

To: Chino Basin Watermaster Stakeholders
From: Watermaster 2020 OBMP Update Team
Subject: 2020 OBMP Update: Scoping Report – Development of Activities for Consideration
Date: Draft Part 1, July 24, 2019; Draft Part 2, August 22, 2019;
 Final November 22, 2019

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1. Introduction and Background

Objectives and Purpose of the Scoping Report

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 first Technical Memorandum, *2020 OBMP Update: Scoping Report – Development of Activities for Consideration* (Scoping Report), 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 developed by the stakeholders for 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).

The purpose of the Scoping Report is to provide the Parties with an understanding of the work that would need to be performed to accomplish the desired outcomes of each of the 2020 OBMP Update activities. To the extent that the scopes of work described herein are already being partly or completely performed by Watermaster or others, this Scoping Report acknowledges such. The next steps in the process to prepare the 2020 OBMP Update will focus on the review and revision of the activities scoped herein and the integration of the ongoing activities with the existing OBMP. The recommended 2020 OBMP Implementation Plan, inclusive of ongoing and new activities will be documented in a subsequent report, *2020 Optimum Basin Management Program Update Report*, and will form the foundation for the Parties to develop a final implementation plan and agreements to implement the OBMP Update.



History of the OBMP

The Chino Basin Judgment grants Watermaster the discretionary authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations. Paragraph 41 (within the Physical Solution), states:

41. Watermaster Control. Watermaster, with the advice of the Advisory and Pool Committees, is granted discretionary powers in order to develop an optimum basin management program for Chino Basin, including both water quantity and quality considerations. Withdrawals and supplemental water replenishment of Basin Water, and the full utilization of the water resources of Chino Basin, must be subject to procedures established by and administered through Watermaster with the advice and assistance of the Advisory and Pool Committees composed of the affected producers. Both the quantity and quality of said water resources may thereby be preserved and the beneficial utilization of the Basin maximized.¹ The Chino Basin Judgment gave Watermaster the discretionary authority to develop an OBMP for the Chino Basin, including both water quantity and quality considerations.

The Engineering Appendix (Exhibit "I") of the Judgment establishes the following Basin Management Parameters, including additional quantity, quality, and economic considerations, required for implementation of the Physical Solution and the OBMP:

1. In the process of implementing the physical solution for Chino Basin, Watermaster shall consider the following parameters:

(a) Pumping Patterns. - Chino Basin is a common supply for all persons and agencies utilizing its waters. It is an objective in management of the Basin's waters that no producer be deprived of access to said waters by reason of unreasonable pumping patterns, nor by regional or localized recharge of replenishment water, insofar as such result may be practically avoided.

(b) Water Quality. - Maintenance and improvement of water quality is a prime consideration and function of management decisions by Watermaster.

(c) Economic Considerations. - Financial feasibility, economic impact and the cost and optimum utilization of the Basin's resources and the physical facilities of the parties are objectives and concerns equal in importance to water quantity and quality parameters.²

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 to 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*.³

The four goals of the 2000 OBMP included:

¹ See Restated Judgment, ¶ 41

² See Restated Judgment, Exhibit I

³ 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](http://www.cbwm.org/docs/engdocs/OBMP%20-%20Phase%20I%20(Revised%20DigDoc).pdf)



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 implementation 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*⁴.

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 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 program is to maintain and enhance 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 stop 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.

⁴ See for example: WEI (2019). *Optimum Basin Management Program 2018 State of the Basin Report*. Prepared for the Chino Basin Watermaster. June 2018.

http://cbwm.org/docs/engdocs/State_of_the_Basin_Reports/SOB%202018/2018%20State%20of%20the%20Basin%20Report.pdf



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 Management Program. The objectives of this storage program are (1) to implement, and periodically update, a storage management plan that prevents overdraft, protects water quality, and ensures equity among the Parties and (2) to periodically recalculate Safe Yield. This PE explicitly defined the storage management plan, including a “Safe Storage Capacity” for managed storage of 500,000 acre-feet (af) – inclusive of local and supplemental storage and Storage and Recovery Programs.

PE 9 – Develop and Implement Storage and Recovery Programs. The objectives of the conjunctive use program are to develop Storage and Recovery Programs that will provide broad mutual benefit to the Parties and ensure that basin water and storage capacity are put to maximum beneficial use while causing no Material Physical Injury (MPI).

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.

For purposes of the discussions in this report, the term OBMP refers to the collective programs implemented by Watermaster and others (e.g. IEUA, the Chino Basin Desalter Authority, etc.) pursuant to the Peace Agreements, the OBMP Implementation Plan, the PEIR, and any amendments to these documents.

2007 Supplement to the OBMP IP and the Peace II Agreement

The work to develop the OBMP determined that the groundwater pumping capacity of the Chino Basin Desalters would ultimately need to be 40,000 acre-feet per year (afy) to accomplish the goals of the OBMP; however the Peace Agreement only provided for the development of the first 20,000 afy of this capacity and the Parties committed to developing expansion and funding plans the remaining capacity within five years of approval of the Peace Agreement. The Parties developed the Peace II Agreement that included provisions to expand the desalting capacity to 40,000 afy. The Peace II agreement introduced Re-operation⁵ to achieve Hydraulic Control⁶ of the Chino Basin and maintain Safe Yield. Hydraulic Control is 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 recharge and reuse throughout the basin under PEs 2 and 5.

The Parties executed the Peace II Agreement in 2007, which included a supplement to the OBMP Implementation Plan to expand the Chino Basin Desalters to 40,000 afy of groundwater pumping, to incorporate Re-operation and Hydraulic Control, and to resolve other issues. There were no changes to

⁵ 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.

⁶ 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.



the storage management plan in the OBMP Implementation Plan 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 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](#).⁷

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

⁷ <http://www.cbwm.org/OBMPU.htm>



of every stakeholder to be heard. Participation in the listening sessions is critical to the development of the 2020 OBMP Update.

The work documented in this Scoping Report is based on the discussions and feedback from the first four listening sessions, which were held 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 Scoping Report summarizes and integrates the work products of the first 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 and the integration of those activities with the existing OBMP. The outcomes will be integrated into a recommended implementation plan for the 2020 OBMP Update. The second TM, *2020 Optimum Basin Management Program Update Report*, will form the foundation for the Parties to develop a final implementation plan and agreements to implement the OBMP Update.



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 EF).
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).

Commented [SA1]: This is the same as Exhibit 5 in The OBMP Update Report (TM2) – same edit applied there.

Page 2 of 6, under impediment 1b, the bullet in the first column will be revised to:

Discharge of recycled water to the SAR reduces the amount of recycled water available for other uses such as reuse and recharge.

The text of the third column will be revised to:

A strategy to meet the Santa Ana River base flow obligation in the broader water resources planning context in Chino Basin.



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 CG).
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 HIJ).



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. The scopes of work will be performed by engineers hired by Watermaster, the IEUA or others responsible for implementing the OBMPU.

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. Unless otherwise stated, the schedule to implement the activities is provided in a general context (Year 1, Year 2, Year 5, etc.) and not assigned to a specific start or end date.



Activity A

Description of Activity A

Activity A defined by the stakeholders 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 holds three permits with the State Water Resources Control Board (State Board) for the diversion and recharge of stormwater in trust for the Parties. The San Bernardino County Flood Control District (SBCFCD) is a co-permittee for two of these permits, 19895 and 20753. Each permit defines a maximum diversion limit and the period over which diversions are allowed to occur each year (diversion season):

- 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.⁸ 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.⁹ 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. 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 diversion season, based on the historical hydrology for the 63-year period of 1950 to 2012.¹⁰ 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

⁸ Note that Watermaster completed its 2018 RMPU in October 2018, but no projects were selected for implementation.

⁹ 2018 Recharge Master Plan Update. WEI. September 2018.

¹⁰ 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.



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 af¹¹) 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.

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.¹² 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

¹¹ WEI. (2018). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

¹² 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.



address current basin management issues, such as existing land subsidence in Management Zone 1 (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:

- The theoretical average annual stormwater discharge available for diversion under the existing water rights permits is about 74,000 afy ranging from 21,400 to 110,500 afy (combined permitted diversion), 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 effectively address the existing basin management issues, including: land subsidence, maintaining Hydraulic Control, 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
- 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.



- SBCFCD and CBWCD 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 MPI 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 defined by the stakeholders 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 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*,¹³ 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, external funding, 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 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

¹³ WEI. (2019). *Storage Framework Investigation – Final Report*. Prepared for the Chino Basin Watermaster. October 2018, revised January 2019.



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 led by the IEUA. The latter is in response to a \$207 million conditional funding opportunity awarded to IEUA under Proposition 1 for the construction and operation of storage programs that create environmental benefits in the Sacramento-San Joaquin Delta, while providing local water quality benefits.

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 Programs? 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*

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:

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

Year two:

- Develop conceptual alternatives for Storage and Recovery Program s at various scales (Task 2).

Year three:

- 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:

- 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 defined by the stakeholders 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), artificial recharge by spreading or injection (indirect potable reuse), and direct potable reuse. Increasing recycled water reuse is an integral part of the OBMP's goal to enhance water supplies, and, the Judgment states that Watermaster shall give high priority to maximizing the beneficial use of recycled water for replenishment purposes (Judgment ¶ 49(a)). 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 of water to the Santa Ana River pursuant to the Santa Ana River Judgment and associated agreements with the Western Municipal Water District (WMWD)-A strategy to meet the Santa Ana River baseflow obligation in the broader water resources planning context in Chino Basin.~~

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 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, direct reuse demands for recycled water have been prioritized above groundwater recharge with recycled water. 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 a result of OBMP implementation. Specifically, 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. Since 2014, recycled water discharge has been less than 20,000 afy and has averaged about 18,600 afy over the last five years.

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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. Recycled water reuse 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.

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 is due to the mindful reduction in use by the City of Chino to accommodate changes in IEUA policy related to the use of recycled water base entitlements and conversions of land from agricultural to urban uses. 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

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. 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 increasing demand for recycled water reuse will the IEUA’s ability to continue to use recycled water to meet its discharge obligations pursuant to the Santa Ana River Judgment.~~

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 2040.¹⁴ Also shown in Exhibit D-5 is the calculation of ~~surplus supply available remaining recycled water. Exhibit D-5 depicts the degree of variation in supplies and projected use. This illustrates the need for coordinated water supply development to potentially include supplemental sources if the demand for recycled water reuse exceeds available supplies. 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 the IEUA may need to find supplemental supplies to meet both recycled water demands and its discharge obligations.~~

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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 prioritize¹⁵ 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 maximum supplemental water recharge capacity¹⁶ that can be used for recycled water recharge, subject to Watermaster’s priority need for recharge and replenishment.¹⁷ 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 2029/30.¹⁸ As the table shows, the planned volume of recycled water recharge of 16,400 af is less than

¹⁴ 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.

¹⁵ Note that the primary goal of multipurpose facilities is to attenuate flood peak discharge.

¹⁶ 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.

¹⁷ WEI, (2019). *2018 Recharge Master Plan Update*. Prepared for the Chino Basin Watermaster. September 2018.

¹⁸ 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.



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. The CBP was conditionally awarded approximately \$207 million of Proposition 1 Water Storage Investment Program funding. 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 pumped into Metropolitan’s system for use in Southern 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 led by the IEUA together with regional agencies 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 and recharge of IEUA recycled water in the Chino Basin (refer to Activity K for more details). 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 water quality projections would be required to demonstrate the impacts of reuse of non-IEUA sources of recycled water in the Chino Basin. The existing SNMP contains provisions for mitigation at such time that the TDS and/or nitrate concentration of recycled water or groundwater exceeds the regulatory limits defined in the Basin Plan.

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 without treatment (see discussion in Activity EF 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. DPR will require advanced treatment of any recycled water source used.

Santa Ana River Judgment. ~~Historically the IEUA has used recycled water to meet its obligations under the Santa Ana River Judgment. As demand for recycled water increases, the IEUA will have to rely on other sources of water to meet this obligation. If the IEUA were able to obtain access to additional water supplies (recycled or other supplemental), 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. The Santa Ana River (SAR) Judgment (“SAR Judgment”) is the result of a water rights dispute in which water users downstream from Prado Dam were seeking an adjudication of water rights against substantially all water users in the area tributary to Prado Dam within the SAR Watershed, including the producers in the Chino Basin. The 1969 SAR Judgment dismissed all defendants and cross-defendants except for the four major public water districts overlying (Inland Empire Utilities Agency (then Chino Basin Municipal Water District), Orange County Water District, San Bernardino Valley Municipal Water District (SBVMWD) and Western Municipal Water District (WMWD), in aggregate, substantially all of the major areas of water use in the watershed; IEUA, in particular, accepted the obligation on behalf of the Chino Basin. The Prado Agreement defined the shared responsibility for the 34,000 af Base Flow obligation at Prado. IEUA’s portion of this responsibility is commonly referred to as the SAR Base Flow obligation at Prado. IEUA currently uses available recycled water to contribute towards the SAR Base Flow obligation, although it is not limited to using recycled water.~~

Summary

The process to achieve the objective of Activity D to maximize the reuse of recycled water produced by IEUA and others should include: (1) a characterization of the availability of all recycled water supplies, (2) a characterization of the direct recycled water demands of the Parties, (3) identification of project opportunities and the planning and screening criteria to evaluate them, and (4) development of reconnaissance-level engineering design and operating plans. This information could then be used to evaluate, prioritize, and select projects for implementation. To optimize the expansion of recycled water reuse, the Parties 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 and could be led by IEUA, Watermaster, and/or others. 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

The IEUA already performs various efforts to characterize recycled water supply and demand within its service area, including the periodic update of its Integrated Resources Plan (IRP). And, 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 reduce the effort required to implement the scope of work for 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. As such, 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 supply and demands. Following each future assessment, 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. Given its current efforts, the IEUA would be the logical entity to lead the implementation of Activity D on behalf of all Parties in these service areas, but the process could be led by others. In this role, the agency leading the project on behalf of the Parties would: convene the Recycled Water Projects Committee, characterize recycled water demands, identify additional recycled water supplies and conduct discussions with the owners of those supplies, and contract for planning and engineering services as required. Watermaster's role would be to work with project lead, on the implementation of Activity D (1) to review and evaluate the basin management implications of the recycled water projects, including but not limited to compliance with the maximum benefit SNMP and (2) 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:

- 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:

- 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:

- 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:

- 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:

- Prepare final designs and acquire necessary permits for the selected projects.

Years nine and beyond:

- 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 performs various efforts to estimate the recycled water supply and demands of its member agencies and 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 EF

Description of Activity EF

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 (DDW¹⁹).

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*

¹⁹ 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.



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 2010 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 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 EF

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 ($\mu\text{g/l}$), 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 $\mu\text{g/l}$. 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 $\mu\text{g/l}$. 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, CDA, City of Chino, City of Pomona, Monte Vista Water District (MVWD), and JCSD.

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 µg/l was established in 2007. In 2015, the Office of Environmental Health Hazard Assessment (OEHHA) revised the Public Health Goal (PHG²⁰) for perchlorate from 6 µg/l to 1 µg/l, 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 µg/l to equal to or less than 1 µg/l 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 µg/l and not the MCL of 6 µg/l. 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 µg/l (DLR = 4 µg/l). 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 µg/l 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 µg/l.

Hexavalent Chromium. The PHG for hexavalent chromium is 0.02 µg/l. In 2014, the DDW established an MCL of 10 µg/l, 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 µg/l. 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 µg/l. Seven percent of all wells sampled have a concentration above 10 µg/l: 127 of the 141 active municipal supply wells have a detectable concentration of hexavalent chromium, and nine of the

²⁰ 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.



141 active municipal wells exceeded 10 µg/l. Hexavalent chromium is not a widespread compliance issue based on the old 10 µg/l MCL, but compliance could be problematic in the future if the DDW establishes a new MCL less than 10 µg/l.

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 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 EF

The scope of work to develop and implement a *Groundwater Quality Management Plan* consistent with the objectives of Activity EF 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 (QA/QC) 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.²¹ 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

²¹ This scope of work assumes 40 monitoring and private wells will be sampled by Watermaster.



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.

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 EF

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 EF

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

Year one:

- 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:

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

Year three:

- 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:

- 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:

- 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:

- 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:

- 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.



Activity CG

Description of Activity CG

Activities C and G, defined by the stakeholders, are both intended to address the need for infrastructure to optimize the use of water supplies. Activity C defined by the stakeholders is:

Identify and implement regional conveyance and treatment projects/programs to enable all stakeholders to exercise their pumping rights and minimize land subsidence.

Activity G defined by the stakeholders is:

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.

The two activities were combined into Activity CG.

The Parties have identified that there are basin management challenges, such as land subsidence and poor water quality, that could limit the ability to fully exercise their pumping rights using existing infrastructure. The intent of Activity CG is to optimize the use of all sources of water available to the Parties to meet their demands despite these basin management challenges and potentially help to mitigate them.

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

- Enable producers with infrastructure in MZ1 and MZ2 to obtain water through regional conveyance, which supports the management of groundwater levels to reduce the potential for land subsidence and ground fissuring.
- Enable the Parties to increase pumping in areas currently constrained by poor water quality.
- Remove groundwater contaminants from the Chino Basin and thereby improve water quality.
- Protect and/or enhance Safe Yield.
- Maximize the use of existing infrastructure, which will minimize investments in new facilities.
- Provide infrastructure that can also be used to implement Storage and Recovery Programs.

Activity CG 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 the availability of imported and recycled waters throughout the basin. 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.

Early in the development of the PE 3/5 implementation plan, the stakeholders discussed the development of a regional water facilities plan that, when implemented, would enable the Parties to maximize the use of imported water in years when Metropolitan has surplus water and to be able to rely completely on local supplies during years when Metropolitan supplies are low or completely interrupted due to planned or catastrophic outages. This plan involved the construction of new wells and groundwater treatment and regional conveyance improvements; the water produced in this plan would be used exclusively by the Parties. The stakeholders ultimately did not include this plan in the 2000 OBMP IP, preferring at that time to focus on expanding groundwater desalting in the lower Chino Basin, increasing stormwater recharge, and implementing a large-scale recycled water program to maximize its reuse.

The IEUA and its member agencies are currently preparing the *2020 Integrated Water Resources Plan (IRP)*, which will serve as a regional implementation strategy for long-term water resources management



within IEUA’s service area. The objective of the IRP is to ensure that the IEUA’s water supplies over the next 25 years are reliable, cost-effective, and environmentally responsible. The 2020 IRP is in development, and there is a significant body of engineering planning being performed that can be leveraged to accomplish the objectives of Activity CG for all Chino Basin Parties.

Need and Function of Activity CG

In addition to Chino Basin groundwater, the sources of water available to the Parties include:

- Imported water purchased from Metropolitan (through the IEUA and TVMWD) and the San Bernardino Valley Municipal Water District (Valley District).
- Non-Chino Basin groundwater from adjacent groundwater basins, including the Six, Spadra, Cucamonga, Rialto, Lytle, and Riverside Basins.
- Local surface water from San Antonio, Cucamonga, Day, Etiwanda, East Canyon, and Lytle Creeks, and some tunnels and springs located in the San Gabriel Mountains.
- Recycled water from the IEUA and the Los Angeles Sanitation District.

Watermaster periodically compiles the Parties’ future water supply plans. The data collected as part of that process represent the Parties’ best estimates of their demands and associated water supply plans. The most recent effort by Watermaster to characterize the water supply plans was during the development of the *Storage Framework Investigation*.^{22,23} Exhibit CG-1 shows the historical (2015) and projected aggregate water demand and supply plan for all Parties. Total water demand is projected to grow from about 290,000 afy in 2015 to about 420,000 afy by 2040, and increase of about 130,000 afy. The projected growth in water demand by the Appropriative Pool Parties drives the increase in aggregate water demand as some Appropriative Pool Parties are projected to serve new urban water demands created by the conversion of agricultural and vacant land uses to urban uses. Chino Basin groundwater and imported water together make up about 70 percent of the aggregate water supplies of the Parties.

Each of the water sources shown in Exhibit CG-1 has its limitations; they are described below.

Chino Basin groundwater and basin management issues

Chino Basin groundwater is the largest source of supply used to meet the demands of the Watermaster Parties. Exhibit CG-1 shows that Chino Basin groundwater makes up about 40 to 50 percent of the total aggregate supply. Groundwater pumping was about 147,000 afy in 2015 and is projected to increase to about 177,000 afy by 2040, an increase of about 30,000 afy. The ability to produce groundwater from the Chino Basin is limited by current basin management issues, such as ongoing land subsidence in MZ1 and parts of MZ2, pumping sustainability issues in the JCSD and CDA well field areas, and water quality.

Land subsidence. One of the earliest indications of land subsidence in the Chino Basin was the appearance of ground fissures within the City of Chino in MZ1. These fissures appeared as early as 1973, but an accelerated occurrence of ground fissuring ensued after 1991 and resulted in damage to existing infrastructure. The OBMP IP called for a management plan to reduce or abate the subsidence and fissuring problems to the extent that it may be caused by pumping in MZ1. Watermaster has been conducting land

²² The water demand and supply plans developed in 2017 were based in part on 2015 Urban Water Management Plans and updated to 2017 conditions. The Storage Framework Investigation can be found on Watermaster’s website. https://cbwm.syncedtool.com/shares/folder/9abb162877b999/?folder_id=1429

²³ Watermaster is currently compiling future water supply plans for the Safe Yield Recalculation.



subsidence investigations in the Chino Basin since September 2000 to implement PE 4 of the OBMP IP.²⁴ The results of the investigations have indicated that the potential occurrence of pumping-induced land subsidence and ground fissuring is confined to MZ1 and MZ2. Watermaster has defined five specific Areas of Subsidence Concern within MZ1 and MZ2: the Managed Area, Northwest MZ1, Central MZ1, the Northeast Area, and the Southeast Area. Exhibit CG-2 shows the locations of the Areas of Subsidence Concern and recent measurements of land subsidence from 2011 to 2019.

For the Managed Area, Watermaster utilized the results of the land subsidence investigations to develop and implement a Subsidence Management Plan (SMP)²⁵ to minimize the potential for future subsidence and ground fissuring. The SMP established a specific groundwater level at a monitoring well in the Managed Area (the “Guidance Level” at well PA-7 at the Ayala Park Extensometer facility) and recommended that the pumpers with wells in the Managed Area manage their groundwater production such that the groundwater levels at PA-7 remain above the Guidance Level. The main pumpers in the Managed Area are the City of Chino Hills, City of Chino, and State of California. They have voluntarily managed their pumping as recommended in the SMP, and as a result, the rate of land subsidence has declined to de minimis levels within the Managed Area.

Exhibit CG-2 shows that the maximum rate of recent land subsidence from 2011-2019 has occurred in Northwest MZ1. Of particular concern is that the subsidence in Northwest MZ1 has occurred in a pattern of concentrated differential subsidence across the San Jose Fault—the same pattern of differential subsidence that occurred in the Managed Area during the time of ground fissuring in the 1990s. Ground fissuring is the main subsidence-related threat to infrastructure. Exhibit CG-2 also shows the occurrence of subsidence across broad areas in Central MZ1 and the Northeast Area during 2011-2019. Watermaster is monitoring and investigating the relationships between pumping, recharge, groundwater levels and land subsidence in Northwest MZ1, and investigating pumping and recharge strategies to minimize or abate the occurrence of the differential land subsidence. These efforts are being implemented pursuant to the *Work Plan to Develop a Subsidence-Management Plan for the Northwest MZ-1 Area*,²⁶ which is an appendix to the SMP.

The main groundwater producers in Northwest MZ1, Central MZ1, and the Northeast Area are the City of Pomona, the MVWD, Golden State Water Company (GSWC), the City of Chino, and the City of Ontario. Interim work performed in Northwest MZ1 to support the development of a subsidence management plan for this area suggests that land subsidence could be reduced or abated if recharge in Northwest MZ1 is increased by at least 20,000 afy, pumping is decreased by at least 20,000 afy, or some combination of both totaling about 20,000 afy.²⁷ Exhibit CG-3 is a time-series chart of groundwater pumping, wet-water recharge, and land subsidence (represented as negative vertical ground motion) in Northwest MZ1 from 1978-2019. Recent pumping in Northwest MZ1 has decreased significantly: 2017-2019 pumping averaged

²⁴ Detailed information on Watermaster’s land subsidence investigations, the causes of subsidence and ground fissuring, Watermaster’s subsidence management plan for the so-called “Managed Area” in the City of Chino, annual monitoring reports, and ongoing investigations to develop a subsidence management plan for Northwest MZ1 can be found on Watermaster’s website at:

https://cbwm.syncedtool.com/shares/folder/9abb162877b999/?folder_id=1055

²⁵ Chino Basin Watermaster. 2015. *Chino Basin Subsidence Management Plan*. July 2015.

²⁶ Chino Basin Watermaster. 2015. *Work Plan to Develop a Subsidence Management Plan for the Northwest MZ-1 Area*.

²⁷ Chino Basin Watermaster. 2017. *Task 3 and Task 4 of the Work Plan to Develop a Subsidence Management Plan for the Northwest MZ-1 Area: Development and Evaluation of Baseline and Initial Subsidence-Management Alternatives*.



about 12,000 afy compared to about 19,000 afy since the implementation of the OBMP (2001-2016), a reduction of about 7,000 afy. The reduced pumping is mainly due to water quality issues. Additionally, recent wet-water recharge in Northwest MZ1 has increased: 2017-2019 recharge averaged about 15,000 afy compared to about 9,000 afy since the implementation of the OBMP (2001-2016), an increase of about 6,000 afy. Exhibit CG-3 shows that these recent decreases in pumping and increases in recharge, totaling about 13,000 afy, appear to coincide with reduced rates of land subsidence in Northwest MZ1. This suggests that reduced pumping and/or increased recharge can abate land subsidence in Northwest MZ1. If the subsidence management plan for the Northwest MZ1 area recommends a combination of reduced pumping and wet-water recharge to minimize and abate the ongoing land subsidence, the pumpers in this area who elect to reduce pumping in accordance with the plan may have difficulty in fully utilizing their water rights with existing infrastructure.

Pursuant to the Peace Agreement, new land subsidence is considered MPI and would require mitigation. New land subsidence refers to additional land subsidence caused by the reduction of pressure head in the coarse-grain sediments to levels lower than historical lows. Through the Watermaster's recent *Storage Framework Investigation*, a groundwater-elevation metric was defined as a minimum threshold for the occurrence of new land subsidence in MZ1.²⁸ Based on the modeling results of the *Storage Framework Investigation*, new land subsidence is not projected to occur through 2050 in MZ1 under Scenario 1A, which is based on the Parties' best estimates of how future supplies would be used to meet demands. However, the investigation is limited to new land subsidence and does not address ongoing land subsidence in Northwest MZ1.

Pumping sustainability. The term *pumping sustainability*, as used herein, refers specifically to the ability to pump water from a specific well at a desired pumping rate, given the groundwater level at that well and its specific well construction and equipment details. The pumping sustainability metrics for all Appropriator wells were recently updated as part of the *Storage Framework Investigation*. Groundwater pumping at a well is presumed to be sustainable if the groundwater level at that well is greater than the sustainability metric. If the groundwater level falls below the sustainability metric, the owner will either need to lower the pumping equipment in their well or reduce the well's pumping rate. Groundwater levels at wells in the JCSD and CDA well fields and a part of the FWC service area are currently below the pumping sustainability metric and therefore have limited pumping capacity. Exhibit CG-4 shows the projected difference between the groundwater levels and the pumping sustainability metric in FY 2030 for Scenario 1A. Groundwater levels in Scenario 1A are projected to be above the pumping sustainability metric in 2030 over the entire basin except for the areas with existing pumping sustainability issues, identified by the red circles in Exhibit CG-4. This suggests that projected basin operations will not improve nor exacerbate pumping sustainability issues that currently exist in these areas and that the JCSD and CDA well fields and one well in the FWC service area will continue to have limitations on pumping due to groundwater levels.

Water quality. As described for Activity EF, throughout most of the Chino Basin, there are contaminants in groundwater that can limit its direct use for drinking water supply in the absence of treatment. The constantly evolving regulatory environment described under Activity EF, threatens the ability of the Parties to pump groundwater. Some Parties are not, or will not be, able to pump their groundwater rights

²⁸ The metric is based on historical groundwater levels and is represented as a groundwater level control surface throughout MZ1 that defines the likelihood of initiating new subsidence: if groundwater levels are higher than the metric, then new land subsidence would not occur; if groundwater levels fall below the metric, then new land subsidence could occur and cause MPI.



due to the presence of contaminants and the lack of treatment facilities to comply with drinking water standards. For example, the regulatory-required response action for compliance with the new MCL for 1,2,3-TCP is to shut-down pumping at wells with concentrations that exceed the MCL until a treatment plan is implemented.

Exhibit EF-2 shows the locations of active municipal supply wells, symbolized by the number of regulated drinking water contaminants that have been detected in exceedance of their respective primary MCLs. A subset of these wells is currently offline due to these exceedances. According to the interim results from Based on the 2020 IRP, the Parties in the IEUA service area that are impacted by water quality such that some of their production capacity is offline or requires blending are the Cities of Chino, Chino Hills, Upland, and Ontario; the CVWD; the MWVD; and Fontana Water Company. Based on Exhibit EF-2, other Parties that are impacted by water quality and have wells with one or more constituents that exceed an MCL are the City of Pomona, GSWC, JCSO, and Marygold Mutual Water Company. As new drinking water regulations come into effect, additional wells and/or Parties will be impacted if there is no plan to address the contaminants.

Imported water.

Imported water is projected to account for about 20 to 30 percent of the aggregate water supplies of the Parties, as shown in Exhibit CG-1. Imported water demand was about 63,000 afy in 2015 and is projected to increase to about 120,000 afy by 2040, an increase of about 58,000 af. The challenges to imported water include reliability of its supply and infrastructure and the local capacity to treat it for municipal supply.

Supply reliability. In January 2016, Metropolitan completed its *2015 Integrated Resources Plan Update (2015 IRP)*²⁹, which reported that, if the plan is fully implemented, shortages of imported water supplies will occur about nine percent of the time under 2020 conditions, four percent of the time under 2025 conditions, and zero percent under 2030 conditions. “Shortage” is defined herein as Metropolitan’s inability to fully meet its demands. If Metropolitan does not fully implement its 2015 IRP, shortages in Metropolitan supplies are projected to occur about 12 percent of the time under 2020 conditions, and the occurrence of a shortage is projected to increase to 80 percent under 2040 conditions. Therefore, by 2040, Metropolitan is assumed to be able to fully meet its demands 90 percent of the time (nine out of ten years) with the full implementation of its 2015 IRP and 20 percent of the time (one out five years) without it. As of this writing, the implementation of some projects identified in the 2015 IRP, such as the California WaterFix tunnel project, are uncertain. Failure to fully implement the 2015 IRP in a timely manner will result in less imported water available to the Parties.

Infrastructure reliability. Metropolitan is planning to rehabilitate the Rialto Feeder pipeline, and according to its draft schedule, construction will occur from 2029 to 2033. During construction, continuous six- to nine-month shutdowns are planned to occur. Because the Rialto Feeder pipeline is the main source of imported water deliveries to the IEUA and TVMWD, long-term shutdowns will cause significant reductions in water supplies to the Parties and will require them to rely more heavily on Chino Basin groundwater or other supplies during this period.

In addition to planned infrastructure shutdowns, catastrophic events, such as earthquakes, can cause unplanned outages. Metropolitan recently published its three primary goals to contribute to seismic resilience: (1) conducting a Rialto Feeder pipeline alternative supply needs study, (2) completing a re-evaluation of its emergency storage needs, and (3) completing a comprehensive evaluation of its storage

²⁹ Metropolitan. (2016). *Integrated Water Resources Plan: 2015 Update*. January 2016.



programs.³⁰ According to Metropolitan, the latest projections for the worst case scenario under a seismic catastrophic event suggest that the Metropolitan’s East Branch of the SWP, which includes the Rialto Feeder pipeline, can be repaired within 12 to 24 months. This means, that under such an event, the Parties would be required to find alternative sources of water to meet 20 to 30 percent of their total demands for up to two consecutive years.

Capacity limitations. The capacity to treat imported water to meet future municipal supply demands is limited for some Parties in the Chino Basin. The Water Facilities Authority (WFA) treats imported water purchased from the IEUA at the Agua de Lejos treatment plant (WFA plant) and delivers it to the Cities of Chino, Chino Hills, Ontario, and Upland, and the MVWD. Each of these WFA member agencies has a contracted share of the plant’s total capacity of 81 million gallons per day (mgd), which is equivalent to 90,700 afy. The WFA plant’s current capacity is less than its rated capacity of 81 mgd due to solids handling limitations.³¹ According to the WFA, the current capacity of the WFA plant is about 40 mgd in the summer months and about 20 mgd in the winter months. This suggests that even when imported water is available to the WFA, there is a limitation in the ability to treat the water and deliver it for municipal use.

Other supply reliability issues

Other reliability issues that can affect the Parties include:

- Non-Chino-Basin groundwater supplies. Non-Chino-Basin groundwater is projected to account for 16 to 18 percent of the Parties’ aggregate water supplies. This source of water is not available to all the Parties. The reliability of non-Chino-Basin groundwater depends on water quality, water rights, and infrastructure to convey it to a Parties’ water systems.
- Local surface water supplies. Local surface water is projected to account for 3 to 5 percent of the aggregate water supplies of the Parties. This water source is not available to all Parties. The reliability of local surface water depends on the hydrologic characteristics of the individual supplies, water quality, water rights, and infrastructure to convey it from points of diversion to a Party’s water system.
- Recycled water supply. Recycled water is projected to account for about 7 to 8 percent of the aggregate water supplies of the Parties. The challenges to maximizing the reuse of recycled water are described under Activity D and include: timing of recycled water availability, salt and nutrient management, water quality regulations (such as new drinking water standards for emerging contaminants of concern), and direct potable reuse regulations, and the Santa Ana River Judgment.
- Climate change. Climate change is likely to result in higher temperatures, longer dry periods, and shorter more intense wet periods, which can ultimately affect the availability and management of all water supply sources. For example, shorter more intense precipitation periods are expected to result in reduced recharge, and longer dry periods are expected to result in reduced imported water supplies (as occurred with SWP supplies in the recent drought from 2013 to 2016).

Summary

The water demands of the Chino Basin Parties are expected to increase by 44 percent by 2040, and as illustrated above, there are numerous challenges to the reliability of the supplies and the infrastructure that deliver them. Many of the challenges are interrelated and compounding. And, the impacts to individual Parties and associated costs to manage them are not equal. For example, the reliability of

³⁰ Metropolitan. (2018). *Seismic Resilience, First Biennial Report*. February 2018.

³¹ Email from Terry Catlin, April 10, 2018.



imported water (and other non-groundwater supplies) not only affects the imported water supply but also the groundwater supplies that are dependent on imported water for blending. According to draft results from IEUA's 2020 IRP, the Parties that require blending are: the MVWD, CVWD, FWC, and the Cities of Pomona, Upland, Chino, Chino Hills, Ontario.

In the Chino Basin, prolonged reductions in groundwater pumping due to land subsidence, groundwater sustainability, or groundwater contamination have the effect of reducing Safe Yield, potentially contributing to the loss of Hydraulic Control and the spread of contamination. The ability to convey water from areas that are not subject to these limitations to areas that may provide flexibility to the Parties to pump their respective Chino Basin groundwater rights.

Activity CG will require a planning process that will ensure that the recommended infrastructure that results from it will meet the Parties' needs. To do this, the planning process should answer the following questions:

- 1) How do the Parties define reliability? How can this be quantified?
- 2) What is the desired level of reliability? How is it articulated at the regional and individual Party levels? For example, the level of reliability could be articulated as: the ability to meet all or a percentage of the potable water demands of the Parties under a full interruption of SWP supplies delivered by Metropolitan.
- 3) What are the other benefits of optimization desired by the Parties? How can such benefits be quantified?
- 4) What existing/planned infrastructure could be used to optimize the use of all sources of water and how would it be used?
- 5) What new infrastructure would be required to achieve the desired level of reliability and other benefits?
- 6) How would the existing/planned/new infrastructure be operated to achieve the desired level of reliability and other benefits?
- 7) Are the capital and O&M costs of optimization less than the cost to agencies to manage the supply and infrastructure challenges on their own?
- 8) What institutional arrangements are necessary to operate the facilities to achieve the benefits?

As previously mentioned, the IEUA is currently developing the 2020 IRP, which will serve as a regional implementation strategy for long-term water resources management within IEUA's service area. As part of this work, the IEUA retained INTERA to model the existing major infrastructure of the IEUA's service area and develop scenarios to identify opportunities and vulnerabilities in the existing infrastructure of its member agencies. The IRP is in development, and there is a significant body of work being performed by the IEUA and its member agencies that can be leveraged to accomplish the objectives of Activity CG for all of the Parties. The IEUA is also currently conducting preliminary engineering and planning for the CBP, which is a large Storage and Recovery Program to provide regional, dry-year water supplies and associated infrastructure. The project concepts envisioned in the CBP could meet, at least in part, the objectives of Activity CG. Regardless, the work currently in development can be leveraged to reduce the cost of implementing Activity CG.

In order to optimize the use of all sources of water and identify and implement water supply reliability projects, the Parties should convene a Water Supply Reliability Committee for the purposes of accomplishing the objectives of Activity CG for all Parties. The scope of work is described below.

Scope of Work for Activity CG

The scope of work to develop and implement Activity CG consists of six tasks.



- Task 1 – Form the Water Supply Reliability Committee, define objectives, and refine scope
- Task 2 – Characterize water demands, water supply plans, and existing/planned infrastructure and its limitations
- Task 3 – Develop planning, screening, and evaluation criteria
- Task 4 – Describe water supply reliability opportunities
- Task 5 – Develop reconnaissance-level engineering design and operating plan
- Task 6 – Plan, design, build water reliability alternatives

The tasks are described below.

Task 1 – Form the Water Supply Reliability Committee, define objectives, and refine scope. In this task, a Water Supply Reliability Committee will be convened. The Committee’s initial tasks are: (1) to clearly articulate and obtain consensus on the objectives for optimizing the use of all sources of water; (2) to define reliability, benefits, and performance criteria for the Parties; and (3) to refine the preliminary scope of work, schedule, and cost defined for Tasks 2 through 6 to fully leverage the existing data and planning efforts of Watermaster, the IEUA, and others. Four Committee meetings will be conducted to accomplish these tasks. In step (2), the Committee will address the following questions:

- 1) How do the Parties define reliability? How can this be quantified?
- 2) What is the desired level of reliability? How is it articulated at the regional and the individual Party levels?
- 3) What are the other benefits of optimization desired by the Parties? How can such benefits be quantified?

Task 2 – Characterize water demands, water supply plans, and existing/planned infrastructure and their limitations. The objectives of this task are: (1) to characterize the water demands and supply plans of the Parties; (2) to characterize existing/planned infrastructure to convey, treat, and distribute the supplies to meet demands; and (3) to identify opportunities and limitations in the existing/planned infrastructure consistent with the objectives of Activity CG defined in Task 1. The water demands and supply plans will be characterized on a monthly basis for various climate conditions. One committee meeting and one individual meeting with each participating Party will be conducted to review the characterization of water demands and supply plans and existing/planned infrastructure. Two additional meetings will be conducted to identify opportunities and limitations in the existing/planned infrastructure consistent with the objectives of Activity CG defined in Task 1.

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

- Watermaster criteria that include no potential MPI, balance of recharge and discharge, and others;
- qualitative criteria that include institutional complexity and others; and
- quantitative criteria that include business case evaluations, expressed as net present value, unit cost, and others.

Task 4 – Describe water supply reliability opportunities. The objectives of this task include identifying potential water supply reliability project alternatives, screening them using the screening criteria developed in Task 3, and developing project alternatives for detailed evaluation. Three meetings will be conducted to develop a list of potential projects that can be implemented, to review the screening of these projects, and to select projects to evaluate in Task 5. In executing this task, the Committee will address the following questions:



- 4) What existing/planned infrastructure could be used to optimize the use of all sources of water and how would it be used?
- 5) What new infrastructure would be required to achieve the desired level of reliability and other benefits?

Task 5 – Develop reconnaissance-level engineering design and operating plan. The objective of this task is to characterize the performance and costs of the water supply reliability alternatives developed in Task 4. A reconnaissance-level engineering design and operating plan will be developed for each alternative. Each alternative design will include the approximate size, location, and alignment of major infrastructure, and will describe any potential implementation barriers for the project. A cost opinion will be determined for each alternative. This task includes evaluating alternatives based on the alternative evaluation criteria developed in Task 3, describing how the alternative could be implemented and financed, and recommending an alternative for implementation. The deliverable of this task will be a technical report that summarizes the work performed under Tasks 1 through 5, and it will include a plan to pay for the preliminary design and CEQA documentation of the recommended alternative. Five meetings will be conducted to review the design and estimated benefit of the recommended alternative; review the evaluation of the projects, based on the criteria developed in Task 3; and review the recommended list of projects for implementation; review the implementation plan; and review the technical report. In executing this task, the Committee will address the following questions:

- 6) How would the existing/planned/new infrastructure be operated to achieve the desired level of reliability and other benefits?
- 7) Are the capital and O&M costs of optimization less than the cost to agencies to manage supply and infrastructure challenges on their own?
- 8) What institutional arrangements are necessary to operate the facilities to achieve the benefits?

Task 6 – Plan, design, build water reliability alternatives. 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 alternative, (3) preparing the environmental documentation for the recommended alternative and other alternatives that will tier-off the 2020 OBMP Update PEIR, (4) preparing a financial plan for constructing the recommended alternative, (5) preparing final design of the recommended alternative, (6) acquiring permits for constructing and operating the recommended alternative, and (7) constructing the recommended alternative.

Cooperative Efforts with Appropriate Entities to Implement Activity CG

This is a basin-wide activity that involves the Parties, the IEUA, the TVMWD, and the WMWD. Given its current efforts, the IEUA would be the logical entity to lead the implementation of Activity D on behalf of all Parties in these service areas, but the process could be led by others. In this role, the agency leading the project on behalf of the Parties would contract for planning and engineering services as required. Watermaster, TVMWD and WMWD would work with IEUA as needed to support the expansion of the planning efforts to cover non-IEUA member agencies. Watermaster would also participate in the process to ensure that Activity CG implementation is consistent with the Judgment, Peace Agreements and other agreements, and the Watermaster Rules and Regulations.

Implementation Actions, Schedule, and Costs for Activity CG

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



Year one:

- Convene Water Supply Reliability Committee, define reliability and other benefits, and refine scope of work, schedule, and budget (Task 1).

Year two:

- Characterize the water demand, water supply plans, and existing/planned infrastructure and its limitations; and identify conceptual facilities and operational improvements that achieve reliability and other benefits defined in Task 1 (Task 2).
- Develop planning, screening, and evaluation criteria for water supply reliability projects (Task 3).
- Develop water reliability alternatives for evaluation (Task 4).

Year three:

- Conduct reconnaissance-level engineering study for the alternatives (Task 5).

Years four through seven:

- Recommend alternative for implementation (Task 5).
- Prepare final report, documenting work performed in Tasks 1 through 5 (Task 5).
- 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 and provides information for identifying the permits required for construction and operation.
- Prepare environmental documentation for alternatives. CEQA will cover the recommended alternative and other alternatives at the project level, 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 eight and nine:

- Prepare final designs and acquire permits for the selected alternative.

Years ten and beyond:

- Construct recommended alternative.

Exhibit CG-5 shows the estimated budget-level engineering cost to complete Tasks 1 and 2 which is about \$305,000. The cost of Tasks 3 through 6 cannot be estimated until the completion of Task 2. And, because the IEUA is currently conducting its 2020 IRP (the scope of work for which overlaps with scope recommended herein), the cost may be lower than estimated if its work is leveraged.

Some of the facilities and associated operating plans identified under this activity may overlap with those envisioned in Activity EF and/or Activity B. If Activity EF and/or B and CG move forward, there will be cost savings related to facilities planning.



Activity K

Description of Activity K

Activity K defined by the stakeholders is:

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.

The objective of Activity K is to determine if compliance with recycled water recharge dilution requirements, defined in Watermaster and the IEUA's maximum benefit SNMP, can be achieved under existing management plans, and if not, to develop a plan to achieve compliance.

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

- Enable the continued and expanded recharge of recycled water, which will:
 - protect water quality,
 - improve water-supply reliability, especially during dry periods, and
 - protect/enhance Safe Yield.

The 2000 OBMP included PE 7—*Develop and Implement Salt Management Plan*—to characterize current and future salt and nutrient conditions in the basin and to subsequently develop and implement a plan to manage them. Such a management strategy was necessary to address historical salt and nutrient accumulation from agricultural operations and to support the aggressive expansion of recycled water recharge and reuse envisioned in PE 2 and PE 3/5. Recognizing that implementing the recycled water reuse program would require large scale treatment and mitigation of salt loading under the then-current antidegradation objectives for total dissolved solids (TDS) and nitrate, defined in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan), Watermaster and the IEUA petitioned the Regional Board to establish a maximum benefit-based salt and nutrient management plan (maximum benefit SNMP) that involved (1) increasing the TDS and nitrate objectives for the Chino-North groundwater management zone³² (GMZ) to numerically higher values to enable recycled water reuse without mitigation or treatment and (2) committing to a program of salt and nutrient management activities and projects (“maximum benefit commitments”) that ensure the protection of the beneficial uses of the Chino-North GMZ and downgradient water resources (the Santa Ana River and the Orange County GMZ). The maximum benefit commitments included the implementation of a monitoring, analysis, and reporting program to track TDS and nitrate trends; the construction and future expansion of the Chino Basin Desalters to attain Hydraulic Control of the Chino-North GMZ to protect the Santa Ana River; the construction of recharge facilities to increase storm and recycled water recharge; and a commitment to future treatment of recycled water and/or groundwater, as needed, to protect beneficial uses and comply with the maximum benefit TDS and nitrate objectives. These are all activities that were planned to be implemented under the OBMP. The maximum benefit SNMP was incorporated into the Basin Plan in January 2004.

Activity K, as envisioned by the stakeholders, would entail an expansion on the existing analysis requirements in the maximum benefit SNMP to incorporate a forward-looking assessment of the ability to comply with the maximum benefit commitments. It would set up Watermaster and the IEUA to more

³² The Chino-North GMZ has a maximum-benefit TDS objective of 420 mg/l and is a combination of the Chino-1, Chino-2, and Chino-3 antidegradation GMZs that have lower TDS objectives ranging from 250 to 280 mg/l.



proactively prepare a compliance plan as opposed to reacting to a trigger event that requires short-term, time-certain response actions.

Need and Function of Activity K

Maximum benefit SNMP commitments

Implementation of the maximum benefit SNMP is a regulatory requirement of the Basin Plan. It's also incorporated into Watermaster and the IEUA's recycled water recharge program permit (R8-2007-0039) and the IEUA's recycled water discharge and direct reuse permit (R8-2015-0021; NPDES No. CA 8000409). There are nine maximum benefit commitments included in the Basin Plan and recycled water permits:

1. The development and implementation of a surface-water monitoring program
2. The development and implementation of a groundwater monitoring program
3. The expansion of the Chino-I Desalter to 10 million gallons per day (mgd) and the construction of the Chino-II Desalter with a design capacity of 10 mgd
4. The additional expansion of desalter capacity to a total capacity of 40 mgd pursuant to the OBMP and the Peace Agreement
5. The construction of the recharge facilities included in the Chino Basin Facilities Improvement Program
6. The management of recycled water quality to ensure that the IEUA agency-wide, 12-month running average wastewater effluent quality does not exceed 550 mg/l for TDS and 8 mg/l for total inorganic nitrogen (TIN)
7. The management of the basin-wide, volume-weighted TDS and nitrate concentrations of artificial recycled, storm, and imported waters to concentrations that are less than or equal to the maximum benefit objectives as a five-year rolling average
8. The achievement and maintenance of Hydraulic Control of groundwater outflow from the Chino Basin, specifically from the Chino-North GMZ, to protect the water quality of the Santa Ana River and downstream beneficial uses
9. The periodic redetermination of "current" ambient TDS and nitrate concentrations of the Chino Basin GMZs (every three years).

Additionally, Watermaster and the IEUA are required to prepare an annual report to the Regional Board on the status of compliance with the maximum benefit commitments. If the maximum benefit commitments are not met to the Regional Board's satisfaction, the antidegradation objectives would apply for regulatory purposes. The application of the antidegradation objectives would result in a finding of no assimilative capacity for TDS and nitrate in the Chino-North GMZ, and the Regional Board would require mitigation for recycled water discharges to Chino-North that exceed the antidegradation objectives. Furthermore, the Regional Board would require that Watermaster and the IEUA mitigate the effects of discharges of recycled water that took place in excess of the antidegradation objectives under the maximum benefit objectives retroactively to January 2004. The mitigation for past discharges would be required to be completed within a ten-year period following the Regional Board's finding that the maximum benefit commitments were not met.



Current compliance with the recycled water dilution requirements of the maximum benefit SNMP

Commitment number 7 of the maximum benefit SNMP is the stakeholders’ stated focus of Activity K. This commitment defines a compliance limit that if met, allows for the continued recharge of recycled water without mitigation. Hereafter, the limit will be referred to as the “dilution limit.” Commitment number 7 requires that recycled water recharge be limited to the amount that can be blended, on a basin-wide, volume-weighted basis, with other sources of supplemental recharge to achieve five-year running-average concentrations that are less than or equal to the dilution limits. The dilution limits are the maximum benefit objectives: 420 mg/l for TDS and 5 mg/l for nitrate (as nitrogen). If the five-year, volume-weighted TDS or nitrate concentrations (hereafter, dilution metrics) exceeds the dilution limits, then Watermaster and the IEUA must develop a plan to come into compliance. Compliance options could include, but are not limited to, increasing the recharge of low-salinity supply sources (storm or imported waters), desalting recycled water to reduce salinity, or desalting groundwater as a salt offset.

Watermaster and the IEUA annually analyze and report on “current” compliance with the dilution limit as part of the *Chino Basin Maximum Benefit Annual Report*. The most recent annual report was submitted to the Regional Board in April 2019 and reported on compliance through December 2018.³³ Exhibits K-1 and K-2 are time-series charts that characterize compliance with the dilution limit since the recycled water recharge program began in 2005. The exhibits show the monthly recharge volumes and TDS and nitrate concentrations of each recharge source, the dilution metrics, and the dilution limits. Note that because recycled water recharge began in July 2005, the first five-year period for which the dilution metric was computed was July 2005 through June 2010.

Exhibits K-1 and K-2 illustrate that the TDS and nitrate dilution limits have never been exceeded. From June 2010 to December 2016, the TDS dilution metric increased from about 203 to 354 mg/l. During the same period the nitrate dilution metric increased from 1.1 to 3.0 mg/l. After December 2016, the TDS and nitrate dilution metrics decreased to 281 mg/l and 2.0 mg/l, respectively. As of 2018, the five-year, volume-weighted TDS dilution metric was 139 mg/l less than the dilution limit, and the nitrate dilution metric was 3 mg/l below the dilution limit.

Threats to compliance with the dilution limits

As suggested by Exhibit K-1, the primary threats to compliance with the TDS dilution limit are the availability of imported and storm waters for recharge. Increases in the TDS concentration of recycled water are also a threat to compliance. The threat of exceeding the nitrate dilution limit is far less given that the nitrate concentration of the recycled water recharge is typically less than the nitrate dilution limit of 5 mg/l.

Imported water is a low-TDS source of recharge and has an important influence on the dilution metric. As shown in Exhibit K-1, the TDS concentration of imported water used for recharge ranged from 87 to 367 mg/l. In mid-2016, the rate of increase of the TDS dilution metric rose significantly from about 1.3 mg/l per month to 12 mg/l per month through October 2016 when the metric peaked at 354 mg/l. In October 2016, the five-year dilution metric calculation included almost no imported water recharge: the last significant period of imported water recharge occurred in May through September of 2011 (3,700 to 7,800 af). After peaking in October 2016, the dilution metric for TDS began to decrease and stabilize due to a large imported water recharge event that occurred from October 2016 through January 2018 (46,000 total af).

³³ WEI. (2019). *Optimum Basin Management Program Chino Basin Maximum Benefit Annual Report 2018*. April 2019.



A similar trend was observed for the dilution metric for nitrate, as shown in Exhibit K-2. These observations demonstrate the importance of imported water recharge to compliance with the dilution metric.

Stormwater is a more consistent source of recharge, but it occurs in smaller volumes than imported water recharge. Over the most recent five-year period (January 2014 to December 2018), the total volume of stormwater recharge was 39,000 af compared to 47,000 af of imported water. And, while stormwater TDS concentrations are typically low in the wet winter months (50 to 150 mg/l), the TDS of dry-weather flows diverted to recharge in summer months are typically greater than 300 mg/l. The implementation of the 2013 RMPU is expected to increase the annual average stormwater recharge volume, but even with increased recharge capacity, multiyear drought conditions with limited stormwater recharge opportunities could lead to compliance challenges.

During drought conditions there is: a reduction in the amount of high-quality stormwater recharge; limited or no availability of imported water for recharge; an increase in the TDS concentrations of imported water, if it is available for recharge; and a concomitant increase in the TDS concentrations of the recycled water. Not only are the two primary sources of low-TDS water less available during drought periods, but the source water quality of municipal water supplies is also higher in TDS due to increases in imported water TDS and indoor water conservation practices. Exhibit K-1 shows the influence of the most recent statewide drought, which occurred over 2013 to 2016, on the dilution metric. During this time the dilution metric for TDS steadily increased from about 210 mg/l to 350 mg/l. This analysis demonstrates the meaningful impact that drought has on compliance with the dilution metric and indicates that climate change, which is expected to result in longer, drier droughts, could potentially threaten future compliance with the dilution limit.

Other maximum benefit SNMP compliance challenges

There are other metrics in the maximum benefit SNMP commitments that would require the evaluation of potential salt offset projects to achieve compliance. Commitment number 6 requires that when the IEUA's agency-wide, 12-month, running-average recycled water effluent TDS concentrations exceeds 545 mg/l for three consecutive months or the TIN concentrations exceeds 8 mg/l in any one month, Watermaster and the IEUA must submit a water quality improvement plan and schedule to the Regional Board. The plan must demonstrate how the 12-month running-average IEUA agency-wide recycled water effluent will remain in compliance with its discharge permit limits of 550 mg/l and 8 mg/l for TDS and TIN, respectively.

Exhibit K-3 shows the monthly and 12-month running-average IEUA agency-wide effluent TDS and TIN concentrations for 2005 through 2018. In 2015, the 12-month running-average IEUA agency-wide TDS concentration in recycled water approached the 545 mg/l action limit that would require the IEUA and Watermaster to submit a water quality improvement plan and schedule. In analyzing the available data, the IEUA determined that the primary drivers for the increasing recycled water TDS concentration were the increase in the TDS concentration of the water supplies used by its member agencies and an increase of the TDS waste increment from indoor water conservation.

Although the 12-month running-average IEUA agency-wide TDS concentration declined from the 2015 peak before reaching the 545 mg/l action limit, it was an important indicator that the TDS concentration of recycled water is likely to approach or exceed the recycled water compliance limit during the next prolonged dry period and require the planning for recycled water quality improvements. In May 2017, recognizing the potential cost of implementing recycled water quality improvements for what might be only short-term exceedances of the 545 mg/l action limit, Watermaster and the IEUA petitioned the Regional Board to consider updating the maximum benefit SNMP to incorporate a revised 12-month compliance metric for recycled water effluent (commitment number 6) specifically to allow a longer-term



averaging period. The Regional Board agreed that an evaluation of the recycled water compliance metric is warranted and directed Watermaster and the IEUA to develop a technical scope of work to demonstrate the potential impacts of the revised compliance metric. The work began in September 2017 and is ongoing as of the writing of this Scoping Report. If the investigation finds that changing the recycled water compliance metric will not impact beneficial uses in the Chino Basin or cause downgradient water supplies to exceed water quality objectives, then it is likely that the alternative recycled water compliance metric will be approved. If approved, the Regional Board would amend the Basin Plan and the IEUA’s permits to incorporate the revised maximum benefit commitments.

The primary objectives of the technical work to support the maximum benefit SNMP and permit updates are: to develop and use an updated groundwater solute transport model to evaluate the TDS and nitrate concentrations of the Chino Basin, to define alternative salinity management scenarios, and to project the future TDS and nitrate concentrations of the Chino Basin for each scenario. The results will be used to develop a regulatory compliance strategy that includes a longer-term average period for recycled water TDS concentrations that is acceptable to the Regional Board. The Regional Board has indicated that in accepting a proposal to modify the recycled water compliance limit, it will require Watermaster and the IEUA to add a new maximum benefit commitment to the Basin Plan that involves updating the TDS and nitrate projections every five years.

The compliance approach being pursued by Watermaster, the IEUA, and the Regional Board illustrates that the Regional Board may be willing to consider adopting an alternative dilution metric—e.g. a longer averaging period—for recycled and supplemental water recharge so long as there are no unmitigated impacts to beneficial uses. The work that is being performed to support the maximum benefit SNMP update can be directly leveraged to achieve the objective of Activity K.

Process required to evaluate potential future dilution compliance challenges

To achieve the objective of Activity K, it is necessary to prepare projections of the dilution metric to evaluate potential compliance challenges and to determine if and when it will be necessary to develop a plan to achieve compliance. The table below summarizes the planning data that are needed to prepare such projections and the existing Watermaster or IEUA programs that produce the planning data.³⁴

Planning Data	Existing Watermaster and IEUA Efforts that Compile or Produce the Required Planning Data
Recycled water recharge volumes	Projections prepared through the RMPU process, the Recycled Water Program Strategy, and other efforts.
Recycled water quality	There is no current effort to prepare this projection at the requisite level of detail on a regular basis, but it can be calculated from projections of water supply quality; such a projection was just completed to support the maximum benefit SNMP update.
Imported water recharge volumes	Projections prepared through the RMPU process.

³⁴ Some additional planning data not listed here would also be required to run the Chino Basin Groundwater Model, which is updated and recalibrated at least every five years.



Planning Data	Existing Watermaster and IEUA Efforts that Compile or Produce the Required Planning Data
Imported water recharge quality	There is no current effort to prepare this projection at the requisite level of detail, but it can be estimated based on historical data; such a projection was just completed to support the maximum benefit SNMP update.
Stormwater recharge volumes	Projections prepared through the RMPU process.
Stormwater recharge quality	Estimates can easily be produced based on historical data.
Groundwater supply volumes	Water supply plans of the Parties are compiled at least once every five years for various Watermaster and IEUA efforts.
Groundwater supply quality	There is no current effort to prepare this projection at the requisite level of detail, which requires the use of a numerical groundwater solute transport model; such a model was just built to support the maximum benefit SNMP update and is being used to prepare groundwater quality projections.
Other water supply volumes	Water supply plans of the Parties are compiled at least once every five years for various Watermaster and IEUA efforts.
Other water supply quality	There is no current effort to prepare this projection at the requisite level of detail, but it can be estimated based on historical data; such a projection was just completed to support the maximum benefit SNMP update.

The planning data would be used to prepare projections of: municipal water supply and quality, imported water quality, recycled water quality, groundwater quality, and ultimately the TDS and nitrate dilution metrics. The projections would be done assuming a range of future cultural conditions (land use changes, population growth, etc.) and climate conditions. These projections would be analyzed to produce best-case and worst-case five-year, ten-year, 15-year, and 20-year recharge projections for imported and storm waters. The best- and worst-case projections of the dilution metric would be appended to the historical record to produce a bracketed series of dilution metric time histories to evaluate the risk of exceeding the dilution metric over a range of potential climate conditions in the short (5-year) and long (20-year) term.

If there is no projected compliance challenge in the next five to ten years, then no additional work would be needed to develop a compliance plan. It would be necessary to update the planning data and modeling tools to evaluate projections at a minimum of every five years. A five-year frequency is consistent with the State Board’s 2018 amendments to the SNMP guidelines within its Recycled Water Policy.³⁵

If a compliance challenge is projected, then it will be necessary to develop a plan to ensure compliance with the blending metric in the future. As previously noted, the compliance plan could include treatment

³⁵ The *Water Quality Control Policy for Recycled Water* is available at: https://www.waterboards.ca.gov/water_issues/programs/water_recycling_policy/



of the recycled water, increased recharge of high-quality imported water and/or stormwater, increase in groundwater desalting as a salt offset, or an update to the maximum benefit SNMP to change the compliance metric to a longer averaging period. For the latter, it would first be necessary to demonstrate to the Regional Board that a change to the compliance metric will not harm beneficial uses.

Alignment of Activity K with the current investigation to support the update to the maximum benefit SNMP

All of the above steps to analyze compliance challenges with the dilution metric are currently being performed in support of the update to the maximum benefit SNMP. Watermaster and the IEUA anticipate that the compliance strategy for the SNMP update will be finalized during FY 2020/2021. When completed the potential compliance challenges with the dilution limit will be known and a range of compliance plans will have been evaluated at a conceptual level. Thus, it may not be necessary to perform any work pursuant to Activity K, unless it is determined that some form salt offset is required. If no compliance challenges arise, or remain at the completion of the SNMP update, no significant work would need to be performed pursuant to Activity K for at least five years. If a salt offset is required, Watermaster and the IEUA would need to begin reconnaissance-level engineering planning in FY 2021/22.

Summary

In order to achieve the objectives of Activity K to ensure the ability to comply with the maximum benefit SNMP dilution metric in the future, Watermaster and the IEUA should expand the existing analysis and reporting efforts to periodically (every five-years), prepare future projections of recharge volumes and quality to determine if there is a compliance challenge, and if necessary, evaluate compliance alternatives. Projections of the dilution metric and an evaluation of compliance challenges in the future are currently being developed for the investigation to support the update to the maximum benefit SNMP described above. The scope of work to implement Activity K can leverage that work.

Scope of Work for Activity K

The scope of work to achieve the objectives of Activity K—*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*—consists of five tasks:

- Task 1 – Prepare projection to evaluate compliance with recycled water dilution requirements
- Task 2 – Identify alternative compliance strategies
- Task 3 – Evaluate alternative compliance strategies
- Task 4 – Implement the alternative compliance strategy
- Task 5 – Periodically reevaluate compliance with dilution requirements

Task 1 – Prepare projection to evaluate compliance with recycled water recharge dilution requirements. The objective of this task is to prepare projections of compliance with the dilution metric for TDS and nitrate in the maximum benefit SNMP and determine if there is a compliance challenge in the future. In this task, all planning data will be compiled, Watermaster’s groundwater solute transport model will be updated and used to estimate future groundwater and recycled water quality, and projections of the dilution metric will be prepared. The planning data will be used to evaluate the dilution metric for best-case and worst-case recharge conditions over a twenty-year period. If there are no projected compliance challenges within the next five years, then Tasks 2 through 4 will not need to be performed. If there is a compliance challenge within the next five years, then Tasks 2 through 4 will need to be performed. Task 5 would be performed regardless of the outcome.



Task 2 – Identify alternative compliance strategies. The objective of this task is to identify potential alternative compliance strategies to address foreseeable challenges with complying with the dilution limit in the future. This task includes the following subtasks:

- Develop planning, screening, and evaluation criteria for projects to comply with the maximum benefit SNMP dilution limit.
- Identify potential alternative compliance strategies.
- Perform initial screening of the alternative compliance strategies based on the evaluation criteria.
- Select alternative compliance strategies to evaluate in Task 3.

Task 3 – Evaluate alternative compliance strategies. The objective of this task is to characterize the performance and costs of the alternative compliance strategies defined in Task 2. A reconnaissance-level engineering design and operations will be developed for each alternative. The reconnaissance-level engineering work will include a description of the activity, description of facilities (if required), its ability to comply with the dilution limits, its impact on the TDS and nitrate concentrations of the Chino Basin, and the estimated cost to implement the project alternatives. The projects will be evaluated and ranked based on the criteria developed in Task 2, and an alternative compliance strategy will be selected. The deliverable for this task will include a technical document that describes the reconnaissance-level engineering design and operations, the selected alternative compliance strategy, and the scope of work and cost estimate to implement the selected alternative compliance strategy.

Task 4 – Implement the alternative compliance strategy. The objective of this task is to implement the selected alternative compliance strategy. This task includes (1) developing and implementing necessary agreements between participating Parties; (2) preparing a Basin Plan amendment, if necessary; (3) preparing preliminary designs of the recommended projects; (4) preparing the environmental documentation for the recommended projects (this will tier-off from the 2020 OBMP Update PEIR); (5) preparing financial plans to construct the recommended projects; (6) preparing final designs of the recommended projects; (7) acquiring necessary permits for constructing and operating the recommended projects; and (8) constructing the recommended projects.

Task 5 – Periodically re-evaluate compliance with dilution requirements. The objective of this task is to proactively evaluate future compliance with the maximum benefit SNMP recycled water dilution limit to address any foreseen compliance challenges. The task includes two efforts:

- (1) Prepare projections of the dilution metric on a five-year frequency. This includes updating the model, collecting planning data, preparing the requisite projections (see Task 1), and evaluating if there is a compliance challenge. If it is determined that there is a compliance challenge, then Tasks 2 through 4 will be performed. If it is determined that there is not a compliance challenge, this evaluation will be redone in another five years.
- (2) Annually report on current and future compliance with the dilution limit. Annual reporting of current compliance with the dilution metric is already done in the Chino Basin Maximum Benefit Annual Reports. This task would simply involve expanding that reporting discussion to include a comparison of the current dilution metric to the bracketed projections of the dilution metric prepared in Task 1. If the current dilution metric suggests there is a potential compliance challenge that was not predicted by Task 1, Watermaster and the IEUA would initiate a process to determine if additional evaluation of compliance alternatives is warranted.

Cooperative Efforts with Appropriate Entities to Implement Activity K

As co-permittees to the maximum benefit SNMP and recycled water recharge program, this activity involves Watermaster and the IEUA. Similar to the existing implementation of the maximum benefit



SNMP, Watermaster would lead the technical and reporting efforts, and any engineering planning work would be led by IEUA.

Implementation Actions, Schedule, and Costs for Activity K

As previously described, all the work required in Task 1 is currently being performed as part of Watermaster and the IEUA's investigation to support an update to the maximum benefit SNMP to change the recycled water TDS compliance metric to a longer averaging period. Watermaster and the IEUA anticipate that the work to update the compliance strategy for the maximum benefit SNMP will be completed during FY 2020/21. When completed the potential compliance challenges with the dilution limit will be known, and a range of compliance plans will have been evaluated at a conceptual level. Thus, it may not be necessary to perform any work pursuant to Activity K unless it is determined that some form salt offset project is required to address near-term compliance challenges. If no compliance challenges are identified or are resolved through the completion of the SNMP update, no significant work would need to be performed pursuant to Activity K for at least five years. If a salt offset project is required to address anticipated near-term compliance challenges, Watermaster and the IEUA will need to begin reconnaissance-level engineering planning in FY 2021/22 (Tasks 2 through 4).

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

Year one:

- Wait for Watermaster and the IEUA to complete the maximum benefit SNMP update.

Year two:

- Identify alternative compliance strategies, if needed (Task 2).
- Start the evaluation of alternative compliance strategies, if needed (Task 3).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year three:

- Complete the evaluation of alternative compliance strategies, if needed (Task 3).
- Select preferred compliance plan and begin preparing implementation agreements, if needed (Task 4).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year four:

- Begin implementation the of compliance plan, if needed (Task 4).
- Report the annual dilution metric compared to dilution limits and projections (Task 5).

Year five and beyond:

- Reevaluate compliance with dilution requirements every five years (Task 5).

Exhibit K-4 shows the estimated budget-level engineering cost to complete Tasks 1 through 5. Given the ability to leverage the existing work being performed by Watermaster and the IEUA, there is no cost (\$0) to perform Task 1. A cost estimate for Task 2 through 4 cannot be prepared because the outcome of the SNMP update is not yet known. It is premature to estimate the cost for performing the five-year update of the projections in Task 5, and there is no increased cost to performing the additional recommended annual reporting.



Activity L

Description of Activity L

Activity L defined by the stakeholders is:

Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance.

The objective of Activity L is to refine the monitoring and reporting requirements of Watermaster to ensure that the objectives of each requirement are being met efficiently at a minimum cost. Through the listening session process, the stakeholders identified the following desired outcomes for Activity L:

- Ensure full compliance with regulatory requirements.
- Ensure full support of basin management initiatives.
- Enable the Parties to monitor the performance of the OBMP IP and related Court orders and regulatory obligations.
- Ensure cost efficiency.

The OBMP IP included PE 1 – *Develop and Implement Comprehensive Monitoring Program*. PE 1 was included in the OBMP to provide the information necessary to support the implementation of all other OBMP program elements and to evaluate their performance. The types of monitoring programs called for by PE 1 in the OBMP IP included:

- Groundwater-level monitoring
- Groundwater-quality monitoring
- Groundwater-production monitoring
- Surface-water discharge and quality monitoring (including managed artificial recharge)
- Ground-level monitoring
- Well construction, abandonment, and destruction

Activity L has identical objectives and desired outcomes to those of PE 1 because Watermaster continues to need data and information to comply with regulations, to fulfill its obligations under its agreements and Court orders, to comply with its requirements under CEQA, and to assess the performance of the evolving OBMP IP, including the 2020 OBMP Update. Financial resources to conduct these monitoring and reporting programs are limited, so through Activity L, the Parties desire to ensure cost efficiency in Watermaster’s monitoring and reporting programs.

Need and Function of Activity L

Watermaster monitoring and reporting programs

Data and information acquired in Watermaster’s monitoring and data-collection programs are used to prepare reports and data deliverables that are required by regulations and Watermaster’s obligations under its agreements, Court orders, and CEQA. The table below is a list of each Watermaster monitoring and reporting requirement and the regulatory entities that require the monitoring and reporting.



Monitoring and Reporting Requirement	Regulatory Entity					
	Court	State Board	Regional Board	California DFW	California DWR	CEQA
Water Rights Compliance Annual Report		X		X		
SGMA Annual Report for Adjudicated Basins					X	
Biannual Evaluation of the Cumulative Effect of Transfers	X					
Biannual Evaluation of the Balance of Recharge and Discharge	X					
Annual Finding of Substantial Compliance with the Recharge Master Plan	X					
Annual Report of Compliance with SB 88 and SWRCB Regulations for Measurement and Reporting of Diverted Surface Water		X				
Safe Yield Recalculation	X					
Recharge Master Plan Update (RMPU)	X					
State of the Basin Report	X					
California Statewide Groundwater Elevation Monitoring Program (CASGEM)					X	
Chino Basin Maximum Benefit Annual Report			X			
Annual Report of the Prado Basin Habitat Sustainability Committee						X
Water Recycling Requirements for the Chino Basin Recycled Water Groundwater Recharge Program			X			
Annual Report of the Ground-Level Monitoring Committee	X					
OBMP Semi-Annual Status Reports	X					

Exhibit L-1 is a comprehensive description of each monitoring and reporting requirement listed in the table above, the associated data types required to meet the reporting requirement, the data analyses performed, the reporting content, and past efforts by Watermaster to reduce the scope and cost of the monitoring and/or reporting requirements.

The scope of the monitoring programs under PE 1 have evolved over time to satisfy new requirements associated with regulations and Watermaster obligations under its agreements, Court orders, and CEQA. In some instances, the monitoring programs have expanded to satisfy new basin-management initiatives and regulations. In some instances, the scope of the monitoring programs has been reduced with periodic reevaluation and redesign to achieve the monitoring objectives with reduced cost.



The following summarizes each of Watermaster’s existing monitoring and data-collection programs. Watermaster compiles, checks, and stores the data collected under most of these programs in a centralized environmental database. The database and the database-management procedures ensure the quality and accuracy of the data, allow for efficient data exploration and analysis, and include standardized reports and data exports in formats for regulatory data deliverables or further analysis (e.g. creation of model input files).

Groundwater-production monitoring. Since 1978, Watermaster has collected information to estimate total groundwater production from the Chino Basin. Watermaster uses groundwater-production data to quantify and levy assessments pursuant to the Judgment. Estimates of production are also essential inputs to recalibrate Watermaster’s groundwater flow model, which is used to inform redeterminations of the Safe Yield of the Chino Basin, evaluate the state of Hydraulic Control, perform MPI assessments, and support many other Watermaster initiatives. The Watermaster Rules and Regulations require groundwater producers that produce in excess of 10 afy to install and maintain meters on their well(s). Well owners that pump less than 10 afy are considered “Minimal Producers” and are not required to meter or report to the Watermaster. Exhibit L-2 depicts the groundwater-production monitoring program as of 2018. Members of the Appropriative and Overlying Non-Agricultural Pools and CDA record their own meter data and submit them to Watermaster staff on a quarterly basis. For Agricultural Pool wells, Watermaster performed a well-metering program to equip Agricultural Pool wells with in-line flow meters, where feasible. Watermaster staff visit and record production data from the meters at these wells on a quarterly basis. For the remaining unmetered Agricultural Pool wells, including Minimal Producer wells, Watermaster applies a “water duty” method to estimate their production on an annual basis. Watermaster continues its efforts to implement the well-metering program and improve its methods to estimate pumping at un-metered wells.

Groundwater-level monitoring. Watermaster’s groundwater-level monitoring program supports many Watermaster management functions, including: the periodic assessment of Safe Yield, groundwater model development and recalibration, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, subsidence management, MPI assessments, estimation of storage change, other scientific demonstrations required for groundwater management, and many regulatory requirements, such as the demonstration of Hydraulic Control and the triennial recomputation of ambient water quality. The wells within the southern portion of the basin were selected for inclusion in the monitoring program to assist in Watermaster’s analyses of Hydraulic Control, land subsidence, desalter impacts to private well owners, and riparian vegetation in the Prado Basin. The density of groundwater-level monitoring near the CDA well fields is greater than in outlying areas because hydraulic gradients are expected to be steeper near the CDA well fields, and these data are needed to assess the state of Hydraulic Control. In FY 2017/2018, about 1,300 wells comprised Watermaster’s groundwater-level monitoring program. Exhibit L-3 depicts the groundwater-level monitoring network of wells. At about 1,050 of these wells, well owners measure water levels and provide data to Watermaster. These well owners include municipal water agencies, private water companies, the California Department of Toxic Substance Control (DTSC), the County of San Bernardino, and various private consulting firms. The remaining 250 wells are private or dedicated monitoring wells that are mostly located in the southern portion of the Basin. Watermaster staff measures water levels at these wells once a month or with pressure transducers that record water levels once every 15 minutes. Wells monitored by transducers were preferentially selected to support Watermaster’s monitoring programs for Hydraulic Control, Prado Basin habitat sustainability, land subsidence, and others where such high-frequency data are necessary to fulfill program objectives. To continue to support assessments of Hydraulic Control, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.



Groundwater-quality monitoring. The Watermaster’s groundwater-quality monitoring program supports compliance for two maximum benefit commitments: the triennial ambient water quality recomputation and the analysis of Hydraulic Control. Groundwater-quality data are also used for Watermaster’s biennial State of the Basin report, to support ground-water modeling, to characterize non-point source contamination and plumes associated with point-source discharges, to characterize groundwater/surface-water interactions in the Prado Basin area, and to characterize basin-wide trends in groundwater quality. Exhibit L-4 depicts the groundwater-quality monitoring network of wells. The groundwater-quality monitoring program relies on municipal producers, government agencies, and others to supply groundwater-quality data on a cooperative basis. Watermaster supplements these data through its own sampling and analysis program at private wells and monitoring wells in the area generally south of State Route 60. These wells include:

- **Private Wells:** Watermaster collects groundwater quality samples at about 85 private wells, located predominantly in the southern portion of the Basin. The wells are sampled at various frequencies based on their proximity to known point-source contamination plumes. 77 wells are sampled on a triennial basis, and eight wells near contaminant plumes are sampled on an annual basis.
- **Watermaster/IEUA Monitoring Wells:** Watermaster collects groundwater quality samples at 22 multi-nested monitoring sites located throughout the southern Chino Basin. There is a total of 53 well casings at these sites. These include nine HCMP monitoring sites constructed to support the demonstration of Hydraulic Control, nine sites constructed to support the Prado Basin Habitat Sustainability Program (PBHSP), and four sites that fill spatial data gaps near contamination plumes in MZ3. Each nested well site contains up to three wells in the borehole. The HCMP and MZ3 wells are sampled annually. The PBHSP wells are sampled quarterly to triennially.
- **Other Wells:** Watermaster collects samples from four near-river wells quarterly. The data are used to characterize the interaction of the Santa Ana River and groundwater in this area. These shallow monitoring wells along the Santa Ana River consist of two former USGS wells and two Santa Ana River Water Company wells.

For the period 2013 to 2018, water quality data were obtained from a total of 1,357 wells within and adjacent to the Chino Basin. Of those, 650 wells were sampled during FY 2017/2018. To continue to support the triennial ambient water quality recomputation, and other analyses, it is anticipated that new monitoring wells will need to be constructed to replace the currently monitored private wells that will be lost as land is converted from agricultural uses to urban uses.

Surface-water and climate monitoring. Watermaster’s surface-water and climate monitoring program supports many Watermaster management functions, including: groundwater model development and recalibration, the periodic assessment of Safe Yield, evaluating the cumulative impacts of transfers and the balance of recharge and discharge, MPI assessments, recharge master planning, the PBHSP, compliance with the recycled-water recharge permit, and the maximum benefit program, among others. Exhibit L-5 depicts the surface-water and climate monitoring network of surface-water discharge sites and atmospheric monitoring stations. Much of these data are collected from publicly available datasets, including POTW discharge data, USGS stream gaging station data, and precipitation and temperature data measured at public weather stations or downloaded from spatially gridded datasets. Watermaster collects stormwater, imported water, and recycled water recharge data from the IEUA. Watermaster also collects quarterly surface-water quality samples from two sites along the Santa Ana River to support the Maximum Benefit program.



Ground level monitoring. The Watermaster’s ground-level monitoring program is conducted pursuant to the Chino Basin Subsidence Management Plan. The objective of the plan is to minimize or abate the occurrence of land subsidence and groundwater fissuring within the Chino Basin. Exhibit L-6 depicts the ground-level monitoring program, which is focused across the western portion of Chino Basin within defined Areas of Subsidence Concern—areas of Chino Basin that are susceptible to land subsidence. The ground-level monitoring program consists of the following:

- Watermaster conducts high-frequency, piezometric level monitoring at about 60 wells as part of its ground-level monitoring program. A pressure-transducer/data-logger is installed at each of these wells and records one water-level measurement every 15 minutes. Data loggers also record depth-specific piezometric levels at the piezometers located at Watermaster’s Ayala Park Extensometer and Chino Creek Extensometer facilities once every 15 minutes.
- Watermaster installed two extensometers in the MZ1 Managed Area to support the MZ1 Interim Monitoring Program and two extensometers in the Southeast Area understand the effects of pumping at the newly constructed Chino Creek Well Field. Both extensometer facilities record the vertical component of aquifer system compression and expansion once every 15 minutes, synchronized with the piezometric measurements, to understand the relationships between piezometric changes and aquifer-system deformation.
- Watermaster monitors vertical ground-motion via traditional elevation surveys at benchmark monuments and via remote sensing (InSAR) techniques established during the IMP. Elevation surveys are typically conducted in the MZ1 Managed Area, Northwest MZ1 Area, Northeast Area, and Southeast Area once per year. Vertical ground-motion data, based on InSAR, are collected about every two months and analyzed once per year.
- Watermaster monitors horizontal ground-surface deformation across areas that are experiencing differential land subsidence to understand the potential threats and locations of ground fissuring. These data are obtained by electronic distance measurements (EDMs) between benchmark monuments in two areas: across the historical zone of ground fissuring in the MZ1 Managed Area and across the San Jose Fault Zone in Northwest MZ1.

Watermaster convenes a Ground-Level Monitoring Committee (GLMC) annually to review and interpret data from the ground-level monitoring program. The GLMC prepares annual reports that include recommendations for changes to the monitoring program and/or the Subsidence Management Plan, if such changes are demonstrated to be necessary to achieve the objectives of the plan.

Biological monitoring. The Watermaster’s biological monitoring program is conducted pursuant to the adaptive monitoring program (AMP) for the Prado Basin Habitat Sustainability Program (PBHSP). The objective of the PBHSP is to ensure that groundwater-dependent riparian habitat in Prado Basin will not incur unforeseeable significant adverse effects due to implementation of the Peace II Agreement. Exhibit L-7 depicts the Riparian Habitat Monitoring Program (RHMP) for the PBHSP. It produces a time series of data and information on the extent and quality of the riparian habitat in the Prado Basin over a historical period that includes both pre- and post-Peace II implementation. Two types of monitoring and assessment are performed: regional and site-specific. Regional monitoring and assessment are appropriate because the main potential stress associated with Peace II activities is the regional drawdown of groundwater levels. The intent of site-specific monitoring and assessment is to verify and complement the results of the regional monitoring.

- Regional monitoring of riparian habitat: Regional monitoring and assessment of the riparian habitat is performed by mapping the extent and quality of riparian habitat over time using: (i)



multi-spectral remote-sensing data, Normalized Difference Vegetation Index (NDVI), and (ii) air photos.

- Site-specific monitoring of riparian habitat: Site-specific monitoring performed in the Prado Basin includes field vegetation surveys and seasonal ground-based photo monitoring. The most current vegetation survey conducted for the PBHSP was performed by the United State Bureau of Reclamation (USBR) in 2016, consisting of 38 sites in the Prado Basin: 24 previously established USBR sites and 14 new sites primarily located near the PBHSP monitoring wells.

Watermaster convenes the Prado Basin Habitat Suitability Committee (PBHSC) annually to review and interpret data from the RHMP. The PBHSC prepares annual reports that include recommendations for RHMP and other monitoring for the PBHSP, if such changes are demonstrated to be necessary to achieve the objectives of the PBHSP.

Water-supply and water-use monitoring. Watermaster compiles water supply and use data from the Parties to support two required reporting efforts: the Watermaster Annual Report to the Court and annual reporting requirements for adjudicated basins pursuant to the Sustainable Groundwater Management Act (SGMA). Monthly water use volumes for supply sources other than Chino Basin groundwater are collected from the Parties; this includes groundwater from other basins, recycled water, imported water, and native surface water. This data is collected and compiled twice per year to support fiscal year reporting for the Annual Report and water year reporting for the SGMA.

Planning information. Watermaster periodically compiles future water supply plans from the Parties. The data collected as part of that process represents the Parties' best estimates of their demands and associated water supply plans and are used for future planning investigations (e.g. Safe Yield recalculations and recharge master plan updates). The data collected includes:

- Water supply plans of the Watermaster Parties, including:
 - i. Projected total water demand
 - ii. Projected amount of each water supply by source to meet the projected water demand
 - iii. Monthly distribution of demand and water supplies used to meet the demand
 - iv. Projected groundwater pumping at each currently active well and future planned wells
 - v. Groundwater pumping schedules (well use priorities and capacities)
 - vi. Pumping capacities, required pumping combinations, and sustainable pumping levels (pumping sustainability metric) at each well
- Assumptions for how:
 - vii. Managed storage will be used to meet Replenishment Obligations.
 - viii. Lands currently in agricultural uses will be converted to urban uses.
 - ix. Additional potential conservation above that currently required for new land development will occur.
- Future projections of location and magnitude of storm and Supplemental Water recharge

Well construction, abandonment, and destruction. Watermaster maintains a database on wells in the basin and Watermaster staff makes periodic well inspections. Watermaster staff sometimes finds a new well while implementing its monitoring programs. Watermaster needs to know when new wells are constructed as part of its administration of the Judgment. Valuable information for use in managing the Chino Basin is developed when wells are constructed, including: well design, lithologic and geophysical logs, groundwater level and quality data, and aquifer stress test data. Well owners must obtain permits from the appropriate county and state agencies to drill a well and to put the well in use. Watermaster has



developed cooperative agreements with the Counties of Los Angeles, Orange, Riverside, and San Bernardino, and DDW to ensure that the appropriate entities know that a new well has been constructed. Watermaster staff makes best efforts to obtain well design, lithologic and geophysical logs, groundwater level and quality data, and aquifer stress test data. The presence of abandoned wells is a threat to groundwater supply and a physical hazard. Watermaster staff periodically reviews its database, makes appropriate inspections, consults with well owners, maintains a list of abandoned wells in the Chino Basin, and provides this list to the counties for follow-up and enforcement. The owners of the abandoned wells are requested to properly destroy their wells following the ordinances developed by the county in which the abandoned well is located.

Considerations for updating the monitoring and reporting programs

Financial resources are limited, and the Parties desire to conduct these monitoring and reporting programs to satisfy each requirement efficiently at minimum cost. As documented in Exhibit L-1, the scope of Watermaster’s monitoring and reporting programs has evolved over time with new or changing regulations, obligations, and management initiatives.

Watermaster staff and its engineer continually review and revise the monitoring programs to collect the minimum data necessary to meet the objectives of the monitoring and reporting requirements. In some instances, Watermaster convenes special committees to analyze monitoring data and develop recommendations for revisions to the programs. What has not been performed by Watermaster in the recent past is a comprehensive review of all monitoring and reporting programs in an open stakeholder process.

To achieve the Parties’ desire to satisfy all monitoring and reporting requirements at minimum cost, Activity L should begin with a comprehensive review of each of Watermaster’s requirements for monitoring and reporting and a discussion of if and how the programs could be revised. The review should be performed in an open stakeholder process should consider:

- the objectives of the monitoring and reporting program,
- the minimum datasets required to meet the objectives,
- the prospective loss of private (or other) wells that are currently used in the Watermaster’s monitoring programs and how they can be cost-effectively replaced over time,
- the methods used to analyze the data, and
- the reporting frequency and content.

In some cases, revision of the monitoring and reporting programs will require Court approvals, regulatory approvals, or modification/amendment to CEQA documents.

Ultimately, Activity L will produce a *Monitoring and Reporting Work Plan* that documents the programs and will be used to define the Watermaster’s annual monitoring scope and budget. The *Monitoring and Reporting Work Plan* will be updated as needed to respond to changed conditions within any of the programs with opportunity for input and feedback from the Parties.

Scope of Work for Activity L

The scope of work for Activity L – *Perform the appropriate amount of monitoring and reporting required to fulfill basin management and regulatory compliance* consists of the following tasks:

- Task 1 – Convene Monitoring and Reporting Committee and prepare the *Monitoring and Reporting Work Plan*
- Task 2 – Implement recommendations in *Monitoring and Reporting Work Plan*



- Task 3 (recurring future task) – Conduct monitoring and reporting programs and prepare annual updates to Monitoring and Reporting Work Plan

Task 1 – Convene Monitoring and Reporting Committee and prepare the Monitoring and Reporting Work Plan. The objectives of this task are to:

- Update the Parties on all Watermaster monitoring and reporting requirements associated with regulations and obligations under its agreements, Court orders, and CEQA.
- Review the current monitoring and reporting programs that are designed to satisfy all Watermaster requirements.
- Develop recommendations for a revised monitoring and reporting program, including a scope of work and cost estimates to implement the recommendations.
- Document all Watermaster monitoring and reporting programs in a *Monitoring and Reporting Work Plan*. For each monitoring program, the work plan will include: a statement of objectives/requirements, the monitoring program to satisfy the requirements, the methods for evaluating data, the frequency for data analysis and reporting, and a schedule for initiating future updates to the plan, including construction of new monitoring wells (if needed).
- Prepare a technical memorandum to document the recommendations and a proposed process to revise the monitoring and reporting programs that require specific regulatory and/or Court approvals for modification. The memorandum will describe the anticipated cost savings that the Parties will realize if the revisions to the monitoring and reporting programs are approved. The memorandum will be titled: *Recommended Revisions to Watermaster’s Non-Discretionary Monitoring and Reporting Programs*.

A series of six committee meetings will be conducted over an 18-month period to achieve these objectives.

Task 2 – Implement recommended revisions to Watermaster’s non-discretionary monitoring and reporting programs. In this task, the plan described in the *Recommended Revisions to Watermaster’s Non-Discretionary Monitoring and Reporting Programs* will be implemented. This task will likely require technical demonstrations to the appropriate regulatory body (e.g. Regional Board, the Court, etc.) to gain approval for revisions to the monitoring program, report content, and/or report frequency. This task may be a multi-step, multi-year process to implement all recommended revisions. The results of this task will result in future updates to the *Monitoring and Reporting Work Plan*. Updates will be incorporated as they are approved.

Task 3 (recurring future task) – Bi-Annual review of scope of work and cost to implement the Monitoring and Reporting Work Plan in the subsequent fiscal year. In the first quarter of every other calendar year, the Monitoring and Reporting Committee will meet to review any changes to the *Monitoring and Reporting Work Plan* and the scope of work and budget for the subsequent fiscal year. The work plan updates and subsequent fiscal year budget will incorporate the recommendations made by special committees (such as the Ground-Level Monitoring Committee), any approved changes resulting from work performed in Task 2, and other changed conditions of the monitoring and reporting programs. The annual review can also include discussion and consideration of additional recommendations for efficiencies suggested by the Parties.

Cooperative Efforts with Appropriate Entities to Implement Activity L

This is a basin-wide activity that involves the Parties. Watermaster’s role will be to convene the Monitoring and Reporting Committee; to coordinate and administer its activities and meetings; to ensure that the recommendations derived from this effort are consistent with the Judgment, Peace Agreements and other



agreements, Court orders, state and federal regulations, and CEQA requirements; and to execute the *Recommended Revisions to Watermaster’s Non-Discretionary Monitoring and Reporting Programs*.

Implementation Actions, Schedule, and Costs for Activity L

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

Year one and two:

- Convene Monitoring and Reporting Committee and prepare the *Monitoring and Reporting Work Plan*.
- Prepare memorandum: *Recommended Revisions to Watermaster’s Non-Discretionary Monitoring and Reporting Programs*.

Year three and beyond:

- Implement *Recommended Revisions to Watermaster’s Non-Discretionary Monitoring and Reporting Programs*.
- Perform bi-annual review of scope of work and cost to implement the *Monitoring and Reporting Work Plan*.

Exhibit L-8 shows the estimated budget-level cost opinion to complete Task 1, which is about \$165,000. The cost of Tasks 2 and 3 cannot be estimated until the completion of Task 1.



Activities H, I, and J

Description of Activities H, I, and J

Activities H, I, and J as defined by the stakeholders are intended to equitably allocate and minimize the cost of OBMP implementation. The fourth goal of the 2000 OBMP and the 2020 OBMP Update is to *Equitably Finance the OBMP*. As described in Section 3 of this Scoping Report, the intent of this goal is to identify and use efficient and equitable methods to fund OBMP implementation. Three of the activities defined by the stakeholders address equity and cost.

Activity H is to:

Develop an equitable distribution of costs/benefits of the OBMP Update and include in the OBMP Update agreements

Activity I is to:

Develop regional partnerships to implement the OBMP Update and reduce costs and include in the OBMP Update agreements

Activity J is to:

Continue to identify and pursue low-interest loans and grants or other external funding sources to support the implementation of the OBMP Update

Through the listening session process, the stakeholders identified the following desired outcomes from Activities H, I, and J:

- Provide transparency as to the benefits of the OBMP Update activities, including identification of who benefits.
- Clearly identify Watermaster's roles in OBMP implementation and the associated future assessment costs to the Parties.
- Provide information needed to plan financial resources, such as cost projections similar to a Master Plan process.
- A formal process to revisit the OBMP implementation plan and adjust priorities and schedules as necessary to address changed conditions.
- Improve readiness to apply for grants as they become available.
- Increase the likelihood that the OBMP will be implemented.
- Keep the cost of OBMP implementation as low as possible by obtaining grants and low-interest loans.

As noted above, the fourth goal of the 2000 OBMP is to equitably finance the OBMP, however there were no PEs in the OBMP IP related to this goal. The Peace and Peace II Agreements and OBMP project implementation agreements established cost allocations for certain activities. The benefit and cost allocations included in these agreements were based on negotiations among the Parties and encouraged the use of grant funding to build projects. These funding agreements were deemed equitable when they were developed, and they are in use today.

Together, the management framework of the OBMP IP and implementation agreements enabled the Parties to obtain tens of millions of dollars in grants and other outside funding to implement the 2000 OBMP, including for the Chino Basin Desalters, RMPU recharge facilities, and the recycled water recharge program. In 2018, a contingent grant in the amount of \$200 million was awarded to IEUA for the regional CBP Storage and Recovery Program.



Need and Function of Activities of H, I, and J

Benefits of the OBMP

To support the Parties' consideration of the Peace II Agreement, Watermaster contracted with Dr. David L. Sunding to prepare the *Report on the Distribution of Benefits to Basin Agencies from the Major Program Elements Encompassed by the Peace Agreement and Non-Binding Term Sheet*. The economic analysis estimated the costs and benefits of the implementation of the PEs encompassed by the Peace I and Peace II Agreements to the ten Chino Basin appropriator Parties with the largest water rights in the Judgment (they are listed in the table below). These ten Parties account for 91.2 percent of the Operating Safe Yield. The allocation of aggregate costs and benefits to the individual agencies in the basin was computed based on a complex set of legal rules (such as share of Operating Safe Yield), cost-sharing arrangements for implementation, and market forces. The estimated net present value benefits, expressed in 2007 dollars (2007\$), to the Parties were primarily based on the value of (1) the gains in pumping created by implementation of the agreements and (2) the offset of the purchase of Tier 2 supplies from Metropolitan for replenishment. The study estimated that together the Peace I and Peace II Agreements would provide over \$904 million dollars in net present value benefits to the Parties (2007\$) for the implementation period of 2007 to 2030. The following table summarizes the net benefits to the ten agencies, as reported by Sunding:

Party	Net Benefit (2007\$)
Chino	\$95,966,000
Chino Hills	\$73,537,000
Ontario	\$232,271,000
Upland	\$44,086,000
CVWD	\$278,128,000
Fontana	\$30,268,000
MVWD	\$40,480,000
SAWCo	\$7,136,000
Jurupa	\$35,254,000
Pomona	\$67,537,000
Total	\$904,663,000
Average	\$90,466,300

Based, at least in part, on these expected benefits, the Parties executed the Peace II Agreement.

During the listening session process, some stakeholders expressed opinions that the distribution of benefits projected by the Sunding work had not come to fruition, that there is a lack of clarity as to the distribution of benefits of the various PEs in the OBMP IP, and that the allocation of the cost of OBMP implementation may not be equitable. And, some stakeholders have expressed concern about participating in new or expanded efforts without first understanding the benefits received to date,



performing an analysis of potential future benefits, and assessing the equitable allocation of benefits and costs.

Since the Sunding report was published, no additional work has been done to quantify the benefits that have resulted from OBMP implementation or to update the projection of benefits based on changed conditions. In 2013, the Appropriative Pool Parties discussed performing an updated economic analysis, but ultimately, they elected not to do it.

Costs of the OBMP

The costs of OBMP implementation include, among others:

- Watermaster expenses for engineering work to implement the OBMP IP, including implementation costs of certain projects (e.g. monitoring/reporting and construction of extensometers and monitoring wells)
- Watermaster expenses for other project costs, including recharge debt payments, improvement projects, recharge operations and maintenance costs, recharge, and the Pomona Credit
- Desalter replenishment and related monitoring expenses
- IEUA recycled water recharge costs
- Individual agency costs for water management activities impacted by the OBMP

As previously noted, the Peace and Peace II Agreements and OBMP project implementation agreements established cost allocations for certain activities. Watermaster-related costs for OBMP implementation are assessed annually as part of the Assessment Package. No calculation of the total OBMP costs incurred to date has been performed.

Benefits and costs of the 2020 OBMP Update

Some of the tasks within the 2020 OBMP Update activities provide broad benefit to the Parties and are essential to the Watermaster to do its job to implement the Physical Solution. Some 2020 OBMP Update activities could result in the construction of projects that will provide benefits to all stakeholders or may only provide benefits to a subset of stakeholders.

Based on the scopes of work described herein for the 2020 OBMP Update activities (A, B, CG, D, EF, K and L), there are at least 2-4 years of scoping and preliminary engineering work that would need to be performed to evaluate and select projects envisioned by the 2020 OBMP Update activities and to develop the level of detail required to quantify the benefits and costs from project implementation. Exhibit HIJ-1 illustrates the four phases of work and associated schedule for each of the 2020 OBMP Update activities, assuming that all activities would be initiated in July 2020.³⁶ The phases shown are: (1) scoping, (2) evaluation of the need for projects, (3) project alternatives evaluation, and (4) project implementation. The exhibit also illustrates the go-no-go decision points to proceed with the activity.

The detail required to quantify the benefits and costs of projects (including ongoing needs for monitoring and assessment) would be developed during the project alternatives evaluation phase. Once the benefits and costs for projects are quantified, the Parties will be able to review them, consider whether or not they want to participate in projects that provide benefits to participants only, and establish equitable cost allocations for the implementation actions that provide specific benefits.

³⁶ This exhibit is for demonstrative purposes as the parties have yet to finalize the activities for inclusion in the OBMP Update or define a scheduled to implement them.



Grant funding and regional partnerships to minimize the costs of OBMP implementation

In the future, it is anticipated that it will become increasingly difficult to secure grants and low-interest loans due to increased competition. Most grant and low-interest loan programs require, or heavily favor, projects that are within watersheds and groundwater basins with adopted integrated regional management plans, groundwater sustainability plans, or their equivalents. The 2020 OBMP Update is equivalent to a regional water resources and groundwater management plan. The first three phases of each activity described in the prior subsection and shown in Exhibit HIJ-1 should be completed to maximize the ability to be competitive when applying for grants and low-interest loans, or in securing regional funding partners. Assessing cost/benefit at a level of detail appropriate to meet the needs of the stakeholders in establishing equitable cost allocations during the project alternatives evaluation phase will enable the Parties (1) to evaluate projects in a manner that is comprehensive and clear and (2) to enter into regional partnerships and apply for grant opportunities with greater certainty as to the expected benefits and costs.

Scope of Work for Activities H, I, and J

The objectives for Activities H, I, and J can be efficiently met by incorporating tasks within the other activities to characterize the benefits and costs of the projects produced by the activities. This section describes how the scopes of work of the other 2020 OBMP Update activities can accomplish the objectives of Activities H, I, and J.

As described throughout this Scoping Report, each activity has tasks related to identifying and evaluating project alternatives to achieve the activity's objectives (e.g. project evaluation). The project evaluation phase includes the following generalized steps:

1. Develop planning, screening, and evaluation criteria for projects
2. Identify the potential project alternatives
3. Develop reconnaissance-level engineering design and operating plans for each alternative
4. Develop an engineering cost opinion for each alternative
5. Describe how each alternative could be implemented and financed
6. Evaluate project alternatives based on the evaluation criteria
7. Select the preferred project alternative

At such time that each activity reaches the project evaluation phase, the scope of work for project evaluation should include a process to articulate and value the benefits of interest to the stakeholders in establishing equitable cost allocations, considering whether a project has broad basin management benefits and the benefits to specific Parties. Examples of benefits include new yield, water supply reliability, and water quality improvements. The project benefits to analyze and value would be defined during the first step to develop criteria for selecting projects. In step five, the alternative evaluation would include a characterization of implementation benefits and costs (Watermaster expenses and other costs) and their allocation to participants under various levels of participation and cost allocation methods. The benefit and cost projections, together with the other engineering analyses, could then be used by the Parties to select a cost allocation method, prepare projections of costs to support planning of financial resources for implementation, and develop a project implementation agreement that will clearly establish the allocation of benefits and costs to each Party. With regard to the identification and valuation of benefits, the Parties could address this on a case-by-case (project-by-project) basis, or by developing and agreeing to a standard set of benefits to analyze and quantify for every project to achieve equitable cost allocations.



The steps to achieve an equitable allocation of benefits and costs should be addressed in the agreement that will be developed by the Parties to implement the 2020 OBMP Update. The 2020 OBMP implementation agreement could be designed to ensure that the desired extent of cost/benefit assessments are performed to support equitable cost allocations in the implementation of activity scopes of work, to anticipate and accommodate the development of project implementation agreements that define the project-specific cost/benefit allocation, and to periodically update cost projections for implementation of the 2020 OBMP Update activities and associated projects to support planning of financial resources.

Cooperative Efforts with Appropriate Entities to Implement Activities H, I, and J

The Parties that will participate in projects developed through the implementation of the 2020 OBMP Update activities would need to agree to an allocation of costs for the implementation of the projects and document the allocation in the project implementation agreements. Watermaster’s role will be to assess certain costs associated with implementation. Watermaster will continue to assess the costs of ongoing OBMP implementation efforts that provide broad benefits to the Parties pursuant to existing agreements and would allocate costs of the implementation of new activities/projects based on the new implementation agreements developed for the 2020 OBMP Update.

Implementation Actions, Schedule, and Costs for Activities H, I, J

Other than the performance of tasks associated with the assessment of benefits and costs within each 2020OBMP Update activity, there are no separate implementation actions associated with this activity as the future implementation agreements will make such considerations. Depending on the types of benefits that need to be quantified and valued to define equitable cost allocations, the project evaluation costs estimated herein for Activities A and D could be higher. (Note that these are the only two activities that have budget-level cost-estimates for project evaluation).

The *2020 OBMP Update: Implementation Plan Report*, which is the next work product of the 2020 Update, will include an implementation plan and schedule for each of the 2020 OBMP Update activities selected for implementation by the stakeholders and a projection of associated Watermaster costs to support the planning of financial resources for implementation.