Recycled Water Regulatory Summary

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Executive Summary

This Technical Memorandum (TM) provides regulatory context for the Chino Basin Program (CBP). The CBP will produce up to 15,000 acre-feet per year (AFY) of advanced treated recycled water. The purified water will be injected into the Chino North Groundwater Management Zone (GMZ) within the Chino Groundwater Basin (Chino Basin) (BC 2023).

The CBP is a conjunctive use initiative proposed by the Inland Empire Utilities Agency (IEUA) that intends to address regulatory water quality issues in the Chino Basin, while providing multiple other benefits including: (1) local environmental resilience and water independence; (2) improved water quality in the basin; (3) a cushion for future permit compliance; (4) a regional solution during drought years; and (5) state-wide environmental benefits.

The CBP incorporates Chino Basin permits and regulations into its design to remain legally compliant with governing entities, including:

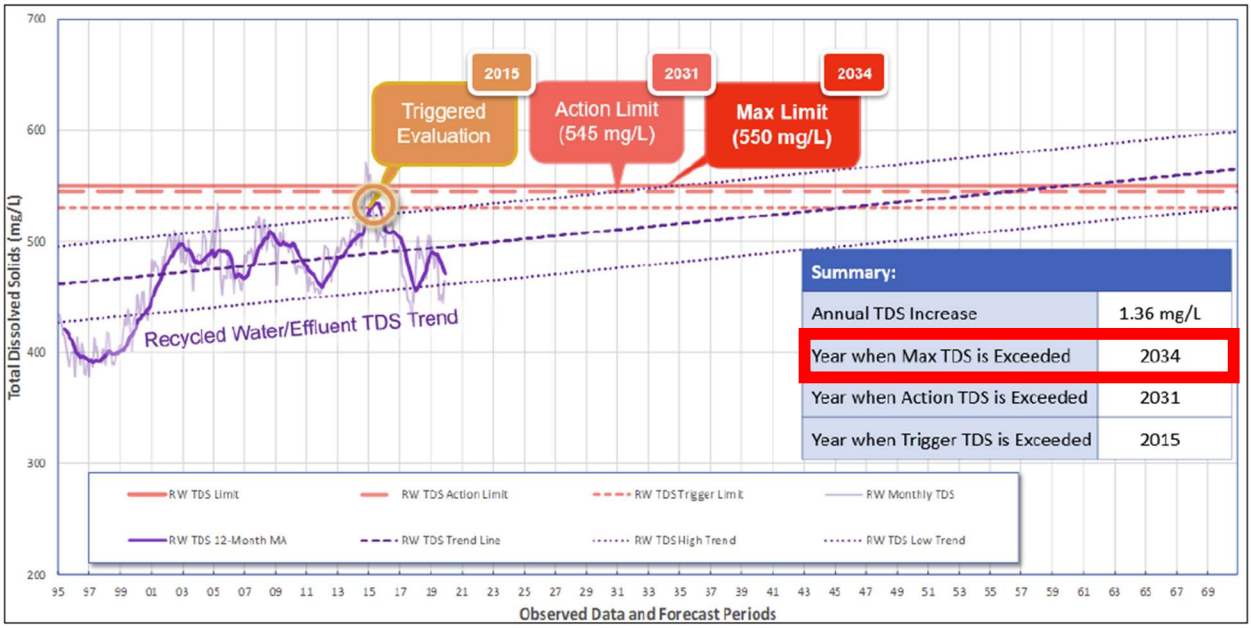
- *Santa Ana Region Basin Plan* (California Water Boards 2019) (Basin Plan)
- IEUA's National Pollutant Discharge Elimination System (NPDES) permit (Santa Ana Regional Water Quality Control Board [RWQCB] 2022)
- California's 2014 *Groundwater Replenishment Regulations* (GRRs)

Priority contaminants of regulatory concern that will be targeted by the CBP include total dissolved solids (TDS) and chemicals of emerging concern (CECs), including per- and polyfluoroalkyl substances (PFAS) and 1,2,3-trichloropropane (1,2,3-TCP).

TDS – The NPDES permit includes a TDS limit of 550 mg/L and an Action Level of 545 mg/L based on a flow weighted 12-month average using all four of IEUA's water reclamation plants. IEUA has proactively set an internal trigger limit of 530 mg/L. As shown in Figure ES-1, the 12-month running average TDS concentration in IEUA's recycled water effluent exceeded 530 mg/L in 2015, and three monthly flow-weighted average TDS concentrations exceeded 550 mg/L (2014-2015). These occurrences prompted IEUA to investigate TDS levels in the Chino Basin (IEUA and GEI 2020). Based on a TDS mass balance, it was estimated that advanced treatment including membrane filtration (MF) and reverse osmosis (RO) was needed with a minimum production output of 9,000 AFY to maintain NPDES permit compliance.

CECs - Based on available data, RO is expected to reduce PFAS below regulatory levels. Additional data will be required to assess compliance with 1, 2, 3-TCP.

Figure ES-1. Recycled Water Total Dissolved Solids Trend.



Source: IEUA and GEI 2020.

After identifying the system-wide TDS compliance capacity target of 9,000 AFY, the CBP was developed as a conjunctive use program and funding was secured under the Water Storage Investment Program (WSIP) established by California Proposition 1. The CBP was conceptualized to supplement the Chino Basin with up to 15,000 AFY of purified water, while offering additional local and regional water supply resilience, water quality improvement in Chino Basin, and state-wide ecological benefits. Recycled water produced by IEUA will be seasonally supplemented with flows from the City of Rialto Water Reclamation Plant (WRP) and purified at an advanced water purification facility (AWPF) utilizing MF, RO and ultraviolet light/advanced oxidation process (UV/AOP) prior to injection in the Chino Basin.

Considerable efforts have been invested to-date to develop the CBP, including a feasibility study, a draft AWPF preliminary design report (Draft PDR), and preliminary development of regulatory strategies that consider applicable regulations and permits. The following recommendations will continue the CBP program development:

- Water quality data for PFAS and 1,2,3-TCP are currently limited, but will improve via an ongoing 12-month sampling plan.
- There is a need to understand the fate of 1,2,3-TCP throughout the WRPs and AWPF.
- Future permit limits of PFAS and 1,2,3-TCP will likely necessitate future actions to maintain regulatory compliance.
- The reverse osmosis concentrate will contain elevated levels of PFAS and 1,2,3-TCP and will be conveyed to Los Angeles County Sanitation Districts' (LACSD) system. Potential concerns, if any, should be discussed with LACSD and may require future negotiations.
- Additional analysis of monthly CBP source water flow availability should be performed to confirm the regulatory driver of the CBP capacity.
- A Business Case Evaluation of non-regulatory CBP advantages should be developed to assess other aspects of the CBP, including development of a sustainable and local water supply, non-TDS related environmental benefits, and offset imported water costs.

1. Introduction

The Inland Empire Utilities Agency (IEUA) is currently developing the Chino Basin Program (CBP). The CBP will provide advanced treatment of recycled water from IEUA and City of Rialto water reclamation plants (WRPs) at an advanced water purification facility (AWPF) using membrane filtration (MF), reverse osmosis (RO), and ultraviolet light/ advanced oxidation process (UV/AOP). The purified water will be injected into the Chino North Groundwater Management Zone (GMZ) within the Chino Groundwater Basin (Chino Basin) (BC 2023).

Over a 25-year lifetime, this conjunctive use program has been conceptualized to store up to 15,000 acre-feet per year (AFY) of advanced treated recycled water, while allowing for up to 40,000 AFY of groundwater extraction. The extracted groundwater will be used as an alternative source of water for the Metropolitan Water District of Southern California (MWD) and provide ecological benefits to the Sacramento-San Joaquin Delta (Delta) watershed. IEUA has been awarded a funding amount of $215.3 million by the California Water Commission's Water Storage Investment Program (WSIP) to develop the CBP (BC 2023).

The CBP was developed by assessing water supply and demand, water quality, and infrastructure needs (IEUA 2016). IEUA worked with several consultants to develop numerous technical and regulatory aspects of the CBP (Table 1-1).

Table 1-1. Chino Basin Program Development Studies

Consultant	Produced Document	Description
GEI	Regulatory Challenges TM	Describes the permits and regulations that apply to the CBP and conducts a historical water quality study.
	CBP Feasibility Study	Presents the site conditions and alternate proposals for the CBP.
BC	CBP Draft PDR	Provides a planning-level design for the AWPF, confirmation of project feasibility, technical requirements, and preliminary costs.

Source: IEUA and GEI 2020, 2021; BC 2023

BC = Brown and Caldwell

GEI = GEI Consultants, Inc.

PDR = Preliminary Design Report

TM = technical memorandum

The purpose of this TM is to describe compliance requirements, document the analyses to date related to these requirements, and provide recommendations for further program development in one document to provide the regulatory context for the CBP.

2. Compliance Requirements

This section describes the water quality and regulatory requirements that framed the development of the CBP.

2.1 Water Quality Parameters

The CBP incorporated specific water quality parameters into its design to positively impact the region and improve water quality in the Chino Basin. The parameters of concern for the CBP can be sorted into two main categories: total dissolved solids (TDS), and a group of unregulated constituents that are collectively referred to as "contaminants of emerging concern" (CECs).

TDS is a bulk water quality parameter that measures salinity. Advanced water treatment through high pressure membranes such as RO is required downstream of conventional treatment at the existing WRPs to reduce effluent TDS levels.

The term “CECs” incorporates thousands of emerging chemicals and toxins that are not currently regulated, many of which are still being evaluated to assess health implications and occurrence. CECs include:

- Pharmaceutical and personal care products
- Microplastics
- Industrial chemicals
- Solvents
- Others

The CECs identified to be of the most relevance to IEUA include per- and polyfluoroalkyl substances (PFAS) and 1,2,3-trichloropropane (1,2,3-TCP) (BC 2023).

2.2 Permits and Regulations

The CBP incorporates Chino Basin permits and regulations into its design to remain legally compliant with governing entities, including:

- *Santa Ana Region Basin Plan* (California Water Boards 2019) (Basin Plan)
- IEUA’s National Pollutant Discharge Elimination System (NPDES) permit (Santa Ana Regional Water Quality Control Board [RWQCB] 2022)
- California’s 2014 *Groundwater Replenishment Regulations* (GRRs)

2.2.1 Santa Ana Region Basin Plan

The Basin Plan was first adopted by the Santa Ana RWQCB in 1995 and was most recently updated in 2019. It establishes and provides guidelines for water quality objectives (WQOs) for different receiving water body types. The WQOs protect designated beneficial uses of water in the Santa Ana region, which include (California Water Boards 2019):

- Municipal and domestic supply
- Agricultural supply
- Industrial services supply
- Industrial process supply

Table 2-1 shows the Groundwater Management WQOs for the Chino Basin.

Table 2-1. Chino Basin Groundwater Management Water Quality Objectives

Parameter	Criteria
Nitrate (as N)	≤ 5.0 mg/L 5-year running average
TDS[a]	≤ 420 mg/L
Chloride	≤ 500 mg/L
Sulfate	≤ 500 mg/L
Boron	≤ 0.75 mg/L
Sodium	≤ 180 mg/L for municipality use
Sodium Adsorption Ratio	≤ 9 for agricultural use

Source: California Water Boards 2019.

[a]Criteria based on the Basin Plan's "Maximum Benefit" objectives.

≤ = less than or equal to

mg/L = milligram(s) per liter

N = nitrogen

The 2004 iteration of the Basin Plan established maximum benefit objectives to protect beneficial uses, such as reclamation of wastewater, while maintaining maximum benefits to the people of the state (for example, accounting for cost burden). As part of this update to the Basin Plan, IEUA and the Chino Basin Watermaster gained approval for less-stringent TDS and nitrate WQOs, while committing to implement special programs to further these objectives.

Separate TDS objectives were established for ambient water quality, groundwater recharge, and recycled water. These objectives are shown in Table 2-2 and summarized as follows (IEUA and GEI 2020):

- An **ambient water quality objective** of 420 mg/L was established to maintain TDS levels within the Chino North GMZ, based on 20 years of historical water quality.
- A **groundwater recharge objective** of 420 mg/L (also provided in Table 2-1) applies to recycled water recharge in the Chino North GMZ. It must be blended with imported water and stormwater and reach this objective on a 5-year flow-weighted running average basis.
- A **recycled water objective** of 550 mg/L was established, along with a corresponding change in IEUA's NPDES permit limit to reflect this same TDS value for IEUA's surface water discharges. Compliance is based on a 12-month flow-weighted running average across all point sources.

If the maximum benefit objectives are met while beneficial uses are protected, the TDS limit for each respective water type is the same across the entire Chino North GMZ. If these objectives are not met, the Basin Plan provides the Santa Ana RWQCB the discretion to apply more stringent antidegradation limits to the three individual GMZs (Chino 1, 2, and 3) within the Chino North GMZ, which are listed in Table 2-2 (IEUA and GEI 2020). The Basin Plan TDS limits are less than drinking water secondary maximum contaminant levels (MCLs), with the exception of the Recycled Water Objective (550 mg/L, Table 2-2), as shown in Table 2-3.

Table 2-2. Chino Basin TDS Objectives

Chino North GMZs	Antidegradation Objective (mg/L)	Ambient WQO (mg/L)	Recycled WQO and Permit Limit (mg/L)	Groundwater Recharge Objective (mg/L)
Chino 1	280	420	550	420
Chino 2	250			
Chino 3	260			

Source: IEUA and GEI 2020.

Table 2-3. California Secondary Maximum Contaminant Levels for TDS

Consumer Acceptance Contaminant Level Ranges	Drinking Water TDS Concentration (mg/L)	Significance
Recommended	500	Greater than this value, the water starts to gain color and taste salty, and consumers might object to drinking it even though it is safe to drink. Unenforceable standard.
Upper	1,000	Greater than this limit, the water becomes brackish and unsafe to drink.
Short Term	1,500	High TDS concentration that must be decreased after a short amount of time.

Source: California Water Boards 2018b.

As part of the development of the maximum benefit objectives, the Basin Plan includes a "salinity management program" aimed at reducing TDS concentrations in the Chino Basin (California Water Boards 2019). It includes the following actions:

- Establish Inland Empire Brine Line connections for industries that discharge TDS greater than 550 mg/L (brine). The connections will convey the brine out of the Chino Basin.
- Regulate use of water softeners.
- Percolate State Water Project (SWP) water into the GMZs when that water is low in TDS.
- Develop a plan for sewer connections in areas currently served by septic tanks to reduce nitrogen loading into the GMZs.

2.2.2 IEUA National Pollutant Discharge Elimination System Consolidated Permit

IEUA obtained an NPDES and Master Recycling Permit (NPDES Permit) from the Santa Ana RWQCB, designated as RWQCB Order Number (No.) R8-2022-0041 (Santa Ana RWQCB 2022). This permit allows IEUA to discharge water from four WRPs into nearby natural waters (Santa Ana RWQCB 2022):

1. Regional Water Recycling Plant No. 1 (RP-1)
2. RP-4
3. RP-5
4. Carbon Canyon Water Recycling Facility (CCWRF)

Out of these four, RP-1 and RP-4 are the selected sources for the CBP, along with the Rialto WRP, which maintains a separate NPDES permit (BC 2023).

The NPDES Permit currently regulates TDS based on the 12-month flow-weighted running average across IEUA's four WRP discharges (Santa Ana RWQCB 2022). The NPDES Permit includes both the enforceable permit limit of 550 mg/L from the Basin Plan, as well as an Action Limit of 545 mg/L. Exceeding the Action Limit requires IEUA to submit a plan and schedule to the RWQCB to bring the TDS concentration back into compliance. As an additional measure, IEUA developed an internal Trigger Limit of 530 mg/L to provide additional time to plan for regional solutions to an increasing TDS value (IEUA and GEI 2020). Table 2-4 shows each TDS limit, along with the required action. IEUA has been working with the Chino Basin Watermaster and the RWQCB to evaluate a future switch to regulation of TDS in IEUA's Consolidated NPDES Permit using a 10-year running average of the flow-weighted TDS from the four WRP discharges. This effort is on-going, but is thought to reduce the impact of drought on TDS compliance.

Table 2-4. Limit Types and Details

Limit Type	Regulator	TDS Concentration (mg/L)	Details
Trigger Limit	N/A - triggers internal IEUA review	530	Once surpassed, IEUA analyzes, plans, designs, and implements solutions that allow them to comply with the NPDES permit.
Action Limit	RWQCB (NPDES)	545	Once surpassed, IEUA is required to submit a plan and schedule to the RWQCB when the 12-month running average is greater than the Action Limit for 3 consecutive months.
Permit Limit	RWQCB (NPDES)	550	The maximum value that the 12-month running average concentration can reach; if surpassed, it may impact the ability to use recycled water and will not comply with the NPDES Permit.

Source: IEUA and GEI 2020.

N/A = not applicable

2.2.3 2014 California Groundwater Replenishment Regulations

Title 22 of the *California Code of Regulations* (CCR) was amended in 2014 to include GRRs. These regulations define requirements for replenishing groundwater aquifers using recycled water in two types of indirect potable reuse: surface spreading and subsurface injection (California Water Boards 2018a).

IEUA began recharging recycled water from RP-1 and RP-4 using surface spreading into the Chino North GMZ in 2007, as regulated by RWQCB Order No. R8-2007-0039 (GWR Permit) (Santa Ana RWQCB 2007). Since the 2014 GRRs were promulgated, IEUA has submitted a Compliance Assessment Report and is working with the Division of Drinking Water (DDW) to meet each component of the GRR. No new permit has been officially adopted by DDW.

The CBP introduces subsurface injection to the Chino Basin. As opposed to surface spreading treatment requirements, the GRRs specify that recycled water used for subsurface injection undergoes full advanced treatment (FAT), which includes MF, RO and AOP. FAT processes significantly reduce TDS and CECs such as PFAS.

2.2.4 Contaminants of Emerging Concern Regulations

Currently, PFAS are among the most scrutinized CECs. On March 14, 2023, the U.S. Environmental Protection Agency (EPA) proposed drinking water MCLs for six PFAS compounds (EPA 2023). California has not enacted MCLs for PFAS; the state has only adopted Notification Levels (NLs) as of now. On the other hand, California has established an MCL for 1,2,3-TCP, whereas the EPA has not (BC 2023). Table 2-5 summarize these regulations.

Table 2-5. Current and Future Regulations of CBP Most Significant CECs

Parameter	California NL (ng/L)	California MCL (ng/L)	EPA Proposed MCL
PFBS	500	--	1.0 HI[a]
PFHxS	3	--	1.0 HI[a]
PFOA	5.1	--	4 ng/L
PFOS	6.5	--	4 ng/L
1,2,3-TCP	--	5	--

Source: BC 2023; EPA 2023.

HI is applicable for PFBS, PFHxS, PFNA, and GenX. It is determined by summing the ratio of the measured concentration to a Health-Based Water Concentration, which is the level at which no health risks are expected.

- = not applicable

GenX = trade name for the ammonium salt of hexafluoropropylene oxide dimer acid

HI = hazard index

ng/L nanogram(s) per liter

PFBS = perfluorobutane sulfonic acid

PFHxS = perfluorohexane sulfonic acid

PFNA = perfluorononanoic acid

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonic acid

Drinking water MCLs are not typically included in NPDES permits for environmental discharge. However, considering the downstream use of the Santa Ana River as a drinking water supply, the Santa Ana RWQCB has included several MCLs in IEUA's NPDES Permit.

RO is effective at removing PFAS, and compliance will not be an issue for the CBP; however, the PFAS will be concentrated in the RO brine stream. For 1,2,3-TCP, while some removal through FAT is expected, its removal is not well documented, so there is some uncertainty with future compliance.

3. Summary of Existing Studies

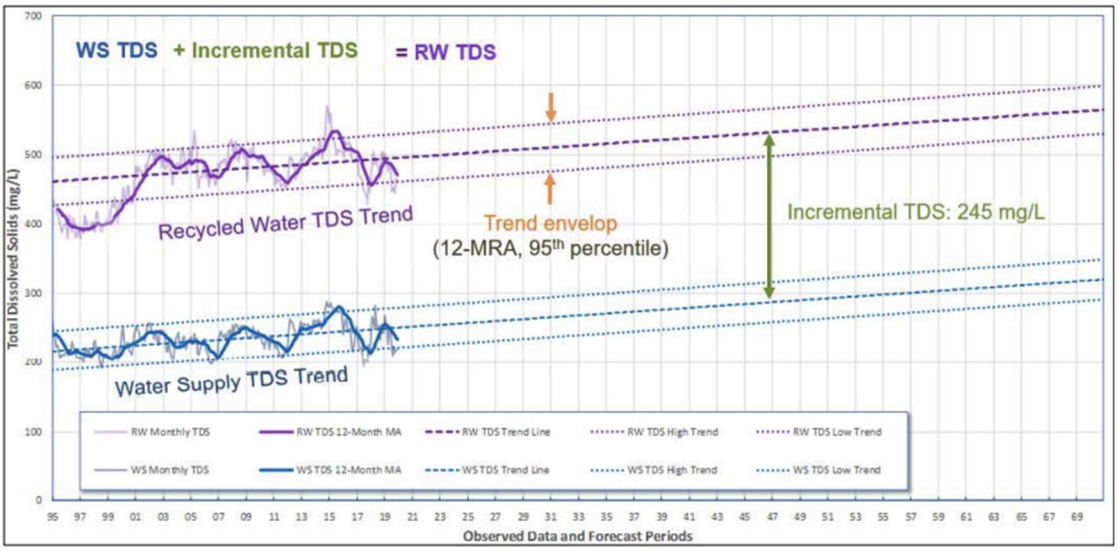
This section provides an overview of the assumptions and findings from historical technical analyses as part of the development of the CBP and IEUA's recycled water use planning efforts.

3.1 Historical Total Dissolved Solids Studies

As shown in Figure 3-1, in 2015, the 12-month running average TDS concentration in IEUA's recycled water effluent reached the Trigger Limit of 530 mg/L. As shown in Figure 3-2, in 2014 and 2015, three monthly flow-weighted average TDS concentrations exceeded 550 mg/L (Nov. 2014 - 571 mg/L, Dec. 2014 - 565 mg/L, Feb. 2015 - 560 mg/L). These occurrences prompted IEUA to investigate TDS levels in the Chino Basin (IEUA and GEI 2020) and develop a plan to ensure future regulatory compliance.

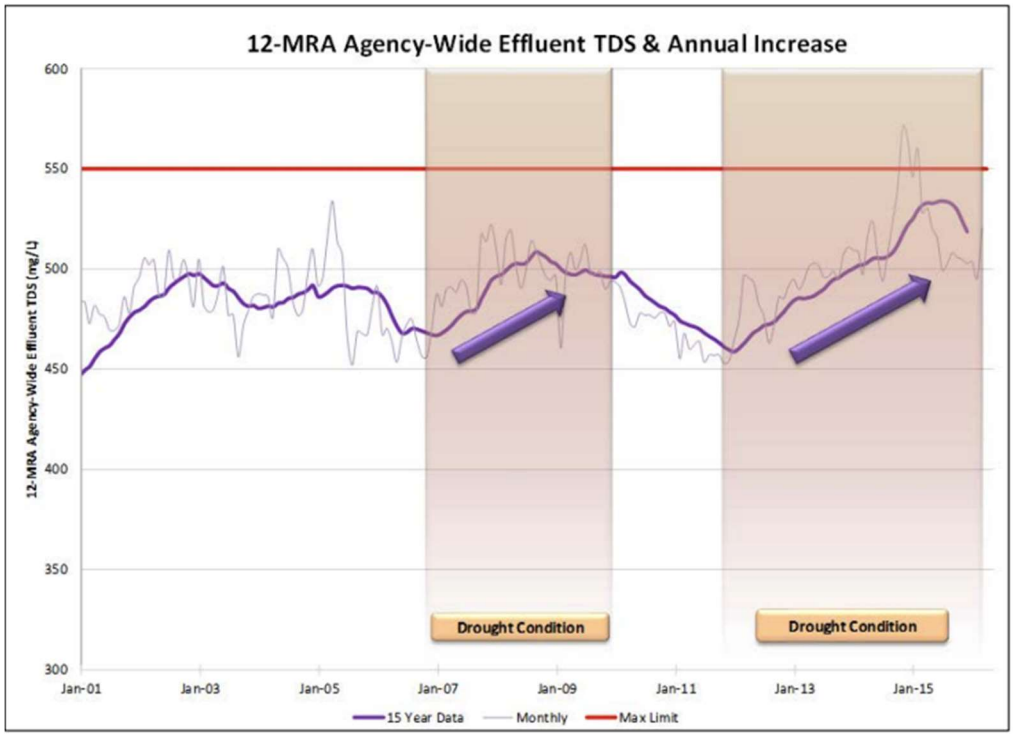
The IEUA service area predominantly receives drinking water from MWD supplied by the SWP (IEUA and GEI 2020). As seen in Figure 3-1, SWP TDS concentrations appear to be increasing over time with larger fluctuations in water quality and higher peaks. The recycled water TDS significantly increased between 1999 and 2002. Since then, similar to SWP trends, the recycled water TDS concentrations exhibit larger fluctuations and higher peaks over time. Another notable finding was that large spikes in TDS concentrations coincide with drought periods as shown in Figure 3-2.

Figure 3-1. Water Supply and Recycled Water Total Dissolved Solids Trends Over Time



Source: IEUA and GEI 2020.

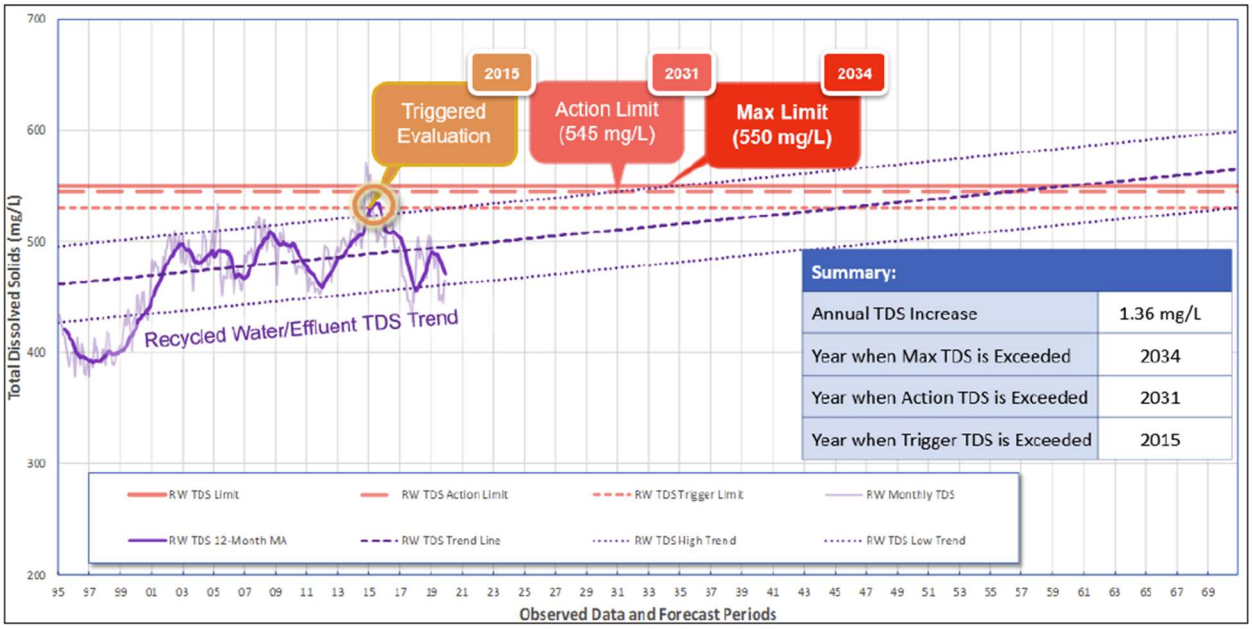
Figure 3-2. Drought Impact on Total Dissolved Solids Concentration in Recycled Water



Source: IEUA and GEI 2020.

IEUA extrapolated the increasing TDS 12-month weighted average trend into the future. Provided this trend continues, the Permit Limit (Max Limit on the figure) of 550 mg/L would be surpassed in 2034 (Figure 3-3).

Figure 3-3. Recycled Water Total Dissolved Solids Trend



Source: IEUA and GEI 2020.

Additional analysis of both historical TDS trends and projections of future concentrations have been completed in tandem with on-going efforts to switch IEUA's Consolidated NPDES Permit TDS compliance to a 10-year running average (Section 2.2.2). West Yost is currently working with IEUA to complete these analyses.

3.2 Mitigation Measure for Increasing TDS

With the possibility of exceeding TDS limits in the future, IEUA identified advanced water treatment through RO for TDS removal as a mitigation measure. RO product water of 9,000 AFY was determined using a planning-level mass balance to calculate the MF/RO capacity that would be needed to dilute the total, system-side, recycled water volume (74,786 AFY) to a target that would comply with the NPDES Permit Limit. Table 3-1 shows the assumed mass balance parameters. Based on an MF/RO recovery of 85% (15% is lost as MF waste and RO concentrate), an AWPF feed of 10,590 AFY would be required.

Table 3-1. IEUA System-Wide TDS Reduction Mass Balance Parameters

Parameter	Value
Planning Horizon (year)	2040
Tertiary Recycled Water Effluent / AWPF Influent TDS Concentration (mg/L)	563
System-wide Target TDS Concentration (mg/L)	500
RO Product Water TDS Concentration (mg/L)	50
Tertiary Recycled Water Flow (AFY)	74,786
MF/RO Recovery (%)	85
Necessary RO Product Water (AFY)	9,000

3.3 Chino Basin Program

As mentioned above, the CBP was conceptualized to address a number of IEUA's compliance and local resiliency goals, related to future permitting compliance, increasing the reliability of the Chino Basin water supply, improving the overall water quality of the basin, and providing other environmental benefits. To achieve these goals, IEUA considered three alternative program concepts summarized in Table 3.2. Alternative 3 (CBP) was selected as the preferred approach (BC 2023). The increased production capacity (9,000 AFY to 15,000 AFY), and additional groundwater injection and extraction facilities provided by Alternative 3 are expected to provide the following benefits:

- Further local environmental resilience and water independence
- Improved water quality in the basin
- A cushion for future permit compliance
- A regional solution during drought years (supplement Metropolitan Water District's supplies)
- State wide environmental benefits (Delta carriage water savings though reduction in State Water Project delivery to Southern California and ecosystem enhancement in the Feather River)

The CBP includes an AWPF which, in addition to MF/RO, provides UV/AOP disinfection to meet the regulatory requirements for groundwater injection.

Table 3-2. Alternative Comparison

Parameter	IEUA Alternative 1	IEUA Alternative 2	IEUA Alternative 3 (CBP)
Location	RP-4	RP-4	RP-4
Production Capacity	9,000 AFY by 2030, 15,000 AFY by 2040	15,000 AFY by 2030	15,000 AFY by 2030
Process	MF, RO, and UV-AOP	MF, RO, and UV-AOP	MF, RO, and UV-AOP
Pump Station	1,500 HP at RP-4	1,500 HP at RP-4	1,500 HP at RP-4
Disposal System	NRWS	NRWS	NRWS
Brine Pipeline	1,400 feet of 8-inch pipe	1,400 feet of 8-inch pipe	1,400 feet of 8-inch pipe
Extraction Facilities Required	No	Yes, up to 15,000 AFY	Yes, up to 40,000 AFY
Recharge Locations	--	MZ-2	MZ-2
Purified Water Conveyance	--	7.1 miles of 8- to 30-inch pipe	7.1 miles of 8- to 30-inch pipe
No. of Injection Wells	--	16 (12 duty, 4 standby)	16 (12 duty, 4 standby)

Source: IEUA and GEI 2021.

HP = horsepower

MZ = management zone

NRWS = Non-Reclaimable Wastewater System

UV-AOP = ultraviolet advanced oxidation process

IEUA source supplies were evaluated using IEUA data to meet the following obligations: direct use, GWR, and CBP. As shown in Table 3-3, RP-4 alone does not have the capacity to produce the 15,000 AFY for the CBP. Supplemental flows from RP-1 also do not have sufficient recycled water for the CBP during summer months, as the RP-1 recycled water is used to satisfy peak non-potable demands. To maximize local water sources, allow operational flexibility, and given that AWPFs are designed to operate at relatively consistent, year-round flows, the CBP incorporates flows from nearby Rialto WRP as an additional source.

Table 3-3. Chino Basin Program Monthly Recycled Water Source Breakdown (2028 Projections)

Month	RP-4 Supply (AFY)	RP-1 Supply (AFY)	Rialto Supply (AFY)
January	808	609	0
February	737	680	0
March	864	553	0
April	864	553	0
May	836	0	581
June	836	0	581
July	836	0	581
August	836	0	581
September	836	0	581
October	793	43	581
November	808	609	0
December	836	581	0
Total	**9,888**	**3,627**	**3,485**

Source: BC 2023 (IEUA data and projections)

3.4 City of Ontario Alternative Assessment

The City of Ontario engaged Stetson Engineers Inc. (Stetson) to develop an alternative assessment of the CBP. Table 3-4 shows the relevant parameters for Stetson's capacity calculations.

Table 3-4. Stetson Advanced Water Purification Facility Capacity Calculations

Parameter	City of Ontario and Stetson
Planning Horizon (year)	2045
Tertiary Recycled Water Effluent / MF/RO Influent TDS Concentration	569[a]
Target TDS Concentration (mg/L)	550[b]
RO Product Water TDS Concentration (mg/L)	Unknown
Tertiary Recycled Water Flow (AFY)	Unknown
Recovery (%)	80
Necessary AWPF Capacity (AFY)	2,400

Source: Stetson 2021.

[a]Stetson determined a capacity that would reduce the wastewater effluent flow-weighted average TDS by 19 mg/L. Per footnote (b), if the target concentration is assumed to be 550 mg/L, this 19 mg/L increment is added to the target concentration to yield a value of 569 mg/L as the influent TDS concentration.

[b]Stetson sized their proposal to push the worst-case scenario TDS exceedance projection from 2031 to 2045 (the planning horizon). Considering that they classify the worst-case scenario as 550 mg/L, this number is assumed to be the target TDS concentration.

Using their calculated capacity, the City of Ontario and Stetson developed an alternative proposal, the specifications of which are summarized in Table 3-5 (Stetson 2021). At a minimum, this alternative does not meet the GRR requirements for subsurface injection due to its lack of an AOP. For evaluations of regulatory compliance, a typical approach is to incorporate a margin of safety in meeting the regulatory limit, whereas this evaluation appears to target the limit itself without a margin of safety.

Table 3-5. Stetson Proposed System Specifications

Parameter	Stetson Alternative
Location	RP-1
Capacity	2,400 AFY by 2030
Process	MBR and RO
Pump Station	--
Disposal System	--
Brine Pipeline	--
Extraction Facilities Required	No
Recharge Locations	--
Purified Water Conveyance	--
No. of Injection Wells	--

Source: Stetson 2021.
MBR = membrane bioreactor

3.5 Contaminants of Emerging Concern Implications

Limited historical data are available for the main CECs (PFAS and 1,2,3-TCP), both of which have been present in IEUA's WRP recycled water effluent. Their average concentrations at RP-1, RP-4, and Rialto WRP, the three proposed CBP recycled water sources, are listed in Table 3-6 (BC 2023) along with current and proposed regulatory limits.

Table 3-6. Chino Basin Program Most Significant Contaminants of Emerging Concern

Parameter	California NL (ng/L)	California MCL (ng/L)	EPA Proposed MCL	RP-1 Average Water Quality (2014-2023) (ng/L)	RP-4 Average Water Quality (2014-2023) (ng/L)	Rialto WRP Average Water Quality (2020-2022) (ng/L)
PFBS	500	--	1.0 HI[a]	Data not provided	Data not provided	Data not provided
PFHxS	3	--	1.0 HI[a]	Data not provided	Data not provided	Data not provided
PFOA	5.1	--	4 ng/L	7.2	11.82	7.6
PFOS	6.5	--	4 ng/L	7.1	1.07	6.5
1,2,3-TCP	5	5	--	13	< 24[b]	14

Source: BC 2023; EPA 2023.
[a]HI is applicable for PFBS, PFHxS, PFNA, and GenX. It is determined by summing the ratio of the measured concentration to a Health-Based Water Concentration, which is the level at which no health risks are expected.
[b]The RP-4 AWPF Preliminary Design Report (BC 2023) lists a minimum value of <1.2 ng/L and a maximum value of <24 ng/L, but the average value is listed as '0.0', which appears to be an error. Further data assessment is needed to determine the average.
< = less than

PFOA is present at levels that exceed the California NL and the proposed MCL at all three sources. Likewise, PFOS at RP-1 and Rialto exceed the NL and proposed MCL. Average levels of 1,2,3-TCP at both RP-1 and Rialto exceed the California MCL. Due to limited available data, IEUA is currently implementing a 12-month sampling plan to supplement the existing data set.

3.6 Implications for Types of Recycled Water Use

This section contains information about how recycled water is currently used in IEUA's systems and how the CBP would potentially affect its use. Table 3-7 describes the four uses of recycled water in the Chino Basin. All four uses are governed by the three regulatory requirements mentioned in Section 2.2:

1. IEUA's NPDES Permit
2. Santa Ana Region Basin Plan
3. California's Groundwater Replenishment Regulations (CCR Title 22)

Table 3-7. Recycled Water Use in the Chino Basin

Scenario	Non-Potable Title 22 Recycled Water	Environmental Discharge (NPDES)	Surface Spreading Potable Reuse	Subsurface Injection Potable Reuse
Current and future uses of recycled water	▪ Landscape irrigation ▪ Agricultural irrigation ▪ Dust control ▪ Industrial processes	Four WRPs discharge tertiary treated wastewater into the Santa Ana River and its tributaries	Recycled water from RP-1 and RP-4 is used for groundwater recharge through surface application around Chino North GMZ	Once the CBP is operational, advanced treated water will be injected into the Chino North GMZ
Does CBP change use?	No; IEUA remains committed to provide recycled water for non-potable use	Yes; CBP will divert additional water that is currently being environmentally discharged, and minimum flow commitments will be maintained	No; spreading of tertiary recycled water is planned for continued operation in a similar capacity	Yes; advanced treated water will be used for injection; RO concentrate will be conveyed to LACSD
Are CECs removed for recycled water use?	No	No	No	Advanced treated water: ▪ PFAS: yes ▪ 1,2,3-TCP: additional assessment required RO concentrate will have elevated levels of PFAS

Source: Santa Ana RWQCB 2022.

LACSD = Los Angeles County Sanitation Districts

4. Recommendations for Continued Program Development

Considerable planning efforts have been invested to develop the CBP to date. The following recommendations will continue the CBP program development:

- **Additional water quality characterization for the main CECs (PFAS and 1,2,3-TCP)**: As part of the PDR planning process, a two-week sampling effort was recommended and conducted to capture data for key constituents including CECs. The Draft PDR recommended a more thorough 12-month sampling effort to be conducted. This 12-month sampling effort (now underway) is expected to provide better understanding of the occurrence and magnitude of these CECs in the effluent of IEUA's WRPs, and inform treatment needs at the AWPF.

- **Assess 1,2,3-TCP fate through WRPs and reduction through AWPF**: As noted in the Draft PDR, an ongoing investigation of method interference and disinfection by-product formation within WRPs will provide additional insight into the recycled water concentration of 1,2,3-TCP. Additionally, FAT is expected to provide some reduction of 1,2,3-TCP; but depending on the magnitude of the concentrations in the feed waters, further assessment of treatment efficacy in addressing this contaminant may be needed. A demonstration facility will evaluate this removal in the near future.

- **Likely future regulation of CECs**: As developed in the Draft IEUA System-Wide CEC Compliance Study (included as appendix to the Draft PDR), drinking water MCLs are currently included in IEUA's NPDES Permit, but 1,2,3-TCP was removed pending results from the method interference and disinfection by-product study. Although potentially addressed by FAT, 1,2,3-TCP may still be a regulatory concern for other recycled water uses covered by the NPDES Permit, and the WRPs do not have treatment in place to address this contaminant. Likewise, once PFAS MCLs are promulgated, subsequent updates of the NPDES Permit may include those limits. PFAS is expected to be addressed in the product water from the CBP (based on RO rejection), but IEUA's WRPs do not have treatment in place that would address these contaminants in the recycled water.

- **Establish RO concentrate disposal**: RO concentrate from the AWPF is planned to be conveyed through IEUA's NRWS to the LACSD. There are no existing local limits for PFAS or 1,2,3-TCP in the NRWS discharges, nor are these contaminants currently regulated by the *California Ocean Plan* (Water Boards 2019). As recommended in the AWPF Draft PDR, discussions with LACSD about their strategic planning for PFAS is needed to understand future disposal requirements through the NRWS.
- **Further evaluation of monthly flow variability and availability**: Table 3-3 summarizing the available recycled water source availability was developed after an analysis of different options based on IEUA data and projections. Additional seasonal and temporal flow analyses should be performed to inform IEUA's recycled water master planning efforts and balance supply and demand.
- **Further evaluation of TDS trends**: More recent data for flow and TDS should be incorporated into an updated evaluation of TDS trends. This evaluation should consider both the current 12-month running average compliance basis for TDS in IEUA's Consolidate NPDES Permit, as well as the potential future 10-year running average.
- **Business Case Evaluation (BCE) of non-regulatory CBP advantages**: A cost-benefit analysis was included in the 2021 CBP Feasibility Study as part of the comparison between alternatives (CBP was the recommended alternative). Building on the Feasibility Study, a formal BCE should be conducted to highlight the overall value of both regulatory and non-regulatory advantages of the CBP based on recent developments, PDR findings, additional data, and further refinements. For comparison, a do-nothing option should be considered.

5. References

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