To: Chino Basin Watermaster Stakeholders

From: Watermaster 2020 OBMP Update Team

Subject: 2020 OBMP Update – Technical Memorandum #1 – Part 1

Date: July 24, 2019

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1. Introduction and Background

Purpose of Technical Memorandum #1

The Chino Basin Watermaster (Watermaster) is in the process of updating its Optimum Basin Management Program (OBMP) and its implementation plan. The objectives of this Technical Memorandum #1 (TM1) are: (1) to describe the stakeholder process to develop the 2020 OBMP Update, (2) to document the key outcomes of the stakeholder process to date, and (3) to describe the proposed scope of work, implementation actions, schedule, and cost to perform the following eight activities under consideration for inclusion in the 2020 OBMP Update:

1. Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water—particularly in areas of the basin that will promote the long-term balance of recharge and discharge (Activity A).
2. Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance safe yield, and improve water quality (Activity B)
3. Maximize the reuse of recycled water produced by IEUA and others (Activity D).
4. Develop and implement a water-quality management plan to address current and future water-quality issues, protect beneficial uses, and develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits (Activity E/F).
5. Develop a management strategy within the salt and nutrient management plan to ensure the ability to comply with the dilution requirements for recycled water recharge (Activity K).

6. Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence and optimize the use of all water supply sources (Activity C/G).
7. Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance (Activity L).
8. Develop a process to provide for the equitable distribution of the costs and benefits of the OBMP Update, to encourage regional partnerships for implementation to reduce costs, and to identify and pursue low-interest loans, grants, or other external funding sources to support the implementation of the OBMP Update (Activity H/I/J).

TM1 will be released to the Chino Basin stakeholders (stakeholders) for review in two parts. This first part includes the description of the first four activities: A, B, D, and E/F. The second part will include descriptions of the remaining four activities and will be released in August 2019.

History of the OBMP

The Chino Basin Judgment gave Watermaster the discretionary authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations. Watermaster, with direction from the Court, began developing the OBMP in 1998 and completed it in July 2000. The OBMP was developed in a collaborative public process that identified the needs and wants of all stakeholders, described the physical state of the groundwater basin, defined a set of management goals, characterized impediments those goals, and developed a series of actions that could be taken to remove the impediments and achieve the management goals. This work was documented in the *Optimum Basin Management Program – Phase I Report*.[1]

The four goals of the 2000 OBMP included:

Goal 1 – Enhance Basin Water Supplies

Goal 2 – Protect and Enhance Water Quality

Goal 3 – Enhance Management of the Basin

Goal 4 – Equitably Finance the OBMP

The actions defined by the stakeholders to remove impediments to the OBMP goals were logically grouped into sets of coordinated activities called Program Elements (PEs), each of which included a list of definitive actions and an implementation schedule. The nine PEs defined in the 2000 OBMP included:

PE 1 – Develop and Implement Comprehensive Monitoring Program. The objectives of the comprehensive monitoring program are to collect the data necessary to support the implementation of the other eight PEs and periodic updates to the *State of the Basin Report*.[2]

PE 2 – Develop and Implement Comprehensive Recharge Program. The objectives of the comprehensive recharge program include increasing stormwater recharge to offset the recharge lost due to channel lining, to increase safe yield, and to ensure that there will be enough

[1] WEI. (1999). *Optimum Basin Management Program – Phase I Report*. Prepared for the Chino Basin Watermaster. August 19, 1999. http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf

[2] See for example: WEI, 2019. *Optimum Basin Management Program 2018 State of the Basin Report*. Prepared for the Chino Basin Watermaster. June 2018.

supplemental water recharge capacity available to Watermaster to meet its replenishment obligations.

PE 3 – Develop and Implement a Water Supply Plan for Impaired Areas. The objective of this PE is to maintain and enhance the Chino Basin safe yield with a groundwater desalting program that is designed (1) to replace declining agricultural groundwater pumping in the southern part of the basin with new pumping to meet increasing municipal water demands in the same area (2) to minimize groundwater outflow to the Santa Ana River and (3) to increase the Santa Ana River recharge into the basin.

PE 4 – Develop and Implement Comprehensive Groundwater Management Plan for Management Zone 1. The objectives of this land subsidence management program are to characterize the spatial and temporal occurrence of land subsidence, to identify its causes, and, where appropriate, to develop and implement a program to minimize or abate land subsidence.

PE 5 – Develop and Implement Regional Supplemental Water Program. The objective of this program is to improve the regional conveyance and availability of imported and recycled waters throughout the basin.

PE 6 – Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management. The objectives of this water quality management program are to identify water quality trends in the basin and the impact of the OBMP implementation on them, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water quality regulators to identify and facilitate the cleanup of soil and groundwater contamination.

PE 7 – Develop and Implement Salt Management Plan. The objectives of this salinity management program are to characterize current and future salt and nutrient conditions in the basin and to develop and implement a plan to manage them.

PE 8 – Develop and Implement Groundwater Storage Program. The objectives of this storage program are (1) to develop and implement a storage management plan that prevents overdraft, protects water quality, and ensures equity among the parties to the Chino Basin Judgment and (2) to periodically recalculate safe yield. The OBMP defined a "safe storage capacity" for managed storage of 500,000 acre-feet (af).

PE 9 – Develop and Implement Conjunctive Use Program. The objective of the conjunctive use program is to develop storage and recovery programs that will provide broad mutual benefit and reduce the cost of the OBMP implementation.

The PEs and their associated implementation actions were incorporated into the OBMP Implementation Plan (OBMP IP). The Chino Basin Judgment parties (parties) then developed an agreement—the Peace Agreement—to implement it. The OBMP IP is Exhibit B to the Peace Agreement. The Peace Agreement was reviewed in a programmatic environmental impact report (PEIR), completed by the Inland Empire Utilities Agency (IEUA) in July 2000.

2007 Supplement to the OBMP IP and the Peace II Agreement

In 2007, Watermaster and the parties identified the need to update the OBMP IP. Through extensive investigations, it was identified that it would be necessary to expand the groundwater pumping capacity of the Chino Basin Desalters to 40,000 acre-feet per year (afy) and implement re-operation[3] to achieve hydraulic control[4] of the Chino Basin and maintain safe yield. Hydraulic control is a both a goal of the OBMP and a requirement of the maximum-benefit salt-and-nutrient management plan (SNMP) that was developed by Watermaster and IEUA under PE 7 to enable the expansion of recycled water reuse and recharge through the basin.

The Peace II Agreement was developed to implement the required changes to the OBMP IP to expand the desalters to 40,000 afy of groundwater pumping, to incorporate re-operation and hydraulic control, and to resolve other issues. There was no change to the storage management plan in the OBMP IP to address the implications of the reduction in storage of basin water by 400,000 af as provided for by re-operation. The IEUA completed and adopted a supplemental environmental impact report (SEIR) for the Peace II Agreement in 2010.

2017 Addendum to the 2010 Peace II SEIR

In 2016, Watermaster identified the need to update the OBMP storage management plan because the total amount of water in managed storage accounts was projected to exceed the safe storage capacity limit of 500,000 af defined in the 2000 OBMP. In 2017, the IEUA adopted an addendum to the Peace II SEIR to revise the storage management plan in the OBMP through June 30, 2021. The addendum was supported with engineering work that demonstrated that the safe storage capacity could be safely increased to 600,000 af with the commitment that Watermaster would update the OBMP storage management plan by June 30, 2021.

Need for the 2020 OBMP Update

As of 2019, many of the projects and management programs envisioned in the 2000 OBMP have been implemented, while some have not. The understanding of the hydrology and hydrogeology of the Chino Basin has improved since 2000, and new water-management issues have been identified that need to be addressed to protect the collective interests of the parties and their water supply reliability. For these reasons, the parties are updating the OBMP to set the framework for the next 20 to 30 years of basin-management activities.

A more detailed description of the development of the 2000 OBMP and the rationale for and process to prepare the 2020 OBMP Update is included in a white paper prepared for the stakeholders: *White Paper – 2020 Update to Chino Basin Optimum Basin Management Program* (OBMP White Paper). The OBMP White Paper, and all documents relevant to the 2020 OBMP Update, are available on the Watermaster's website.[5]

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[3] Re-operation is the controlled overdraft of the Basin by the managed withdrawal of groundwater pumping for the Desalters and the potential increase in the cumulative un-replenished pumping from the 200,000 acre-feet authorized by paragraph 3 of the Engineering Appendix Exhibit I to the Judgment, to 600,000 acre-feet for the express purpose of securing and maintaining hydraulic control as a component of the Physical Solution.

[4] Hydraulic control is the elimination of groundwater discharge from the Chino North Management Zone to the Santa Ana River or its reduction to less than 1,000 afy. Re-operation is the increase of the control overdraft of the Chino Basin from 200,000 af to 600,000 af with 400,000 af allotted to meet replenishment of obligation of the Chino Basin Desalters.

[5] http://www.cbwm.org/OBMPU.htm

Stakeholder Process for the 2020 OBMP Update

The 2020 OBMP Update is being conducted using a collaborative stakeholder process like that employed for the development of the 2000 OBMP. A series of public listening sessions are being held by the Watermaster throughout 2019 to support the 2020 OBMP Update. The purpose of the listening sessions is to obtain information, ideas, and feedback from the stakeholders to define their issues needs and wants, their collective goals for the 2020 OBMP Update, the impediments to achieving the goals, the management actions required to remove the impediments, and an implementation plan for the management actions.

The Watermaster has established an OBMP Update Team to facilitate the stakeholder process. The OBMP Update Team is composed of Watermaster staff, Watermaster legal counsel, engineers and scientists from Wildermuth Environmental Inc. ([WEI] Watermaster's engineering consultant), and staff from the IEUA. The OBMP Update Team is providing key information prior to and during each listening session to enable the stakeholders to provide their input on each topic discussed. The objective is for the ideas and opinions of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update.

Thus far, Watermaster has held four listening sessions on the following dates:

- Listening Session #1: January 15, 2019
- Listening Session #2: February 12, 2019
- Listening Session #3: March 21, 2019
- Listening Session #4: May 16, 2019

The objectives of the first four listening sessions were (1) to confirm the need to update the OBMP, (2) to identify the issues, needs, and wants of the stakeholders, (3) to define goals for the 2020 OBMP Update, and (4) to identify the new and revised activities that could be included in the 2020 OBMP Update to remove impediments to achieving the 2020 OBMP Update goals. Listening Session memorandums were prepared to document the outcomes of Listening Sessions 1, 2, and 3. The listening session memorandums are included as appendices herein.

This memorandum (TM1), summarizes and integrates the work products of all four listening sessions and provides new information on the recommended scope of work to implement the 2020 OBMP Update activities defined by the stakeholders. The next series of listening sessions will focus on the review and revision of the activities scoped herein. The outcomes will be documented in a memorandum following each listening session and ultimately integrated into a recommended implementation plan for the 2020 OBMP Update (TM2). TM2 will form the foundation for the parties to develop a final implementation plan (2020 OBMP IP) and agreements to implement it.

2. Development of Activities for Consideration in the 2020 OBMP Update

Drivers, Trends and Implications for Basin Management

The strategic drivers and trends that shaped the goals and activities of the OBMP in the late 1990s have since changed. There a several drivers and trends in today's water management space that will challenge the ability of the parties to protect their collective interests in the Chino Basin and their water supply reliability. Figure 1 characterizes the drivers and trends shaping water management, and their basin management implications for the parties. "Drivers" are external forces that cause changes in the Chino Basin water space, such as climate change, regulations, and funding. Grouped under each driver are expected trends that emanate from that driver. For example, trends associated with climate change include reduced groundwater recharge, increased evaporation, and reduced imported water supply. The relationship of the drivers/trends to the management implications are shown by arcs that connect trends to implications. For example, a management implication of reduced groundwater recharge is the reduction of the Chino Basin safe yield.

The drivers, trends, and implications were first identified in the OBMP White Paper and served as the initial rationale for recommending an update to the OBMP. Figure 1 represents the final characterization of the drivers, trends, and implications, based on stakeholder input. The basin management implications that form the stakeholders' rationale for the 2020 OBMP Update are:

- Reductions in Chino Basin safe yield
- Reduced imported water availability and increased cost
- Imported water quality degradation
- Chino Basin water quality degradation
- Inability to pump groundwater with existing infrastructure
- Increased cost of groundwater use
- Recycled water quality degradation
- Reduced recycled water availability and increased cost
- Increased cost of Basin Plan compliance

Issues, Needs, and Wants of the Chino Basin Stakeholders

The issues, needs, and wants of the stakeholders form the basis of the management goals of the 2020 OBMP Update and inform the identification of impediments to the goals as well as the action items to remove the impediments. Through the listening session process, 57 unique needs and wants were identified by the stakeholders. The classes of issues identified were effectively the same as the implications for basin management defined in Figure 1 and listed above. Table 1 is a matrix that summarizes: the needs and wants of the parties, organized by basin management issue (rows) and attribution to stakeholders that share each need/want (columns).

2020 OBMP Goals

Through the assessment of the basin management issues, needs, and wants, the stakeholders concluded that the goals defined in the 2000 OBMP are still relevant today. The following is the statement of intent developed for each goal in the 2020 OBMP Update:

> ***Goal No. 1 - Enhance Basin Water Supplies.*** The intent of this goal is to increase the water supplies available for Chino Basin parties and improve water supply reliability. This goal applies to Chino Basin groundwater and all other sources of water available for beneficial use.
>
> ***Goal No.2 - Protect and Enhance Water Quality.*** The intent of this goal is to ensure the protection of the long-term beneficial uses of Chino Basin groundwater.
>
> ***Goal No.3 - Enhance Management of the Basin.*** The intent of this goal is to encourage sustainable management of the Chino Basin to avoid material physical injury, promote local control, and improve water-supply reliability for the benefit of all Chino Basin parties.
>
> ***Goal No. 4 - Equitably Finance the OBMP***. The intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation.

The far right-hand column of Table 1 (issues, needs, and wants) illustrates the nexus of the goals to the needs and wants of the parties.

Activities for Consideration in the 2020 OBMP Update

There are physical, institutional, and financial impediments to achieving the 2020 OBMP's goals. The issues, needs, and wants of the stakeholders shown in Table 1 recognize these impediments. The stakeholders identified and described 12 new and revised activities that will be considered for inclusion in the 2020 OBMP Update. The 12 activities are listed in Table 2. Table 1 illustrates which of the 12 activities (identified by the letters A through L, as characterized in Table 2) the stakeholders believe have the potential to address each of their needs and wants. 55 of the 57 needs and wants were identified as addressed by one or more of the proposed activities.

Nexus Between the 2020 OBMP Update Goals, Their Impediments, and the Activities Recommended for Consideration

Table 3 illustrates the nexus of the OBMP goals, the impediments to achieving these goals, the activities to remove the impediments, and the potential outcomes (i.e. the implications) of implementing each activity. Table 3 also shows the nexus of each activity to addressing the issues needs and wants of the stakeholders, categorized by basin management issues. In the process of developing Table 3, it was identified that some of the activities defined in Table 2 are related enough to be combined into single activities. The 12 activities were condensed into eight activities. The statements of impediments, expected outcomes, and grouping of the activities were initially proposed by the 2020 OBMP Update Team, based on stakeholder input in Listening Sessions #1 through #3, and were subsequently revised, based on the feedback obtained from stakeholders during Listening Session #4.

The eight activity groups scoped out herein are:

1. Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge (Activity A).
2. Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, to protect or enhance safe yield, and to improve water quality (Activity B)
3. Maximize the reuse of recycled water produced by the IEUA and others (Activity D).
4. Develop and implement a water-quality management plan to address current and future water-quality issues, protect beneficial uses, and develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits (Activity E/F).
5. Develop a management strategy within the salt and nutrient management plan to ensure ability to comply with dilution requirements for recycled water recharge (Activity K).
6. Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence and to optimize the use of all water supply sources (Activity C/G).
7. Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance (Activity L).
8. Develop a process to provide for the equitable distribution of the costs and benefits of the OBMP Update, to encourage regional partnerships for implementation to reduce costs, and to identify and pursue low-interest loans, grants, or other external funding sources to support the implementation of the OBMP Update (Activity H/I/J).

3. Scope of Work to Perform Proposed 2020 OBMP Update Activities

In this section, each of the eight activities identified by the stakeholders will be described in detail. The potential outcomes Table 3 provide the basis for intended scope of each activity. For each activity the following is described:

- Description of the activity
- Need and function of the activity
- Relationship to the PEs in the 2000 OBMP and OBMP IP
- Scope of work to perform the activity
- Schedule of the implementation actions
- Budget-level cost estimate to implement the initial implementation actions

Assumptions Applied in Defining the Scope of Work, Schedule, and Cost of the OBMP Activities

In order to develop the scope of work, schedule, and cost of the activities, the following assumptions were made:

Basis for scope of work and cost. The scopes of work and associated costs to perform the 2020 OBMP Update activities are based on the current understanding of the stakeholders' desired outcomes as articulated during the 2020 OBMP Update listening sessions and described in Section 2 in this TM1. The precise scopes of work and costs defined in this section are preliminary and will likely change during implementation. Each scope of work includes an introductory process to refine the objectives of the activity and to refine the scope of work, schedule, and costs, as necessary.

Estimated costs of engineering services. The estimated engineering services costs are based on 2019 WEI rates and rounded to the nearest $1,000. The estimated costs will need to be adjusted in implementation based on the final recommended scope and schedule.

Participating agency costs are not included. The staff labor costs and other direct costs incurred by agencies participating in the activities are not included in the implementation cost estimates contained herein.

Stand-alone costs. The recommended scope of work and cost for each OBMP activity were developed assuming that the activities were unrelated, or that they could be implemented independently. Once the final set of activities and scopes are selected for inclusion in the 2020 OBMP Update, the scopes will be reviewed to identify overlapping tasks among the activities and will be refined to integrate the work and reduce costs.

Existing OBMP activities. The recommended scopes of work assume that the ongoing activities of the 2000 OBMP and the 2007 supplement to the OBMP IP will continue unless otherwise specified, including, the Recharge Master Plan updates, the ongoing monitoring program under PE1, the Ground Level Monitoring Program, the maximum-benefit salt and nutrient management plan, and the Prado Basin Habitat Sustainability Program.

Leveraging existing work. The recommended scopes of work and costs were assumed to leverage existing work being performed by Watermaster, such as the safe yield recalculation. There may be opportunities to leverage work done by other agencies to reduce the cost of implementing the recommended scope of work. In implementation, when the activity objectives and scopes of work are being refined, the ability to leverage the work of others would need to be identified and considered to eliminate redundancies and reduce cost.

Schedule. All activities are assumed to begin in fiscal year (FY) 2020/21. The implementation schedule assumes that all of the 2020 OBMP activities scoped herein will be implemented and are shown to take longer to complete than would likely be the case if each activity was a stand-alone effort. Once the final set of activities and scopes are selected for inclusion in the 2020 OBMP Update, the schedule will be revised.

Activity A

Description of Activity A

Activity A of the OBMP Update is:

> *Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental waters, particularly in areas of the basin that will promote the long-term balance of recharge and discharge.*

Activity A has the following objectives: (1) to maximize stormwater capture pursuant to Watermaster's diversion permits, (2) to promote the long-term balance of recharge and discharge, (3) to ensure sufficient supplemental water recharge capacity for future replenishment, (4) to reduce dependence on imported water by maintaining or enhancing safe yield, (5) to improve water quality, and (6) to ensure a supply of dilution water to comply with recycled water recharge permit requirements. For the remainder of this section, the use of the term "recharge" is inclusive of diverting, storing, and recharging storm and supplemental waters.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity A:

- Increase recharge of high-quality stormwater that will:
    - protect/enhance safe yield,
    - improve water quality,
    - reduce dependence on imported water,
    - increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and
    - provide new supply of blending water to support the recycled-water recharge program.
- Provide additional supplemental-water recharge capacity for replenishment and the implementation of storage and recovery programs.
- Provide additional surface water storage capacity.

Activity A has similar objectives to those of PE 2 of the 2000 OBMP – *Develop and Implement Comprehensive Recharge Program*. PE2 was included in the 2000 OBMP to reverse the loss of yield caused by urbanization and the concrete lining of natural streams overlying the Chino Basin. The scope of work defined under PE2 was to continue the recharge master plan study initiated by Watermaster and the Chino Basin Water Conservation District (CBWCD) in 1998. The implementation plan for PE2, as defined in the Peace Agreement, requires the preparation of a recharge master plan update (RMPU) at least every five years.

The objectives and scope of each RMPU are defined at the beginning of each update and are derived from several guiding documents: the Peace Agreement, the Peace II Agreement, and the Special Referee's

December 2007 Report. Pursuant to these guiding documents, the general objectives of the RMPU include:

- Ensure there is enough recharge capacity and supplemental water available to meet future replenishment requirements. Pursuant to the Judgment, there must be enough wet-water recharge capacity available to Watermaster to ensure it can replenish the basin with supplemental water to offset overproduction. The wet-water recharge capacity for replenishment must include consideration of the availability of supplemental water supplies, competing uses for the recharge facilities, and the need to balance recharge and discharge in every area and subarea.
- Maximize the recharge of recycled and storm waters where feasible. Both of these supplies are reliable: they are under local control and are less costly when compared to imported water supplies.
- Balance the recharge and discharge in every area and subarea. This provision in the Peace Agreement was included to enable Watermaster to use its discretion when conducting recharge and replenishment operations to prioritize the location and magnitude of recharge and replenishment to improve the hydrologic balance, to ensure pumping sustainability, and to help manage land subsidence.

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 planning, design, and construction of recharge improvements. The 2002 Recharge Master Plan and subsequent RMPUs (2010, 2013, and 2018) were developed in open and transparent planning processes that were convened by Watermaster. As part of the *2013 Amendment to the 2010 RMPU* (2013 RMPU), the RMPU Steering Committee was created to assist Watermaster and the IEUA in preparing RMPUs. The Steering Committee is open to all interested stakeholders and meets regularly through the development of RMPUs. Since the implementation of the OBMP began, Watermaster has achieved the following through the RMPU process:

- Modified seventeen existing flood retention facilities to increase diversion rates, conservation storage, and recharge, and constructed two new recharge facilities. These improvements increased average annual stormwater recharge by about 9,500 acre-feet per year (afy). The cost of these recharge improvements was about $60 million, IEUA and Watermaster paid for about half of this cost, while the other half was funded through Proposition 13 grants and other grant programs.
- Completed the design of five recharge improvement projects, expected be completed and in operation by 2021. These projects are expected to increase average annual stormwater recharge by an additional 4,700 afy.
- Ensured sufficient supplemental water recharge capacity is available to meet its replenishment obligations through 2050.

The next RMPU must be completed and submitted to the Court by October 2023. Based on the alignment of the objectives of Activity A with those of the RMPU, Activity A can be accomplished through the existing RMPU process. The sections below describe the limitations of the existing RMPU process to fully achieve the objectives of Activity A and the recommended scope to refine the RMPU process to accomplish the objectives.

Need and Function of Activity A

Watermaster and the San Bernardino County Flood Control District (SBCFCD) jointly hold three permits with the State Water Resources Control Board (State Board) for the diversion and recharge of stormwater in trust for the parties. Each permit defines a maximum diversion limit and the period over which diversions are allowed to occur each year (diversion season):

- Permit 19895 has a diversion limit of 15,000 acre-feet (af) from November 1 to April 30,
- Permit 20753 has a diversion limit of 27,000 af from October 1 to May 1, and
- Permit 21225 has a diversion limit of 68,500 af from January 1 to December 31.

When combined, these permits allow up to 110,500 af per year (afy) of diversion and recharge. Exhibit A-1 shows the locations where stormwater may be diverted from the stream systems (points of diversion [PODs]) as defined in Permits 19895, 20753, and 21225. The PODs for Permit 19895 are located on the Day Creek system, the PODs for Permit 20753 are located on the San Sevaine Creek system, and the PODs for Permit 21225 are located on the San Antonio/Chino Creek, Cucamonga Creek, Day Creek, and San Sevaine Creek systems. Permit 21225 includes PODs that are also listed in Permits 19895 and 20753, but expands the allowable diversion season.

From 2003 to 2005, Watermaster, working in collaboration with the IEUA, constructed the first set of recharge facilities to exercise its rights pursuant to these permits, increasing average annual stormwater recharge by about 9,500 afy. In 2013, Watermaster and the IEUA completed the 2013 RMPU, which included five new recharge facility improvement projects. As of this writing and as stated above, Watermaster and the IEUA are completing the final design/construction of the 2013 RMPU facilities, and they should be online in 2021. These facilities are expected to increase stormwater recharge by about 4,700 afy.[6] Upon completion of the 2013 RMPU facilities, the annual average stormwater recharge performed pursuant to these three permits is expected to be about 14,950 afy.[7] Exhibit A-2 shows the locations of the existing and planned facilities.

Exhibit A-3 lists the existing recharge facilities and shows the historical average stormwater recharge from 2005 to 2018, the theoretical maximum supplemental water recharge capacity, and the total theoretical maximum recharge capacity for each facility.[3] As shown in Exhibit A-3, actual stormwater recharge has averaged about 10,150 afy which is about 10 percent of the combined diversion limit and 15 percent of the total theoretical maximum recharge capacity. The differences between the historical average stormwater recharge and the diversion limit and total theoretical maximum recharge capacity suggests lost opportunity for stormwater recharge. Because the existing diversion structures are used at their instantaneous capacities, the limitations to increasing the capture and recharge of stormwater are diversion capacity and storage capacity. Hence, Activity A has been identified to increase the capacity to divert, store, and recharge additional surface water.

Availability of Additional Stormwater for Recharge

To better understand the lost opportunity for recharge, Watermaster used its Wasteload Allocation Model (WLAM) to estimate the daily stormwater discharge available for diversion over each permit's respective

[6] Note that Watermaster completed its 2018 RMPU in October 2018, but no projects were selected for implementation.

[7] 2018 Recharge Master Plan Update. WEI. September 2018.

diversion season, based on the historical hydrology for the 63-year period of 1950 to 2012.[8] The WLAM uses daily precipitation, evapotranspiration, evaporation, and land use data to estimate stormwater discharge entering the stream systems. The WLAM then uses hydraulic design data for channels and stormwater management facilities to computationally route the stormwater discharge through the channels, diversion works, and recharge facilities. The stormwater discharge available for diversion was determined to be the flow at the most downstream PODs on each stream system.

Exhibits A-4 and A-5 show comparisons of stormwater discharge available for diversion, model-estimated stormwater recharge, and permitted diversion limits. Exhibit A-4 presents a direct comparison of the annual time series of stormwater discharge—divided into stormwater diverted for recharge and stormwater not diverted for recharge—and the total annual diversion limit. Exhibit A-5 presents a cumulative frequency plot that shows: (1) the probability that stormwater discharge is equal to or greater than a specified value, (2) the probability that stormwater recharge for existing and projected 2013 RMPU facilities is equal to or greater than a specified value, and (3) the permitted diversion limit. Based on Exhibit A-5, the theoretical average annual stormwater discharge is estimated to be about 74,000 afy and the projected average annual stormwater recharge with existing and projected 2013 RMPU facilities is about 14,500 afy. The difference between these two values, 60,000 afy, is the lost opportunity for stormwater recharge.

Through the RMPU process, the Steering Committee analyzes and recommends projects that can increase stormwater diversion and storage capacity and increase stormwater recharge, up to the permit limit, for Watermaster approval. Historically, Watermaster and the IEUA have selected projects for implementation only if the melded unit cost of stormwater recharge resulting from the projects was less than the avoided unit cost of purchasing imported water from the Metropolitan Water District of Southern California (Metropolitan). Over time, more expensive stormwater recharge projects will meet the criteria as the unit cost of imported water increases in the future. The use of this economic criterion alone ignores the economic value of the greater reliability of stormwater relative to imported water.

Exhibit A-6 lists the potential new stormwater recharge projects evaluated in the 2018 RMPU. The locations of these potential projects are shown in Exhibit A-7. The projects listed in Exhibit A-6 were reviewed, and their capital and unit stormwater recharge costs were projected to 2023 costs, which is the year when the next RMPU is due to be completed. The unit cost of new stormwater recharge for the projects listed in Exhibit A-6 ranges from $2,000 to $6,000 per af, and the estimated new stormwater recharge from these projects ranges from 7 to 5,000 afy. Exhibit A-8 is a time history chart showing the historical and projected cost of imported water purchased from Metropolitan compared to the projected unit stormwater recharge cost of the projects shown in Exhibit A-6. In all cases, the projected unit cost of new stormwater recharge projects listed in Exhibit A-6 exceeds the projected cost of imported water that could be supplied by Metropolitan in 2023 (about $900 per af[9]) and through the foreseeable future. Based on Watermaster and the IEUA's historical selection process, no project in Exhibit A-6 was recommended for implementation in the 2018 RMPU. To accomplish the goals of Activity A, the economic criteria for selecting projects would have to be reevaluated.

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[8] WEI. (2018). *Support for Watermaster's response to State Board request for information for petition for extensions of time.* Prepared for Chino Basin Watermaster. March 7, 2018.

[9] WEI. (2018). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

Supplemental Recharge Capacity

As part of the RMPU process, Watermaster also needs to ensure that there is sufficient supplemental water recharge capacity in the basin to meet replenishment obligations. As shown in Exhibit A-3, the theoretical maximum supplemental water recharge capacity under the current IEUA maintenance operations averages about 56,000 afy.[10] For comparison, during FY 2017/18, about 47,000 af of supplemental water was recharged in spreading basins, using about 85 percent of the existing supplemental water recharge capacity. This suggests that new recharge facilities and/or improvements to existing facilities may be needed if parties want to increase supplemental water recharge.

Balance of Recharge and Discharge

Historically, Watermaster has attempted to manage the recharge of storm and supplemental water to promote the balance of recharge and discharge. This method of managing recharge does not specifically address current basin management issues, such as existing land subsidence in MZ1 and parts of MZ2 and pumping sustainability issues in the Jurupa Community Services District (JCSD) and Chino Basin Desalter Authority (CDA) well fields. There is a need to define additional criteria on how and where to conduct recharge to better address existing basin management issues.

Summary

Based on the information summarized herein, the opportunities and challenges in conducting Activity A are:

- There is about 74,000 afy of stormwater discharge available for diversion under the three existing water rights permits, and existing facilities divert about 14,500 afy. The difference between these two values, about 60,000 afy, is a lost opportunity for stormwater recharge. Improvements to existing facilities and/or new facilities are required to achieve the stormwater recharge potential.
- Based on Watermaster and the IEUA's existing economic selection criteria, no new recharge projects were recommended for implementation in the 2018 RMPU. To accomplish the goals of Activity A, the economic criteria for selecting projects needs to be reevaluated.
- The criteria on how and where to conduct recharge needs to be updated to more efficiently address the existing basin management issues, including land subsidence and pumping sustainability.

These challenges can be addressed through the existing RMPU process. The section below describes the recommended scope for developing the 2023 RMPU, refined from past RMPU scopes, to better meet the current needs of the parties defined for Activity A.

Scope of Work for Activity A

Activity A—*Construct new facilities and improve existing facilities to increase the capacity to store and recharge surface water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge*—will be accomplished through the RMPU implementation process. The scope of work summarized below is for developing the 2023 RMPU and conducting the necessary work to achieve the objectives of Activity A*.* The scope of work consists of five tasks:

- Task 1 – Define objectives and refine scope of work
- Task 2 – Develop planning, screening, and evaluation criteria

[10] This estimate corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins were used less frequently.

- Task 3 – Describe recharge enhancement opportunities
- Task 4 – Develop reconnaissance-level engineering design and operating plan
- Task 5 – Plan, design, and construct selected recharge projects

Task 1 – Define objectives and refine scope of work. The objective of this task is to obtain consensus on the objectives of Activity A and the impediments this activity is meant to overcome. During this process, the Steering Committee will address questions raised by stakeholders during the OBMP Update, such as:

(1) Should Watermaster have a process in Activity A to identify vacant land for purchase even if there is no specified project or it becomes available outside the "call for projects" window of the RMPU process?

(2) Should Watermaster have a process to encourage developers to utilize infiltration to manage on-site runoff pursuant to the Municipal Storm (MS4) permit?

A detailed scope, cost, and schedule will be prepared to meet the defined objectives. Two meetings will be conducted (1) to define the objectives and impediments and (2) to define the scope, cost, and schedule.

Task 2 – Develop planning, screening, and evaluation criteria. The objectives of this task are to develop criteria to determine how and where new recharge capacity can be constructed and to evaluate and select a subset of projects to evaluate. The criteria developed to evaluate potential projects in Task 4 will include qualitative criteria, such as reliability, and quantitative criteria that include business case evaluations, expressed as net present value, unit cost, and others. The recharge projects with the best cost-benefit ratio at the time were constructed in earlier recharge improvement efforts in the 2000 OBMP implementation. The types of new stormwater projects required to meet the objectives described herein and subsequently refined in Task 1 will likely be more expensive than the avoided cost of purchasing imported water from Metropolitan. The Steering Committee will (1) review and refine criteria used in past RMPUs and (2) review the current projected basin management challenges to develop "smart" recharge criteria. The smart recharge criteria will ensure that project designs and operations are complementary to other Watermaster management activities, such as protecting and enhancing safe yield, management of land subsidence, promoting pumping sustainability, ensuring dilution supplies to comply with recycled water recharge permits, water quality improvement, maintenance of Hydraulic Control, and others.

Included in this scope is estimating future replenishment obligations, updating the estimated supplemental water recharge capacity, and characterizing the availability of imported and recycled water. Future replenishment obligations will be estimated in the 2020 safe yield recalculation effort and will be subsequently used as a criterion for planning supplemental water recharge. Two meetings will be scheduled to review and refine the criteria with the stakeholders.

Task 3 – Describe recharge enhancement opportunities. The objectives of this task are to identify potential projects, to screen them using the criteria developed in Task 2, and to subsequently develop a set of stormwater and supplemental water recharge projects for detailed evaluation. Two meetings will be conducted: (1) to develop a list of potential projects that can be implemented and (2) to review the screening of the projects defined during the first meeting and select projects to evaluate in Task 4.

Task 4 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of new recharge projects—individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate size, location, and alignment of major stormwater utilities, and will describe any potential implementation barriers. A cost opinion, stormwater recharge performance, and supplemental water recharge capacity will be determined for each project. The task includes evaluating the projects based on the criteria developed in Task 2 and recommending a set of projects for implementation. The deliverable of this task will be the *2023 Recharge Master Plan Update* report, summarizing the work performed under Tasks 1 through 4, and it will include an implementation plan and a plan to finance the preliminary design and CEQA documentation. Four meetings will be conducted: (1) to review the designs and estimated benefits of the projects, (2) to review the evaluation of the projects based on the criteria developed in Task 2 and the recommended list of projects for implementation, (3) to review the implementation plan, and (4) to review the 2023 RMPU report.

Task 5 – Plan, design, and construct selected recharge projects. The objective of this task is to implement the recommendations from the 2023 RMPU report. This task includes (1) developing and implementing necessary agreements between participating parties, (2) preparing the preliminary design of the recommended recharge projects, (3) preparing the environmental documentation for the recommended recharge projects that will tier off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended recharge projects, (5) preparing final designs of the recommended recharge projects, (6) acquiring necessary permits for constructing and operating the recommended recharge projects, and (7) constructing the recommended recharge projects.

Future Tasks – Repeat Tasks 1 through 5 every five years as required by the Court

Cooperative Efforts with Appropriate Entities to Implement Activity A

The IEUA, Watermaster, the CBWCD, and the SBCFCD are partners in conducting recharge in the Chino Basin. The four agencies have an agreement to implement the existing recharge program. They also collaborate to update the recharge master plan at least every five years with the guidance of the Steering Committee. Activity A will be achieved within the existing RMPU process and will maintain the existing institutional organization as follows:

- ***Watermaster***: Leads the stakeholder process to define the objectives in Task 1, to develop the criteria in Task 2, and to estimate the recharge benefit of the projects using the its existing modeling tools in Task 4.
- ***IEUA***: Leads the development of the list of projects for evaluation in Task 3 and preparing cost opinions for the projects in Task 4. Additionally, the IEUA will collaborate with Watermaster in leading Tasks 1 and 2.
- ***CBWCD***: Collaborates with Watermaster in leading Tasks 1 and 2. The CBWCD is responsible for reviewing and permitting all of the engineering designs developed under Task 5 for their facilities.
- ***SBCFCD***: Collaborates with Watermaster in leading Tasks 1 and 2. The SBCFCD is responsible for reviewing and permitting all of the engineering designs developed under Task 5 for their facilities.

The four parties will continue to collaborate in the RMPU process and in conducting recharge in the Chino Basin.

Implementation Actions, Schedule, and Costs for Activity A

The recommended schedule to complete the scope of work described herein is described below:

Year one (FY 2020/21):

- Convene Steering Committee.
- Conduct a meeting regarding “current conditions” of groundwater recharge.
- Define objectives of Activity A and the RMP update (Task 1):
  - Define scope and schedule of RMP update.
- Develop criteria on how and where to conduct recharge (Task 2).
- Develop new criteria for evaluation and selection of recharge projects (Task 2).

Year two (FY 2021/22):

- Develop list of projects for evaluation (Task 3).
- Conduct a reconnaissance-level engineering study for the proposed projects (Task 4).

Year three (FY 2022/23):

- Select project(s) for implementation (Task 4).
- Prepare 2023 RMPU Report (Task 4).

Year four (FY 2023/24):

- Watermaster approves the 2023 RMPU Report by October 2023.
- Watermaster and the IEUA Project Implementation Agreement. The objective of this agreement is to define the roles of Watermaster and the IEUA in the planning, permitting, design, and implementation of the projects, and the financing plan.
- Flood Control and Water Conservation Agreement. The parties to this agreement include the SBCFCD, Watermaster, and the IEUA and potentially others. The objectives of this agreement are to define the terms and conditions to jointly explore and construct new conservation works on SBCFCD and IEUA properties and to conduct flood control and water conservation activities utilizing those same conservation works. The agreement will define the project sites, facility improvements, construction and maintenance cost allocations, user or license fees, operating criteria (with flood control purposes taking priority over conservation for joint use facilities), and other conditions. The SBCFCD will require Watermaster and the IEUA to fund SBCFCD engineering studies and analyses to demonstrate that all conservation improvements at flood control facilities will not negatively impact the operation and maintenance of SBCFCD facilities or reduce the level of the designed flood protection. All engineering studies and analyses shall be done and provided to SBCFCD for review and approval, and an encroachment permit shall be obtained from SBCFCD before the construction of any conservation improvements can commence. The SBCFCD will require that all applicable Environmental Agencies' permits and approvals be obtained and submitted to the SBCFCD before an encroachment permit can be issued.
- Agreement with Property Owners. Develop an agreement among a property owner, the IEUA, and Watermaster on the terms for use of land where land is required for a recharge project.
- In addition to these agreements, Watermaster will determine whether it is necessary to submit a Petition for Change with the State Board for selected projects that are not included in the Watermaster's current diversion permits. The duration of the Petition for Change process is unknown but would likely be more than one year.

Years five and six (FY 2024/25 and FY 2025/2026):

- Preliminary Design of Recommended Projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces updated New Yield and cost estimates.
- Prepare Environmental Documentation for Recommended Projects. CEQA will cover the recommended projects at the project level and the deferred projects at a programmatic level, based on the project descriptions developed in Task 5. This documentation will tier off from the 2020 OBMP Update programmatic environmental impact report. Watermaster will conduct a Material Physical Injury analysis in parallel with the CEQA process.
- Begin 2028 RMPU process (first year of the 2028 RMP update).

Years seven and eight (FY 2026/27 and FY 2027/28):

- Prepare Final Designs and Acquire Necessary Permits for the Selected Projects.

Years nine and ten (FY 2028/29 and FY 2029/30):

- Construct 2023 RMPU Selected Projects.

Exhibit A-9 shows the estimated budget-level engineering cost to complete Tasks 1 through 4, which is about $575,000. The cost of Task 5 cannot be estimated until the completion of Task 4. Exhibit A-9 also shows how Tasks 1 through 4 and their associated costs will be scheduled over the first three years of implementation. Note that because Watermaster and the IEUA are required to complete the RMPU at least every five years, the cost to perform the Activity A scope of work is not a new cost to the parties.

Activity B

Description of Activity B

Activity B of the OBMP Update is:

> *Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance safe yield, and improve water quality.*

The objective of Activity B is to develop and implement storage and recovery programs in the Chino Basin that provide defined benefits to the parties and the basin.

Through the listening session process, the stakeholders identified the following desired outcomes from Activity B:

- Storage and recovery programs that are optimized: to protect/enhance safe yield, to improve water quality, to avoid land subsidence, to ensure balance of recharge and discharge, and to maintain hydraulic control.
- Leverage unused storage space in the basin.
- Reduce reliance on imported water, especially during dry periods.
- Potentially provide opportunity for outside funding sources to implement the OBMP Update.

The Judgment recognized the existence of unused storage space within the Chino Basin that could be used by a person or a public entity to store water for subsequent beneficial use. The Judgment requires that the use of such storage capacity be undertaken only under Watermaster control and regulation to protect all stored water, to protect safe yield, and to avoid adverse impacts to groundwater pumpers. The Judgment prioritizes the use of storage space by the parties over the use of storage space for the export of stored water.

The Peace Agreement defined a "storage and recovery program" as the use of available storage capacity in the Chino Basin by any person to store supplemental water in the basin pursuant to a Groundwater Storage Agreement with Watermaster, including the right to export that water for use outside the basin.

Activity B has similar objectives and desired outcomes to those of PE 9 of the 2000 OBMP—*Develop and Implement Storage and Recovery Programs*. PE 9 was included in the 2000 OBMP to implement storage and recovery programs to “benefit all parties in the basin and ensure that basin waters and storage capacity are put to maximum beneficial use while causing no material physical injury (MPI) to any producer or the basin.” The implementation plan for PE 9 was combined with PE 8—*Develop and Implement Groundwater Storage Management Program*—in the OBMP IP and Peace Agreement.

The OBMP IP included a storage management plan that allowed the parties to utilize a 500,000 af band of storage space in the basin and requires them to mitigate adverse impacts from its use. In 2017, the IEUA adopted an addendum to the 2010 Peace II SEIR that provided a temporary increase in the useable storage space to 600,000 af through June 30, 2021. Pursuant to the OBMP IP, Watermaster shall: (1) prioritize its efforts to regulate and condition storage and recovery programs for the mutual benefit of the parties and (2) give first priority to proposed storage and recovery programs that provide broad mutual benefits to the parties.

In 2018, Watermaster conducted a *Storage Framework Investigation*,[11] where future projections of the use of storage were estimated and evaluated for potential MPI. The *Storage Framework Investigation* projected that MPI could occur due to the implementation of prospective storage and recovery programs and described potential facilities and operating concepts that, if implemented, would minimize potential MPI. The *Storage Framework Investigation* is being used to inform the development of the *2020 Storage Management Plan*. The *2020 Storage Management Plan* is in preparation, and when completed, it will inform the development of future storage and recovery programs.

Need and Function of Activity B

Activity B describes the Parties' desires to implement "optimized" storage and recovery programs that avoid potential MPI and provide benefits, such as:

- *Increased water-supply reliability*. Imported water is stored in the basin during times of imported-water surplus and can be recovered during times of water-supply shortage (e.g. prolonged drought, imported water shortages/outages, etc.) to supplement local supplies.
- *Protected or enhanced safe yield*. The operation of storage and recovery programs needs to be implemented to minimize reductions in net recharge and potentially increase net recharge to the basin.
- *Improvements to water quality.* Recovery operations could be programmed to occur in areas of impaired water quality, thereby removing groundwater contaminants. This would require groundwater treatment facilities. Supplemental water recharge may provide a slight water quality improvement.
- *Reduced cost of OBMP implementation.* Leave behind water, revenue, credits, investment in facilities, or other contributions produced by a storage and recovery program can be used to offset Watermaster assessments and provide other benefits.

Watermaster, the IEUA, and the parties have tried to develop and implement storage and recovery programs since the Peace Agreement came into effect in 2000. The first attempt included the issuance of a request for proposals, declaring that the Chino Basin was ready to develop storage and recovery programs with water agencies outside the basin. Very few proposals were received, and the proposals that were submitted did not provide the benefits desired by the parties.

Metropolitan developed a program called the Dry-Year Yield Program (DYYP) and offered it to its member agencies in the Metropolitan service area. As key feature of the DYYP, Metropolitan offered funding to construct and operate new facilities that would enable Metropolitan to store imported water in a groundwater basin and recover it when needed. In 2003, Metropolitan, the IEUA, Watermaster, and the TVMWD entered into an agreement to implement a 100,000 af DYYP in the Chino Basin that was consistent with the DYYP parameters required by Metropolitan. The DYYP is the only storage and recovery

[11] WEI. (2019). *Storage Framework Investigation – Final Report*. Prepared for the Chino Basin Watermaster. October 2018, revised January 2019.

program that has been implemented within the Chino Basin since 2000, and the DYYP agreement expires in 2028. As part of the DYYP, the parties received compensation from Metropolitan for the construction and operation of numerous facilities across Chino Basin that are used for recovery operations during "take" cycles of the DYYP. The parties can use these facilities for their own purposes at all other times. In 2010, Metropolitan, the IEUA, Watermaster, and the TVMWD began discussions to expand the DYYP to 150,000 af of storage but decided against expansion. The parties have expressed that the DYYP presented an opportunity to fund certain capital improvement projects that added groundwater pumping capacity; however, the anticipated long-term benefits, such as improved water-supply reliability through dry periods, were not sufficiently planned for and agreed upon during the development of DYYP and ultimately were not realized by the parties.

Currently, there are two new efforts underway to develop storage and recovery programs: (1) the Chino Basin Water Bank being developed by some of the parties and the IEUA and (2) the Chino Basin Program (CBP) being developed by the IEUA. The latter is in response to a $207 million grant awarded to IEUA under Proposition 1 for the construction and operation of storage programs that create environmental benefits in the Sacramento-San Joaquin Delta.

Summary

What is common to all past efforts to develop and implement storage and recovery programs is the belief that Chino Basin storage is a valuable resource that can and should be leveraged to benefit the parties. What was missing in past efforts was an initial effort to clearly articulate the objectives of the parties and the required benefits to be realized from storage and recovery programs.

Activity B should follow a more deliberate planning process that will enable the parties and their storing partners to select and implement storage and recovery programs that achieve the objectives of the parties and the desired benefits. To do this, the planning process should answer the following questions:

(1) Why do the parties want to conduct storage and recovery programs? And, what are the parties' objectives for storage and recovery programs?

(2) What were the obstacles to implementing storage and recovery programs in the past? How do we avoid or overcome them in the future?

(3) What are the benefits desired by the parties? How can such benefits be quantified?

(4) What are the potential source waters for storage and recovery programs in the Chino Basin? What is the availability and what are the volumes of these potential source waters?

(5) Who are the entities that would be interested in obtaining water from a storage and recovery program? How would they take delivery of the stored water?

(6) How could put and take operations be performed to match the availability of the source waters with the demand for the stored water and be consistent with the *2020 Storage Management Plan*?

(7) How can existing infrastructure be used to perform put and take operations? Are new facilities required? What are the capital and O&M costs associated with the use of existing and new facilities?

(8) What are the practical alternatives for implementing storage and recovery programs?

(9) What institutional arrangements are necessary to implement storage and recovery programs?

The Watermaster should convene a Storage and Recovery Program Committee for the purposes of answering these questions and ultimately developing and implementing a *Storage and Recovery Program Master Plan*. The *Storage and Recovery Program Master Plan* will enable the parties and other potential storing partners: (1) to reference a common set of objectives for storage and recovery programs and align the objectives with requirements in grant applications and other funding opportunities, (2) to assess the potential for implementing storage and recovery programs in the Chino Basin at various scales, (3) to solicit interest in participation in storage and recovery programs, and (4) to develop storage and recovery programs that are consistent with the *2020 Storage Management Plan*.

Scope of Work for Activity B

The scope of work to achieve the objectives of Activity B—*Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance safe yield, and improve water quality*—is designed to answer the questions listed above and will consist of the following four tasks:

- Task 1 – Convene the Storage and Recovery Program Committee and articulate the program objectives
- Task 2 – Develop conceptual alternatives for storage and recovery programs at various scales
- Task 3 – Describe and evaluate reconnaissance-level facility plans and costs for storage and recovery program alternatives
- Task 4 – Prepare *Storage and Recovery Program Master Plan*

A great deal of prior work has been performed for the *Storage Framework Investigation*, the Chino Basin Water Bank, and the Chino Basin Program. These past efforts can be leveraged after Watermaster completes Task 1. At the end of Task 4, Watermaster and the parties will have a master plan for storage and recovery programs, know what is reasonably possible, know what is a "stretch" program, and know how to subsequently implement the master plan.

The scope of work described below for Task 1 is a necessary first step. If the parties cannot agree upon the objectives for storage and recovery programs, Tasks 2 through 4 will not be executed. If the process moves beyond Task 1, the precise scope and level of effort required to perform Tasks 2 through 4 will greatly depend on the outcomes of Task 1. Tasks 2 through 4 are generally described below, but the cost to perform these tasks is not estimated herein. The precise scope of work for Tasks 2 through 4 will be developed in detail as part of Task 1.

Task 1 – Convene the Storage and Recovery Program Committee, define objectives, and refine scope of work. In this task, the Storage and Recovery Program Committee will be convened. The Committee's initial task is to obtain consensus on the objectives and desired benefits of storage and recovery programs and, if consensus is achieved, scope the effort to prepare a *Storage and Recovery Program Master Plan*. To execute this task, the Committee will address the following questions:

(1) Why do the parties want to conduct storage and recovery programs and what should be their objectives?

(2) What were the obstacles to implementing storage and recovery programs in the past, what are the current objectives, and how we can overcome them in the future?

(3) What are the benefits desired by the parties and how should they be quantified?

Four Committee meetings will be conducted (1) to define the objectives and impediments, (2) to define a set of mutual benefits that are expected/required from storage and recovery programs, and (3) to develop the preliminary scope, cost, and schedule for the work (Tasks 2 through 4 below) to develop the *Storage and Recovery Program Master Plan*.

Task 2 – Develop conceptual alternatives for storage and recovery programs at various scales. The objective of this task is to describe a set of conceptual alternatives for storage and recovery programs at various scales that will achieve the objectives defined in Task 1. The set of conceptual alternatives will be described and evaluated in greater detail in Task 3.

To execute this task, the Committee will address the following questions:

(4) What are the potential source waters for storage and recovery programs in the Chino Basin? What is the availability and what are the volumes of these potential source waters?

(5) What entities are interested in obtaining water from a storage and recovery program? How would they take delivery of the stored water?

(6) How could put and take operations be performed to match the availability of the source waters with the demand for the stored water and be consistent with the 2020 Storage Management Plan?

Five to six Committee meetings will be needed to answer these questions, describe various conceptual alternatives for storage and recovery programs, and evaluate and select a set of these alternatives for further development, evaluation, and ranking in Task 3.

Work involved in this task will likely include: (1) collecting, compiling, and reviewing existing and new information; (2) identifying potential source waters for storage and recovery programs in the Chino Basin; (3) characterizing the availability and volumes of these potential source waters; (4) identifying the entities that would be interested in obtaining water from a storage and recovery programs; (5) characterizing how the entities would take delivery of the stored water; (6) identifying and characterizing institutional challenges to program implementation; (7) developing planning criteria to formulate and rank the conceptual storage and recovery program alternatives; (8) describing several conceptual alternatives for storage and recovery programs of various scales; and (9) selecting a set of alternatives for further development, evaluation, and ranking in Task 3.

Each alternative will describe, at a conceptual level, the operating parameters for put and take operations in the Chino Basin that match the available source waters with the demand for stored water. The alternatives must be consistent with the Watermaster's 2020 Storage Management Plan and the objectives for storage and recovery programs defined in Task 1.

Task 3 – Describe and evaluate reconnaissance-level facility plans and costs for storage and recovery program alternatives. The objective of this task is to describe and evaluate reconnaissance-level facility plans, operational plans, and cost opinions to implement the various storage and recovery program alternatives described in Task 2.

To execute this task, the Committee will need to answer the following questions:

(7) How can existing infrastructure be used to perform put and take operations? Are new facilities required? What are the capital and O&M costs associated with the use of existing and new facilities?

(8) What are the practical alternatives for implementing storage and recovery programs?

Three to four Committee meetings will be needed to answer these questions and to describe, evaluate, and rank the various storage and recovery program alternatives.

For each alternative, two sub-alternatives will be developed: one alternative that uses both existing and new facilities and one that is based only on new facilities. Potential implementation barriers will be described. Capital and O&M cost opinions will be prepared for each alternative, utilizing criteria developed in Task 2.

To characterize the performance of the storage and recovery program alternatives: (1) the Watermaster's groundwater model will be utilized to estimate the physical response of the basin and to assess the potential for MPI, and (2) the benefits of the storage and recovery program will be quantified and assessed. Each alternative will be ranked using this and any other criteria developed in Task 2.

Task 4 – Prepare Storage and Recovery Program Master Plan. The objective of this task is to prepare a *Storage and Recovery Program Master Plan* that will enable the parties and other potential storing partners: (1) to reference a common set of objectives for storage and recovery programs and align the objectives with requirements in grant applications and other funding opportunities, (2) to assess the potential for implementing storage and recovery programs in the Chino Basin at various scales, (3) to solicit interest in participation in storage and recovery programs, and (4) to develop storage and recovery programs that are consistent with the *2020 Storage Management Plan*.

The plan will describe the results and recommendations of Tasks 1 through 3 and will include a discussion of the institutional arrangements required to implement storage and recovery programs in the Chino Basin. Three to four Committee meetings will be needed (1) to finalize the discussion on what was learned in prior tasks, (2) to gain consensus on the recommendations, and (3) to review, revise, and finalize the *Storage and Recovery Program Master Plan*.

Cooperative Efforts with Appropriate Entities to Implement Activity B

This is a basin-wide activity that involves the parties, IEUA, TVMWD, and WMWD. Potential storing partners located outside of the Chino Basin will need to be consulted but need not participate on the Storage and Recovery Program Committee. Watermaster's role will be to convene the Storage and Recovery Program Committee, coordinate and administer its activities and meetings, and ensure that the recommendations derived from this effort are consistent with the Judgment, Peace Agreements and other agreements, the 2020 Storage Management Plan, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity B

The recommended schedule to complete the scope of work described herein is described below:

Year one (FY 2020/21):

- Convene Storage and Recovery Program Committee and articulate the program objectives (Task 1).

Year two (FY 2021/22):

- Develop conceptual alternatives for storage and recovery program s at various scales (Task 2).

Year three (FY 2022/23):

- Describe and evaluate reconnaissance-level facility plans and costs for storage and recovery program alternatives (Task 3).
- Prepare *Storage and Recovery Program Master Plan* (Task 4).

Year four and thereafter (FY 2023/24+):

- Develop and implement storage and recovery program with guidance and assistance from the *Storage and Recovery Program Master Plan*.

- Update the *Storage and Recovery Program Master Plan* as needed to be consistent with periodic updates to the Storage Management Plan.

Exhibit B-1 shows the estimated budget-level cost opinion to complete Task 1, which is about $105,000. The cost of Tasks 2 through 4 cannot be estimated until the completion of Task 1. Exhibit B-1 also shows how Tasks 1 through 4 will be scheduled over the first three years of implementation.

Activity D

Description of Activity D

Activity D of the OBMP Update is:

> *Maximize the reuse of recycled water produced by IEUA and others.*

The objective of Activity D is to maximize the reuse of recycled water produced by the IEUA and other publicly owned treatment works (POTWs) in proximity to the Chino Basin to meet future demands and improve local water-supply reliability, especially during dry periods. Expanded reuse activities could include direct non-potable reuse (landscape irrigation or industrial uses), groundwater recharge (indirect potable reuse), and direct potable reuse. Increasing recycled water reuse is an integral part of the OBMP's goal to enhance water supplies. The direct use of recycled water increases the availability of native and imported waters for higher-priority beneficial uses.

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activity D:

- Provide a new, reliable volume of in-lieu and/or wet water recharge that could:
  - Protect or enhance safe yield,
  - reduce dependence on imported water,
  - improve water-supply reliability, especially during dry periods, and
  - increase pumping capacity in areas of low groundwater levels and areas of subsidence concern.
- Provide for alternative sources of recycled water that can be used to satisfy the IEUA's requirement to discharge a minimum of 17,000 afy to the Santa Ana River pursuant to the Santa Ana River Judgment and associated agreements with the Western Municipal Water District (WMWD).

Activity D has similar objectives to those of PE 5 of the 2000 OBMP—*Develop and Implement Regional Supplemental Water Program*. Recognizing that growth in the Chino Basin was going to result in a more than 30 percent increase in then-current water demands, PE 5 was included in the 2000 OBMP to improve regional conveyance and availability of imported and recycled waters throughout the basin. Recycled water is more reliable than imported water, and using it in lieu of imported water improves the sustainability of Chino Basin and water supply reliability. The implementation plan for PE 5 was combined with PE 3—*Develop and Implement Water Supply Plan for the Impaired Areas of the Basin* in the OBMP and Peace Agreement.

The PE 3/PE 5 implementation action defined in the Peace Agreement related to recycled water reuse was for the IEUA to construct recycled water facilities to meet recycled water demands for direct use and for groundwater recharge. Since 2000, the IEUA has constructed and operated a recycled water conveyance system throughout the basin, enabling it to provide recycled water to its member agencies. Recycled water deliveries grew from about 3,400 afy in 2000 to about 34,000 afy in 2017 and have replaced a like amount of groundwater and imported water that would have otherwise been used for non-potable purposes.

The aggressive expansion of the recycled water reuse program was made possible—and economically feasible—through the SNMP activities performed pursuant to PE 7—*Develop and Implement Salt Management Plan*. The SNMP, discussed as part of Activity K, will be an integral management tool to enable the maximization of recycled water reuse pursuant to Activity D.

Need and Function of Activity D

History of Recycled Water Discharge and Reuse in the Chino Basin

The IEUA owns and operates four wastewater treatment facilities: Regional Plant No. 1 (RP-1), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF). Recycled water produced by these plants is reused for direct uses, groundwater recharge, and discharged to Chino Creek or Cucamonga Creek, which are tributaries to the Santa Ana River. Exhibit D-1 shows the location of the IEUA's treatment plants, discharge points to surface water, recharge facilities receiving recycled water, and recycled water distribution pipelines for direct use deliveries. Historically, the IEUA's operating plan has prioritized the use of recycled water as follows: (1) to meet the IEUA's discharge obligation to the Santa Ana River (17,000 afy), (2) to meet direct reuse demands for recycled water, and (3) to recharge the remaining recycled water.

Exhibit D-2 shows the time history of the IEUA's annual discharges to the Santa Ana River since FY 1977/78. The increase in recycled water discharges from 20,000 afy in FY 1977/78 to about 60,000 afy by FY 1996/97 is illustrative of the population growth in the Chino Basin over this period. Although recycled water had been reused since the 1970s, the growth of IEUA's recycled water reuse programs started in 1997. Total recycled water discharge remained at 60,000 afy through 2005 after which it declined as the IEUA's recycled water reuse program was aggressively expanded as a result of OBMP implementation. Since 2014, recycled water discharge has been less than 20,000 afy and has averaged about 18,600 afy over the last five years. In FY 2017/18, recycled water discharge to the Santa Ana River was 16,700 afy, which is about equal to the minimum discharge required for the IEUA to comply with the Santa Ana River Judgment.

Exhibit D-3 characterizes the total reuse of recycled water for direct use and recharge in the Chino Basin from FY 1996/97 through FY 2017/18. When the OBMP was completed in 2000, the IEUA was recharging about 500 afy of recycled water and utilizing about 3,200 afy for non-potable direct uses. The incorporation of Watermaster and the IEUA's maximum-benefit SNMP into the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) in 2004 triggered the ability to rapidly increase recycled water reuse, which peaked at about 38,200 af in FY 2013/14. Total recycled water reuse in the Chino Basin declined about 5,600 to 32,700 af in FY 2017/18. State-mandated water conservation programs implemented in 2014 in the midst of an extreme drought resulted in reduced indoor water use and ultimately less recycled water available for reuse over the last several years.

Direct Reuse. Recycled water from the IEUA's facilities is reused directly for: irrigation of crops, animal pastures, freeway landscape, parks, schools, and golf courses; commercial laundry and car washes; outdoor cleaning and construction; toilet plumbing; and industrial processes. The direct use of recycled water increased from about 3,500 af in FY 1999/00 to about 24,600 af in FY 2013/2014 and has since declined to about 19,400 af as of FY 2017/18. The recent decline in the direct use of recycled water is a result of reduced water use due to drought and state-mandated water conservation programs that required significant reductions in water use. Exhibit D-4 is a map of IEUA's recycled water deliveries for direct use in FY 2017/18.

Recharge. In 2005, the IEUA initiated its recycled water recharge program and recycled water has since become an important component of annual recharge to the Chino Basin. In FY 2017/18, recycled water recharge was 13,200 af and has averaged about 13,000 afy over the past five years. The locations of the recharge facilities receiving recycled water are shown in Exhibit D-4.

Recycled Water Reuse Projections and the Availability of Additional Recycled Water for Reuse

As illustrated above, the IEUA is currently maximizing the reuse of recycled water given the constraint of meeting its obligations to discharge a minimum of 17,000 afy to comply with the Santa Ana River Judgment and associated agreements with WMWD. Growth is still occurring in the Chino Basin and will result in additional wastewater flows to the IEUA's treatment plants. Much of this supply will be used to meet increasing non-potable demands as the currently remaining agricultural land uses convert to urban uses. The IEUA is continuing to expand its recycled-water distribution system and recharge facilities throughout the Chino Basin for direct non-potable uses and recharge.

Projected Recycled Water Supplies and Demands. Exhibit D-5 shows the IEUA's latest projections of recycled water production, expressed as a range (low and high) and projections of direct reuse and recharge through 2040.[12] Also shown in Exhibit D-5 is the calculation of surplus supply available for expanded reuse and/or discharge. Under the "high" recycled water production projections, there is sufficient surplus supply to meet the Santa Ana River discharge obligations and expand recycled water reuse. Under the "low" recycled water production projections, there is insufficient supply to meet the Santa Ana River discharge obligations through at least 2025, suggesting that (1) expanded recycled water reuse activities beyond that which are currently projected may not be possible until after 2025, and (2) the IEUA may need to find supplemental supplies to meet its discharge obligations.

Supplemental recycled water supply. In addition to the recycled water available from the IEUA, other nearby POTWs are not currently reusing recycled water and may have surplus recycled water that could be acquired and conveyed to the Chino Basin. The surplus recycled water from these POTWs could be utilized to increase reuse in the Chino Basin if it is economical to convey the water to the desired end uses or used to meet discharge obligations. The nearby POTWs with potential surplus supply include the Pomona Water Reclamation Facility (WRF), the Western Riverside County Regional Wastewater Authority (WRCRWA), the City of Rialto, RIX, and the City of Riverside. The locations of these facilities are shown in Exhibit D-1. Currently, the availability of recycled water from these or other POTWs is not precisely known.

Capacity for Expanded Recycled Water Recharge at Existing Facilities. As described for Activity A, Watermaster and the IEUA operate a set of recharge facilities in the Chino Basin to conduct storm, recycled, and imported water recharge. The IEUA and Watermaster prioritize[13] the use of these facilities as follows: (1) maximize stormwater capture and recharge, (2) meet Watermaster's replenishment and recharge obligations as required by the Judgment and Peace Agreements, and (3) recharge other supplemental water for groundwater storage and management. Exhibit D-6 shows the theoretical

[12] These projections are based on information published by the IEUA to support the development of the Chino Basin Program: *Sources of Water Supply for the Chino Basin Program.* Memo to Member Agencies. February 20, 2019. These projections differ slightly from the latest water supply planning projections published in Watermaster's *Storage Framework Investigation* and the *2018 RMPU*, both of which were published in 2018.

[13] Note that the primary goal of multipurpose facilities is to attenuate flood peak discharge.

maximum supplemental water recharge capacity[14] that can be used for recycled water recharge, subject to Watermaster's priority need for recharge and replenishment.[15] The table also shows actual FY 2017/18 recycled water recharge (13,200 af) and planned recycled water recharge for FY 2019/20 through FY 2029/30.[16] As the table shows, the planned volume of recycled water recharge of 16,400 af is less than one-half of the theoretical maximum supplemental water recharge capacity. This suggests that there is sufficient capacity to recharge future surplus recycled water supply that will not be used for direct non-potable uses, subject to Watermaster's need for recharge and replenishment and the ability to comply with the dilution requirements defined in Watermaster and the IEUA's maximum-benefit SNMP.

Considerations and Challenges for Maximizing Recycled Water Reuse

There are various factors that should be considered in determining how to maximize the reuse of recycled water produced by the IEUA and other POTWs. These are summarized as follows.

Existing Planning Efforts. The IEUA is currently performing planning efforts for the CBP, which is a large storage and recovery program to provide for regional, dry-year water supplies and associated infrastructure and to create environmental benefits in the Sacramento-San Joaquin Delta. The CBP was selected to receive a $207 million Proposition 1 Storage Grant. Over its 25-year project life, the CBP would increase recycled water recharge in the Chino Basin by 15,000 afy, and during dry years, the water in storage would subsequently be recovered and used in Sothern California in lieu of imported water from the State Water Project. The planned sources of recycled water for the CBP are currently being evaluated by the IEUA, but it is certain additional supplies beyond those produced by the IEUA will be needed. The CBP is still undergoing planning and evaluation, and its implementation is not certain. Regardless of whether the CBP is implemented, the significant body of work being performed by the IEUA can be leveraged to accomplish Activity D.

Timing of Recycled Water Availability. A common challenge with maximizing recycled water reuse is the mismatch in the timing of non-potable water demands and recycled water supply availability. It will be important to characterize in detail the seasonality of outdoor water demands and availability of recharge capacity given that surplus recycled water may only be available in winter months when outdoor demand is low and recharge capacity is otherwise being utilized for stormwater recharge. These relationships will also vary based on climate conditions (wet versus dry periods). Fully maximizing recycled water supplies will require an understanding of these complex relationships to optimize the design and operation of projects. Fully maximizing recycled water reuse may require storage facilities.

Salt and Nutrient Management. Watermaster and the IEUA have an existing maximum-benefit SNMP that enables the reuse of recharge in the Chino Basin. This SNMP, which is incorporated into the Basin Plan for the Santa Ana Region, did not contemplate the use of non-IEUA sources of recycled water in the Chino Basin. Some of the available recycled water sources have TDS and/or nitrate concentrations that are numerically higher than those of IEUA's current or permitted TDS and nitrate limits, which could impact compliance with the SNMP or trigger additional mitigation measures to protect beneficial uses. Detailed

[14] There are two estimates of theoretical supplemental water recharge capacity. The first is corresponds to the 10-month period directly after a cleaning. The second corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins are used less frequently.

[15] WEI, (2019). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

[16] The projection cited here is based on the recycled water projection included in the 2018 RMPU, which was published before the CBP planning memo projection of 18,700 afy.

water quality projections would be required to demonstrate the impacts of reuse of non-IEUA sources of recycled water in the Chino Basin.

Water Quality. Water quality regulations are constantly evolving as new contaminants of potential concern are identified and studied. In recent years, the presence of pharmaceutical and personal care products (PPCPs) in recycled water has been an area of focused research to determine potential health impacts that could result from reuse of recycled water for recharge in groundwater basins. A new set of emerging contaminants of concern is a group of chemicals known as poly- and per-fluorinated compounds (PFAS). PFAS are known to be present in recycled water, and any new regulatory standards for PFAS in drinking water could impact the ability to reuse recycled water (see discussion in Activity E/F for additional details on PFAS).

Direct Potable Reuse (DPR). The direct potable reuse of recycled water, although only currently being done at a very limited pilot scale in California, is emerging as a potential future municipal water supply. The State Board has released a framework for regulating DPR through reservoir and raw water augmentation, but regulatory criteria for DPR projects will not be adopted for many years. The State Board will prioritize developing regulations for reservoir augmentation and will follow with raw water augmentation in the future after more research is completed to determine the criteria necessary to ensure protection of public health.

Santa Ana River Judgment. The discharge requirements of the Judgment preclude the IEUA from reusing 100 percent of its recycled water supply. If the IEUA were able to obtain access to additional recycled water supplies, alternative plans should be evaluated to optimize which sources are used to ensure that the IEUA meets its annual discharge volume and water quality requirements pursuant to the Judgment.

Summary

In order to achieve the objectives of Activity D, to maximize the reuse of recycled water produced by IEUA and others, Watermaster should implement a process (1) to characterize the availability of all recycled water supplies, (2) to characterize the direct recycled water demands of the parties, (3) to identify project opportunities and the planning and screening criteria to evaluate them, and (4) to develop reconnaissance-level engineering design and operating plans. This information can then be used to evaluate, prioritize, and select projects for implementation. Watermaster and the IEUA should convene a Recycled Water Projects Committee for the purposes of evaluating project opportunities and developing a plan to implement them. The Committee could be comprised of representatives from all interested stakeholders. The scope of work to implement such a process is described below.

Scope of Work for Activity D

The scope of work to achieve the objectives of Activity D—*Maximize the reuse of recycled water produced by IEUA and others*—consists of six tasks:

- Task 1 – Convene Recycled Water Projects Committee, define objectives and refine scope of work
- Task 2 – Characterize the availability of all recycled water supplies and demands
- Task 3 – Develop planning, screening, and evaluation criteria
- Task 4 – Describe recycled water reuse project opportunities
- Task 5 – Develop reconnaissance-level engineering design and operating plan
- Task 6 – Plan, design, and construct selected recycled water projects

As previously noted, the IEUA is performing a significant amount of work to evaluate opportunities to acquire surplus recycled water supplies for recharge as part of the CBP, and this work could be leveraged to simplify the scope of Activity D.

Task 1 – Convene Recycled Water Projects Committee, define objectives and refine scope of work. In this task, a Recycled Water Projects Committee will be convened. The Committee's initial tasks are (1) to obtain consensus on the objectives for maximizing recycled water reuse, (2) to refine the preliminary scope of work defined in the 2020 OBMP Update (Tasks 2-7 below), and (3) to update the schedule and cost to perform the work. Two Committee meetings will be conducted to accomplish these tasks.

Task 2 – Characterize the availability of all recycled water supplies and demands. The objectives of this task are: (1) to characterize the future water demands of the parties to estimate the IEUA's recycled water production, (2) to prepare updated projections of the direct recycled water reuse demands of the parties, (3) to identify other available sources of recycled water, (4) to characterize the use and potential availability of each recycled water supply (IEUA and others), and (5) to identify the institutional and physical challenges for acquiring each source of surplus supply. The recycled water availability and direct reuse demands will be characterized on a monthly basis for various climate conditions to enable the characterization of potential storage needs to fully maximize recycled water reuse. One meeting will be conducted to review the characterization of recycled water availability.

Task 3 – Develop planning, screening, and evaluation criteria. The objective of this task is to develop the criteria that will be used to evaluate recycled water reuse projects in Tasks 4 and 5. The types of criteria developed to evaluate potential projects will include:

- Watermaster criteria that include no potential MPI, balance of recharge and discharge; and others;
- regulatory criteria that include compliance with salt and nutrient management plans, DDW regulations, and others;
- qualitative criteria that include institutional complexity, reliability of non-IEUA recycled water sources, overall water supply reliability and others; and
- quantitative criteria that include business case evaluations expressed as net present value, unit cost, and others.

Two meetings will be conducted to review and refine the criteria with the Recycled Water Projects Committee.

Task 4 – Describe recycled water reuse project opportunities. The objectives of this task include identifying potential recycled water project alternatives, screening them using the criteria developed in Task 3, and selecting a set of projects for detailed evaluation. Three meetings will be conducted to develop the list of potential projects that can be implemented, to review the screening of the projects, and to select the projects to evaluate in Task 5.

Task 5 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of new recycled water projects for reuse, individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate size, location, and alignment of major recycled water utilities, and will describe any potential implementation barriers for the project. A cost opinion will be determined for each project. This task includes evaluating projects based on the criteria developed in Task 2 and recommending a set of projects for implementation. The deliverable of this task will be a technical report that summarizes the work performed under Tasks 1 through 4, and it will include an implementation plan as well as a plan to finance the preliminary design and CEQA documentation. Five meetings will be conducted to review the design and estimated benefit of the projects; review the evaluation of the projects, based on the criteria developed in Task 2, and review the recommended list of projects for implementation; review the implementation plan; and review the technical report.

Task 6 – Plan, design, and construct selected recycled water projects. The objective of this task is to implement the recommendations of the technical report. This task includes (1) developing and implementing necessary agreements between participating parties, (2) preparing the preliminary design of the recommended projects, (3) preparing the environmental documentation for the recommended projects that will tier-off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended projects, (5) preparing final designs of the recommended projects, (6) acquiring necessary permits for constructing and operating the recommended projects, and (7) constructing the recommended projects.

Task 7 – Periodically re-evaluate availability of recycled water supplies for reuse. As agencies update water supply and demand projections, project economics change, and other changes occur in the Basin, the ability to maximize the reuse of recycled water may also change. To ensure that Watermaster is maximizing the reuse of recycled water, Task 2 should be updated periodically. A first step in this task would be to scope out a process to periodically update the characterization of recycled water availability. Following each future assessment of recycled water availability, the Recycled Water Projects Committee would determine the need to perform the steps in Tasks 3 through 6 again.

Cooperative Efforts with Appropriate Entities to Implement Activity D

This is a basin-wide activity that involves the parties in the IEUA, TVMWD, and WMWD service areas. The IEUA would be the appropriate entity to lead the implementation of Activity D on behalf of all parties in these service areas. In this role, the IEUA would identify additional recycled water supplies and conduct discussions with the owners of those supplies, contract for planning and engineering services as required, and coordinate with Watermaster and the parties.

Watermaster's role would be to convene the Recycled Water Committee process that involves all of the parties for the purpose of coordinating with the IEUA on the implementation of Activity D and to ensure that its implementation is consistent with the Judgment, Peace Agreements and other agreements, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity D

The recommended schedule to complete the scope of work described herein is described below:

Year one (FY 2020/21):

- Convene Recycled Water Projects Committee and refine scope of work, schedule and budget (Task 1).
- Characterize the availability of all recycled water supplies (Task 2).
- Develop planning, screening, and evaluation criteria for recycled water projects (Task 3).
- Conduct five Committee meetings to review and refine the work products of Tasks 1 through 3.

Year two (FY 2021/22):

- Develop list of recycled water projects for evaluation (Task 4).
- Begin reconnaissance-level engineering study for the proposed projects (Task 5).
- Conduct four workshops to review and refine work products of Tasks 4 and 5.

Year three (FY 2022/23):

- Complete reconnaissance-level engineering study for the proposed projects (Task 5).
- Select project(s) for implementation.
- Prepare final report documenting work performed in Tasks 1 through 5.

Years four through six (FY 2023/24 to FY 2025/26):

- Watermaster, the IEUA, and other potential partners develop a Project Implementation Agreement. The objective of this agreement is to define the roles of each partner in the planning, permitting, design, and implementation of the projects, and the cost allocations.
- Preliminary Design of Recommended Projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces an updated recycled water capacity benefit.
- Prepare Environmental Documentation for Projects. CEQA will cover the recommended projects at the project level and the deferred projects at a programmatic level (PEIR), based on the project descriptions developed in Task 5. This documentation will tier-off from the 2020 OBMP Update PEIR. Watermaster will conduct an MPI analysis in parallel with the CEQA process.

Years seven and eight (FY 2026/27 and 2027/28):

- Prepare Final Designs and Acquire Necessary Permits for the Selected Projects.

Years nine and beyond (FY 2028/29+):

- Construct selected Projects.

Exhibit D-7 shows the estimated budget-level engineering cost to complete Tasks 1 through 5, which is about $620,000. The cost of Tasks 6 and 7 cannot be estimated until the completion of Task 5. Exhibit D-7 also shows how Tasks 1 through 5 and their associated costs will be scheduled over the first three years of implementation.

As previously discussed, because the IEUA is currently developing estimates of recycled water availability in the region and developing a list of project concepts for recycled water reuse as part of the CBP, the cost to perform Activity D may be lower than estimated herein.

Activity E/F

Description of Activity E/F

Activities E and F, defined by the stakeholders, are both are intended to address impediments to groundwater management that are related to groundwater quality, specifically contaminants of emerging concern. Activity E of the OBMP Update is:

> *Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses.*

Activity F of the OBMP Update is:

> *Develop strategic regulatory-compliance solutions that achieve multiple benefits in managing water quality.*

The objective of the management plan envisioned for Activity E is to collect and analyze the data and information needed to characterize and proactively plan for the water quality challenges to pumping groundwater for municipal supply in a constantly evolving regulatory environment. The objective of Activity F is to evaluate the treatment and related infrastructure improvements, including the potential for multi-benefit collaborative projects, that can be implemented to ensure groundwater can be pumped for beneficial use as new drinking water regulations are adopted by the State Board's Division of Drinking Water (DDW[17]).

Through the listening session process, the stakeholders identified the following as potential outcomes of performing Activities E and F:

- Proactively address challenges and solutions to comply with new and potential future drinking water regulations.
- Enable the parties to make informed decisions on infrastructure improvements for water-quality management and regulatory compliance.
- Remove groundwater contaminants from the Chino Basin and thereby improve groundwater quality.
- Enable the parties to produce or leverage their water rights that may be constrained by water quality.
- Ensure that groundwater is pumped and thereby protect/enhance safe yield.

The 2000 OBMP included multiple PEs to protect and enhance water quality. PE 6—*Develop and Implement Cooperative Programs with the Regional Board and Other Agencies to Improve Basin Management*—was included to assess water quality trends in the basin, to evaluate the impact of OBMP implementation on water quality, to determine whether point and non-point contamination sources are being addressed by water quality regulators, and to collaborate with water quality regulators to identify and facilitate the cleanup of soil and groundwater contamination. PE 7—*Develop and Implement Salt Management Plan*—was included to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. PE 3—*Develop and Implement a Water Supply Plan for Impaired Areas*—provided for the construction and operation of regional groundwater desalters, the Chino Basin Desalters (Desalters), to pump and treat high-salinity groundwater in the southern part of the Basin to maintain and enhance safe yield and meet increasing municipal water demands. The 2000 OBMP also recognized that the Desalters would intercept VOC contaminants associated with the Chino Airport and South Archibald plumes and that the Desalters could be used in the future to treat these contaminants (at some additional cost).

Since 2000, under PE 6, Watermaster has assessed groundwater quality in the Chino Basin using data compiled through their own monitoring activities and the efforts of other cooperating entities, reported on the water quality trends and findings, and collaborated with the Regional Board in its efforts to work with dischargers to facilitate the cleanup of groundwater contamination. Watermaster formed the Water Quality Committee to coordinate many of these activities. The Water Quality Committee convened from 2003 through 2009 and reported on its findings, work products, and recommendations to the Watermaster Pools, Advisory Committee, and Board. Since 2009, Watermaster has continued to perform ad-hoc monitoring for contaminants of emerging concern at its monitoring wells and some private agricultural wells and prepares annual or more frequent reports on the status of monitoring and remediation of point-source contamination sites. The opportunities to use the Desalters to assist in the

[17] The DDW regulates public drinking water systems in California; prior to June 2014 it was the California Department of Public Health which was formally known as the Department of Health Services. All references to the actions of DDW herein include its predecessors.

remediation of the Chino Airport and South Archibald plumes envisioned in the 2000 OBMP IP are coming to fruition.

The objectives of Activity E and PE 6 are similar in that they address the management of groundwater quality contaminants from point and non-point sources that threaten the use of groundwater for drinking water supply. Activity E is a refinement on PE 6 in that it seeks a more proactive and basin-wide approach to address contaminants of emerging concern to better prepare the parties for addressing compliance with new and increasingly stringent drinking water regulations defined by the DDW.

The objective of Activity F is similar to PE 3 in that it seeks to evaluate the feasibility of regional solutions for the treatment of impaired areas that can provide multiple benefits in the management of the Basin to achieve the goals of the OBMP. The areas and contaminants that need to and can be addressed with regional, multi-benefit solutions can be determined as part of the process to develop and implement the groundwater quality management plan envisioned in Activity E.

The scope of work defined herein for developing and implementing a *Groundwater Quality Management Plan* will address both Activities E and F and, when implemented, will provide information that will enable municipal water agencies to make informed decisions on how to manage groundwater quality for beneficial uses. The scope of the *Groundwater Quality Management Plan* does not address salinity, which is managed separately under Watermaster and IEUA maximum-benefit SNMP.

Need and Function of Activity E/F

Throughout most of the Chino Basin, there are contaminants in groundwater that can limit its direct use for drinking water supply if treatment is not implemented. Drinking water is regulated by the DDW. The enforceable drinking water standards to protect the public from potential negative health effects are Primary Maximum Contaminant Levels (MCLs) set by the DDW. Water supplies that exceed MCLs cannot be used for drinking water without treatment (blending is the most common treatment). In addition, the DDW sets Notification Levels (NLs), which are health-based advisory levels for potential contaminants of concern that do not have MCLs established. The level at which DDW recommends removal of a drinking water source from service is called the "Response Level," where the Response Level ranges between ten to 100 times the NL, depending on the toxicological endpoint that is the basis for establishing the NL. Since the 1980s, the DDW has established NLs for 93 contaminants, 40 of which now have MCLs.

Since the implementation of the 2000 OBMP, the DDW has adopted new Primary MCLs that have changed or restricted how and where groundwater is pumped by municipal water agencies. As laboratory analytical technologies to detect contaminants in water advance over time, it can be expected that new contaminants of concern will be identified, and some will ultimately become regulated. In response, municipal water agencies will need to construct treatment facilities or implement changes in existing pumping operations to address the newly regulated contaminants. With each new regulation there are increasing constraints on existing water supply infrastructure that can limit a parties' ability to pump their groundwater rights and stored water and conflict with other basin management issues that include, but are not limited to, groundwater recharge, maintaining safe yield, and maintaining hydraulic control.

Occurrence of Contaminants in the Chino Basin

Exhibit EF-1 summarizes the occurrence of drinking water contaminants with a Primary MCL in groundwater pumped from active municipal supply wells in the Chino Basin for the five-year period of 2014 to 2018. For this discussion, "active municipal supply wells" includes the 141 municipal supply wells that pumped groundwater anytime within the two-year period of 2017 to 2018. For comparison, this table also summarizes the number of wells with exceedances of the MCL for: all existing municipal supply wells whether they are recently active or not and all existing wells in the basin, including private agricultural, non-agricultural, municipal supply, and monitoring wells, whether they are recently active or not. The three most common contaminants that exceed a primary MCL in the Chino Basin at active municipal supply wells are nitrate (71 wells), 1,2,3-trichloropropane (1,2,3-TCP) (33 wells), and perchlorate (27 wells).

Exhibit EF-2 shows the locations of active municipal supply wells and symbolizes them based on the number of regulated drinking water contaminants that have been detected in exceedance of their respective primary MCLs. Of the 141 recently active municipal supply wells, 45 have at least one drinking water contaminant, 17 wells have two contaminants, 14 have three contaminants, five have four contaminants, and five have five contaminants. The wells with regulated drinking water contaminants are primarily located in the southern (south of the 60 freeway) and western (west of Euclid Avenue) areas of the Basin. Exhibits EF-3, EF-4, and EF-5 show the spatial distribution of the maximum observed nitrate, 1,2,3-TCP, and perchlorate concentrations at all wells in the Chino Basin for the five-year period of 2014 to 2018.

The occurrence of 1,2,3-TCP in nearly 25 percent of active municipal supply wells is noteworthy. The MCL for 1,2,3-TCP is 0.005 micrograms per liter (µgl), which is 5 parts per trillion (ppt). This is the lowest numerical value for a MCL established to date in the State of California. And, unlike past newly adopted MCLs, the MCL for 1,2,3-TCP became immediately effective upon its adoption in December 2017. As a result, municipal water agencies were immediately required to either cease using active wells that pump groundwater with 1,2,3-TCP concentrations in excess of the new MCL or implement treatment (typically blending) to ensure their water supplies have a 1,2,3-TCP concentration below the MCL. Prior to 2018, municipal water supplies were not routinely tested for 1,2,3-TCP even though there was an existing NL for 1,2,3-TCP of 0.005 µgl. And, when testing occurred it was not always done using the lowest available detection limit that was equal to the NL. For this reason, upon adoption of the MCL, the DDW also required municipal water agencies to perform quarterly compliance monitoring in 2018 using laboratory detection limits low enough to test for concentrations equivalent to the MCL of 0.005 µgl. Exhibit EF-4 includes the quarterly monitoring results from 2018 and represents the most comprehensive characterization of the occurrence of 1,2,3-TCP in the Chino Basin to date. The wells producing groundwater with 1,2,3-TCP concentrations equal to or greater than the MCL are primarily located in the western half of the Basin. The following agencies have had to shut down supply wells or modify operations as a result of the new MCL: the City of Chino Hills, Chino Desalter Authority, City of Chino, City of Pomona, Monte Vista Water District, and Jurupa Community Services District.

Exhibit EF-6 summarizes the occurrence of drinking water contaminants with a California NL in groundwater pumped from active municipal supply wells in the Chino Basin for the five-year period of 2014 to 2018. For comparison, this table also summarizes the number of wells with exceedances of the NLs for: all existing municipal supply wells whether recently active or not and all existing wells in the basin, including private agricultural, non-agricultural, municipal supply, and monitoring wells whether they are recently active or not. Exhibit EF-7 shows the location of the active municipal supply wells and symbolizes them based on the number of contaminants that have been detected in exceedance of a NL. Of the 141 recently active municipal supply wells, only two wells show an exceedance of an NL for one contaminant: groundwater sampled from both wells exceed the NL for 1,4-dioxane. It is likely there are more occurrences of NL exceedances for 1,4- dioxane and other contaminants in the Chino Basin, but because the DDW does not require monitoring for contaminants with an NL and/or testing is not performed using analytical methods with the numerically lowest detection limits that are equal to or lower than the NLs, the potential impact to the parties posed by the adoption of MCLs based on existing NLs cannot be characterized.

Readiness to Address Future Drinking Water Regulations

Since the implementation of the 2000 OBMP, the DDW has adopted three new Primary MCLs that have impacted municipal water agencies the Chino Basin, including perchlorate, hexavalent chromium, and 1,2,3-TCP. And, as demonstrated by the newest MCL for 1,2,3-TCP, the timeline for complying with new drinking water quality regulations is becoming more restrictive. To prepare for the challenges of complying with potential future MCLs, it will be increasingly important for municipal supply agencies to understand which emerging contaminants of concern are candidates for regulation, potential regulatory limits, and the occurrence of those contaminants in local and regional water supplies. Tracking emerging contaminants that are being considered for regulation and performing monitoring to characterize their occurrence in the Chino Basin will help to identify and plan for optimal solutions to manage groundwater quality for drinking water supply.

Since 2000, under PE 6, Watermaster has assessed groundwater quality in the Chino Basin using data compiled through its own monitoring activities and the efforts of other cooperating entities, and has reported on the water quality trends and findings related to regulated contaminants and contaminants of emerging concern in its biannual State of the Basin reports. For the municipal water agencies, monitoring groundwater for emerging contaminants is, for the most part, a voluntary activity. There are periodic monitoring requirements under the Federal Environmental Protection Agency's (EPA) Unregulated Contaminant Monitoring Rule (UCMR), which is implemented to collect occurrence data for selected contaminants of emerging concern that have documented potential public health effects. Monitoring under the UCMR program is performed every five years and the results are used, in part, to support determinations of whether or not to regulate a contaminant in drinking water to protect public health. For each UCMR cycle, the EPA defines the municipal water agencies that must perform monitoring and the analytical methods and detection limits that should be used for each contaminant on the UCMR list. Generally, the UCMR does not require municipal water agencies to test all of their water supply sources and, as to groundwater, may only require a subset of wells be sampled. And, the UCMR does not always require the use of analytical methods with the numerically lowest detection limits, which in some cases means that analysis is done using detection limits for reporting (DLR) that are above potential regulatory limits, as was the case for UCMR monitoring of 1,2,3-TCP. Once a UCMR monitoring event is over, no additional requirements for testing for the contaminants of emerging concern are required. In the State of California, the monitoring of unregulated contaminants with established NLs is recommended but not required. And as with UCMR monitoring, the use of analytical methods with the numerically lowest detection limits are often not used. Because monitoring for unregulated contaminants is voluntary and there are various analytical methods used, it is generally difficult to characterize the basin-wide occurrence of contaminants of emerging concern.

The occurrence of three contaminants in the Chino Basin that are subject to revised or new drinking water regulations are discussed below.

Perchlorate and Hexavalent Chromium

Currently, in the State of California, there are two drinking water contaminants with primary MCLs that are well characterized in the Chino Basin that are undergoing review and consideration by the DDW for an MCL revision: perchlorate and hexavalent chromium.

Perchlorate. As previously described, perchlorate is one of the top three drinking water contaminants in the Chino Basin. An MCL of 6 µgl was established in 2007. In 2015, the Office of Environmental Health

Hazard Assessment (OEHHA) revised the Public Health Goal (PHG[18]) for perchlorate from 6 µgl to 1 µgl, based on new scientific literature that indicates possible health effects to infants from exposure to perchlorate in drinking water. This revision prompted the DDW to review the current MCL and determine if it should be lowered to a value closer to the revised PHG. To support its review and decision, the DDW has recommended that the required DLR for analysis of municipal drinking water supplies be lowered from the current DLR of 4 µgl to equal to or less than 1 µgl and occurrence data be collected across the state.

Exhibit EF-8 shows the spatial distribution of the maximum observed perchlorate concentration for all wells in the Chino Basin for the five-year period of 2014 through 2018 along with the locations of the 141 active municipal supply wells. Exhibit EF-8 differs from Exhibit EF-5 in that the symbology of the perchlorate concentration at wells is based on the PHG of 1 µgl and not the MCL of 6 µgl. Exhibit EF-8 also indicates which of the wells in the Basin characterized as having "non-detect" concentrations have not been tested using detection limits that are less than or equal to the PHG of 1 µgl (DLR = 4 µgl). Most of the wells that have not been tested at the lower DLR are private wells south of the 60 freeway. Exhibit EF-8 shows that 95 percent of the of the detectable concentrations of perchlorate in the Basin are above the PHG of 1 µgl and that perchlorate is prevalent throughout the entire Chino Basin. As such, compliance with the drinking water standard could require treatment facilities across most of the Chino Basin if the MCL is lowered from 6 µgl.

Hexavalent Chromium. The PHG for hexavalent chromium is 0.02 µgl. In 2014, the DDW established an MCL of 10 µgl, which was subsequently challenged in court. In 2017, the Superior Court of Sacramento County issued a judgment invalidating the Primary MCL for drinking water because the DDW failed to properly consider the economic feasibility of complying with it. The court ordered the DDW to conduct an economic evaluation and establish and adopt a new MCL, which could be the same or different from the prior and now invalidated MCL of 10 µgl. Exhibit EF-9 shows the spatial distribution of the maximum observed hexavalent chromium concentration for all wells in the Chino Basin for the five-year period of 2014 through 2018. The symbology of the observed hexavalent chromium concentrations is based on the prior MCL of 10 µgl. Seven percent of all wells sampled have a concentration above 10 µgl: 127 of the 141 active municipal supply wells have a detectable concentration of hexavalent chromium, and nine of the 141 active municipal wells exceeded 10 µgl. Hexavalent chromium is not a widespread compliance issue based on the old 10 µgl MCL, but compliance could be problematic in the future if the DDW establishes a new MCL less than 10 µgl.

Poly- and Per-fluorinated Compounds. An example of emerging contaminants that were part of the UCMR and are currently receiving notable regulatory attention on both State and Federal levels include two PFAS compounds: — perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). In 2009, the EPA published provisional Health Advisory Levels (HAL) for PFOA and PFOS of 400 nanograms per liter (ngl) and 200 ngl, respectively (or 400 and 200 parts per trillion [ppt]). The 2012 UCMR 3 contaminant monitoring list included six PFAS, including PFOA and PFOS. The required DLRs for PFOA and PFOS were 20 and 40 ngl, respectively. In 2016, following the UCMR 3 monitoring, the EPA significantly lowered the HAL for PFOA and PFOS to a combined 70 ngl, a 90 percent reduction. And, in 2018, the DDW established NLs for PFOA and PFOS of 14 and 13 ngl, respectively. That same year, laboratory methods with detection limits numerically less than these NLs became available. As part of the NL guidelines, the DDW established

[18] A PHG is the level of a chemical contaminant in drinking water that does not pose a significant risk to health. PHGs are not regulatory standards, but State of California law requires the DDW to set MCLs for a contaminant as close as technologically and economically possible to the PHG.

an interim Response Level of 70 ngl for PFOA and PFOS combined, consistent with the EPA's interim HAL. If the DDW recommends that the water source be removed from service or that treatment be implemented to get levels below the Response Level. The PFOA and PFOS Response Level is five times the NL for one of them individually; this is more stringent than other Response Levels established by the DDW, which as previously noted are typically ten to 100 times the NL.

Exhibit EF-10 shows the occurrence of PFOA and PFOS in groundwater and some blending sources for the recycled water recharge in the Chino Basin as of March 2019, based on all monitoring performed since 1998. The exhibit shows that the majority of wells in the Chino Basin have not been sampled for PFOA and/or PFOS. The 30 wells in the Chino Basin that have been sampled for PFOA and PFOS were tested during UCMR 3 using the laboratory detection limits of 20 and 40 ngl, which are higher than the current NLs. Monitoring of recycled water recharge blending sources shows that many of the sources sampled have detectable concentrations of PFOA and PFOS, and some are above the NLs. The EPA and the DDW have both indicated that they are moving forward with the process to adopt MCLs for PFOA and PFOS in the near future. The occurrence of PFOA and PFOS in Chino Basin groundwater as of March 2019 is not well characterized at concentrations equivalent to or below the current NLs, and there are recharge water sources with concentrations of PFOA and PFOS above the NLs. Widespread monitoring for PFOA and PFOS using lower-detection limit laboratory methods is necessary to understand the occurrence of PFOA and PFOS in the Basin in order to plan for compliance with potential new drinking water regulations.

Basin Management and Water Rights Implications of More Stringent Water Quality Regulations

To maintain yield and limit losses to the Santa Ana River, the Chino Basin is managed as hydrologically closed: the primary discharge of groundwater from the Chino Basin is groundwater pumping. Maintaining hydraulic control in this way is also a requirement of the maximum-benefit SNMP. Operating the Chino Basin as a closed system contributes to the accumulation of salts, nutrients, and other contaminants in groundwater, which are primarily removed by groundwater pumping. The constantly evolving regulatory environment described above threatens the ability of the parties to pump groundwater, and some parties are not or will not be able to pump their groundwater rights due to the presence of contaminants and the lack of treatment facilities to comply with drinking water quality standards.

As is currently occurring in response to the immediate enforcement of the new MCL for 1,2,3-TCP, it is likely that the initial response actions for compliance with new MCLs will be to shut-down pumping at wells with concentrations that exceed the MCL until a treatment plan is developed and implemented, which for some agencies could take years. Prolonged reductions in groundwater pumping due to groundwater contamination have the effect of reducing safe yield and potentially contributing to the loss of hydraulic control and the spread of contamination. Therefore, it will become increasingly necessary to pump and treat groundwater to comply with drinking water standards and maintain Safe Yield and hydraulic control of the Chino Basin.

With the exception of the Desalters, groundwater treatment facilities in the Chino Basin have been constructed and operated by individual municipal water supply agencies, and the construction and operations and maintenance costs are borne by the agency alone. There is potential for cost savings and other benefits to basin management, such as protecting safe yield, and maintaining hydraulic control, if regional groundwater treatment and conveyance systems are implemented to address groundwater contamination.

Summary

In order to achieve the objectives of Activities E and F to effectively plan for compliance with future water quality regulations, a *Groundwater Quality Management Plan* should be developed (1) to continually track the UCMR monitoring program, DDW regulatory activities, and others to stay informed of which groundwater contaminants are potential candidates for future MCLs; (2) to implement a long-term basin-wide monitoring plan—including protocols for the use of consistent laboratory methods by all agencies—to collect data on the occurrence of the contaminants of emerging concern; (3) to periodically characterize the potential for compliance challenges on a basin-wide scale; and (4) to develop and evaluate individual and regional compliance solutions to address these challenges. Such a process will enable the parties to prioritize the most cost-effective compliance solutions that provide for multiple benefits in achieving the goals of the OBMP. The *Groundwater Quality Management Plan* could be developed and implemented by reconvening the Water Quality Committee. The scope of work to develop the *Groundwater Quality Management Plan* is described below.

Scope of Work for Activity E/F

The scope of work to develop and implement a *Groundwater Quality Management Plan* consistent with the objectives of Activity E/F consists of eight tasks.

- Task 1 – Convene the Water Quality Committee, define objectives, and refine scope of work
- Task 2 – Develop and implement an initial emerging-contaminants monitoring plan
- Task 3 – Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan
- Task 4 – Develop planning, screening, and evaluation criteria
- Task 5 – Identify and describe potential projects for evaluation
- Task 6 – Conduct a reconnaissance-level study for the proposed projects
- Task 7 – Prepare the *Groundwater Quality Management Plan*
- Task 8 – Plan, design, and build water quality management projects

Task 1 will develop the administrative and stakeholder process and refine the objectives and scope for developing the *Groundwater Quality Management Plan*. Tasks 2 and 3 will include an initial monitoring program and the characterization of current water quality conditions to determine the appropriate long-term monitoring and assessment program and to support the development and implementation of the groundwater quality management plan. Tasks 4 through 8 contain the efforts to fully develop and implement a groundwater quality management plan. The precise scope and level of effort required to perform Tasks 4 through 8 will greatly depend on the assessment in Task 3. At present, there is not enough information to fully scope out these later tasks. The activities for Tasks 4 through 8 are generally described below, but the cost estimate to perform these tasks is not estimated herein. For completeness, a scoping effort to perform Tasks 4 through 7 will be included as a work-product of Task 3. The scoping effort for Task 8 cannot be completed until Task 7 is completed.

Task 1 – Convene the Water Quality Committee, define objectives, and refine scope of work. The objective of this task is to reestablish the Water Quality Committee, which will be comprised of representatives from all interested stakeholders for the purposes of developing and implementing a groundwater quality management plan. The Committee will precisely articulate the objectives of a groundwater quality management plan and refine the scope of work described below in Tasks 2 and 3 to develop and implement an initial monitoring plan, to perform an assessment of the current water quality condition, and to scope the remaining tasks to develop a groundwater quality management plan. After the scope of work has been refined, the cost and implementation schedule will be updated. Four Committee meetings will be conducted to obtain consensus on the objectives and scope of work.

Task 2 – Develop and implement an initial emerging-contaminants monitoring plan. The objective of this task is to develop a monitoring plan to support the initial assessment of water quality conditions related to contaminants of emerging concern in the Chino Basin. The intent is to conduct monitoring using consistent laboratory methods and detection limits at all wells (including those sampled by Watermaster and municipal water agencies) and to use methods with detection limits that are capable of quantifying concentrations at levels equal to relevant regulatory criteria such as PHGs, NLs, or MCLs.

The initial emerging contaminants monitoring plan will include: a list of wells to be sampled, the list of contaminants to analyze, and a quality assurance project plan (QAPP) that defines the monitoring procedures, quality assurance and quality control (QAQC) protocols for data collection and review, and other requirements. The list of wells will include all municipal supply wells and all monitoring and private wells that are in the capture zone of the municipal supply wells. The QAPP will ensure that Watermaster and each municipal water agency that tests its own wells will collect and analyze samples in a consistent manner. The monitoring plan may include the collection and analysis of groundwater in adjacent groundwater basins that are tributary to the Chino Basin and other sources of recharge to the groundwater basin. At a minimum, the initial emerging contaminants monitoring plan should consist of a one-time sampling event at each well identified in the plan. Two Committee meetings will be conducted to obtain consensus on the scope, cost, and schedule to perform the initial monitoring.

Once consensus is achieved, the initial emerging contaminants monitoring plan will be executed by Watermaster and all participating agencies at the selected wells. The labor and laboratory costs to conduct the initial monitoring at municipal wells will be incurred by the well owners. The labor and laboratory cost to conduct the initial monitoring at monitoring wells or private wells in the capture zone of municipal supply wells will be incurred by Watermaster.[19] All monitoring data will be collected, processed, reviewed for QA/QC, and uploaded to a centralized database maintained by Watermaster for the Chino Basin. The Committee will use the data collected for the initial emerging contaminants monitoring plan, along with other groundwater quality data collected and maintained by Watermaster for the basin-wide groundwater quality monitoring program, to perform the initial water quality assessment in Task 3.

Task 3 – Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan. The objectives of this task are to prepare a comprehensive assessment of current water quality conditions related to contaminants of emerging concern in the Chino Basin and perform a scoping effort to develop and implement a groundwater quality management plan. Task 3 will begin once the initial emerging contaminants monitoring plan developed in Task 2 has been completed.

The water quality assessment will characterize:

- basin-wide concentrations of constituents analyzed pursuant to the initial emerging contaminants monitoring plan;
- current and foreseeable challenges to pumping groundwater for municipal supply based on the results of initial monitoring and other data;
- actions currently being implemented by the parties to mitigate and/or adapt to current or foreseeable water quality challenges; and
- areas where there are no actions being implemented or planned to mitigate and/or adapt to current or foreseeable water quality challenges.

[19] This scope of work assumes 40 monitoring and private wells will be sampled by Watermaster.

The water quality assessment will support the scoping effort (1) to implement a long-term monitoring and assessment program and (2) to complete the *Groundwater Quality Management Plan* (e.g. perform Tasks 4 through 7 to identify, evaluate, and select projects to address groundwater quality).

The long-term monitoring and assessment program should be adaptive and include a process to update it at a selected frequency and/or when triggered, based on the needs of the Water Quality Committee, observed trends in water quality, or new or potential regulations.

The deliverable of this task will be a technical report that documents the initial monitoring program, the basin-wide characterization of water quality, the recommended scope of work, schedule and cost to implement a long-term monitoring and assessment program, and the scope of work, schedule, and cost to complete the groundwater quality management plan (Tasks 4 through 7). Four Committee meetings will be conducted to complete the work necessary for Task 3.

Task 4 – Develop planning, screening, and evaluation criteria. The objectives of this task are to develop criteria to evaluate water quality improvement projects. The types of criteria developed to evaluate potential projects in Task 4 will include:

- Watermaster criteria that include no potential MPI, balance of recharge and discharge, and others;
- regulatory criteria that include compliance with DDW regulations and others;
- qualitative criteria that include institutional complexity, overall water supply reliability, and others; and
- quantitative criteria that include business case evaluations expressed as net present value, unit cost, and others.

Task 5 – Identify and describe potential projects for evaluation. The objectives of this task are to identify groundwater quality treatment projects using existing and new facilities, to screen them using the criteria developed in Task 4, and to select a final list of projects for detailed evaluation in Task 6. The list of potential projects should include concepts using existing infrastructure and new infrastructure, solutions for individual agencies, and collaborative solutions.

Task 6 – Conduct a reconnaissance-level study for the proposed projects. The objective of this task is to characterize the performance and the groundwater treatment projects selected for evaluation in Task 5, individually and as a group/system. A reconnaissance-level engineering design and operating plan will be developed for each project. Each project design will include the approximate location, target contaminants, treated volumes, and conveyance systems, and will describe any potential implementation barriers. A cost opinion will be determined for each project. The cost opinion will include a comparison of the cost to implement treatment projects by individual municipal agencies to those of collaborative projects. This task will include a recommended set of projects for implementation, based on the criteria developed under Task 4. The final deliverable of this task will be an implementation plan that includes a schedule and plan to finance preliminary design and CEQA documentation of the projects selected for implementation.

Task 7 – Prepare the Groundwater Quality Management Plan. The objective of this task is to prepare the *Groundwater Quality Management Plan*, which will document the most current water quality assessment, the long-term monitoring and analysis plan, the reconnaissance-level engineering design plan, the selected projects for implementation, and an implementation plan. New regulatory requirements and the compliance challenges that result can occur at random, so the groundwater quality management plan should include a strategy to trigger an update to address pending or newly adopted regulations. Water quality results reported out of the long-term monitoring and assessment program could also trigger the need to update the management plan. The implementation plan will include a process to initiate the development and implementation of an update to the *Groundwater Quality Management Plan*.

Task 8 – Plan, design, and build water quality management projects. The objective of this task is to implement the recommended projects in the *Groundwater Quality Management Plan*. This task includes (1) developing and implementing necessary agreements between participating parties, (2) preparing preliminary designs of the recommended projects, (3) preparing the environmental documentation for the recommended projects (this will tier-off from the 2020 OBMP Update PEIR), (4) preparing financial plans to construct the recommended projects, (5) preparing final designs of the recommended projects, (6) acquiring necessary permits for constructing and operating the recommended projects, and (7) constructing the recommended projects.

Cooperative Efforts with Appropriate Entities to Implement Activity E/F

Watermaster and the IEUA will collaborate to support the development of the *Groundwater Quality Management Plan*. Based on the scope of work described above, the following is a description of the recommended roles of each agency:

- ***Watermaster.*** Convenes the Water Quality Committee, leads the stakeholder process to define the initial emerging contaminants monitoring plan, performs monitoring at Watermaster monitoring wells and private wells pursuant to the initial and long-term monitoring plans, collects and maintains the data collected by the municipal agencies and other stakeholders as part of the initial and long-term monitoring plans, performs water quality assessments of the Chino Basin, and prepares the final groundwater quality management plan.
- ***IEUA.*** Leads stakeholders in the process of identifying and describing potential projects, conducting a reconnaissance-level engineering study for the proposed projects, and project implementation.

Implementation Actions, Schedule, and Costs for Activity E/F

The recommended schedule to complete the scope of work described herein is described below:

Year one (FY 2020/21):

- Convene the Water Quality Committee, define objectives, and refine scope of work for Tasks 2 and 3 (Task 1).
- Develop initial emerging contaminants monitoring plan (Task 2).

Year two (FY 2021/22).

- Implement initial emerging contaminants monitoring plan (Task 2).
- Begin preparing the water quality assessment of the Chino Basin (Task 3).

Year three (FY 2022/23).

- Complete the water quality assessment of the Chino Basin, recommendations for a long-term monitoring and assessment program, and the scoping effort for Tasks 4 through 7 (Task 3).

Year four (FY 2023/24).

- Implement long-term monitoring and assessment program (continues every year thereafter, subject to periodic modifications).
- Develop planning, screening, and evaluation criteria to review potential projects (Task 4).
- Identify and describe potential projects for evaluation (Task 5).

- Begin the reconnaissance-level study of selected projects (Task 6).

Year five (FY 2024/25).

- Complete the reconnaissance-level study of selected projects (Task 6).
- Select project/s for implementation (Task 6).
- Begin to prepare the *Groundwater Quality Management Plan* (Task 7).
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Years six and seven (FY 2025/26 and 2026/27):

- Complete the final *Groundwater Quality Management Plan* (Task 7).
- Prepare necessary agreements to implement selected projects.
- Prepare preliminary design reports for the recommended projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces updated cost estimates (Task 8).
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Years eight to ten (2027/2028/29, and 2029/30):

- Prepare final designs and acquire necessary permits for the selected projects (Task 8).
- Construct selected projects.
- Conduct the long-term monitoring and assessment plan as defined in Task 3.

Exhibit EF-11 shows the estimated budget-level engineering cost to complete Tasks 1 through 3, which is about $295,000. The cost of Tasks 4 through 7 cannot be estimated until the completion of Task 3, and the cost of Task 8 cannot be estimated until the completion of Task 7. Exhibit EF-11 also shows how Tasks 1 through 3 and their associated costs will be scheduled over the first three years of implementation.

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: ● Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural			Overlying Non-Ag								
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA		IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reductions in Chino Basin Safe Yield																						
Develop a storage management plan to optimize the use of unused storage space in the basin, avoid undesirable results, and encourage storage and recovery programs	● Need	● Need		● Need	● Need			● Need	● Need	● Need	● Need		● Want		● Need		● Need				B, C	1, 2, 3
Design storage management and storage & recovery programs that maintain or enhance safe yield	● Need	● Want						● Need	● Need	● Want			● Need		● Want		● Want			● Want	B, C	1, 3
Maintain or enhance the safe yield of the basin without causing undesirable results	● Need	● Want		● Need	● Need			● Need	● Need	● Need	● Want				● Want		● Want			● Need	B, D	1, 3
Manage the basin safe yield for the long-term viability and reliability of groundwater supply	● Need	● Want						● Need	● Need	● Need	● Need			● Need			● Want	● Want		● Need	A, B, C	1, 3
Reassess the frequency of the safe yield recalculation	● Want				● Want												● Want				I	3
Continue to model and track safe yield, but utilize other management strategies to address a decline.																	● Want				B	1, 3
Develop recharge programs that maintain or enhance safe yield	● Need	● Want					● Want	● Want	● Need	● Want					● Want		● Want			● Want	A, B	1, 3
Develop more facilities to capture, store, and recharge water	● Want	● Need					● Need			● Want	● Want				● Want		● Want				A, B, D	1, 2
Enhance recharge in northeast MZ-3	● Want		● Want						● Need								● Want				A, C	1, 3
Maximize use of existing recharge facilities	● Want	● Want						● Want	● Need	● Want											A, C, F, G	3
Establish incentives to encourage recharge of high-quality imported water	● Want		● Want																		H, I	2, 3
Develop an OBMP Update that is consistent with the Physical Solution and allows access to the basin for users to meet their requirements	● Need	● Want				● Need		● Need													C, E	3
Engage with regional water management planning efforts in the Upper Santa Ana River Watershed that have the potential to impact Chino Basin operations or safe yield	● Want														● Need		● Want			● Need	I, D	3

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Inability to Pump Groundwater with Existing Infrastructure																						
Pursue collaborative, regional partnerships to implement regional solutions to water management challenges	●			●	●			●							● (Need)	●	●	●	● (Need)	● (Need)	B, E, F, G, I	3
Ensure that sufficient, reliable water supplies will be available to meet current and future water demands	● (Need)	● (Need)	● (Need)	● (Need)			●	● (Need)	●	●	●				● (Need)	●	●	● (Need)	●		A, B, D, G	1, 3
Develop conjunctive use agreements that provide certainty in the ability to perform during put and take years by clearly defining facilities/infrastructure and operating plans, and that leverage the lessons learned from obstacles encountered during the implementation of the current Dry Year Yield program	●						●	●	●						●		●	●			B, G, I	1, 2, 3
Develop management strategies that enable the parties to produce or leverage their respective water rights that may be impacted by physical basin challenges like land subsidence or water quality	● (Need)						●	● (Need)							●		●				A, C, D, E, F, G, I	3
Design storage management and storage & recovery programs to raise funding to build infrastructure	●			●											●		●				B, D, I, J	3, 4
Develop process to support/facilitate project implementation	●																				F, H, J	4
Design subsidence management plans to allow flexibility in the location and volume of groundwater production in MZ-1 and MZ-2	●						●	● (Need)		● (Need)				●	●						A, C, G	3

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Increased Cost of Groundwater Use																						
Seek supplemental financial resources to support the implementation of the OBMP Update	🔴	🔴		●			●	🔴	🔴	●					●	🔴	●		●		D, F, G, I, J	4
Develop regional partnerships to help reduce costs	●			●			●	●	🔴						🔴	●	●			●	F, G, I, J	4
Monetize agencies' unused water rights for equitable balance of basin assets			●																		G, H	4
Decrease Watermaster assessment costs	●				●			●													I, J	4
Support to develop a justification for increases in water rates and developer fees to invest in needed water infrastructure	🔴	●							●								●				F, G, H	
Develop an equitable distribution of costs/benefits of the OBMP	●	●		●		🔴	●	🔴	🔴	●				🔴	●						H, J	4
Watermaster assessments for implementation of the OBMP should be allocated based on benefits received	●				●																H	4
Continue or enhance incentives to pump groundwater from the Chino Basin			🔴																		G, I	3, 4
Improve flexibility for parties to execute water rights transfers														🔴							G, I	4

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Chino Basin Water Quality Degradation																						
Develop a water quality management plan to ensure ability to produce groundwater rights	🔴	●		●			●	●	●	●				🔴	●		●	●			E, F, G, J	2, 3
Develop regional infrastructure to address water quality contamination and treatment				●	●			●													A, B, C, E, F, G, I, J	2
Plan for and be prepared for new drinking water quality regulations that may result in an increase in groundwater treatment and costs	●	●	🔴	🔴			🔴	●	🔴	●					🔴		●				E, F	2
Be more proactive and engaged in the process to develop new drinking water quality regulations								●													A, B, D, E, G, J	2
Recycled Water Quality Degradation																						
Maintain compliance with recycled water and dilution requirements pursuant to the Chino Basin groundwater recharge permit		●					●	●	🔴	🔴				🔴	🔴						A, B, D, E, G, J	2
Increased Cost of Basin Plan Compliance																						
Develop management strategy to ensure sufficient supplies to blend with recycled water and comply with Salt and Nutrient Management Plan	●	●									🔴				●		●				G, K	2
Perform the minimum amount of monitoring/reporting that is required for basin management and regulatory compliance	●			●			●	●													L	3, 4

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Reduced Recycled Water Availability and Increased Cost																						
Fully utilize IEUA recycled water resources		🔴		●			●	●		🔴					●						A, D, E, F, G	1
Maximize the use of recycled water for direct use or recharge	●	🔴		🔴			●	🔴	🔴	🔴					●						A, D, E, F, G	1
Evaluate the potential for direct potable reuse of recycled water	●								●						●						D, E, F	1
Develop alternative management strategies to comply with the recycled water discharge obligations to the Santa Ana River	●	●		●			●	●		●					●		●				D, E, F	1, 3
Utilize non-IEUA sources of recycled water that are not being put to beneficial use	🔴	●					●	●	🔴	🔴					●		●				D, E, F	1
Other																						
Coordinate timing of agreements, grants, etc. to ensure implementation of the OBMP Update	●							●	🔴	●					●	●	●				F, G, H, I, J	
Improve communication between the parties	🔴			🔴				●						🔴	●		●				F, H, I	
Educate elected officials and decision makers on the need and urgency to address the water management challenges	●	🔴							🔴						●	●	●				F, G, H, I, J	
Consider a long-term planning horizon of up to 50 years	●								●	●					●						F, G, H, I, J	3

Table 1
Issues, Needs and Wants of the Chino Basin Stakeholders

Key: ● (red) Need ● Want/Unspecified

*The letter in this column corresponds with the letter ID of the Activities listed in Table 3

Needs and Wants Categorized by Basin Management Issues	Pool Parties														Others						Addressed by Activities in Table 3*	Alignment with 2000 OBMP Goals
	Appropriative										Agricultural											
	Pomona	Chino	Fontana	CVWD	SAWCO	MVWD	Chino Hills	Upland	JCSD	Ontario	Crops	Dairy	State of CA	Overlying Non-Ag	IEUA	TVMWD	WMWD	Metropolitan	CBWCD	CDA		
Reduced Imported Water Availability and Increased Cost																						
Ensure that there is a reliable local water supply to replace imported water during shut down of imported water delivery infrastructure for maintenance and longer-term emergency outages	● (red)	●	●	● (red)			●	● (red)	●	●					● (red)	● (red)	● (red)	● (red)			B, C, G	1, 3
Identify and utilize new sources of supplemental water	● (red)	●		●			● (red)	●	●	●					●	●	●				A, B	1, 3
Construct inter-basin and intra-basin connections for the benefit of regional water supply and conjunctive use	●	●		● (red)			●	●	● (red)			● (red)			●	● (red)	●	● (red)			C, G	1, 3
Understand how imported water reliability from Metropolitan Water District will be affected with and without the California Water Fix	●							●	● (red)						●	●	●				-	1, 3
Develop management strategies that ensure parties will meet future desalter replenishment obligation and have the money to fund it	●	●		● (red)			● (red)		●								●			● (red)	H, I, J	3
Increase water-supply reliability at the lowest possible cost	● (red)			●			●	●				● (red)		● (red)	●		●				A, B, D, J	3
Need a better understanding of the water management plans of the Parties to be able to better plan for imported water needs and to assure reliability of Metropolitan Water District water supply	●			●					● (red)			● (red)			●	●	●	● (red)			A	3
Analyze water management scenarios that plan for unexpected challenges and emergencies	●							●	● (red)	●					●	●	●				E, G	3
Ensure that sufficient supplemental water supplies will be available to meet future replenishment requirements							●		● (red)	●		● (red)		? (red)	●					● (red)	A	1, 3
Despite the best efforts of the Parties to decrease reliance on imported water, the cost of the total water supply continues to increase	●																				-	3
Use more recycled water for replenishment obligation	●			● (red)			● (red)		● (red)								●				A, D, E, F	3
Continue to build collaborative programs between the Metropolitan Water District and Chino Basin	● (red)						●	●	●						●		●	●			B, I	3

Table 2
Activities for Consideration in the 2020 OBMP Update and their Nexus to the OBMP Goals

ID	Activity
A	Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge
B	Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance Safe Yield, and improve water quality.
C	Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.
D	Maximize the reuse of recycled water produced by IEUA and others
E	Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses
F	Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality
G	Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.
H	Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements
I	Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement
J	Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update
K	Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge
L	Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1a • Not all of the stormwater runoff available to the Chino Basin is diverted and recharged; failure to divert and recharge stormwater is a permanently lost opportunity. • The existing methodology to select recharge projects for implementation is based on the cost of imported water. There are currently no known projects with a unit cost lower than the cost of imported water, hindering expansion of stormwater capture and recharge • Pumping capacity in some areas of the basin is limited due to low groundwater levels, land subsidence, and water quality	A Construct new facilities and improve existing facilities to increase the capacity to store and recharge storm and supplemental water, particularly in areas of the basin that will promote the long-term balance of recharge and discharge	• Increases recharge of high-quality stormwater that will: • protect/enhance the safe yield, • improve water quality, • reduce dependence on imported water, • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern, and • provide new supply of blending water to support the recycled-water recharge program. • Provides additional supplemental-water recharge capacity for replenishment and implementation of storage and recovery programs. • Provides additional surface water storage capacity. • Revised economic criteria for selecting recharge projects for implementation.	✓	✓	✓	✓	✓	✓		✓

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 1 - Enhance Basin Water Supplies										
1b • There is a surplus of recycled water potentially available to the Chino Basin parties that is not being put to beneficial use. • Existing infrastructure limits the expansion or reuse and recharge of recycled water in the Chino Basin. • Existing requirements to discharge recycled water to the Santa Ana River limit the amount of IEUA recycled water available for reuse and recharge •The Department of Drinking Water and the Regional Board blending requirements for recycled water recharge could limit expanded recharge opportunities	D Maximize the reuse of recycled water produced by IEUA and others	• Results in a new, consistent volume of in-lieu and/or wet water recharge that will: • protect/enhance the safe yield, • reduce dependence on imported water, • improve water-supply reliability, especially during dry periods, and • increase pumping capacity in areas of low groundwater levels and areas of subsidence concern. • Identify additional sources of water to satisfy IEUA discharge requirements pursuant to the Santa Ana River Judgment.	✓	✓					✓	✓

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
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Goal 2 - Protect and Enhance Water Quality										
2a • Areas of the basin are contaminated with VOCs, nitrate, perchlorate and other contaminants of emerging concern (CECs). • Water-quality regulations are evolving and becoming more restrictive, which limits the beneficial uses of groundwater. • Groundwater treatment may be necessary to meet beneficial uses, but can be expensive to build and operate. • The basin is hydrologically closed, which causes accumulation and concentration of salts, nutrients, and other contaminants. • Some stored water in the Chino Basin cannot be used due to water quality and insufficient treatment capacity • Recharge sources may contribute CECs to the groundwater basin	E Develop and implement a water-quality management plan to address current and future water-quality issues and protect beneficial uses F Develop strategic regulatory-compliance solutions to comply with new and evolving drinking water standards that achieve multiple benefits in managing water quality	• Proactively addresses new and near-future drinking water regulations. • Enables the parties to make informed decisions on infrastructure improvements for water-quality management and regulatory compliance. • Removes groundwater contaminants from the Chino Basin and thereby improves groundwater quality. • Enables the parties to produce or leverage their water rights that may be constrained by water quality. • Ensures that groundwater is pumped and thereby protects/enhances the safe yield.	✓	✓	✓	✓				✓
2b • Water-quality regulations are evolving and generally becoming more stringent, which could limit the reuse and recharge of recycled water.	K Develop management strategy within the Salt and Nutrient Management Plan to ensure ability to comply with dilution requirements for recycled water recharge	• Enables the continued and expanded recharge of recycled water, which will: • protect water quality, • improve water-supply reliability, especially during dry periods, and • protect/enhance the safe yield.	✓			✓	✓	✓		✓

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
			Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 3 - Enhance Management of the Basin										
3a • Existing infrastructure (pumping and treatment capacity and conveyance) is insufficient to conduct puts and takes under proposed storage programs. • There is unused storage space in the Basin the use of which is constrained by the storage limits defined in existing CEQA documentation. • Watermaster's current storage management plan is not optimized to protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain hydraulic control, etc. • Storage and recovery operations could be limited by contaminant plumes or other CECs in groundwater	B Develop, implement, and optimize storage-and-recovery programs to increase water-supply reliability, protect or enhance safe yield, and improve water quality.	• Storage programs that protect/enhance basin yield, improve water quality, avoid new land subsidence, ensure balance of recharge and discharge, maintain hydraulic control, etc. • New regional infrastructure to optimize put and take operations • Leverages unused storage space in the Basin. • Reduces reliance on imported water, especially during dry periods. • Potentially provides outside funding sources to implement the OBMP Update. • Improves water quality through the recharge of high quality water.	✓	✓	✓	✓				✓

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

			Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
Impediments	**Activities to Remove Impediments**	**Potential Outcomes of Activities**	Reductions in Chino Basin Safe Yield	Inability to Pump Groundwater with Existing Infrastructure	Increased Cost of Groundwater Use	Chino Basin Water Quality Degradation	Recycled Water Quality Degradation	Increased Cost of Basin Plan Compliance	Reduced Recycled Water Availability and Increased Cost	Reduced Imported Water Availability and Increased Cost
Goal 3 - Enhance Management of the Basin										
3b • Land subsidence in northwest MZ1 may limit the ability for parties to pump their respective rights in this area. • Poor water quality and increasingly restricting water quality regulations limits the ability for some parties to pump their respective rights. • Low groundwater levels impact pumping capacity	C Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence. G Optimize the use of all sources of water supply by improving the ability to move water across the basin and amongst stakeholders, prioritizing the use of existing infrastructure.	• Enables producers in MZ1 and MZ2 to obtain water through regional conveyance, which supports management of groundwater levels to reduce the potential for subsidence and ground fissuring. • Enables the parties to increase production in areas currently constrained by poor water quality. • Removes groundwater contaminants from the Chino Basin and thereby improves water quality. • Protects/enhances the safe yield. • Maximizes the use of existing infrastructure, which will minimize costs. • Provides infrastructure that can also be used to implement storage and recovery programs.	✓	✓	✓	✓				✓
3c • Watermaster needs information to comply with regulations and its obligations under its agreements and Court orders, yet financial resources to collect this information are limited.	L Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance	• Ensures full compliance with regulatory requirements. • Ensures full support of basin management initiatives. • Enables parties to monitor the performance of the OBMP Update. • Continual review and revision of requirements and monitoring program to ensure cost efficiency	✓	✓	✓	✓	✓	✓	✓	✓

Table 3
OBMP Update Goals, Impediments to the Goals, Activities to Remove the Impediments, Expected Outcomes of Activities, and Nexus to Addressing the Issues Needs and Wants of the Stakeholders

Impediments	Activities to Remove Impediments	Potential Outcomes of Activities	Issues, Needs and Wants, as Categorized by Basin Management Issues, that are Addressed by Activities							
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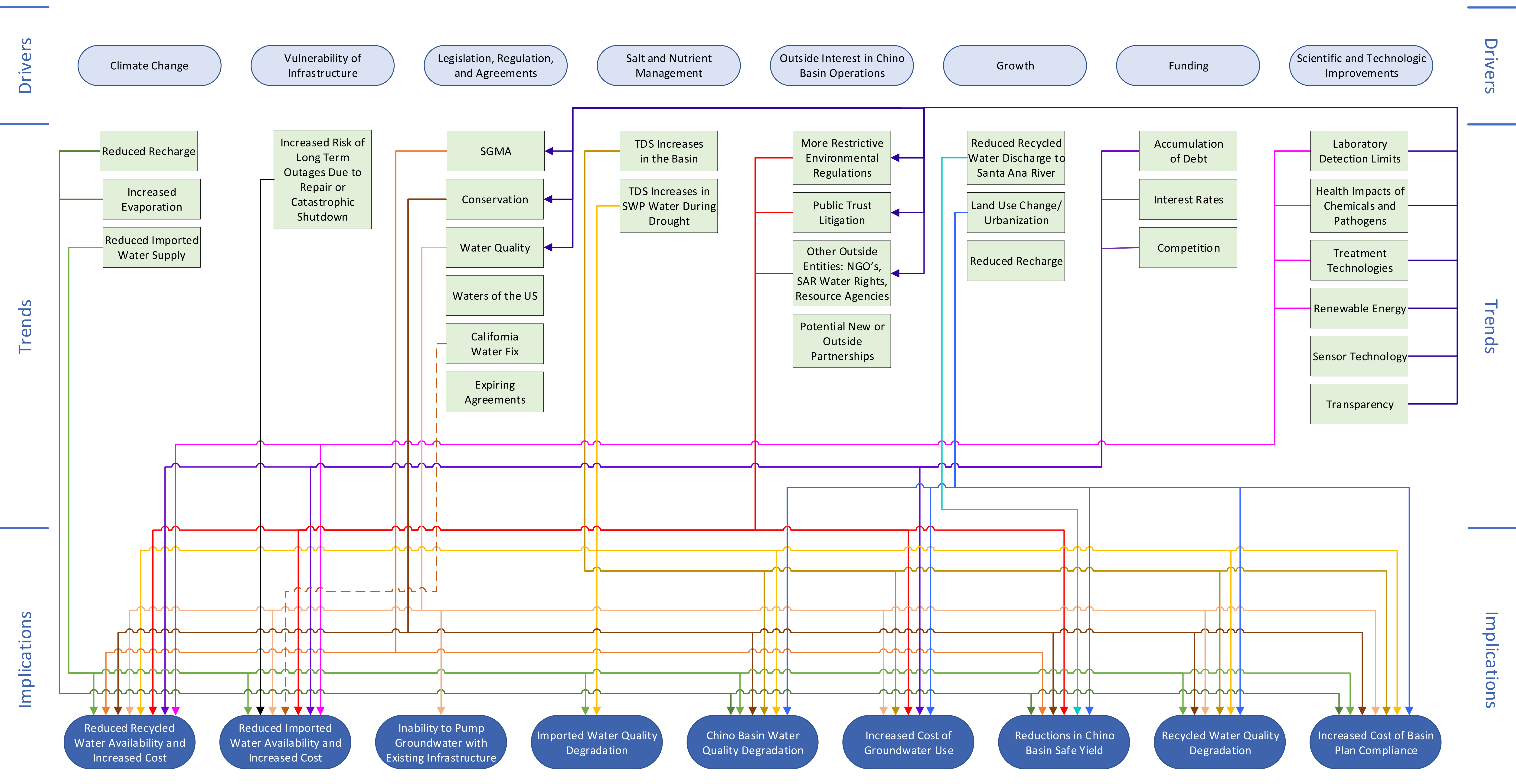
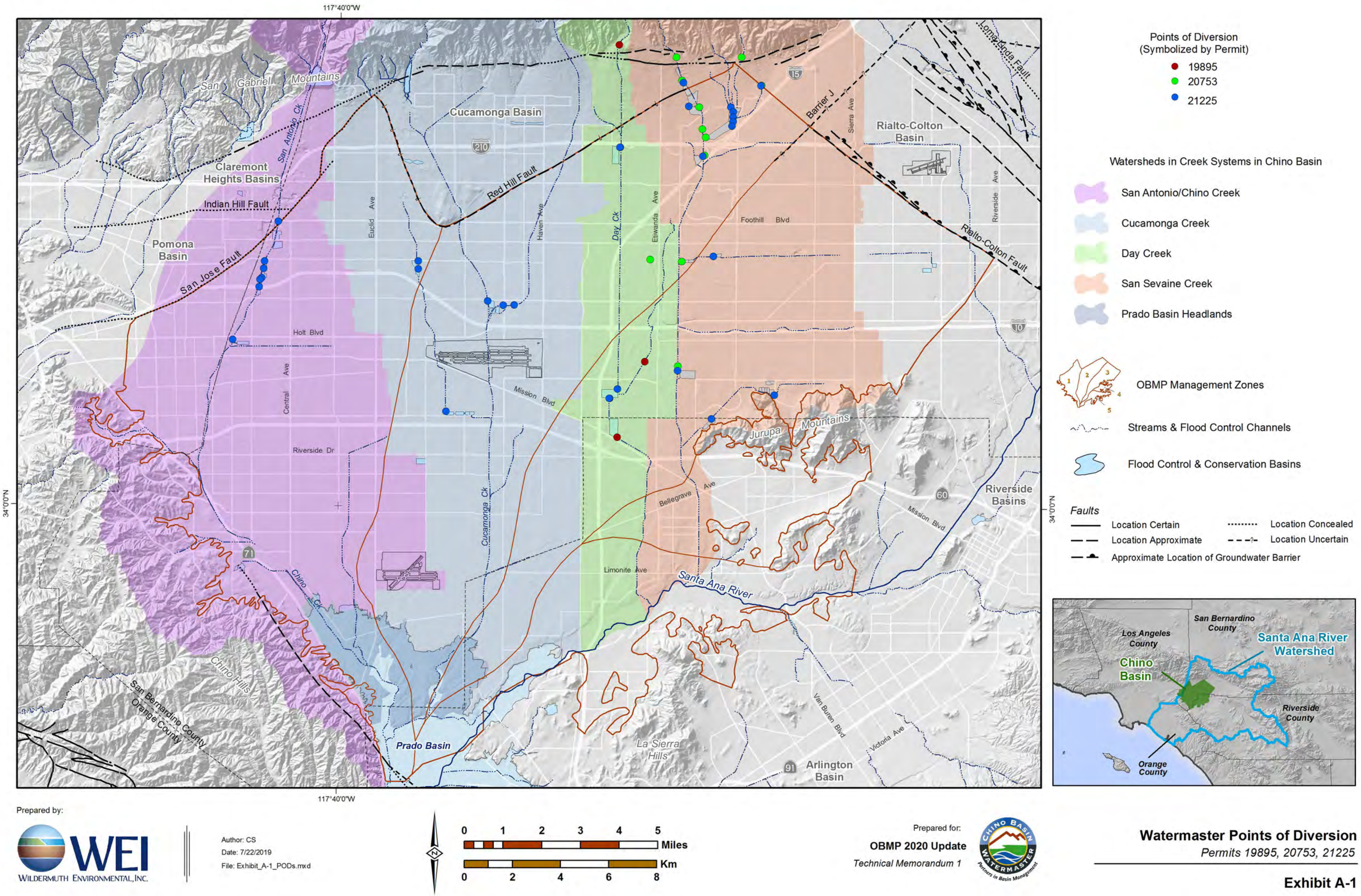
Goal 4 - Equitably Finance the OBMP										
4a • The distribution of benefits associated with the OBMP Update is not defined. • Funding needed for the OBMP implementation activities of the Watermaster is not projected beyond the current year budget, which limits parties ability to plan required funding for the future. • There is currently no formal process to evaluate and adapt the OBMP implementation plan, schedule and cost.	H Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP update agreements	• Provides transparency as to the benefits of the OBMP Update activities • Identifies Watermaster roles and costs to the parties • Formal process to revisit implementation plan and adjust priorities and schedule as necessary to address changed conditions • Periodic updates of cost projections for OBMP implementation needed to plan financial resources. • Improves readiness to apply for grants as they become available • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
4b • Limited financial resources constraint the implementation of the OBMP. • Future reliability of grant funding is uncertain	I Develop regional partnerships to implement the OBMP Update and reduce costs and include in OBMP Update agreement	• Lowers the cost of OBMP implementation. • Improves the likelihood that the OBMP will be implemented.			✓			✓	✓	✓
	J Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update				✓			✓	✓	✓

Figure 1 – Drivers and Trends and Their Implications
2020 OBMP Update





Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 7/22/2019
File: Exhibit_A-1_PODs.mxd

Prepared for:

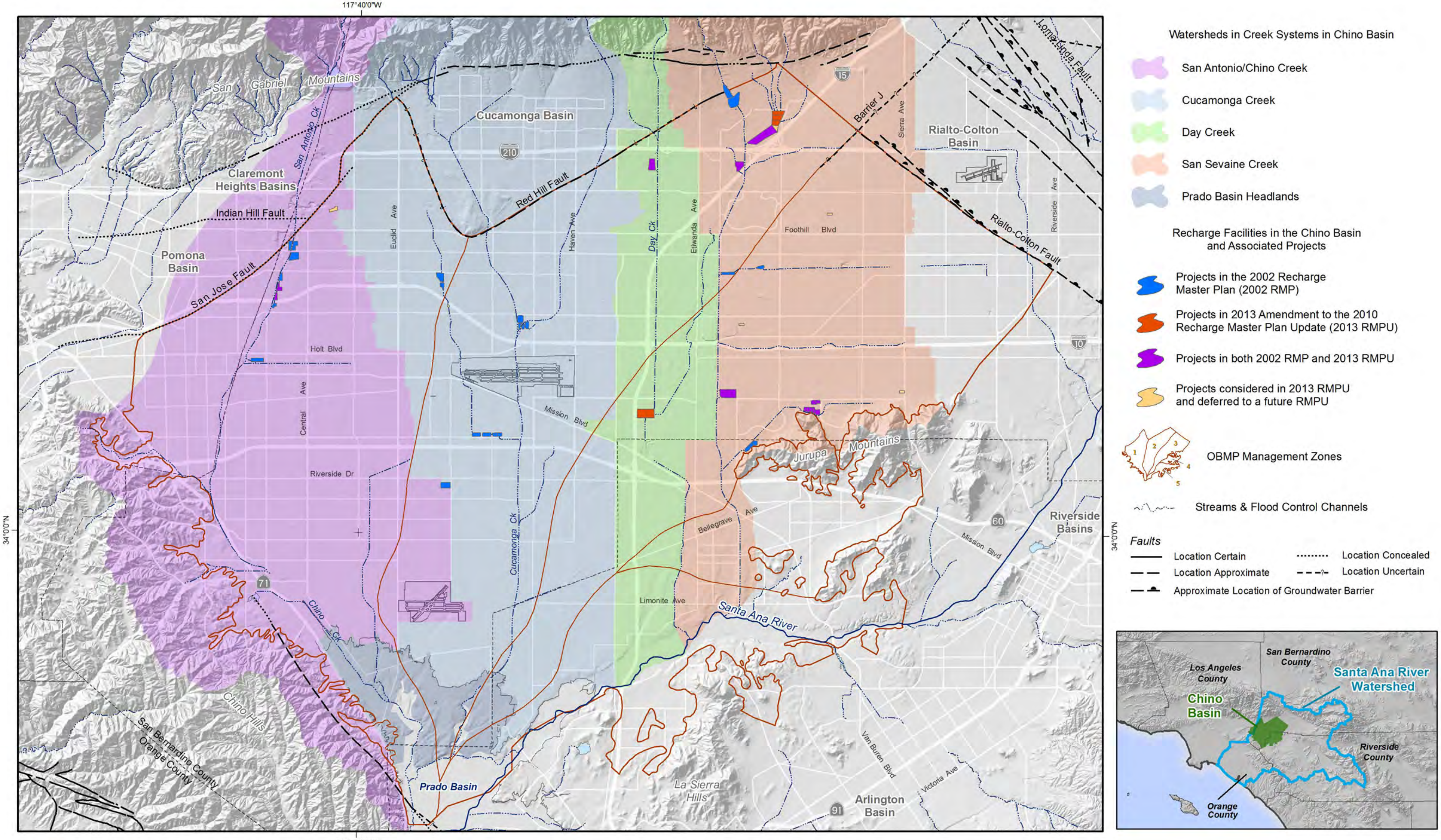
OBMP 2020 Update

Technical Memorandum 1

Watermaster Points of Diversion

Permits 19895, 20753, 21225

Exhibit A-1



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_A-2_RMPUprojects.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Technical Memorandum 1

Chino Basin Watermaster — Partners in Basin Management

Recharge Improvements in the Chino Basin Since Implementation of the OBMP

Exhibit A-2

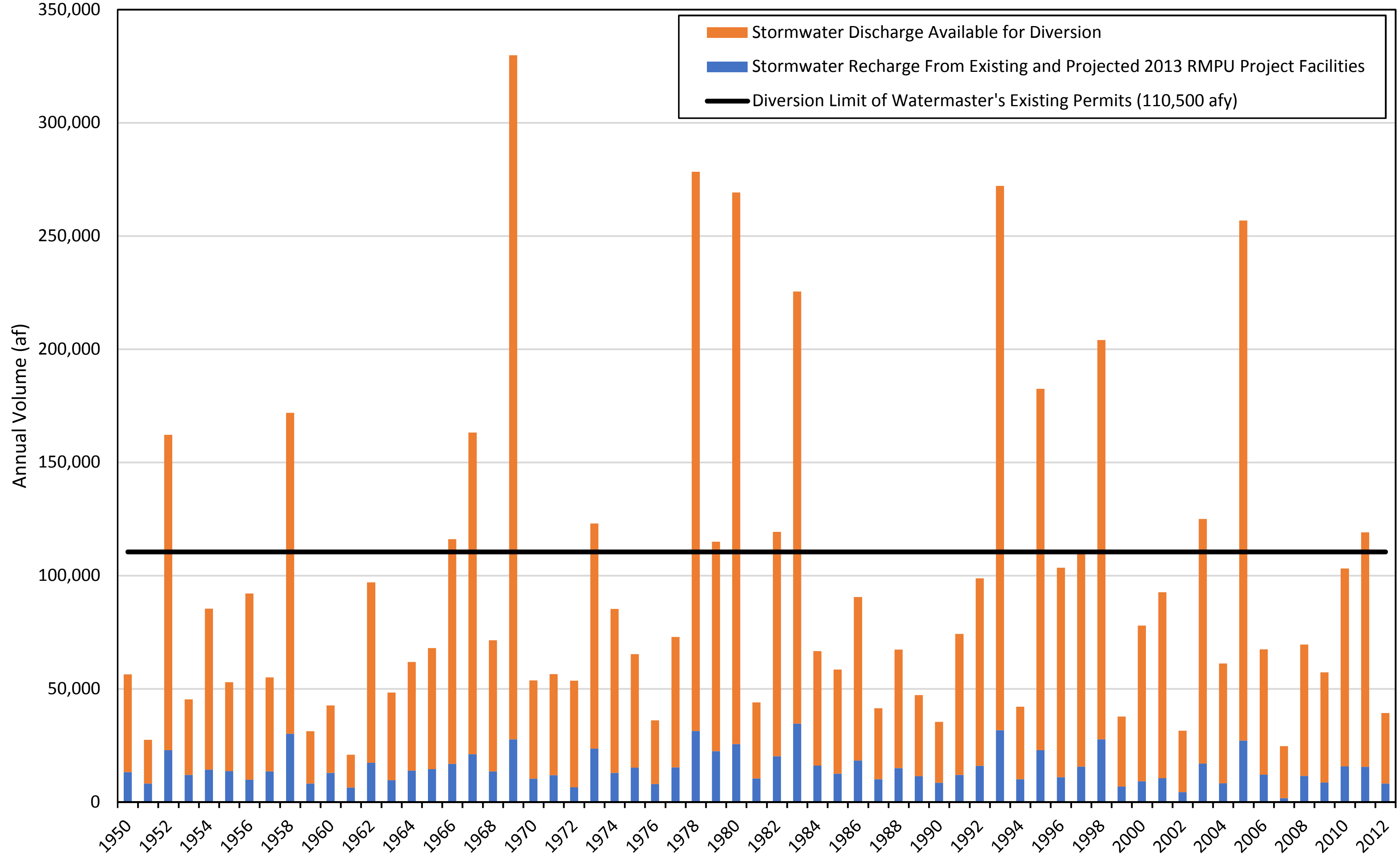
Exhibit A-3
Average Stormwater Recharge and Supplemental Water Recharge Capacity Estimates

Recharge Facility	Average Stormwater Recharge FY 2004/05 through FY 2016/17 (afy)	Theoretical Maximum Supplemental Water Recharge Capacity (afy)	Theoretical Maximum Recharge Capacity (afy)
Brooks Street Basin	489	1,658	2,147
College Heights Basin - East	78	5,816	7,958
College Heights Basin - West		2,064	
Montclair Basin 1	953	409	5,617
Montclair Basin 2		2,940	
Montclair Basin 3		400	
Montclair Basin 4		915	
Eighth Street Basin	1,069	3,426	5,665
Seventh Street Basin		1,170	
Upland Basin	430	891	1,321
Subtotal Management Zone 1	*3,019*	*19,689*	*22,708*
Ely	1,120	4,501	5,621
Grove Basin	305	-	305
Etiwanda Debris Basin	212	2,908	3,120
Hickory Basin East	361	856	2,637
Hickory Basin West		1,420	
Lower Day Basin Cell 1	513	983	1,496
Lower Day Basin Cell 2			
Lower Day Basin Cell 3			
San Sevaine No. 1	816	114	6,025
San Sevaine No. 2		2,869	
San Sevaine No. 3		2,226	
Turner Basin No. 1	1,527	577	4,084
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	309	2,279	2,588
Subtotal Management Zone 2	*5,163*	*20,713*	*25,876*
Banana Basin	258	1,790	2,048
Declez Basin Cell 1	582	1,235	3,409
Declez Basin Cell 2		823	
Declez Basin Cell 3		770	
IEUA RP3 Basin Cell 1	1,129	4,653	12,716
IEUA RP3 Basin Cell 3		3,266	
IEUA RP3 Basin Cell 4		3,669	
Subtotal Management Zone 3	*1,969*	*16,204*	*18,173*
Total	**10,151**	**56,606**	**66,757**

Source: 2018 Recharge Master Plan (WEI 2018)

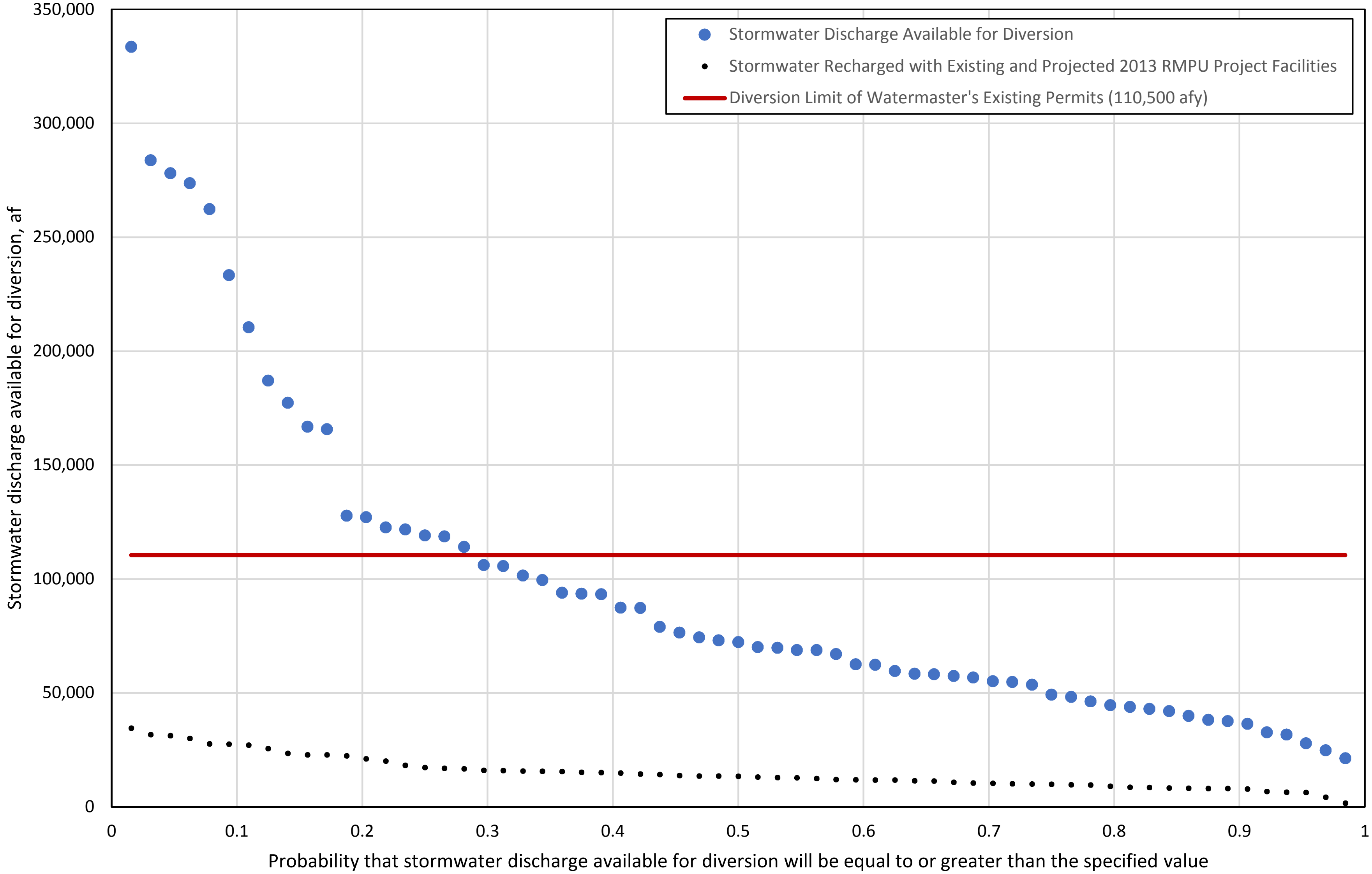
Exhibit A-4

Model-Projected Estimates of Total Stormwater Discharge and Recharge in the Chino Basin for the Hydrologic Period of 1950 to 2012



Exhibit_A-4_A-5_Annual_Flow_Available--Figure_3-3
Created on 6/11/2019
Printed on 7/5/2019

Exhibit A-5
Exceedance Frequency Curve of Stormwater Discharge Available for Diversion in the Chino Basin for the Hydrologic Period of 1950-2012



Exhibit_A-4_A-5_Annual_Flow_Available--Figure_3-4
Created on 6/11/2019
Printed on 7/5/2019

Exhibit A-6

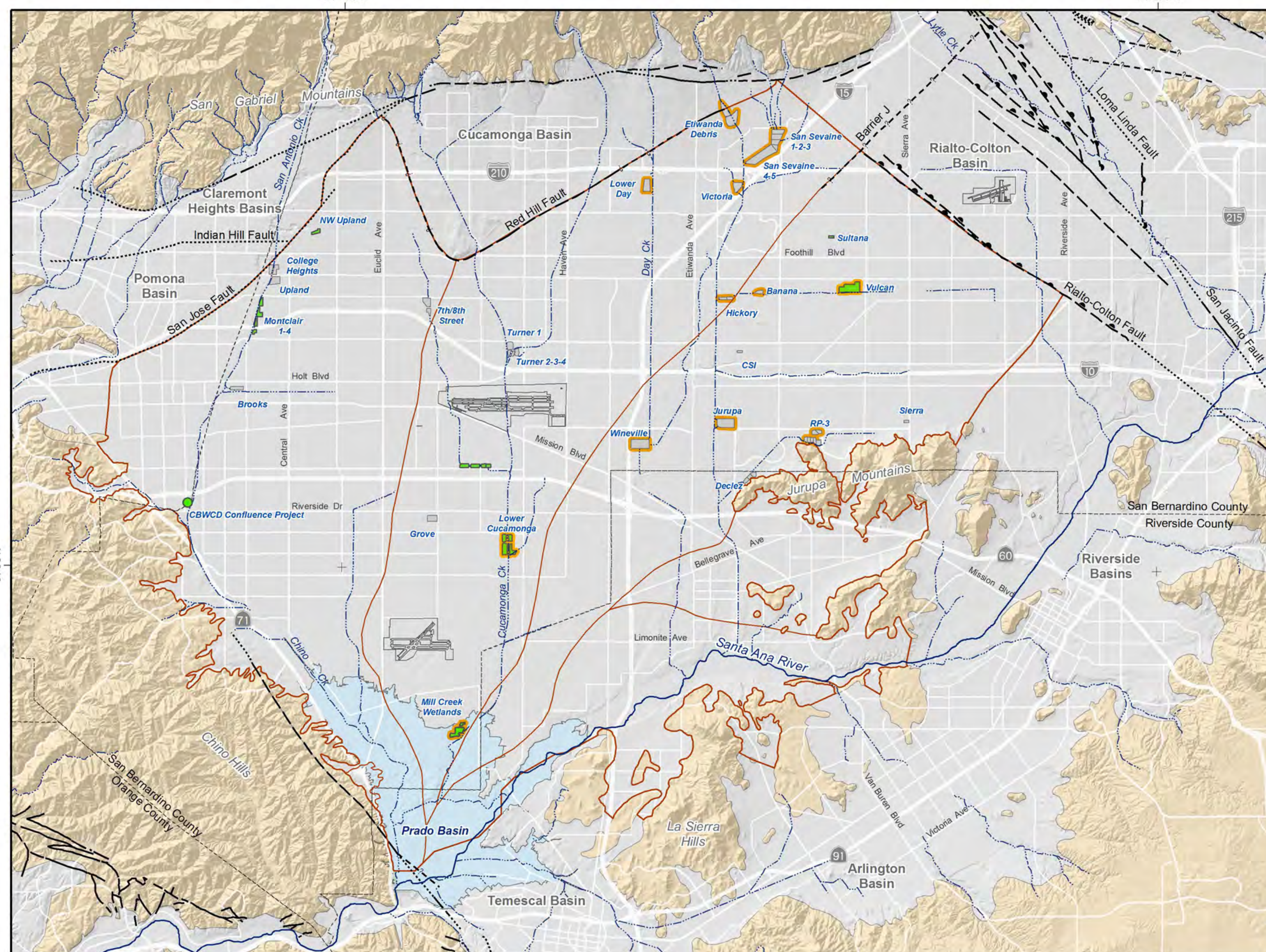
Projects Considered and Not Recommended Due to Cost in the 2013 RMPU and New Conceptual Recharge Projects Considered and Not Recommended in the 2018 RMPU[1]

PID[2]	Project	Source	New Stormwater Recharge (afy)	Projected Costs in 2023	
				2018 RMPU Estimated Unit Stormwater Recharge Cost ($/af)	2018 RMPU Estimated Capital Cost
1a	Montclair Basins - Transfer water between Montclair Basins and deepen MC 4	2013 RMPU	71	$5,980	$6,526,000
5	North West Upland Basin - Increase drainage area and basin enlargement	2013 RMPU	93	$4,620	$6,574,000
15	Ely Basin - Basin enlargement and increased drainage area	2013 RMPU	101	$1,990	$3,017,000
24	Vulcan Basin - Construct new inflow and outflow structures	2013 RMPU	857	$2,560	$33 million
26	Sultana Avenue - Deepen basin by 10 feet	2013 RMPU	7	$5,620	$601,000
n/a	Regional Recharge Distribution System	2013 RMPU	5,000	$2,810	$184 million
n/a	Vineyard Managed Aquifer Recharge	2018 RMPU	n/a	n/a	n/a
n/a	CBWCD Confluence Project[3]	2018 RMPU	n/a	n/a	n/a

[1] With the exception of the last two projects listed, projects in this table were included in the 2013 RMPU and were considered in the 2018 RMPU based on the following criteria: projected yield is greater than zero (excluding projects for which yield was not quantified); project was not already implemented; project was determined to be technically and institutionally feasible; project was not recommended for final implementation in the 2013 RMPU

[2] 2013 Project Identification (PID) number; n/a - No PID assigned.

[3] Per an email from Steve Sentes at CBWCD dated August 16, 2018, the potential new stormwater recharge for the Confluence Project is 2,940 afy at a cost of about $17 million (excluding land acquisition costs). The estimated unit stormwater recharge cost is $650/af. This information was not vetted through the CBWM Steering Committee process during the development of the 2018 RMPU.



Recharge Facilities in the Chino Basin and Associated Projects

Potential New Stormwater Recharge Projects That Were Evaluated in the 2018 RMPU and Not Recommended Due to Cost

Other Existing Stormwater Management Facilities

Stormwater Management Facility in the Regional Recharge Distribution System Project

OBMP Management Zones

Streams & Flood Control Channels

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

Location Certain

Location Approximate

Location Concealed

Location Uncertain

Approximate Location of Groundwater Barrier

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_A-7_Potential new facilities.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:

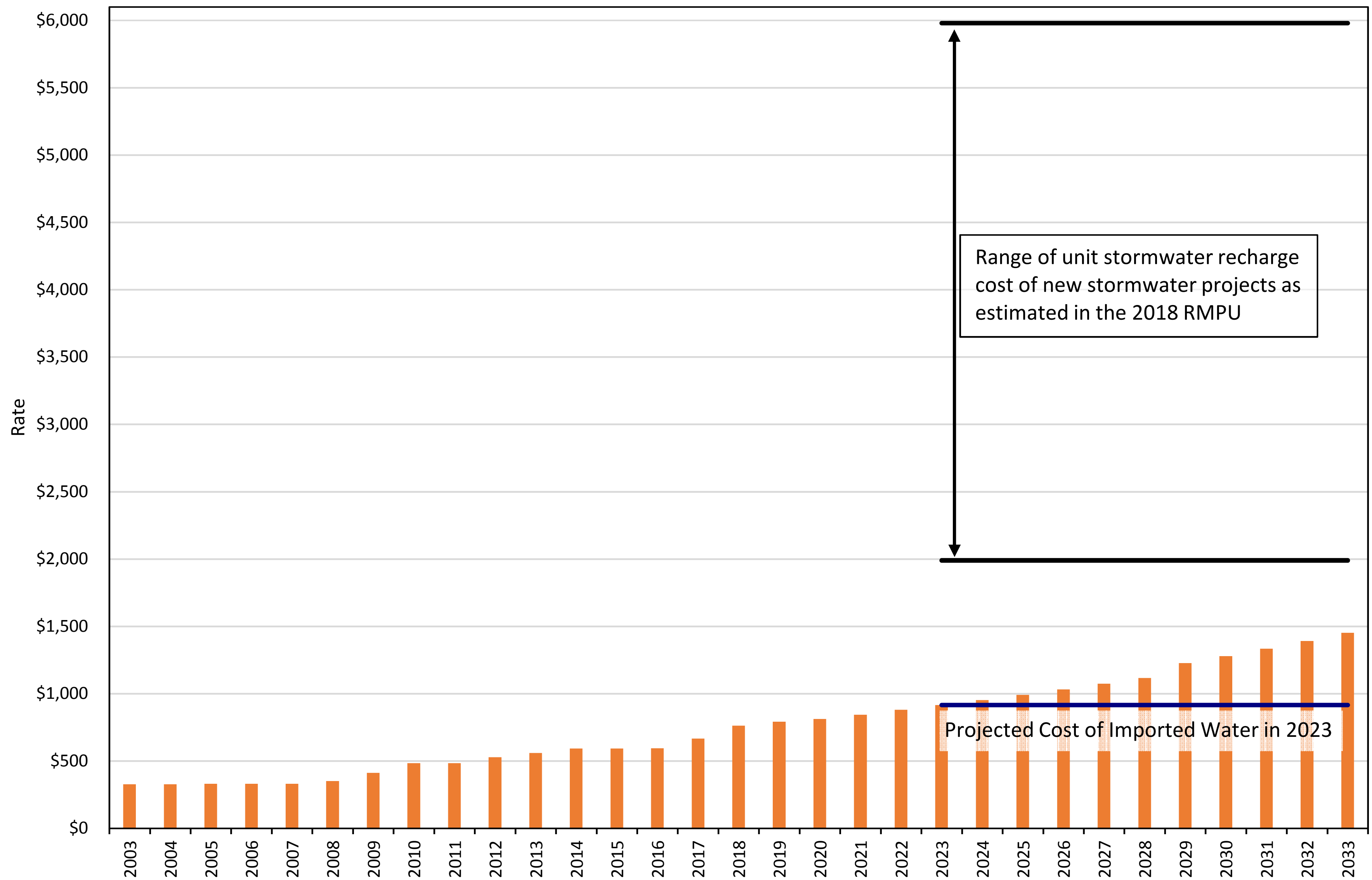
OBMP 2020 Update

Technical Memorandum 1

Potential New Stormwater Recharge Projects Considered in the 2018 RMPU

Exhibit A-7

Exhbit A-8
Projected Imported Water Rates
Compared to Estimated Unit Cost of New Stormwater Recharge Projects



Exhibit_A-8_IW_Costs--Exhibit A-8
Created on 3/15/2019
Printed on 7/5/2019

Exhibit A-9
Cost-Estimate and Schedule to Implement Activity A

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Define objectives and refine scope of work · Define objectives of Activity A · Refine scope described in TM1 · Refine detailed cost and schedule	$45,000	$45,000												
Task 2 Develop planning, screening, and evaluation criteria · Develop criteria on how and where to conduct recharge · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$125,000			$125,000										
Task 3 Describe recharge enhancement opportunities · Identify potential stormwater recharge projects · Select projects for reconnaissance level recharge study	$80,000					$80,000								
Task 4 Develop reconnaissance-level engineering design and operating plan · Characterize potential recharge alternatives · Rank Alternatives · Prepare finance plan for soft-costs · Prepare report	$325,000							$220,000			$105,000			
Task 5 Plan, design, and construct selected recharge projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$575,000**	**$170,000**				**$300,000**				**$105,000**				**$ TBD**

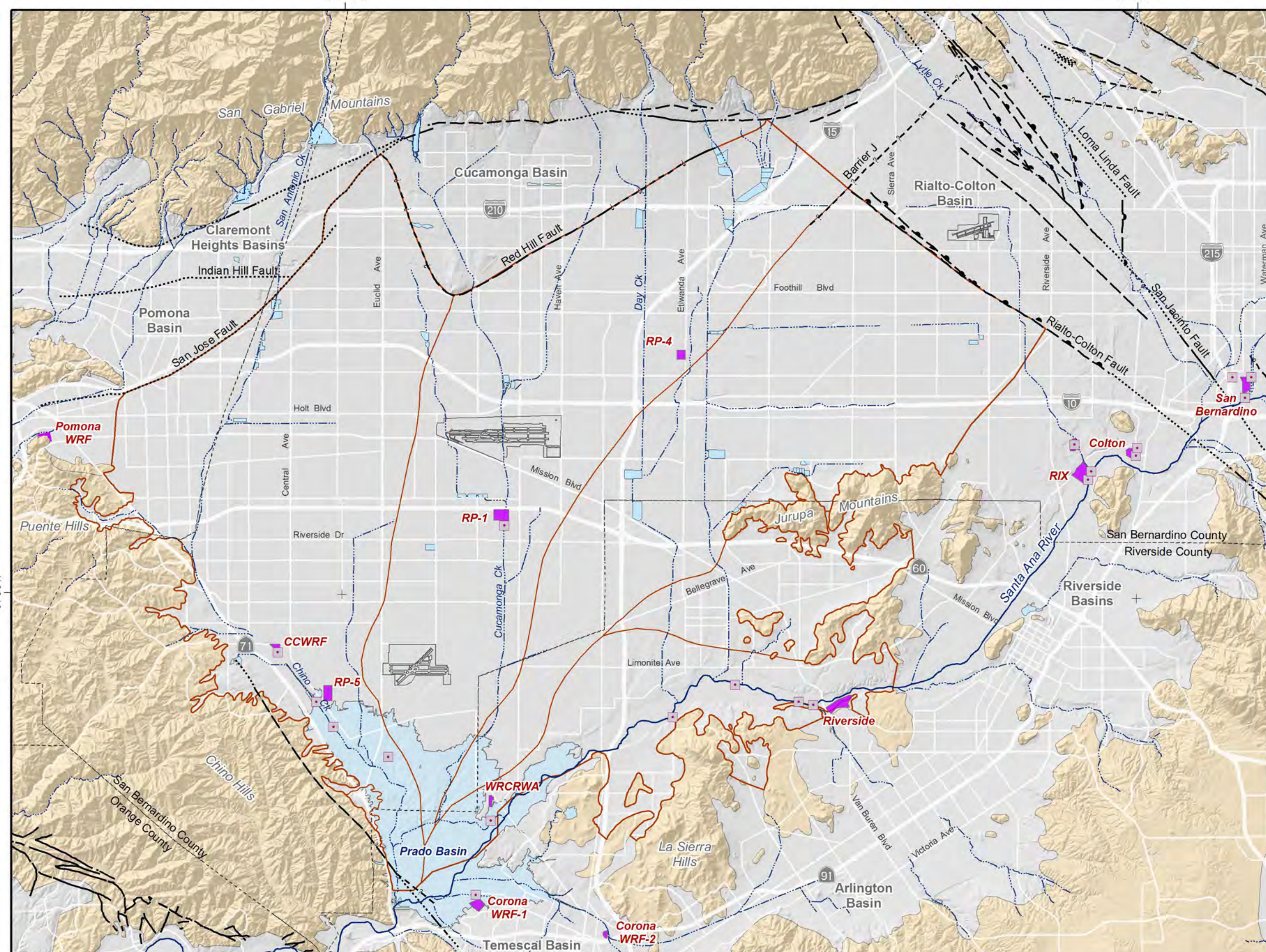
TBD -- To be determined

Exhibit B-1
Cost-Estimate and Schedule to Implement Activity B

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene the Storage and Recovery Program Committee, define objectives, and refine scope of work · Convene Storage and Recovery Program Committee · Define objectives and impediments for developing storage and recovery programs · Define mutual benefits expected from storage and recovery programs · Develop scope, schedule, and cost to prepare a *Storage and Recovery Program Master Plan*	$105,000	$105,000												
Task 2 Develop conceptual alternatives for storage and recovery programs at various scales · Identify and characterize potential source waters · Identify potential storing partners and delivery methods · Identify and characterize institutional challenges · Develop planning criteria · Describe several conceptual storage and recovery programs alternatives · Evaluate and select alternatives for Task 3	$ TBD					$ TBD								
Task 3 Describe and evaluate reconnaissance-level facility plans and costs for storage and recovery program alternatives · Describe alternative facility plans, operations, and costs · Characterize basin response, potential MPI, benefits · Describe potential implementation barriers · Assess feasibility and rank alternatives	$ TBD									$ TBD				
Task 4 Prepare *Storage and Recovery Program Master Plan* · Describe results and recommendations of Tasks 1 through 3 · Achieve consensus on the recommendations · Prepare *Storage and Recovery Program Master Plan*	$ TBD												$ TBD	$ TBD
Total Cost and Cost by FY	**$105,000**	**$105,000**				**$0**				**$0**				**$ TBD**

TBD -- To be determined

ActivityB_Cost.xlsx--Summary_TM1
Created on 6/10/2019
Printed on 7/23/2019



Recycled Water Treatment Plant

Recycled Water Discharge Point

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Faults

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

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: SO
Date: 7/22/2019
File: Exhibit D-1_RW Treatment Plants.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:

OBMP 2020 Update

Technical Memorandum 1

Recycled Water Treatment Plants and Discharge Points

Exhibit D-1

Exhibit D-2

IEUA Recycled Water Discharge to Santa Ana River FY 1977/78 to 2017/18

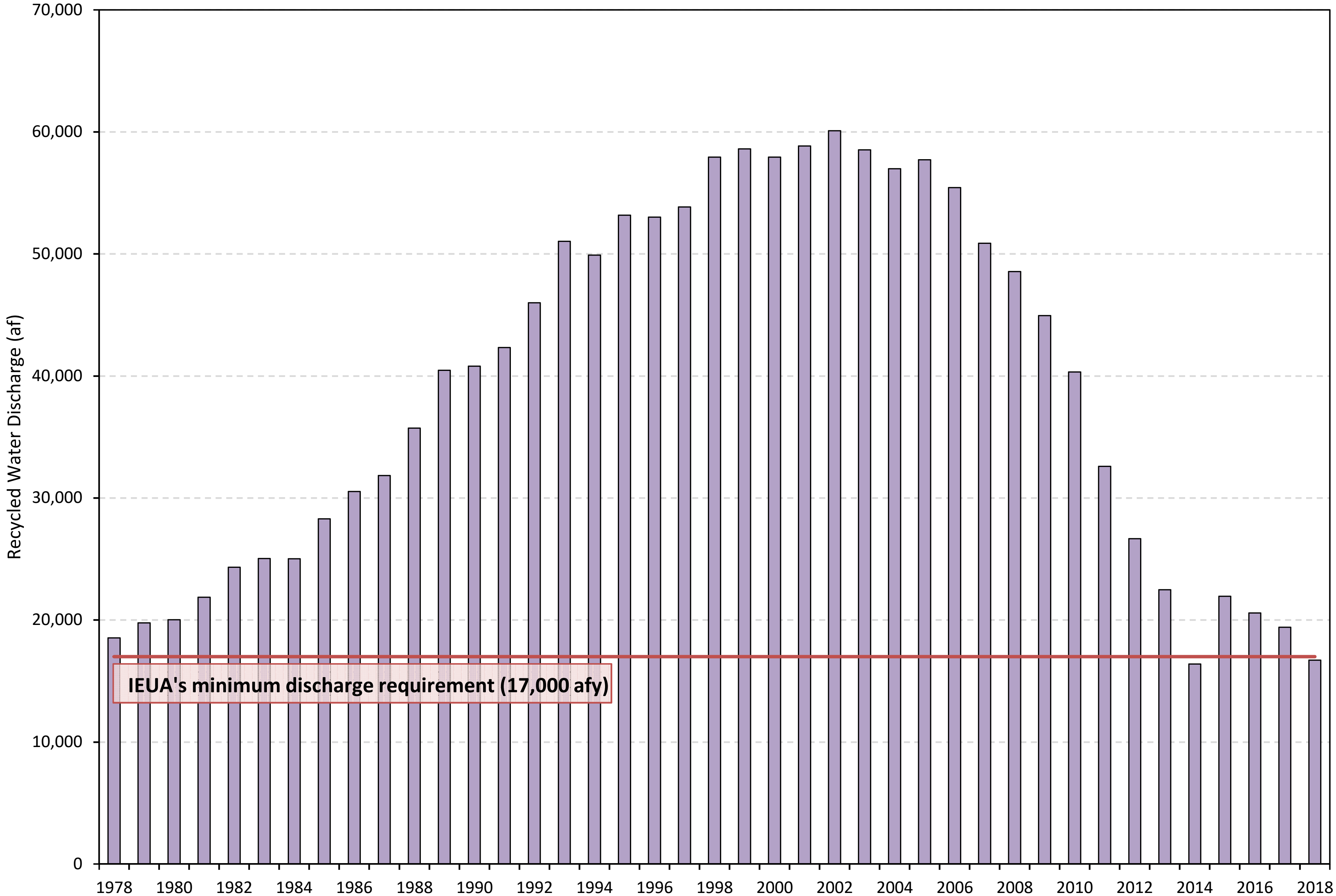


Exhibit D-2_RW Discharge.xlsx -- Exhibit D-2
7/23/2019

Exhibit D-3
Recycled Water Recharge and Direct Recycled Water Reuse FY 1996/97 to 2017/18

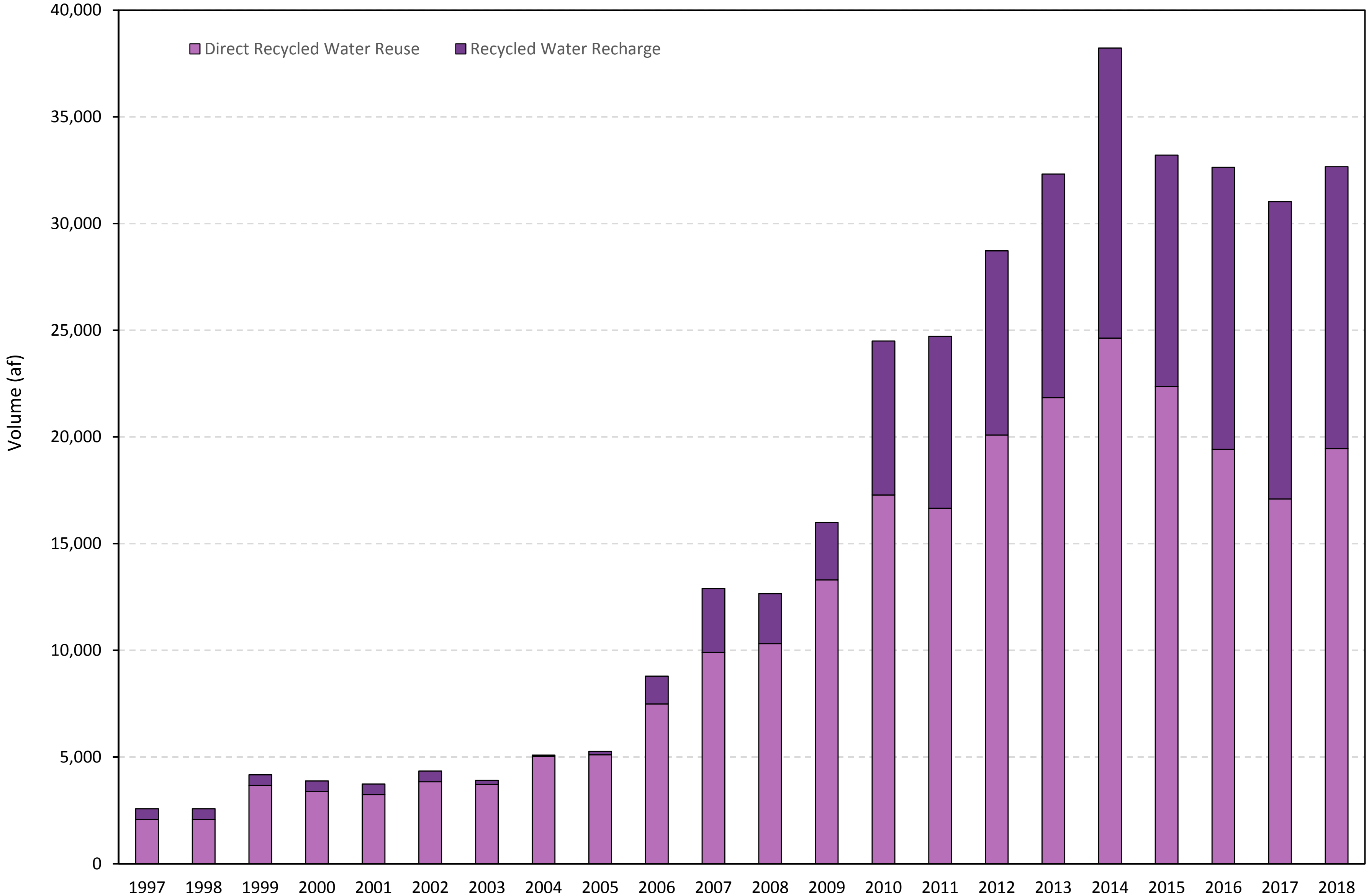
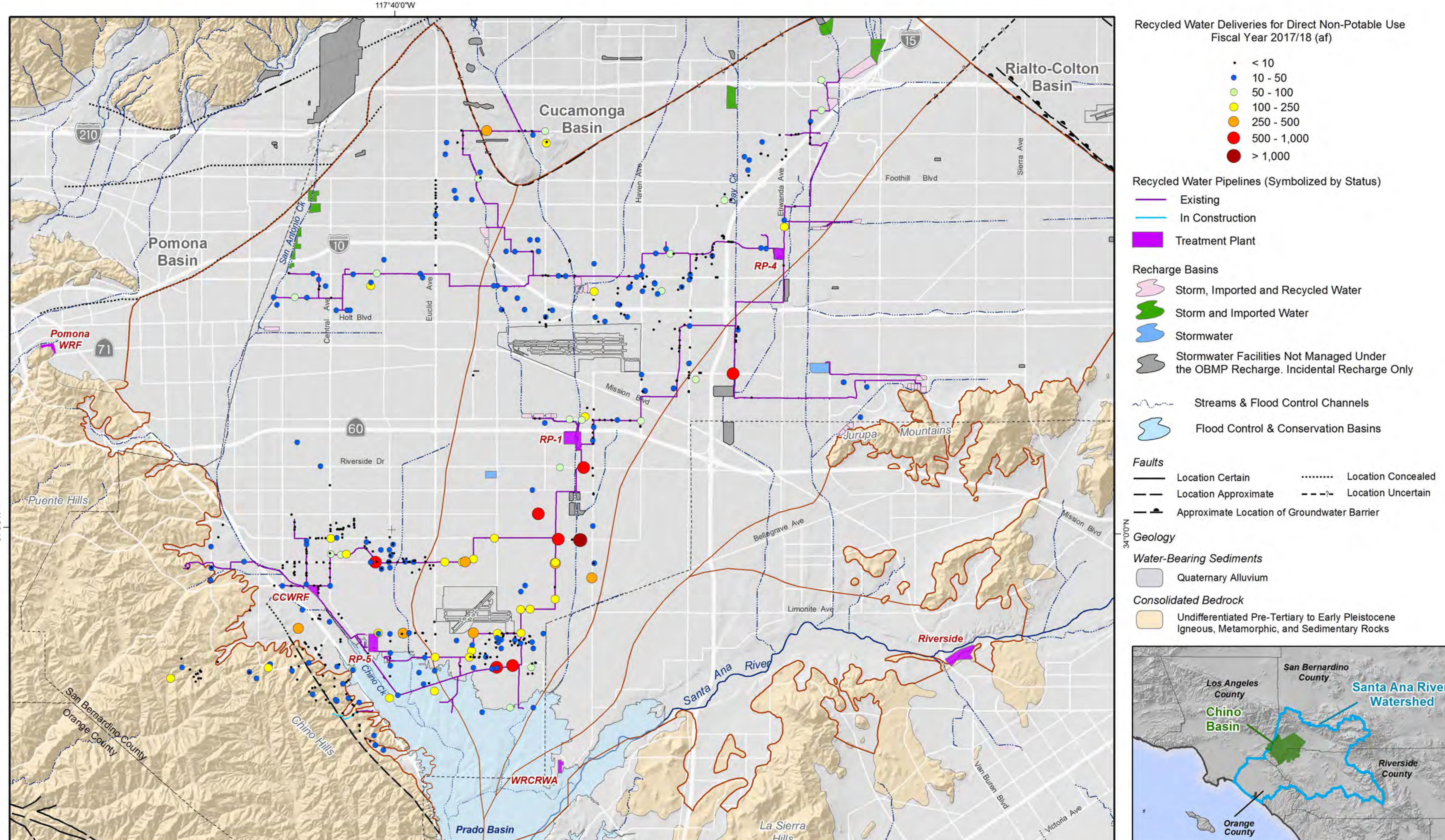


Exhibit D-3_RW Reuse.xlsx -- Exhibit D-3
7/3/2019



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 20170215
File: Exhibit D-4_RW Deliveries

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Technical Memorandum 1

Chino Basin Watermaster — Partners in Basin Management

IEUA Recycled Water Delivery System for Direct Reuse
FY 2017/18

Exhibit D-4

Exhibit D-5
IEUA Projections of Recycled Water Production and Reuse through 2040

Recycled Water (af)		FY 2017/18	2020	2025	2030	2040
Production - High*	a	49,369	64,400	70,400	75,200	83,000
Production - Low*			54,400	61,000	67,700	74,700
Direct Reuse*	b	19,450	24,000	27,500	30,000	30,000
Recharge	c	13,212	16,900	18,700	18,700	18,700
Surplus Supply Available for Reuse and/or Discharge - High	d = a - (b + c)	16,708	23,500	24,200	26,500	34,300
Surplus Supply Available for Reuse and/or Discharge - Low		0	13,500	14,800	19,000	26,000

* Source: Inland Empire Utilities Agency. *Sources of Water Supply for the Chino Basin Program* . Memo to Member Agencies. February 20, 2019.

Exhibit D-6

Actual and Projected[1] Annual Recycled Water Recharge

(afy)

Basin Permitted for Recycled Water Recharge	Theoretical Maximum Supplemental Water Recharge Capacity[2]		Actual FY 2017/18 Recharge	Projected Annual Recharge for FY 2019/20 to FY 2029/30
	Directly After Cleaning[3]	Average Between Maintenance Periods[4]		
Brooks Street Basin	2,825	1,658	1,268	2,000 [5]
Seventh and Eighth Street Basins	5,045	4,596	1,037	1,490
Subtotal Management Zone 1			*2,305*	*3,490*
Ely Basins	7,375	4,501	1,511	1,100
Hickory Basin	2,433	2,276	1,399	1,650
San Sevaine Basins 1-5	9,637	5,209	0	840
Turner Basins 1-4	3,674	2,557	1,526	1,110
Victoria Basin	2,436	2,279	793	1,530
Subtotal Management Zone 2			*5,228*	*6,230*
Banana Basin	1,913	1,790	2,131	1,050
Declez Basin	3,032	2,827	588	1,250
IEUA RP3 Ponds	12,389	11,587	2,960	4,400
Subtotal Management Zone 3			*5,679*	*6,700*
Total	**50,760**	**39,280**	**13,212**	**16,420**

n/a - not applicable

[1] Source - Andy Campbell, IEUA, June 2016

[2] Subject to Watermaster needs for recharge and replenishment

[3] Total recharge from the 10-month period directly after a cleaning.

[4] Average annual recharge over the span between maintenance. The average cleaning frequency of each recharge facility was provided by the IEUA. This estimate corresponds to continuous use between maintenance periods and is less than the recharge capacity that would occur if the recharge basins are used less frequently.

[5] The projected recharge at Brooks Basin is larger than the theoretical maximum average supplemental water recharge capacity between maintenance periods, but the capacity can increase up to 2,825 afy if the maintenance frequency is increased.

Exhibit D-7
Cost-Estimate and Schedule to Implement Activity D

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene Recycled Water Projects Committee, define objectives and refine scope of work · Convene Recycled Water Projects Committee · Define objectives of Activity D · Refine scope described in TM1 · Refine detailed cost and schedule	$50,000	$50,000												
Task 2 Characterize the availability of all recycled water supplies and demands · Review 2020 Urban Water Management Plans · Develop water supply and demand projections · Characterize timing and magnitude of recycled water available	$135,000		$135,000											
Task 3 Develop planning, screening, and evaluation criteria · Develop Watermaster criteria · Develop regulatory criteria · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$40,000				$40,000									
Task 4 Describe recycled water reuse project opportunities · Identify potential recycled water reuse projects · Select projects for reconnaissance level recharge study	$85,000					$85,000								
Task 5 Develop reconnaissance-level engineering design and operating plan · Characterize potential project alternatives · Rank alternatives · Prepare finance plan for soft-costs · Prepare report	$310,000						$130,000			$180,000				
Task 6 Plan, design, and construct selected recycled water projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$620,000**	**$225,000**				**$215,000**				**$180,000**				**$ TBD**

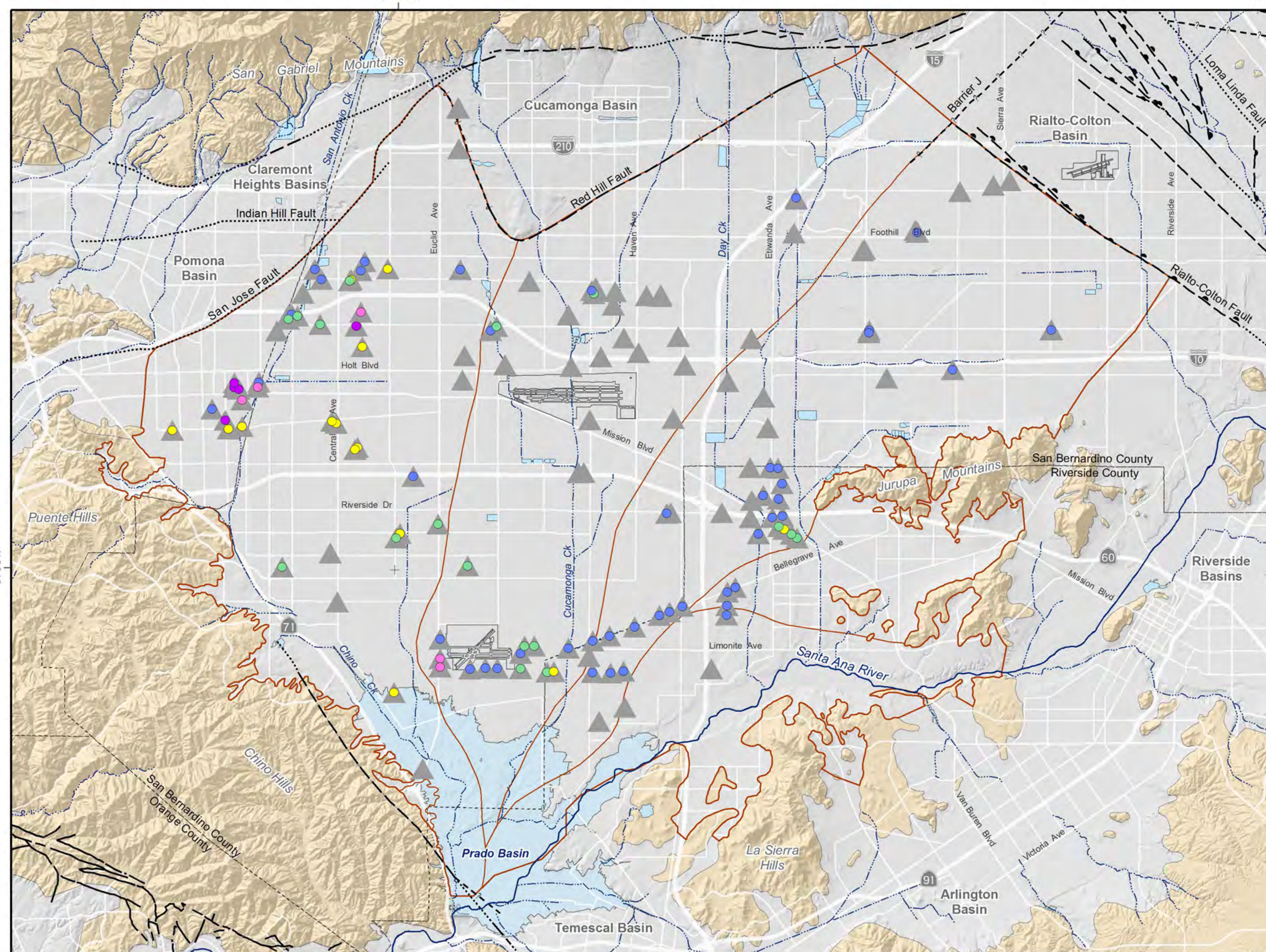
TBD -- To be determined

Exhibit EF-1

Summary of Drinking Water Contaminants with Primary MCLs in Municipal Supply Wells

FY 2013/14 - 2017/18

Analyte	Primary CA MCL	Number of Active Municipal Supply Wells with Exceedance of MCL	Number of Municipal Supply Wells with Exceedance of MCL	Number of Total Wells in the Chino Basin with Exceedance of MCL
Nitrate-Nitrogen	10 mgl	71	80	555
1,2,3-Trichloropropane	0.005 µgl	33	36	111
Perchlorate	6 µgl	27	30	387
Trichloroethylene (TCE)	5 µgl	11	14	269
Gross Alpha	15 pCi/L	6	7	14
Chromium	50 µgl	4	4	4
Arsenic	0.01 mgl	3	5	74
1,2-Dibromo-3-chloropropane	0.2 µgl	3	3	4
Tetrachloroethene (PCE)	5 µgl	3	3	96
Trihalomethanes	10 µgl	2	3	2
Nitrite-Nitrogen	1 mgl	2	2	17
1,1-Dichloroethene (1,1-DCE)	5 µgl	1	1	13
Dichloromethane (Freon 30)	5 µgl	1	1	91
Uranium	20 pCi/L	1	1	1



Active Municipal Supply Well

Number of Contaminants that Exceed a MCL

- 1
- 2
- 3
- 4
- 5

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-2_Exceedance_Count.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:

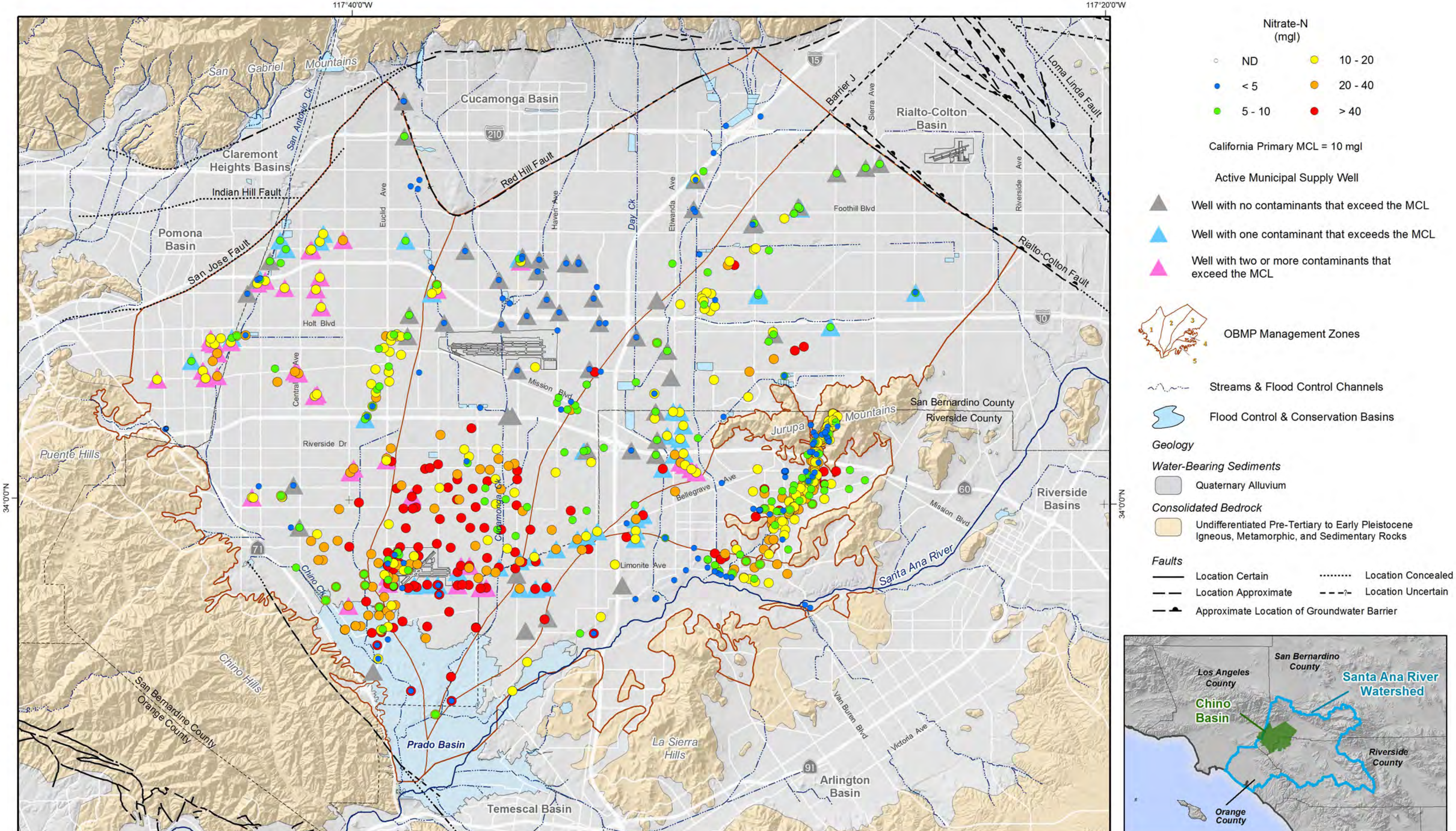
OBMP 2020 Update

Technical Memorandum 1

Occurrence of Drinking Water Contaminants in Active Municipal Supply Wells in Chino Basin

2014-2018

Exhibit EF-2



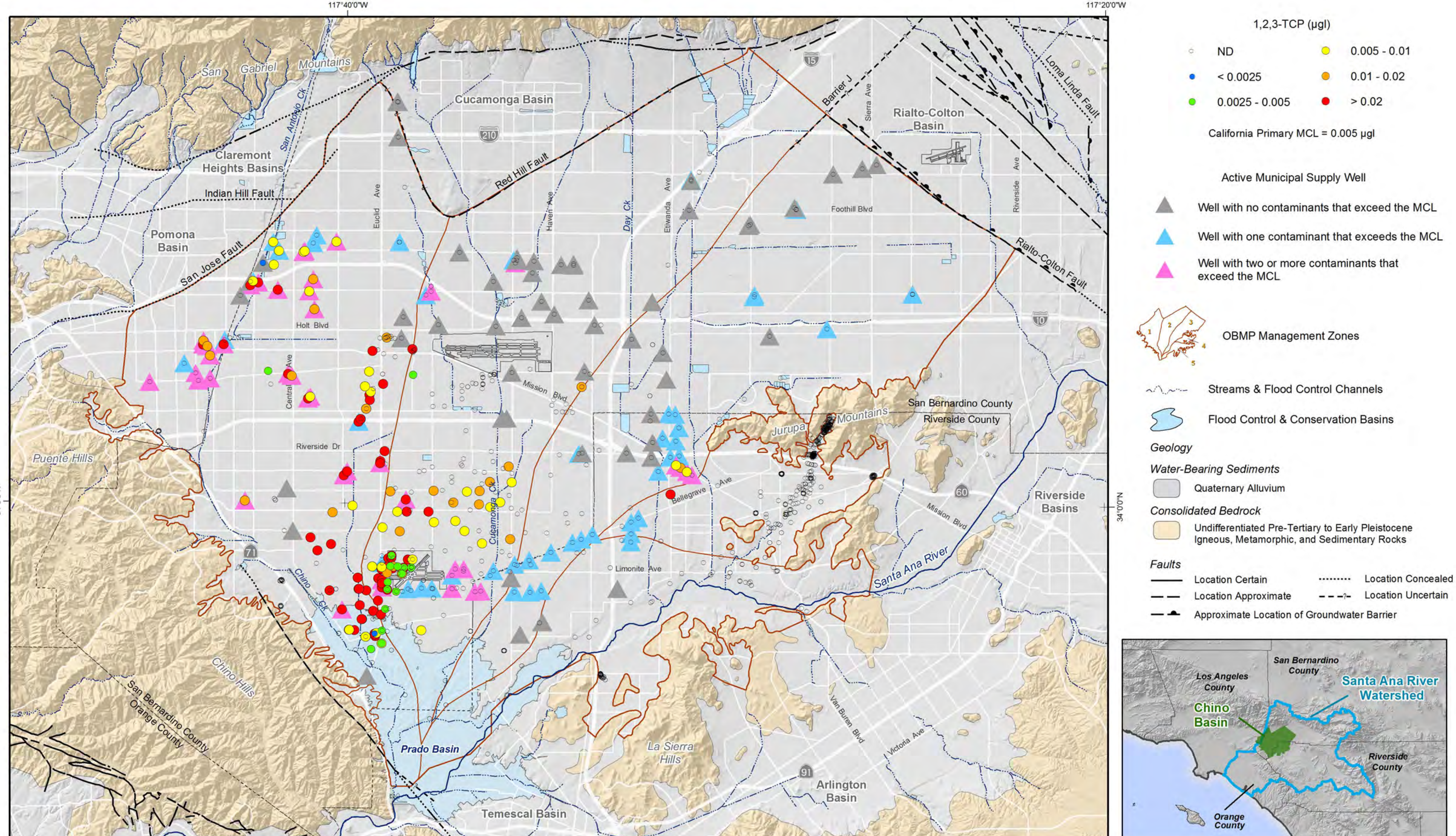
Prepared by:
WEI
Wildermuth Environmental, Inc.
Author: CS
Date: 7/22/2019
File: Exhibit_EF-3_NO3_2014-2018.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Technical Memorandum 1

Maximum Nitrate Concentration
2014-2018

Exhibit EF-3



Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-4_1,2,3-TCP_2014-2018.mxd

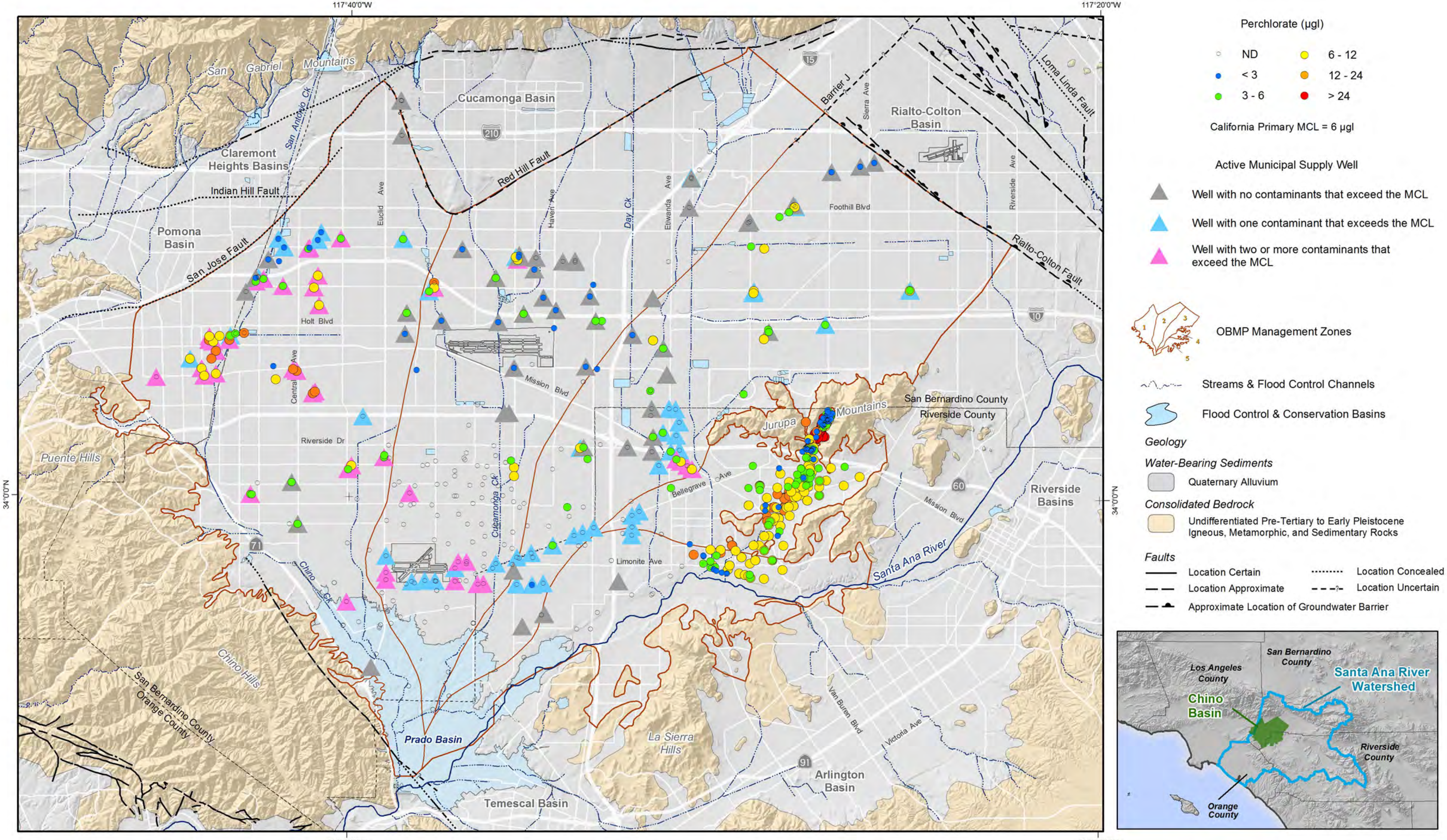
0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Technical Memorandum 1

CHINO BASIN WATERMASTER
Partners in Basin Management

Maximum 1,2,3-Trichloropropane (1,2,3-TCP) Concentration
2014-2018

Exhibit EF-4



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-5_CLO4_MCL_2014-2018.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:
OBMP 2020 Update
Technical Memorandum 1

Chino Basin Watermaster
Partners in Basin Management

Maximum Perchlorate Concentration
2014-2018

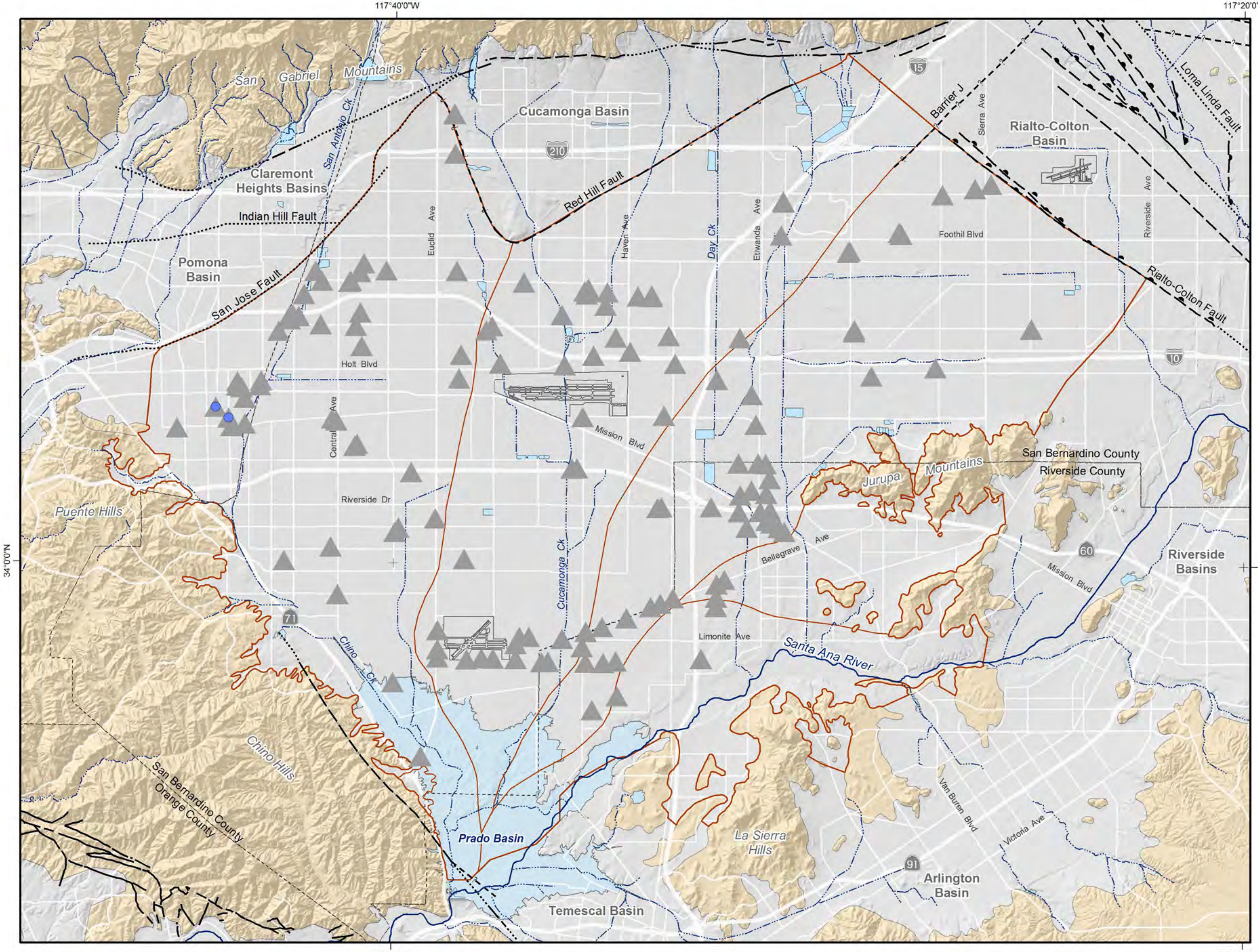
Exhibit EF-5

Exhibit EF-6

Summary of Drinking Water Contaminants with Notification Levels in Municipal Supply Wells

FY 2013/14 - 2017/18

Analyte	CA Drinking Water NL	Number of Active Municipal Supply Wells with Exceedance of NL	Number of Municipal Supply Wells with Exceedance of NL	Number of Total Wells in the Chino Basin with Exceedance of NL
1,4-Dioxane	1 µgl	2	2	133
Manganese	0.5 mgl	0	0	118
N-Nitrosodimethylamine (NDMA)	0.01 µgl	0	0	60
Vanadium	0.05 mgl	0	0	55
Naphthalene	0.017 mgl	0	0	48
1,2,4-Trimethylbenzene	0.33 mgl	0	0	26
1,3,5-Trimethylbenzene	0.33 mgl	0	0	19
Methyl Isobutyl Ketone	0.12 mgl	0	0	11
n-Propylbenzene	0.26 mgl	0	0	11
HMX (Octogen)	0.35 mgl	0	0	11
Chlorate	0.8 mgl	0	0	4
Formaldehyde	0.1 mgl	0	0	3
N-Nitrosodiethylamine (NDEA)	0.01 µgl	0	0	3
Ethylene Glycol	14 mgl	0	0	1
n-Butylbenzene	0.26 mgl	0	0	1



Active Municipal Supply Well

Well exceeds NL of 1 µgl for 1,4-Dioxane

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

Location Certain

Location Concealed

Location Approximate

Location Uncertain

Approximate Location of Groundwater Barrier

Prepared by:

WEI
WILDERMUTH ENVIRONMENTAL, INC.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-7_Exceedance_Count_NL.mxd

0 1 2 3 4 5 Miles

0 2 4 6 8 Km

Prepared for:

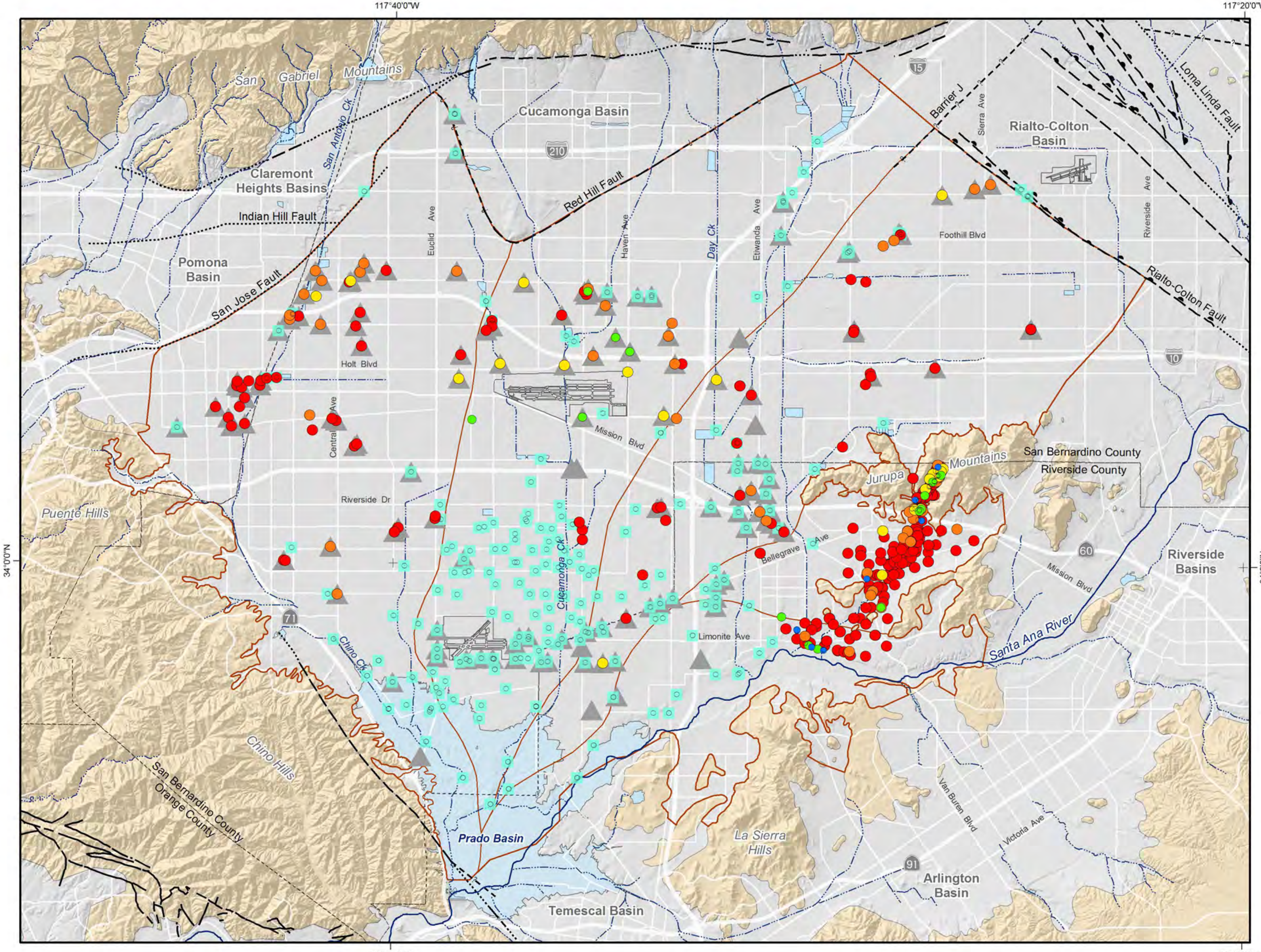
OBMP 2020 Update

Technical Memorandum 1

Contaminants that exceed the NL in Active Municipal Supply Wells in Chino Basin

2014-2018

Exhibit EF-7



Perchlorate (µgl)

- ND
- < 0.5
- 0.5 - 1
- 1 - 2
- 2 - 4
- > 4

California MCL = 6 µgl

California PHG = 1 µgl

Well Sampled for Perchlorate but the Method Detection Limit was Greater than the PHG of 1 µgl

Active Municipal Supply Well

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-8_CLO4_PHG_2014-2018.mxd

0 1 2 3 4 5 Miles

0 2 4 6 8 Km

Prepared for:

OBMP 2020 Update

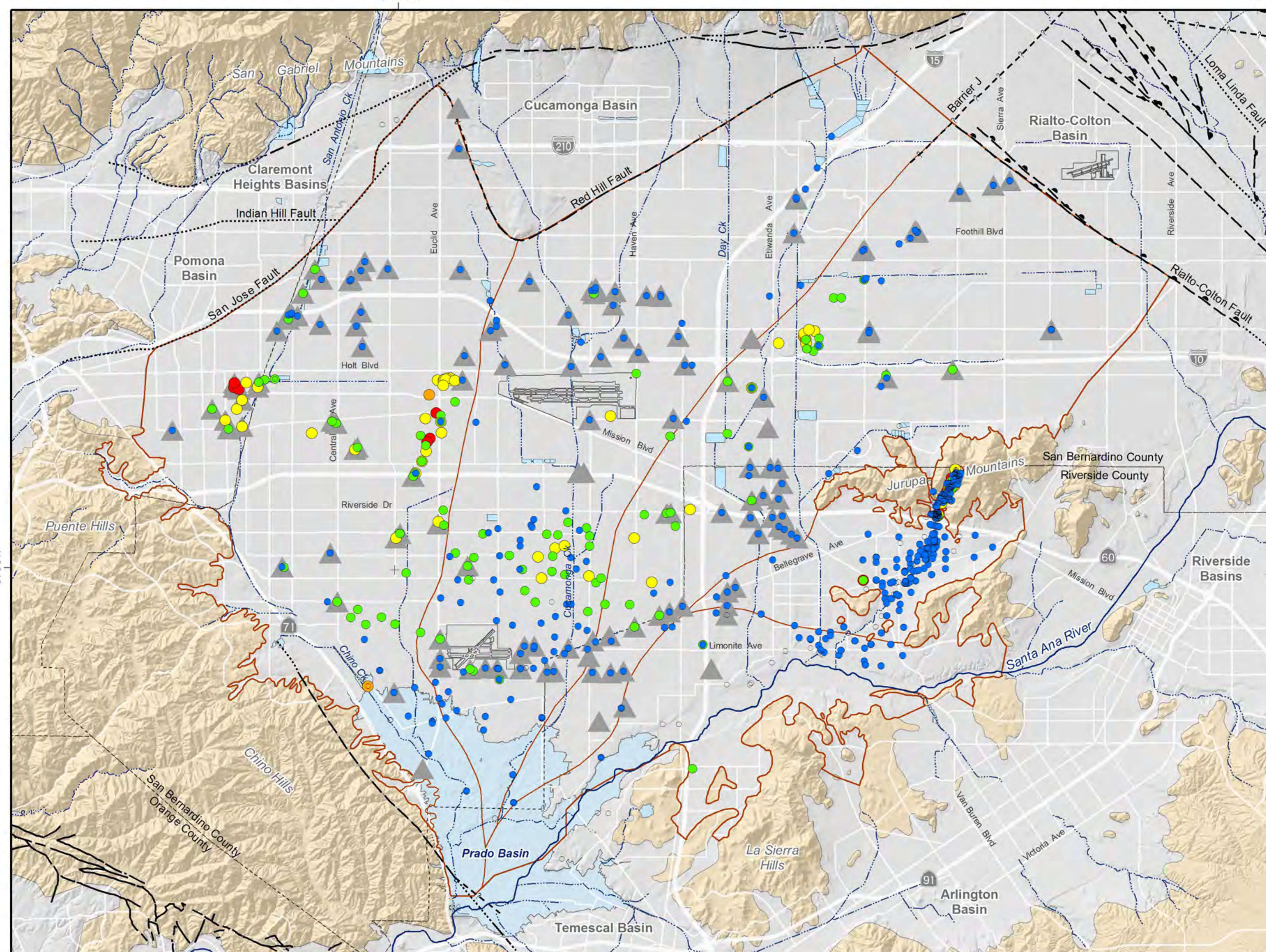
Technical Memorandum 1

Chino Basin Watermaster — Partners in Basin Management

Maximum Perchlorate Concentration

2014-2018

Exhibit EF-8



Hexavalent Chromium (µgl)

- ND
- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

A MCL for Hexavalent Chromium of 10 µgl was established in 2014, and later invalidated by the court in 2017

Active Municipal Supply Well

OBMP Management Zones

Streams & Flood Control Channels

Flood Control & Conservation Basins

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-9_HexCr_2014-2018.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:

OBMP 2020 Update

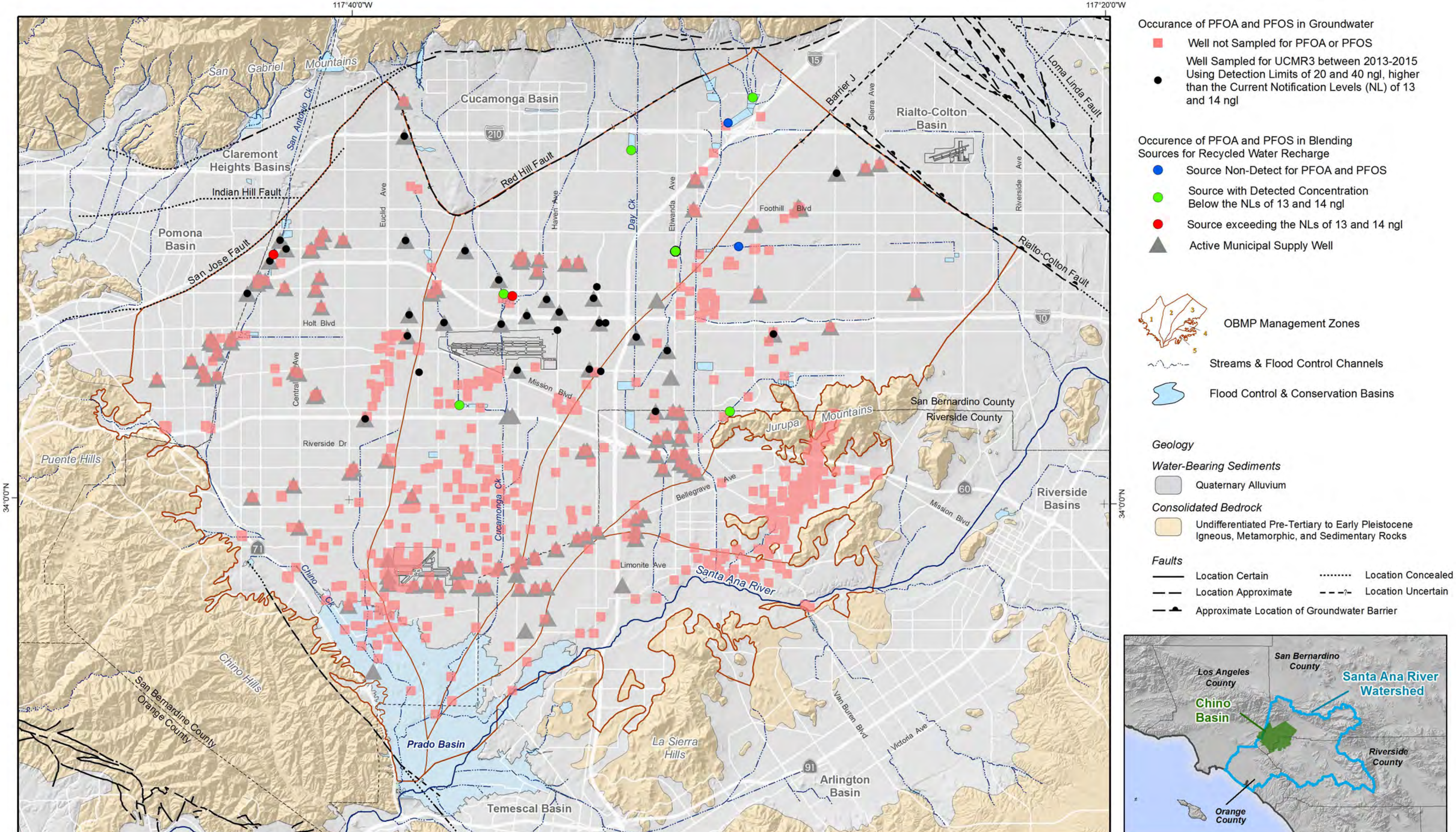
Technical Memorandum 1

Chino Basin Watermaster — Partners in Basin Management

Maximum Hexavalent Chromium

2014-2018

Exhibit EF-9



Prepared by:

WEI
Wildermuth Environmental, Inc.

Author: CS
Date: 7/22/2019
File: Exhibit_EF-10_PFAS_1998-2019.mxd

0 1 2 3 4 5 Miles
0 2 4 6 8 Km

Prepared for:

OBMP 2020 Update

Technical Memorandum 1

Chino Basin Watermaster — Partners in Basin Management

PFOA and PFOS Concentrations

Through March 2019

Exhibit EF-10

Exhibit EF-11
Cost-Estimate and Schedule to Implement Activities E & F OBMP Update

Task and Subtask Description	Engineering Cost	FY 2020/21				FY 2021/22				FY 2022/23				FY 2023/24 and beyond
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Task 1 Convene the Water Quality Committee, define objectives, and refine scope of work · Convene Recycled Water Projects Committee · Define objectives of Activity D · Refine scope described in TM1 · Refine detailed cost and schedule	$65,000	$65,000												
Task 2 Develop and implement an initial emerging-contaminants monitoring plan · Determine contaminants of interest · Develop initial monitoring plan · Implement initial monitoring plan	$95,000			$50,000		$45,000								
Task 3 Perform a water quality assessment and prepare a scope to develop and implement a Groundwater Quality Management Plan · Describe current and future challenges and solutions · Develop recommendations for long-term monitoring and assessment · Prepare scope to develop and implement a groundwater quality management plan · Prepare final assessment	$135,000							$80,000			$55,000			
Task 4 Develop planning, screening, and evaluation criteria · Develop criteria to evaluate project cost and benefit · Review and finalize criteria	$ TBD												$ TBD	$ TBD
Task 5 Identify and describe potential projects for evaluation · Identify potential projects · Select projects for reconnaissance level study	$ TBD													$ TBD
Task 6 Conduct a reconnaissance-level study for the proposed projects · Characterize potential treatment projects · Evaluate Projects · Prepare finance plan for soft-costs · Prepare implementation plan	$ TBD													$ TBD
Task 7 Prepare the *Groundwater Quality Management Plan* · Prepare draft plan · Prepare final plan	$ TBD													$ TBD
Task 8 Plan, design, and build water quality management projects · Prepare preliminary design report and CEQA documentation · Prepare finance plan for project implementation · Obtain permits and agreements and prepare final design · Construct selected projects	$ TBD													$ TBD
Total Cost and Cost by FY	**$295,000**	**$115,000**				**$125,000**				**$55,000**				**$ TBD**

TBD -- To be determined