022, stormwater recharge in the basin may have increased by about 840 afy.
2. The historical state of the balance of recharge and discharge for MZ1 is consistent with the Peace Agreements.
3. No changes are recommended for the 6,500 afy supplemental water recharge obligation in MZ1[37] (Peace II Agreement).
4. No changes are recommended in the current Watermaster prioritization of supplemental water recharge locations and amounts to meet balance of recharge and discharge requirement (Peace Agreement).
5. Based on the planning data provided by the parties, Metropolitan, and the IEUA, Watermaster has access to enough wet-water recharge capacity to meet its supplemental recharge obligations through 2045.

8.2 LIMITATIONS

The DCE Report noted that the "year-to-year changes in groundwater pumping projections and Parties' uncertainty in the use of Managed Storage and urban outdoor water use indicates that there is uncertainty in future cultural conditions." The uncertainty in future cultural conditions supported the DCE Report's recommendation to "[d]evelop multiple projection scenarios for the 2025 Safe Yield Reevaluation that represent the maximum range in future cultural conditions." The multiple projection scenarios that will be simulated for the 2025 Safe Yield Reevaluation will characterize a variety of cultural conditions, including pumping, recharge, and the use of Managed Storage to meet replenishment obligations. These scenarios will allow for a more comprehensive understanding of the Basin response to various water supply plans and climate scenarios and will improve Watermaster's ability to carry out its obligations regarding recharge in the Basin (see Chapter 1.2). Relevant findings from the 2025 Safe Yield Reevaluation will be summarized in the next RMPU.

8.3 OTHER RECHARGE-RELATED ACTIVITIES

The 2018 Recharge Master Plan Update (RMPU) provided a list of recharge projects that were considered but not recommended for implementation by the Chino Basin Parties (Parties). The recharge projects included: projects considered in the 2013 RMPU that were determined to be technically and institutionally feasible but had stormwater recharge unit costs that exceeded 2013 RMPU's economic feasibility threshold of $612 per acre-foot; and, other projects that the Parties brought to the 2018 RMPU Steering Committee that have not yet been implemented. Additionally, recharge projects were proposed through the 2020 Optimum Basin Management Plan Update (OBMPU) process. The 2018 RMPU projects that were

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[37] This value may be updated following further evaluation of the appropriate minimum, which will be part of the ongoing development of a MZ1 subsidence management plan.

considered but not recommended for implementation and the OBMPU recharge projects are referred to herein as Recharge Projects. At its October 27, 2022, meeting, the Watermaster Board discussed recent grant opportunities that are available for planning and construction of recharge and storage projects in the Chino Basin. The Watermaster Board emphasized the importance of having readily available information and documentation that could be used to support grant applications, since grant funding can change the economic feasibility of constructing the Recharge Projects. Based on the Board discussion, Watermaster began developing a Work Plan that will include the following information:

- A description of the information and documentation required for Recharge Projects to be eligible for grant funding opportunities.
- A description of the Recharge Projects in the 2018 RMPU and OBMPU and current level of analysis.
- A current list of Recharge Projects, reflecting the Parties' recommended removals and additions of projects since the 2013 RMPU.

Table 8-1 lists the Recharge Projects from the 2018 RMPU and the 2020 OBMPU Project Description. The locations of these projects are shown in Figure 8-1. Figure 8-1 also shows the location of: areas of pumping sustainability and subsidence concern, recycled and imported water pipelines, and groundwater plumes in relation to the Recharge Projects. The projects listed in Table 8-1 include projects that were considered in the 2013 RMPU and determined to be technically and institutionally feasible but whose unit stormwater recharge costs exceeded the economic feasibility threshold established in the 2013 RMPU of $612 per af. For those projects, where a cost had been developed, the unit stormwater recharge costs were projected to 2023 costs. Additional projects were recommended as part of the 2018 RMPU scoping process and the 2020 OBMPU environmental review process, which is ongoing. These projects are included in Table 8-1, and they should be evaluated more thoroughly in the future when their project descriptions and operating characteristics are more clearly defined.

The unit cost of new stormwater recharge for the projects listed in Table 8-1 ranges from $2,150 to $6,500 per af. In all cases, the projected unit cost of new stormwater recharge projects listed in Table 8-1 exceeds the projected cost of water that could be supplied by Metropolitan in 2023 at about $900 per af (see Table 4-4). However, the cost-benefit of these projects can change when the costs of the WaterFix project are included in the cost of imported water supplied by Metropolitan and/or if grant funding could be obtained that would lower the unit cost of stormwater recharge. Watermaster is continuing to review and analyze these projects.

8.4 IMPLEMENTATION PLAN

The 2023 RMPU implementation plan includes the following:

1. Continue the implementation of the final recommended 2013 RMPU yield enhancement projects.
2. Continue the implementation of the Board-requested recharge project analysis as described in Chapter 8.3.
3. Develop the scope and budget for the 2028 RMPU in FY 2026/27.
4. Complete the 2028 RMPU in FY 2027/28 and file the 2028 RMPU report with the Court in October 2028.

5. Annually review the time and effort involved in the collection of information on MS4 project implementation and reassess the value this effort provides.
6. Develop a plan to collaborate with MS4 permittees to ensure MS4-compliance projects prioritize recharge.
7. Refine and implement the R&R implementation plan defined in Chapter 7.4.2

Table 8-1. Recharge Projects and Status

Project Name	Land Owner	Capital Cost [(a)] ($)	New Stormwater Recharge[(a)] (afy)	Unit Stormwater Recharge Cost[(a)] ($/af)
San Antonio/Chino Creek				
North West Upland Basin	City of Upland	$6,574,000	93	$4,620
Montclair Basins	CBWCD	$5,600,000	68	$5,400
California Institution for Men (CIM) [(b)]	State of California	NE	NE	NE
Cucamonga Creek				
Ely Basin	CBWCD, SBCFCD	$3,017,000	101	$1,990
Lower Cucamonga Ponds[(b)]	SBCFCD	NE	NE	NE
Day Creek				
Riverside Basin[(b)]	RCFC	NE	NE	NE
San Sevaine Creek				
Sultana Avenue	City of Fontana	$601,000	7	$5,620
Jurupa Basin[(b)]	SBCFCD	NE	NE	NE
Agricultural Managed Aquifer Recharge (AgMAR)	n/a	NE	NE	NE
Prado Basin				
Mill Creek Wetlands[(b)]	USACE	NE	NE	NE
Basin-Wide				
ASR Wells	n/a	NE	NE	NE
MS4 Compliance Projects	n/a	NE	NE	NE
Regional Recharge Distribution System	n/a	$184,000,000	5,000	$2,810

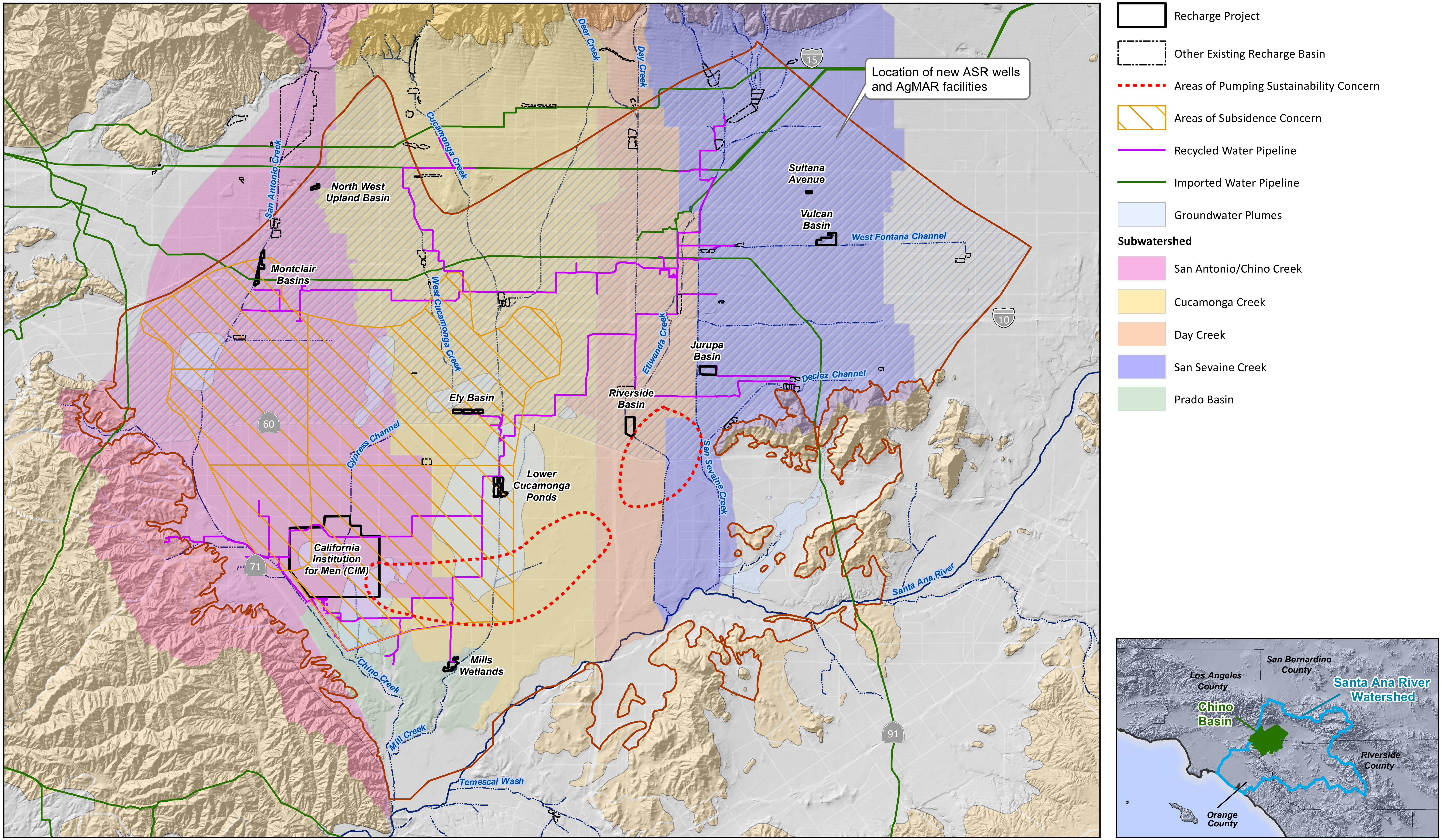
Source: 2018 RMPU; 2020 OBMPU Project Description

(a) Projects considered to have the information and documentation necessary to apply for grant funding were evaluated in 2013. The project costs were re-evaluated in 2018 as part of the 2018 RMPU. However, it should be noted that the project cost and benefit should be re-evaluated based on most current conditions.

(b) These projects are considered elements of the Regional Recharge Distribution System project listed under "Basin-Wide."

(c) The Regional Recharge Distribution system was evaluated at a conceptual level in 2017. However, the evaluation was not documented in any RMPUs and is considered insufficient for grant funding applications.

afy – acre-feet per year; af - acre-feet; NE - Not Estimated; n/a - not applicable; USACE - US Army Corps of Engineers



Prepared by:

WEST YOST

Prepared for:

Chino Basin Watermaster
2023 Recharge Master Plan Update

Recharge Projects
Location Map

Figure 8-1

CHAPTER 9
References

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Appendix A

In-Lieu Recharge Calculations for Appropriative Pool Parties

A1: Under Current Conditions

A2: Under Design Conditions

A1. Under Current Conditions

Appendix A1 -- In-Lieu Recharge Calculations for Appropriative Pool Parties Under Current Conditions (afy)

Party	Month	Facility Capacity	Imported Water and Treatment Constraints										Groundwater Right Constraints					Maximum In-Lieu Capacity Based on Overriding Constraint				
			Imported Water Supply to Meet Demand					Excess Imported Water Capacity					Projected Pumping from Chino Basin									
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Chino	July	281	334	334	413	413	413	0	0	0	0	0	989	1,136	1,156	1,378	1,378	0	0	0	0	0
	August	281	346	346	428	428	428	0	0	0	0	0	989	1,136	1,156	1,378	1,378	0	0	0	0	0
	September	272	319	319	394	394	394	0	0	0	0	0	989	1,136	1,156	1,378	1,378	0	0	0	0	0
	October	140	247	247	305	305	305	0	0	0	0	0	989	1,136	1,156	1,378	1,378	0	0	0	0	0
	November	136	210	210	260	260	260	0	0	0	0	0	662	780	882	1,060	1,060	0	0	0	0	0
	December	140	151	151	187	187	187	0	0	0	0	0	499	602	691	847	847	0	0	0	0	0
	January	140	152	152	188	188	188	0	0	0	0	0	336	424	500	633	633	0	0	0	0	0
	February	127	137	137	170	170	170	0	0	0	0	0	336	424	500	633	633	0	0	0	0	0
	March	140	151	151	187	187	187	0	0	0	0	0	336	424	500	633	633	0	0	0	0	0
	April	272	179	179	221	221	221	92	92	50	50	50	662	780	882	1,060	1,060	92	92	50	50	50
	May	281	243	243	300	300	300	38	38	0	0	0	826	958	965	1,165	1,165	38	38	0	0	0
	June	272	270	270	334	334	334	1	1	0	0	0	989	1,136	1,156	1,378	1,378	1	1	0	0	0
	Total	*2,481*	*2,742*	*2,742*	*3,387*	*3,387*	*3,387*	*131*	*131*	*50*	*50*	*50*	*8,603*	*10,070*	*10,702*	*12,923*	*12,923*	*131*	*131*	*50*	*50*	*50*
City of Chino Hills	July	747	296	302	311	312	313	450	445	436	435	433	249	253	261	262	263	249	253	261	262	263
	August	747	296	302	311	312	313	451	445	436	435	434	256	261	269	270	271	256	261	269	270	271
	September	723	207	211	217	218	219	516	512	506	505	504	222	226	232	233	234	222	226	232	233	234
	October	373	207	211	217	218	219	166	162	156	155	155	216	220	226	227	228	166	162	156	155	155
	November	361	170	173	178	179	180	191	188	183	182	182	173	177	182	183	183	173	177	182	182	182
	December	373	161	164	169	170	171	212	209	204	204	203	115	117	121	121	122	115	117	121	121	122
	January	373	162	165	170	171	172	211	208	203	202	202	55	56	57	58	58	55	56	57	58	58
	February	337	174	177	182	183	184	164	160	155	154	154	82	83	86	86	87	82	83	86	86	87
	March	373	252	257	264	265	266	121	117	109	108	107	86	88	91	91	91	86	88	91	91	91
	April	723	207	211	218	219	219	515	511	505	504	503	202	206	212	213	213	202	206	212	213	213
	May	747	206	210	216	217	218	541	537	531	530	529	224	228	235	236	237	224	228	235	236	237
	June	723	274	279	288	289	290	449	443	435	434	433	214	218	224	225	226	214	218	224	225	226
	Total	*6,601*	*2,613*	*2,662*	*2,742*	*2,753*	*2,763*	*3,988*	*3,939*	*3,859*	*3,848*	*3,838*	*2,093*	*2,132*	*2,196*	*2,204*	*2,213*	*2,043*	*2,075*	*2,126*	*2,132*	*2,137*
Monte Vista Water District	July	1,142	697	711	732	735	737	444	431	410	407	404	765	799	862	888	916	444	431	410	407	404
	August	1,142	741	755	777	780	783	401	387	364	361	359	641	670	722	745	768	401	387	364	361	359
	September	1,105	649	661	681	683	686	456	444	424	421	419	456	476	513	529	546	456	444	424	421	419
	October	571	566	577	594	596	598	5	0	0	0	0	583	609	657	677	698	5	0	0	0	0
	November	552	421	429	442	444	446	131	123	110	108	107	721	753	812	837	863	131	123	110	108	107
	December	571	313	318	328	329	330	258	252	243	242	240	601	627	677	698	719	258	252	243	242	240
	January	571	314	320	329	331	332	257	251	241	240	239	593	620	668	689	711	257	251	241	240	239
	February	516	318	324	334	335	336	198	192	182	181	179	486	508	548	565	582	198	192	182	181	179
	March	571	404	412	424	426	427	167	159	147	145	144	542	566	611	630	649	167	159	147	145	144
	April	1,105	411	419	432	433	435	694	686	673	672	670	560	585	631	650	670	560	585	631	650	670
	May	1,142	471	480	495	497	498	670	661	647	645	643	791	826	891	919	947	670	661	647	645	643
	June	1,105	611	622	641	643	646	494	483	464	462	459	722	754	813	838	864	494	483	464	462	459
	Total	*10,091*	*5,916*	*6,028*	*6,207*	*6,232*	*6,255*	*4,175*	*4,069*	*3,906*	*3,884*	*3,863*	*7,461*	*7,793*	*8,404*	*8,666*	*8,935*	*4,041*	*3,968*	*3,863*	*3,863*	*3,863*

Party	Month	Facilty Capacity	Imported Water and Treatment Constraints										Groundwater Right Constraints					Maximum In-Lieu Capacity Based on Overriding Constraint				
			Imported Water Supply to Meet Demand					Excess Imported Water Capacity					Projected Pumping from Chino Basin									
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Ontario	July	1,494	1,076	1,272	1,468	1,663	1,663	417	222	26	0	0	2,285	2,586	2,815	3,552	3,552	417	222	26	0	0
	August	1,494	1,445	1,708	1,971	2,234	2,234	48	0	0	0	0	2,166	2,451	2,668	3,367	3,367	48	0	0	0	0
	September	1,445	1,668	1,971	2,274	2,578	2,578	0	0	0	0	0	1,716	1,942	2,113	2,667	2,667	0	0	0	0	0
	October	747	1,522	1,799	2,076	2,353	2,353	0	0	0	0	0	1,442	1,632	1,777	2,242	2,242	0	0	0	0	0
	November	723	939	1,109	1,280	1,451	1,451	0	0	0	0	0	1,375	1,556	1,693	2,137	2,137	0	0	0	0	0
	December	747	443	523	604	684	684	304	224	143	63	63	1,278	1,447	1,575	1,987	1,987	304	224	143	63	63
	January	747	493	583	672	762	762	254	164	74	0	0	1,163	1,316	1,432	1,808	1,808	254	164	74	0	0
	February	675	489	578	667	756	756	185	96	7	0	0	1,356	1,534	1,670	2,107	2,107	185	96	7	0	0
	March	747	544	643	742	841	841	203	104	5	0	0	1,300	1,471	1,601	2,020	2,020	203	104	5	0	0
	April	1,445	585	691	798	904	904	861	754	648	542	542	1,827	2,068	2,251	2,841	2,841	861	754	648	542	542
	May	1,494	908	1,074	1,239	1,404	1,404	585	420	255	90	90	2,033	2,300	2,504	3,160	3,160	585	420	255	90	90
	June	1,445	887	1,048	1,209	1,370	1,370	559	398	236	75	75	2,309	2,613	2,844	3,589	3,589	559	398	236	75	75
	Total	*13,202*	*11,000*	*13,000*	*15,000*	*17,000*	*17,000*	*3,416*	*2,381*	*1,395*	*769*	*769*	*20,249*	*22,915*	*24,943*	*31,476*	*31,476*	*3,416*	*2,381*	*1,395*	*769*	*769*
City of Upland	July	1,094	452	543	662	719	764	642	551	432	375	331	520	520	520	520	520	520	520	432	375	331
	August	1,094	516	620	756	821	872	578	474	338	273	223	559	559	559	559	559	559	474	338	273	223
	September	1,059	489	587	716	778	826	570	471	343	281	233	480	480	480	480	480	480	471	343	281	233
	October	547	476	573	698	758	805	71	0	0	0	0	444	444	444	444	444	71	0	0	0	0
	November	529	292	351	428	465	494	237	178	101	64	36	285	285	285	285	285	237	178	101	64	36
	December	547	243	292	356	387	411	304	255	191	160	136	460	460	460	460	460	304	255	191	160	136
	January	547	256	308	375	407	433	291	239	172	140	115	488	488	488	488	488	291	239	172	140	115
	February	494	197	237	289	314	334	297	257	205	180	160	385	385	385	385	385	297	257	205	180	160
	March	547	194	233	284	308	327	353	314	263	239	220	422	422	422	422	422	353	314	263	239	220
	April	1,059	201	242	295	320	340	858	817	764	739	719	519	519	519	519	519	519	519	519	519	519
	May	1,094	221	266	324	352	374	873	828	770	742	720	647	647	647	647	647	647	647	647	647	647
	June	1,059	272	327	399	433	460	787	732	660	626	599	535	535	535	535	535	535	535	535	535	535
	Total	*9,670*	*3,808*	*4,579*	*5,581*	*6,063*	*6,437*	*5,862*	*5,117*	*4,240*	*3,818*	*3,491*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*4,813*	*4,409*	*3,746*	*3,412*	*3,153*
Cucamonga Valley Water District	July	5,718	3,352	3,352	3,352	3,352	3,352	2,366	2,366	2,366	2,366	2,366	1,176	1,695	1,874	2,023	2,023	1,176	1,695	1,874	2,023	2,023
	August	5,718	3,358	3,358	3,358	3,358	3,358	2,361	2,361	2,361	2,361	2,361	1,178	1,698	1,877	2,026	2,026	1,178	1,698	1,877	2,026	2,026
	September	5,534	3,028	3,029	3,028	3,029	3,029	2,506	2,505	2,506	2,505	2,505	1,062	1,531	1,693	1,827	1,827	1,062	1,531	1,693	1,827	1,827
	October	5,718	2,682	2,682	2,682	2,682	2,682	3,037	3,037	3,037	3,037	3,037	941	1,356	1,499	1,618	1,618	941	1,356	1,499	1,618	1,618
	November	5,534	2,096	2,096	2,096	2,096	2,096	3,438	3,438	3,438	3,438	3,438	735	1,060	1,172	1,265	1,265	735	1,060	1,172	1,265	1,265
	December	5,718	1,729	1,729	1,729	1,729	1,729	3,989	3,990	3,989	3,990	3,990	607	874	967	1,043	1,043	607	874	967	1,043	1,043
	January	5,718	1,713	1,713	1,714	1,714	1,714	4,005	4,005	4,005	4,005	4,005	601	866	958	1,034	1,034	601	866	958	1,034	1,034
	February	5,165	1,589	1,589	1,589	1,589	1,589	3,576	3,576	3,576	3,576	3,576	557	803	888	959	959	557	803	888	959	959
	March	5,718	1,773	1,773	1,773	1,773	1,773	3,945	3,945	3,946	3,945	3,945	622	896	991	1,070	1,070	622	896	991	1,070	1,070
	April	5,534	2,243	2,243	2,243	2,243	2,243	3,291	3,291	3,291	3,291	3,291	787	1,134	1,254	1,353	1,353	787	1,134	1,254	1,353	1,353
	May	5,718	2,654	2,654	2,654	2,654	2,654	3,064	3,064	3,065	3,065	3,065	931	1,342	1,483	1,601	1,601	931	1,342	1,483	1,601	1,601
	June	5,534	3,001	3,001	3,001	3,001	3,001	2,533	2,533	2,533	2,533	2,533	1,053	1,517	1,677	1,811	1,811	1,053	1,517	1,677	1,811	1,811
	Total	*67,330*	*29,219*	*29,219*	*29,219*	*29,219*	*29,219*	*38,111*	*38,111*	*38,111*	*38,111*	*38,111*	*10,250*	*14,773*	*16,331*	*17,630*	*17,630*	*10,250*	*14,773*	*16,331*	*17,630*	*17,630*

Party	Month	Imported Water and Treatment Constraints											Groundwater Right Constraints					Maximum In-Lieu Capacity Based on Overriding Constraint				
		Facilty Capacity	Imported Water Supply to Meet Demand					Excess Imported Water Capacity					Projected Pumping from Chino Basin									
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Pomona	July	578	893	893	893	893	893	0	0	0	0	0	953	1,026	1,101	1,174	1,250	0	0	0	0	0
City of Pomona	August	578	946	946	946	946	946	0	0	0	0	0	967	1,041	1,118	1,192	1,269	0	0	0	0	0
City of Pomona	September	559	850	850	850	850	850	0	0	0	0	0	951	1,024	1,099	1,172	1,247	0	0	0	0	0
City of Pomona	October	578	638	638	638	638	638	0	0	0	0	0	952	1,025	1,100	1,173	1,249	0	0	0	0	0
City of Pomona	November	559	393	393	393	393	393	166	166	166	166	166	907	976	1,047	1,117	1,189	166	166	166	166	166
City of Pomona	December	578	203	203	203	203	203	375	375	375	375	375	868	934	1,002	1,069	1,138	375	375	375	375	375
City of Pomona	January	578	172	172	172	172	172	405	405	405	405	405	880	947	1,016	1,084	1,153	405	405	405	405	405
City of Pomona	February	522	136	136	136	136	136	385	385	385	385	385	839	903	970	1,034	1,101	385	385	385	385	385
City of Pomona	March	578	161	161	161	161	161	416	416	416	416	416	867	933	1,001	1,068	1,136	416	416	416	416	416
City of Pomona	April	559	385	385	385	385	385	174	174	174	174	174	865	931	1,000	1,066	1,135	174	174	174	174	174
City of Pomona	May	578	518	518	518	518	518	60	60	60	60	60	919	989	1,061	1,132	1,205	60	60	60	60	60
City of Pomona	June	559	704	704	704	704	704	0	0	0	0	0	889	957	1,027	1,096	1,166	0	0	0	0	0
	Total	*6,800*	*6,000*	*6,000*	*6,000*	*6,000*	*6,000*	*1,982*	*1,982*	*1,982*	*1,982*	*1,982*	*10,858*	*11,685*	*12,543*	*13,376*	*14,238*	*1,982*	*1,982*	*1,982*	*1,982*	*1,982*

A2. Under Design Conditions

Appendix A2 -- In-Lieu Recharge Calculations for Appropriative Pool Parties Under Design Conditions (afy)

Party	Month	Facility Capacity	Imported Water and Treatment Constraints: Imported/Surface Water Supply to Meet Demand					Imported Water and Treatment Constraints: Excess Imported/Surface Water Capacity					Groundwater Right Constraints: Projected Pumping from Chino Basin					Maximum In-Lieu Capacity Based on Overriding Constraint				
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Chino	July	455	334	334	413	413	413	120	120	42	42	42	989	1,136	1,156	1,378	1,378	120	120	42	42	42
	August	455	346	346	428	428	428	108	108	27	27	27	989	1,136	1,156	1,378	1,378	108	108	27	27	27
	September	440	319	319	394	394	394	121	121	46	46	46	989	1,136	1,156	1,378	1,378	121	121	46	46	46
	October	455	247	247	305	305	305	208	208	150	150	150	989	1,136	1,156	1,378	1,378	208	208	150	150	150
	November	440	210	210	260	260	260	230	230	180	180	180	662	780	882	1,060	1,060	230	230	180	180	180
	December	455	151	151	187	187	187	303	303	268	268	268	499	602	691	847	847	303	303	268	268	268
	January	455	152	152	188	188	188	302	302	266	266	266	336	424	500	633	633	302	302	266	266	266
	February	411	137	137	170	170	170	273	273	241	241	241	336	424	500	633	633	273	273	241	241	241
	March	455	151	151	187	187	187	303	303	268	268	268	336	424	500	633	633	303	303	268	268	268
	April	440	179	179	221	221	221	261	261	219	219	219	662	780	882	1,060	1,060	261	261	219	219	219
	May	455	243	243	300	300	300	212	212	154	154	154	826	958	965	1,165	1,165	212	212	154	154	154
	June	440	270	270	334	334	334	170	170	106	106	106	989	1,136	1,156	1,378	1,378	170	170	106	106	106
	Total	*5,353*	*2,742*	*2,742*	*3,387*	*3,387*	*3,387*	*2,611*	*2,611*	*1,966*	*1,966*	*1,966*	*8,603*	*10,070*	*10,702*	*12,923*	*12,923*	*2,611*	*2,611*	*1,966*	*1,966*	*1,966*
City of Chino Hills	July	1,210	296	302	311	312	313	913	908	899	898	896	249	253	261	262	263	249	253	261	262	263
	August	1,210	296	302	311	312	313	914	908	899	898	897	256	261	269	270	271	256	261	269	270	271
	September	1,171	207	211	217	218	219	964	960	954	953	952	222	226	232	233	234	222	226	232	233	234
	October	1,210	207	211	217	218	219	1,003	999	993	992	991	216	220	226	227	228	216	220	226	227	228
	November	1,171	170	173	178	179	180	1,001	998	993	992	991	173	177	182	183	183	173	177	182	183	183
	December	1,210	161	164	169	170	171	1,049	1,046	1,041	1,040	1,039	115	117	121	121	122	115	117	121	121	122
	January	1,210	162	165	170	171	172	1,047	1,044	1,039	1,039	1,038	55	56	57	58	58	55	56	57	58	58
	February	1,093	174	177	182	183	184	919	916	911	910	909	82	83	86	86	87	82	83	86	86	87
	March	1,210	252	257	264	265	266	958	953	945	944	943	86	88	91	91	91	86	88	91	91	91
	April	1,171	207	211	218	219	219	963	959	953	952	951	202	206	212	213	213	202	206	212	213	213
	May	1,210	206	210	216	217	218	1,004	1,000	994	993	992	224	228	235	236	237	224	228	235	236	237
	June	1,171	274	279	288	289	290	897	892	883	882	881	214	218	224	225	226	214	218	224	225	226
	Total	*14,245*	*2,613*	*2,662*	*2,742*	*2,753*	*2,763*	*11,632*	*11,583*	*11,503*	*11,492*	*11,482*	*2,093*	*2,132*	*2,196*	*2,204*	*2,213*	*2,093*	*2,132*	*2,196*	*2,204*	*2,213*
Monte Vista Water District	July	1,849	697	711	732	735	737	1,152	1,139	1,118	1,115	1,112	765	799	862	888	916	765	799	862	888	916
	August	1,849	741	755	777	780	783	1,109	1,095	1,072	1,069	1,066	641	670	722	745	768	641	670	722	745	768
	September	1,790	649	661	681	683	686	1,141	1,129	1,109	1,106	1,104	456	476	513	529	546	456	476	513	529	546
	October	1,849	566	577	594	596	598	1,284	1,273	1,256	1,253	1,251	583	609	657	677	698	583	609	657	677	698
	November	1,790	421	429	442	444	446	1,368	1,360	1,348	1,346	1,344	721	753	812	837	863	721	753	812	837	863
	December	1,849	313	318	328	329	330	1,537	1,531	1,521	1,520	1,519	601	627	677	698	719	601	627	677	698	719
	January	1,849	314	320	329	331	332	1,535	1,529	1,520	1,519	1,517	593	620	668	689	711	593	620	668	689	711
	February	1,670	318	324	334	335	336	1,352	1,346	1,337	1,335	1,334	486	508	548	565	582	486	508	548	565	582
	March	1,849	404	412	424	426	427	1,446	1,438	1,426	1,424	1,422	542	566	611	630	649	542	566	611	630	649
	April	1,790	411	419	432	433	435	1,378	1,371	1,358	1,356	1,355	560	585	631	650	670	560	585	631	650	670
	May	1,849	471	480	495	497	498	1,378	1,369	1,355	1,353	1,351	791	826	891	919	947	791	826	891	919	947
	June	1,790	611	622	641	643	646	1,179	1,168	1,149	1,147	1,144	722	754	813	838	864	722	754	813	838	864
	Total	*21,776*	*5,916*	*6,028*	*6,207*	*6,232*	*6,255*	*15,860*	*15,748*	*15,568*	*15,544*	*15,521*	*7,461*	*7,793*	*8,404*	*8,666*	*8,935*	*7,461*	*7,793*	*8,404*	*8,666*	*8,935*

Party	Month	Imported Water and Treatment Constraints											Groundwater Right Constraints					Maximum In-Lieu Capacity Based on Overriding Constraint				
		Facilty Capacity	Imported/Surface Water Supply to Meet Demand					Excess Imported/Surface Water Capacity					Projected Pumping from Chino Basin									
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Ontario	July	2,420	1,076	1,272	1,468	1,663	1,663	1,343	1,148	952	756	756	2,285	2,586	2,815	3,552	3,552	1,343	1,148	952	756	756
	August	2,420	1,445	1,708	1,971	2,234	2,234	974	711	449	186	186	2,166	2,451	2,668	3,367	3,367	974	711	449	186	186
	September	2,342	1,668	1,971	2,274	2,578	2,578	674	371	67	0	0	1,716	1,942	2,113	2,667	2,667	674	371	67	0	0
	October	2,420	1,522	1,799	2,076	2,353	2,353	897	620	344	67	67	1,442	1,632	1,777	2,242	2,242	897	620	344	67	67
	November	2,342	939	1,109	1,280	1,451	1,451	1,403	1,232	1,062	891	891	1,375	1,556	1,693	2,137	2,137	1,375	1,232	1,062	891	891
	December	2,420	443	523	604	684	684	1,977	1,897	1,816	1,736	1,736	1,278	1,447	1,575	1,987	1,987	1,278	1,447	1,575	1,736	1,736
	January	2,420	493	583	672	762	762	1,927	1,837	1,747	1,658	1,658	1,163	1,316	1,432	1,808	1,808	1,163	1,316	1,432	1,658	1,658
	February	2,186	489	578	667	756	756	1,696	1,607	1,518	1,429	1,429	1,356	1,534	1,670	2,107	2,107	1,356	1,534	1,518	1,429	1,429
	March	2,420	544	643	742	841	841	1,875	1,776	1,678	1,579	1,579	1,300	1,471	1,601	2,020	2,020	1,300	1,471	1,601	1,579	1,579
	April	2,342	585	691	798	904	904	1,757	1,650	1,544	1,438	1,438	1,827	2,068	2,251	2,841	2,841	1,757	1,650	1,544	1,438	1,438
	May	2,420	908	1,074	1,239	1,404	1,404	1,511	1,346	1,181	1,016	1,016	2,033	2,300	2,504	3,160	3,160	1,511	1,346	1,181	1,016	1,016
	June	2,342	887	1,048	1,209	1,370	1,370	1,455	1,294	1,133	971	971	2,309	2,613	2,844	3,589	3,589	1,455	1,294	1,133	971	971
	Total	*28,490*	*11,000*	*13,000*	*15,000*	*17,000*	*17,000*	*17,490*	*15,490*	*13,490*	*11,726*	*11,726*	*20,249*	*22,915*	*24,943*	*31,476*	*31,476*	*15,083*	*14,140*	*12,857*	*11,726*	*11,726*
City of Upland	July	1,772	452	543	662	719	764	1,321	1,229	1,110	1,053	1,009	520	520	520	520	520	520	520	520	520	520
	August	1,772	516	620	756	821	872	1,257	1,152	1,017	951	901	559	559	559	559	559	559	559	559	559	559
	September	1,715	489	587	716	778	826	1,227	1,128	999	937	889	480	480	480	480	480	480	480	480	480	480
	October	1,772	476	573	698	758	805	1,296	1,200	1,074	1,014	967	444	444	444	444	444	444	444	444	444	444
	November	1,715	292	351	428	465	494	1,423	1,364	1,287	1,250	1,222	285	285	285	285	285	285	285	285	285	285
	December	1,772	243	292	356	387	411	1,529	1,480	1,416	1,386	1,362	460	460	460	460	460	460	460	460	460	460
	January	1,772	256	308	375	407	433	1,517	1,465	1,397	1,365	1,340	488	488	488	488	488	488	488	488	488	488
	February	1,601	197	237	289	314	334	1,403	1,363	1,311	1,286	1,267	385	385	385	385	385	385	385	385	385	385
	March	1,772	194	233	284	308	327	1,579	1,539	1,488	1,464	1,445	422	422	422	422	422	422	422	422	422	422
	April	1,715	201	242	295	320	340	1,514	1,474	1,421	1,395	1,376	519	519	519	519	519	519	519	519	519	519
	May	1,772	221	266	324	352	374	1,551	1,507	1,448	1,420	1,399	647	647	647	647	647	647	647	647	647	647
	June	1,715	272	327	399	433	460	1,443	1,388	1,317	1,282	1,255	535	535	535	535	535	535	535	535	535	535
	Total	*20,868*	*3,808*	*4,579*	*5,581*	*6,063*	*6,437*	*17,060*	*16,289*	*15,287*	*14,805*	*14,431*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*	*5,743*
Cucamonga Valley Water District	July	5,718	3,352	3,352	3,352	3,352	3,352	2,366	2,366	2,366	2,366	2,366	1,176	1,695	1,874	2,023	2,023	1,176	1,695	1,874	2,023	2,023
	August	5,718	3,358	3,358	3,358	3,358	3,358	2,361	2,361	2,361	2,361	2,361	1,178	1,698	1,877	2,026	2,026	1,178	1,698	1,877	2,026	2,026
	September	5,534	3,028	3,029	3,028	3,029	3,029	2,506	2,505	2,506	2,505	2,505	1,062	1,531	1,693	1,827	1,827	1,062	1,531	1,693	1,827	1,827
	October	5,718	2,682	2,682	2,682	2,682	2,682	3,037	3,037	3,037	3,037	3,037	941	1,356	1,499	1,618	1,618	941	1,356	1,499	1,618	1,618
	November	5,534	2,096	2,096	2,096	2,096	2,096	3,438	3,438	3,438	3,438	3,438	735	1,060	1,172	1,265	1,265	735	1,060	1,172	1,265	1,265
	December	5,718	1,729	1,729	1,729	1,729	1,729	3,989	3,990	3,989	3,990	3,990	607	874	967	1,043	1,043	607	874	967	1,043	1,043
	January	5,718	1,713	1,713	1,714	1,714	1,714	4,005	4,005	4,005	4,005	4,005	601	866	958	1,034	1,034	601	866	958	1,034	1,034
	February	5,165	1,589	1,589	1,589	1,589	1,589	3,576	3,576	3,576	3,576	3,576	557	803	888	959	959	557	803	888	959	959
	March	5,718	1,773	1,773	1,773	1,773	1,773	3,945	3,945	3,946	3,945	3,945	622	896	991	1,070	1,070	622	896	991	1,070	1,070
	April	5,534	2,243	2,243	2,243	2,243	2,243	3,291	3,291	3,291	3,291	3,291	787	1,134	1,254	1,353	1,353	787	1,134	1,254	1,353	1,353
	May	5,718	2,654	2,654	2,654	2,654	2,654	3,064	3,064	3,065	3,065	3,065	931	1,342	1,483	1,601	1,601	931	1,342	1,483	1,601	1,601
	June	5,534	3,001	3,001	3,001	3,001	3,001	2,533	2,533	2,533	2,533	2,533	1,053	1,517	1,677	1,811	1,811	1,053	1,517	1,677	1,811	1,811
	Total	*67,330*	*29,219*	*29,219*	*29,219*	*29,219*	*29,219*	*38,111*	*38,111*	*38,111*	*38,111*	*38,111*	*10,250*	*14,773*	*16,331*	*17,630*	*17,630*	*10,250*	*14,773*	*16,331*	*17,630*	*17,630*

Party	Month	Imported Water and Treatment Constraints											Groundwater Right Constraints					Maximum In-Lieu Capacity Based on Overriding Constraint				
		Facilty Capacity	Imported/Surface Water Supply to Meet Demand					Excess Imported/Surface Water Capacity					Projected Pumping from Chino Basin									
			2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045	2025	2030	2035	2040	2045
City of Pomona	July	578	893	893	893	893	893	0	0	0	0	0	953	1,026	1,101	1,174	1,250	0	0	0	0	0
	August	578	946	946	946	946	946	0	0	0	0	0	967	1,041	1,118	1,192	1,269	0	0	0	0	0
	September	559	850	850	850	850	850	0	0	0	0	0	951	1,024	1,099	1,172	1,247	0	0	0	0	0
	October	578	638	638	638	638	638	0	0	0	0	0	952	1,025	1,100	1,173	1,249	0	0	0	0	0
	November	559	393	393	393	393	393	166	166	166	166	166	907	976	1,047	1,117	1,189	166	166	166	166	166
	December	578	203	203	203	203	203	375	375	375	375	375	868	934	1,002	1,069	1,138	375	375	375	375	375
	January	578	172	172	172	172	172	405	405	405	405	405	880	947	1,016	1,084	1,153	405	405	405	405	405
	February	522	136	136	136	136	136	385	385	385	385	385	839	903	970	1,034	1,101	385	385	385	385	385
	March	578	161	161	161	161	161	416	416	416	416	416	867	933	1,001	1,068	1,136	416	416	416	416	416
	April	559	385	385	385	385	385	174	174	174	174	174	865	931	1,000	1,066	1,135	174	174	174	174	174
	May	578	518	518	518	518	518	60	60	60	60	60	919	989	1,061	1,132	1,205	60	60	60	60	60
	June	559	704	704	704	704	704	0	0	0	0	0	889	957	1,027	1,096	1,166	0	0	0	0	0
	Total	*6,800*	*6,000*	*6,000*	*6,000*	*6,000*	*6,000*	*1,982*	*1,982*	*1,982*	*1,982*	*1,982*	*10,858*	*11,685*	*12,543*	*13,376*	*14,238*	*1,982*	*1,982*	*1,982*	*1,982*	*1,982*

Appendix B

Renewal and Replacement Projection Details (10-year period)

Row Labels	Sum of Escalated Total Cost
2024	**$16,289,845**
Overdue Replacement	**$3,275,203**
IEUA-7AND8-8TH-RW-INST-PRESSURE	$9,344
IEUA-7AND8-E&I-CONTROL-HMI	$18,688
IEUA-7AND8-E&I-CONTROL-I/O	$46,721
IEUA-7AND8-E&I-CONTROL-PLC	$46,721
IEUA-7AND8-E&I-CONTROL-RTU	$46,721
IEUA-BNNA-E&I-CONTROL-HMI	$18,688
IEUA-BNNA-E&I-CONTROL-I/O	$46,721
IEUA-BNNA-E&I-CONTROL-PLC	$46,721
IEUA-BNNA-E&I-CONTROL-RTU	$46,721
IEUA-BRKS-E&I-CONTROL-HMI-1	$18,688
IEUA-BRKS-E&I-CONTROL-HMI-2	$18,688
IEUA-BRKS-E&I-CONTROL-I/O-1	$46,721
IEUA-BRKS-E&I-CONTROL-I/O-2	$46,721
IEUA-BRKS-E&I-CONTROL-PLC-1	$46,721
IEUA-BRKS-E&I-CONTROL-PLC-2	$46,721
IEUA-CLHTS-BASIN-INST-AIR	$9,344
IEUA-CLHTS-E&I-CONTROL-HMI	$18,688
IEUA-CLHTS-E&I-CONTROL-I/O	$93,442
IEUA-CLHTS-E&I-CONTROL-PLC	$46,721
IEUA-DCLZ-E&I-CONTROL-HMI	$18,688
IEUA-DCLZ-E&I-CONTROL-I/O	$46,721
IEUA-DCLZ-E&I-CONTROL-PLC	$46,721
IEUA-ELY-BASIN-1-INST-FLOW	$9,344
IEUA-ELY-BASIN-1-INST-PRESSURE	$9,344
IEUA-ELY-BASIN-2-INST-FLOW	$9,344
IEUA-ELY-BASIN-2-INST-PRESSURE	$9,344
IEUA-ELY-BASIN-3-INST-FLOW	$9,344
IEUA-ELY-BASIN-3-INST-PRESSURE	$9,344
IEUA-ELY-E&I-CONTROL-I/O-1	$46,721
IEUA-ELY-E&I-CONTROL-I/O-2	$46,721
IEUA-ELY-E&I-CONTROL-I/O-3	$46,721
IEUA-ELY-E&I-CONTROL-I/O-4	$46,721
IEUA-ELY-E&I-CONTROL-PLC	$46,721
IEUA-ELY-E&I-CONTROL-RTU	$46,721
IEUA-GROVE-BASIN-STRUC-GATE-1	$108,318
IEUA-GROVE-BASIN-STRUC-GATE-2	$170,213
IEUA-GROVE-E&I-CONTROL-HMI	$18,688
IEUA-GROVE-E&I-CONTROL-I/O	$46,721
IEUA-GROVE-E&I-CONTROL-PLC	$46,721
IEUA-HCKR-BASIN-INST-AIR	$9,344
IEUA-HCKR-BASIN-PMP-SUMP	$9,344
IEUA-HCKR-E&I-CONTROL-PLC	$233,604
IEUA-JRPA-E&I-CONTROL-HMI	$18,688
IEUA-LWRDY-BASIN-INST-AIR	$9,344
IEUA-LWRDY-E&I-CONTROL-HMI	$18,688
IEUA-LWRDY-E&I-CONTROL-I/O	$93,442
IEUA-LWRDY-E&I-CONTROL-PLC	$93,442
IEUA-MCLR-E&I-CONTROL-I/O	$46,721
IEUA-MCLR-E&I-CONTROL-PLC	$46,721
IEUA-RP3-BASIN-INST-AIR	$9,344
IEUA-RP3-BASIN-INST-PRESSURE	$9,344
IEUA-RP3-E&I-CONTROL-HMI	$18,688
IEUA-RP3-E&I-CONTROL-I/O	$46,721
IEUA-RP3-E&I-CONTROL-PLC	$46,721
IEUA-SASEV-E&I-CONTROL-HMI	$18,688
IEUA-TRNR12-E&I-CONTROL-HMI	$18,688
IEUA-TRNR12-E&I-CONTROL-I/O	$140,162
IEUA-TRNR12-E&I-CONTROL-PLC	$46,721
IEUA-TRNR12-E&I-CONTROL-RTU	$46,721
IEUA-UPLND-E&I-CONTROL-HMI	$18,688
IEUA-UPLND-E&I-CONTROL-I/O	$93,442
IEUA-UPLND-E&I-CONTROL-PLC	$46,721

IEUA-VICT-E&I-CONTROL-HMI	$18,688
IEUA-VICT-E&I-CONTROL-I/O	$93,442
IEUA-VICT-E&I-CONTROL-PLC	$46,721
IEUA-VICT-E&I-CONTROL-RTU	$46,721
SBCFCD-GROVE-E&I-ELEC-GEN	$93,442
SBCFCD-SASEV-CELL-1-STRUC-BERM	$117,736
SBCFCD-SASEV-CELL-3-STRUC-BERM	$75,688
SBCFCD-SASEV-CELL-S-STRUC-BERM	$84,097
Renewal	**$7,230,476**
CBWCD-MCLR-BASIN-1-STRUC-CLVRT	$171,128
CBWCD-MCLR-BASIN-1-STRUC-GATE	$455
CBWCD-MCLR-BASIN-2-STRUC-CLVRT	$170,601
CBWCD-MCLR-BASIN-3-STRUC-CLVRT	$661,211
IEUA-7AND8-8TH-N-STRUC-GATE	$1,023
IEUA-ELY-BASIN-1-STRUC-GATE-1	$455
IEUA-ELY-BASIN-1-STRUC-GATE-2	$455
IEUA-ELY-BASIN-1-STRUC-GATE-3	$455
IEUA-ELY-BASIN-1-STRUC-GATE-4	$455
IEUA-ELY-BASIN-2-STRUC-GATE-1	$455
IEUA-ELY-BASIN-2-STRUC-GATE-2	$455
IEUA-ELY-BASIN-3-STRUC-GATE	$1,365
IEUA-HCKR-BASIN-W-STRUC-GATE-W	$1,365
IEUA-LWRDY-BASIN-CELL1-STRUC-GATE	$682
IEUA-LWRDY-BASIN-CELL2-STRUC-GATE	$682
IEUA-RP3-BASIN-2-STRUC-GATE	$455
IEUA-TRNR34-BASIN-4B&C-STRUC-GATE	$2,161
IEUA-VICT-BASIN-CELL1-STRUC-GATE	$682
SBCFCD-7AND8-7TH-BASIN-FLOW	$3,093
SBCFCD-7AND8-8TH-N-BASIN-FLOW	$2,980
SBCFCD-7AND8-8TH-S-BASIN-FLOW	$2,153
SBCFCD-7AND8-8TH-S-STRUC-CLVRT	$488,500
SBCFCD-BNNA-BASIN-BASIN-FLOW	$2,402
SBCFCD-DCLZ-CELL-1-BASIN-FLOW	$2,419
SBCFCD-DCLZ-CELL-2-BASIN-FLOW	$1,649
SBCFCD-DCLZ-CELL-3-BASIN-FLOW	$1,700
SBCFCD-ELY-BASIN-1-BASIN-FLOW	$4,827
SBCFCD-ELY-BASIN-1-STRUC-CLVRT	$1,173,980
SBCFCD-ELY-BASIN-2-BASIN-FLOW	$5,416
SBCFCD-ELY-BASIN-2-STRUC-CLVRT	$1,760,931
SBCFCD-ELY-BASIN-3-BASIN-FLOW	$7,693
SBCFCD-ELY-BASIN-3-STRUC-CLVRT-1	$1,509,414
SBCFCD-ELY-BASIN-3-STRUC-CLVRT-2	$580,570
SBCFCD-HCKR-BASIN-E-BASIN-FLOW-E	$1,020
SBCFCD-HCKR-BASIN-W-BASIN-FLOW-W	$2,453
SBCFCD-JRPA-BASIN-STRUC-BERM	$695
SBCFCD-LWRDY-BASIN-CELL3-STRUC-CLVRT	$664,045
Replacement	**$5,784,166**
CBWCD-MCLR-BASIN-1-STRUC-GATE	$92,844
IEUA-7AND8-7TH-STRUC-GATE	$92,844
IEUA-7AND8-8TH-S-STRUC-GATE	$123,791
IEUA-BNNA-BASIN-STRUC-GATE	$92,844
IEUA-BRKS-BASIN-STRUC-GATE-1	$123,791
IEUA-BRKS-BASIN-STRUC-GATE-2	$108,318
IEUA-BRKS-E&I-CONTROL-PANEL	$93,442
IEUA-CLHTS-BASIN-E-STRUC-GATE	$123,791
IEUA-CLHTS-BASIN-W-STRUC-GATE	$123,791
IEUA-CLHTS-E&I-CONTROL-PANEL	$93,442
IEUA-CLHTS-SAN-DAM-BLOW	$14,016
IEUA-DCLZ-BASIN-STRUC-VALVE	$14,502
IEUA-DCLZ-CELL-1-STRUC-GATE	$92,844
IEUA-DCLZ-CELL-2-STRUC-GATE	$185,687
IEUA-DCLZ-CELL-3-STRUC-GATE	$185,687
IEUA-DCLZ-E&I-CONTROL-PANEL	$93,442
IEUA-ELY-BASIN-3-STRUC-GATE	$61,896
IEUA-ELY-E&I-CONTROL-PANEL-1	$93,442
IEUA-ELY-E&I-CONTROL-PANEL-2	$93,442
IEUA-ELY-E&I-CONTROL-PANEL-3	$93,442

IEUA-ETIW-CB-14-IW-INST-FLOW	$9,344
IEUA-ETIW-CB-14-IW-INST-LEVEL	$9,344
IEUA-ETIW-CB-14-IW-INST-PRESSURE	$9,344
IEUA-ETIW-E&I-CONTROL-PLC	$46,721
IEUA-ETIW-E&I-CONTROL-RTU	$46,721
IEUA-HCKR-BASIN-E-STRUC-GATE-E	$92,844
IEUA-HCKR-BASIN-W-PMP	$13,082
IEUA-HCKR-E&I-CONTROL-PANEL	$93,442
IEUA-HCKR-SAN-CHANNEL-BLOW	$14,016
IEUA-JRPA-BASIN-PMP-SUMP	$9,344
IEUA-JRPA-E&I-CONTROL-I/O	$46,721
IEUA-JRPA-E&I-CONTROL-PLC	$46,721
IEUA-JRPA-PUMP-STA-INST-PRESSURE-1	$9,344
IEUA-JRPA-PUMP-STA-INST-PRESSURE-2	$9,344
IEUA-LWRDY-BASIN-CELL1-STRUC-GATE	$92,844
IEUA-LWRDY-CB-15-IW-INST-FLOWMETER	$56,065
IEUA-LWRDY-CB-15-IW-STRUC-VALVE	$18,128
IEUA-LWRDY-DAYCRK-DAM-BLOW	$14,016
IEUA-LWRDY-E&I-CONTROL-PANEL	$93,442
IEUA-MCLR-E&I-CONTROL-PANEL	$93,442
IEUA-RP3-BASIN-1-STRUC-GATE	$247,583
IEUA-RP3-BASIN-2-STRUC-GATE	$77,370
IEUA-RP3-BASIN-3-STRUC-GATE	$154,739
IEUA-RP3-BASIN-4-STRUC-GATE	$154,739
IEUA-RP3-BASIN-INST-FLOWMETER	$78,491
IEUA-RP3-DECLEZ-DAM-BLOW	$14,016
IEUA-RP3-DECLEZ-DAM-STRUC-GATE	$340,426
IEUA-RP3-E&I-CONTROL-PANEL	$93,442
IEUA-TRNR12-BASIN-1-RW-INST-FLOWMETER	$33,639
IEUA-TRNR12-BASIN-1-RW-STRUC-VALVE	$9,064
IEUA-TRNR12-BASIN-1-STRUC-GATE	$479,692
IEUA-TRNR12-CUCA-CRK-DAM-BLOW	$14,016
IEUA-TRNR12-E&I-CONTROL-PANEL	$93,442
IEUA-TRNR34-BASIN-4-STRUC-GATE	$232,109
IEUA-TRNR34-CB-11-IW-INST-FLOWMETER	$67,278
IEUA-TRNR34-CB-11-IW-STRUC-VALVE	$21,753
IEUA-UPLND-BASIN-STRUC-GATE	$123,791
IEUA-UPLND-E&I-CONTROL-PANEL	$93,442
IEUA-UPLND-SAN-DAM-BLOW	$14,016
IEUA-VICT-BASIN-CELL1-STRUC-GATE	$247,583
IEUA-VICT-BASIN-CELL2-STRUC-GATE	$92,844
IEUA-VICT-E&I-CONTROL-PANEL	$93,442
TBD-LWRDY-BASIN-CELL3-STRUC-GATE	$185,687
2025	**$1,605,223**
Renewal	**$1,554,810**
IEUA-DCLZ-CELL-3-STRUC-CLVRT	$473,518
IEUA-SASEV-CELL-5-STRUC-GATE	$937
SBCFCD-SASEV-CELL-5-BASIN-FLOW	$4,613
SBCFCD-SASEV-CELL-5-STRUC-CLVRT-1	$278,041
SBCFCD-SASEV-CELL-5-STRUC-CLVRT-2	$795,828
SBCFCD-SASEV-CELL-5-STRUC-GATE	$1,874
Replacement	**$50,413**
IEUA-ELY-RW-STRUC-VALVE-1	$9,336
IEUA-ELY-RW-STRUC-VALVE-2	$9,336
IEUA-ELY-RW-STRUC-VALVE-3	$9,336
IEUA-HCKR-CB-18-IW-STRUC-VALVE	$22,406
2026	**$823,983**
Renewal	**$193,046**
SBCFCD-HCKR-BASIN-W-STRUC-CLVRT	$182,148
SBCFCD-HCKR-BASIN-W-STRUC-CLVRT-1	$4,091
SBCFCD-HCKR-BASIN-W-STRUC-CLVRT-2	$239
SBCFCD-HCKR-BASIN-W-STRUC-CLVRT-3	$477
SBCFCD-JRPA-BASIN-STRUC-CLVRT	$6,091
Replacement	**$630,937**
IEUA-BNNA-E&I-CONTROL-PANEL	$99,132
IEUA-BNNA-FMM-RW-INST-FLOWMETER	$35,688
IEUA-BNNA-FMM-RW-STRUC-VALVE	$9,616

IEUA-BNNA-FMM-RW-STRUC-VALVE-1	$21,155
IEUA-BNNA-FMM-RW-STRUC-VALVE-2	$21,155
IEUA-HCKR-FMM-RW-INST-FLOWMETER	$35,688
IEUA-HCKR-FMM-RW-STRUC-VALVE	$42,310
IEUA-HCKR-SAN-RW-STRUC-VALVE	$9,616
IEUA-LWRDY-BASIN-CELL1-INST-LEVEL	$9,913
IEUA-LWRDY-BASIN-CELL3-INST-LEVEL	$9,913
IEUA-SASEV-E&I-CONTROL-I/O	$99,132
IEUA-SASEV-E&I-CONTROL-PLC	$99,132
IEUA-SASEV-E&I-CONTROL-RTU	$99,132
IEUA-SASEV-RW-INST-FLOW	$9,913
IEUA-SASEV-RW-INST-PRESSURE	$9,913
IEUA-TRNR34-DEER-RW-STRUC-VALVE	$9,616
IEUA-VICT-RW-INST-PRESSURE	$9,913
2027	**$357,304**
Renewal	**$4,997**
SBCFCD-ETIW-BASIN-BASIN-FLOW	$4,500
SBCFCD-ETIW-BASIN-STRUC-GATE	$497
Replacement	**$352,307**
IEUA-7AND8-8TH-RW-INST-FLOWMETER	$36,758
IEUA-7AND8-8TH-RW-STRUC-VALVE	$15,847
IEUA-7AND8-E&I-CONTROL-PANEL	$102,106
IEUA-BRKS-ORCHARD-RW-INST-FLOWMETER	$49,011
IEUA-BRKS-ORCHARD-RW-STRUC-VALVE	$15,847
IEUA-GROVE-E&I-COMM-RADIO	$71,474
IEUA-GROVE-E&I-ELEC-TRANSFRM	$51,053
IEUA-RP3-BASIN-4-INST-LEVEL	$10,211
2028	**$745,877**
Renewal	**$430,369**
SBCFCD-GROVE-BASIN-STRUC-SPILL	$430,369
Replacement	**$315,508**
CBWCD-BRKS-BASIN-WELL-MONITOR	$42,068
CBWCD-CLHTS-BASIN-WELL-MONITOR	$42,068
IEUA-7AND8-BASIN-WELL-MONITOR	$42,068
IEUA-ELY-BASIN-WELL-MONITOR	$42,068
IEUA-SASEV-BASIN-WELL-MONITOR	$42,068
IEUA-SASEV-CELL-5-INST-LEVEL	$10,517
IEUA-TRNR34-BASIN-4A-INST-LEVEL	$10,517
IEUA-VICT-BASIN-WELL-MONITOR	$42,068
ONTARIO-TRNR12-BASIN-WELL-MONITOR	$42,068
2029	**$4,335,145**
Renewal	**$1,092,107**
IEUA-DCLZ-CELL-1-STRUC-CLVRT	$224
IEUA-DCLZ-CELL-2-STRUC-CLVRT	$186
IEUA-JRPA-BASIN-STRUC-GATE	$2,373
IEUA-LWRDY-BASIN-CELL1-STRUC-CLVRT	$497
IEUA-LWRDY-BASIN-CELL2-STRUC-CLVRT	$248
IEUA-RP3-BASIN-2-STRUC-CLVRT	$7,016
IEUA-RP3-BASIN-3-STRUC-CLVRT	$1,490
IEUA-RP3-BASIN-4-STRUC-CLVRT	$1,987
IEUA-TRNR12-BASIN-1-STRUC-CLVRT	$4,098
SBCFCD-7AND8-7TH-STRUC-SPILL	$744,707
SBCFCD-7AND8-8TH-S-STRUC-CLVRT	$306,174
SBCFCD-DCLZ-CELL-2-STRUC-CLVRT	$4,098
SBCFCD-SASEV-CELL-1-BASIN-FLOW	$120
SBCFCD-SASEV-CELL-3-BASIN-FLOW	$918
SBCFCD-SASEV-CELL-S-BASIN-FLOW	$1,302
SBCFCD-TRNR34-BASIN-4B&C-STRUC-BERM-4B/4C	$215
SBCFCD-VICT-BASIN-CELL2-STRUC-CLVRT	$16,454
Replacement	**$3,243,038**
CBWCD-UPLND-BASIN-WELL-MONITOR	$43,330
IEUA-BRKS-E&I-COMM-RADIO	$75,827
IEUA-CLHTS-E&I-COMM-RADIO	$75,827
IEUA-DCLZ-CELL-2-INST-LEVEL-2	$10,832
IEUA-DCLZ-E&I-COMM-RADIO	$75,827
IEUA-DCLZ-E&I-ELEC-TRANSFRM	$54,162
IEUA-ELY-E&I-COMM-RADIO-1	$75,827

IEUA-ELY-E&I-COMM-RADIO-2	$75,827
IEUA-ELY-E&I-COMM-RADIO-3	$75,827
IEUA-ELY-E&I-COMM-RADIO-4	$75,827
IEUA-ETIW-CB-14-IW-STRUC-VALVE	$50,436
IEUA-GROVE-BASIN-INST-LEVEL	$10,832
IEUA-HCKR-E&I-ELEC-TRANSFRM	$54,162
IEUA-JRPA-BASIN-HVAC	$54,162
IEUA-JRPA-BASIN-PMP-	$909,925
IEUA-JRPA-BASIN-STRUC-GATE	$143,508
IEUA-JRPA-E&I-CONTROL-PANEL	$108,324
IEUA-JRPA-PUMP-STA-INST-FLOWMETER	$38,997
IEUA-LWRDY-E&I-COMM-RADIO-1	$75,827
IEUA-LWRDY-E&I-COMM-RADIO-2	$75,827
IEUA-MCLR-E&I-COMM-RADIO	$75,827
IEUA-RP3-E&I-COMM-RADIO	$75,827
IEUA-TRNR12-E&I-COMM-RADIO	$75,827
IEUA-TRNR34-BASIN-4B-INST-LEVEL	$10,832
IEUA-TRNR34-BASIN-4C-INST-LEVEL	$10,832
IEUA-TRNR34-DEER-RW-INST-FLOW	$10,832
IEUA-TRNR34-DEER-RW-INST-PRESSURE	$10,832
IEUA-TRNR34-E&I-CONTROL-I/O	$108,324
IEUA-TRNR34-E&I-CONTROL-PLC	$108,324
IEUA-TRNR34-E&I-CONTROL-RTU	$108,324
IEUA-UPLND-E&I-COMM-RADIO	$75,827
IEUA-VICT-E&I-COMM-RADIO-1	$75,827
IEUA-VICT-E&I-COMM-RADIO-2	$75,827
IEUA-VICT-E&I-COMM-RADIO-3	$75,827
MWD/IEUA-7AND8-CB20-MWD-STRUC-VALVE	$25,218
TBD-JRPA-BASIN-STRUC-VALVE	$157,612
2030	**$22,315**
Replacement	**$22,315**
IEUA-7AND8-8TH-N-INST-LEVEL	$11,157
IEUA-TRNR12-BASIN-1-INST-LEVEL	$11,157
2031	**$5,207,780**
Renewal	**$4,892,114**
SBCFCD-HCKR-BASIN-W-STRUC-SPILL	$789,907
SBCFCD-JRPA-BASIN-STRUC-SPILL	$4,102,207
Replacement	**$315,666**
IEUA-BNNA-E&I-COMM-RADIO	$80,445
IEUA-DCLZ-CELL-3-INST-LEVEL-3	$11,492
IEUA-MCLR-BASIN-2-INST-LEVEL	$11,492
IEUA-RP3-BASIN-2-INST-LEVEL	$11,492
IEUA-SASEV-CB-13-IW-INST-FLOWMETER	$82,743
IEUA-SASEV-CB-13-IW-STRUC-VALVE	$26,754
IEUA-SASEV-RW-INST-FLOWMETER	$41,372
IEUA-SASEV-RW-STRUC-VALVE	$13,377
IEUA-VICT-RW-INST-FLOWMETER	$27,581
IEUA-VICT-RW-STRUC-VALVE	$8,918
2032	**$289,093**
Renewal	**$5,007**
SBCFCD-ETIW-BASIN-STRUC-CLVRT	$5,007
Replacement	**$284,086**
IEUA-7AND8-8TH-S-INST-LEVEL	$11,837
IEUA-7AND8-E&I-COMM-RADIO-1	$82,858
IEUA-7AND8-E&I-COMM-RADIO-2	$82,858
IEUA-7AND8-E&I-COMM-RADIO-3	$82,858
IEUA-CLHTS-BASIN-E-INST-LEVEL-1	$11,837
IEUA-VICT-BASIN-CELL1-INST-LEVEL	$11,837
2033	**$70,617**
Renewal	**$9,657**
IEUA-7AND8-BASIN-WELL-RECHARGE	$1,344
IEUA-BNNA-BASIN-WELL-RECHARGE	$1,344
IEUA-ELY-BASIN-WELL-RECHARGE	$1,344
IEUA-HCKR-BASIN-WELL-RECHARGE	$1,344
IEUA-LWRDY-DAYCRK-DAM-STRUC-BLDG	$250
IEUA-SASEV-BASIN-WELL-RECHARGE	$1,344
IEUA-TRNR12-BASIN-WELL-RECHARGE	$1,344

IEUA-VICT-BASIN-WELL-RECHARGE	$1,344
Replacement	**$60,960**
IEUA-7AND8-7TH-INST-LEVEL	$12,192
IEUA-BNNA-BASIN-INST-LEVEL	$12,192
IEUA-MCLR-BASIN-4-INST-LEVEL	$12,192
IEUA-TRNR34-BASIN-3-INST-LEVEL	$12,192
IEUA-VICT-BASIN-CELL2-INST-LEVEL	$12,192
2034	**$9,492,524**
Renewal	**$5,006,989**
CBWCD/SBCFCD-TRNR12-BASIN-1-BASIN-OFFCH	$23,906
CBWCD/SBCFCD-TRNR12-BASIN-2-BASIN-OFFCH	$3,936
CBWCD-BRKS-BASIN-BASIN-OFFCH	$14,618
CBWCD-CLHTS-BASIN-E-BASIN-OFFCH	$7,141
CBWCD-CLHTS-BASIN-W-BASIN-OFFCH	$6,837
CBWCD-MCLR-BASIN-1-BASIN-OFFCH	$11,420
CBWCD-MCLR-BASIN-1-STRUC-GATE	$1,375
CBWCD-MCLR-BASIN-2-BASIN-OFFCH	$22,490
CBWCD-MCLR-BASIN-2-STRUC-SPILL	$513,883
CBWCD-MCLR-BASIN-3-BASIN-OFFCH	$4,857
CBWCD-MCLR-BASIN-4-BASIN-OFFCH	$8,451
CBWCD-MCLR-BASIN-4-STRUC-SPILL	$863,153
IEUA-7AND8-7TH-STRUC-GATE	$1,375
IEUA-7AND8-8TH-S-STRUC-GATE	$1,834
IEUA-BNNA-BASIN-STRUC-GATE	$1,375
IEUA-BRKS-BASIN-STRUC-GATE-1	$1,834
IEUA-BRKS-BASIN-STRUC-GATE-2	$1,605
IEUA-CLHTS-BASIN-E-STRUC-GATE	$1,834
IEUA-CLHTS-BASIN-W-STRUC-GATE	$1,834
IEUA-CLHTS-SAN-DAM-BLOW	$208
IEUA-CLHTS-SAN-DAM-STRUC-BLDG	$6,179
IEUA-DCLZ-BASIN-STRUC-VALVE	$215
IEUA-DCLZ-CELL-1-STRUC-GATE	$1,375
IEUA-DCLZ-CELL-2-STRUC-GATE	$2,751
IEUA-DCLZ-CELL-3-STRUC-GATE	$2,751
IEUA-ELY-BASIN-3-STRUC-GATE	$917
IEUA-GROVE-BASIN-STRUC-GATE-1	$1,605
IEUA-GROVE-BASIN-STRUC-GATE-2	$2,522
IEUA-HCKR-BASIN-E-STRUC-GATE-E	$1,375
IEUA-HCKR-BASIN-W-PMP	$194
IEUA-HCKR-SAN-CHANNEL-BLOW	$208
IEUA-JRPA-BASIN-STRUC-BLDG	$22,528
IEUA-JRPA-BASIN-STRUC-PIPE	$139,019
IEUA-LWRDY-BASIN-CELL1-STRUC-GATE	$1,375
IEUA-LWRDY-CB-15-IW-INST-FLOWMETER	$831
IEUA-LWRDY-CB-15-IW-STRUC-VALVE	$269
IEUA-LWRDY-DAYCRK-DAM-BLOW	$208
IEUA-RP3-BASIN-1-BASIN-OFFCH-1A	$1,435
IEUA-RP3-BASIN-1-BASIN-OFFCH-1B	$1,435
IEUA-RP3-BASIN-1-STRUC-BERM-1	$747
IEUA-RP3-BASIN-1-STRUC-GATE	$3,668
IEUA-RP3-BASIN-1-STRUC-PIPE	$17,234
IEUA-RP3-BASIN-2-BASIN-OFFCH	$3,373
IEUA-RP3-BASIN-2-STRUC-BERM	$623
IEUA-RP3-BASIN-2-STRUC-GATE	$1,146
IEUA-RP3-BASIN-3-BASIN-OFFCH-3A	$2,908
IEUA-RP3-BASIN-3-BASIN-OFFCH-3B	$2,908
IEUA-RP3-BASIN-3-STRUC-BERM	$592
IEUA-RP3-BASIN-3-STRUC-GATE	$2,292
IEUA-RP3-BASIN-4-BASIN-OFFCH-4A	$3,491
IEUA-RP3-BASIN-4-BASIN-OFFCH-4B	$3,491
IEUA-RP3-BASIN-4-STRUC-BERM	$592
IEUA-RP3-BASIN-4-STRUC-GATE	$2,292
IEUA-RP3-BASIN-INST-FLOWMETER	$1,163
IEUA-RP3-DECLEZ-DAM-BLOW	$208
IEUA-RP3-DECLEZ-DAM-STRUC-BLDG	$257
IEUA-RP3-DECLEZ-DAM-STRUC-GATE	$5,043
IEUA-TRNR12-BASIN-1-RW-INST-FLOWMETER	$498

IEUA-TRNR12-BASIN-1-RW-STRUC-VALVE	$134
IEUA-TRNR12-BASIN-1-STRUC-GATE	$7,106
IEUA-TRNR12-CUCA-CRK-DAM-BLOW	$208
IEUA-TRNR12-CUCA-CRK-DAM-STRUC-BLDG	$3,154
IEUA-TRNR34-BASIN-4B&C-STRUC-GATE	$611
IEUA-TRNR34-BASIN-4-STRUC-GATE	$3,438
IEUA-TRNR34-CB-11-IW-INST-FLOWMETER	$997
IEUA-TRNR34-CB-11-IW-STRUC-VALVE	$322
IEUA-UPLND-BASIN-STRUC-GATE	$1,834
IEUA-UPLND-SAN-DAM-BLOW	$208
IEUA-UPLND-SAN-DAM-STRUC-BLDG	$3,347
IEUA-VICT-BASIN-CELL1-STRUC-GATE	$3,668
IEUA-VICT-BASIN-CELL2-STRUC-GATE	$1,375
SBCFCD-7AND8-8TH-STRUC-BERM	$934
SBCFCD-DCLZ-CELL-1-STRUC-BERM	$561
SBCFCD-DCLZ-CELL-2-STRUC-BERM	$448
SBCFCD-ELY-BASIN-1-STRUC-BERM-1	$1,557
SBCFCD-ELY-BASIN-2-STRUC-BERM	$1,620
SBCFCD-ELY-BASIN-3-STRUC-BERM-1	$374
SBCFCD-ELY-BASIN-3-STRUC-BERM-2	$872
SBCFCD-ELY-BASIN-3-STRUC-BERM-3	$311
SBCFCD-GROVE-E&I-ELEC-GEN	$1,384
SBCFCD-HCKR-BASIN-E-STRUC-BERM-E	$623
SBCFCD-LWRDY-BASIN-CELL1-BASIN-OFFCH	$1,995
SBCFCD-LWRDY-BASIN-CELL1-STRUC-PIPE	$6,813
SBCFCD-LWRDY-BASIN-CELL2-BASIN-OFFCH	$2,391
SBCFCD-LWRDY-BASIN-CELL3-BASIN-OFFCH	$4,218
SBCFCD-LWRDY-BASIN-CELL3-STRUC-SPILL	$677,444
SBCFCD-LWRDY-BASIN-STRUC-BERM	$1,308
SBCFCD-TRNR12-BASIN-2-STRUC-SPILL	$1,716,450
SBCFCD-TRNR34-BASIN-3-BASIN-OFFCH	$3,829
SBCFCD-TRNR34-BASIN-4-BASIN-OFFCH	$11,755
SBCFCD-VICT-BASIN-CELL1-BASIN-OFFCH	$2,170
SBCFCD-VICT-BASIN-CELL1-STRUC-BERM	$1,121
SBCFCD-VICT-BASIN-CELL2-BASIN-OFFCH	$3,586
TBD-LWRDY-BASIN-CELL3-STRUC-GATE	$2,751
UPLAND-UPLND-BASIN-BASIN-OFFCH	$52,912
UPLAND-UPLND-BASIN-STRUC-SPILL	$749,480
Replacement	**$4,485,535**
CBWCD-MCLR-BASIN-1-STRUC-GATE	$55,455
IEUA-7AND8-8TH-N-STRUC-GATE	$124,774
IEUA-7AND8-E&I-CONTROL-HMI	$25,116
IEUA-BNNA-E&I-CONTROL-HMI	$25,116
IEUA-BRKS-BASIN-INST-LEVEL-1	$12,558
IEUA-BRKS-BASIN-INST-LEVEL-2	$12,558
IEUA-BRKS-BASIN-INST-LEVEL-3	$12,558
IEUA-BRKS-BASIN-INST-LEVEL-4	$12,558
IEUA-BRKS-E&I-CONTROL-HMI-1	$25,116
IEUA-BRKS-E&I-CONTROL-HMI-2	$25,116
IEUA-CLHTS-E&I-CONTROL-HMI	$25,116
IEUA-CLHTS-SAN-DAM-STRUC-DAM	$376,733
IEUA-DCLZ-E&I-CONTROL-HMI	$25,116
IEUA-ELY-BASIN-1-INST-LEVEL	$12,558
IEUA-ELY-BASIN-1-STRUC-GATE-1	$55,455
IEUA-ELY-BASIN-1-STRUC-GATE-2	$55,455
IEUA-ELY-BASIN-1-STRUC-GATE-3	$55,455
IEUA-ELY-BASIN-1-STRUC-GATE-4	$55,455
IEUA-ELY-BASIN-2-STRUC-GATE-1	$55,455
IEUA-ELY-BASIN-2-STRUC-GATE-2	$55,455
IEUA-ELY-BASIN-3-STRUC-GATE	$166,365
IEUA-ETIW-E&I-COMM-RADIO	$87,904
IEUA-GROVE-E&I-CONTROL-HMI	$25,116
IEUA-HCKR-BASIN-E-INST-LEVEL-E	$12,558
IEUA-HCKR-BASIN-W-INST-LEVEL-2	$12,558
IEUA-HCKR-BASIN-W-STRUC-GATE-W	$166,365
IEUA-HCKR-SAN-CHANNEL-STRUC-DAM	$376,733
IEUA-JRPA-BASIN-INST-LEVEL	$12,558

IEUA-JRPA-E&I-COMM-RADIO	$87,904
IEUA-JRPA-E&I-CONTROL-HMI	$25,116
IEUA-JRPA-E&I-ELEC-TRANSFRM	$62,789
IEUA-LWRDY-BASIN-CELL1-STRUC-GATE	$83,183
IEUA-LWRDY-BASIN-CELL2-INST-LEVEL	$12,558
IEUA-LWRDY-BASIN-CELL2-STRUC-GATE	$83,183
IEUA-LWRDY-DAYCRK-DAM-STRUC-DAM	$376,733
IEUA-LWRDY-E&I-CONTROL-HMI	$25,116
IEUA-RP3-BASIN-1-INST-LEVEL-1	$12,558
IEUA-RP3-BASIN-1-INST-LEVEL-2	$12,558
IEUA-RP3-BASIN-2-STRUC-GATE	$55,455
IEUA-RP3-BASIN-3-INST-LEVEL	$12,558
IEUA-RP3-DECLEZ-DAM-STRUC-DAM	$376,733
IEUA-RP3-E&I-CONTROL-HMI	$25,116
IEUA-SASEV-E&I-CONTROL-HMI	$25,116
IEUA-TRNR12-CUCA-CRK-DAM-STRUC-DAM	$376,733
IEUA-TRNR12-E&I-CONTROL-HMI	$25,116
IEUA-TRNR34-BASIN-4B&C-STRUC-GATE	$207,957
IEUA-TRNR34-E&I-CONTROL-PANEL	$125,578
IEUA-UPLND-E&I-CONTROL-HMI	$25,116
IEUA-UPLND-SAN-DAM-STRUC-DAM	$376,733
IEUA-VICT-BASIN-CELL1-STRUC-GATE	$83,183
IEUA-VICT-E&I-CONTROL-HMI	$25,116
Grand Total	**$39,239,707**

Appendix C

Review Comments and Responses

WATER FACILITIES AUTHORITY (WFA) – VAN JEW

Comment 1 – Chapter 2.3.3 In-Lieu Capacity

Can we add in the word “sustainable” between “current” and “capacity”? Though many moons ago, the WFA has a history of running in the 70-80 MGD range, but just not in a sustainable 365/24/7 manner.

Response:

The text was updated as requested.

Comment 2 – Chapter 2.3.3 In-Lieu Capacity

In the sentence “According to WFA, the sustainable current capacity of the WFA plant is about 40 mgd in the summer months and about 20 mgd in the winter months.” Can we change the “40” and the “20” to “50” and “25,” respectively? I’ve spoken to Terry before about the 40/20. Those were conservative numbers. 50/25 are still realistic numbers and are neither conservative or aggressive representations. Example: For the last month or so, we’ve been flowing at slightly under 40 mgd and we are not stretched at all. We can go to 50 mgd today if the agencies called on us in that manner. This is all to say 40 mgd as a limit is conservative and not necessarily realistic. (BTW of course, changing to 50/25 may affect some of the calcs in the report, which I will leave up to you re-calc as warranted).

Response:

The text was updated as requested. The in-lieu capacity calculations were also updated based on the updated information (see Table 2-4a).

Comment 3 – Chapter 2.3.3 In-Lieu Capacity

If the WFA agencies decided to lease a portable belt press to process sludge (like they did in 2007), WFA staff would estimate that with a reliable and rightly-sized belt press(es) we can treat water at rate of 70 MGD and 40 MGD in the summer and winter, respectively. (Caveat: the portable belt press utilized in the Spring months of 2007 worked wonderfully, but the WFA’s experience with portable belt presses beyond this 2007 experience is slightly uncharted territory and the WFA’s ability to perform at said higher flows would be very dependent on the portable belt press’ reliability).

Response:

Comment noted.

CUCAMONGA VALLEY WATER DISTRICT (CVWD) – JIWON SEUNG

Comment 1 – Chapter 2.1.2 Historical Recharge Activity

Include discussion of Chino Basin Water Conservation District and SB County Flood Control recharge activities.

Response:

Chapter 2.1.2 has been updated to describe the Chino Basin Water Conservation District and San Bernardino County Flood Control recharge activities.

Comment 2 – Chapter 2.3.1 Facilities Used to Effectuate In-Lieu Recharge

Lloyd W. Michael capacity pending discussion. Remove Royer-Nesbit.

Response:

Per a meeting between West Yost and CVWD staff on August 31, 2023, the Lloyd W. Michael capacity was updated and assumed to be zero.

Comment 3 – Table 2-4a

Lloyd W. Michael capacity pending discussion. Remove Royer-Nesbit.

Response:

Per a meeting between West Yost and CVWD staff on August 31, 2023, the Lloyd W. Michael capacity was updated and assumed to be zero.

Comment 4 – Chapter 2.4.2 Deficiencies in MS4 Facilities Documentation and Reporting

Instead of some of these planning studies (future extremes, long-term planning), it would be beneficial to improving the model if a project was implemented to work with land use agencies on coordinating MS4 projects or educating land use agencies on the importance of maintaining MS4 infiltration facilities.

Consider project for visual field inspections of facilities on the list to confirm that they have been constructed per the WQMP.

Response:

Comment noted.

Comment 5 – Chapter 3.3 Hydraulic Control

Figure 3-3 shows through 2018 and narrative states through 2023. Include note regarding model timeline.

Response:

The narrative has been updated to clarify that Figure 3-3 shows data through 2018 and that information regarding hydraulic control from 2018 to 2023 is based on the Chino Basin OBMP Maximum Benefit Annual Reports.

Comment 6 – Figure 4-1

Update legend to show all categories.

Response:

Figure 4-1 was updated.

Comment 7 – Figure 4-3

Change to side-by-side bars and include note that wet water recharge for replenishment could be (not necessarily will be) used towards MZ1 requirement if recharged in MZ1.

Response:

Figure 4-3 was updated to show that replenishment obligation is used to meet the MZ1 recharge requirement.

Comment 8 – Chapter 7.4.3 R&R Implementation Plan

IEUA has robust asset management program and should be able to provide more detailed analysis, not just confirmation of assets and cost estimates.

Response:

As described in Chapter 7, the asset inventory is based on information provided by IEUA, including IEUA's FY2016/17 Asset Management Plan. Any additional steps to implement a Renewal and Replacement Plan as recommended in Chapter 7.4.3 would be conducted in coordination with IEUA to ensure there are no duplicative efforts.

Comment 9 – Chapter 8.1 Conclusions

Improving the MS4 program data set should be a priority.

Response:

Comment noted.

MONTE VISTA WATER DISTRICT (MVWD) – JUSTIN SCOTT-COE

Comment 1 – Page 1-6: "Figure 1-3. Estimated Streambed Infiltration for the Santa Ana River Tributaries in the Chino Basin and New Recharge Resulting from Recharge Master Plan Implementation, 1978-2018"

This figure does not include managed stormwater recharge in years prior to 2005, and appears to suggest that all managed recharge after 2005 was the result of the Chino Basin Facilities Improvement Program (CBFIP) that resulted from the 2001 RMP. The Chino Basin Water Conservation District had been conducting managed stormwater recharge for decades prior to 2005. The historical water budget included in the 2020 Safe Yield Reset Report (attached) shows not insignificant managed stormwater recharge occurring prior to 2004 (all years over 1 TAFY, with some close to 7 TAFY). In order to avoid misunderstanding, we recommend that Figure 1-3 include all historical managed stormwater recharge prior to 2005. And for managed stormwater recharge occurring 2005 and after, Figure 1-3 should distinguish between the amount that would have occurred without CBFIP and the amount that occurred due to CBFIP.

Response:

Figure 1-3 has been updated to show all historical managed stormwater recharge.

Comment 2 – Page 1-8: "When fully implemented, the 2013 RMPU will reduce the demand for SWP water by at least 4,800 afy and possibly by as much as 11,900 afy."

We recommend deleting or rewriting this statement, as increasing managed stormwater recharge does not directly reduce the demand for SWP water.

Response:

The sentence was removed.

Comment 3 – Page 1-11: "This chapter also provides…"

We recommend removing "also" from this sentence.

Response:

The sentence was updated.

Comment 4 – Pages 1-12/13: "The 2023 RMPU was developed through a stakeholder process. Watermaster convened several workshops with the Steering Committee through the Recharge Investigation & Projects Committee (RIPComm) over the course of developing the 2023 RMPU (from October 2022 to August 2023). At these workshops, the important assumptions and interim work products of the RMPU were presented. The presentations developed for these workshops were posted on the Watermaster's website. As part of the stakeholder process, the development of 2023 RMPU was open to comments by all stakeholders, and all comments were responded to and/or addressed. Appendix B contains the comments and responses."

We were unaware that the RIPComm was being used for stakeholder input on RMPU work product. No materials related to 2023 RMPU assumptions or interim RMPU work products appear to have been posted on Watermaster's website where indicated under footnote 11 (https://protect-us.mimecast.com/s/OTXICXDkYwcLQKrFmlUmR?domain=cbwm.org/), nor do we recall them being circulated. This draft report is the first work product MVWD is aware of that has been distributed to stakeholders for review, with comments requested within 10 days of distribution.

Response:

As described in the FY 2021/22 Engineering Budget, "During FY 2020/21, the stakeholders determined that they do not want to evaluate new recharge projects in the 2023 RMPU. Thus, the 2023 RMPU will have a similar to scope as that of the 2018 RMPU." Due to the scope of the 2023 RMPU and its reliance on existing data and information such as the Data Collection and Evaluation reports, the 2022 State of the Basin, and the 2020 Safe Yield Recalculation, Watermaster focused on presenting new or updated information at RIPComm. This included a discussion on imported water availability and the most up-to-date analysis on MS4 projects. The RIPComm agendas of October 2022, and January and July 2023 included a 2023 RMPU agenda item and were distributed to all Watermaster stakeholders. The presentations with these materials have now been posted on Watermaster's website as documented in the report.

Comment 5 – Page 2-1: "As noted in Chapter 1, prior to 2004 there was no significant recharge of stormwater or dry-weather runoff."

See above comment re Figure 1-3. We recommend this be rewritten to recognize the activities of the Chino Basin Water Conservation District in recharging stormwater and dry-weather runoff prior to 2004 and up to today.

Response:

This sentence has been deleted and additional information has been added to Section 2.1.2 to include this information (see response to comment 6 below).

Comment 6 – Page 2-3: "Prior to 2004, there was no significant recharge of stormwater or dry-weather runoff…"

See above comment re Figure 1-3. We recommend this be rewritten to recognize the activities of the Chino Basin Water Conservation District in recharging stormwater and dry-weather runoff prior to 2004 and up to today.

Response:

Chapter 2.1.2 has been updated to include the Chino Basin Water Conservation District and San Bernardino County Flood Control recharge activities.

Comment 7 – Page 2-3: "Through FY 2021/22, the recharge improvements constructed by Watermaster and the IEUA have enabled them to recharge about 545,400 af of storm and supplemental water into the Chino Basin."

Please clarify how this number was determined separate from the recharge that would have occurred without said recharge improvements constructed by Watermaster and the IEUA.

Response:

The text was updated to read that the recharge improvements constructed by Watermaster and the IEUA have enabled them to recharge about 500,000 af of storm and supplemental water into the Chino Basin. This number now accounts for an average of about 3,000 afy of recharge prior to 2004.

Comment 8 –Page 2-9: "The total in-lieu recharge for the period of FY 1977/78 through FY 2017/18 was about 430,000 af (WEI, 2018). Since FY 2017/18, an additional 78,000 af of in-lieu recharge has occurred, bringing the total in-lieu recharge over the Judgment period to about 508,000 af."

Please explain how these historical in-lieu recharge values were calculated. If the referenced 2018 Storage Framework Investigation report provides this information, please provide a page/table reference.

Response:

The text has been updated to explain how these values were estimated.

Comment 9 – Table 2-4a.

As MVWD is currently conducting in-lieu recharge into the Dry Year Yield Program account under current conditions, please explain the estimate of zero maximum in-lieu recharge capacity for MVWD under current conditions?

Response:

Appendix A now includes the information used to estimate in-lieu recharge calculations. Please note that Table 2-4a has been updated based on comment provided by WFA and it now shows that MVWD has an in-lieu recharge capacity of about 4,000 af.

Comment 10 – Figure 3-2c.

For the "Contour" legend entries, we believe "Spring 2000" should be changed to "Spring 2018".

Response:

The legend was updated to say "Spring 2018".

Comment 11 – Figure 4-1.

The legend appears incomplete (does not include labels for the last two dark green and grey colored bars).

Response:

Figure 4-1 was updated.

Comment 12 – Page 4-5: "For the foreseeable future, the IEUA projects that it will recharge at least 3,490 afy of recycled water in MZ1, yielding a residual MZ1 recharge obligation of 3,010 afy of imported water recharge through 2030."

Under Section 8.4(e) of the Peace II Agreement, Watermaster was obligated by 2012 to evaluate the minimum recharge quantity needed for MZ1. Watermaster has not yet conducted this evaluation; therefore, Watermaster's residual MZ1 recharge obligation through 2030 is unknown at this time. Please revise this section of the report consistent with the Peace II Agreement.

Response:

The text was updated and now reads "For the foreseeable future, the IEUA projects that it will recharge at least 3,490 afy of recycled water in MZ1. Using an obligation of 6,500 afy, this yields a residual MZ1 recharge obligation of 3,010 afy of imported water recharge through 2030." The estimated residual is based on the obligation as it exists at this time. This value may be updated following further evaluation of the appropriate minimum, which will be part of the ongoing development of a MZ1 subsidence management plan.

Comment 13 – Page 4-5: "Figure 4-3 also shows the 6,500 afy supplemental water recharge obligation for MZ1 through 2030.".

Section 8.4(e) of the Peace II Agreement states: "In no circumstance will the commitment to recharge 6,500 acre-feet be reduced for the duration of the Peace Agreement." The Peace Agreement includes provisions for its potential extension for an additional 30 years. If the Peace Agreement is extended, the commitment to recharge 6,500 AFY will also be extended for the full duration (not only the initial term through 2030) of the Peace Agreement. Please revise this section of the report consistent with the Peace II Agreement.

Response:

The Peace II Agreement's requirements will expire when the Peace II Agreement terminates in 2030.

Comment 14 – Page 6-1: "…Watermaster is obligated to recharge at least 6,500 afy of supplemental water in MZ1 through 2030 per the Peace II Agreement. … the additional supplemental water that must be recharged in MZ1 (through 2030) …"

See above comments re Page 4-5. Please add the phrase "at least" before "2030."

Response:

See response to MVWD Comment 13.

Comment 15 – Page 6-5: "… continuing the recharge of 6,500 afy of supplemental water in MZ1 …"

See above comments re Page 4-5. Please add the phrase "at least" before "6,500 afy."

Response:

The text has been adjusted as follows (additions marked in red): "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."

Comment 16 – Page 8-1: "No changes are recommended for the 6,500 afy supplemental water recharge obligation in MZ1 (Peace II Agreement)."

See above comments re Page 4-5. Please revise language contingent on the results of an evaluation of the minimum recharge quantity for MZ1, as required by the Peace II Agreement.

Response:

The text has been updated to include a footnote which reads "This value may be updated following further evaluation of the appropriate minimum, which will be part of the ongoing development of a MZ1 subsidence management plan."