CHAPTER 3 – PROJECT DESCRIPTION

All figures are located at the end of this chapter, not immediately following their reference in the text.

3.1 INTRODUCTION

This chapter contains a detailed description of the proposed project, the Chino Basin Program (CBP), with focus on those program characteristics and activities that have the potential to cause a direct physical change in the environment, or a reasonably foreseeable indirect physical change to the environment.

Inland Empire Utilities Agency (IEUA) and local partners have developed long-term plans to implement a variety of new infrastructure to meet future needs for wastewater treatment and potable water supplies, while increasing resiliency and sustainability of regional water resources management. Some of the facilities included in these plans are addressed in IEUA's ten-year forecast (TYF) and Integrated Water Resources Plan (IRP). The CBP provides an opportunity to implement critical long-term project components of these plans, addressing local, regional, and potentially statewide and federal water resources management issues. The CBP is a revolutionary, first-of-its-kind program designed to help the region move beyond traditional water management practices and into a new era of water use optimization. The CBP promotes proactive investment in managing the water quality of the Chino Groundwater Basin and in meeting regional water supply reliability needs in the face of climate change, while leveraging California's interregional plumbing system and the Chino Basin's future potential for water recycling to produce benefits to local, State, and federal interests.

3.1.1 <u>IEUA Agency Background</u>

IEUA, located in southwestern San Bernardino County, serves approximately 875,000 residents in a 242-square mile service area. As a regional wastewater treatment agency, IEUA provides sewage utility services to seven contracting agencies under the Chino Basin Regional Sewage Service Contract: the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and Cucamonga Valley Water District (CVWD) in the city of Rancho Cucamonga. In addition to the contracting agencies, IEUA provides wholesale imported water from Metropolitan Water District of Southern California (MWD) to Water Facilities Authority (WFA), CVWD in the city of Rancho Cucamonga, Fontana Water Company (FWC) in the city of Fontana and West Valley Water District (WVWD) in the city of Rialto; Water Facilities Authority then serves imported water to the cities of Chino, Chino Hills, Ontario, Upland, and Monte Vista Water District in the City of Montclair and adjacent unincorporated areas (Exhibit 1).

IEUA is a regional sewage treatment and water agency that provides wastewater treatment, solids handling, and recycled water to the west end of San Bernardino County. Its 242-square-mile service area includes the cities of Upland, Montclair, Ontario, Fontana, Chino and Chino Hills, and CVWD, which services the City of Rancho Cucamonga and the unincorporated areas of San Bernardino County, including the Chino Agricultural Preserve. IEUA, a special assessment district, is governed by a five seat publicly elected Board of Directors. Each director is assigned to one of the five divisions which are: Division 1 - Upland/Montclair; Division 2 - Ontario/ Agricultural Preserve; Division 3 - Chino/ Chino Hills; Division 4 - Fontana; and Division 5 - Rancho Cucamonga. The Regional Technical and Policy Committees provide advice on technical and policy issues, and there are representatives from each of the contracting agencies on these committees.

Exhibit 1: IEUA Service Area

Five regional water recycling plants are used to treat wastewater from IEUA's service area. They are: Regional Water Recycling Plant No. 1 (RP-1), located in the City of Ontario; Regional Water Recycling Plant No. 2 (RP-2), located in the City of Chino; Regional Water Recycling Plant No. 4 (RP-4), located in the City of Rancho Cucamonga; Carbon Canyon Water Recycling Facility (CCWRF), located in the City of Chino; and Regional Water Recycling Plant No. 5 (RP-5), located in the City of Chino. Of the five plants, RP-2 is the only plant that does not produce any recycled water. In conjunction with these facilities, IEUA maintains and operates a desalter facility, Chino I Desalter, in the City of Chino and a biosolids composting facility, Inland Empire Composting Facility, in the City of Rancho Cucamonga on behalf of the Chino Basin Desalter Authority and Inland Empire Regional Composting Authority, respectively (Exhibit 2). IEUA is also the MWD representative for the contracting agencies.

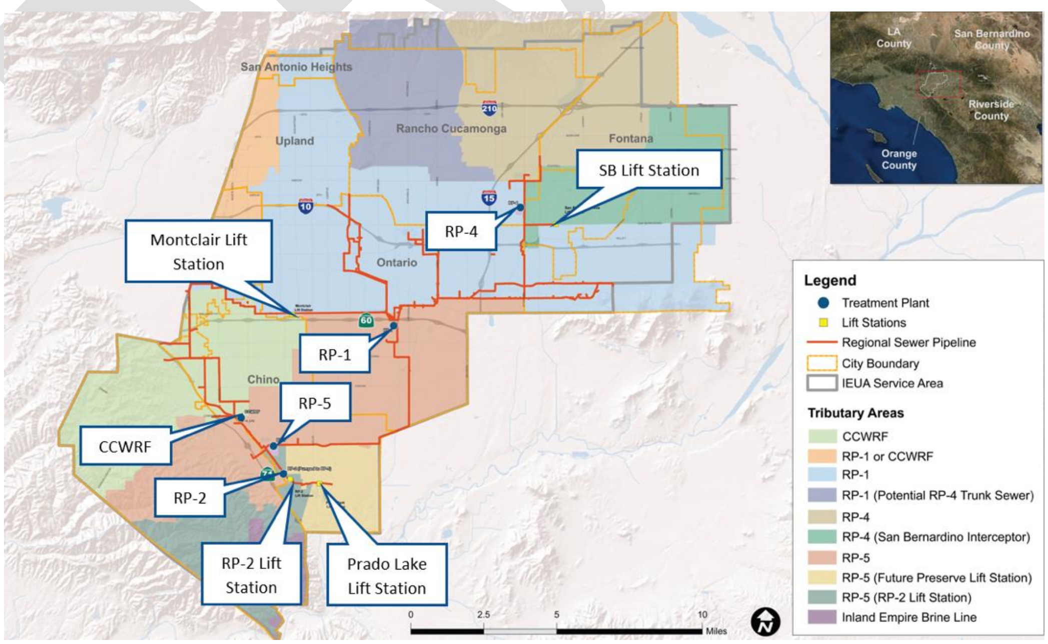

Exhibit 2: IEUA Facility Locations

The water resource inventory for the IEUA service area is made up of stormwater, recycled water, local surface water, groundwater, and imported water.

- Stormwater is derived primarily from rain and snow starting in the San Gabriel Mountains and moving down through the Chino Basin watershed and diverted into groundwater recharge basins.
- Recycled water is generated from IEUA's four water recycling plants.
- Local surface water is similar to stormwater, but the water is diverted and treated at a water treatment facility within the service area.
- Groundwater makes up the majority of the area's annual water supply and comes primarily from the Chino Basin and from basins adjacent to the Chino Basin. These basins include, Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins.
- Imported water is purchased from MWD.

Table 1 provides a recent summary of the raw water supply to the region, which is ultimately the source of supply for the recycled water processed at the IEUA water recycling facilities.

Table 1
WATER SUPPLY BY TYPE FOR IEUA SERVICE AREA

Water Supply	Percent of Total
Groundwater	30%
Desalter Product Water	15%
Imported Water (SWP)	25%
Stormwater and other local water supply	10%
Recycled Water	20%
Total	**100%**

3.2 PROJECT LOCATION

The Chino Basin consists of about 235-square-miles of the upper Santa Ana River watershed. The boundary of the Chino Basin is legally defined in the 1978 Judgment in the case of Chino Basin Municipal Water District vs. the City of Chino et al. The Chino Basin is an alluvial valley that is relatively flat from east to west and slopes from the north to the south at a one to two percent grade. Valley elevation ranges from about 2,000 feet in the foothills to approximately 500 feet near Prado Dam. As shown in Figure 1, the Chino Basin is bounded:

- on the north by the San Gabriel Mountains and the Cucamonga Basin;
- on the east by the Rialto-Colton Basin, Jurupa Hills, and the Pedley Hills;
- on the south by the La Sierra Hills and the Temescal Basin; and
- on the west by the Chino Hills, Puente Hills, and the Spadra, Pomona, and Claremont Basins.

The Chino Basin is one of the largest groundwater basins in southern California with about 5,000,000 acre-feet (AF) of groundwater and an unused storage capacity of approximately 1,000,000 acre-feet. Cities and other water supply entities produce groundwater for all or part of their municipal and industrial supplies; and about 300 to 400 agricultural users continue to produce groundwater from the Basin. The Chino Basin is an integral part of the regional and statewide water supply system. Prior to 1978, the Basin was in an overdraft condition. After 1978, the Basin has been operated as described in the 1978 Judgment.[1]

The principal drainage course of the Chino Basin is the Santa Ana River, which flows 69-miles across the Santa Ana Watershed from its origin in the San Bernardino Mountains to the Pacific Ocean. The Santa Ana River enters the Basin at the Riverside Narrows and flows along the southern boundary to the Prado Flood Control Reservoir where it is eventually discharged through the outlet at Prado Dam into Orange County. Chino Basin is traversed by a series of ephemeral and perennial streams that include: Chino Creek, San Antonio Creek, Cucamonga Creek, Deer Creek, Day Creek, Etiwanda Creek and San Sevaine Creek.

These creeks carry significant flows only during, and for a short time after, storm events that typically occur from November through March. Year-round flow occurs along the entire reach of the Santa Ana River in the Basin due to year-round surface inflows at Riverside Narrows, discharges from municipal water recycling plants to the River between the Narrows and Prado Dam, and rising groundwater. Rising groundwater occurs in Chino Creek, in the Santa Ana River at Prado Dam, and potentially other locations on the Santa Ana River depending on climate and season.

The Chino Basin is mapped within the USGS – Corona North, Cucamonga Peak, Devore, Fontana, Guasti, Mount Baldy, Ontario, Prado Dam, Riverside West and San Dimas Quadrangles, 7.5 Minute Series topographic maps. The center of the Basin is located near the intersection of Haven Avenue and Mission Boulevard at Longitude 34.038040N, and Latitude 117.575954W.

3.3 EXISTING CONDITIONS OF THE BASIN

3.3.1 Chino Groundwater Basin

The proposed CBP envisions an increase the Safe Storage Capacity of the Chino Groundwater Basin (Chino Basin). As such, the following is a discussion of the background, existing circumstances of the Chino Basin and storage capacity thereof.

On January 2, 1975, several Chino Basin groundwater producers filed suit in the California State Superior Court for San Bernardino County (Court) to settle the problem of allocating water rights in the Chino Basin. On January 27, 1978, the Court entered a judgment in "Chino Basin Municipal Water District v. City of Chino et. al." (Judgment). The Judgment adjudicated the groundwater rights of the Chino Basin, established the Chino Basin Watermaster (CBWM or Watermaster)—a Court created entity—to administer the Judgment, and contains a Physical Solution to meet the requirements of water users having rights in or dependent upon the Chino Basin. Figure 2 shows the adjudicated boundary as it is legally defined in the Judgment, the hydrologic boundary, the Chino Basin management zones, and the groundwater management zones defined by the Santa Ana Regional Water Quality Control Board (Regional Board) in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan).

Watermaster is governed by a nine-member Board drawn from parties from three groups: an Appropriative Pool, a Non-Agricultural Pool, and an Agricultural Pool, and three other public

[1] Original judgment in Chino Basin Municipal Water District vs. City of Chino, et al., signed by Judge Howard B. Weiner, Case No. 164327. File transferred August 1989, by order of the Court and assigned new case number RCV51010. The restated Judgment can be found here:
http://www.cbwm.org/docs/WatermasterCourtFilings/2012%20Watermaster%20Restated%20Judgment.pdf

agencies, including IEUA, which effectively represent the water producers and wholesalers in the Chino Basin. These member agencies are considered "stakeholders" or "the Parties."

To manage the Chino Basin for the long-term benefit of all producers in the area, the Optimum Basin Management Program (OBMP) was developed pursuant to a Judgment entered in the Superior Court of the State of California on January 27, 1978 (the Court) and compelled by further order of the Court under its continuing jurisdiction. The Watermaster administers the decree under the direction of the Court. It was granted discretionary powers to develop and implement the OBMP.

When the OBMP was developed it was expected that the Parties and other entities would use the storage space above 5,300,000 AF for conjunctive use and not exceed a storage volume of 5,800,000 AF. The Operational Storage Requirement—the storage or volume in the Chino Basin that is necessary to maintain safe yield—was estimated to be 5,300,000 AF in the OBMP. The OBMP also defined the term Safe Storage, which is an estimate of the maximum storage in the Basin that will not cause significant water-quality and high-groundwater related problems. Safe Storage was estimated to be about 5,800,000 AF in the 2000 OBMP. The Safe Storage Capacity, which is the difference between the Safe Storage (5,800,000 AF) and the Operational Storage Requirement (5,300,000 AF), was determined to be 500,000 AF in the 2000 OBMP. Water occupying the Safe Storage Capacity includes water in storage accounts (stored water), carryover water, and water that was anticipated to be stored in future groundwater Storage and Recovery Programs.

If groundwater storage exceeded 5,800,000 AF, the OBMP assumed that mitigation would be required to operate the Basin at those higher levels of storage. In the years since the 2000 OBMP was adopted, however, twenty years of additional hydrologic information, implementation experience of the OBMP through the Peace and Peace II Agreements, and related actions of the Watermaster and the Parties, have demonstrated that Safe Storage is greater than 5,800,000 AF and, although not precisely computed, the implied Safe Storage Capacity is 735,000 AF or larger.

In 2016, Watermaster identified the need to update the OBMP so that the storage management plan in the OBMP Implementation Plan could be modified to reflect an increase in managed storage accounts, which were projected to exceed the Safe Storage Capacity (SSC) limit of 500,000 AF defined in the 2000 OBMP. In 2017, IEUA adopted Addendum No. 1 to the OBMP PEIR to provide a "temporary increase in the Safe Storage Capacity from 500,000 AF to 600,000 AF for the period of July 1, 2017 through June 30, 2021 […] until a comprehensive re-evaluation of the Safe Storage Capacity value/concept can be completed before June 30, 2021."[2] Addendum No. 1 was supported with engineering work that demonstrated that this temporary increase in SSC would not cause material physical injury (MPI) to Watermaster stakeholders or loss of Hydraulic Control.[3] Addendum No. 1 was certified by IEUA in March 2017, and Safe Storage Capacity was reset to 600,000 AF through June 30, 2021.

[2] Tom Dodson & Associates. (2017). Addendum No. 1 to the Optimum Basin Management Program Project. Page 2.
[3] MPI means material injury that is attributable to the recharge, transfer, storage and recovery, management, movement or production of water, or implementation of the OBMP, including, but not limited to, degradation of water quality, liquefaction, land subsidence, increases in pump lift (lower water levels), and adverse impacts associated with rising groundwater. MPI does not include "economic injury" that results from other than physical causes. Once fully mitigated, physical injury shall not be considered to be material. (From Peace Agreement Definitions, page 8) Further, loss of Hydraulic Control means the inability to eliminate groundwater discharge from the Chino-North Groundwater Management Zone to the Santa Ana River or its reduction to less than 1,000 AFY.

Watermaster began the comprehensive re-evaluation of the Safe Storage Capacity concept through a stakeholder process during 2017 and 2018, which resulted in the 2018 Storage Framework Investigation Report (SFI). The SFI evaluated the Basin response, MPI and undesirable results from projections of the Parties' future storage management activities and potential future Storage and Recovery Programs that could store additional water in the Basin, concurrently with the Parties (cumulatively up to 1,000,000 AF). This work was based, in part, on groundwater modeling projections of the Basin using the 2017 Watermaster model that was last previously calibrated in 2011. The SFI developed a series of metrics to identify MPI and undesirable results for the use of storage space and introduced a new term called managed storage. Managed storage includes water stored by the Parties and other entities, which fluctuates over time based on the actions of the Parties and other entities.

During the period between 2018 and mid-2020, Watermaster revised its groundwater model and renamed it the 2020 Chino Valley Model (CVM). The 2020 CVM supersedes the model version used in the 2018 SFI. The CVM was used to update pumping and recharge projections to develop an updated estimate of Safe Yield for the period 2021 through 2030 (WEI, 2020). Based on this Safe Yield Investigation, Safe Yield for the period was determined to be 131,100 acre-feet per year.[4] The Court subsequently accepted Watermaster's Safe Yield recommendation and ordered the Safe Yield changed in July 2020.

In late 2020, Watermaster identified the need to amend the OBMP so that the Safe Storage Capacity of the Chino Basin could be increased to address what Watermaster deemed a "Local Storage Limit Solution" (LSLS).[5] As such, Watermaster and IEUA authorized the preparation of Addendum No. 2 in order to enable a study of the current Safe Storage Capacity. Watermaster facilitated the preparation of a report based on the CVM regarding the use of Chino Basin storage space to update the Safe Storage Capacity based on updated water use and Safe Yield projections.

Based on the report's projection of managed storage, the LSLS was defined by the use of storage space up to 700,000 AF through June 30, 2030, decreasing to 620,000 AF from July 1, 2030 through June 30, 2035. This definition of the LSLS balanced the need to provide for the combined use of managed storage by the Parties and the Dry Year Yield Program (DYYP)[6] through the end of the DYYP contract period (2028) and the Parties' need to hedge against future uncertainty by maximizing projected use of managed storage in the early 2030s. The increase in Safe Storage Capacity did not require the development of any new facilities or any other mitigation to minimize potential adverse impacts to the Basin, as none were projected to occur within the confines of the reset Safe Storage Capacity limits. Over time, cumulative use of the Basin for storage utilizing existing facilities at the same general existing rate of use can fully utilize managed storage space up to 700,000 AF through June 30, 2030, decreasing to 620,000 AF from July 1, 2030 through June 30, 2035. Addendum No. 2 was adopted by IEUA in March 2021, and Safe Storage Capacity

[4] As defined by the Judgment, Safe Yield means the long-term average annual quantity of ground water (excluding replenishment or stored water but including return flow to the Basin from use of replenishment or stored water) which can be produced from the Basin under cultural conditions of a particular year without causing an undesirable result.
[5] The intent of the Local Storage Limit Solution was to address the need for greater storage in the Basin to accommodate the Parties desire for greater managed storage in the Basin, whilst taking into account the Metropolitan Dry-Year Yield Program (DYYP).
[6] The DYYP can store up to 100,000 AF with maximum puts of 25,000 AFY and maximum takes of 33,000 AFY. The DYYP Storage and Recovery agreement provides that puts and takes can exceed these values if agreed to by Watermaster (as was done in fiscal years 2018 and 2009, respectively). The agreement that authorizes the DYYP will expire in 2028.

was reset to 700,000 AF through June 30, 2030, decreasing to 620,000 AF from July 1, 2030 through June 30, 2035.

3.3.2 Water Supply

Formed in 1950, IEUA is a member of the MWD and thus acts as a supplemental water provider. Approximately 25 percent of the water used in the region is imported from MWD through the State Water Project (SWP). Due to water quality limitations (salinity, total dissolved solids [TDS]) and operation of the regional recycled water program, IEUA only takes water from the SWP. IEUA strives to increase regional sustainability through the development of reliable local water supplies. These efforts include using water more efficiently, eliminating waste and unreasonable use, and making the region climate resilient through maximizing the use of recycled water. IEUA has invested in water use efficiency efforts and is on track to reduce water use.

A diverse portfolio of water supply sources has been developed within IEUA's service area. The region relies on groundwater from the Chino Basin and other basins (Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins), local surface water from creeks originating in the San Gabriel Mountains, recycled water produced locally, and imported water from the SWP via MWD. The IEUA IRP established a baseline water supply scenario for IEUA's service area through 2040. Table 2 below provides the current and projected recycled water supplies in acre-feet per year (AFY) through 2040.

Table 2
CURRENT AND PROJECTED RECYCLED WATER SUPPLIES (AFY)

	2020	2025	2030	2035	2040
Recycled Water Supply	55,074[1]	60,150	63,530	64,500	67,140

NOTES (1): For 2020, this amount is the actual supply. For 2025 to 2040, supply projections are from IEUA 2021 Wastewater and Recycled Water Demand Forecasts based on land use

3.3.3 Water Demand

Current and projected recycled water demands through 2040 are provided in Table 3 below. Recycled water demands include direct use, groundwater recharge, and Santa Ana River discharge obligations.

Table 3
CURRENT AND PROJECTED RECYCLED WATER DEMAND (AFY)

	2020	2025	2030	2035	2040
Direct Use Demands[2]	16,278	20,870	23,275	24,704	27,855
Groundwater Recharge[2]	13,381	16,420	16,420	16,420	16,420
Total	29,659	37,290	39,695	41,124	44,275

NOTES: (1) Minimum discharge required by Santa Ana River Obligation is 16,420 AFY at Prado. (2) From IEUA 2021 Wastewater and Recycled Water Demand Forecasts.

3.3.4 Water Quality

As one of the stewards responsible for managing water and wastewater in the region, IEUA continuously evaluates challenges and develops solutions to address them, all with the goal of securing a reliable/resilient, high-quality water supply in a cost-effective manner. This goal involves the use of various water sources, including imported water, stormwater, groundwater, and recycled water.

Recycled water is an increasingly essential asset to the region particularly with the uncertain future of imported water supplies due to climate change and environmental factors. Recycled water is the region's most climate resilient water supply because the amount of water available is not affected by dry years. Today, recycled water makes up approximately 15 percent of IEUA's water supply portfolio and hundreds of millions of dollars have been invested into the regional recycled water program.

The Santa Ana Regional Water Quality Board's Basin Plan sets regulatory limitations for recycled water TDS and continued use of recycled water within the region depends on compliance with these limits. Increasing TDS levels in recycled water have been exacerbated by climate change, conservation and episodic periods of drought over the last twenty years. In 2015, there was a period where every month was setting a record-high recycled water TDS concentration. As a result, recycled water TDS approached the maximum effluent limit for recycled water (550 mg/L) in 2015, prompting an internal evaluation that was prepared in 2016. As demonstrated in Exhibit 3, recycled water TDS concentration over time shows a pattern of peaks and valleys, with a gradual increase over time. The 2016 preliminary evaluation demonstrated that TDS concentrations in water and wastewater supplies, and therefore recycled water, are steadily increasing, and drought conditions and water conserving activities exacerbate TDS concentrations in both (Exhibit 4). Based on this evaluation, IEUA concluded that implementation of an advanced water purification facility (AWPF) will be needed at some point to address increasing salinity. Furthermore, postponing treatment poses risks to maintaining the region's maximum benefit objectives associated with the Basin Plan, and consequently IEUA's compliance for its wastewater treatment operations. Maximum benefit objectives are defined in the paragraphs below. IEUA and the Watermaster raised these concerns to the RWQCB, who requested modeling and analysis to investigate the salinity challenge and explore alternative TDS compliance metrics that are protective of beneficial uses and that could be incorporated into the Basin Plan and subsequently IEUA and Watermaster permits.

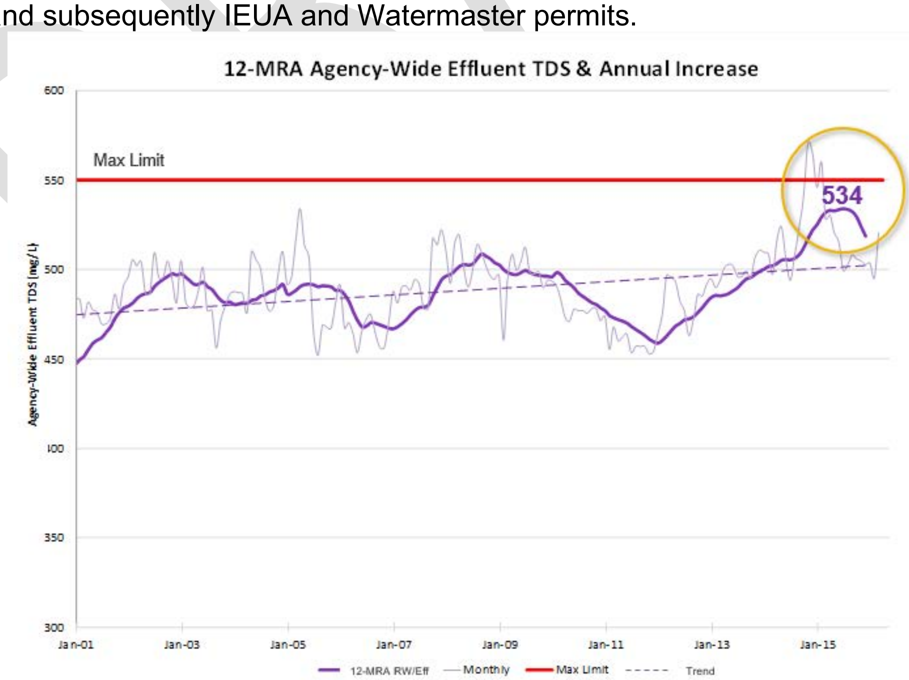

Exhibit 3: Agency-wide Recycled Water Effluent TDS Concentration (2001 – 2016)

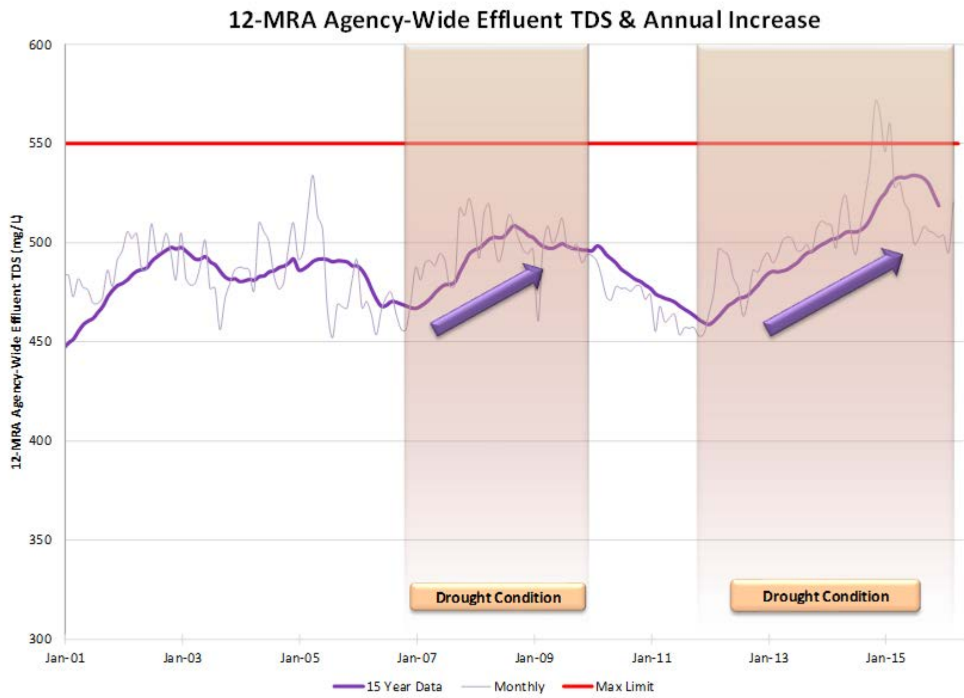

Exhibit 4: Drought & Recycled Water Effluent TDS Relationship

Subsequent to the 2016 Preliminary Evaluation, further analyses were completed in support of regional planning efforts. The primary objective for these analyses was to project when the recycled water TDS concentration would exceed the permit limit, as well as another RWQCB compliance-driven action limit (545 mg/L), which is in place to ensure TDS concentrations remain below the permit limit of 550 mg/L. It is important to note that the analyses did not include the effects of climate change, and it is likely that the time for recycled water to reach the permit limits is shorter than the projections described below. The analyses demonstrated increasing trends in TDS concentrations for the water supply and recycled water. Based on the analysis, exceedance of the RWQCB action limit of 545 mg/L was projected to occur in 2031. Exceedance of the permit limit of 550 mg/L was projected to occur as early as 2030, up to 2034.

Maintaining permit compliance is a critical priority for IEUA and Chino Basin stakeholders. There are strict consequences associated with non-compliance with the Basin Plan that could lead to recycled water and groundwater recharge program interruption and/or retroactive activities. If the NPDES permit limit is exceeded, IEUA will be in violation of its NPDES permit, and if a plan to address it is not submitted to the RWQCB in a timely manner, this could result in the halting of all use of recycled water to recharge the groundwater aquifer. Consequently, all effluent from IEUA's water recycling facilities will need to be discharged to the Santa Ana River.

Discharge to the Santa Ana River above 550 mg/L will also be above the discharge limitation, which is also 550 mg/L. Additionally, according to the Basin Plan, if the maximum benefit commitments (including the 550 mg/L limit) are not met, "the Regional Board will require that Watermaster and IEUA mitigate the effects of discharges of recycled and imported water that took place under the maximum benefit objectives." This will require AWPFs to mitigate the effects of the recycled water and groundwater recharge programs that have operated above the more stringent antidegradation objectives since the 2004 Basin Plan amendment was adopted. The Basin Plan also states that "The Regional Board will also require mitigation of any adverse effects on water quality downstream of the Chino Basin that result from failure to implement the 'maximum benefit' commitments." Non-compliance could result in permit modification with more stringent recycled water and groundwater recharge limits, severely impacting both the operability of the programs as well as the costs.

In addition to the challenges associated with TDS, IEUA is also facing regulatory challenges with 1,2,3-Trichloropropane (1,2,3-TCP), perfluorooctanoic acid (PFOA), microplastics, and other contaminants of emerging concern (CEC). These contaminants are making their way into IEUA's recycling plants, which are not designed for their removal. In 2019, recycled water used for groundwater recharge exceeded the 1,2,3-TCP maximum contaminant level and PFOA Notification Level. It becomes evident, then, that even if advanced treatment is not needed for TDS compliance, it may be needed to address other regulatory challenges related to CECs within the region to continue to have access to existing groundwater supplies.

3.3.5 Recycled Water Program

IEUA has produced and distributed high quality recycled water since 1972 when the Agency expanded its services to include regional wastewater treatment. Currently, IEUA owns and operates four regional recycled water plants that produce disinfected and filtered tertiary treated recycled water in compliance with California's Title 22 regulations. As previously discussed, these four regional recycled water plants include RP-1, RP-4, RP-5, and the CCWRF. Recycled water from these plants is used within the region for direct use (irrigation, industrial, and construction purposes) and groundwater recharge.

Water recycling is a critical component of the water resources management strategy for IEUA and the Chino Basin. The State of California has determined that the reuse of highly treated recycled water is the only new major source of water available to meet Southern California's growing water demand. IEUA currently receives over 50 million gallons per day of wastewater from its regional treatment plants. This water is treated to Title 22 regulations set forth by the State Division of Drinking Water and is then distributed throughout the service area. As noted above, IEUA delivers the recycled water to be used for direct reuse and for groundwater recharge.

Direct Reuse

Within the region, recycled water is reused for a variety of applications including landscape irrigation, agricultural irrigation, industrial process water and construction. Recycled water demands by use type for fiscal year (FY) 2018/2019 are provided in Table 4: Recycled Water Demand for Direct Use by Use Type for FY 2018/2019.

Table 4
RECYCLED WATER DEMAND FOR DIRECT USE BY USE TYPE FOR FY 2018/2019

Type of Use	Demand (acre-feet)	Percentage
Recharge	13,381	44%
Agriculture	5,757	19%
Landscape	9,716	32%
Industrial	1,004	3%
Construction	638	4%
Total	**30,495**	**100%**

Notes: From IEUA 2019/2020 Recycled Water Annual Report

IEUA is the wholesale recycled water provider to its member agencies, which in turn are retail agencies that directly serve their customers. IEUA member agencies which served recycled water in FY 2019/2020 include:

- City of Chino
- City of Chino Hills
- CVWD
- Fontana (through FWC)
- Montclair (through MVWD)
- City of Ontario
- City of Upland

MVWD and FWC are the water retailers in the Cities of Montclair and Fontana, respectively, and obtain recycled water from their overlying cities. San Bernardino County is currently a direct use customer of IEUA based on long standing historical contracts since 1972. Table 5: Recycled Water Demand for Direct Use by Agency for FY 2019/2020 shows the recycled water demand for direct use by agency.

Table 5
RECYCLED WATER DEMAND FOR DIRECT USE BY AGENCY FOR FY 2018/2019

Retail Agency	4,795	Recharge (AF)	Demand (AF)
City of Chino	1,417	0	4,765
City of Chino Hills	1,417	1,188	2,605
CVWD	1,038	4,458	5,496
Fontana/FWC	211	2,693	2,904
Montclair/MVWD	298	781	1,079
City of Ontario	7,817	3,017	10,864
City of Upland	703	1,243	1,946
IEUA	773	0	773
San Bernardino County	65	0	65
Total	**17,115**	**13,381**	**30,495**

Notes: From IEUA 2019/2019 Recycled Water Annual Report

3.3.6 Groundwater Recharge

IEUA, the Watermaster, the Chino Basin Water Conservation District, and the San Bernardino County Flood Control District jointly sponsor the Chino Basin recycled water groundwater recharge program that is an integral part of the OBMP and the region's water supply portfolio. This program was put in place to enhance water supply reliability and to improve drinking water quality throughout the greater Chino Basin. Annually, IEUA recharges on average between 30,000 and 40,000 AF of imported water, stormwater, and recycled water. The recharge infrastructure consists of a network of pipelines that direct stormwater run-off, imported water from the SWP, and IEUA recycled water to 16 recharge sites most of which consist of multiple recharge basins. These recharge basins provide capacity to recharge up to approximately 77,500 AFY.

The Chino Basin recycled water groundwater recharge program assists in mitigating future water shortages in California caused by future limitations for importing water supplies from the SWP and provides a subsurface reserve of groundwater for local use. This enhances the current reliability of local groundwater supplies for a rapidly growing population and is an integral part of local water supply planning. The groundwater recharge program is an important part of the overall

Chino Groundwater Basin program and serves as a long-term solution to the water supply and water quality issues facing the greater Chino Basin.

In fiscal year 2018/2019, 11,542 acre-feet of recycled water was used for groundwater recharge. This accounts for 41 percent of the total recycled water demand within the region. Recycled water demand for groundwater recharge by agency is provided in Table 6: Recycled Water Demand for Groundwater Recharge by Agency for FY 2018/2019.

Table 6
RECYCLED WATER DEMAND FOR RECHARGE BY AGENCY FOR FY 2018/2019

Type of Use	Demand (acre-feet)
City of Chino	0
City of Chino Hills	1,188
CVWD	4,458
Fontana/FWC	2,693
Montclair/MVWD	781
City of Ontario	3,017
City of Upland	1,243
IEUA	0
San Bernardino County	0
Total	**13,381**

Notes: From IEUA 2019/2020 Recycled Water Annual Report

3.4 PROJECT PURPOSE AND OBJECTIVES

It is the goal of the CBP to enhance both the SWP and the Central Valley Project for the betterment of operations, environment, resilience, and reliability. The CBP will be developed to provide flexibility to regional and local water operations, particularly during future extended droughts expected as climate change continues to impact California. New injection and extraction facilities, conveyance facilities, and water system interconnections will allow more optimal management of local water supplies, including improved storage and recovery operations, as well as redundancies in water delivery infrastructure that will facilitate future rehabilitation and replacement needs. The CBP will also develop new southern California advanced water treatment supplies to be stored in the Chino Groundwater Basin and exchanged in hydrologically drier years for southern California-bound SWP supplies stored in northern California. The stored northern California water will subsequently be released as multi-day pulse flows to support anadromous fish populations in the Feather River and the Sacramento-San Joaquin Delta (Delta), providing a statewide public benefit. The term for this exchange will be fixed at 25 years for a total volume of 375,000 acre-feet, after which time the CBP will be devoted to meeting local water management needs while fulfilling commitments to improve water quality in the Chino Groundwater Basin and provide a source of emergency water supply.

The CBP would strengthen partnerships among local agencies that participate in the project and offer an opportunity for local agencies to coalesce around the future of the Chino Basin. Partnerships between local agencies, the MWD, the California Department of Water Resources (DWR), the California Department of Fish and Wildlife (CDFW), and the U.S. Bureau of Reclamation (USBR) will also be essential to the success of the project and offer a framework for future improved collaboration. The program objectives are designed to guide the development and implementation of the CBP to reflect the collective interests of this partnership. These are to:

- Meet permit compliance for the continued use of recycled water in the Chino Groundwater Basin.
- Maintain commitments for salt management to sustain and enhance the safe yield of the Chino Groundwater Basin.
- Develop infrastructure that addresses long term supply vulnerabilities.
- Provide a source of water for emergency response during severe drought or catastrophic failure of imported water systems infrastructure.
- Enhance recharge and/or reduce pumping in key locations to address subsidence in the Chino Groundwater Basin.
- Develop an integrated solution to produce State and federal environmental benefits.

3.5 PROJECT SUMMARY

3.5.1 Chino Basin Program Overview

The CBP was submitted for Proposition 1 – Water Storage Investment Program (WSIP) funding and was awarded $206.9M in conditional funding in July 2018. Under the WSIP, the CBP is proposed to be a 25-year conjunctive use project that proposes to use advanced water purification to treat and store up to 15,000 AFY of recycled water in the Chino Basin and extract the water during call years, which will likely be in dry seasons.

The proposed CBP is uniquely designed to deliver public benefits including a highly reliable, dedicated environmental water supply to benefit Bay Delta instream flows, as well as enhance water supply reliability and improve water quality for water users in southern California. Among the key attributes of the CBP is the production of a new source of highly reliable water supply for the environment. The challenges of allocating scarce water supplies among water users and the environment faced by State and federal agencies during California's recent historical drought clearly demonstrated the value of creating dependable new supplies for all California water users. Consistent with Governor Newsom's Water Resilience Portfolio Initiative, responsible public water agencies across California are adding resiliency to meet their future water needs by diversifying their water management portfolios through investment in a variety of water use efficiency and supplemental local supply programs and projects. The CBP offers an important opportunity to similarly diversify the tools available to California's environmental managers for sustaining our State's vital aquatic ecosystems.

By increasing additional available groundwater supplies in the adjudicated Chino Groundwater Basin through increased water recycling and storage, and then dedicating a like amount of water for environmental flow purposes, the CBP provides a compelling example of a conjunctive use storage project operating at both ends of the SWP. The reliability of the water designated for groundwater storage is based upon the development of new water supplies from treated wastewater secured from IEUA partner agencies. In the scope of this program, new water is secured, transported, treated, and then deposited in the Chino Groundwater Basin for ecological benefit in the Bay-Delta watershed while providing water supply reliability and improved water quality benefits to IEUA customers and partner agencies.

The CBP will provide for an exchange of new water supplies in the Chino Basin for SWP supplies in Lake Oroville in northern California that would otherwise be delivered to southern California.

The additional Lake Oroville water would subsequently be released in the form of pulse flows in the Feather River to improve habitat conditions for native salmonids and achieve environmental benefits (Exhibit 5).

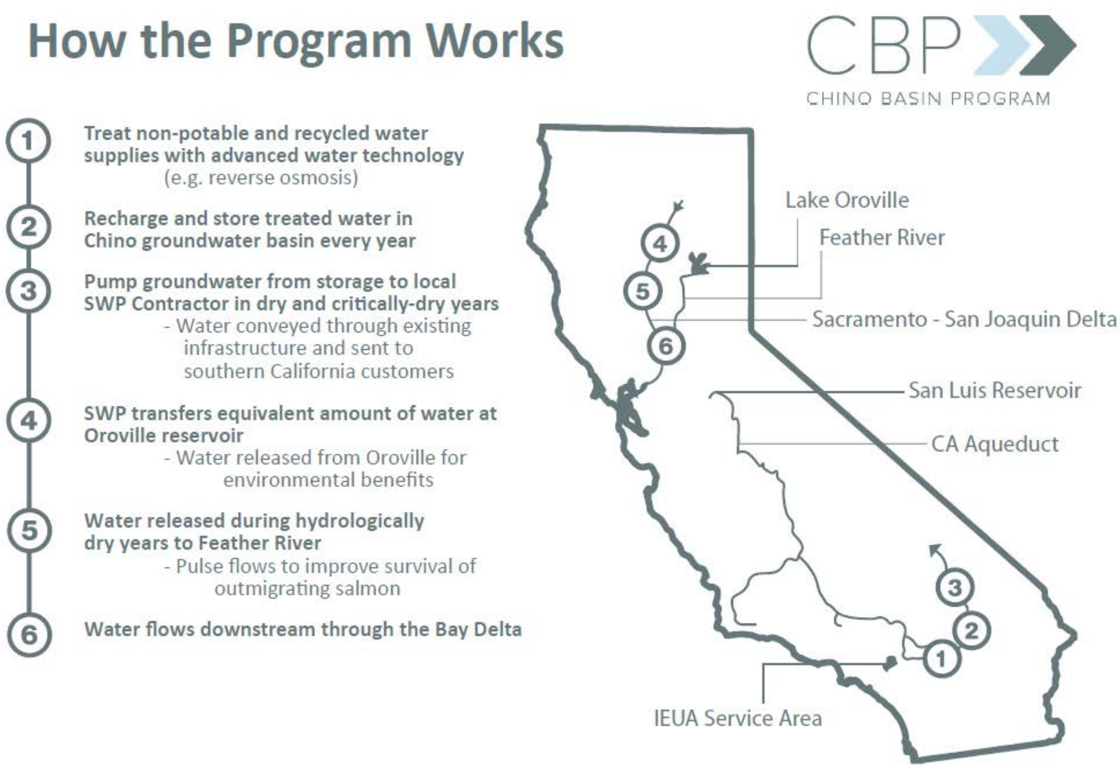

Exhibit 5: Overview of CBP Operations

The Feather River is the principal tributary of the Sacramento River, in the Sacramento Valley of Northern California. The river's main stem is about 73-miles long. Its length to its most distant headwater tributary is just over 210-miles. The lower Feather River begins in Lake Oroville, where its 4-mile-long tributary forks join together — the South Fork, Middle Fork, North Fork, and West Branch Feather Rivers. These and other tributaries drain part of the northern Sierra Nevada, and the extreme southern Cascades, as well as a small portion of the Sacramento Valley. The total drainage Basin is about 6,200-square-miles, with approximately 3,604-square-miles above Lake Oroville.

Since 1967, the Feather River's origin at the confluence of its four forks has been submerged under the waters of Lake Oroville, created by the construction of Oroville Dam in 1967. The construction of Oroville Dam created a fish passage barrier which stopped all anadromous fish, such as salmon, from migrating further upstream. At about 770 feet high, it is the tallest dam in the United States and wields nearly complete control over the flow of the Feather River by creating one of the largest reservoirs in California. The dam is the principal feature for the California SWP, storing water for more than 23 million people and 750,000 acres of farmland in Central and Southern California.

Directly downstream from Oroville Dam lies the Oroville-Thermalito Complex, which consists of two reservoirs, a Forebay and Afterbay, both used for hydroelectricity generation, although the water diverted from the Feather River for this purpose is returned to the river. Flow in the Feather River between the point of diversion and the Thermalito Outlet is commonly referred to as the Low Flow Channel. Flow in the Feather River below the Thermalito Afterbay is referred to as the High Flow Channel (Exhibit 6).

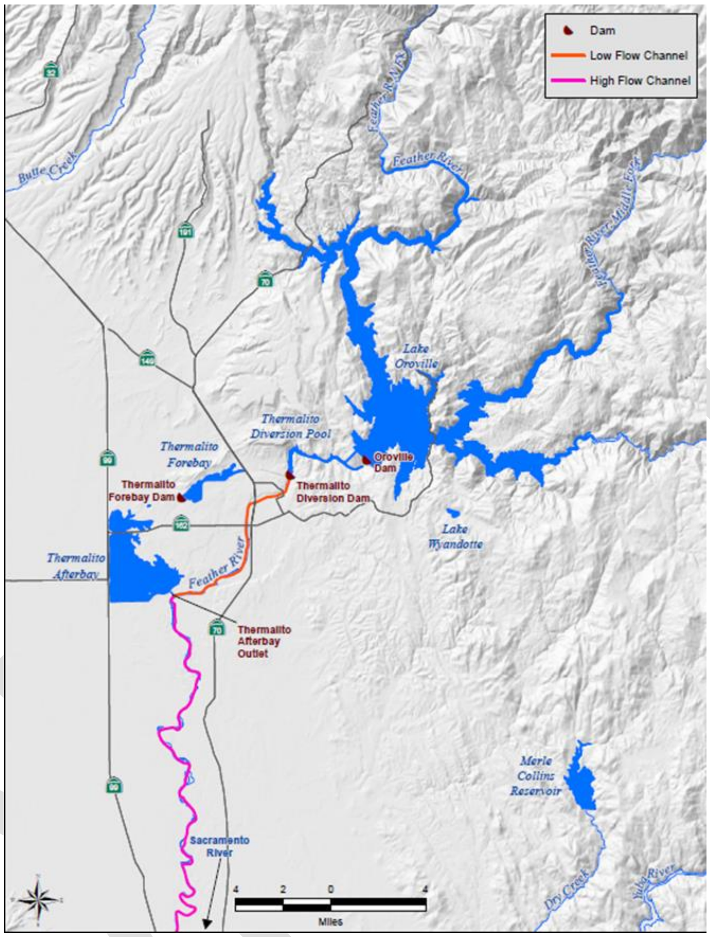

Exhibit 6: Overview of the Lower Feather River where CBP Pulse Flows would be Delivered

15,000 AFY of new water supply would be produced for a period of 25-years to provide for the State exchange, to be used in blocks of up to 50,000 AFY in hydrologically drier years when pulse flows in the Feather River would provide the most ecosystem benefit. The exchange would be administered through agreements with the California Department of Water Resources (DWR), the California Department of Fish and Wildlife, the Metropolitan Water District of Southern California (MWD), and other project partners, the Basin would be operated in a way which dedicates blocks of water of up to 50,000 AFY towards ecosystem benefits north of the Delta. Additionally, new water stored in the Chino Basin will also enhance emergency response water supply availability for IEUA and other participating agencies during crises such as flood or seismic events that disrupt imported water infrastructure. The infrastructure included in the CBP is consistent with infrastructure identified to reduce recycled water salinity for regulatory compliance as well as water infrastructure that has been identified through IEUA's Integrated Water Resources Plan (IRP) effort.

The program would rely on water transfer agreements through MWD. For every acre-foot of water requested for north of the Delta ecosystem benefits, IEUA would pump locally stored groundwater and deliver it to MWD or use the water locally instead of taking raw imported water from MWD (referred to as in lieu). MWD would then leave behind an equivalent amount of water in Lake Oroville to be dedicated and released for the requested ecosystem benefit. It is also envisioned that the CBP would include both storage capacity and borrowing capacity in the Chino Basin as approved by the Chino Basin Watermaster (CBWM or Watermaster). The borrowing capacity would be used to help deliver multiple consecutive, dedicated blocks of water for ecosystem benefits. This water would be borrowed from previously stored groundwater, outside of this program, and replaced over time. Through this approach, the CBP can be operated in a way to provide up to 50,000 AFY of water for up to 7.5 years of the 25-year program (375,000 AF total) as long as the groundwater extraction does not exceed the approved borrow amount. This would result in balancing the PUTs (the components to recharge purified water to the Chino Basin) and TAKEs (the components to extract groundwater and convey potable water supply) to the Chino Basin at the end of the 25-year program, i.e., 375,000 AF would be recharged over 25 years and the same amount would be extracted over 25 years.

The CBP includes two main categories of facilities: PUT and TAKE components. The PUT and TAKE components are summarized in Table 7. The annual PUT (the components to recharge purified water to the Chino Basin) and periodic TAKE cycles (the components to extract groundwater and convey potable water supply) are shown graphically in Exhibit 7.

Table 7
SUMMARY OF PUT AND TAKE COMPONENTS

PUT Components	TAKE Components
• Tertiary recycled water supply and conveyance • Advanced water purification facility (AWPF) • Purified water pumping and conveyance • Groundwater recharge (injection wells and/or recharge basins)	• Groundwater extraction and treatment • Potable water pumping and conveyance • Potable water usage (MWD pump back or in-lieu)
The CBP will comprise both PUT and TAKE components.	

Ultimately, the CBP brings together these components cost-effectively and greatly enhances flexibility to regional and local water operations, particularly during future extended droughts expected as climate change continues to impact California. The CBP's proposed AWPF, new injection and extraction facilities, conveyance facilities, and water system interconnections will allow more optimal management of local water supplies, including meeting water quality requirements for the continued use of recycled water, improved storage and recovery operations, as well as redundancies in water delivery infrastructure that will facilitate future rehabilitation and replacement of existing infrastructure. The CBP will utilize advanced treated water for groundwater recharge, helping to ensure water quality objectives are met and local groundwater supply is sustainable.

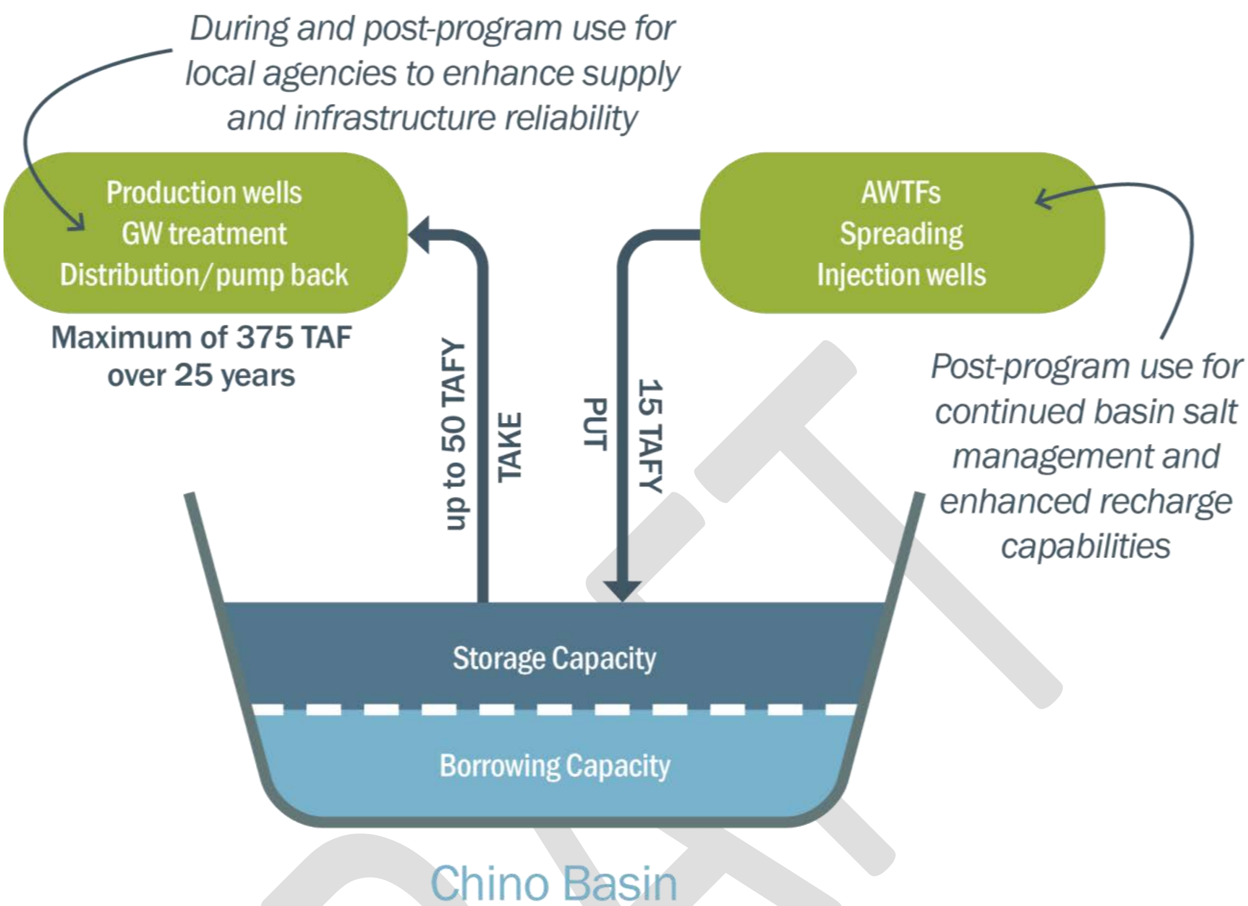

Exhibit 7: CBP PUT and TAKE Overview

3.5.2 Groundwater Storage within the Chino Basin

The CBP will provide up to 150,000 acre-feet (AF) of storage capacity in the Chino Groundwater Basin to be used for deposit of up to 15,000 AF of advanced treated water in each year for 25-years. As previously discussed, this water will be accessible for withdrawal at a maximum capacity of 50,000 AF per year, for up to three consecutive years, when an ecosystem need arises. Through this approach, and depending on existing groundwater conditions, the CBP will be able to provide up to 150,000 AF of advanced treated water through storage in the Chino Groundwater Basin, which enhances operational flexibility and reduces impacts to the Chino Groundwater Basin.

As stated under Subsection 3.3.1, Chino Basin Groundwater, the proposed CBP requires an increase in the Safe Storage Capacity of the Chino Basin in order to accommodate an addition of up to 150,000 AF of managed storage above the existing Safe Storage Capacity (700,000 AF through June 30, 2030, and to 620,000 AF from July 1, 2030 through June 30, 2035). As such, the CBP would contemplate a permanent increase in Safe Storage Capacity up to 850,000 AF in order to accommodate the CBP and after a 25-year period, the increased managed storage will be available for local use, therefore reducing dependence on imported water, improving water quality, and providing a new local water supply for the Basin. This permanent increase would supersede the Safe Storage Capacity that was approved in March of 2021 by the IEUA Board and subsequently approved by the CBWM in May 2021.

3.6 REGIONAL CONTEXT AND PLANNING EFFORTS THAT INFORM THE CBP

The CBP combines various projects that will allow the region to meet the needs identified in the regional planning efforts conducted by IEUA in conjunction with its member agencies. These regional planning efforts enable IEUA to better prepare for the region’s future water needs. Each planning report is backed by technical studies and supporting documentation to ensure regional planning efforts are well informed. Through these planning documents IEUA has identified future needs that the agency must meet in order to continue its track record of providing reliable, clean, and sustainable water to the region.

While each planning report is unique, there are shared themes including:

- The need to diversify water supplies and reduce dependency on imported water
- The anticipated negative impacts of climate change on water reliability
- An increasing need for advanced water treatment
- Furthering the beneficial use of water to restore natural populations and habitats

These themes have been intentionally addressed by components of the CBP. The CBP provides an opportunity to implement projects that address critical needs on a more expedited schedule, providing benefits earlier not only for the local agencies, but for CBP partners across the State.

Provided in Appendix 1, Draft Chino Basin Program Assumptions Technical Memorandum No. 1, under Section 2: Related Studies and Activities, is the complete list of regional planning documents that support the implementation of the CBP. The reviewer interested in details regarding CBP background information can review these documents for additional information.

3.7 REGULATORY REQUIREMENTS

Alternatives developed for the CBP were screened for viability in the context of regulatory compliance. Key regulatory requirements are set forth by the California State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW) and the Regional Water Quality Control Board (RWQCB), Santa Ana Region, which have the following responsibilities:

- SWRCB DDW
    - Administers California’s Drinking Water and Recycled Water Programs;
    - Establishes criteria to protect public health regarding recycled water production and use;
    - Develops Water Recycling Criteria in the California Code of Regulations (CCR), Title 22, which includes regulations for non-potable and potable use projects; and
    - Participates in public hearings and makes recommendations for recycled water permits issued by the RWQCBs.

- RWQCB, Santa Ana Region
    - Establishes and oversees surface water and groundwater quality objectives to protect designated beneficial uses of waters in the region;

- o Issues and enforces water recycling and waste discharge permits and requirements; and
- o Incorporates Title 22 requirements and recommendations from the SWRCB DDW into permits for water recycling and groundwater recharge projects.

Data provided in Appendix 1 (TM1) details the specific regulatory requirements that will govern the various aspects of the CBP. Since the program will include both groundwater replenishment and potable water production, the applicable regulations include:

- IEUA's existing water recycling and recharge permits;
- Groundwater replenishment regulations; and
- Drinking water regulations

The PUT, TAKE, and CBP program alternatives were developed to comply with these broad regulatory requirements. Additionally, a description of future direct potable reuse (DPR) regulations is discussed in Subsection 3.4.

While the CBP does not specifically include DPR concepts at this time, the program could be expanded to include DPR in the future. The CBP concept is based on indirect potable reuse (IPR) that relies on the ability to use the Chino Basin as a water resource storage Basin. A DPR concept could expand upon the advanced water purification concepts developed for the CBP with additional treatment/buffers and mix the water with a raw imported water source prior to water treatment, such as the Rialto Pipeline or upstream of CVWD's Lloyd. W. Michael WTP.

The main difference between IPR projects and DPR projects is the presence of an environmental buffer. An IPR project features an aquifer or reservoir that provides measurable and significant public health benefits. Lacking such an environmental buffer, a DPR project can utilize enhanced reliability from mechanical systems and treatment plant performance to replace the environmental buffer benefits and maintain an equivalent level of public health protection.

3.8 CHINO BASIN PROGRAM SPECIFICS

3.8.1 Initial Groundwater Modeling

During development of the PUT and TAKE alternatives it was determined that initial, interim modeling would be beneficial to help guide the alternatives development process. Wildermuth Environmental, Inc. (WEI, now known as West Yost) completed four interim groundwater modeling scenarios for the initial PUT and TAKE concepts to determine if potential program elements align with the Optimum Basin Management Plan objectives and 2018 Storage Framework Investigation (SFI). The modeling also evaluated potential pumping constraints in the existing well fields with the new extraction wells and groundwater travel time requirements between recharge locations (i.e., injection wells) and extraction wells. This early modeling input allowed the team to refine the PUT and TAKE components to better align with Chino Basin's functional requirements.

The modeling runs evaluated the following PUT and TAKE components:

- Potential PUT locations, including initial and refined injection well locations in Chino Basin Groundwater Management Zone (MZ) 2.
- Potential TAKE locations in MZ-1, MZ-2, and MZ-3.

- Asymmetrical PUT and TAKE with the majority of the groundwater recharge in MZ-2 and extraction in MZ-2 and MZ-3.

The following results were determined from the initial groundwater modeling:

- Confirmed that injection wells located in the northern portion of MZ-2 can support the level of TAKE in the CBP.
- The initial model runs showed that the PUT and TAKE components maintained hydraulic control and minimized impact to pumping sustainability and net recharge.[7]
- The refined MZ-2 injection well locations (selected to reduce purified water conveyance infrastructure) were acceptable and meet travel time requirements.
- Asymmetrical PUT and TAKE is acceptable for recharge in MZ-2 and extraction in MZ-2 and MZ-3.
- TAKE in MZ-1 is feasible with symmetric, upgradient PUT.

Table 10 summarizes the initial groundwater modeling runs with the PUT and TAKE assumptions and the corresponding results. The order of the model runs matched the development of the overall CBP concepts with the formulation and refinements of the PUT and TAKE alternatives.

Table 10
SUMMARY OF INITIAL GROUNDWATER MODELING

Model Run	PUT Assumptions	TAKE Assumptions[1]	Results
1	• 15,000 AFY • Recharge assumptions - MZ-1: 3,000 AFY via 3 injection wells - MZ-2: 9,000 AFY via recharge basins[2] - MZ-3: 3,000 AFY via 3 injection wells	• No pre-delivery (50,000 AFY) • Extraction assumptions - MZ-1: 4,000 AFY - MZ-2: 34,300 AFY - MZ-3: 11,700 AFY • Call occurs in last 3 years of a 10-year cycle (e.g., Years 8-10)	✓ TAKE in MZ-1 is feasible with symmetric, upgradient PUT ✓ Achieved hydraulic control • PUT and TAKE facilities should be closer together in MZ-2 • Utilize injection wells in MZ-2 • Identified potential pumping constraints in the existing MZ-2 and MZ-3 well fields • TAKE in MZ-3 requires more evaluation
2	• 15,000 AFY via 16 injection wells in MZ-2[3]	• No pre-delivery (50,000 AFY) • Extraction in MZ-2 • Call occurs in last 3 years of a 10-year cycle (e.g., Years 8-10)	• Identified potential pumping constraints in the existing well fields • Identified travel time constraints • Achieved hydraulic control
3	• 15,000 AFY • Recharge assumptions - 12,000 AFY via 12 injection wells in MZ-2[3] - 3,000 AFY via 3 injection wells in MZ-3	• No pre-delivery (50,000 AFY) • Extraction in MZ-2 • Call occurs in last 3 years of a 10-year cycle (e.g., Years 8-10)	• Achieved hydraulic control • Elevated groundwater levels in MZ-3 and satisfied the sustainability criteria in existing well fields • Identified potential pumping constraints in the existing MZ-2 well fields

[7] Net recharge is net inflow to the basin excluding the direct recharge of Supplemental Water.

Model Run	PUT Assumptions	TAKE Assumptions[1]	Results
4	• 15,000 AFY via 16 injection wells in MZ-2[4]	• No pre-delivery (50,000 AFY) • Extraction in MZ-2 • Call occurs in last 3 years of a 10-year cycle (e.g., Years 8-10)	• Tightened the distribution of injection wells and extraction wells to reduce the conveyance infrastructure. • Achieved hydraulic control • Minimized impact to sustainability constraints • Meets travel time requirements

Notes: [1]No pre-delivery was assumed for all initial model runs since this is the most conservative extraction assumption. Pre-delivery would have less impacts on the Chino Basin.
[2]Model Run #1 included recharge basins for the following reasons, 1) provide insight on the effectiveness of utilizing the recharge basins, 2) determine if the location of the basins was conducive to a corresponding TAKE, and 3) a preference to utilize existing facilities to reduce cost. The use of recharge basins in the CBP was not considered after Model Run 1 primarily because the capacity of the recharge basins to accept CBP water through the storm season was not feasible without modifying the existing operations at the recharge facilities, the CBP water recharged at the recharge basins takes too long to reach the extraction facilities due to the thick vadose zone in MZ-2, and the proximity to the extraction well field exceeded the sustainability constraints in the MZ-2 well fields.
[3]Injection wells assumed in two east-west alignments on the Pacific Electric Inland Empire Trail and Foothill Boulevard (initial alignments).
[4]Injection wells assumed in two east-west alignments on Foothill Boulevard and Arrow Route (refined alignments).

3.8.2 Chino Basin Program Specifics

In August 2017, IEUA submitted a California Proposition 1 Water Storage Investment Program (WSIP) application for the CBP. In July 2018, the California Water Commission (CWC) approved maximum conditional funding for the proposal in the amount of $206.9 million. In return for this funding, the CBP will provide water supplies for public benefits as defined by WSIP, including ecosystem improvement, water quality improvement, and emergency response benefits.

The CBP will consist of AWPF, injection wells, extraction wells, groundwater treatment facilities, and a pipeline distribution network connecting the facilities to local agencies and MWD for a water exchange with the SWP.

The CBP would introduce extraction wells, groundwater treatment facilities, pipelines, and interconnections to the MWD system, Rialto Pipeline. In addition, the CBP includes up to 17,000 AFY of unused recycled water supplies and external supplies and imported to the IEUA service area as a new supply. As a result of implementation of the CBP, 2,000 AFY of water will be lost through the AWPF process each year.

The infrastructure details were evaluated based on the objectives discussed above. The preferred infrastructure design that best met the objectives defines the CBP and are shown in Exhibit 8. This system would collectively treat and store up to 15,000 AFY of recycled water in the Chino Basin each year, creating a new local water supply. However, the CBP also provides for an exchange of new water supplies in the Chino Basin for SWP supplies in Lake Oroville in northern California that would otherwise be delivered to southern California. Beginning in 2017, IEUA consulted with The Nature Conservancy and other environmental interest groups to develop an innovative project that could advance the Agency's long-range water resource plans and provide significant public benefits to both the State of California and federal interests. The concept of creating a new water supply to use in a water exchange that would allow for a "block of water" to be dedicated to ecosystem improvements in the Feather River (a significant tributary within the Bay-Delta watershed of northern California) in hydrologically drier water years was identified as a high priority with significant public benefits.

The lower Feather River provides habitat for a variety of native resident and anadromous fish including spring-run Chinook salmon (*Oncorhynchus tshawytscha*) which is listed as threatened under the California and federal Endangered Species Acts, and fall-run Chinook salmon that support recreational and commercial fisheries. Low instream flows, increased water temperatures, and decreased water quality during hydrologically drier water years poses a significant threat to the survival of juvenile salmonid species and increased straying of returning adults in California's Central Valley.

The exchange will encompass a capacity to use this new local water supply to support an exchange of 50,000 AFY "call" for water in hydrologically drier years, for up to three consecutive years, that would be delivered from Lake Oroville to be used to enhance instream flows in the Feather River, providing ecosystem benefits during an extended dry period. Releases of this magnitude equate to an increase of instream flows in the low flow channel of the Feather River by 2,500 cubic feet per second (cfs) per day (baseflow is approximately 800 cfs). These releases would be designed to improve the survival rate of migrating juvenile spring-run Chinook salmon. The proposed ecosystem benefit also pledges to work with resource agencies to alter the location of spring-run Chinook smolt releases to a point further upstream. This would increase natal imprinting which in turn decreases adult stray rates upon return.

While the releases will target spring-run Chinook salmon other federally listed species would also benefit. Specifically, pulse releases would provide migratory cues for steelhead (*O. mykiss*), increase forage opportunities for rearing steelhead and green sturgeon (*Acipenser medirostris*), increase access to floodplain habitat, and decrease predation by nonnative species. These benefits are specifically identified in federal planning documents as priority recovery actions to improve habitat and survival rates for these federally listed species.

This exchange element will be in operation during the first 25-years, administered through agreements with DWR, CDFW, MWD, and other project partners. The total delivery commitment is 375,000 AF at the end of the 25-year period. Afterwards, this water will be available for local use, therefore reducing dependence on imported water, improving water quality, and providing a new local water supply for the Basin.

In addition to the unique ecosystem improvement benefits provided by this dedicated water supply, the production of high-quality water in the Chino Basin will also deliver public benefits in the form of enhanced water quality and in the form of local water supply benefits available annually to offset the cost of imported water from MWD or banked for later extraction during hydrologically drier years when MWD supplies are curtailed due to reduced SWP allocations after the State performance period of 25-years.

The CBP also provides local emergency supply benefits during the life of the project, including the first 25-years, for when planned or unplanned service disruptions occur, and provides potential land subsidence mitigation through operational efficiencies using recharged supplies to better manage groundwater pumping in areas sensitive to subsidence.

MWD is a vital partner in implementing the CBP. MWD is a SWP Water Supply Contract holder and would serve as a fundamental party in completing proposed water exchange between supplies stored locally in the Chino Groundwater Basin and SWP supplies stored in Lake Oroville. A principle for MWD participation is that no adverse impacts should occur to MWD, its member agencies, or other SWP contractors due to CBP operations. Because real time extraction capacity from the Chino Groundwater Basin will be limited in comparison to SWP delivery capability to MWD, some reoperation[8] of the MWD distribution system will be necessary. Operations plans will be developed to minimize the potential for reoperations. These plans include the ability for IEUA and local partners to access stored water in the Chino Groundwater Basin in lieu of planned water deliveries from MWD. In addition, the CBP would have the ability to extract stored water, treat it to meet all water quality requirements (the means of treatment are discussed under Subsection 3.9.2, below) and pump it into MWD's water distribution system. This direct delivery will utilize new interconnection infrastructure. These new water conveyance and water system interconnections also provide an important alternative source of water supply to IEUA and its member agencies during any required shutdown of MWD's major pipelines delivering water to the region, such as the Rialto Pipeline, which is planned for rehabilitation as part of a larger rehabilitation plan of MWD's pipelines within their service area.

DWR's SWP infrastructure provides the basis for the Feather River Ecosystem Water Exchange proposed by the CBP. Water supplies for Feather River Pulse flows would be released by DWR, under terms of agreements with CDFW, MWD, and others from Lake Oroville. Similar to MWD's participation conditions, a principle for the CBP operations is that no adverse impacts should occur to the SWP or SWP Water Supply Contract holders. Operations plans will be developed to minimize the potential for SWP reoperations that result in adverse impacts to other SWP purposes, including water deliveries to SWP water supply contract holders. IEUA is working with DWR as they conduct SWP operations analyses to identify potential impacts and develop operational parameters to avoid them. Preliminary operations analysis indicates that reoperations required to achieve the exchange could be successfully completed under most hydrologically dry conditions. IEUA and DWR are developing metrics and conditions that will govern reoperations during an exchange and prevent potential water supply impacts to the SWP and its contractors. Should it be determined that pulse flow exchanges in certain critical year conditions are problematic for SWP and Oroville operations, CDFW has expressed willingness to consider avoiding exchanges under those unique conditions and instead carry out exchanges in years classified as dry or below normal years.

[8] "Re-Operation" means the controlled overdraft of the Basin by the managed withdrawal of groundwater Production for the Desalters and the potential increase in the cumulative un-replenished Production from 200,000 acre-feet to 600,000 acre-feet for the express purpose of securing and maintaining Hydraulic Control as a component of the Physical Solution. [Peace II Agreement § 1.1(d).]

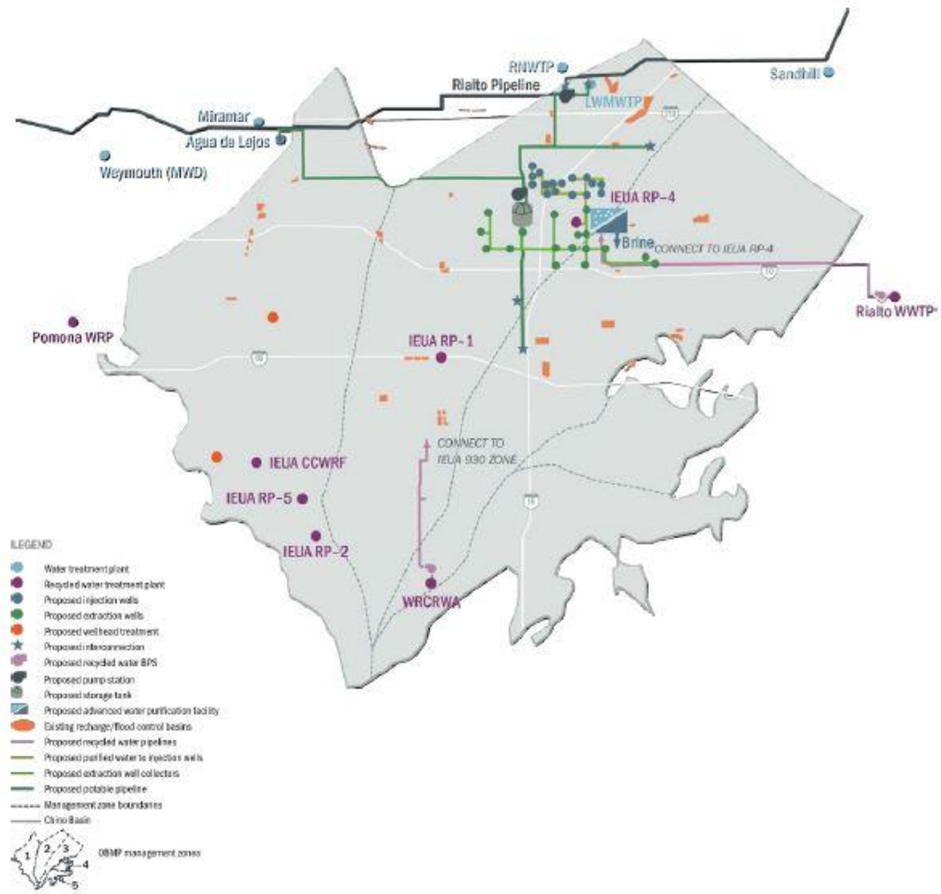

Exhibit 8: Conceptual CBP Infrastructure

Conclusion

A summary of the infrastructure for the CBP is provided below in Table 11. The CBP includes water quality infrastructure, including advanced water treatment and groundwater injection facilities that would collectively treat and recharge/store up to 15,000 AFY of recycled water in the Chino Basin. The CBP would introduce water supply infrastructure, including extraction wells, groundwater treatment facilities, pipelines, and connections that are integrated with the AWPF and injection well system, as well as 17,000 AFY of recycled water, which includes unused recycled water and 6,000 AFY of external supplies.

The CBP would also include a regional pipeline connecting CBP potable water facilities to the region, as well as connections to the MWD with the ability to pump CBP potable supplies into MWD's water distribution system. As previously discussed, this connection would allow the CBP to make 50,000 AFY available to MWD in dry or critical year in exchange for the same amount of supply delivered by the SWP. In return, 50,000 AFY that would otherwise have been exported to MWD would be stored in Lake Oroville and used to enhance instream flows in the Feather River.

Table 11
SUMMARY OF CBP INFRASTRUCTURE

	Infrastructure
Project Category 1: Well Development (Injection Wells, Extraction Wells, Etc.)	16 injection wells (maximum) 17 extraction wells (maximum) 4 monitoring wells (maximum) Use of existing wells including a mix of up to 4 of the following: • Use of existing Rialto Pipeline • Use of existing member agency wells • Use of existing Agua de Lejos WTP Clearwell • Use of existing Lloyd Michael WTP Clearwell
Project Category 2: Conveyance Facilities and Ancillary Facilities	<u>Pipeline</u>: The CBP would ultimately install a total of about 38.65 miles or 204,088 lineal feet (LF) of various types of pipeline. The breakdown of the types of pipeline follows: • 7.1 miles of 8" to 30" pipeline for purified water conveyance • 4 miles of 12- through 24-inch potable southern pipeline • 9 miles of 36" to 72" east west pipeline • 8 miles of 48" to 72" inch potable northern pipeline • 9 miles of 12" to 42" inch collector pipeline • 1,400 ft (8' pipeline) NRWS brine conveyance; NRWS Capacity Units required 2,603 • In lieu Brine Disposal IEBL 6,800 ft 8" pipeline, jack and bore across 300 ft under Hwy 71 and Chino Creek <u>Reservoir</u>: The CBP would install a storage tank with a maximum capacity of 5 MG with possible and in-conduit hydropower facility. <u>Pump Station</u>: The CBP would install 3 pump stations serving various PUT and TAKE facilities. One pump station would serve PUT facilities, while up to two pump stations would support TAKE facilities. The breakdown of the types of pump stations are as follows: • Pump station at RP-4 1,500 HP • Pump Station with a max 9,300 HP, and a max of 31,100 gpm • Second Pump Station 700 HP 6,200 gpm capacity <u>Turnouts</u>: The CBP would install a maximum of 6 turn-outs that would be between 24" and 54" in size to support TAKE facilities at various member agency locations throughout the Chino Basin
Project Category 3: Groundwater Storage Increase	The CBP contemplates a permanent increase in Safe Storage Capacity of 850,000 AF
Project Category 4: Advanced Water Purification Facility and Other Water Treatment Facilities	<u>AWPF</u>: The CBP would install an AWPF at RP-4, which will ultimately have a capacity 15,000 AFY. The intake of recycled water at this facility will total 17,000 AFY, with a resulting 15,000 AFY of purified water derived from the AWPF processes. <u>Wellhead Treatment</u>: The CBP may install up to 2 wellhead treatment facilities at locations that have yet to be selected.

How the CBP Meets Objectives

The CBP also helps address local and state/federal objectives as follows:

- **Meet Permit Compliance for the Continued Use of Recycled Water in the Chino Groundwater Basin:** The project provides groundwater recharge facilities to recharge high quality recycled water, thus reducing TDS levels within the Chino Groundwater Basin.

- **Maintain Commitments for Salt Management to Sustain and Enhance the Safe Yield of the Chino Groundwater Basin:** With the implementation of AWPF with an expected effluent concentration of 100 mg/L, the recycled water TDS will be significantly reduced.
- **Develop Infrastructure That Addresses Long Term Supply Vulnerabilities:** The project improves the use of recycled water at a regional level through regional pipelines and enhances local groundwater supplies through additional groundwater wells and wellhead treatment.
- **Provide a Source of Water for Emergency Response:** The project results in 15,000 AFY in local supplies which can be used to augment the water supply portfolio during unplanned or catastrophic events.
- **Enhance Recharge and/or Reduce Groundwater Production to Address Subsidence:** The project enhances the recharge of water to curtail future subsidence, thus securing future groundwater supplies.
- **Develop an Integrated Solution to Produce State and Federal Environmental Benefits:** The project develops a highly reliable new water supply formally dedicated to environmental benefit that can be deployed dynamically and managed flexibly to address varying and changing ecological needs.

3.9 CHINO BASIN PROGRAM PUT FACILITIES

The CBP includes two main categories of facilities: PUT, the components to recharge purified water to the Chino Basin, and TAKE, the components to extract groundwater and convey potable water supply.

The PUT components are as follows:

- **Tertiary recycled water supply** of 17,000 AFY to produce 15,000 AFY of purified water.
- **Tertiary recycled water conveyance** to supply additional tertiary recycled water to IEUA's recycled water distribution system and the AWPF(s).
- **Advanced water purification** to treat the tertiary recycled water and produce purified water suitable for groundwater recharge through subsurface application.
- **Purified water pumping and conveyance** to convey water from the AWPF(s) to the injection wells for groundwater recharge.
- **Groundwater recharge using injection wells**

To support the development of the PUT, TAKE, and program alternatives, WEI completed initial groundwater modeling for the PUT and TAKE components as shown above in Subsection 3.8.1.

3.9.1 Tertiary Recycled Water Supply and Quality

To meet the CBP objectives, various recycled water supply sources were considered that would allow IEUA to expand both direct use and groundwater recharge of tertiary recycled water as well as meet the future needs of CBP. The CBP will require 17,000 AFY of tertiary recycled water to produce 15,000 AFY of purified water.

The recycled water supply sources considered for the CBP include IEUA, the Rialto WWTP, and the Western Riverside County Regional Wastewater Authority (WRCRWA) treatment plant. The seasonal and diurnal availability of recycled water could impact the AWPF sizing and operations. An evaluation of seasonal availability was also conducted to confirm that the AWPF could be supplied with a constant supply of recycled water to most cost-effectively produce purified water.

New recycled water supplies that can provide constant flow year-round, such as WRCRWA and the Rialto WWTP, have the biggest benefit to the CBP to supply the AWPF at a constant rate and eliminate the need for seasonal storage.

Diurnal recycled water supply fluctuations were assumed to be managed with existing and new equalization basins and recycled water storage tanks, which will be analyzed in more detail in future phases of the Program. The external recycled water supplies both have existing or planned equalization that will allow them to deliver a constant recycled water supply to IEUA's system Equalization basins to manage diurnal recycled water supply fluctuations within IEUA's system were assumed for the AWPF components.

An analysis of IEUA's recycled water system was also completed using IEUA's recycled water model to confirm that recycled water can be conveyed to the appropriate locations in the recycled water system to meet current and future direct use and tertiary GWR demands as wells as future CBP demands.

Overall Recycled Water Quality

The overall impact of recycled water quality on the AWPF design is discussed in this section.

For the RP-4 alternatives, it is assumed that the AWPF influent would similarly reflect the RP-4 values reported in Table 12 with slightly lower chloride, sodium, pH, and NDMA levels for 60 percent of the influent flow on average. The remaining 40 percent of the RP-4 AWPF influent flow would reflect the water quality from IEUA's recycled water distribution system, comprised of a varying blend of recycled water from RP-1, WRCRWA, and/or the Rialto WWTP. Table 12 summarizes the projected water quality for the RP-4 AWPF alternatives assuming the following for each condition and this projected water quality was used to develop the RP-4 AWPF alternatives.

- **Average:** 60 percent RP-4 and 40 percent RP-1.
- **Minimum:** Minimum of RP-4, RP-1, WRCRWA, and the Rialto WWTP.
- **Maximum:** Maximum of RP-4, RP-1, WRCRWA, and the Rialto WWTP.

Table 12
PROJECTED AWPF INFLUENT WATER QUALITY

Constituent (1)	Average	Min	Max
Calcium (mg/L Ca^{2+})	41	25	68
Magnesium (mg/L Mg^{2+})	9.4	7.0	11
Sodium (mg/L Na^{+})	96	75	140
Potassium (mg/L K^{+})	15	14	18
Barium (mg/L Ba^{2+})	0.012	0.008	0.053
Copper (mg/L Cu^{+2})	0.004	0.0004	0.079
Iron (mg/L Fe^{2+})	0.068	0.000	0.112
Manganese (mg/L Mn^{2+})	0.018	0.002	0.037
Ammonium (mg/L NH_{4+} as N)	<0.1	<0.1	14.0
Aluminum (mg/L Al^{3+})	0.077	0.024	1.2
Bicarbonate (mg/L HCO_{3-})	166	100	230
Sulfate (mg/L SO_4^{2-})	52	39	264

Constituent [1]	Average	Min	Max
Chloride (mg/L Cl^-)	112	58	190
Fluoride (mg/L F^-)	0.22	0.10	0.54[2]
Nitrate (mg/L NO_{3-} as N)	5.1	2.7	12
Phosphate (mg/L PO_4^{3-})	2.6	0.1	12
Silica (mg/L SiO_2)	22	4.0	31
pH	7.06	5.9	8.5
Alkalinity (mg/L as $CaCO_3$)	136	82	178
Hardness (mg/L as $CaCO_3$)	142	91	230
Boron (mg/L)	0.24	0.18	0.63
TOC (mg/L)	4.9	3.4	48
TDS (mg/L)	475	199	660*
1,4-Dioxane (µg/L)	1.0	ND	1.1
NDMA (ng/L)	4.4	<1.4	7.0
NMOR (ng/L)	66	6.9	350
Temperature(°C)	25	16[3]	36

Notes: This data assumes an Average of 60 percent RP-4 and 40 percent RP-1; a Minimum of RP-4, RP-1, WRCRWA, and the Rialto WWTP; and, a Maximum of RP-4, RP-1, WRCRWA, and the Rialto WWTP.
(2) Removed 68 mg/L outlier from WRCRWA data set.
(3) Removed 6.7°C outlier from WRCRWA data set.

Recycled Water Hydraulic Modeling

The recycled water model was used to support the development of CBP alternatives to (1) complete a recycled water distribution analysis to confirm that IEUA's existing recycled water system has sufficient capacity to convey water and maintain adequate pressures once the external supplies and the AWPF are incorporated into the system and (2) estimate tertiary recycled water pumping requirements whether the AWPF is located at RP-1 or RP-4.

The elements of the recycled water system included in the hydraulic model and recent system improvements are listed below:

- Pipelines: The recycled water pipelines are included in the hydraulic model, and include the pipeline length, diameter, roughness coefficient, and a check valve if the pipe does not allow reverse flow. The Baseline Pipeline and the Napa Lateral pipelines were constructed after the 2016 model calibration and are included in the model.
- Junction: The junctions in the recycled water model are necessary to connect joining pipelines at intersections. The elevation is defined at the junctions and necessary for the model to calculate system pressures. The system demands and demand patterns are also applied to the junctions.
- Tanks: The recycled water system includes 22.5 MG of available storage within six storage tanks. These tanks provide operational storage during times of peak demands. The modeled tanks include properties such as elevation, minimum and maximum water level, and diameter.
- Pumps: The pumps at each pump station are included in the model and run based on their pump curve and operational controls. The RP-1 1158 Pump Station was recently upgraded to include higher capacity pumps and was also updated in the model.

- Reservoirs: Fixed head reservoirs[9] are used to model the water recycling plants.
- Valves: The model includes both pressure reducing valves (PRV) and flow control valves (FCV). The PRVs are representative of actual PRVs in the recycled water system that allow higher pressure zones to supply lower pressure zones. The PRVs includes the valve diameter, pressure setting, and operational controls as applicable. The FCVs in the model are located on the discharge side of IEUA's water recycling plants to control the recycled water supply. Diurnal production curves developed from the SCADA data during the 2016 calibration are applied to each plant to mimic the actual production at each plant throughout the day.

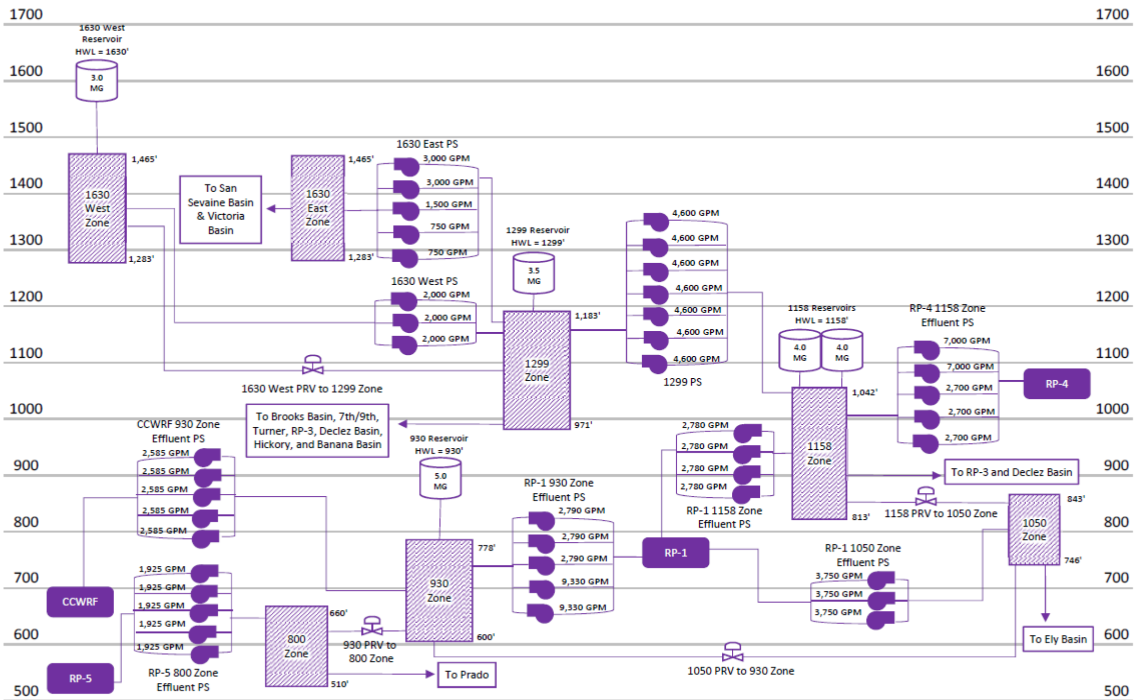

Exhibit 9: Recycled Water System Hydraulic Profile

3.9.2 Advanced Water Purification

The PUT alternatives include advanced water purification to meet long-term salinity requirements in the Chino Basin. In addition, subsurface application through injection wells is assumed for groundwater replenishment, which also requires purified water. This section discusses the AWPF assumptions for the PUT alternatives.

Potential AWPF Locations

The potential AWPF locations impact treatment process selection and infrastructure requirements for tertiary recycled water, purified water, and brine conveyance. The closer that the AWPFs can be sited to source water supply (tertiary recycled water), the groundwater recharge locations, and brine disposal will result in lower capital and operating costs. To avoid additional costs and

[9] The reservoir is operated by a specified head elevation. This elevation is maintained in the model.

schedule delays associated with siting and purchasing land for an AWPF, only IEUA-owned or stakeholder-owned properties are being considered for the CBP.

Of IEUA's existing four regional water recycling facilities (RP-1, RP-4, RP-5, and CCWRF), RP-1 and RP-4 were identified as the two most-feasible locations for the future AWPF. However, ultimately, the Technical Memorandum No. 2 (TM2), Chino Basin Put, Take, and Program Alternatives Evaluation (Appendix 2) indicates that RP-4 has been selected as the preferred location for the AWPF over RP-1 due to its proximity to recharge basins, its greater capacity to pump to recharge basins, future injection wells, space availability, ability to integrate with future direct potable reuse opportunities and proximity of surface water treatment plants, its consistency with the SFI recharge prioritization, and overall operational flexibility. An AWPF at RP-4 will meet regulatory and permit requirements. Additionally, RP-4 is located near extensions of the Non-Reclaimable Wastewater System (NRWS) for brine disposal.

Purified Water Goals

Purified water must meet the treatment goals set forth by the CCR Title 22 Division 4, Chapter 3, Article 5.2 for IPR and groundwater replenishment through subsurface application. In addition, product water must meet the Basin Plan groundwater objectives for minerals and drinking water MCLs and Recycled Water Policy requirements regarding the SNMP, maximum benefit, and monitoring constituents of contaminants of emerging concern in the Upper Santa Ana River Basin (hydraulic sub area 801.21). Table 13 summarizes the treated water goals based on this regulatory framework.

Table 13
PURIFIED WATER GOALS FOR IPR GROUNDWATER REPLENISHMENT VIA SUBSURFACE INJECTION IN THE UPPER SANTA ANA RIVER BASIN

Parameter	Criteria	Regulation
Enteric Virus	>12 log reduction	CCR
Giardia cysts	>10 log reduction	CCR
Cryptosporidium oocysts	>10 log reduction	CCR
TOC	≤ 0.25 mg/l in 95% of weekly samples within first 20 weeks ≤ 0.5 mg/L 20-week running average and average of last 4 weekly samples	CCR
Total Nitrogen	≤ 10 mg/L average of twice weekly samples	CCR
Nitrate (as N)[1]	≤ 4.2 mg/L 5-year running average	Basin Plan
1,4-dioxane	>0.5 log reduction by AOP	CCR
Inorganic Chemicals in Table 64431-A, except for nitrogen compounds	≤ MCLs in quarterly samples	CCR
Radionuclide Chemicals in Tables 64442 and 64443	≤ MCLs in quarterly samples	CCR
Organic Chemicals in 64444-A	≤ MCLs in quarterly samples	CCR
Disinfection Byproducts in Table 64533-A	≤ MCLs in quarterly samples	CCR
Lead and Copper	90th percentiles ≤ Action Levels	CCR
Secondary Drinking Water Contaminants in Tables 64449-A and 64449-B	≤ sMCLs in annual samples	CCR
Priority Toxic Pollutants in 40 CFR Section 131.38	≤ DDW-specified priority toxic pollutants and NLs[(2)] in quarterly samples	CCR
DDW-Specified Chemicals based on Engineering Report, Affected Groundwater Basin(s), and Wastewater Source Control	As specified by DDW in quarterly samples	CCR

Parameter	Criteria	Regulation
NDMA	≤ 10 ng/L	CCR
TDS[1]	≤ 680mg/L	Basin Plan
Chloride	≤ 500 mg/L	Basin Plan
Sulfate	≤ 500 mg/L	Basin Plan
Boron	≤ 0.75 mg/L	Basin Plan
Sodium	≤ 180 mg/L for municipality use	Basin Plan
Sodium Absorption Ratio	≤ 9 for agricultural use	Basin Plan

Notes: [1] Criteria applies the Basin Plan's "Maximum Benefit" objectives but if the Regional Board determines it is lowering the water quality and not a maximum benefit to the Basin, the "Antidegradation" objectives will apply with Nitrate (as N) and TDS needing to meet 2.9 mg/L and 250 mg/L, respectively, for a 5-year running average (RWQCB – SA, 2019).
[2] Notable among which is the NDMA goal of 10 ng/L or less. (Listed as a separate row in this table for emphasis)
[3] A draft of the Lead and Copper Rule Long-Term Revisions was published in November 2019 and a final rule is expected to be released in fall 2020. Compliance is likely to begin around 2023.

Process Rationale

IEUA is planning to upgrade the secondary treatment systems at both RP-1 and RP-4 plants with membrane bioreactor (MBR) systems, although the RP-1 upgrade is planned in the near term (online by 2030) and RP-4 is in the long term (approximately 2040). It is assumed that if the AWPF is implemented at RP-4 the treatment train would be *Membrane Filtration (MF)- Reverse Osmosis (RO)- Ultraviolet (UV) Advanced Oxidation Process (AOP) (MF-RO-AOP)*. IEUA could potentially convert an AWPF at RP-4 to MBR-RO-AOP when the MBR is implemented at RP-4. As IEUA has selected RP-4 as the preferred AWPF location, the *Membrane Bioreactor (MBR)-Reverse Osmosis (RO)- Ultraviolet (UV) Advanced Oxidation Process (AOP) (MBR-RO-AOP)* treatment train at RP-1 will not be discussed further in this Project Description.

This process train—MF-RO-AOP—is described in subsequent sections.

RP-4 Membrane Filtration (MF)- Reverse Osmosis (RO)- Ultraviolet (UV) Advanced Oxidation Process (AOP) (MF-RO-AOP)

All existing potable reuse facilities in California utilize MF as pretreatment for RO. MF removes suspended solids, reduces turbidity, and achieves credit for up to 4-log reduction of protozoa through daily integrity testing. If the AWPF is constructed at RP-4, then the treatment train would be MF-RO-AOP since the future conversion at RP-4 to MBR is planned for the long term.

Additionally, the MBR-RO-AOP process at RP-1 would remove pathogens including Virus, *Giardia* cysts, Virus, and *Cryptosporidium* oocysts to at or below the minimum regulatory requirements. If desired, IEUA could claim additional virus credit through final chlorine disinfection though this level of treatment is not required at this time (refer to Appendix 1 [TM1, Subsection 4.2.3] for the specific pathogen log removal credits).

AWPF Capacity and Redundancy Assumptions

The most economical approach to size an AWPF is to provide a near constant flow of approximately 17,000 AFY to produce the purified water goal of 15,000 AFY. Exhibit 10 shows the required flow rates and assumed recoveries MF-RO-AOP at RP-4. MF backwash waste would return to the upstream wastewater treatment plant in order to minimize losses through the system. During the water purification process, of the stream of recycled water that the AWPF would receive, a small percentage is lost to the water purification process. While available proprietary and non-proprietary high recovery RO treatment technologies could conceivably achieve 93%

recovery, pilot testing achievable recovery on the anticipated water quality and corresponding impacts to concentrate disposal would be required before constructing a full-scale system.

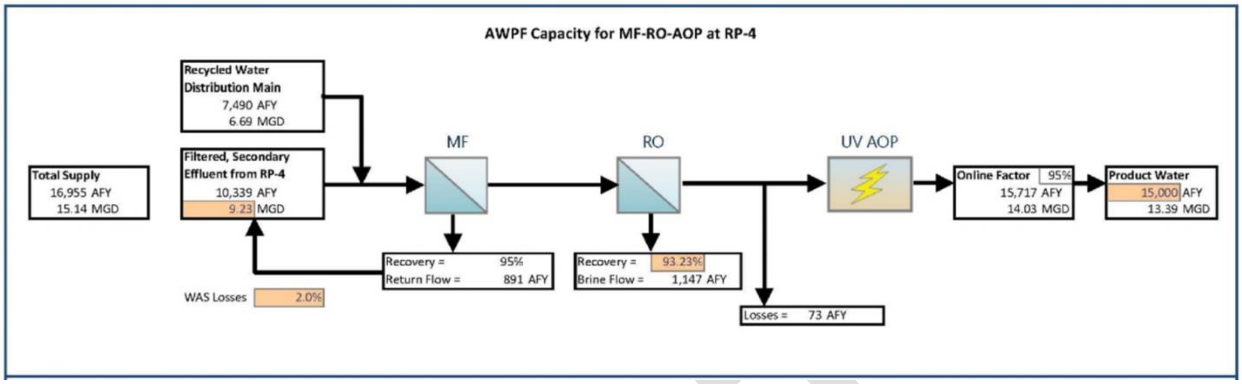

Exhibit 10: AWPF Capacities for MF-RO-AOP at RP-4

Redundancy requirements are established by the function of the facility and criticality of continuous full capacity operations. In order to maintain the high online factor required to reliably produce 15,000 AFY with limited supply, the design includes fully redundant trains for all processes. Table 15 summarizes the redundancy planned for the AWPF along with the anticipated offline time.

Table 15
REDUNDANCY REQUIREMENTS

Process	Duty + Standby	Online Factor	Required Downtime
MF System			
MF Feed Tanks	1 + 0	98.6%	5 days per year to drain, clean, and inspect
MF Feed Pumps	3 + 1	100%	21 days per 5 years per pump
MF Strainers	3 + 1	100%	14 days per year per strainer
MF Trains	7 + 2	100%	12 days per year per train for CIP; 7 days per year per train for maintenance; 100 minutes per day for MC/backwash/PDT
MF Backwash Pumps	1 + 1	100%	21 days per 5 years per pump
MF Backwash Blowers	1 + 1	100%	2 days per year per blower
RO System			
RO Feed Tank	1 + 0	98.6%	5 days per year to drain, clean, and inspect
RO Feed Pumps	4 + 1	100%	21 days per 5 years per pump
Cartridge Filters	4 + 1	100%	1 day per 3 months per cartridge filter
RO Trains	4 + 1	100%	1 day per train per year for CIP; 28 days per 5 years per train for maintenance
RO Interstage Booster Pumps	4 + 1	100%	21 days per 5 years per pump
RO Flush Tank	1 + 0	98.6%	5 days per year to drain, clean, and inspect
RO Flush Pumps	1 + 1	100%	21 days per 5 years per pump
UV-AOP System			
UV Reactors	1 + 1	100%	14 days per year per reactor for bulb, sleeve, and ballast replacement

Process	Duty + Standby	Online Factor	Required Downtime
Factor to Account for Time to Switch Over to Duty Train in the Event of Failure		99.5%	20 failures per year; 2 hours to recover from each
Anticipated Online Time		**95.4%**	

The proposed AWPF located at RP-4 would utilize an MF-RO-AOP treatment process. The sizing assumptions for the 15,000 AFY AWPF at RP-4 are summarized in Table 16, below.

Table 16
SIZING ASSUMPTIONS FOR 15,000 AFY AWPF AT RP-4

Process or Facility	Description	Units	Value[1]
Equalization	Equalization Tank	MG	1.2[2]
MF System	MF system production capacity	MGD	15.1
	MF feed pumps	No.	3 + 1
	Capacity, per pump	gpm	4,700
	MF strainers	No.	3 + 1
	Capacity, per strainer	gpm	4,700
	MF trains	No.	7 + 2
	Filtrate flow, per train	gpm	1,500
	MF backwash pumps	No.	1 + 1
	Capacity, per pump	gpm	2,010
RO System	RO system production capacity	MGD	14.1
	RO feed tank	gal	105,000
	RO feed pumps	No.	4 + 1
	Capacity, per pump	gpm	2,640
	Cartridge filters	No.	4 + 1
	Capacity, per cartridge filter	gpm	2,640
	RO trains	No.	4 + 1
	Permeate, per train	gpm	2,450
	RO interstage booster pumps	No.	1 Per Train
	Capacity, per pump	gpm	650
	RO flush tank	gal	18,900
	RO flush pumps	No.	1 + 1
	Capacity, per pump	gpm	900
UV-AOP System	UV-AOP system production capacity	MGD	14.1
	UV reactors	No.	2 + 1
	Flow, per reactor	gpm	4,900
Chemical Facilities	Sulfuric acid tank	No.	2
	Tank volume	gal	11,900
	Sodium hypochlorite tank	No.	2
	Tank volume	gal	13,100
	Caustic soda totes	No.	2

Process or Facility	Description	Units	Value[1]
	Tote volume	gal	300
	Ammonium sulfate tank	No.	1
	Tank volume	gal	13,500
	Antiscalant tank	No.	1
	Tank volume	gal	6,100
	Hydrogen peroxide tank	No.	1
	Tank volume	gal	7,300
	Sodium bisulfite tote	No.	2
	Tote volume	gal	300
Post Treatment	Lime system	No.	2 + 0
	Decarbonator system	No.	2 + 0
CIP Systems	MF CIP system tanks	No.	2
	RO CIP system tanks	No.	2
	RO CIP cartridge filter	No.	1

Notes: [1]Equipment quantities are shown in the format of duty + standby, i.e., MF feed pumps are 3 + 1, or 3 duty + 1 stand-by.
[2]Size is limited by available space near existing chlorine contact basins. The size and location of the equalization tank will be evaluated in more detail during future phases of the project.

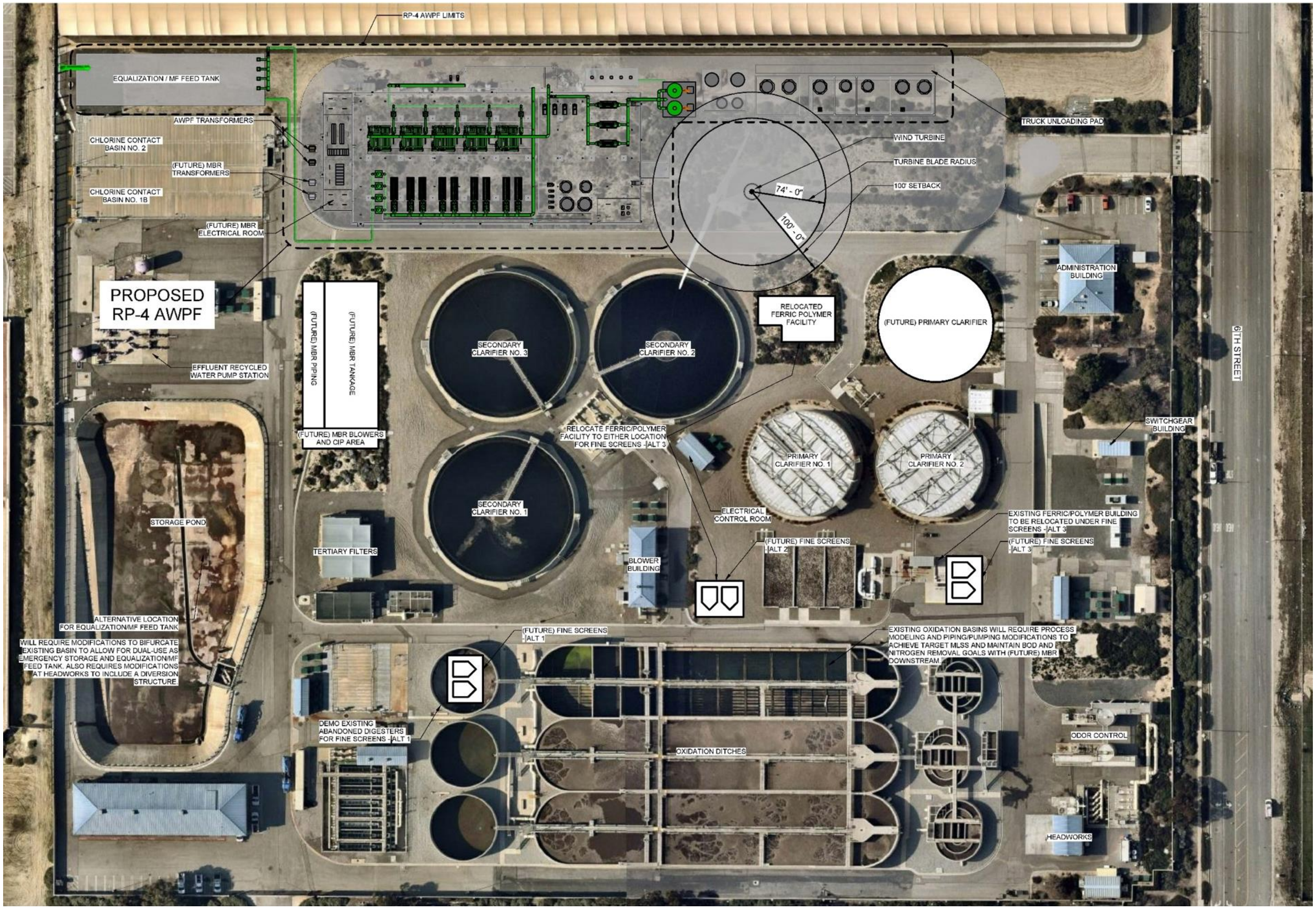

Exhibit 11: RP-4 Site Layout

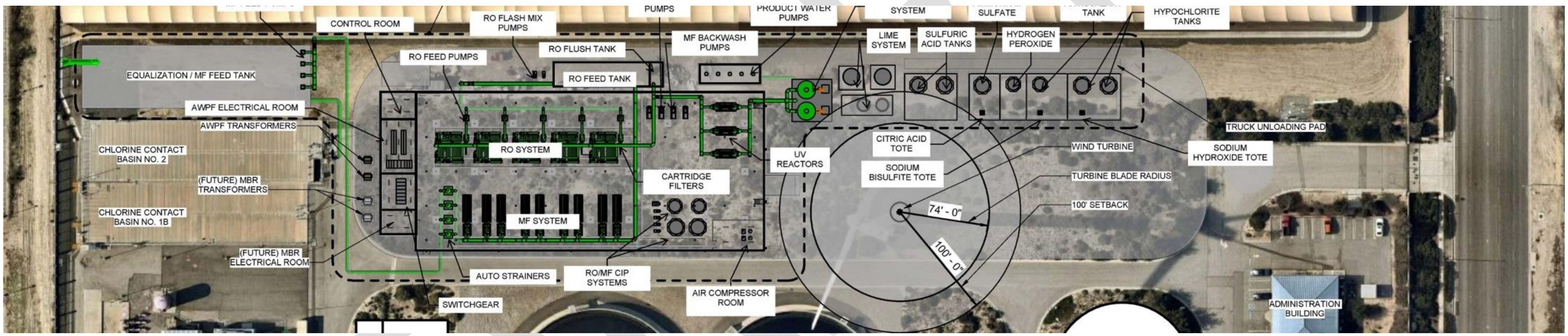

Exhibit 12: RP-4 AWPF Site Layout

Brine Disposal

As stated above, during the water treatment process, the stream of recycled water that the AWPF would receive, a small percentage is lost to the water purification process. This small percentage that is lost to the water purification process is called brine. The AWPF requires brine disposal for the brine stream generated by RO treatment. Refer to Technical Memorandum 3 (TM3), provided as Appendix 3, which presents a summary of NRWS infrastructure, available capacity in each system, requirements for new connections and tie-ins, a summary of system costs for connection capacity and operations, and future considerations for brine conveyance and scaling mitigation. New connections to the NRWS consider the existing hydraulics, requirements for physical connection, and operations and maintenance.

IEUA operates the Non-Reclaimable Wastewater System (NRWS), which is infrastructure for disposal of high-salinity wastewater (brine) and other non-reclaimable high-strength wastewater. The NRWS is comprised of three pipelines shown on Figure 3: the NRWS pipeline, the Etiwanda Wastewater Line (EWL), and the Inland Empire Brine Line (IEBL). The NRWS is split into two service areas within IEUA's jurisdiction. The North NRWS is comprised of the NRWS pipeline and EWL, while the South NRWS is comprised of the IEBL. The NRWS pipeline and the EWL ultimately convey flow to the Los Angeles County Sanitation Districts (LACSD) through the Joint Outfall System (JOS). The IEBL directly conveys flow to the Orange County Sanitation District (OCSD) by gravity. The NRWS is shown graphically in Exhibits 13 and 14.

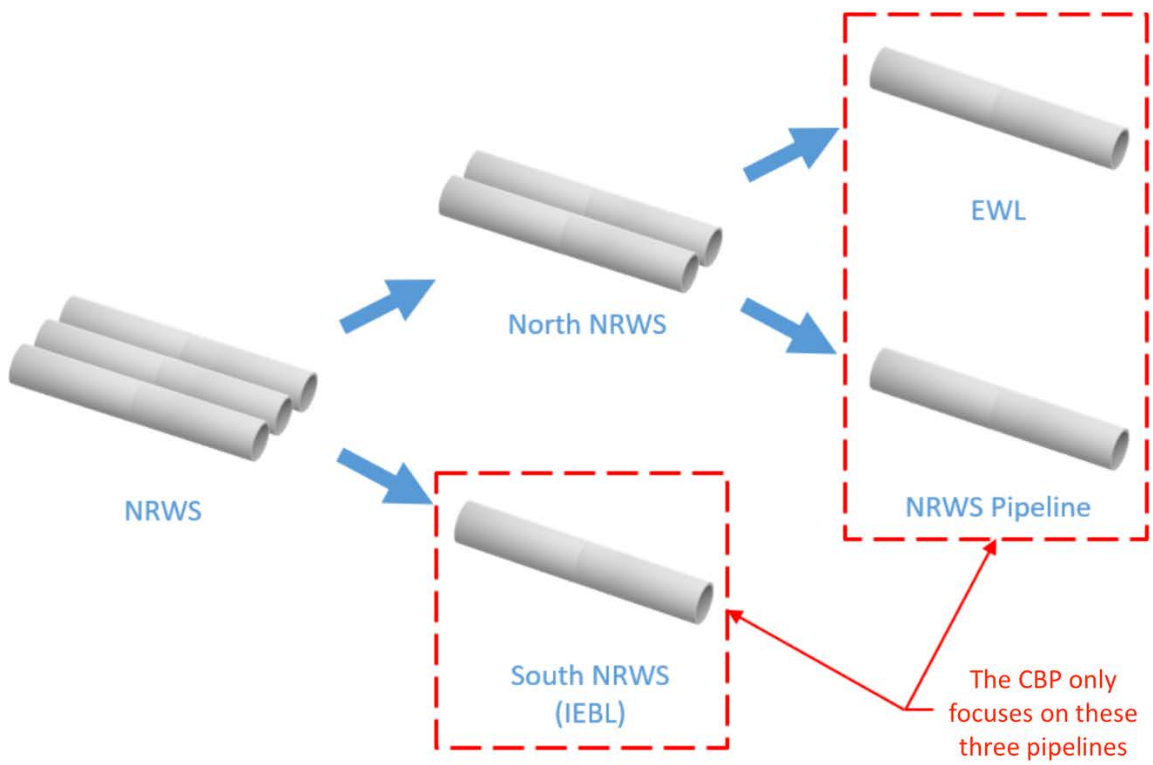

Exhibit 13: NRWS Nomenclature

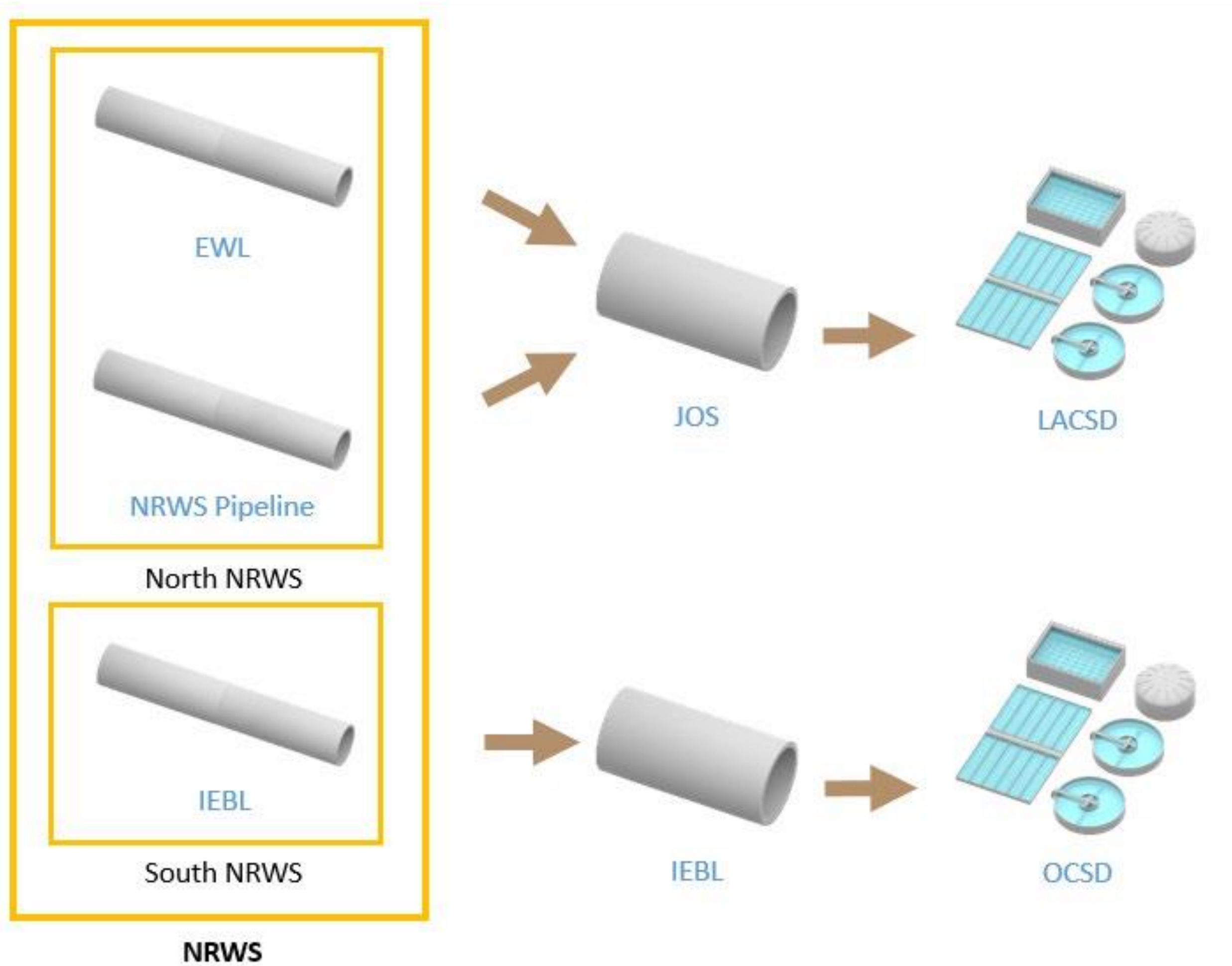

Exhibit 14: Overall System Schematic

New Connections to the NRWS

To discharge to the NRWS, the user must obtain a Wastewater Discharge Permit and purchase capacity units (CU) for the respective pipeline. The typical terms for the permit are five years for the NRWS pipeline and EWL and two years for the IEBL. Permit application and renewal fees vary by industry and are listed in the Resolutions for each pipeline. Exhibit 15 summarizes the steps to obtain a permit.

Exhibit 15: Typical Process for Wastewater Discharge Permit

Plans detailing the facility layout, points of connection to the NRWS, and monitoring station must be submitted with the Wastewater Discharge Permit Application. The materials that must be submitted with the Wastewater Discharge Permit Application can be located at IEUA's website.[10]

3.9.3 Groundwater Recharge

The PUT alternatives include recharging purified water to the Chino Basin to achieve two goals: capitalizing on storage within the Basin as well as reducing the overall salinity of the Basin. The groundwater recharge component includes both where to recharge the water and how to recharge the water.

This section discusses the groundwater recharge assumptions for the PUT alternatives, which are presented in the following sections:

- Recharge locations in the Chino Basin, which need to consider the characteristics of the Chino Basin, groundwater quality, and recovery of the stored water.
- Recharge method, including injection wells and recharge basins
- Monitoring wells

Recharge Locations

The northern portion of MZ-2 was identified as the primary recharge location for purified water as part of the Storage Framework Investigation (WEI, October 2018). The northern portion of MZ-2 is generally outside of known areas of contamination and does not have known subsidence constraints or significant pumping depressions. The Storage Framework Investigation also included managed storage and recovery programs within operational bands 2, 3, and 4. For these storage and recovery programs, ASR wells, which can be used for both injection and extraction, were assumed in the northern MZ-2 area in two east-west alignments in Rancho Cucamonga. ASR wells were not considered in the CBP as current regulations do not allow ASR wells to inject and extract purified recycled water, although this may be considered in the future with evolving regulations.

For the PUT alternatives, two sets of potential injection well locations in MZ-2 were identified, which are as follows:

Initially, potential injection well locations were identified in MZ-2 in Rancho Cucamonga in similar locations as assumed for the Storage Framework Investigation. One east-west alignment was assumed on the Pacific Electric Inland Empire Trail and one along Foothill Boulevard.

In order to reduce the infrastructure required to convey the purified water from the AWPF to the injection wells, a second set of injection well locations have been identified in MZ-2. These were located further south than the initial set (closer to both RP-1 and RP-4) to reduce the overall purified water pipeline lengths. The east-west alignments of injection wells were assumed along Foothill Boulevard and Arrow Route in Rancho Cucamonga.

Preliminary groundwater modeling was completed for both sets of preliminary injection well locations and results indicate that both alternatives align with the OBMP objectives and the SFI. The second set of injection wells (located on Foothill Boulevard and Arrow Route) are assumed for the PUT alternatives to reduce the overall infrastructure costs. This scenario would reduce the

[10] https://www.ieua.org/everything-water/pretreatment-source-control/wastewater-discharge-permits/

infrastructure required to convey the purified water from the AWPF to the injection wells. These were located further south and closer to both RP-1 and RP-4 to reduce the overall purified water pipeline lengths. The east-west alignments of injection wells were assumed along Foothill Boulevard and Arrow Route in Rancho Cucamonga. Injection wells in MZ-1 and MZ-3 were also investigated as part of the project:

Recharge Method

Existing recharge basins are used to recharge a combination of stormwater, tertiary recycled water, and imported water into the Basin. These recharge basins are highly utilized, especially seasonally during storm events, and do not have sufficient year-round capacity for the additional purified water (15,000 AFY) to be recharged as part of the CBP. The PUT alternatives were developed assuming injection wells would be used to recharge purified water.

Injection Wells

Injection wells will be used to recharge purified water to the Chino Basin drinking water aquifers. Injection wells allow for consistent recharge of specific aquifers and are not subject to stormwater capacity restraints like recharge basins. Each injection well will be constructed to the State of California regulations. Each well site will include a concrete pad, superstructure, necessary safety features, signage, and flowmeters. Each injection well is estimated to require a site space of 100 feet by 100 feet (0.23 acres) that will accommodate the initial well construction, the wellhead equipment, and future well maintenance and redevelopment. It is assumed that land would need to be purchased for each injection well. An example injection well site is shown in Photo 1, below.

Photo 1: Example Injection Well Site

The capacity of each injection well is assumed to be 50 percent of the average pumping rate of nearby production wells. Based on the data included in the Storage Framework Investigation (WEI, October 2018) and the characterization of each management zone, the estimated injection wells capacities for MZ-2 are 830 gpm and 3.77 acre feet per day (AFD).

Preliminary groundwater modeling was completed for both sets of preliminary injection well locations and results indicate that both alternatives align with the OBMP objectives and the

Storage Framework Investigation. The second set of injection wells (located on Foothill Boulevard and Arrow Route) are used for the PUT alternatives as the superior option to reduce the overall infrastructure costs.

Table 16 summarizes the MZ-2 injection wells assumed for the PUT alternatives. The number of injection wells was determined using the maximum capacity per well, defined above.

Table 16
MZ-2 INJECTION WELLS

Recharge Goal (AFY)	Maximum Capacity per Injection Well (gpm)	Conceptual Design	
		Number of Injection Wells	Capacity per Injection Well (gpm)
12,000	830	Duty = 9, Standby = 3 Total = 12	830
15,000	830	Duty = 12, Standby = 4 Total = 16	775

Injection well capacities are dependent on the well maintenance and other operational assumptions. Standard injection well operational procedures include assuming wells do not sit idle for longer than one week, are exercised near design flow rates, are backflushed for approximately one hour a week, and are rehabbed every three to five years. Redundant injection wells are recommended to allow for backflushing and well rehabilitation while meeting the continuous recharge rate of 15,000 AFY. Test injection wells are likely to be required to collect site specific information to guide injection well design.

The recommended redundancy for injection wells is one standby well for every three active wells. For example, if all 15,000 AFY (41.1 acre-feet per day (AFD)) is proposed to be recharged in MZ-2, then 12 operating wells and four standby wells (16 wells total) are recommended based on the estimated MZ-2 injection well capacity projected above, and the recommended redundancy requirements. One example operating scenario would be to group the wells into four sets of four wells each where at any one time three wells would be active and one standby. The active wells would be cycled on a weekly basis to make sure that each well is not inactive for more than a week.

Monitoring Wells

Per the Title 22 regulations for groundwater replenishment using recycled water, monitoring wells are required to monitor water quality in the groundwater Basin. The regulations require that at least two monitoring wells be constructed downgradient of the replenishment location. One must be located at least two weeks but no more than six months downgradient travel time through the aquifer and at least 30 days upgradient from the nearest drinking water well, and the second well must be located between the replenishment location and the nearest downgradient drinking water well. A total of 4 monitoring wells were included in each PUT alternative to comply with these requirements.

3.9.4 PUT Facilities Summary

PUT Alternative 5 (PUT-5) assumes that the AWPF is located at RP-4, where 15,000 AFY of purified recycled water is produced and recharged into MZ-2. The elements of PUT Alternative 5 are as follows:

- Recharge location
  - MZ-2: All purified water would be recharged via injection wells in MZ-2, which is consistent with the Storage Framework Investigation.
- AWPF
  - The AWPF (MF-ROP-AOP) would be located at RP-4. The preliminary RP-4 AWPF layout is shown in Exhibit 12.
- Conveyance
  - Purified water would be pumped from the AWPF to the injection well sites in MZ-2.
  - Brine from the AWPF would be pumped in to the NRWS pipeline and conveyed to LACSD for disposal.

PUT Alternative 5 is summarized in Table 17 and shown in Figure 4.

Table 17
PUT FACILITIES

Parameter	Description
Recharge Locations	MZ-2
AWPF	
Location	RP-4
Process	MF/RO/UV-AOP
Capacity (AFY)	15,000
Purified water conveyance	
Pipelines[1]	7.1 miles (8-inch to 30-inch)
Pump station[2]	
Location	RP-4
Size	1,500 HP
Number of injection wells	16 (12 duty, 4 standby)
Brine conveyance[3]	
Disposal system	NRWS
Pipeline	1,400 ft (8-inch)

Notes: [1]Pipelines are discussed under Subsection 3.11, 3.10.5, and 3.10.6
[2]Pump Stations are discussed under Subsection 3.10.5 Delivery to Hydraulic Elevations Above the Blending Reservoir
[3]Brine Conveyance is discussed under Subsection 3.11.4 and 3.9.2, above.

3.10 CHINO BASIN PROGRAM TAKE FACILITIES

The CBP includes two main categories of facilities: PUT, the components to recharge purified water to the Chino Basin, and TAKE, the components to extract groundwater and convey potable water supply. The TAKE components are as follows, with the corresponding section noted:

- Groundwater extraction and treatment
- Potable water pumping and conveyance
- Potable water usage
  - MWD pump back
  - In lieu usage

To support the development of the PUT, TAKE, and program alternatives, WEI completed initial groundwater modeling for the PUT and TAKE components. The initial groundwater modeling results are discussed in Subsection 3.8.1. The following table summarizes the TAKE alternatives that will be considered as part of the overall CBP Project.

Table 18
TAKE ALTERNATIVES SUMMARY

TAKE Alternative	Description		Call Year Deliveries			Total Delivery over 25 Years
	Pump Back and/or In-Lieu	Standard Delivery	Pump Back (AFY)	In-Lieu (AFY)	Total (AFY)	Total (AF)
TAKE-1	100% Pump Back	Standard	50,000	-	50,000	375,000
TAKE-3	Partial Pump Back and Partial In-Lieu	Standard	25,500	24,500	50,000	375,000
TAKE-7		Standard	28,000	22,000	50,000	375,000
TAKE-8		Standard	10,000	30,000	40,000	300,000

3.10.1 Groundwater Extraction and Storage

The goal of the TAKE components is to deliver the 375,000 AF of potable water from the Chino Basin over the 25-year life of the CBP. The 375,000 AF would replace water supply that would otherwise be imported from the Sacramento-San Joaquin Delta (Delta), which will be done either by delivering extracted groundwater to MWD's regional facilities for eventual distribution to member agencies (MWD pump back), or by delivering groundwater directly to member agencies for their use in-lieu of receiving imported water deliveries from MWD, which is referred to as In-Lieu CBP.

The 375,000 AF would be used during dry years (call years) when less water is imported from the Delta. Two groundwater extraction scenarios were assumed for the TAKE alternatives:

- Standard delivery (no pre-delivery): Assuming a maximum pumping rate of 50,000 AFY, 7.5 call years would occur over the 25-year life of the project. The TAKE facilities would be sized to deliver 50,000 AFY of groundwater from the Chino Basin to MWD regional facilities or directly to member agencies.

An alternative to directly delivering extracted CBP groundwater to member agencies for in-lieu use is to provide new local wells or wellhead treatment to existing wells, which is referred to as In-Lieu Local. Examples for this type of in-lieu use include adding groundwater treatment to wells that are currently offline due to groundwater contamination. For these example In-Lieu Local projects, up to 3,000 AFY is assumed to be treated at member agency wells, for a total of 6,000 AFY if two such projects are implemented. This sum of water would already be within member agency service areas and is assumed to not require any additional infrastructure other than wellhead treatment. This would reduce the total amount of water required to be extracted from the proposed extraction wellfield and conveyed through TAKE facilities by up to 6,000 AFY.

Extraction Wells

Multiple extraction wells are required to meet baseline (50,000 AFY) project option. Up to 17 extraction wells would be required depending upon the alternative selected.

Site Selection

The location of potential extraction well sites was determined through the identification of land within the Chino Basin with the following attributes:

- Undeveloped parcels.
- Parcels located at the intersection of streets. These sites would provide for easy access to the site during construction, maintenance, and rehabilitation activities.
- Located within the groundwater MZ desired for extraction well options (predominantly MZ-2 as evaluated in the SFI)

It was assumed that the minimum extraction well size would need to be a minimum of 100 feet by 100 feet (0.23 acres) to allow for construction, periodic well rehabilitation, and the drilling of a new well, should the original well fail and need to be replaced. Photo 2 is a photo of a well site measuring 100 feet by 100 feet during well rehabilitation. As shown, well rehabilitation (and drilling) activities required adequate space for pump column laydown, well rig placement, spoils placement, and decant tanks for well development.

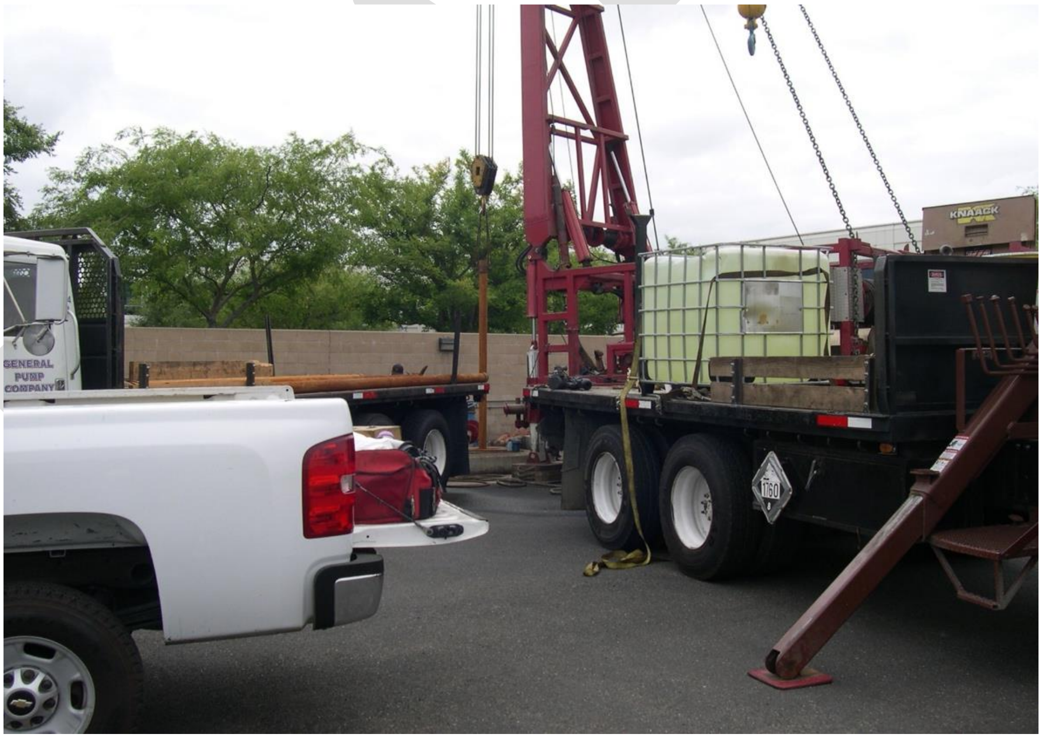

Photo 2: Well Rehabilitation Activities

Production Capacity

The estimated flowrates of proposed wells in the area are between 1,500 gpm and 2,000 gpm, based on production data from other nearby wells. It is assumed that one redundant well would be constructed for each alternative such that the firm production capacity with the largest well offline would still produce the amount of CBP water required for the alternative. A sampling port would be installed at all wellheads to facilitate routine water quality sampling. Each well would be able to deliver water to an HGL of 1,180 feet (ft), which is the operational water elevation of the proposed blending and storage reservoir. Chlorine would be injected at each wellhead to prevent biological growth in well collector pipelines.

Well Collector Pipelines
A network of pipelines would be installed to connect each well to the blending and storage reservoir. The collector pipeline diameters would range from 12- to 54-inch, and are sized to keep pipeline velocity below 5 feet per second (fps). Collector pipes are considered separately from the regional potable pipelines because they would convey raw groundwater to a reservoir for blending. After blending in the reservoir and addition of chlorine, the water would be considered potable. It is assumed that additional groundwater treatment would not be necessary as water quality in the proposed wellfield location meets drinking water standards. If additional treatment becomes necessary in the future, either a wellhead or centralized treatment facility can be integrated and located at either an individual well site or adjacent to the blending and storage reservoir.

Redundancy Requirements
It is assumed that one redundant well would be required for each alternative to accommodate capacity loss from hydrogeologic conditions, poor water quality, or maintenance shutdowns. In the event multiple wells are offline or have reduced production capacity at a given time, the online wells can be pumped at a higher rate until the wells are back online. The extraction wells design should include variable frequency drives (VFD) and the ultimate design point should be at maximum drawdown and lowest anticipated static groundwater level so that additional production is possible.

Blending and Storage Reservoir
A storage reservoir is recommended near the extraction wellfield to collect groundwater from all proposed wells prior to MWD pump back and/or in-lieu usage by agencies. The storage reservoir will have two purposes:

1. If an extraction well begins to pump contaminated groundwater, the reservoir will provide an opportunity for blending, which can avoid taking the well offline or the need for treatment.
2. The storage reservoir will serve as a forebay for the pump station that will be needed to boost water to elevations well above the extraction well field, and to break head for water to be delivered to lower elevations. This will also provide a constant head for the wells to pump against, rather than having the variability of discharge pressure that may come from having the wells pump directly into a high-pressure transmission line.

The reservoir would provide short-term storage and blending. Because the reservoir will primarily be used for blending and not storage, it is assumed that the reservoir volume would be determined based on retention time, and not hours of stored water available to meet demands. For blending purposes, it is assumed the retention time would need to be three hours. The reservoir outlet(s) will serve as the sampling point for water quality analyses for potable water.

Groundwater treatment for centralized extraction wells is not anticipated due to the groundwater extraction locations being focused in the better water quality areas of MZ-2, blending in the storage reservoir, and water quality in MWD's Rialto Pipeline. In the event that treatment is needed in the future, the land acquired for the reservoir should to be large enough to accommodate a future treatment system.

3.10.2 Groundwater Treatment

Groundwater treatment for the centralized extraction wells is not anticipated but could be needed for In-Lieu Local projects where wellhead treatment is added to existing wells that are out of service due to groundwater contamination. Potential groundwater treatment technologies that could be used for wellhead treatment for potential In-Lieu Local projects include reverse osmosis, advanced oxidation, ion exchange, GAC, and biological treatment.

Based on the potential groundwater contaminants that may be found in the Chino Basin, a wide variety of treatment processes must be evaluated; these processes all have various degrees of efficacy depending on the mix of contaminants present. Groundwater treatment technologies may include more conventional best available technologies (BAT) or biological treatment, the latter being an emerging treatment technology in the water sector. Exhibit 16 shows the range of conventional treatment technologies that are available for various groundwater contaminants.

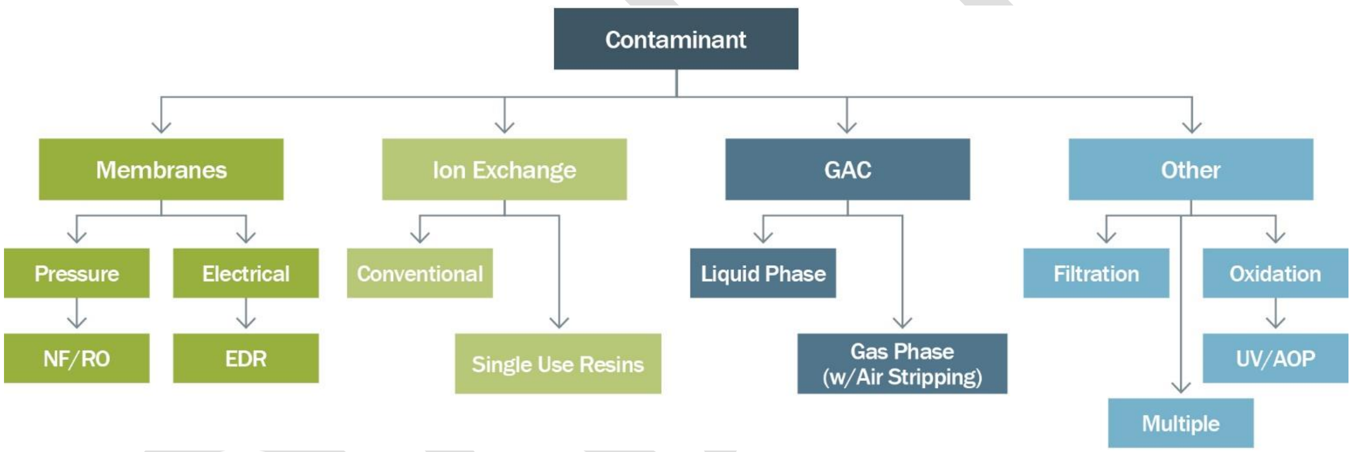

Exhibit 16: The Universe of Conventional Groundwater Contaminant Treatment Options

Membrane processes, especially RO, will remove many contaminants but are limited to higher molecular weight compounds and generally ineffective for the removal of compounds like NDMA and 1,4-dioxane.

Ion exchange, while typically utilized by engineers for the removal of nitrate, perchlorate, hexavalent chromium, and some TDS, will be ineffective at volatile organic carbon (VOC) removal.

GAC is often the treatment option of choice for VOCs but can become a costly option for some poorly absorbed compounds such as 1,2,3-TCP and trichloroethylene (TCE) and will require frequent change outs to meet effluent water quality objectives.

Finally, advanced oxidation processes, such as UV-AOP, are well suited for some difficult to treat compounds like 1,4-dioxane and NDMA but cannot treat compounds such as 1,2,3-TCP and carbon tetrachloride (CTC) without using extremely high UV doses, which will result in significant power consumption.

PFAS, a large class of emerging contaminants including PFOS and PFOA, has been detected in drinking water supplies across the United States and now have notification levels and response levels established in California. GAC or IX are the two main treatment technologies used for PFAS; RO is also effective for PFAS removal, but more expensive to construct and operate.

Table 19 summarizes the efficacy of various treatment processes for different, and common, groundwater contaminants.

Table 19
CANDIDATE TECHNOLOGIES TO REMOVE POSSIBLE CONSTITUENTS OF CONCERN

Constituent	Treatment Technologies							Most Common Processes for this Constituent
	GAC	Air Stripping (A/S) + Vapor Phase GAC	IX	RO	AOPs	Biological (Fixed Bed/ Fluidized Bed)	MBR	
Organic Constituents								
TCE	✔	✔		✔	✔	✔	✔	A/S & GAC
Perchloroethylene (PCE)	✔	✔		✔	✔	✔	✔	A/S & GAC
MTBE	✔				✔	✔	✔	GAC
1,4-dioxane					✔	✔	✔	AOP
NDMA					✔	✔	✔	UV
1,2,3-TCP	✔				✔	✔		GAC
PFAS	✔		✔	✔				GAC/IX
Inorganic Constituents								
Nitrate			✔	✔		✔	✔	IX
Hexavalent Chromium			✔	✔		✔	✔	IX
Perchlorate			✔	✔		✔	✔	IX
Iron								Oxidation & Filtration
Manganese								Oxidation & Filtration

3.10.3 <u>MWD Pump Back</u>

MWD operates three raw water transmission pipelines near the project area shown in Figure 5 that could all be suitable for MWD Pump Back: Rialto Pipeline, Upper Feeder Pipeline, and Etiwanda Pipeline.

Under normal operation, the Rialto Pipeline delivers raw water from the Devil Canyon Afterbay (which receives water from the East Branch of the State Water Project) westerly to turnouts at the FWC Sandhill WTP, CVWD Lloyd W. Michael WTP, CVWD Royer Nesbit WTP (currently offline), WFA Agua de Lejos WTP, and Three Valleys Municipal Water District (TVMWD) Miramar WTP. The Rialto Pipeline also delivers raw water to various spreading basins for groundwater recharge in the Cucamonga Basin and northern areas of the Chino Basin. After turnouts to those agencies, the Rialto Pipeline delivers raw water west to the MWD F.E. Weymouth WTP (Weymouth), for ultimate delivery to Los Angeles and Orange Counties.

The Rialto Pipeline is the only appropriate pipeline to pump CBP potable water into in order to keep reclaimed water within the Chino Basin. Since the Rialto Pipeline is a raw water pipeline, the potable water generated by CBP would be considered raw water once pumped into the Rialto Pipeline. There are no MWD treated water pipelines near the proposed extraction wellfield.

TAKE alternatives that include MWD Pump Back will require a pump station to lift extracted groundwater from the elevation of the reservoir at the extraction wellfield (between 1,000 ft and 1,200 ft above mean sea level (AMSL) to the static HGL of the Rialto Pipeline of 1,936 ft AMSL. While the hydraulic grade line (HGL) of the Rialto Pipeline decreases from 1,936 ft AMSL as it flows west due to head-loss, the pump back facilities should be capable of pumping to the Devil Canyon Afterbay static head of 1,936 ft AMSL to maintain operational flexibility. MWD Pump Back will also require a large-diameter pipeline from the extraction wellfield to the Rialto Pipeline, and a new or retrofitted turnout into the Rialto Pipeline

Water Quality Considerations

The extracted groundwater being delivered to the Rialto Pipeline must be of quality not to significantly diminish the quality of existing raw water in the Rialto Pipeline and, per MWD requirements, must meet primary and secondary MCLs. Water quality data from existing production wells near the proposed extraction wellfield in northern MZ-2 were collected to estimate the water quality of extracted CBP groundwater. Likewise, water quality data from the Devil Canyon Afterbay were provided by MWD to represent Rialto Pipeline water quality.

The blended Rialto Pipeline/CBP water quality was calculated using a mass balance based on the maximum annual CBP delivery of 50,000 AFY and typical Rialto Pipeline flow of 614 MGD. The estimated water quality for CBP water, the Rialto Pipeline water quality, and the blended CBP and Rialto Pipeline water quality is presented in Table 20.

Table 20
BLENDED WATER QUALITY

Constituent	CBP Blended Extraction Wells[1]	Rialto Pipeline[2]	CBP/Rialto Pipeline Blend[3]	Primary *(Secondary)* MCL
TDS (mg/L)	235.6	254.0	252.8	(*500.0)*
Nitrate-N (mg/L)	3.3	0.4	0.6	10.0
Hardness (mg/L)	146.7	94.0	97.6	-
EC (µS/cm)	3844.4	457.0	452.1	*(900.0)*
pH	7.8	8.1[4]	8.1	-
Calcium (mg/L)	45.1	20.0	21.8	-
Magnesium (mg/L)	7.7	11.0	10.8	-
Sodium (mg/L)	19.6	52.0	49.8	-
Potassium (mg/L)	1.8	N/A	N/A	-
Bicarbonate (mg/L)	178.7	72.0	79.2	-
Chloride (mg/L)	9.4	72.0	67.8	*(250.0)*

Constituent	CBP Blended Extraction Wells[1]	Rialto Pipeline[2]	CBP/Rialto Pipeline Blend[3]	Primary *(Secondary)* MCL
Sulfate (mg/L)	15.1	33.0	31.8	*(250.0)*
Perchlorate (µg/L)	2.4	0[5]	0.2	6.0
Hexavalent Chromium (µg/L)	3.4	0[5]	0.2	10.0[6]

Notes: [1]Based on 5-10 years water quality data of nearby production wells.
[2]Rialto Pipeline water quality assumed to be equivalent to Devil Canyon Afterbay water quality as provided in MWD Bulletin 132-13 from April 2015, Table 4-1.
[3]Calculated by mass balance of typical Rialto Pipeline flowrate (614 MGD) and maximum proposed CBP flowrate (50,000 AFY, 44.64 MGD). CBP water would account for approximately 6.8% of the combined flow.
[4]CVWD LWMWTP Master Plan, October 2010
[5]No data, which suggests that these constituents were not sampled because not typically present in surface water. For this analysis, they were assumed to be zero.
[6]The hexavalent chromium MCL was rescinded but is anticipated to be re-proposed at this same level in the future. Total chromium has an MCL of 60 µg/L.

Table 20 above shows that the projected, blended water quality for the CBP extraction wells is of high quality and, in many cases, the extraction well water quality exceeds that in Rialto Pipeline. The lack of perchlorate and hexavalent chromium data for the Rialto Pipeline suggests that these constituents were not sampled. These constituents are not typically present in surface water and for this analysis it is assumed that they have low or zero concentration in the Rialto Pipeline. The projected levels for the CBP water alone are below the MCL for perchlorate and the assumed future MCL for hexavalent chromium. Considering the significant dilution that will occur in the Rialto Pipeline once the CBP water is pumped in, treatment is not anticipated to be required.

The CBP water would be sampled and monitored at or near the turnout into the Rialto Pipeline. It is anticipated that MWD will provide a list of constituents to be monitored at regular intervals to verify the quality of water being delivered. Constituents to be monitored may include TDS, nitrate, hardness, chloride, sulfate, perchlorate, hexavalent chromium, 1,2,3-TCP, and other contaminants that may present treatment challenges or that have primary and secondary MCLs for drinking water. The frequency of the sampling is unknown at this time.

<u>PFAS</u>
PFAS sampling was completed in 2019 and 2020 and results are forthcoming. The following describe sampling that has been undertaken to date:

- The only sampling completed on Chino Basin groundwater to date was through UCMR3, which was for 30 active wells.
- All UCMR3 data showed that all samples were non-detect. However, UCMR3 data was analyzed using older analytical methods with a higher detection limit than the current NLs. Therefore, it is inconclusive as to whether the CBP groundwater will require treatment for PFOA and PFOS.
- The CBWM monitors some wells in Chino Basin and have added PFOA and PFOS sampling to their constituents. The first samples were collected in 2019.
- A couple of drinking water agencies in the Chino Basin area were served sampling orders from DDW and had to start quarterly sampling in June. These agencies are waiting to see data has been uploaded to DDW's online database.
- The CDA started sampling at desalter wells, but data is not yet available.

Operational Considerations

It is assumed that the MWD Pump Back would operate at a constant rate over the entire calendar year and would not vary to meet seasonal demands. The system is anticipated to deliver water at 50,000 AFY (~31,100 GPM) constantly during call years and would not operate during non-call years.

The high-hydraulic grade line (HGL) in the Rialto Pipeline changes as flow varies seasonally so MWD would likely maintain operational control over the pump back conveyance system for more streamlined operation of the pump station with MWD's control system. The interconnection between the MWD Pump Back and the Rialto Pipeline will also include a backflow prevention mechanism to prevent raw water in the Rialto Pipeline from contaminating the potable water in the CBP conveyance system since the MWD Pump Back will not be hydraulically isolated from the In-Lieu CBP system delivering potable water to member agencies.

Water may be delivered back to the Rialto Pipeline either by retrofit of an existing turnout off the Rialto Pipeline, or by a newly constructed tap into the Rialto Pipeline. There is currently one turnout off the Rialto Pipeline that is unused, CB-7, which has an 18-inch diameter and a capacity of approximately 6,944 GPM. Where a pump back flowrate of 10,000 AFY to MWD will be feasible by pumping back through CB-7, a new connection to the Rialto Pipeline could be installed. All alternatives that require more than 10,000 AFY of pump back to MWD will require construction of a new turnout. A new turnout would likely be placed between connections CB-16 (Lloyd W. Michael WTP) and PM-21 (Miramar WTP) to reduce the length of pipe required between the Rialto Pipeline and the extraction wellfield and/or other potable water distribution facilities.

3.10.4 In-Lieu CBP and In-Lieu Local

CBP water could also be delivered directly to local agencies and used in-lieu of imported water. Member agencies would receive a direct delivery of CBP water for use instead of imported water that originates from the Rialto Pipeline.

- In-Lieu CBP would be water from the extraction wellfield delivered to agencies through a new conveyance system, and
- In-Lieu Local would be water from wellhead treatment on existing wells or new wells delivered using only existing conveyance infrastructure.

TAKE alternatives that include In-Lieu CBP would have a regional conveyance system including pipelines, pump stations, and turnouts and would be owned and operated by IEUA to deliver extracted CBP groundwater from the extraction wellfield to turnouts into the member agencies' distribution systems. Each member agency receiving CBP water will have a direct turnout into their local distribution system, and alternatives requiring member agencies to use existing interconnections to deliver CBP water to other member agencies will be avoided. An effort will be made to design the regional conveyance system to deliver CBP water directly to member agencies in the pressure zone that they currently receive imported water in order to avoid requiring operational changes from shifting water sources. Member agencies may also request their CBP turnout to be in pressure zones in their system with higher demands if it will give them operational flexibility, water supply reliability, and/or relieve some capacity-constrained portions of their system.

Minimum Plant Flows

The amount of CBP water member agencies can receive in-lieu of Rialto Pipeline raw water is limited by the minimum flowrate required to keep each WTP operating reliably. Because In-Lieu Use involves member agencies taking CBP water directly rather than Rialto Pipeline raw water through their respective WTP, only so much can in-lieu water can be received before demand on the WTPs falls below their minimum acceptable flowrate.

Water Quality Considerations

Extracted groundwater for in-lieu use would need to be of potable quality as it will be delivered directly to member agencies' distribution systems. Table 18, above, provides the anticipated quality of extracted groundwater based on samples from existing nearby potable wells in the previous 5 to 10 years. The CBP water is expected to meet primary and secondary MCLs and is assumed to not require treatment prior to delivery into each member agency's system. However, each well will include chlorine for disinfection, and the proposed reservoir at the extraction wellfield will also include chlorine to maintain chlorine residual in the tank and chlorine residual in the regional distribution pipelines.

The WFA Agua de Lejos WTP uses chloramines for disinfection at its WTP, leaving residual chloramine in the WFA distribution system and in its members' systems as well. There may be adverse water quality affects from mixing water with residual chlorine and residual chloramine, such as disinfection byproduct production. If concerns arise from mixing the two types of disinfected water, the disinfection strategy at turnouts from chlorinated regional CBP facilities to local agency systems using chloramine will require evaluation to determine the optimum blending strategy.

Water quality will be monitored in the potable water reservoir near the extraction wellfield. Water will also be sampled at various locations throughout the regional distribution system to ensure that water being delivered to member agencies meets drinking water quality requirements. It is anticipated that agreements will be made between member agencies and IEUA that provides a set of water quality requirements, or that the CBP water deliveries will only be required to meet the primary and secondary MCLs for drinking water.

Operational Considerations

The regional CBP delivery system for In-Lieu CBP, including wells, reservoirs, pump stations, pipes, and turnouts, would be owned and operated by IEUA. The system would primarily operate as a constant flow system, simultaneously pumping, conveying, and delivering groundwater to member agencies at the designated flowrate for either a call year or non-call year. The system would not have the ability to increase production to accommodate increased summertime demands, except in non-call years for alternatives that include pre-delivery, as the average flow rate for the non-call year would be less than the maximum capacity of the conveyance system.

If a well began producing water with a high level of a contaminant that could not be blended out by the rest of the production wells, a redundant well would be operated to make up the water deficit. If a redundant well is unavailable or already producing water, the production of the other well could be increased slightly to make up the deficit of the offline well.

TAKE alternatives that include In-Lieu CBP, i.e., direct deliveries of extracted groundwater in-lieu of imported water to member agencies, will include dedicated pipelines, pump stations, and turnouts owned and operated by IEUA. Turnouts will be metered to track deliveries of CBP water made to member agencies to accurately determine how much water member agencies are using in-lieu of imported water. Like In-Lieu CBP, water deliveries from In-Lieu Local projects would need to be metered to track deliveries of CBP water made to member agencies for accurate accounting.

In-Lieu Local

The In-Lieu Local delivery mechanism involves using either new or existing wells and piping to locally produce groundwater stored by CBP. If existing wells were used for In-Lieu Local, then it was assumed that only existing wells that are currently offline would be considered to exclusively produce CBP water when they are brought back into service.

In-Lieu Local projects have been incorporated into the CBP, though the specific member agencies that might participate in these projects are unknown. Additionally, the specific locations of the wells within member agency service areas are unknown.

IEUA member agencies have many existing wells that are currently offline that previously extracted potable water from the Chino Basin. The wells are generally not in operation due to the concentrations of constituents such as 1,2,3-TCP, nitrate, PFAS, etc., the concentrations of which exceed the MCL. As such, the CBP assumes that a wellhead treatment facility would be required to reduce the concentration of constituents that degrade water quality to below the MCL for each constituent, and resume operation of the existing wells for potable water usage.

The wellhead treatment system that would be installed to connect the existing wells to the wellhead treatment would utilize a treatment system appropriate to treat the constituents of concern affecting the specific well or group of wells.

This project assumes that up to 9 wells, and up to 3 wellhead treatment systems (averaging 3 wells per treatment systems) could be installed to support the CBP. These wellhead treatment systems are assumed to be capable of treating up to 3,000 AFY per wellhead treatment system or up to 6,000 AFY. The table below outlines the In-Lieu Local assumptions.

Table 21
POTENTIAL IN-LIEU LOCAL
WELL USE AND WELLHEAD TREATMENT FACILITY

Parameter	Description
Wellhead Treatment Facility	
Location	Member Agency, Existing offline Well
Treatment Capacity (Product Water)	Up to 3,000 AFY per wellhead treatment system, maximum of 6,000 AFY assumed to be treated in total
Number of Extraction Wells (existing)	9 total
Brine Conveyance	
Disposal System	Assumed utilization of the IEBL
Disposal Capacity	4,900 gpd per wellhead treatment system
Pipeline Length	Up to 6,800 LF (8-inch)

In-Lieu CBP

Both In-Lieu CBP and MWD pump back involve the direct delivery of CBP water to a member agency or to MWD, respectively, from a dedicated regional potable CBP pipeline. Therefore, they are essentially the same regarding operations and construction of new facilities, the only difference being the location where the CBP water is being delivered. Both delivery mechanisms have three components:

- Groundwater Extraction and Blending, which includes extraction wells, well collector pipelines, and a blending and storage reservoir.
- Delivery to Hydraulic Elevations Above the Blending Reservoir, which includes pump stations, high-hydraulic grade line (HGL) potable water pipelines, and turnouts and in-conduit hydropower facilities (refer to Subsection 3.10.5).
- Delivery to Hydraulic Elevations Below the Blending Reservoir, which includes low-HGL potable water pipelines and turnouts and in-conduit hydropower facilities (refer to Subsection 3.10.6).

3.10.5 Delivery to Hydraulic Elevations Above the Blending Reservoir

Delivery to hydraulic elevations above the blending reservoir includes one or more pump stations, potable water pipelines, and turnouts and hydropower facilities to agencies with HGLs higher than the storage reservoir. The HGL of the Rialto Pipeline, as well as some member agencies pressure zones, is higher than the proposed storage and blending reservoir. To deliver In-Lieu CBP water or MWD pump back water to those pressure zones, a pump station and pressurized pipeline network is required above the reservoir. Coincidentally, the project area is on a south facing slope from the San Gabriel Mountain Range to the north, and all of the delivery locations that are higher in elevation than the proposed reservoir are north of the reservoir as well. The inverse is true that all delivery locations south of the proposed reservoir are lower in elevation than the reservoir.

Agencies that may receive water from the Component B facilities include the following with the HGL of the facility indicated:

- Metropolitan Water District (MWD): Rialto Pipeline – 1,936 ft
- Cucamonga Valley Water District (CVWD): Zone III – 1,658 ft
- Fontana Water Company (FWC): Highland Zone – 1,504 ft
- WFA: Agua de Lejos WTP Clearwell– 1,632 ft

Pump Stations

TAKE alternatives include the construction of Potable Water Pump Station #1, which is to be located adjacent to the proposed reservoir and would use the reservoir as a forebay to provide suction head. Typically, Pump Station #1 would lift water up to the highest HGL of all of the Component B turnouts (Rialto Pipeline, HGL 1,936 ft). Because all other Component B turnouts are lower than the Rialto Pipeline, this would result in over-pressurizing some water which would require Pressure Reducing Valve (PRV) stations or in-conduit hydropower facilities to reduce the head.

In some alternatives, it is more cost effective to construct a second pump station (Potable Water Pump Station #2) to lift MWD's share of water to the HGL of the Rialto Pipeline (1,936 ft), rather than requiring Pump Station #1 to lift all water in Component B up to 1,936 ft. This was typically done when the allocation of water to MWD was low enough to make the cost of constructing Pump Station #2 lower than the cost of losing energy from over-pressurizing water to every other member agency turnout in Component B. In alternatives with Pump Station #2, Pump Station #1 lifts water to the HGL of the second highest turnout in Component B (CVWD Zone III – 1,658 ft), and Pump Station #2 takes only MWD's share of water and lifts it from 1,658 ft to the Rialto Pipeline HGL. The decision to construct a second pump station would be re-evaluated using a hydraulic model in the preliminary design phase once the preferred TAKE alternative has been selected.

High HGL Potable Water Pipelines

A potable pipeline network is proposed north of the blending and storage reservoir to deliver water to the agencies and pressure zones listed above under 3.10.5. The primary feature is the northern pipeline, which would comprise pipelines with diameters ranging from 30 and 54 inches and would align from the reservoir north along Milliken Avenue, east along Baseline Road, and north along Day Creek Boulevard to the general area of the CWWD Lloyd W. Michael WTP. The Lloyd W. Michael WTP is owned and operated by CVWD and is the location of some of CVWD's Zone III tanks. This northern pipeline would supply CVWD Zone III and the MWD Rialto Pipeline.

For alternatives that include delivery to FWC's Highland Zone, a 24-inch pipeline would branch off from the northern pipeline at the intersection of Day Creek Boulevard and Baseline Road and would align East in Baseline Road until reaching FWC's system.

For alternatives that include delivery to WFA, a proposed 36- to 72-inch east-west pipeline would branch off from the northern pipeline at the intersection of Foothill Boulevard and Milliken Avenue. The east-west pipeline would align in Foothill Boulevard until turning North at Mountain Avenue in Upland, then turning west again at 18th Street toward the Agua de Lejos WTP. The east-west pipeline would terminate at its connections to Agua de Lejos. Maps of all potable pipeline alignments are provided with the TAKE alternatives below under 3.10.7, TAKE Facilities Summary.

Turnouts and In-Conduit Hydropower Facilities

MWD would receive delivery of CBP water into the Rialto Pipeline near the Lloyd W. Michael WTP in Rancho Cucamonga (off the northern pipeline). In either case, a new turnout would need to be constructed from the regional CBP pipeline into the Rialto Pipeline. The turnout would include a sampling port for monitoring CBP water quality flowing into the Rialto Pipeline, and a backflow prevention device to prevent water from the Rialto Pipeline from entering the CBP pipeline. Because the CBP regional pipeline network is potable and Rialto Pipeline is raw, the Division of Drinking Water would be involved in the permitting of the interconnection between the Rialto Pipeline and the CBP pipeline. Very strict redundancy and safety requirements to ensure the potable pipelines are not contaminated with raw Rialto Pipeline water would be required.

CVWD Zone III would receive delivery of CBP water at the storage tanks on the Lloyd W. Michael WTP site from the northern pipeline. The HGL of the northern pipeline would be 1,936 ft (Rialto Pipeline) in some alternatives, and therefore the turnout to CVWD Zone III may include a PRV station of in-conduit hydropower facility to recapture energy. The CVWD Zone III turnout would include a sampling port to monitor water quality entering CVWD's system.

CVWD Zone II would receive delivery of CBP water via a turnout into a transmission main at the intersection of Archibald Avenue and Foothill Boulevard off the east-west pipeline. The HGL of the east-west pipeline would be at least 1,632 ft to reach other downstream turnouts, so CVWD's Zone II turnout (1,420 ft) would require a PRV or in-conduit hydropower facility to reduce pressure into CVWD Zone II. The CVWD Zone II turnout would include a sampling port to monitor water quality entering CVWD's system.

FWC Highland Zone would receive delivery of CBP water into a transmission main in Baseline Avenue (Baseline becomes "Avenue" East of the Fontana/Rancho Cucamonga city line). The

HGL of the Highland Zone is 1,504 ft, and the FWC Highland turnout would always require a PRV station or in-conduit hydropower facility to reduce pressure to the Highland Zone HGL. The FWC Highland turnout would include a sampling port to monitor water quality entering FWC's system.

WFA receive imported water currently from the Agua de Lejos WTP in Upland. The Agua de Lejos WTP has a clear well with a surface elevation of 1,632 ft that provides water supply to WFA agencies. The Agua de Lejos clear well is the ideal location to deliver CBP water to WFA agencies because it provides the CBP water in the same location as imported water currently enters their systems.

3.10.6 Delivery to Hydraulic Elevations Below the Blending Reservoir

Delivery to hydraulic elevations below the blending reservoir includes the potable water pipelines and turnouts and hydropower facilities to agencies with HGLs lower than the storage reservoir. As such, the CBP proposes a north-south pipeline that would go from the northern portion of IEUA's service area to the southern portion of IEUA's service area. Due to elevation changes, some delivery locations are at HGLs below the proposed reservoir and can receive water via gravity.

Low-HGL Potable Water Pipelines

The southern pipeline would deliver CBP water from the proposed reservoir to IEUA member agencies. The pipeline is anticipated to vary in size between 24- and 36-inches based on the delivery amount to those agencies proposed in each alternative. The southern pipeline is alignment location has not yet been determined.

Turnouts and In-Conduit Hydropower Facilities

The southern pipeline may require one or more turnouts to reach member agencies. Because of the anticipated high difference in HGL from the proposed reservoir (1,180 ft) to the certain areas within IEUA's service area, it is assumed that an in-conduit hydropower facility may be at one or more turnouts. However, at other locations there is not enough of a difference in head to justify an in-conduit hydropower facility at possible turnout locations.

Sampling ports would be included at all turnouts to monitor water quality entering member agencies' systems.

3.10.7 TAKE Facilities Summary

TAKE-1: 100% pump back with standard delivery

TAKE Alternative 1 (TAKE-1) includes delivery of 50,000 AFY of CBP water to the Rialto Pipeline during call years, with standard delivery (i.e., no pre-delivery of CBP water during non-call years) and no delivery of CBP water to member agencies for in-lieu. Table 22 provides the breakdown of CBP water deliveries to MWD and the member agencies during call and non-call years.

Table 22
TAKE ALTERNATIVE 1 DELIVERIES TO EACH AGENCY (AFY)

Agency	Call Year	Non-Call Year
Metropolitan Water District	50,000	-
IEUA Member Agencies	-	-
TOTAL	**50,000**	-

Note: [1]Water supplied from the WFA Agua de Lejos WTP.

TAKE Alternative 1 includes the following facilities, shown on Figure 6:

- Component A – Groundwater Extraction and Blending
  - 17 extraction wells
  - 9 miles of 12- to 36-inch collector pipelines
  - 5 MG Storage Tank #1
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - Potable Water Pump Station #1: 9,300 HP, 31,100 gpm firm capacity, 823 ft total dynamic head (TDH)
  - 5 miles of 54-inch potable northern pipeline
  - Proposed 54-inch turnout to the Rialto Pipeline
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
  - None
- Component D – Delivery to member agencies via In-Lieu Local (Example Projects)
  - None
- Existing Facilities
  - Rialto Pipeline (HGL 1,936 ft)

TAKE Alternative 1 would be operated to deliver 50,000 AFY to the Rialto Pipeline during call years. Although the facilities would not be operated for Program purposes during non-call years, the infrastructure would be available for local and/or regional uses. The operation of the TAKE-1 components during call years is described below.

- Component A – Groundwater Extraction and Blending
  - The extraction wells, collector pipes, and Storage Tank #1 would extract and blend 50,000 AFY (about 31,100 gpm) of groundwater during call years.
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - Storage Tank #1 would serve as a forebay for Potable Water Pump Station #1. During call years, Pump Station #1 would deliver 50,000 AFY of water to the Rialto Pipeline through a proposed 54-inch northern pipeline and a proposed 54-inch turnout into the Rialto Pipeline.

<u>TAKE-3: Partial pump back and partial in-lieu with standard delivery</u>

TAKE Alternative 3 (TAKE-3) involves the delivery of 50,000 AFY combined during call years to the Rialto Pipeline, five member agencies, and Jurupa Community Services District. Since this alternative is based on standard delivery, no water would be delivered during non-call years. Table 23 provides the deliveries to each Agency in Alternative 3.

Table 23
TAKE ALTERNATIVE 3 DELIVERIES TO EACH AGENCY (AFY)

Agency	Call Year	Non-Call Year
Metropolitan Water District	25,500	-
IEUA Member Agencies	24,500	-
TOTAL	**50,000**	**-**

Note: [1]Water supplied from the WFA Agua de Lejos WTP.

TAKE Alternative 3 includes construction or use of the following facilities, shown on Figure 7:

- Component A – Groundwater Extraction and Blending
  - 15 extraction wells
  - 9 miles of 12- to 42-inch collector pipelines
  - Storage Tank #1: 5 MG and in-conduit hydropower facility
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - Potable Water Pump Station #1: 7,000 HP, 23,300 gpm firm capacity, 823 ft TDH
  - 8 miles of 16- through 48-in potable northern pipeline (includes branches to Fontana Water Company (FWC) and Cucamonga Valley Water District (CVWD)
  - Proposed 16-inch turnout to FWC Highland Zone (and optional hydropower facility)
  - Proposed 24-inch turnout to CVWD Zone III (and optional hydropower facility)
  - Proposed 36-inch turnout to the Rialto Pipeline
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
  - 4 miles of 12- through 24-inch potable southern pipeline
  - Proposed 12-inch turnout to unknown member agency
- Component D – Delivery to member agencies via In-Lieu Local (Example Projects)
  - Up to 6,000 AFY wellhead treatment by 3 wellhead treatment systems treating water pumped from up to existing member agency 9 wells.
- Existing Facilities:
  - Rialto Pipeline (HGL 1,936 ft)
  - Member agency wells

TAKE Alternative 3 would be operated to deliver 50,000 AFY to the Rialto Pipeline, member agencies, and JCSD during call years only. Although the facilities would not be operated for Program purposes during non-call years, the infrastructure would be available for local and/or regional uses. The operation of the TAKE-3 components would be as follows:

- Component A – Groundwater Extraction and Blending
  - The extraction wells, collector pipes, and Storage Tank #1 would extract and blend 44,000 AFY (about 27,300 gpm) of groundwater during call years.
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - Storage Tank #1 would serve as a forebay for Potable Water Pump Station #1. During call years, Pump Station #1 would deliver 37,500 AFY combined of water to the Rialto Pipeline, CVWD Zone III, and FWC Highland Zone through the proposed 7.1-mile northern pipeline network and turnouts to all three agencies.
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
  - Potable Water Pump Station #1 is designed to lift water to an HGL of 1,936 ft to be able to deliver to the Rialto Pipeline. CVWD and FWC, who would both receive water from Pump Station #1, are at HGLs much lower than 1,936 ft. To recapture some of the lost energy from over-pumping, in-conduit hydropower facilities are proposed at both the CVWD and FWC turnouts. Preliminary calculations showed that the energy loss from over-pumping and recovering energy from hydropower facilities is less costly than the expense of constructing two additional pump stations designed to deliver water exactly to the HGLs of CVWD and FWC (1,658 ft and 1,504 ft, respectively).
  - Water would flow by gravity from north to south in a pipeline with a size between 12” and 24”; The volume of water that would flow by gravity under this alternative is anticipated to be 6,500 AFY of water. Water would flow by gravity from Storage Tank #1 South to turnouts to member agencies along a proposed 24-inch southern

pipeline. Coming from an HGL of 1,180 in Storage Tank #1, an in-conduit hydropower facility may be appropriate at some turnout locations, but not at others.

- Component D – Delivery to member agencies via In-Lieu Local (Example Projects)
  - The remaining 6,000 AFY would be delivered to member agencies via In-Lieu Local and groundwater treatment. TAKE Alternative 3 proposes up to three new groundwater treatment facilities for member agencies that would enable reactivation of local wells currently offline due to water quality. These facilities would produce up to 3,000 AFY of potable supply which they would use in-lieu of MWD Rialto Pipeline Water. Existing infrastructure would be utilized to convey treated groundwater throughout their distribution systems to their customers. The Program would help fund these facilities in exchange for in-lieu participation.

TAKE-7: Partial pump back and partial in-lieu

TAKE Alternative 7 (TAKE-7) involves the delivery of 50,000 AFY combined during call years to the Rialto Pipeline, WFA, CVWD, and FWC. Table 24 provides the deliveries to each agency for TAKE Alternative 7.

Table 24
TAKE ALTERNATIVE 7 DELIVERIES TO EACH AGENCY (AFY)

Agency	Call Year	Non-Call Year
Metropolitan Water District	28,000	-
IEUA Member Agencies	22,000	-
TOTAL	**50,000**	

Notes: [1]Water supplied from the WFA Agua de Lejos WTP.

TAKE Alternative 7 includes construction or use of the following facilities, shown on Figure 8:

- Component A – Groundwater Extraction and Blending
  - 9 extraction wells
  - 6 miles of 12- to 36-inch collector pipelines
  - 5 MG Storage Tank #1
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - Potable Water Pump Station #1: 2,600 HP, 11,700 gpm firm capacity, 599 ft TDH
  - 8 miles of 12- to 36-inch northern pipeline
  - Proposed 12-inch turnout to FWC Highland Zone
  - Proposed 12-inch turnout to CVWD Zone III
  - Potable Water Pump Station #2: 700 HP, 6,200 gpm firm capacity, 281 ft TDH
  - Proposed 54- to 72-inch turnout to the Rialto Pipeline
  - 9 miles of 36- to 72-inch east-west pipeline
  - Proposed 36-inch turnout to Agua de Lejos clear well (WFA)
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
- Component D – Delivery to member agencies via In-Lieu Local (Example Projects)
  - Up to 3,900 AFY wellhead treatment by 3 wellhead treatment systems treating water pumped from up to existing member agency 9 wells.
- Existing Facilities
  - Rialto Pipeline (HGL 1,936 ft)
  - Member agency wells
  - Agua de Lejos WTP Clearwell (HGL 1,632 ft)

- o Lloyd Michaels WTP Clearwell (HGL 1,658 ft)
- o FWC Highland Zone (HGL 1,504 ft).

All facilities in TAKE Alternative 7 would be operated to deliver 50,000 AFY to the Rialto Pipeline and member agencies, during call years. The following discusses call year operation.

- Component A – Groundwater Extraction and Blending
  - o The extraction wells, collector pipes, and Storage Tank #1 would extract and blend 50,000 AFY (about 31,000 gpm) of groundwater.
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - o Storage Tank #1 would serve as a forebay for Potable Water Pump Station #1, #2 and #3. Pump Station #1 would deliver 36,000 AFY combined of water to the Rialto Pipeline and to CVWD Zone III (HGL 1,658 ft). Pump Station #2 would deliver 4,000 AFY of water to FWC Highland Zone (HGL 1,504). Pump Station #3 would deliver 10,000 AFY of water to WFA Agua de Lejos clear well (HGL 1,632 ft) through the east-west pipelines network, and four turnouts.

TAKE-8: Partial pump back and partial in-lieu

TAKE Alternative 8 (TAKE-8) involves the delivery of 40,000 AFY of CBP water to all MWD, CVWD and FWC during call years. Table 25 provides the deliveries to each agency for TAKE Alternative 8.

Table 25
TAKE ALTERNATIVE 8 DELIVERIES TO EACH AGENCY (TAFY)

Agency	Call Year	Non-Call Year
Metropolitan Water District	10,000	-
CVWD and FWC	30,000	
TOTAL	**40,000**	

Note: [1]Water supplied from the WFA Agua de Lejos WTP.

TAKE Alternative 8 includes construction or use of the following facilities, shown on Figure 9:

- Component A – Groundwater Extraction and Blending
  - o 17 extraction wells
  - o 6 miles of 12- to 36-inch collector pipelines
  - o 5 MG Storage Tank #1
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - o Potable Water Pump Station #1: 5,300 HP, 11,300 gpm firm capacity, 558 ft TDH
  - o 6.3 miles of 48-inch northern pipeline
  - o Proposed 24-inch turnout to FWC Highland Zone
  - o Proposed 48-inch turnout to CVWD Zone III
  - o Proposed 24-inch turnout to Rialto Pipeline
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
  - o 2 miles of 36-inch potable southern pipeline
  - o 0.7 miles of 24-inch potable pipeline to FWC Jupiter Zone F17 Tank (HGL 1,103 ft)

- Component D – Delivery to member agencies via In-Lieu Local (Example Projects)
  - o Up to 4,000 AFY wellhead treatment by 3 wellhead treatment systems treating water pumped from up to existing member agency 9 wells.
- Existing Facilities
  - o Member agency wells

All facilities in TAKE Alternative 8 would be operated to deliver 40,000 AFY to the Rialto Pipeline, CVWD, and FWC during call years. The facilities would operate as a complete in-lieu to deliver 30,000 AFY to CVWD and FWC. The following discusses call year operation. The operation of the TAKE-8 components would be as follows:

- Component A – Groundwater Extraction and Blending
  - o The extraction wells, collector pipes, and Storage Tank #1 would extract and blend 50,000 AFY (about 31,000 gpm) of groundwater.
- Component B – Delivery to Hydraulic Elevations Above the Blending Reservoir
  - o Storage Tank #1 would serve as a forebay for Potable Water Pump Station #1. Pump Station #1 would deliver 40,000 AFY combined of water to Rialto Pipeline, CVWD Zone III, FWC Highland Zone, through a proposed network of 24- to 48-inch pipelines.
- Component C – Delivery to Hydraulic Elevations Below the Blending Reservoir
  - o Water would flow by gravity from north to south in a pipeline with a size between 24- and 36-inch; The volume of water that would flow by gravity under this alternative is anticipated to be 5,000? AFY of water would flow by gravity from Storage Tank #1 South to turnout to FWC's Jupiter Zone F17 tank member agencies along a proposed 24-inch southern pipeline. Coming from an HGL of 1,100 in Storage Tank #1, an in-conduit hydropower facility may be appropriate at some turnout locations, but not at others.

3.11 CHINO BASIN PROGRAM CONVEYANCE FACILITIES

This section presents the conveyance approach and assumptions for both the PUT and TAKE alternatives. This section includes:

- General criteria and alignment assumptions
- Recycled water conveyances
- Purified water conveyance
- Brine conveyance
- Potable water conveyance

Note that some conveyance facilities are discussed under the Subsections 3.9, Chino Basin Program PUT Facilities and 3.10 Chino Basin Program TAKE Facilities; however, these facilities are summarized below for continuity under conveyance facilities.

3.11.1 General Criteria and Alignment Assumptions

In general, all proposed conveyance pipelines will be aligned through the public Right-of-Way (ROW) and properties owned or to-be acquired by IEUA to reduce the number of easements required for construction and maintenance. Parallel alignments through ROWs governed by the California Department of Transportation (Caltrans) will also be avoided (though not excluded from consideration) to reduce permitting efforts. Constructing in areas requiring additional permitting will be considered to avoid known utility conflicts and/or narrow segments of road, or to shorten the length of the overall alignment.

Many existing utilities could conflict with proposed conveyance pipelines, potentially leading to increases in construction time and cost. It is assumed that each stretch of public ROW will include at least one local water main and services, one local sewer main and laterals, local communication and electricity facilities in a duct bank, and one local gas distribution main and services. In addition, regional facilities have been mapped in to Figure 10 identify larger utility conflicts, including the following:

- Large water transmission mains operated by MWD, San Gabriel Valley Municipal Water District, and CDA
- IEUA sewer trunk lines and force mains
- IEUA recycled water pipelines fuel transmission lines
- Groundwater recharge basins
- Natural gas transmission and distribution pipelines
- Regional brine transmission lines
- Regional storm drainage facilities
- Properties owned by the Southern California Edison Company (Edison)

While avoiding all utility conflicts is not feasible, all conveyance pipelines will be aligned to avoid known parallel utility conflicts with as many existing regional utility facilities as possible. Pipelines may be aligned through utility conflicts if alternatives to avoid utilities require excessive increases in pipe length, excessive segments that require horizontal directional drilling to construct, or acquisition of easements that are considered more costly and challenging than avoiding the utility. Lots owned by Edison that cannot be purchased outright by IEUA are also not being considered due to Edison's "No Permanent Facility" clause in its Transmission Line Right of Way Constraints and Guidelines.

3.11.2 Recycled Water Conveyance

IEUA owns and operates a recycled water distribution system with five pressure zones to serve recycled water customers and deliver recycled water to recharge basins for groundwater replenishment. The proposed AWPFs are to be placed along existing recycled water mains; therefore, no additional recycled water facilities will be required to move recycled water from IEUA's existing system to the AWPFs. However, due to the demand of the AWPFs on the existing recycled water system, IEUA will be receiving additional supply from Rialto WWTP and WRCRWA. Both new recycled water supply sources will require a pump station and pipeline to connect into the existing recycled water system. The assumptions and criteria for these recycled water pipelines and pump stations are listed below and in Table 26, below.

- Total dynamic head (TDH) required of pump stations to pump water into the existing recycled water system was calculated by the existing hydraulic model
  - The existing model uses the Hazen Williams equation used to determine friction head loss within pipelines
- Trenchless technologies will be required at freeway, flood channel, and railroad crossings
  - Jack and bore for lengths less than 500 feet
  - Horizontal directional drilling for lengths exceeding 500 feet

Table 26
TERTIARY RECYCLED WATER PUMP STATION AND PIPELINE DESIGN CRITERIA AND PLANNING ASSUMPTIONS

Parameter	Criteria	Units	Demand Condition
Maximum System Velocity	5	fps	Constant Flow
Pipe Material, Diameter ≥ 16 in	Steel	-	-
Pipe Material, Diameter < 16 in	Unspecified	-	-
Hazen Williams Coefficient	120	-	-
Minor Losses (% of friction losses) (bends, valves, etc.)	5	%	-
Low water level plant and booster pump stations	20 ft below grade	-	-
Motor Efficiency	75	%	-
Pump Efficiency	93	%	
Total Pump Station Efficiency	70	%	

Recycled Water Pipeline Alignment Assumptions

Connection from the Rialto WWTP
The connection from the Rialto WWTP is assumed to connect to IEUA's recycled water system near RP-4 within the 1158 pressure zone (HGL 1158 ft, typically). In scenarios with the AWPF located at RP-4, the pipeline connection from the Rialto WWTP will directly feed the AWPF. In order to make the connection near RP-4, the supply pipeline is required to cross the Union Pacific Railroad and Interstate 10. It is assumed that the pipeline will require jack-and-bore to cross both the railway and the freeway.

Connection from Western Riverside County Regional Wastewater Authority (WRCRWA)
The connection from WRCRWA to the IEUA recycled water system is assumed to connect within the 930 pressure zone near the 930/800 pressure reducing valve. This connection will allow the supplemental supply from WRCRWA to offset demands in the southern pressure zones where the highest agricultural demands exist and make available IEUA supply normally used to meet these demands to feed the AWPF. Due to limitation in how water can move between pressure zones, a connection to the 800 pressure zone would not allow for a maximum benefit of the new supply source. A connection within the 1158 pressure zone would allow the new supply to directly feed the AWPF if located near RP-1, but will also require about two additional miles of pipeline than a connection to the 930 pressure zone, making this connection cost prohibitive.

3.11.3 Recycled Water Conveyance

The purified water distribution system consists of pump stations and pipelines. The treatment plant pump stations deliver water to injection wells and lower elevation recharge basins. Additional booster pump stations are required to deliver purified water to higher elevations and more distant recharge basins.

Pipelines
Purified water would be routed from the AWPF's located at RP-4 to injection wells located within the Chino Basin. Pipeline design criteria established for the purified water system in addition to the overall pipeline design criteria (Table 26) are shown in Table 27.

- Hazen Williams equation used to determine friction head loss within pipelines
- Trenchless technologies will be required at freeway, flood channel, and railroad crossings
  - o Jack and bore for lengths less than 500 feet
  - o Horizontal directional drilling for lengths exceeding 500 feet
- Pressure reducing valves will be included at each injection well to decrease head to the required residual pressure to feed the wells.

Table 27
PURIFIED RECYCLED WATER PIPELINE DESIGN CRITERIA AND PLANNING ASSUMPTIONS

Parameter	Criteria	Units	Demand Condition
Hazen Williams Coefficient	120	-	-
Maximum System Velocity	5	fps	Constant Flow
Pipe Material	Steel	-	-
Minor Losses (bends, valves, etc.)	5	%	-
Residual Head required at Injection Wells	10	psi	-
Low water level plant and booster pump stations	20 ft below grade	-	-
Motor Efficiency	75	%	
Pump Efficiency	93	%	
Total Pump Station Efficiency	70	%	-

Pump Stations
The proposed conveyance routings will require pump stations to deliver water to the injection wells in the event that an option including the recharge basins is selected. Only one pump station would be required to pump water from the AWPF to the conveyance pipeline to the injection wells. Design criteria for these pump stations is included in Table 27.

If a PUT alternative is developed that includes using recharge basins for groundwater replenishment of purified water, an additional pump station would be required to convey purified water to the northern recharge basins including Lower Day, Etiwanda Debris, and San Sevaine. The purified water conveyance system could be extended from the injection wells to Victoria, Hickory, and Banana recharge basins without an additional pump station (i.e., the purified water pump station could pump to the injection wells and these three recharge basins).

3.11.4 Brine Conveyance

RO concentrate created at IEUA's RP-4 AWPF and brine concentrate from the example In-Lieu Local project for the City of Chino Hills wellhead treatment facility will be disposed of into the existing NRWS via the nearest existing manhole. The following assumptions were made to complete this phase of design:

- Hazen Williams equation used to determine friction head loss within pipelines
- RO concentrate will have sufficient pressure to deliver water from treatment plant to brine line discharge
- Jack and bore required at freeway crossings

Table 28
BRINE PIPELINE DESIGN CRITERIA AND PLANNING ASSUMPTIONS

Parameter	Criteria	Units	Demand Condition
Hazen Williams Coefficient	120	-	-
Maximum System Velocity	5	fps	Constant Flow
Pipe Material	HDPE	-	-
Minor Losses (bends, valves, etc.)	5	%	-

Pipelines

The RP-1 brine pipeline connection will connect into the NRWS pipeline via a pipeline parallel to the recycled water conveyance line also exiting the plant. The HDPE brine line will require one jack-and-bore trenchless crossing under the 60 freeway.

The RP-4 brine pipeline will connect into the NRWS pipeline via a pipeline on the southeastern side of the existing facility. No trenchless crossings are required for this pipeline.

The brine pipeline for the AWPF at MVWD's site would be routed parallel to the recycled water conveyance line also exiting the plant to connect to the EWL. No trenchless crossings are required for this pipeline.

The brine pipeline for the example In-Lieu Local project included for the City of Chino Hills wellhead treatment facility would connect into the IEBL via a pipeline on the southern side of the facility. The HDPE brine line would require one jack and bore trenchless crossing under the 71 Highway and Chino Creek.

Table 29
BRINE PIPELINE DESIGN CRITERIA AND PLANNING ASSUMPTIONS

Parameter	Diameter (in)	Approximate Length (ft)	Maximum Elevation (ft)
RP-4 Brine Line	8	1,400	1,084

AWPF at RP-4

For a product water capacity of 15 TAFY, approximately 1.03 MGD of brine concentrate will require disposal. The elements of the proposed connection are as follows:

- Connection
  - o Brine concentrate will be conveyed through a 1,400-foot 8-inch HDPE brine line using residual pressure from the RO system. The residual pressure is projected to be a maximum of 80 psi and would be reduced using a control valve. It is assumed that the brine concentrate would be discharged from an RO concentrate air gap.
  - o The new brine line would exit the southeast side of the AWPF and connect to existing manhole EINL- 008 on the NRWS pipeline, located on Etiwanda Avenue between Wells Street and 6th Street.
  - o No trenchless crossings would be required for this brine line.
- Capacity
  - o At the proposed connection, the existing NRWS pipeline is a 15-inch vitrified clay pipe (VCP) with a capacity of 7.1 cfs (4.6 MGD).

- o The current flow at this location is 20,000 gallons per day (gpd) and the purchased capacity is 21,600 gpd.
- o It has been verified that the existing NRWS infrastructure would be able to accommodate the brine stream at the point of connection and downstream.
- o 2,603 NRWS CUs would need to be purchased
- Hydraulics
  - o At the proposed connection, flow would transition from pressurized to gravity.

The brine disposal for the AWPF at RP-4 is summarized in Table 30 and shown in Figure 11.

Table 30
RP-4 AWPF BRINE FACILITIES

Parameter	Description
Brine Stream Characteristics	
Flow	1,027,300 gpd
Chemical Oxygen Demand (COD)[3]	262 ppd[1], dry
Total Suspended Solids (TSS)[3]	1 ppd, dry
Connection	
Disposal System	NRWS Pipeline
Pipeline	1,400 ft (8-inch)
No. of Crossings	None
NRWS CUs Required	2,603
Capacity	
NRWS Pipeline Capacity	4.6 MGD (15-inch)
Current Flow	20,000 gpd
Purchased Capacity	21,600 gpd
Hydraulics	
Design Velocity	5 fps[2]

Notes: [1]ppd = pounds per day
[2]fps: feet per second
[3]Values are estimates

New IEBL Connection

The CBP may include groundwater wellhead treatment facilities that could generate brine. Two example In-Lieu Local projects were included in the TAKE alternatives for the City of Chino Hills and the City of Chino. The City of Chino Hills wellhead treatment facility would require a new connection to the IEBL. Table 31 provides a summary of the proposed example In-Lieu Local project for the City of Chino Hills and the corresponding product water capacity for each TAKE alternative.

Table 31
CBP TAKE ALTERNATIVE WELLHEAD TREATMENT FACILITY CAPACITY

Wellhead Treatment Facility Location	TAKE 1	TAKE 3	TAKE 7	TAKE 8
	-	3,000 AFY	-	-

CBP TAKE Alternative 3 assume that one of the wellhead treatment facilities is located at the City of Chino Hills Booster 9. For a product water capacity of 3,000 AFY, approximately 4,900 gpd of brine concentrate will require disposal. The size and alignment for the proposed brine line is the same for TAKE Alternative 3. The elements of the proposed connection are as follows:

- Connection
  - Brine concentrate would be conveyed through a 6,800-foot 8-inch HDPE brine line.
  - The new brine line would exit the south side of the facility and connect to existing manhole SST-018 on the IEBL, located at the intersection of Eucalyptus Avenue and Monte Vista Avenue.
  - To cross the 71 Highway and Chino Creek, approximately 300 feet of the brine line would need to be installed using jack and bore.
- Capacity
  - At the proposed connection, the existing IEBL pipeline is a 12-inch VCP with a capacity of 3.5 CFS (2.3 mgd).
  - The current flow at this location is 22,000 gpd and the purchased capacity is 43,000 gpd.
  - It has been verified that the existing IEBL infrastructure would be able to accommodate the brine stream at the point of connection and downstream.
  - One Agency Capacity Unit (CU) would need to be purchased for TAKE Alternatives 3, 4c, and 6b.
- Hydraulics
  - Constant flow through the brine line is not feasible since a very small pipe diameter is needed to meet the velocity design criteria. To promote full pipe flow, a pressure sustaining valve is recommended at the connection to the IEBL.
  - At the proposed connection, flow will transition from pressurized to gravity.

The brine disposal for the City of Chino Hills wellhead example In-Lieu Local project is summarized in Table 32 and shown in Figure 12.

Table 32
EXAMPLE IN-LIEU LOCAL PROJECT (CITY OF CHINO HILLS WELLHEAD TREATMENT FACILITY) BRINE DISPOSAL

Parameter	Description
Brine Stream Characteristics	
Flow	4,900 gpd
COD[1]	10 ppd, dry
TSS[1]	1 ppd, dry
Connection	
Disposal System	IEBL
Pipeline	6,800 ft (8-inch)
No. of Crossings	1 (Jack and bore 300 ft beneath Highway 71 and Chino Creek)
NRWS CUs Required	1

Parameter	Description
Capacity	
NRWS Pipeline Capacity	1.9 MGD
Current Flow	22,000 gpd
Purchased Capacity	43,000 gpd
Hydraulics	
Design Velocity	5 fps

Notes: [1]Values are estimated

Scaling Prevention and Mitigation Strategies

Scaling occurs when minerals precipitate out of a liquid stream and form deposits on surfaces within treatment processes or downstream distribution systems. Calcium carbonate and sulfate scales are the most common types of scale resulting from RO and IX systems. If not properly managed, scale can reduce capacity, cause water quality fluctuations, diminish treatment results, or lead to failure of piping and equipment. For applications susceptible to scaling, a water quality analysis should be performed, and an action plan implemented to minimize the effects of scaling on the system.

The scaling process starts with nucleation, which is the early stages of crystal formation. Subsequent crystal formation will quicken once nucleation has started. Nucleation can only occur in saturated or supersaturated solutions. There are two types of nucleation:

- Homogenous nucleation
  - Crystal growth within a solution. Clusters of ions, known as seed crystals, can form and grow until they are large enough to precipitate out of the solution, forming scale deposits.
  - More likely to occur as the degree of supersaturation increases.
  - Typically prevented by adding scale inhibitors (inhibits nucleation), distorting agents (alters and weakens crystal structure), and dispersants (cause crystals to repel each other).
- Heterogenous nucleation
  - Crystal growth on an existing surface. The interaction between the solution and the existing surface will form seed crystals and lead to scale deposits.
  - More likely to occur at irregularities on the existing surface such as pipe joints, defects, valves, and meters.
  - Typically prevented by altering the physical properties of the piping or equipment. Minimizing homogenous nucleation will also reduce heterogenous nucleation by maintaining a smoother pipe free of scale deposits.

RO systems typically inject scale inhibitors upstream of the treatment process to facilitate a higher recovery rate; thus, it is expected that the brine concentrate from the proposed AWPF(s) would be supersaturated. Brine concentrate from the IX system at the City of Chino Hills wellhead treatment facility is expected to be saturated since scale inhibitors are typically not injected upstream of the treatment process.

Table 33
FACTORS AFFECTING SCALING POTENTIAL

Parameter	Description	Mitigation Strategy
Treatment Recovery Rate	For RO systems, higher recovery rates will lead to brine with higher salt concentrations since less water is wasted.	Confirm that anti-scalant residuals are present in RO system brines.
Degree of Saturation	Higher degrees of saturation will increase the rate of homogenous and heterogenous nucleation.	Inject scale inhibitors or dispersants to prevent crystal growth, or inject distorting agents so that scale is easier to clean.
pH	The solubility of carbonate increases with acidity.	Lower the pH to reduce the scaling potential in the brine line (through chemical injection)
Alkalinity	Results from the presence of hydroxides, carbonates, and bicarbonates.	Reduce the alkalinity to directly reduce the scaling potential (acid addition).
Physical Properties of Interacting Surfaces	Roughness, shape, and material of the piping or equipment can catalyze heterogenous nucleation	Select materials resistant to scale, minimize irregularities, and frequently perform maintenance.
Flow Regime	Free water surfaces will lead to scaling at the interacting surface. Free water surfaces will also experience evaporation, causing the salt concentration to increase.	Brine conveyance pipelines should be designed to promote full pipe flow.

Conclusion

Heterogenous nucleation is more likely to occur than homogenous nucleation in brine conveyance pipelines. The most economical strategies for preventing scale are physical properties and flow regime. The following should be considered:

- HDPE is recommended because the pipe interior is smooth.
- The fusion-weld beads resulting from HDPE installation should be removed from the interior using a mandrel.
- The pipeline design should promote full-pipe flow. Air release valves are likely needed and should be easily accessible and resistant to scale. To promote full-pipe flow, a pressure sustaining valve could be used at the connection to the North NRWS or IEBL.
- The velocity should not exceed 5 fps because turbulent flow will induce scaling.

Chemical treatment and pH adjustment should also be considered. Since RO systems utilize scale inhibitor upstream of the process, it is a feasible option to inject additional scale inhibitor into the brine concentrate leaving the system. Since IX systems do not utilize scale inhibitors, it would be more economical to inject sulfuric acid into the brine concentrate to dissolve calcium carbonate by suppressing the pH. A water quality analysis for the brine concentrate is recommended to determine the optimal strategy to prevent scaling.

It is recommended that the brine lines are inspected regularly as a preventive measure. If scale formation is detected, then cleaning through chemical treatment (acid) should be undertaken before scaling becomes extensive. Long radius bends should be installed to facilitate pipe pigging in the future, if required. Additionally, installing parallel brine lines at each facility is recommended to allow for continuous operation during maintenance. The second brine line would be drained and flushed when not in use.

3.11.5 Potable Water Conveyance

The potable water conveyance system will consist of extraction wells, a reservoir, pump stations, pipelines, and turnouts to member agencies and/or MWD. In general, the extraction wellfield will deliver potable water to a reservoir which will be used for blending and to break head between high and low HGL zones where potable water will be delivered. The reservoir will have two outlets – one directly into a proposed transmission main to deliver water to lower HGL member agencies, and one into the suction side of a proposed potable booster pump station to deliver water to higher HGL member agencies and/or into the Rialto Pipeline.

Pipelines and Pump Stations

For alternatives that include both MWD Pump Back and In-Lieu CBP, regional potable water facilities will be joined and used for both purposes to reduce costs. For instance, if water is to be pumped back to MWD at CB-7 and also delivered to CVWD at the Lloyd W. Michael WTP (about a half mile away from CB-7), a single pump station and pipeline with capacity for both deliveries would be installed to convey water from the extraction wellfield to the general area near CB-7 and Lloyd W. Michael WTP at which point the pipeline would diverge to two smaller diameter pipelines to deliver water to each turnout.

The assumptions and criteria for the potable water pipelines and pump stations are listed below and in Table 28.

- Hazen Williams equation used to determine friction head loss within pipelines
- Pump suction side HGL set to 10 ft above ground elevation for pump stations with an open-atmosphere forebay
- Trenchless technologies will be required at freeway, flood channel, and railroad crossings
    - o Jack and bore for lengths less than 500 feet
    - o Horizontal directional drilling for lengths exceeding 500 feet

Table 34
PURIFIED RECYCLED WATER PIPELINE DESIGN CRITERIA AND PLANNING ASSUMPTIONS

Parameter	Criteria	Units	Demand Condition
Maximum System Velocity	5	fps	Constant Flow
Pipe Material, Diameter ≥ 16 in	Steel	-	-
Pipe Material, Diameter < 16 in	Unspecified	-	-
Hazen Williams Coefficient	120		-
Minor Losses (% of friction losses) (bends, valves, etc.)	5	%	-
Motor Efficiency	75	%	
Pump Efficiency	93	%	
Total Pump Station Efficiency	70	%	-

In-Conduit Hydropower Facilities

In-conduit hydropower facilities may be considered in locations of the potable water distribution system where the system pressure needs to be reduced and energy can be produced. Due to the various pressure zones that the regional potable system will be pumping into, it is likely that in some cases a single pump station may deliver water to multiple local pressure zones with different HGLs, and in-conduit hydropower facilities may be appropriate to recapture some of the energy used to lift the water to the higher HGL. This would only be appropriate where the energy loss from pumping water to an HGL and then attempting to recover it with a hydropower facility would be less costly than to build a second pump station and pipeline to deliver water to the lower HGL without any unnecessary additional lift.

Locations ideal for in-conduit hydropower generations should have an available pressure between 25 and 260 psi. The power output at the facility will depend on the available head and flow rate. Three types of in-line hydropower facilities were identified for the CBP:

1. Pump Turbines. A pump turbine is a centrifugal pump running in reverse and is a typically used in small output applications less than 300 kW. Economically, these start to make sense with a minimum power output of 50 kW. They work best with stable and relatively constant flow rates.
2. In-line Francis Turbines. Francis type turbines are the most widely used in-line hydraulic turbines. In-line Francis Turbines can be dropped into an existing PRV location. Unlike pump turbines, Francis Turbines can operate over a wide flow range. These typically have an efficiency of 70-75%. Economically, installation of a Francis Turbine makes sense in locations that can generate 150 kW or greater.
3. Custom Francis Turbines. A custom Francis Turbine has a higher efficiency, typically 80-85%, and are generally installed in locations that can produce much high power 500 kW or greater. These can also cover a wide range in flow.

Under the Federal Power Act, non-federal hydropower resources are regulated under the Federal Energy Regulatory Commission (FERC). FERC issues three types of authorizations: conduit exemptions, 10-megawatt exemptions, and licenses. FERC approval is required to construct and operate small/low-impact hydropower projects while assuring adequate protection of environmental resources. The FERC Small/Low Impact Hydropower Projects program is intended for small projects that would results in minor environmental effects, such as projects that involve little change to water flow and use and are unlikely to affect threatened and endangered species. The CBP would likely be classified as a small/low-impact hydropower project or would qualify for a conduit exemption as all proposed hydropower generation would be from in-conduit turbines.

Blending and Storage Reservoir

A single reservoir is proposed near the extraction wellfield to allow for blending of groundwater and serve as a forebay for the pump station. The proposed reservoir near the extraction wellfield should provide a retention time of approximately three hours from the extraction wellfield for adequate blending. The reservoir was sized at 5 MG for TAKE alternatives.

The location for a potential reservoir site was determined through identifying land in the Chino Basin near the extraction wellfield suitable for reservoir construction. A GIS shapefile of parcels in San Bernardino County provided by the Assessor’s Office was used to identify potential reservoir sites with the following attributes for use in developing the TAKE alternatives:

- Undeveloped parcels.
- Parcels located at the intersection of streets. These sites would provide for easy access to the site during construction, maintenance, and rehabilitation activities.

- Parcels greater than one acre for a 2.5-MG reservoir and greater than 1.75 acres for 5-MG reservoir.
- Parcels not planned for development (such as the former Empire Lakes Golf Course site).
- Parcels with a vacant land use designation.

3.12 SUMMARY OF FACILITY CONSTRUCTION AND OPERATIONS

The CBP would, as stated under Subsection 3.4, Program Objectives, be developed to provide flexibility to regional and local water operations, particularly during future extended droughts expected as climate change continues to impact California. The Program would enhance both the SWP and the Central Valley Project for the betterment of operations, environment, resilience, and reliability. This section of the Project Description is intended to outline operational and construction scenarios for the specific types of facilities and/or improvements that could result from the implementation of the CMP.

The implementation of the facilities proposed as part of the CBP consists of construction and operation of the various facilities that will be summarized below. These potential facilities are separated into four project categories: (1) Project Category 1: Well Development (Injection wells, extraction wells, etc.); (2) Project Category 2: Conveyance Facilities and Ancillary Facilities; (3) Project Category 3: Groundwater Storage Increase; and, (4) Project Category 4: Advanced Water Purification Facility. Below are general descriptions of the facilities and operations proposed as part of the CBP.

Project Category 1: Well Development (Injection Wells, Extraction Wells, Etc.)
The CBP would ultimately install several wells and utilize one or up to four existing wells in order to facilitate project operation as follows:

- 16 injection wells (12 duty, 4 standby)
- The CBP would install a maximum of 17 extraction wells.
- 4 monitoring wells
- Use of existing wells including the following:
    - Use of up to 9 existing member agency wells
    - Use of existing Agua de Lejos WTP Clearwell (HGL 1,632 ft)

Project Category 2: Conveyance Facilities and Ancillary Facilities
The CBP would ultimately install a total of about 38.65 miles or 204,088 lineal feet (LF) of various types of pipeline. The breakdown of the types of pipeline follows:

- 7.1 miles of 8” to 30” pipeline for purified water conveyance
- 4 miles of 12- through 24-inch potable southern pipeline
- 9 miles of 36” to 72” east west pipeline
- 8 miles of 12” to 48” inch potable northern pipeline
- 9 miles of 12” to 42” inch collector pipeline
- 1,400 ft (8’ pipeline) NRWS brine conveyance; NRWS Capacity Units required 2,603
- In lieu Brine Disposal IEBL 6,800 ft 8” pipeline, jack and bore across 300 ft under Hwy 71 and Chino Creek

The CBP would install a storage tank with a maximum capacity of 5 MG with possible and in-conduit hydropower facility.

The CBP would install 3 pump stations serving various PUT and TAKE facilities. One pump station would serve PUT facilities, while up to two pump stations would support TAKE facilities. The breakdown of the types of pump stations are as follows:

- Pump station at RP-4 1,500 HP
- Pump Station with a max 9,300 HP, and a max of 31,100 gpm, 823 ft TDH
- Second Pump Station 700 HP 6,200 gpm capacity, 281 ft TDH

The CBP would install a maximum of 6 that would be between 24" and 72" in size turnouts in support of TAKE facilities within IEUA's service area. Possible turn out locations may or may not include the following:

- o to FWC Highland Zone (and optional hydropower facility)
- o to CVWD Zone III (and optional hydropower facility)
- o to the Rialto Pipeline
- o to CVWD Zone II
- o to Agua de Lejos clear well (Upland and MVWD)
- o to TVMWD Miramar WTP clear well (HGL 1,630ft)

Project Category 3: Groundwater Storage Increase

As discussed under Subsection 3.3.1, Chino Basin Groundwater, the proposed CBP requires an increase the Safe Storage Capacity of the Chino Basin in order to accommodate an addition of up to 150,000 AF of managed storage above the existing Safe Storage Capacity (700,000 AF through June 30, 2030, and to 620,000 AF from July 1, 2030 through June 30, 2035). As such, the CBP contemplates a permanent increase in Safe Storage Capacity of 850,000 AF in order to accommodate the CBP and after a 25-year period, the increased managed storage will be available for local use, therefore reducing dependence on imported water, improving water quality, and providing a new local water supply for the Basin. This permanent increase would supersede the Safe Storage Capacity that was adopted in March of 2021 by the IEUA Board.

Project Category 4: Advanced Water Purification Facility and Other Water Treatment Facilities

This Project Category contemplates the AWPF at RP-4, which will be constructed to utilize an MF/RO/UV-AOP treatment train and will ultimately have a capacity 15,000 AFY. Additionally, the CBP may install up to 3 wellhead treatment facilities at a location that has yet to be selected up to 3,000 AFY each, with no more than 6,000 AFY treated in total through biological or other wellhead treatment mechanisms (treatment mechanisms are discussed in further detail TM1, which is provided as Appendix 1).

<u>Operational Scenarios</u>

Operational Scenarios are provided above under Subsections 3.9 Chino Basin Program Put Facilities, 3.10 Chino Basin Program Take Facilities, and 3.11 Chino Basin Program Conveyance Facilities. Operational scenarios are repeated and condensed under this section.

Possible operational scenarios are provided as part of the discussion of each type of facility. The future modes of operation (activities) are provided to enable evaluation of the direct and indirect environmental impacts that could result from CBP implementation.

Construction Scenarios

Secondarily, as part of this summary of all facilities, estimated construction scenarios are provided as part of the discussion of each type of facility. The purpose of the following general construction scenarios is to assist the reviewer to understand how the proposed facilities will be installed, the amount of time required for their construction, and potential direct and indirect environmental impacts. This information also provides essential data for making the program air quality impact forecasts using the most current CalEEMod emission forecast model.

For some of the facilities anticipated by the CBP, the types, configuration and exact location of future specific projects that may be constructed in support of the CBP have not been determined. However, there are several specific projects and alternatives that have been identified at a sufficient level of detail that a location has been pinpointed in which a specific project will be developed. Ultimately, it is possible to foresee most of the infrastructure that is likely to be constructed and to project the reasonably foreseeable direct and indirect impacts that would result from construction and operation of the infrastructure. Impacts associated with specific future projects could be evaluated in second-tier CEQA evaluations to determine if the actual impacts fall within the impacts forecast by this analysis, or require subsequent CEQA evaluations and determinations. These evaluations would be conducted under Section 15162 of the State CEQA Guidelines.

3.12.1 Project Category 1: Well Development and Monitoring Devices

Operational Scenario: Wells

The CBP anticipates the installation of up to 37 new wells, (16 injection wells (12 duty, 4 standby), 17 extraction wells, 4 monitoring wells). The Injection wells will recharge up to 15,000 AFY per year, while the new extraction wells will pump up to 50,000 AFY of water from the Basin in call years, or 10,000 AFY in non-call years (only 7.5 call years are anticipated over a 25-year period). After the 25-year period in which the CBP would be active, IEUA member agencies could utilize the water purified at the AWPF in the amount of 15,000 AFY.

The 16 injection wells would have a maximum operational capacity of 830 gpm each.

The 17 extraction wells would have a maximum operational capacity of 2,000 gpm each.

The 4 monitoring wells will be visited by a field technician on a monthly to quarterly frequency. There is negligible energy consumption in obtaining groundwater levels from a monitoring well.

The 9 existing extraction wells would be assumed to operate in a similar manner, on average, to the new proposed extraction wells discussed above.

Construction Scenario: Wells

Installation of the 37 new wells could occur over a period of 3 years, with 12 wells being installed each year to coincide with the opening year (2028) of the AWPF. Thus, for analysis purposes it is assumed that a maximum of 12 wells per year may be developed. The depth of a new A wells could range between 500 and 1,500 feet. The average area of disturbance of a well site is anticipated to be half an acre or less. Development of up to 12 new wells during a given year will require the delivery and set up of the drilling rig at each site. It is anticipated these wells will be drilled at different times and the drilling equipment will be transported to and from the sites on separate occasions. For the purposes of this evaluation, it is forecast that delivery of the drilling equipment 12 times in a year will result in 12 50-mile round-trips for the drill rigs.

Injection well development has essentially the same construction impacts as production well development. The primary physical difference between injection and production wells is that different valve options are installed according to the type of well.

It is anticipated that about five persons will be on a given well site at any one time to support drilling a well: three drillers, the hydrologist inspector, and a foreman. Daily trips to complete the well will average about 15 roundtrips per day, which at various points of construction will include: two roundtrips for drill rigs; between 6 and 12 roundtrips for cement trucks; about 5 trips to deliver pipe; and about 10 trips per day for employees.

For analysis purposes it is assumed that each well would be drilled using the direct rotary or fluid reverse circulation rotary drilling methods. The average area of disturbance of each well site is estimated to be one-half an acre or less. Access to the drilling site for the drilling rig and support vehicles would be from adjacent roadways. Typically, well drilling requires only minimal earth movement and/or grading.

The drilling and development of each well will require drilling to—in most cases—between 250 and 1,500 feet below ground surface (bgs). The proposed schedule for constructing each well would be as follows: drilling, construction, and testing of each well would require approximately six weeks to complete (about 45 days, of which 15 to 20 days would include 24-hour, 7-day a week drill activity). For planning purposes, a construction and testing schedule duration of 60 days per well is assumed to account for unforeseen circumstances (e.g. extreme weather, equipment break downs, etc.) that could affect the drilling and testing schedule. The well casings are expected to be welded and it will be assumed that well development and installation will require a two week use of a diesel generator.

The borehole for the well would be drilled using at least two separate drilling passes. The first pass, or pilot borehole, would be drilled using a 17.5-inch diameter bit to an estimated maximum depth below the ground surface, which would correspond to the top of the consolidated bedrock in the area, or a depth selected by the project hydrologist/hydrogeologist. Upon completion of the geophysical logs, the pilot borehole would be enlarged (reamed) to a diameter of 24 inches to approximately the same depth to accommodate the well casing, screen and filter pack.

Once each well is constructed it would immediately be developed through a process of swabbing and airlifting. During this process, drilling fluids and suspended sediment would be removed from the well. After the drilling fluids are removed along with most of the suspended sediment, the well would be further developed through pumping.

The use of existing wells is not anticipated to require construction beyond that which is described under Subsection 3.12.1.4, Advanced Water Purification Facility and Other Water Treatment Facilities, as several of these wells would require wellhead treatment in order to become operational in support of the CBP.

3.12.2 Project Category 2: Conveyance Facilities and Ancillary Facilities

Operational Scenario: Pipelines, Booster Pumps, Water Storage Tank, Brine Disposal, Etc.
Pipelines and Turnouts: Once a pipeline or turnout is installed, operations do not require any visits unless unforeseen circumstances arise that would require maintenance or repair of the pipelines. In the event of routine maintenance one vehicle trip per maintenance event would be required.

Brine Disposal: The proposed AWPF and wellhead treatment facilities would generate greater brine disposal within IEUA's service area than that which is generated at present. The additional brine stream flow from the AWPF at RP-4 would be 1,027,300 gpd, with a chemical oxygen demand of 262 pounds per day (ppd) and total suspended solids, dry (TSS) of 1 ppd, dry. The additional brine stream flow from the AWPF at RP-4 would be 1,027,300 gpd, with a chemical oxygen demand (COD) of 262 ppd and TSS of 1 ppd, dry. The brine stream flow from the AWPF would ultimately need to be treated at Los Angeles County Sanitation Districts (LACSD) through the Joint Outfall System (JOS) or at the Orange County Sanitation District (OCSD). Additional energy similar to that which would be generated by the AWPF commensurate with the amount of brine generated by the operation of these new IEUA facilities (about 1,150 AFY).

Pump Stations: Pump stations that are incorporated into the project will be operated to convey the water, the capacity and amounts of water pumped varies depending upon the alternative that is ultimately selected. A total of 3 pump stations will be installed.

The first pump station (Potable Water Pump Station #1) would have a maximum horsepower of 9,300 HP, and a maximum pumping capacity of 31,100 gpm firm.

The second pump station (Potable Water Pump Station #2) would have a maximum horsepower of 700 HP, and a maximum pumping capacity of 6,200 gpm firm.

The third pump station would operate at 1,500 HP.

Water Storage Tank: Once the reservoirs are installed, operation of the reservoirs would not require any shifts or employees as they will be monitored and controlled remotely. Scheduled maintenance visits to each reservoir site will occur in the future with one trip per maintenance event. Reservoirs typically do not directly consume energy as water or recycled water is pumped into reservoirs directly from wells or through booster pump stations.

Construction Scenario: Pipelines

An estimated 38.65 miles or 204,088 LF of pipeline may be installed in support of CBP. The maximum pipe length that would be installed in a single year would be 100,000 LF. Installation of 204,088 LF of pipeline could occur over a period of 3 years, with 70,000 LF being installed each year to coincide with the opening year (2028) of the AWPF.

It is forecast that most of the pipe will range from 10-inch to 48-inch diameter. It is assumed that an underground utility installation team can install an average of 200-400 LF of pipeline per day. A team consists of the following:

- 200-400 feet of pipeline installed per day
- 1 Excavator
- 1 Backhoe
- 1 Paver
- 1 Roller
- 1 Water truck
- Traffic Control Signage and Devices
- 10 Dump/delivery trucks (40 miles round trip distance)
- Employees (14 members per team, 40-mile round-trip commute)

The emissions calculations are based upon the above assumptions for each pipeline installation team. Typically, up to 800 feet of pipeline trench could be excavated, the pipe installed, backfilled, and compacted each day during pipeline installation in undeveloped areas whereas only 400 ft per day can be installed in developed roadways. In either case equipment would be operated for roughly the same portion of the day and daily equipment emissions would be the same, except that undeveloped areas would not require pavement removal and reinstallation.

It is assumed that three teams will be installing pipelines for a maximum total of 1,200 LF per day (400 x 3 = 1,200 LF). It is assumed that the proposed pipeline installation will occur for a maximum of 260 days in one calendar year.

Ground disturbance emissions assume roughly half an acre of land would be actively excavated on a given day. It is anticipated that installation of pipeline in developed locations will require the use of a backhoe, crane, compactor, roller/vibrator, pavement cutter, grinder, haul truck and two dump trucks operating 6 hours per day; a water truck and excavator operating 4 hours per day and a paving machine and compacter operating 2 hours per day. Installation of pipeline in undeveloped locations would require the same equipment without the paving equipment (cutter, grinder, paving machine). Depending on the pipe size, the trenches may vary in depth and width. A 12" pipeline may have a depth of 48" and 36" in width. A 72" pipeline may have a depth of 120" and 96" in width.

The pipelines that would be installed in support of CBP are anticipated to use push-on joints (e.g., gasketed bell-and-spigot) that do not require welding or, where the sizing is greater than 24" cement-mortar lined and coated (CML&C) welded steel pipe is preferred. However, the Contractor may occasionally use a portable generator and welder for equipment repairs or incidental uses.

Construction Scenario: Turn Outs

Turnout structures are provided to deliver water from the main canal to the water user via a pipeline or other means. The type of turnout structure and its design requirements are primarily dependent on its location. It is anticipated that installation of a maximum of 6 turnouts that would be between 12" and 72" in size would require a similar team of workers to that of pipeline installation. Installation of 6 turnouts that would be between 12" and 72" in size could occur over a period of 2 years, with 3 turnouts being installed each year to coincide with the opening year (2028 of the AWPF.

A team of turnout installers would consist of the following:

- 1 Excavator
- 1 Backhoe
- 1 Paver
- 1 Roller
- 1 Water truck
- Traffic Control Signage and Devices
- 10 Dump/delivery trucks (40 miles round trip distance)
- Employees (14 members per team, 40-mile round-trip commute)

The emissions calculations are based upon the above assumptions for each pipeline installation team. It is assumed that one teams will be installing turnouts at a given time and that each turnout would require 180 days to be fully installed.

Ground disturbance emissions assume roughly a quarter acre of land would be actively excavated on a given day. It is anticipated that installation of pipeline in developed locations will require the use of a backhoe, crane, compactor, roller/vibrator, pavement cutter, grinder, haul truck and two dump trucks operating 6 hours per day; a water truck and excavator operating 4 hours per day and a paving machine and compacter operating 2 hours per day. Installation of turnout in undeveloped locations would require the same equipment without the paving equipment (cutter, grinder, paving machine). The contractor may occasionally use a portable generator and welder for equipment repairs or incidental uses.

<u>Construction Scenario: Pump Stations</u>

Pump stations are required to pump water from areas at a lower elevation within the Basin, to areas located at a higher elevation. The total number of pump stations to be constructed in support of the CBP is anticipated to be 3.

It is forecasted that, at each site, no more than 0.5 acre will be actively graded on a given day for site preparation of each pump station. Construction of each pump station will require the delivery and installation of equipment and materials. It is anticipated that grading activities will occur over a 5 day period and this phase of construction will result in 6 truck trips on the worst-case day with an average round trip of 20 miles delivering construction materials and equipment (concrete, steel, pipe, etc.). Installation of the pump station will require the use a crane, forklift, backhoe and front loader operating 4 hours per day. Calculations assume five workers will each commute 40 miles round-trip to the work site.

Each pump station is assumed to be housed within a block building, and will require a transformer to be installed to handle the electric power delivered to the pumps. The proposed pump station building may include a pump room, electric control room, odor control facilities, chemical tanks, and storage room. Construction of the pump station would involve installation of piping and electrical equipment, excavation and structural foundation installation, pump house construction, pump and motor installation, and final site completion.

The pump stations proposed are anticipated to be located at sites that have permanent power available for construction, as such a generator is not anticipated to be required for welding required to construct the pump stations.

<u>Construction Scenario: Water Storage Tank</u>

One 5 MG storage tank is anticipated to be required in support of the CBP. The new tank would be designed in accordance with the California Building Code (CBC), the Occupational Safety and Health Administration (OSHA), American Concrete Institute (ACI), and AWWA's design standards. AWWA's design standards require that reservoirs be operated at fill levels below their maximum physical height in order to prevent roof damage which may be caused by a "sloshing wave" during a seismic event. As a result, the usable capacity of the new reservoir will be reduced from its physical capacity by approximately 30% to 5 MG.

<u>Grading</u>: During mass grading of the site an assumed 5,000 cubic yards (CY) of selected materials will be imported as an engineered backfill. This material will be delivered by trucks to the site in the amount of about 300 trips, assuming 50 trips maximum per day to and from the site, with a roundtrip length of no more than 50 miles. Fine grading of the site will be completed after the reservoir and piping are installed. It is assumed that a maximum of five to twelve workers will be on the site during grading, which would take place for about 10 days.

<u>Foundation Construction</u>: Following mass excavation, the tank foundation will be installed. The foundation will consist of concrete/steel/aggregate. It is assumed that a maximum of five to twelve workmen will be on the site during foundation construction for a maximum of about 25 days.

<u>Tank Construction</u>: The new 5 MG storage tank will be constructed in the following fashion: floor; walls and columns; roof; prestressing; and appurtenances. It is assumed that a maximum of

twelve employees will be on the site during reservoir construction for a maximum of about 50 days.

Overall, reservoir construction is anticipated to require about 3 months from start to finish.

3.12.3 Project Category 3: Groundwater Storage Increase

The CBP proposes the expansion of the safe storage capacity from 700,000 AF through June 30, 2030, and to 620,000 AF from July 1, 2030 through June 30, 2035 to 850,000 AF going forward. Generally, this expansion would not result in any visible above ground impacts; however, in order to ensure safe storage capacity within the Chino Basin, the facilities outlined herein (as part of 3.12 Summary of Facility Construction and Operations) are intended to support this expansion.

3.12.4 Project Category 4: Advanced Water Purification Facility and Other Water Treatment Facilities

Operational Scenario: AWPF and Wellhead Treatment Facilities
Please refer to Exhibits 10, 11 and 12, which depict the proposed modifications to RP-4 to enable the installation of the AWPF. Additionally, Exhibit 17 depicts the example wellhead treatment facilities at Chino Wells 10, 12, and 14 and Chino Hills Wells 1A, 7B, 7B, and 17.

The Operational Scenario for the 15,000 AFY AWPF at RP-4 is discussed in detail under Subsection 3.9.2. Refer specifically to Table 15 (description of redundancy requirements) and Table 16 (sizing assumptions for the AWPF).

The example Operational Scenarios for the wellhead treatment at is discussed in detail under Subsection 3.10.4, In-Lieu CBP and In-Lieu Local. Refer Specifically to Table 21.

According to the IEUA FMP, over the course of the next 15 years, IEUA intends to procure 100 percent of its electricity needs from carbon neutral sources, so in that period of time IEUA will slowly begin to use less carbon sourced energy for greater operational demands.

Construction Scenario: Advanced Water Purification Facility
The installation of the AWPF at RP-4 would require approximately 12 months to construct. It is anticipated that the AWPF would be operational by 2028. The construction of the 15,000 AFY advanced water purification facility would consist of site clearing, grading, construction of facilities, installation of equipment, and site completion. Construction equipment would include the following: one bull dozer or motor grader, backhoes, loaders, dump trucks, crew trucks, concrete trucks, cranes, personal vehicles, compactor, delivery trucks, and a water truck. It is anticipated that the maximum number of construction personnel at a site on any given day will be 20 persons. The maximum number of truck deliveries is forecasted at 15 per day at 40-miles round-trip per day of construction. Materials and equipment would be delivered to the site including piping, building materials, concrete forms, roofing materials, HVAC equipment, pumps, diffusers, screens, belt presses, and screw presses.

Construction Scenario: Wellhead Treatment Facilities
The CBP envisions constructing two wellhead treatment facilities located in the vicinity of multiple wells at existing member agency wells. The area expected to be disturbed by the construction of the proposed treatment facilities would be less than 3 acres for each site. A regional groundwater treatment facility would will range from about 1 acres to 2 acres in size per facility. Construction

of water treatment facilities may involve site demolition; site paving; site prep/grading; excavation and installation of yard pipes; installation of treatment facilities; site finishing (landscaping, misc. curb/cutter, etc.); site drainage (above and below grade).[11] Construction equipment would include the following: one bull dozer or motor grader, backhoes, loaders, dump trucks, crew trucks, concrete trucks, cranes, personal vehicles, compactor, delivery trucks, and a water truck. It is anticipated that the maximum number of construction personnel at a site on any given day will be 10 persons. The maximum number of truck deliveries is forecasted at 10 per day at 40-miles round-trip per day of construction. Each wellhead treatment facility will require about 6-months to construct, with both treatment systems assumed to potentially occur within the same year. The operational year is anticipated to coincide with the opening year (2028) of the AWPF.

3.13 ENTITLEMENTS, APPROVALS AND OTHER AGENCY PARTICIPATION

Implementation of future individual project(s) in accordance with the CBP may require a variety of approvals from other agencies. This section summarizes agency approvals that have been identified to date. This list may be expanded as the environmental review proceeds. Consequently, it should not be considered exhaustive.

- Notice of Intent (NOI) to the State Water Resources Control Board (SWRCB) for a NPDES general construction stormwater discharge permit. This permit is granted by submittal of an NOI to the SWRCB, but is enforced through a Storm Water Pollution Prevention Plan (SWPPP) that identifies construction best management practices (BMPs) for the site. In the project area, the Santa Ana Regional Water Quality Control Board enforces the BMP requirements described in the NPDES permit by ensuring construction activities adequately implement a SWPPP. Implementation of the SWPPP is carried out by the construction contractor, with the Regional Board and county providing enforcement oversight.

- The project may include the potential discharge of fill into or alterations of “waters of the United States,” “waters of the State,” and stream beds of the State of California. Regulatory permits to allow fill and/or alteration activities due to project activities such as pipeline installation are likely be required from the Army Corps of Engineers (ACOE), the Regional Board, and California Department of Fish and Wildlife (CDFW) over the life of the OBMPU. A Section 404 permit for the discharge of fill material into “waters of the United States” may be required from the ACOE; a Section 401 Water Quality Certification may be required from the Regional Board; a Report of Waste Discharge may be required from the Regional Board; and a 1600 Streambed Alteration Agreement may be required from the CDFW.

- The U.S. Fish and Wildlife Service (USFWS) and/or CDFW may need to be consulted regarding threatened and endangered species documented to occur within an area of potential impact for future individual projects. This could include consultations under the Fish and Wildlife Coordination Act.

- Land use permits may be required from local jurisdictions, such as individual cities and the two Counties (Riverside and San Bernardino).

[11] Please refer to the discussion of the construction scenario for conveyance facilities for a depiction of the construction associated with installation of pipeline that may be associated with the proposed regional groundwater treatment facilities.

- Air quality permits may be required from the South Coast Air Quality Management District (SCAQMD).

- Encroachment permits may be required from local jurisdictions, such as individual cities, California Department of Transportation (Caltrans), the two counties (Riverside and San Bernardino), Flood Control agencies, and private parties such as Southern California Edison, The Gas Company, or others such as BNSF Railway Company.

- Watermaster has a separate approval process for determining material physical injury to the stakeholders within the Chino Basin.

- State Water Resources Control Board will be a responsible agency if permits or funding are requested from the State Revolving Fund Program or Division of Drinking Water.

This is considered to be a partial list of other permitting agencies for future CBP future individual projects.

3.14 CEQA RESPONSIBLE AGENCIES

Table 36 depicts the many agencies that may be responsible agencies under CEQA as they are stakeholders of the overall Chino Basin Program.

Table 36
CBP WORKGROUP STAKEHOLDERS

Stakeholder	Retail Member Agencies[1]	IEUA Member Agency	Wastewater Contract Agency[1]	Chino Basin Appropriative Pool[2]	Other
Chino Basin Water Conservation District					✔
Chino Basin Watermaster					✔
Chino Desalter Authority (CDA)					✔
City of Chino	✔	✔	✔	✔	
City of Chino Hills	✔	✔	✔	✔	
City of Fontana		✔	✔	✔	
City of Montclair		✔	✔		
City of Ontario	✔	✔	✔	✔	
City of Pomona				✔	
City of Upland	✔	✔	✔	✔	
Cucamonga Valley Water District (CVWD)	✔	✔	✔	✔	
Fontana Water Company (FWC)	✔			✔	
Jurupa Community Services District (JCSD)				✔	
Metropolitan Water District (MWD)					✔
Monte Vista Water District (MVWD)	✔			✔	
San Antonio Water Company (SAWCO)	✔			✔	
Three Valleys Municipal Water District (TVMWD)					✔

Stakeholder	Retail Member Agencies[1]	IEUA Member Agency	Wastewater Contract Agency[1]	Chino Basin Appropriative Pool[2]	Other
Water Facilities Authority (WFA)		✔			✔
West Valley Water District (WVWD)				✔	✔
Western Municipal Water District (WMWD)					✔

Notes: [1]Source: IEUA-WFA Final 2015 Urban Water Management Plan (Arcadis, June 2016).
[2]Source: Appropriative Pool Committee, Calendar Year 2019.