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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

wfa Water Facilities Authority

2015 URBAN WATER MANAGEMENT PLAN

FINAL

June 2016

2015 URBAN WATER MANAGEMENT PLAN

FINAL

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ACRONYMS AND ABBREVIATIONS

20x2020	20 percent reduction in urban water use by year 2020
Act	Urban Water Management Planning Act
AF	Acre-Feet
AFY	Acre-Feet per Year
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BMP	Best Management Practice
CARL	Current Annual Real Losses
CBFIP	Chino Basin Facilities Improvement Program
CBWCD	Chino Basin Water Conservation District
CBWM	Chino Basin Watermaster
CCWRF	Carbon Canyon Water Recycling Facility
CDA	Chino Basin Desalter Authority
CDP	Climate Disclosure Project
CFS	Cubic Feet per Second
Chino Basin	Chino Groundwater Basin
CII	Commercial/Industrial/Institutional
COPC	Constituents of Potential Concern
CRA	Colorado River Aqueduct
CUP	Conjunctive Use Program
CUWCC	California Urban Water Conservation Council
CVWD	Cucamonga Valley Water District
DDW	Division of Drinking Water
DMM	Demand Management Measure
DVL	Diamond Valley Lake
DWR	Department of Water Resources
DYY	Dry Year Yield
FTE	Full Time Employee
FWC	Fontana Water Company
FY	Fiscal Year
GIS	Geographic Information Systems
GPCD	Gallons per Capita per Day
GPF	Gallons per Flush
GPM	Gallons per Minute
GHG	Greenhouse Gas
Handbook	Climate Change Handbook for Regional Water Planning
HECW	High Efficiency Clothes Washer
HEN	High Efficiency Sprinkler Nozzle

HET	High Efficiency Toilet
HEU	High Efficiency Urinal
IEBL	Inland Empire Brine Line
IELA	Inland Empire Landscape Alliance
IEUA	Inland Empire Utilities Agency
ILI	Infrastructure Leakage Index
IPCC	Intergovernmental Panel on Climate Change
IRP	Integrated Water Resource Plan
IWA	International Water Association
JPA	Joint Powers Authority
kWh	Kilowatt Hour
LEAP	Landscape Evaluation and Audit Program
LID	Low Impact Development
LRP	Local Resources Program
LUD	Land Use Unit Demands
MEU	Meter Equivalent Unit
M&I	Municipal and Industrial
MAF	Million Acre-Feet
MCL	Maximum Contaminant Level
MWD	Metropolitan Water District of Southern California
MNWD	Moulton Niguel Water District
MG	Million Gallon
MGD	Million Gallons per Day
MOU	Memorandum of Understanding Regarding Urban Water Conservation
MWELO	Model Water Efficiency Landscape Ordinance
MVWD	Monte Vista Water District
NIMS	National Incident Management System
NPDES	National Pollution Discharge Elimination System
NTC	National Theatre for Children
NL	Notification Level
NO.	Number
NRDC	Natural Resources Defense Council
NRWS	Non-reclaimable Wastewater System
OBMP	Chino Basin Optimum Basin Management Program
OCSD	Orange County Sanitation District
OSY	Operating Safe Yield
Plan	Water Quality Control Plan
PSI	Pounds per Square Inch
RO	Reverse Osmosis
RP-1	Regional Water Recycling Plant #1

RP-2	Regional Water Recycling Plant #2
RP-4	Regional Water Recycling Plant #4
RP-5	Regional Water Recycling Plant #5
RTP-SCAB	Regional Transport Plan of Southern California Association of Governments
RTS	Readiness-to-Serve
RWIP	Recycled Water Implementation Plan
RWPS	Recycled Water Program Strategy
RWRP	Regional Water Recycling Plant
SANDAG	San Diego Association of Governments
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWCO	San Antonio Water Company
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SBCFCD	San Bernardino County Flood Control District
SB X7-7	Senate Bill 7 as part of the Seventh Extraordinary Session
SCAB	South Coast Air Basin
SCAG	Southern California Association of Governments
STT	Shows that Teach
SWP	State Water Project
SWRCB	California State Water Resources Control Board
TDS	Total Dissolved Solids
TYCIP	Ten Year Capital Improvement Plan
UARL	Unavoidable Annual Real Losses
ULFT	Ultra-Low Flow Toilets
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compound
WBIC	Weather Based Irrigation Controller
WEWAC	Water Education Water Awareness Committee
WFA	Water Facilities Authority
WSAP	Water Supply Allocation Plan
WSDM	Water Surplus and Drought Management
WUE	Water Use Efficiency

1 INTRODUCTION

The Inland Empire Utilities Agency (IEUA) is a wholesale supplier of imported water from Metropolitan Water District of Southern California (MWD) and a regional wastewater treatment agency. IEUA is focused on providing four key services: 1) treating wastewater; 2) developing recycled water, local water resources, and water use efficiency programs that will reduce the region's dependence on imported water supplies and drought-proof the service area; 3) converting biosolids and waste products into a high-quality compost made from recycled materials; and 4) generating electrical energy from renewable sources. Since its formation in 1950 as an agency to supply supplemental imported water from MWD, IEUA has expanded to become a major provider of recycled water, a supplier of biosolids/compost materials, as well as continuing its leading role in water quality management and environmental protection in the Inland Empire.

IEUA provides wholesale imported water to seven retail agencies including, the Cities of Chino, Chino Hills, Ontario, and Upland, Cucamonga Valley Water District (CVWD) in the City of Rancho Cucamonga, Fontana Water Company (FWC) in the City of Fontana, and Monte Vista Water District (MVWD) in the City of Montclair. IEUA purchases only untreated imported water from MWD. Two of IEUA's retail water agencies (FWC and CVWD) provide their own treatment. Five of IEUA's retail water agencies purchase treated water from the Water Facilities Authority (WFA). WFA purchases untreated imported water from IEUA, treats and delivers the water to the cities of Chino, Chino Hills, Ontario, Upland, and MVWD. IEUA also provides wastewater services to seven contracting agencies under the Chino Basin Regional Sewage Service Contract including, the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and CVWD. IEUA and WFA's service area boundaries are illustrated in Figure 1-1 and the relationship between MWD, IEUA, WFA, and their retail agencies are shown in Figure 1-2.

Between 2013 and 2016, IEUA collaborated with its retail agencies to develop an Integrated Water Resources Plan (IRP) and a regional Water Use Efficiency Business Plan update. These two foundational planning documents together with IEUA's 2015 Recycled Water Program Strategy and 2015 Energy Management Plan, lay out the region's plan for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. It is IEUA's goal to capture these previous efforts and to incorporate the new regional vision into this 2015 Urban Water Management Plan (UWMP).

In line with IEUA's goals towards regional resiliency and sustainability, this 2015 UWMP includes an evaluation of the water energy intensity of IEUA's operations and an assessment of climate change vulnerability impacts on the region's supply portfolio. The water resources management strategies detailed in this 2015 UWMP illustrate that despite past periods of extraordinary growth and prolonged drought, the region is well positioned to ensure adequate water supplies, reduce dependence on imported supplies and increase drought resilient water sources, while addressing water quality management challenges. This 2015 Regional UWMP is reflective of IEUA's holistic water resources management strategies to prepare for future uncertainty and to ensure sufficient water resources for the region.

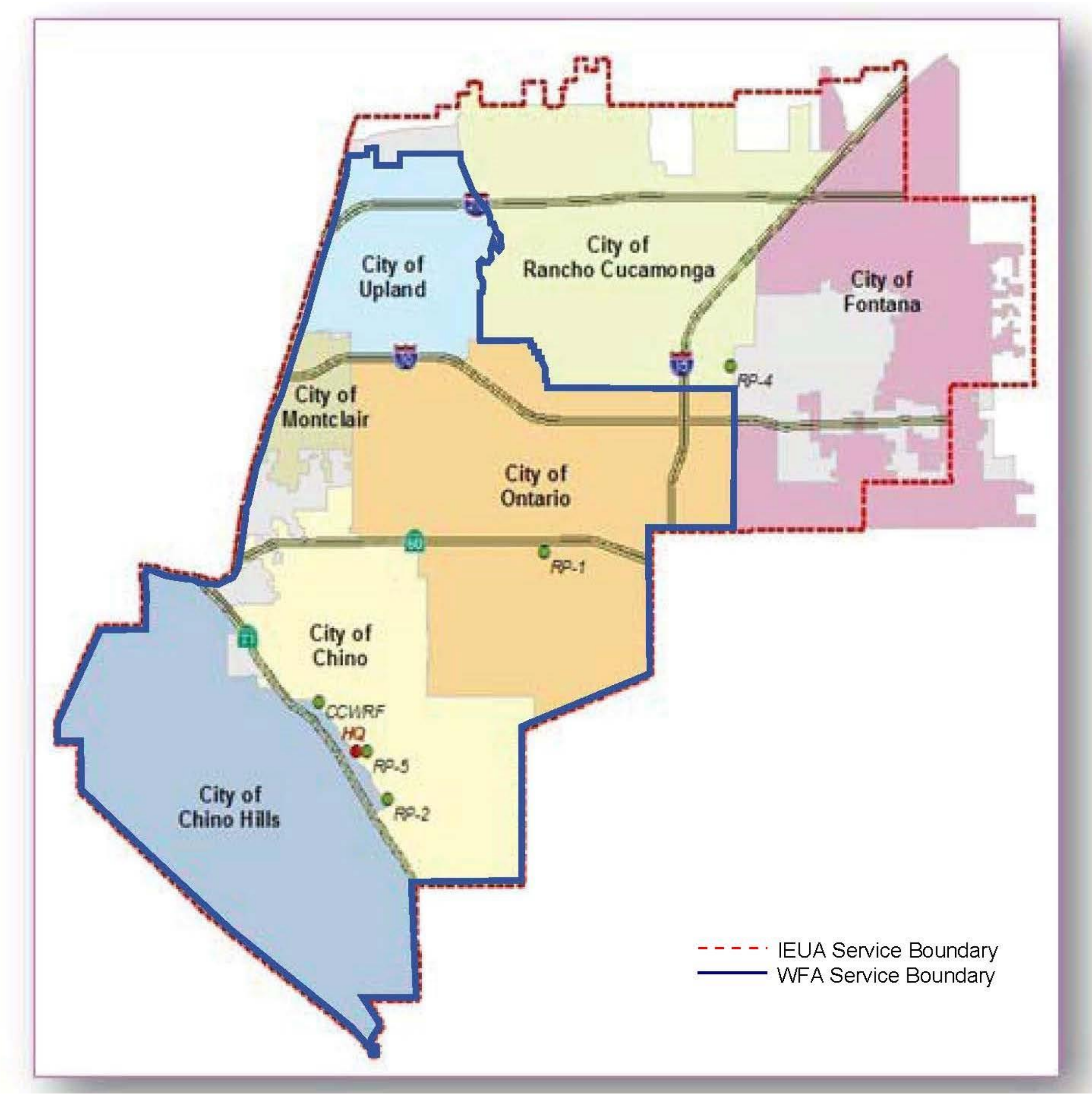

Figure 1-1: IEUA and WFA's Service Area Boundaries

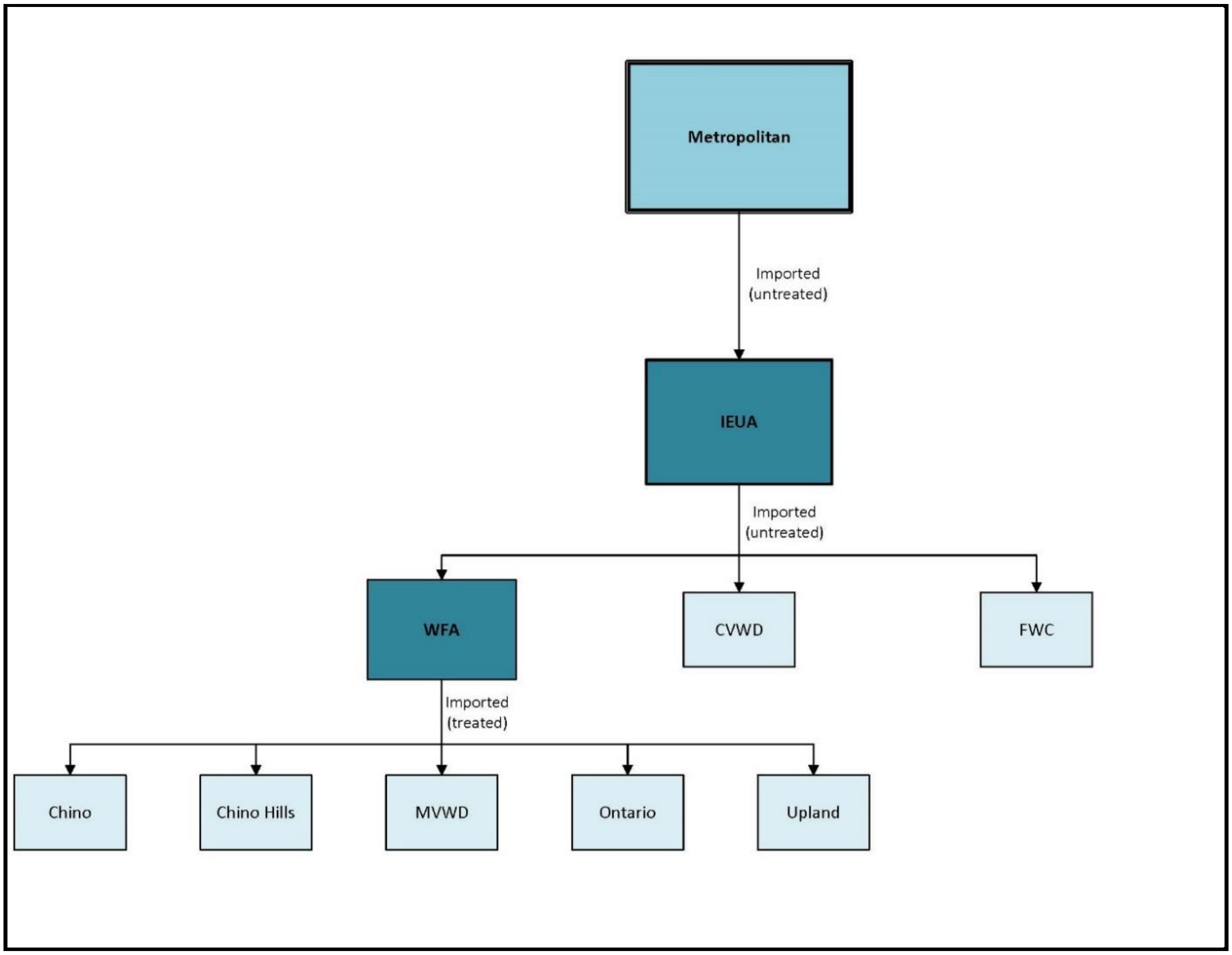

Figure 1-2: Relationship between MWD, IEUA, WFA, and Their Retail Agencies

1.1 Urban Water Management Plan Requirements

This 2015 Regional UWMP has been prepared consistent with the State of California Water Code Sections 10610 through 10656, known as the Urban Water Management Planning Act (Act). Originally enacted in 1983, the Act requires every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre-feet (AF) of water annually to prepare, adopt, and file an UWMP with the California Department of Water Resources (DWR) every five years in the years ending in zero and five. The 2015 UWMP updates are due to DWR by July 1, 2016.

A UWMP must provide water supply planning for a 20-year planning period in five-year increments and identifies water supplies needed to meet existing and future demands. It must include an assessment of supply reliability under three hydrologic conditions: a normal year, a single-dry year, and multiple-dry years and includes a discussion of:

- Plan Preparation

- System Description
- System Water Use
- System Supplies
- Water Supply Reliability Assessment
- Water Shortage Contingency Planning
- Demand Management Measures
- Plan Adoption and Implementation

Since the original Act's passage in 1983, several amendments have been made. A significant change in 2010 was the passage of the Water Conservation Act of 2009 also known as Senate Bill (SB) 7 as part of the Seventh Extraordinary Session (SB X7-7) stemmed from Governor Schwarzenegger's goal to achieve a 20 percent statewide reduction in urban per capita water use by 2020 (20x2020). SB X7-7 requires each urban retail water supplier to develop urban water use targets to achieve the 20 percent reduction goal by 2020 and an interim ten percent goal by 2015. Wholesale water suppliers are not required to establish reduction targets but are required to include an assessment of present and proposed future measures, programs, and policies that would help their region achieve the reduction.

The most recent amendment made to the UWMP requirements is set forth by SB 1420 approved on September 19, 2014. SB 1420 - Distribution System Water Losses requires water purveyors who own a water distribution system to quantify distribution system losses for the most recent 12-month period available based on the water system balance methodology developed by the American Water Works Association (AWWA).

1.2 IEUA and WFA 2015 UWMP Preparation

This 2015 Regional UWMP is an update of IEUA and WFA's 2010 UWMPs. In previous years, IEUA and WFA prepared separate UWMP documents where WFA's UWMP was a companion document to the IEUA UWMP. WFA is a wholesale supplier of imported water (State Water Project water) purchased from MWD via IEUA. WFA provides services to five retail agencies that are encompassed within IEUA's service area, including the cities of Chino, Chino Hills, Ontario, and Upland, and MVWD. Because of this overlap, IEUA and WFA prepared a synergistic planning document i.e. one UWMP that is inclusive of IEUA and WFA that represents a regional perspective.

While this 2015 Regional UWMP provides water demand, water supply, and supply reliability assessment for the entire IEUA region consistent with IEUA's IRP, all requirements of the California Water Code for each of IEUA's member agencies will be met through each retail agency's individual 2015 UWMP. Additionally, IEUA formed a regional alliance consisting of all of its retail agencies to comply with SB X7-7 goals. Table 1-1 identifies this as a regional UWMP prepared collaboratively by IEUA and WFA. Table 1-2 indicates that IEUA and WFA are wholesale suppliers.

Table 1-1: Plan Identification

Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance**
☐	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☑	**Regional Urban Water Management Plan (RUWMP)**		IEUA
NOTES: This UWMP covers the Inland Empire Utilities Agency (IEUA) and the Water Facilities Authority (WFA)			

Table 1-2: Agency Information

Agency Identification	
Type of Agency	
☑	Agency is a wholesaler
☐	Agency is a retailer
Fiscal or Calendar Year	
☐	UWMP Tables Are in Calendar Years
☑	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
07/01	
Units of Measure Used in UWMP	
Unit	AF
NOTES: This agency identification table applies to both IEUA and the WFA.	

1.3 2015 UWMP Organization

The content presented in this UWMP correspond to the outline of the Act, specifically Article 2, Contents of Plans, which correspond to the California Water Code Sections 10631, 10632, and 10633. The organization of the report slightly differs from the DWR UWMP Guidebook's organization in order to reflect the unique characteristics of IEUA's and WFA's systems as well as to be as consistent as possible with IEUA's IRP and Water Use Efficiency Business Plan. This UWMP is organized as follows:

- Section 1 – Introduction
- Section 2 – Water Demands
- Section 3 – Water Sources and Supply Reliability
- Section 4 – Water Use Efficiency Program
- Section 5 – Water Shortage Contingency Plan
- Section 6 – Recycled Water
- Section 7 – Future Water Supply Projects and Programs
- Section 8 – Climate Change Vulnerability Assessment
- Section 9 – Voluntary Reporting of Energy Intensity
- Section 10 – UWMP Adoption Process

The UWMP Checklist has been completed, which identifies the location of the Act requirements in this UWMP and is included in Appendix A.

1.4 IEUA System Description

IEUA was formed as a municipal water district by popular vote of its residents in June 1950 to become a member agency of the MWD for the purpose of importing water to its retail agencies. IEUA has significantly expanded its water and wastewater utility services since 1950 to also include wastewater treatment, recycled water production and distribution, co-composting of green waste and municipal biosolids, desalination of brackish water, and disposal of non-reclaimable industrial wastewater and brine.

IEUA is governed by a five-member Board of Directors. Each Director is publicly elected for a four year term and represents one of the five divisions:

- Division 1 – Upland, Montclair, portion of Ontario, and portion of Rancho Cucamonga.
- Division 2 – Ontario, portion of Chino, and portion of Fontana.
- Division 3 – Chino and Chino Hills
- Division 4 – Fontana, portion of Rialto, and portion of Bloomington.
- Division 5 – Rancho Cucamonga and portion of Fontana.

Current Board members are:

- Terry Catlin – President, Division 1 (Upland/Montclair)
- Michael Camacho – Vice President, Division 5 (Rancho Cucamonga)
- Steven J. Elie – Secretary/Treasurer, Division 3 (Chino/Chino Hills)
- Gene Koopman – Director, Division 2 (Ontario)
- Jasmin A. Hall – Director, Division 4 (Fontana)

IEUA owns and operates four regional water recycling plants in its service area: Regional Water Recycling Plant Number (No.) 1, Regional Water Recycling Plant No. 4, Regional Water Recycling Plant No. 5, and the Carbon Canyon Water Recycling Facility. IEUA's regional recycled water plants produce disinfected, tertiary treated recycled water in compliance with California's Title 22 regulations. Wastewater is collected with regional wastewater interceptors and two non-reclaimable wastewater pipeline systems. Biosolids produced at the water recycling plants are handled by three facilities: Regional Water Recycling Plant No. 1 Solids Handling Facility, Regional Water Recycling Plant No. 2 Solids Handling Facility, and the Inland Empire Regional Composting Facility. Regional Water Recycling Plant No. 5 can also handle solids and is leased to a private enterprise for biogas energy production from food or dairy waste. IEUA owns and operates sewer lines and recycled water pipelines. The recycled water systems include pump stations, reservoirs, and pressure regulating stations to serve numerous pressure zones.

IEUA also operates groundwater recharge facilities in cooperation with the Chino Basin Watermaster (CBWM), San Bernardino County Flood Control District (SBCFCD), and the Chino Basin Water Conservation District. The Chino I Desalter is managed by IEUA under an agreement with the Chino Basin Desalter Authority (CDA).

1.4.1 IEUA Service Area

IEUA provides a number of services for the southwestern section of San Bernardino County in the Santa Ana River Watershed. The IEUA service area overlies almost entirely the Chino Groundwater Basin (Chino Basin). The 242-square mile service area encompasses the Chino Basin that consists of a relatively flat alluvial valley from east to west and slopes from north to south at a one to two percent grade. Valley elevation ranges from about 2,000 feet above sea level in the foothills below the San Gabriel Mountains to about 500 feet near Prado Dam.

IEUA's service area population has grown quickly in the past decade and is expected to increase in the future. The region's growth underlies the need for careful water resources planning and management to ensure adequate water supplies and address water quality management problems.

1.4.2 IEUA Member Agencies

The IEUA service area consists of the cities of Chino, Chino Hills, Montclair, Upland, Ontario, Rancho Cucamonga, and Fontana, and unincorporated areas within San Bernardino County. There are eight retail water agencies within IEUA's service area (Table 1-3 and 1-4). Two of IEUA's retail water agencies, (FWC and CVWD) purchase untreated water directly from IEUA and provide their own treatment. Five of IEUA's retail water agencies purchase treated water from WFA. WFA purchases untreated imported water from IEUA, treats and delivers the water to the cities of Chino, Chino Hills, Ontario, Upland, and MVWD. San Antonio Water Company (SAWCO) wholesales surface water from San Antonio Creek and potable groundwater to Upland, Ontario, and irrigation customers.

IEUA also provides wastewater services to seven agencies including, the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and CVWD in the city of Rancho Cucamonga.

Table 1-3: IEUA's Retail Member Agencies

Agency	Description
City of Chino	The City of Chino serves water to a population of approximately 74,000 in the city and some unincorporated areas in San Bernardino County.
City of Chino Hills	The City of Chino Hills provides water to a population of approximately 77,600 in the City within its 46 square mile service area that also includes small portions of Chino and Pomona.
Cucamonga Valley Water District	CVWD is a retail agency that provides water to approximately 200,460 residents within a 47 square mile area comprised mainly of the City of Rancho Cucamonga. CVWD also provides water to small portions of the cities of Upland, Ontario, Fontana and unincorporated areas of San Bernardino County.
Fontana Water Company	Fontana Water Company is a retail investor-owned utility company that provides water to approximately 215,500 residents mainly in the City of Fontana, and also serves portions of the cities of Rancho Cucamonga and Rialto, outside the IEUA service area.
Monte Vista Water District	MVWD is a county water district founded in 1927 that provides retail water services to a population of approximately 54,200 in the City of Montclair, portions of the City of Chino, and unincorporated areas of San Bernardino County between Chino, Ontario, and Pomona. MVWD is also a wholesale water supplier to the City of Chino Hills, providing up to 21 MGD of water.
City of Ontario	The City of Ontario supplies water to a population of approximately 168,780 in the city and some unincorporated areas of San Bernardino County. The City of Ontario also serves a small portion of the City of Rancho Cucamonga.
San Antonio Water Company	San Antonio Water Company is a mutual water company that supplies water to approximately 3,150 residents in the unincorporated area of the City of Upland.
City of Upland	The City of Upland encompasses 15 square miles and serves water to approximately 75,790 people.

Table 1-4: Water Supplier Information Exchange

Wholesale: Water Supplier Information Exchange	
☐	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with CWC 10631. Completion of the table below is optional. If not completed include a list of the water suppliers that were informed.
	Provide page number for location of the list.
☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631.
City of Chino	
City of Chino Hills	
Cucamonga Valley Water District	
Fontana Water Company	
Monte Vista Water District	
City of Ontario	
San Antonio Water Company	
City of Upland	
NOTES:	

1.4.3 IEUA Climate

IEUA is located within the South Coast Air Basin (SCAB) that encompasses all of Orange County and the urban areas of Los Angeles, San Bernardino, and Riverside counties. The SCAB climate is characterized as “Mediterranean” climate with a semi-arid environment with mild winters, warm summers, and moderate rainfall.

1.4.4 IEUA Population and Demographics

The IEUA IRP based on the Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) projects a population of 856,168 in 2015 for IEUA’s service area with a growth rate of approximately 1.3 percent per year to reach a population of 1,125,203 in 2040.

Table 1-5: IEUA Population – Current and Projected

Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	856,168	896,533	955,569	1,009,349	1,067,946	1,125,203
NOTES: Total population for IEUA service area from IEUA IRP (Appendix D) based on 2012 SCAG RTP including unincorporated area population.						

The IEUA IRP also provided demographics data for the IEUA service area based on 2012 SCAG RTP (Table 1-6). IEUA's service is expected to see an increase in new housing developments and more dense developments within existing communities. Urban employment is also projected to increase.

Table 1-6: IEUA Demographics – Current and Projected Occupied Housing Units

Demographics - Current and Projected						
	2015	2020	2025	2030	2035	2040
Occupied Housing Units	246,784	262,894	279,209	295,545	311,860	329,707
Single Family Units	170,447	178,394	187,488	197,642	207,794	218,366
Multi-Family Units	76,337	84,500	91,721	97,903	104,066	111,422
NOTES: For IEUA service area from IEUA IRP (Appendix D) based on 2012 SCAG RTP including unincorporated area population.						

1.5 WFA System Description

WFA owns and operates the Agua de Lejos Treatment Plant, a conventional surface water treatment facility that treats and disinfects imported water supplies, primarily State Water Project (SWP) water that is purchased from MWD through IEUA. This plant is located in Upland on a sixteen acre site. The plant began operating in 1988 and has a treatment capacity of 81 million gallons per day (MGD). Historical flows through the treatment plant range from 30 to 40 MGD during the peak summer months and can be as low as 12 MGD during winter months.

WFA is guided by a five-member Board of Directors. Each retail agency of WFA appoints, by Resolution of its governing body, one member of its governing body to act as its representative on the Board.

1.5.1 WFA Service Area

WFA's service area covers approximately 135 square miles within the upper Santa Ana River watershed. WFA provides services to five retail agencies that are encompassed within IEUA's service area. The service area is located within the boundary of the Chino Basin at the western portion of San Bernardino County as shown on Figure 1-1. This area is an alluvial valley that is relatively flat from east to west and slopes along a north-south grade. The service area is bounded to the north by the San Gabriel Mountains and on the west by the Chino Hills. The principle drainage within the Chino Basin is the Santa Ana River.

1.5.2 WFA Member Agencies

WFA provides services to five retail water agencies that are encompassed within IEUA's service area, including the cities of Chino, Chino Hills, Ontario, and Upland, and MVWD as previously listed in Table 1-3.

1.5.3 WFA Climate

The WFA service area has the same climatic characteristics as described in Section 1.4.3.

1.5.4 WFA Population and Demographics

The population for WFA is projected to increase at the same rate as IEUA's service area. Table 1-7 shows WFA's service area population projections in five-year increments to 2040. The 2015 population shown in Table 1-7 reflects the sum of WFA member agencies estimate based on methods described in Section 4.4.1. In 2015, WFA's population represents 52.6 percent of IEUA's service area population. This percentage was applied to IEUA's population from 2020 to 2040 to obtain WFA's population estimates for those years.

Table 1-7: WFA Population – Current and Projected

Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040
	450,041	471,259	502,291	530,560	561,361	591,458
NOTES: 2015 population is the sum of 2015 population reported by each of WFA's five retail agencies (estimated using various methods) representing 52.6 percent of IEUA's service area population estimated by 2012 SCAG RTP. Projections assume 52.6 percent for all future years.						

1.6 Regional Water Agency Coordination

There are many agencies involved in water management within the Chino Basin. IEUA is working, in cooperation with each of these agencies, to achieve water supply reliability, water quality and watershed management goals for the Santa Ana River Watershed and the Inland Empire.

1.6.1 Metropolitan Water District of Southern California

IEUA is a member agency of MWD. MWD is a public agency that provides supplemental imported water from the northern California SWP and the Colorado River Aqueduct (CRA) to 26 member agencies located in the coastal plains of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties. Nearly 90 percent of the population within these counties, about 19 million people, resides within MWD's 5,200 square mile service area.

As a water wholesaler, MWD has no retail customers. It distributes treated and untreated imported water from the CRA and SWP to its member agencies. MWD provides an average of 50 percent of the municipal, industrial and agricultural water used within its service area. The remaining 50 percent comes from local groundwater, local surface water, recycling, and from the City of Los Angeles' Owen's Valley Aqueduct in the eastern Sierra Nevada.

MWD prepares its own UWMP and IEUA's Regional 2015 UWMP was developed with information provided from MWD's 2015 UWMP (MWD, 2015 Draft UWMP, March 2016). MWD currently provides financial support for local water projects and water conservation projects implemented by its member agencies that increase the reliability of water supplies to the region.

MWD sponsors the Local Resources Program (LRP), established in June 1998, to encourage member agencies to develop and use recycled water and recover groundwater to reduce dependence on imported water supplies. IEUA currently receives financial contributions from MWD from the following programs:

- LRP – MWD made significant improvements to the LRP in October 2014 such as providing three incentive payment structures to choose from: sliding scale incentives up to $340 per AF over 25 years, sliding sale incentives up to $475 per AF over 15 years, or fixed incentives up to $305 per AF over 25 years. MWD funds local projects that seek to identify the best way to meet the region's water needs and provide the greatest return on investment.
- Conservation Credits Program – MWD pays the lesser of one-half the program cost or the equivalent of $195 per AF of water saved through conservation. A variation of this policy provides funding for programs that document water savings.

MWD also provides financial and technical assistance to its member agencies for implementing the water conservation measures, known as Best Management Practices (BMP), contained in the California Urban Water Conservation Council (CUWCC) Best Management Practices Memorandum of Understanding. IEUA currently receives financial contribution from MWD for the following conservation programs:

- Residential SoCal Water Smart Program - MWD sponsors a region-wide program that offers single family residents rebates for high efficiency toilets (HET) and washers, weather based irrigation controllers (WBIC), rotating nozzles, and synthetic turf.

- Enhanced Conservation Program - The Enhanced Conservation Program provides funding directly to MWD member agencies to encourage new and creative approaches to implement urban water conservation.
- California Friendly Landscape Irrigation Efficiency Training - MWD offers classroom and online training to professional landscapers and the residential community.
- Community Partnering Program - MWD provides co-sponsorships to support water-related and education community projects, programs, and events.
- Innovative Conservation Program - The Innovative Conservation Program provides funding for research and development of new and creative ways to conserve water. The participants include public agencies, individuals and organizations.
- California Friendly Model Homes for New Construction - MWD offers financial incentives to builders who incorporate California Friendly features into new southern California homes, which include appliances and irrigation devices.
- Public Sector Program Phase I - MWD provided up-front funding to increase water use efficiency at public facilities through indoor/outdoor water audits, enhanced device incentives, and recycled water hook-ups. Phase II is currently suspended.
- Water Savings Performance Program – MWD provides incentives for customized water process and irrigation system improvements for both large landscape water use efficiency and industrial process improvements.
- Pilot Turf Removal Program - Modeled after IEUA's Water Wise Landscape Rebate Program, this program is currently suspended due to the State economic crisis. May in the future provide $1 per square foot of turf removed for residential and commercial, industrial, and institutional (CII) customers to assist them in reducing outdoor irrigation.

1.6.2 Santa Ana Watershed Project Authority

The Santa Ana River Watershed faces enormous challenges as it strives to adapt to changing conditions, many of which are at an unprecedented scale in its modern history. Santa Ana Watershed Project Authority (SAWPA) acts as the Regional Water Management Group and its Mission is to facilitate communication, identify emerging opportunities, develop regional plans, secure funding, implement programs, build projects, and operate and maintain facilities.

IEUA is a member of SAWPA formed in 1972. SAWPA is a Joint Powers Authority (JPA) that coordinates regional planning within the Santa Ana River Watershed to address water quality and supply improvements. SAWPA is comprised of the five major water supply and wastewater management agencies within the Santa Ana Watershed including: IEUA, Eastern Municipal Water District, Orange County Water District, San Bernardino Valley Municipal Water District, and Western Municipal Water District.

Since the early 1970's, SAWPA has played a key role in developing and updating the Regional Basin Plan for the California Regional Water Quality Control Board. SAWPA conducts water-related investigations and planning studies, and builds facilities needed for regional water supply and water quality remediation.

The “One Water One Watershed” (OWOW) is the Santa Ana River Watershed’s integrated regional water management (IRWM) plan. This plan reflects a collaborative planning process that addresses all aspects of water resources throughout the region and watershed. It includes planning of future water demands and supplies over a 20-year time horizon within the watershed as a hydrologic and interconnected system. The plan represents collaboration across jurisdictions, and political boundaries involving multiple agencies, stakeholders, individuals, and groups; and attempts to address the issues and differing perspectives of all the entities involved through mutually beneficial solutions. The plan reflects a new suite of innovative approaches that instead of relying solely on continued imported water deliveries to meet growing water demands in the region, is leading with a water demand reduction strategy.

1.6.3 Chino Basin Watermaster

IEUA is a member of the CBWM Board of Directors. CBWM was established in 1978 by a judgment entered by the Superior Court of California. The judgment requires that the CBWM develop a management plan for the Chino Groundwater Basin that meets water quality and quantity objectives for the region.

In 1998, CBWM developed an integrated set of water management goals and actions for the Chino Basin known as the Optimum Basin Management Program (OBMP) that describes nine program elements to meet the water quality and local production objectives in the Chino Groundwater Basin (See Section 3.3.2 – Management of the Chino Groundwater Basin). The OBMP encourages the increased use of local supplies to help “drought proof” the Chino Basin.

In July 2000, CBWM adopted the “Peace Agreement” that ended over 15 years of litigation within the Chino Basin. The Peace Agreement outlined the schedule and actions for implementing the OBMP. In December 2007, CBWM adopted the “Peace II Agreement” that redefined the future programs and actions required to implement the OBMP, based on the nine years of experience and accomplishments in implementing the OBMP. Between 2009 and 2010, CBWM updated the Groundwater Recharge Master Plan in response to changes in demand, recharge capacity, safe yield, and other factors. CBWM was required to prepare an update of the Groundwater Recharge Master Plan for the Chino Basin by July 2010 consistent with the Peace II Agreement and court deadline. The updated Groundwater Recharge Master Plan includes an assessment of safe yield changes and a revised safe yield projection as well as identified opportunities for enhanced stormwater, recycled water, and imported water recharge (including low impact development (LID), new recharge projects and integrated stormwater and supplement water facilities).

1.6.4 Chino Basin Water Conservation District

The Chino Basin Water Conservation District (CBWCD) was established in 1949 to protect and replenish the Chino Groundwater Basin with rainfall and stormwater runoff from the San Gabriel Mountains. CBWCD uses an extensive system of percolation ponds and spreading grounds to augment the natural capacity of the region to capture runoff for recharge. CBWCD also promotes water conservation through public education programs. IEUA works closely with the CBWCD. Figure 1-3 is a map of the CBWCD service area.

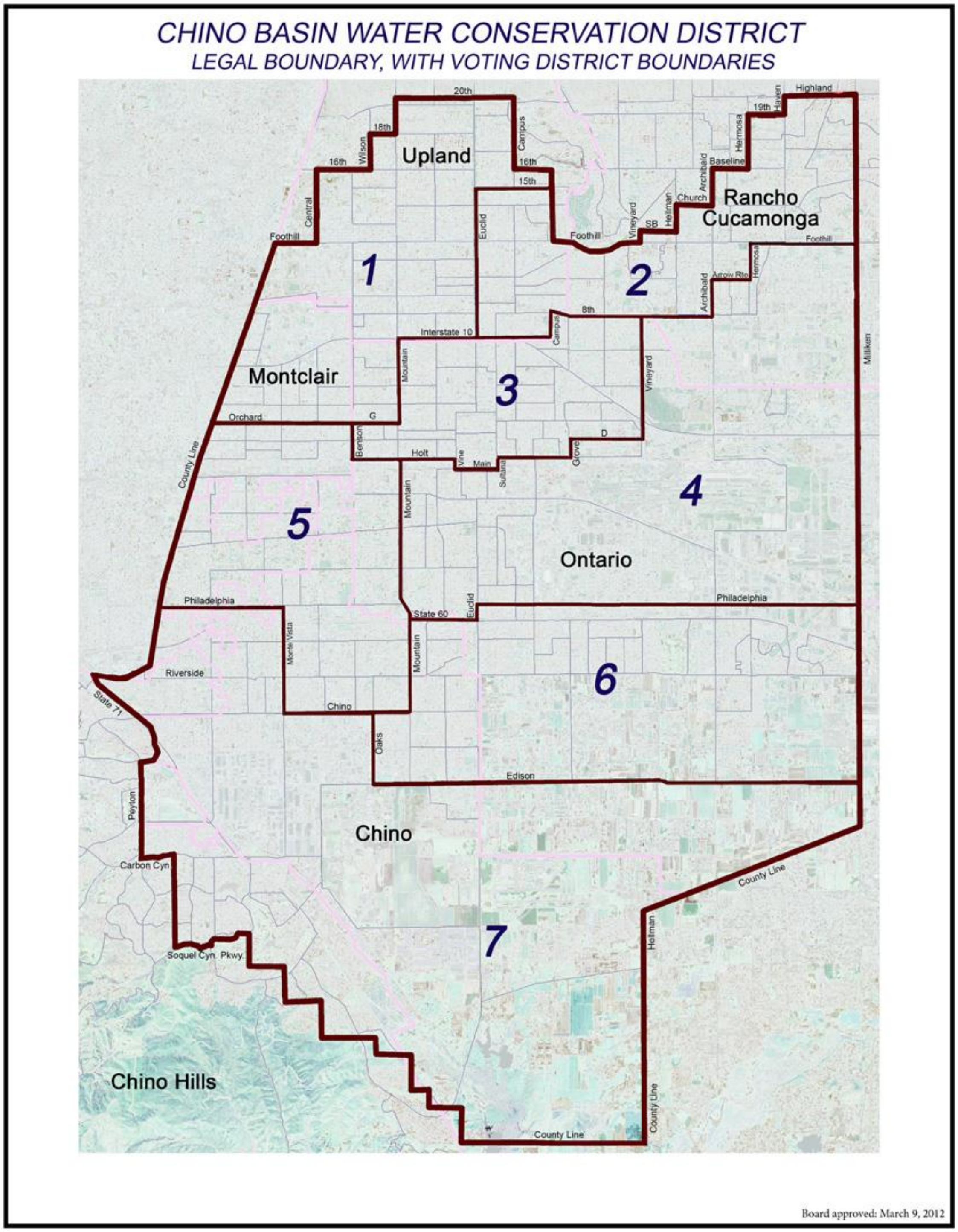

Figure 1-3: Chino Basin Water Conservation District Boundaries

1.6.5 Santa Ana Regional Water Quality Control Board

The Santa Ana Regional Water Quality Control Board (SARWQCB) is responsible for the development and enforcement of water quality objectives to meet the requirements of the Federal Clean Water Act, California Porter-Cologne Act, and the National Pollution Discharge Elimination System (NPDES).

In 1975, the SARWQCB completed the Water Quality Control Plan (Plan) for the upper portion of the Santa Ana Watershed. The plan outlined specific water quality management actions to address water quality and salt build up, in the form of total dissolved solids (TDS) within the Chino Groundwater Basin. These included the construction of a large well field and desalters in the lower part of the Chino Basin to extract and treat poor quality water, and construction of a pipeline to export brine from the upper Basin to the Orange County Sanitation District (OCSD) Plant 1.

The brine line, previously known as the Santa Ana River Interceptor or SARI line and now known as the Inland Empire Brine Line (IEBL) was built and has been in operation since 1975. The 2000 OBMP by CBWM has been developed to meet the requirements of the 1975 Plan.

1.6.6 Chino Basin Desalter Authority

The CDA is a JPA consisting of the cities of Chino, Chino Hills, Norco and Ontario, the Jurupa Community Services District, the Santa Ana River Water Company, Western Municipal Water District, and IEUA. The CDA treats brackish groundwater from the lower Chino Basin with the Chino I and II Desalter facilities along with distribution of drinking water to retail agencies. IEUA operates and maintains the Chino I Desalter while Jurupa Community Services District operates and maintains the Chino II Desalter. These desalter facilities consist of groundwater wells and associated raw water pipelines, treatment facilities, pumps, and water distribution pipelines. Treatment processes include ion exchange and reverse osmosis (RO). Each of the eight retail water entities have agreements to purchase desalted water.

1.6.7 San Bernardino County Flood Control District

The SBCFCD is partnering with IEUA, CBWM and CBWCD in implementation of the Chino Basin Groundwater Recharge Master Plan. The implementation is known as Chino Basin Facilities Improvement Program (CBFIP). The CBFIP includes modifications to several SBCFCD basins and flood control channels including the installation of five rubber dams and three drop inlet diversion structures to divert imported, storm and recycled water to 18 groundwater recharge sites.

2 WATER DEMANDS

Since the 2010 UWMP update, IEUA's retail agencies have been actively engaged in efforts to comply with SB X7-7 that requires all California retail urban water suppliers serving more than 3,000 acre-feet per year (AFY) or 3,000 service connections to achieve a 20 percent water demand reduction from a historical baseline by 2020. Meeting this target is critical to ensure that agencies are eligible to receive future state water grants and loans. The effort to reduce water use in the IEUA region has also expanded in response to one of the most severe droughts in California's recorded history that was solidified by Governor Brown's Emergency Drought Mandate issued in April 2015. The IEUA Regional Alliance, that comprises all of IEUA's retail agencies, has already met the SB X7-7's 20 percent reduction in urban water use in FY 2014-15.

2.1 Overview

2.1.1 Water Use Trends

Since the 1990s, approximately 90 percent of the region's water demands have come from urban municipal and industrial (M&I) users with the remaining 10 percent coming from agricultural users. Overall urban water demand since 1995 has increased by approximately 20 percent, despite a regional growth of 30 percent (approximately 200,000 more residents). This is indicative of new water use behaviors, such as efficient irrigation and the use of more efficient indoor fixtures, which prolong the availability of current regional water supplies into the future.

The 2010 UWMP projected total urban demand by the year 2015 to be approximately 272,000 AFY. However, actual demands have grown more slowly, increasing by only 3,000 AF over the past five years from approximately 197,000 AFY in FY2010-11 to 200,000 AFY in FY2014-15. This is due in part to delayed growth as a result of the economic recession, as well as changes in plumbing codes, implementation of water use efficiency programs, and responses to current water supply challenges such as the drought that California has been experiencing since 2012.

The impact of plumbing code changes and the implementation of water use efficiency programs was quantified in the recent 2015 Wastewater Facilities Master Plan flow monitoring. IEUA monitoring of new versus older residential developments showed that urban usage patterns have decreased from a regional indoor flow average of 55 GPCD down to 37 GPCD in new developments. This is consistent with new development trends throughout California (Codes and Standards Research Report: California's Residential Indoor Water Use. May 2015).

These findings suggest that future developments will require less water than in the past, reducing the previous projected regional need for additional water supplies. This shift has significant implications for future wastewater and recycled water planning. Regional treatment plants may not need to be expanded for hydraulic capacity as quickly as previously thought (potentially saving regional capital); however, treatment plants will have to be expanded to treat increased wastewater strength (because there will be greater concentrations of solids), and future available recycled water supplies may be lower than projected.

2.1.2 IEUA IRP and 2015 Regional UWMP Demand Projections

To prepare the region for uncertain climate patterns and to ensure sufficient water resources and adequate infrastructure capacity, IEUA in collaboration with its member agencies developed the comprehensive Integrated Water Resources Plan (IEUA IRP) in 2014-2016. The two key goals of the IEUA IRP are to integrate and update water resources planning documents in a focused, holistic manner, and to develop an implementation strategy that will improve near-term and long-term water resources management for the region. The IEUA IRP evaluates new growth, development, and water demand patterns within the service area and conducts an assessment of water needs and supply source vulnerabilities under climate change.

The IEUA IRP provides aggregated water demand projections for the IEUA region based on an econometric demand forecasting model through 2040. The econometric model incorporates various influences that impact urban water demand such as population, employment, economics, weather, and conservation activities (both passive and active). Regional demographic forecasts are based on the SCAG 2012 Regional Transportation Plan.

To support its planning efforts, IEUA also undertook a land-use based demand model project to augment its IRP process and to ensure consistency with retail member agency demand projections through 2040. The primary objective was to develop a land use based water demand model that disaggregates regional data to the retail member agency level for IEUA's UWMP. The demand projections can be used by IEUA and retail member agencies for any system or supply planning purpose that requires detailed demand estimates and projections, such as conservation savings analyses.

Because the land use based demand projections do not include active conservation as the econometric model did, these estimates should be considered an upper end of future water needs. The land use based model projection of approximately 278,000 AF at 2040 is four percent higher than the high range IRP projection of 266,557 AF in 2040 (Figure 2-1). When savings from current conservation programs and more efficient developments, such as seen in new developments in Chino and Ontario, are factored in, the higher estimates from the land use model are well within the expected range of future demands. Since both models used different methodologies and the resulting projections are within the error range of each other, there is strong confidence in the projection and the models have, in effect, validated both methodologies.

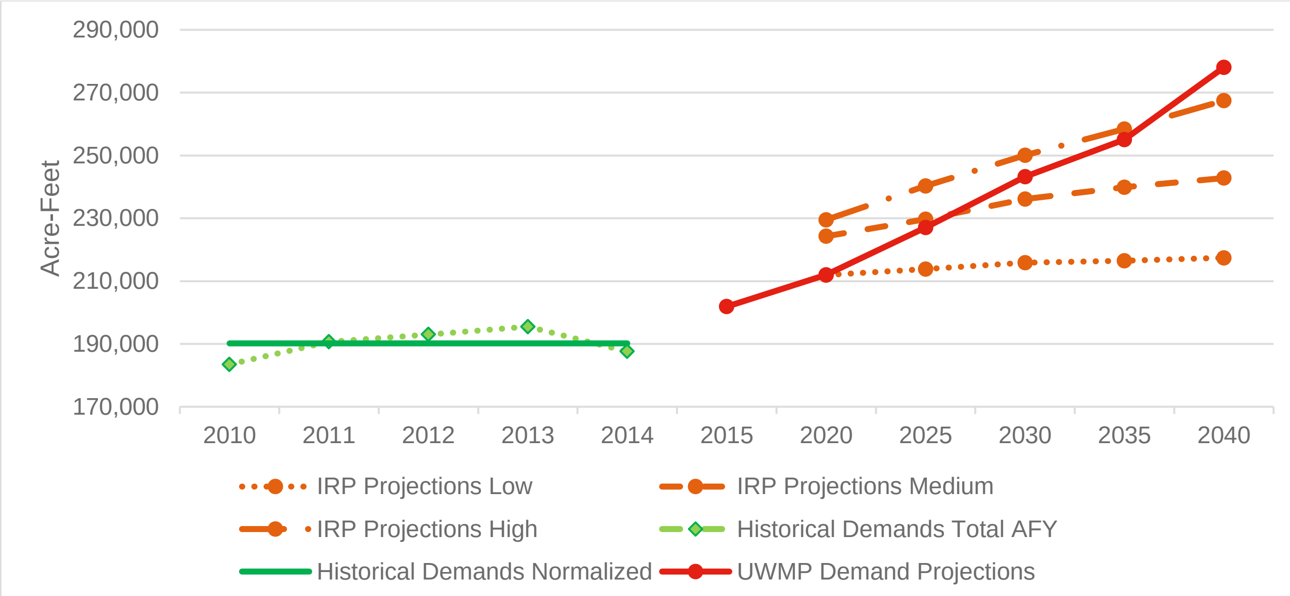

Figure 2-1: Demand Projection Comparison between IEUA IRP and 2015 UWMP Projections

The retail agency level demand projections provided by the land use based model can be used by IEUA and retail agencies for any system or supply planning purpose that requires detailed demand estimates and projections, such as conservation savings analyses. IEUA will be using the retail agency level demand projections for the next phase (Phase 2: Implementation and Capital Improvement Program) of its IRP process to develop detailed project level analyses.

2.2 Demand Projection Methodology

The methodology used to create the land use based demand model and identify demand projections relied on developing a land use database within a geographic information system (GIS), and determining land use unit demands (LUD). LUDs measure water use on a per acre basis. These water use factors were generated for each IEUA member agency using their billing data and existing land use acreage inventory. The land use projections relied on the use of approved general plans and specifically the land use element and map for vacant lands identified for future development. Adjustment factors were incorporated into the demand model to account for unbilled water, intensification of buildings and uses as land values increase, climate change impacts, and passive conservation savings. The demand model provided demand projections for each member agency separately and for the total IEUA service area in five-year increments to 2040. A detailed description can be found in the Land Use Based Demand Model Development Technical Memorandum (2016).

2.2.1 Land Use Trends

When IEUA was formed in 1950 land use within the service area was primarily field crops, citrus, and vineyards and total urban area land use was less than eight percent. Since 1950, urban areas have expanded significantly and replaced many agricultural uses in the northern and central portions of the Chino Basin. Total urban areas comprised 56 percent of the service area in 2015 with agricultural land uses making up about two percent; in addition, there are large areas of open space such as Chino Hills State Park in the service area. The conversion of agricultural land to urban developments is anticipated to continue for land use within the Chino Basin, based on the general plans.

Table 2-1, from the Demand Model development report, presents a summary of acreages of existing and planned land uses within the service area. The future land uses were calculated based on the general plans for each city in the service area using city spheres of influence as boundaries to prevent overlap. Residential land use is expected to have the largest growth projected at 31 percent, industrial land use is projected to grow at 20 percent, while vacant land will decrease 98 percent and agriculture use will decrease by 96 percent. Agricultural lands not identified for urban uses in the respective general plans will remain as agricultural lands.

Table 2-1: Land Use Projection by Acreage

	Acreage Inventory by Year					
Land Use (du/ac)	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	9,089	9,504	10,155	10,282	10,115	11,522
Residential Low (3 - 7)	26,329	27,090	28,463	29,691	30,804	32,593
Residential Medium (8 - 14)	3,067	3,500	3,959	4,425	4,663	5,915
Residential High (15 - 24)	2,349	2,678	3,131	3,263	3,300	3,427
Residential Very High (25+)	231	256	283	408	466	646
Commercial	6,838	6,925	7,180	7,994	8,456	9,221
Industrial	16,974	18,587	19,856	20,141	20,306	20,420
Public/Institutional	2,979	2,990	3,066	3,095	3,289	3,334
Parks, Schools, Irrigation	5,629	5,687	5,657	5,890	5,963	6,154
Agriculture	2,026	1,534	1,175	630	376	68
Unique Water Users	863	863	852	852	852	852
Non-Irrigated	34,438	34,410	35,668	35,833	35,904	36,085
Vacant	19,724	16,512	11,090	8,032	6,042	298
Total	**130,537**	**130,537**	**130,537**	**130,537**	**130,537**	**130,537**

The greatest acreage increase by 2040 is the largest land use category of low density residential, with an increase of 6,264 acres. The majority of this new low density residential use is attributed to new growth areas in Ontario's New Model Colony and Chino's The Preserve. These lands are currently agricultural lands, but as shown in Table 2-1, agricultural lands designated for future urban uses will decline over time as they are developed.

Medium, high, and very high density residential lands are anticipated to increase at a greater rate (percentage) than very low and low density residential lands. The changes in acreage from 2015 to 2040 listed in Table 2-1 are shown as percent changes in Table 2-2.

Very high density residential lands will increase by 180 percent from 231 acres in 2015 to 646 acres in 2040. This large percentage increase is due to the current low inventory of this category and the significant increase in acres planned for by each city in its general plan. As land values increase, densities tend to increase. The general plans reflect the unique characteristics and policies of each community which are reflected in the water demand projections.

Table 2-2: Changes in Acreage from 2015 to 2040

Land Use (du/ac)	Percent Change
Residential Very Low (1 - 2)	27
Residential Low (3 - 7)	24
Residential Medium (8 - 14)	93
Residential High (15 - 24)	46
Residential Very High (25+)	180
Commercial	35
Industrial	20
Public/Institutional	12
Parks, Schools, Irrigation	9
Agriculture	-97
Non-irrigated	5
Vacant	-98

2.2.2 Demand Factors

The land use based model accounts for water demand changes over time due to three factors – climate change, intensification, and conservation.

- **Climate Change** – DWR identified that climate change would impact the region by increasing the surface temperature by 5.5 to 10.4 degrees Fahrenheit by the end of the century; increasing frequency, magnitude, and duration of heat waves; and causing longer, drier and more frequent periods of droughts. The land use based model assumed climate change will increase demand by 3.2 percent by 2040.
- **Intensification** - The IEUA service area is still rebounding from the Great Recession and market conditions for the region are noted by economists to be strong with higher employment and higher occupancy rates anticipated. As the region develops, some communities are reaching build out, which is a bit of a misnomer as lands are continually evolving over time, resulting in an "up not out" land use pattern shift. In addition, land values are increasing and are anticipated to increase over the 25 year planning horizon which contributes to higher densities and higher use of existing buildings or lands. All of these conditions result in an intensification of land uses and thus higher water demands on a per acre basis.
- **Conservation** – Conservation savings associated with plumbing code changes and water use efficiency programs were determined in IEUA's 2015 Wastewater Facilities Master Plan. Flow monitoring of older residential developments compared with new home development indicated a reduction of indoor flows from an average of 55 GPCD to 37 GPCD. The land use based model assumed the proportional share of this indoor reduction on total 2040 residential demands to be approximately 2.8 percent.

2.3 Regional Water Demands

Regional water demands represent the total demand of all agencies within IEUA's service area over the planning horizon. Total regional demand includes imported water, which is provided by IEUA and WFA, recycled water, groundwater and local surface water. These demands are broken down by retail agency in section 2.3.1 and customer sector in 2.3.2.

2.3.1 Demands by Retail Agency

Table 2-3 and Figure 2-2 presents the water demands for the IEUA service area for existing normalized 2015, and projected years 2020, 2025, 2030, 2035, and 2040.

Table 2-3: IEUA Total Water Demands by Retail Agency (AF)

IEUA Retail Agency Demands – Projected						
	2015	2020	2025	2030	2035	2040
City of Chino	15,744	17,135	18,579	19,951	20,844	23,271
City of Chino Hills	16,592	18,066	19,029	20,171	20,397	22,642
Cucamonga Valley Water District	50,986	54,170	57,150	58,200	59,677	60,930
Fontana Water Company	42,132	42,835	47,590	52,332	57,400	58,512
Monte Vista Water District	10,312	11,085	11,316	11,612	11,904	12,180
City of Ontario	41,796	44,093	48,209	55,402	58,665	73,938
San Antonio Water Company	1,493	1,510	1,597	1,617	1,919	2,267
City of Upland	20,647	21,694	22,453	23,447	23,915	24,277
Total	**199,702**	**210,588**	**225,923**	**242,732**	**254,721**	**278,017**
NOTES: Water demands for 2015 reflect normalized production demands (including system losses), not actual. The simplified normalization methodology used averaged five years of actual demands to smooth annual fluctuations (FY2010-11 to FY2014-15). 2020 to 2040 projections are from land use based model excluding recycled water for agriculture.						

The above demand values were developed in a land use based model and reviewed by IEUA and its retail agencies. These values represent total demand from each agency that are met through several different supply sources. IEUA's demand data from Table 2-6 and Table 2-7 are incorporated into Table 2-3 above and represent the imported water demands of these eight retail agencies. Recycled water demand for agriculture use is not included in Table 2-3 because it was excluded from the land use based projections.

On Figure 2-2, total IEUA demands are shown using the shaded area and values read from the right vertical axis. The individual member agency demands are shown using different lines and values are reads from the left vertical axis.

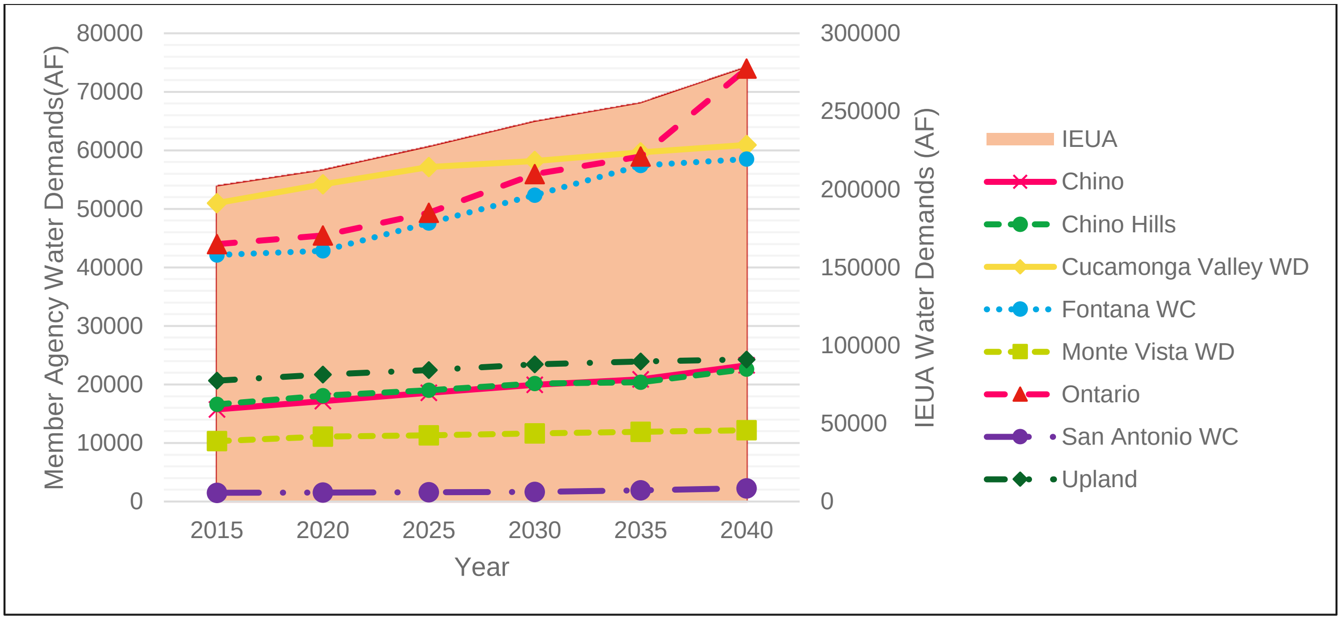

Figure 2-2: Demand Projection by Member Agency

As shown on Figure 2-2, total water demands increase gradually between 2015 and 2035 with a slightly steeper curve between 2035 and 2040. The steeper curve in later years is primarily attributed to the large amounts of residential land uses to be developed in Ontario's New Model Colony. Development of this land is anticipated to be at the outer end of the study planning horizon.

2.3.2 Demands by Sector

The IEUA regional demands by customer sector are shown in Table 2-4 for the 25-year planning window. This information is from the land use based demand model created for IEUA and its retail agencies, and explained in greater detail above in Section 2.2. Water demands for 2015 presented in Table 2-4 reflect normalized water demands, not actual. The simplified normalization methodology used averaged five years of actual demands to smooth annual fluctuations.

Table 2-5 presents the percentage of total demand for each water use sector or land use designation; this table demonstrates that the largest percent of total demand from the region is residential at about 63 percent. Although agriculture is less than one percent of total demand, it goes from 97 AF to 0 AF over the projected period because these are agricultural lands with a general plan designation for future urban use. Most agricultural lands currently are on individual private wells and, therefore, are not included in the water demands in Table 2-4.

Table 2-4: IEUA Total Water Demands by Customer Sector (AF)

IEUA	Total Water Demands (AF)					
	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	15,761	16,753	18,097	18,557	18,778	21,303
Residential Low (3 - 7)	73,060	75,949	80,499	84,647	88,824	94,202
Residential Medium (8 - 14)	16,012	18,376	20,967	24,117	25,806	33,264
Residential High (15 - 24)	18,611	21,212	25,739	27,062	27,752	28,827
Residential Very High (25+)	2,634	2,904	3,300	5,105	6,009	8,292
Commercial	19,607	19,922	20,885	24,281	27,068	29,455
Industrial	6,974	7,601	8,143	8,318	8,436	8,529
Public/Institutional	7,285	7,354	7,627	7,746	8,138	8,257
Parks, Schools, Irrigation	32,890	33,607	33,756	35,988	36,975	38,926
Agriculture	97	95	70	30	14	0
Unique Water Users	6,771	6,815	6,840	6,881	6,921	6,962
Total	**199,702**	**210,588**	**225,923**	**242,732**	**254,721**	**278,017**

NOTE: Water demands for 2015 reflect normalized production demands (including system losses), not actual. The simplified normalization methodology used averaged five years of actual demands to smooth annual fluctuations (FY2010-11 to FY2014-15). 2020 to 2040 projections are from land use based model excluding recycled water for agriculture.

Table 2-5: IEUA Total Water Demands as Percentages by Customer Sector

IEUA	Total Water Demands (%)					
	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	8%	8%	8%	8%	7%	8%
Residential Low (3 - 7)	37%	36%	36%	35%	35%	34%
Residential Medium (8 - 14)	8%	9%	9%	10%	10%	12%
Residential High (15 - 24)	9%	10%	11%	11%	11%	10%
Residential Very High (25+)	1%	1%	1%	2%	2%	3%
Commercial	10%	9%	9%	10%	11%	11%
Industrial	3%	4%	4%	3%	3%	3%
Public/Institutional	4%	3%	3%	3%	3%	3%
Parks, Schools, Irrigation	16%	16%	15%	15%	15%	14%
Agriculture	0%	0%	0%	0%	0%	0%
Unique Water Users	3%	3%	3%	3%	3%	3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

2.4 IEUA's Water Demands

As a wholesaler, IEUA delivers untreated imported water (State Water Project water) that is purchased from the MWD to WFA, CVWD, and FWC. In FY 2014-2015, IEUA delivered 58,906 AFY of untreated imported supply. Approximately 47 percent of IEUA's imported water demand is from WFA.

Table 2-6: IEUA Demands for Potable and Raw Water - Actual (AF)

Wholesale: Demands for Potable and Raw Water – Actual			
Use Type	2015 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Sales to other agencies		Raw Water	58,906
		Total	**58,906**
NOTES: Actual FY 2014/15 from IEUA Annual Water Use Report/Database			

2.4.1 IEUA's 25 Year Demand Projections

A key component of the 2015 Regional UWMP is to provide insight into the future water demand outlook of the region in addition to IEUA's service area. In FY 2014-15, total water demand for the region (excluding recycled water for agriculture) was 199,702 AFY. Demand is met through a diverse portfolio of groundwater, purchased imported water from MWD, local surface water and recycled water are described in Chapter 3. IEUA, as the regional wholesaler, is responsible for the purchase of imported water supplies.

Table 2-7 below, identifies IEUA's imported water supply to retail member agencies. This amount is IEUA's purchase order for SWP imported water with member agencies. In FY 2015, imported water met 26 percent of total demand. IEUA's retail agencies, and the region as a whole, will aim to decrease their reliance on imported water by pursuing a variety of water use efficiency and conservation strategies (refer to Chapter 3 and 4). Per capita water use is developed in Section 4.4. IEUA will meet demand shortfalls by a diverse portfolio of local supply sources supplemented with imported water from MWD which projects 100 percent reliability (MWD, 2015 UWMP).

Table 2-7: IEUA Demands for Potable and Raw Water - Projected (AF)

Wholesale: Demands for Potable and Raw Water – Projected						
Use Type	Additional Description	Projected Water Use				
		2020	2025	2030	2035	2040
Sales to other agencies		69,752	69,752	69,752	69,752	69,752
	Total	**69,752**	**69,752**	**69,752**	**69,752**	**69,752**
NOTES: From IEUA IRP baseline projections for imported water.						

2.4.2 IEUA's Total Water Demand Projections

The total demand on IEUA for raw, potable, and recycled water is listed below in Table 2-8. Use of recycled water is projected to increase within IEUA's service area. Currently, IEUA meets about a third of total water demands within the region, this number is projected to increase to 50 percent of total demands within the service area by 2040. For additional details on IEUA's Recycled Water Program, please refer to Chapter 6 – Recycled Water.

Table 2-8: IEUA Total Water Demands (AF)

Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	58,906	69,752	69,752	69,752	69,752	69,752
Recycled Water Demand	33,419	44,734	49,534	54,027	57,890	67,969
Total	**92,325**	**114,486**	**119,286**	**123,779**	**127,642**	**137,721**
NOTES: 2015 values are FY 2014-15 actuals. Raw imported water projections are from IEUA IRP baseline projection and recycled water projections are derived from IEUA's RWPS (Table 5.4).						

2.4.3 IEUA's Sales to Other Agencies

IEUA wholesales untreated imported water to WFA, CVWD, and FWC as shown previously in Figure 1-2.

2.5 WFA's Water Demands

WFA purchases raw imported water form MWD through IEUA for treatment at its Agua De Lejos Treatment Plant. The water is then sold to five retail agencies, also within IEUA's service area, to meet potable water demands. For FY 2014-15, WFA's total demand from its retail agencies was 27,606 AFY.

Table 2-9: WFA Demands for Potable and Raw Water - Actual (AF)

Wholesale: Demands for Potable and Raw Water – Actual			
Use Type	2015 Actual		
	Additional Description	Level of Treatment When Delivered	Volume
Sales to other agencies		Potable Water	27,606
		Total	**27,606**
NOTES: IEUA's imported water sales to WFA was 47 percent of its total imported water sales in FY 2014-15.			

2.5.1 WFA's 25 Year Demand Projections

A key component of the 2015 UWMP is to provide insight into the region's and WFA's future water demand outlook. Water demand on WFA for FY 2014-15 is 27,606 AFY while the total demand of the five retail agencies WFA serves is 105,091 AFY. Total demand encompasses all supply sources including groundwater, imported water from MWD, local surface water and recycled water. WFA provides potable imported water for its retail agencies. Table 2-10 is a projection of total demand of WFA's five retail agencies for the next 25 years.

Table 2-10: Total Water Demands for WFA's Retail Agencies (AF)

WFA Retail Agency Demands – Projected						
	2015	2020	2025	2030	2035	2040
City of Chino	15,744	17,135	18,579	19,951	20,844	23,271
City of Chino Hills	16,592	18,066	19,029	20,171	20,397	22,642
Monte Vista Water District	10,312	11,085	11,316	11,612	11,904	12,180
City of Ontario	41,796	44,093	48,209	55,402	58,665	73,938
City of Upland	20,647	21,694	22,453	23,447	23,915	24,277
Total	**105,091**	**112,073**	**119,586**	**130,583**	**135,725**	**156,308**
Note: From Land Use Based Demand Model Development (Technical Memorandum, Arcadis, May 2016)						

The demand values in Table 2-10 were developed for IEUA, WFA, and its retail agencies in a land use based model as explained above. These values represent total demand for the five retail agencies of WFA, which are also a part of the total demand for IEUA. Demand is met through a diversified supply portfolio for which WFA provides potable water. Recycled water demand for agriculture use is not included in Table 2-10 because it was excluded from the land use based projections.

WFA's projected demands for imported water from IEUA are broken out in Table 2-11 below. In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. A similar proportion is assumed for 2020 to 2040 i.e. the projected WFA demands shown in Table 2-11 are expected to remain 47 percent of IEUA's SWP imported water purchases as shown in Table 2-7.

Table 2-11: WFA Demands for Potable and Raw Water – Projected (AF)

Wholesale: Demands for Potable and Raw Water - Projected						
Use Type	Additional Description	Projected Water Use				
		2020	2025	2030	2035	2040
Sales to other agencies		32,783	32,783	32,783	32,783	32,783
	Total	**32,783**	**32,783**	**32,783**	**32,783**	**32,783**
NOTES: IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assumption is 47 percent for all future years.						

As the wholesale supplier, WFA works in collaboration with its retail agencies as well as IEUA, its wholesaler, to develop demand projections for imported water.

2.5.2 WFA's Total Water Demand Projections

Table 2-11 above, represents WFA's projected water use for potable and raw water from 2020 through 2040. WFA's imported water purchases comprise 47 percent of IEUA's total imported water purchases of approximately 69,752 AFY. Table 2-12 below, presents the WFA's total water demand with the 2015 value representing actual demand and projected values representing 47 percent of IEUA's total imported water purchases through 2040.Recycled water is used within WFA's service area but is provided directly by IEUA; for this reason, recycled water use demands are included in Table 2-8 but not Table 2-12.

Table 2-12: WFA Total Water Demands (AF)

Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	27,606	32,783	32,783	32,783	32,783	32,783
Recycled Water	0	0	0	0	0	0
Total	**27,606**	**32,783**	**32,783**	**32,783**	**32,783**	**32,783**
NOTES: 2015 value represents actual demand for FY 2014-15. Projected values assume WFA's demands represent 47 percent of IEUA's imported water demand.						

2.5.3 WFA's Sales to Other Agencies

WFA wholesales treated imported water to five retail water agencies including: cities of Chino, Chino Hills, Ontario, and Upland, and MVWD.

2.5.4 Non-Revenue Water for WFA

Non-revenue water is defined by the International Water Association (IWA) as the difference between distribution systems input volume (i.e. production) and billed authorized consumption. Non-revenue water consists of three components: unbilled authorized consumption (e.g. hydrant flushing, firefighting, and blow-off water from well start-ups), real losses (e.g. leakage in mains and service lines, and storage tank overflows), and apparent losses (unauthorized consumption, customer metering inaccuracies and systematic data handling errors).

A water loss audit must be conducted for any water system that owns and operates potable water distribution pipelines. **IEUA is exempt from this requirement because owned and operated distribution pipelines do not deliver potable water; WFA owns and operates 4.55 miles of a potable distribution pipeline** with six customer meter connections and one inactive meter connection and so must conduct a water loss audit. The WFA system does not include hydrants for flushing or firefighting as is typical for retail suppliers. Further, for the WFA, non-revenue water also includes utility water consumption or losses used in the treatment process, domestic purposes, and landscape irrigation, activities of which are prior to production supplies entering the distribution pipeline.

WFA owns and operates 4.55 miles of potable distribution pipelines, therefore must conduct a water loss audit for this 2015 UWMP.

IEUA does not own or operate any potable distribution system, therefore is exempt.

2.5.4.1 AWWA Water Audit Methodology

AWWA Water Audit consists of five data categories: 1) Water Supplied 2) Authorized Consumption 3) Water Losses 4) System Data and 5) Cost Data. Data was compiled from questionnaires, invoices, meter test results, and discussion with WFA. Each data value has a corresponding validation score that evaluates WFA's internal processes associated with that data entry. The scoring scale is 1-10 with 10 representing best practice.

The *Water Supplied* section represents the volume of treated water WFA delivered from purchased imported raw water. Validation scores for each supply source correspond to meter accuracy and how often the meters are calibrated. If the calibration results of supply meters were provided, a weighted average of errors was calculated for master meter adjustment. This adjustment factor was applied to reported supply volumes for meters that were found to register either over or under the true volume. Validity scores for meter adjustment are based on how often the meter is read and what method is used.

The *Authorized Consumption* section breaks down consumption of the volume of Water Supplied. Billed metered water is billed and delivered to customers and makes up the majority of an agency's consumption. Unbilled metered water is typically per policy and not present within the WFA system. Unbilled unmetered water is authorized use that is neither billed nor metered which typically includes activities such as flushing of water mains, which is limited to a single sample collection flushing site for the WFA since there are no hydrants. The AWWA Water Audit recommends using the default value of 1.25 percent to represent this use, as calculating an accurate volume is often tedious due to the many different components involved and it represents a small portion of overall use. For each consumption type listed above the associated validation score reflects utility policy for customer accounts, frequency of meter testing and replacement, computer-based billing and transition to electronic metering systems.

Water Losses are defined as the difference between the volume of water supplied and the volume of authorized consumption. Water losses are further broken down into apparent and real losses. Apparent losses include unauthorized consumption, customer meter inaccuracies and systematic data handling errors. Default percentages were provided for the Audit by AWWA for unauthorized consumption and systematic data handling error as this data is not often available. The corresponding default validation score assigned is 5 out of 10. A discrete validation score was included for customer meter inaccuracies to represent quality of meter testing records, testing procedures for meter accuracy, meter replacement cycles, and inclusion of new meter technology.

System Data includes information about WFA's physical distribution system and customer accounts. The information included is: length of mains, number of active and inactive service connections, and the average operating pressure of the system. The number of service connections is automatically divided by the length of mains to find the service connection density of the system. The calculated service connection density determines which performance indicators best represent a water system's real loss performance. The validity scores in this section relate to the water system's policies and procedures for calculating and documenting the required system data, quality of records kept, integration with an electronic database including GIS and SCADA, and how often this data is verified.

The final section is *Cost Data* and contains three important financial values related to system operation, customer cost and water production. The total annual cost of operating the water system, customer retail unit cost and the variable production cost per AF are included. The customer retail unit value is applied to the apparent losses to determine lost revenue, while the variable production cost is typically applied to real losses. In water systems with scarce water supplies, a case can be made for real losses to be valued at the retail rate, as this volume of water could be sold to additional customers if it were not lost. Validity scores for these items consider how often audits of the financial data and supporting documents are compiled and if third-party accounting professionals are part of the process.

Calculations based on the entered and limited data produce a series of results that quantify the volume and financial impacts of water loss and allow a comparison of WFA's water loss performance with that of other water systems who have also performed water loss audits using the same AWWA methodology that is primarily designed for retail suppliers. WFA's Data Validity Score was 76 out of 100, with a total calculated water loss volume of 266.60 AFY. The Non-Revenue Water volume represents 1.0 percent of the total treated water supplied by WFA, compared to the total raw water supplies to the WFA and also includes utility water consumption or losses used in the treatment process, domestic purposes, and landscape irrigation, activities of which are prior to production supplies entering the distribution pipeline. The value of non-revenue water is calculated to be $172,290 per year.

Apparent losses make up most of the WFA's total water loss at 52 percent; most of this was developed from default percentages provided by the AWWA Water Audit. Based on this information, WFA can improve its water loss assessment by taking a closer look at apparent losses and developing a strategy to better quantify and validate this data in the future. The overall Water Audit score can also be improved by meeting the standards AWWA has developed for each data point through clear procedures and reliable data, subject to the applicability of the AWWA Water Audit Methodology to that of the WFA system.

The result of the AWWA Water Audit completed for WFA as required by the 2015 UWMP is summarized in Table 2-13. The water loss summary was calculated over a one-year period from available data (FY 2014-15) and the methodology explained above.

Table 2-13: Water Loss Audit Summary for WFA (AF)

Wholesale: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
07/2014	266.60
NOTES: WFA's AWWA water loss audit	

3 WATER SOURCES AND SUPPLY RELIABILITY

3.1 Overview

A diverse portfolio of water supply sources have 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 SWP via MWD.

The IEUA IRP established a baseline water supply scenario for the IEUA's service area up to 2040. Table 3-1 provides the current and projected baseline regional water supply from each source. About 31,720 AF is expected to be added to the supplies within next ten years in the IEUA IRP baseline forecast. Groundwater from the Chino Basin is expected to increase from 90,538 AF in 2015 (39 percent of the region's total supply) to 97,666 AF by 2020 and constant through 2040 (37 percent of the region's total supply). In an effort to expand recycled water production, the recycled water supply in the region is projected to increase from 16,050 AF (7 percent of the region's total supply) in 2015 to 28,957 AF (11 percent of the region's total supply) by 2040. Recycled water used for groundwater replenishment is also projected to increase from 14,500 AF in 2015 to 16,900 AF by 2020 and 18,700 AF by 2025. Imported water, used to supplement regional local supplies, is projected to increase to 69,752 AF by 2020 through to 2040. The Regional UWMP supply type (Table 3-1) below for Chino Basin Groundwater includes a combination of the IEUA IRP baseline supply types of Chino Basin Groundwater (91,266 AF) and new Stormwater (6,400 AF), post 2015. Current active and passive water savings is embedded in the current water demand forecast and is estimated to be 1,000 AFY through 2040.

Table 3-1: Current and Projected Regional Baseline Urban Water Supply Sources (AF)

Baseline Supply Forecast						
Supply Type	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Imported Water	65,000	69,752	69,752	69,752	69,752	69,752
Chino Basin Groundwater	90,538	97,666	97,666	97,666	97,666	97,666
Other Groundwater	22,098	22,098	22,098	22,098	22,098	22,098
Surface Water	11,651	11,651	11,651	11,651	11,651	11,651
Recycled Water	16,050	24,936	28,957	28,957	28,957	28,957
Groundwater Replenishment Recycled Water	14,500	16,900	18,700	18,700	18,700	18,700
Chino Basin Desalter	15,000	17,733	17,733	17,733	17,733	17,733
Water Use Efficiency	1,975	9,788	11,984	17,257	22,570	27,802
Total	**236,812**	**270,524**	**278,541**	**283,814**	**289,127**	**294,359**
NOTES: From IEUA IRP's baseline supply forecast to 2040 (Appendix E) excluding recycled water for agriculture. Chino Basin Groundwater includes stormwater recharge beginning in 2020. 2015 and 2020 annual WUE from IEUA 2015 WUE Business Plan. 2025-2040 WUE projections based on 10 percent demand reduction by 2040 as per IRP Phase I Goal.						

Table 3-2 shows the projected supply by source for each of IEUA's retail agencies.

Table 3-2: IEUA Retail Agencies Projected Water Supply (AF)

Wholesale: Water Supplies — Projected					
Water Supply	Additional Detail on Water Supply	Projected Water Supply			
		2020	2025	2030	2035
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
City of Chino					
Imported Water	WFA	5,353	5,353	5,353	5,353
Groundwater	Chino Wells	10,251	11,656	13,061	14,466
Desalinated Water	CDA	5,000	5,000	5,000	5,000
Recycled Water	IEUA	8,107	7,864	7,621	7,379
City of Chino Hills					
Groundwater	Chino Hills Well	4,000	4,000	4,000	4,000
Desalinated Water	CDA	4,200	4,200	4,200	4,200
Recycled Water	IEUA	1,850	1,850	1,850	1,850
Imported Water	WFA	14,069	14,069	14,069	14,069
Imported Water	MVWD	8,577	8,577	8,577	8,577
Cucamonga Valley Water District					
Groundwater	Chino Basin	12,755	13,687	13,859	19,282
Groundwater	Cucamonga Basin	10,000	10,000	10,000	10,000
Surface Water	Cucamonga Canyon	1,000	1,000	1,000	1,000
Surface Water	Deer Canyon	140	140	140	140
Surface Water	Day/East Canyon	3,400	3,400	3,400	3,400
Imported Water	(Tier I)	28,369	28,369	28,369	28,369
Imported Water	(Tier II)	3,236	4,704	6,932	1,509
Recycled Water		1,600	1,800	2,000	2,000
Fontana Water Company					
Imported Water	IEUA	10,000	10,000	12,000	12,000
Imported Water	SBVMWD	2,000	2,000	2,000	2,000
Groundwater	Chino Basin	10,038	11,666	12,153	14,341
Groundwater	Rialto-Colton Basin	2,520	2,520	2,520	2,520
Groundwater	Lytle Basin	9,400	9,400	9,400	9,400
Groundwater	No Man's Land Basin	4,000	4,000	4,000	4,000
Surface water	Lytle Creek	5,700	5,700	5,700	5,700
Recycled Water		1,000	1,500	2,000	2,500

Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply			
		2020	2025	2030	2035
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Monte Vista Water District					
Groundwater	Chino Basin	30,260	30,260	30,260	30,260
Imported Water	WFA	21,776	21,776	21,776	21,776
Imported Water	SAWCO	800	800	800	800
Recycled Water	IEUA	1,350	1,350	1,350	1,350
City of Ontario					
Groundwater	Chino Basin	11,782	13,465	16,234	21,627
Imported Water	WFA	10,000	11,000	13,000	15,000
Desalinated Water	CDA	8,533	8,533	8,533	8,533
Purchased Water	SAWCO	765	765	765	765
Recycled Water	IEUA	8,289	9,947	12,434	15,545
City of Upland					
Groundwater	Chino Basin	7,327	7,327	7,327	7,327
Groundwater	Six Basins	4,975	4,975	4,975	4,975
Groundwater	Cucamonga Basin	5,103	5,103	5,103	5,103
Surface Water	SAWCO	1,780	1,780	1,780	1,780
Recycled Water	WFA	5,098	5,098	5,098	5,098
Imported Water		660	710	800	800
	Total	**285,063**	**295,344**	**309,439**	**323,794**
NOTES: Project supply numbers from 2015 UWMP for each individual retail agency. CVWD's projected Chino Basin Groundwater and Imported Tier II/Chino Basin Replenishment Water is subject to change pending Chino Basin "Safe Yield Reset."					

3.2 Chino Basin Groundwater

The Chino Basin is one of the largest groundwater basins in southern California containing approximately 5 million acre-feet (MAF) of water with an unused storage capacity of approximately 1 MAF for a total potential of 6 MAF.

Groundwater from the Chino Basin accounts for approximately 40 percent of the total water used in IEUA's service area. The Chino groundwater basin is managed by CBWM. IEUA and WFA do not provide groundwater directly to their retail agencies.

Approximately 5 percent of Chino Basin is located in Los Angeles County, 15 percent in Riverside County, and 80 percent in San Bernardino County. Chino Basin is bounded by Cucamonga Basin and the San Gabriel Mountains to the north, the Temescal Basin to the south, Chino Hills and Puente Hills to the southwest, San Jose Hills, Pomona, and Claremont basins on the northwest, and the Rialto/Colton Basins on the east. IEUA's service area overlies approximately 70 percent of Chino Basin.

San Bernardino County Superior Court created the CBWM in 1978 as a solution to lawsuits over historical water right allocations. CBWM is responsible for managing Chino Basin in accordance with the 2000 Peace Agreement, 2007 Peace II Agreement, and the OBMP. CBWM is governed by three stakeholder groups, called Pools. The three Pools consist of:

- **Overlying Agricultural Pool:** representing dairymen, farmers, and the State of California
- **Overlying Non-Agricultural Pool:** representing area industries
- **Appropriative Pool:** representing local cities, public water districts, and private water companies

Although groundwater is an important local supply, the water quality in the lower Chino Basin area has been impacted by historical agricultural uses and now has high levels of nitrates and TDS. There are also some areas that exceed standards for perchlorate and volatile organic compounds (VOC). This lower quality of water requires additional treatment, and/or blending with higher quality imported water before it can be used as a potable supply. CBWM works in partnership with municipalities, IEUA, and the Santa Ana Regional Water Quality Control Board to address these water quality problems and to manage the groundwater basin sustainably.

Chino Basin is hydrologically subdivided into five groundwater zones or systems, referred to as management zones. Each management zone has a unique hydrology, and actions within one zone have little or no impact on adjacent zones. Management zones are used to characterize the groundwater level, storage, production, and water quality conditions. Throughout these management zones, there are 19 existing spreading basins that have the capability of recharging stormwater, recycled water, and/or imported water into the Chino Basin. A description of each of the management zones is listed below.

- **Management Zone 1:** This zone is bounded on the southwest by Chino and Puente Hills, on the northwest by the San Jose fault that separates the Chino Basin from the Pomona and Claremont Heights Basins, on the north by an unnamed non-echelon fault system, and on the east by a line that stretches from the southernmost edge of the Red Hill fault to Prado Dam. Groundwater generally flows south with some localized flows to the west in response to groundwater production.
- **Management Zone 2:** This zone is bounded on the west by Management Zone 1, on the north by the Red Hill fault, on the northeast by a segment of the Rialto-Colton fault, and on the east by a segment of Barrier J. Groundwater generally flows in a southwesterly direction in the northern half of the zone and then due south in the southern half of the zone.
- **Management Zone 3:** This zone is bounded on the west by Management Zone 2, on the northeast by the Rialto Colton fault, and on the southeast by the Bloomington divide. Groundwater generally flows in a southwesterly direction.
- **Management Zone 4:** This zone is bounded on the west by Management Zone 3, on the north by the Jurupa Hills, on the southeast by the Pedley Hills, and on the south by Management Zone 5. Groundwater flows west.
- **Management Zone 5:** This zone is bounded on the north and west by Management Zones 3 and 4, on the east by the Riverside Narrows, and on the south by the La Sierra area and Temescal Basin

(Chino Basin Watermaster, Chino Basin Optimum Basin Management Program 2014 State of the Basin Report, June 2015).

A map of Chino Basin and its management zones is displayed on Figure 3-1.

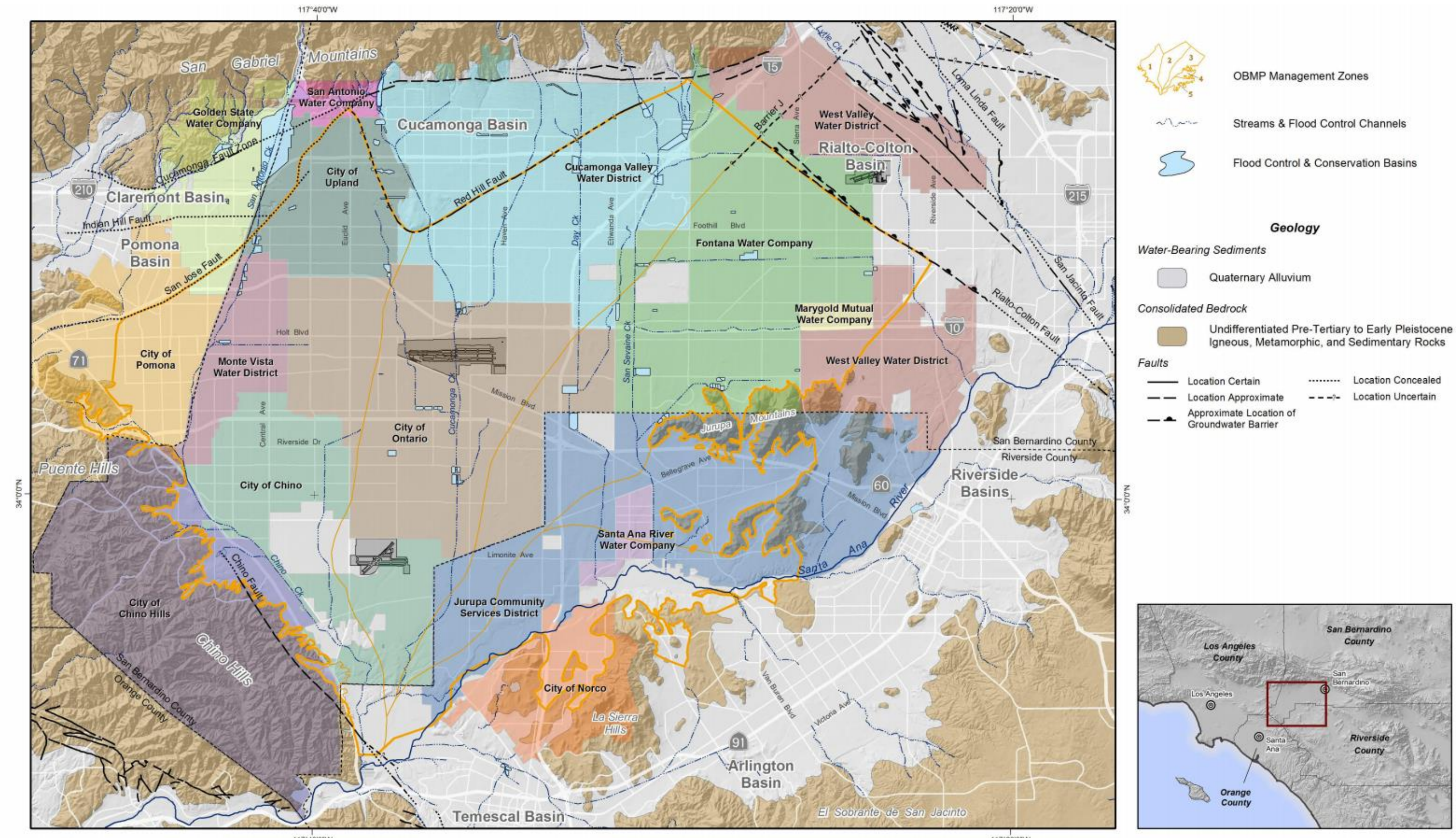

Figure 3-1: Chino Groundwater Basin

3.2.1 Baseline Supply

The court judgment allocates groundwater rights by establishing an annual pumping “safe yield” for each Pool. The Operating Safe Yield (OSY) is the annual amount of groundwater that can be pumped from the Chino Basin by the Pool parties free of replenishment obligations. For planning purposes, controlled overdraft for the Appropriative Pool was not included. Annual groundwater production in excess of the OSY is allowed by the adjudication, provided that the pumped water is replaced and recharged back into the groundwater basin.

The baseline amount for groundwater production between 2015 and 2020 is assumed to be 90,538 AFY, based on historical production. This amount of groundwater pumping includes recharge from natural rainfall and stormwater capture. It does not include recharge from recycled water.

The baseline amount for groundwater production between 2020 and 2040 is assumed to be 91,266 AFY, which is IEUA’s retail agencies share of the forecasted OSY for this period and increased stormwater recharge. This baseline amount does not include future stormwater recharge or recycled water for groundwater recharge.

3.3 Stormwater

Stormwater is water that originates during rainfall and snow melt. IEUA and WFA do not provide stormwater directly to their retail agencies.

In the IEUA region, stormwater comes primarily from surface water runoff from rain and snow originating in the San Gabriel Mountains and moving down through the Santa Ana watershed. In undeveloped areas, the soil absorbs much of the runoff and helps retain the water within the groundwater basin. However, developed areas with a significant amount of hardscape tend to concentrate and accumulate runoff in large quantities in a relatively short amount of time. Stormwater runs off roofs, through streets, and into regional storm drains, where these flows are largely diverted into the region’s flood control channels.

The Chino Basin has six major flood control channels spread throughout the region. These channels collect and manage the stormwater generated within the watershed. Major flood control channels that convey stormwater within IEUA’s service area include:

- San Sevaine Creek
- Day Creek
- Deer Creek
- Cucamonga Creek
- West Cucamonga Creek
- San Antonio Creek

Located adjacent to the channels are detention basins that are operated regionally under a multiple-use agreement for both flood control and groundwater recharge operations. IEUA, CBWM, and other agencies work closely with the San Bernardino Flood Control District to maximize the amount of stormwater that can be captured and recharged into the Chino Groundwater Basin. These channels also carry dry weather runoff from excessive outdoor irrigation. Stormwater percolates to groundwater and is not utilized directly as a supply type, but is counted in the volume of annual groundwater supply.

Runoff that is not captured by detention basins ultimately flows to the Santa Ana River. While there are efforts by agencies further downstream to capture these flows, large amounts of water discharge into the ocean during storm events.

3.4 Recycled Water

IEUA has produced and distributed high quality recycled water since 1972 when the Agency expanded its services to include regional wastewater treatment. While IEUA serves recycled water for both indirect use (outdoor irrigation, industrial processing) and groundwater recharge, WFA does not.

Currently, IEUA owns and operates five regional recycled water plants that produce disinfected and filtered tertiary treated recycled water in compliance with California's Title 22 regulations. These five water reclamation plants are: Regional Plant No. 1 (RP-1), Regional Plant No. 2 (RP-2), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF).

IEUA's five regional water reclamation plants produced approximately 60,200 AF of recycled water during FY 2014-15. Wastewater projections from the Wastewater Facilities Master Plan as documented in the IEUA IRP shows that the regional recycled water supply forecast is expected to increase to approximately 83,000 AFY by 2040. IEUA has a 17,000 AFY dedicated to discharge obligation of recycled water to the Santa Ana River as shown in Table 3-3.The remaining supply would be available for local use and groundwater recharge.

Table 3-3: Projected Regional Recycled Water Supply (AF)

Year	2015	2020	2030	2040
Recycled Water Supply	60,200	64,300	75,100	82,900
Note: From IEUA IRP Table 3-4 (2035 projection is not provided).				

More information about recycled water usage in IEUA's region can be found in Section 6.

3.5 Chino Basin Desalter

The Chino Basin Desalters provide a local source of potable water supply for the region through treatment of unusable groundwater. The Desalters also provide hydraulic control of the lower Chino

Groundwater Basin. These facilities are critical to the continued use of recycled water in the region as well as the improvement of groundwater quality and yield in the Chino Basin.

IEUA and WFA do not provide desalted water directly to their retail agencies. IEUA operates one of the facilities (Chino I Desalter) under contract to the CDA.

The CDA was formed to manage the production, treatment, and distribution of highly treated potable water to cities and water agencies throughout the Chino Basin. A Joint Exercise of Powers Agency, the CDA was formed by the Jurupa Community Services District; Santa Ana River Water Company; Western Municipal Water District; the Cities of Chino, Chino Hills, Norco, and Ontario; and IEUA to treat brackish groundwater extracted from the lower portion of the Chino Basin. Brackish water is water that has more salt (about 1000 ppm of TDS) than fresh water, but not as high as seawater (about 35,000 ppm of TDS).

The Chino I Desalter was constructed in 2000 through a Joint Participation Agreement among five agencies: SAWPA, Western Municipal Water District, Orange County Water District, MWD, and IEUA. The Chino II Desalter was constructed in 2007 and provides a supplemental supply to the Cities of Chino, Chino Hills, and Ontario located within IEUA's service area as well as to the Jurupa Community Services District, City of Norco and the Santa Ana River Water Company located outside of IEUA's service area. The treatment processes at the Chino I and Chino II Desalters include RO and Ion-Exchange for the removal of nitrate and TDS. The treatment processes at Chino I Desalter also includes air stripping for the removal of VOCs.

These facilities serve three purposes. First, they convert unusable groundwater into a reliable potable water supply for the region and are part of a long-term pollution cleanup strategy for the Chino Basin. Second, they provide hydraulic control over the lower Chino Basin, which prevents the migration of poor quality water into the Santa Ana River as well as downstream impacts on groundwater basins in Orange County. Third, they maintain and enhance groundwater yield for the Chino Basin.

Currently, the Chino I and Chino II Desalters produces approximately 25,000 AFY of treated groundwater combined, with plans to expand treat capacity to 35,200 AFY by 2017. IEUA retail member agencies who receive water from the Desalter facilities as part of their water supply portfolios include the cities of Chino, Chino Hills, and Ontario.

3.6 Local Surface Water

Several of the retail agencies within the northern part of IEUA's service area have long standing legal rights to divert and treat water supplies from local surface sources in the Santa Ana River watershed. These sources include San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek and several smaller surface streams.

IEUA and WFA do not provide local surface water directly to their retail agencies.

Production from surface supplies varies dramatically depending on climate conditions. However, when available, local surface water is an extremely valuable resource as it is essentially "free," with the only cost to retail agencies being the operation of necessary facilities to capture, treat and distribute this water. This is due in part to the high quality of local surface water. Nevertheless, surface water is treated to state and federal drinking water quality standards before it can be served for public use.

3.7 Non-Chino Groundwater

Local groundwater supplies from basins other than the Chino Basin represent a significant supplemental source of water for the retail water agencies within IEUA's service area. These basins include Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins. The Six Basins are comprised of the Ganesha, Live Oak, Pomona, Lower Claremont Heights, Upper Claremont heights, and Canyon Basin.

IEUA's retail agencies that use groundwater from all or some of these basins include the City of Upland, CVWD, FWC, and SAWCO. IEUA and WFA do not provide groundwater directly to their retail agencies.

3.8 Imported Water

IEUA was originally formed in 1950 to act as a municipal wholesale water district in order to provide regional municipalities with imported water purchased from MWD as a supplemental source of water. Tables 3-4 and 3-5 respectively show the current and projected amount of water supplies that IEUA will have available to supply to its retail agencies.

Table 3-4: IEUA Wholesale Imported Water Supplies - Actual (AF)

Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume	Water Quality	Total Right or Safe Yield
Purchased or Imported Water		58,906	Raw Water	
	Total	**58,906**		**0**
NOTES: Imported water from Actual FY 2014-15 IEUA Water Use Report/Database.				

Table 3-5: IEUA Wholesale Imported Water Supplies – Projected (AF)

Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply				
		2020	2025	2030	2035	2040
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Purchased or Imported Water		69,752	69,752	69,752	69,752	69,752
	Total	**69,752**	**69,752**	**69,752**	**69,752**	**69,752**
NOTES: IEUA IRP Baseline Supply Projection						

WFA treats and sells imported water wholesale to its five member retail agencies, which are a subset of IEUA. This treated imported water supply supplements the member agencies' local water supplies. Tables 3-6 and 3-7 respectively show the current and projected amount of raw water supplies that WFA will have available to supply to its member agencies, respectively.

Table 3-6: WFA Wholesale Water Supplies - Actual (AF)

Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
		Actual Volume	Water Quality	Total Right or Safe Yield
Purchased or Imported Water		27,606	Potable Water	
	Total	**27,606**		**0**
NOTES: FY 2014-15 IEUA sales to WFA				

Table 3-7: WFA Wholesale Water Supplies – Projected (AF)

Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply				
		2020	2025	2030	2035	2040
		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Purchased or Imported Water		32,783	32,783	32,783	32,783	32,783
	Total	**32,783**	**32,783**	**32,783**	**32,783**	**32,783**
NOTES: Assume 47 percent of IEUA's imported supply is for WFA for all future years (same proportion as in FY 2014-15 actual).						

MWD is a contractor for SWP water, which imports water from northern California; and also imports water from the Colorado River via MWD's CRA system. Hydrology and environmental regulations are major factors that play into the reliability of imported water supplies from MWD. This dependency can lead to high variability in the annual amount of water available to the southern California region. In 2013-2014, SWP was only able to supply 5 percent of its contract allocation in the midst of the current drought.

IEUA only receives and allocates SWP water from MWD. This is due to water quality concerns in the Chino Basin and regional board regulations that preclude the use of CRA water with its higher salinity levels. Imported water purchased from MWD is limited by a purchase order agreement that allows IEUA to purchase up to 93,283 AFY at its lowest (Tier 1) rate. Of this amount, IEUA's wholesales 69,752 AFY to WFA, CVWD, and FWC. As part of IEUA's purchase order agreement with MWD, the agreement includes an annual minimum purchase commitment of 39,835 AFY, which is consistent with the minimum operational needs of the following water treatment facilities.

There are four water treatment plants in the IEUA service area that treat imported water purchased from MWD. These facilities are:

- WFA's Agua de Lejos Treatment Plant (81 MGD capacity)
- FWC's Sandhill Surface Water Treatment Plant (29 MGD capacity)
- CVWD's Lloyd W. Michael Water Treatment Plant (60 MGD capacity)
- CVWD's Royer Nesbit Water Treatment Plant (11 MGD capacity)

Each of these three agencies is allocated an annual portion of IEUA's purchase order volume (shown below). The allocations do not confer a contractual right to MWD imported water but are used to determine the price paid for the water. Purchases in excess of the Tier 1 allocation are assessed by IEUA at MWD's higher Tier 2 rate.

- WFA - 31,384 AFY
- CVWD - 28,368 AFY
- FWC - 10,000 AFY
- IEUA/CBWM – 23,531 AFY

The amount available to IEUA and/or CBWM is used only for groundwater recharge.

3.8.1 Metropolitan Water District's 2015 UWMP

MWD's 2015 UWMP reports its water reliability and identifies projected supplies to meet long-term demand within its service area. MWD's 2015 UWMP indicates that MWD has supply capabilities that would be sufficient to meet expected demands from 2020 through 2040 under average condition (average of 1922 to 2012 hydrology), the single-dry year condition (1977 hydrology), and the multiple-dry year condition (1990 to 1992 hydrologies). MWD's supply capabilities are evaluated using the following assumptions:

- CRA supplies include supplies that would result from existing and committed programs and from implementation of the Quantification Settlement Agreement (QSA) and related agreements. The QSA facilitates the transfer of water from agricultural agencies to urban uses. Colorado River transactions are potentially available to supply additional water up to the CRA capacity of 1.2 MAF on an as-needed basis.
- SWP supplies are estimated based on DWR's 2015 SWP Delivery Capability Report (July 2015) which accounted for restrictions on SWP and Central Valley Project operations in accordance with the biological opinions of the U.S. Fish and Wildlife Service (December 15, 2008) and National Marine Fisheries Service (June 4, 2009). The delivery estimates for SWP for 2020 conditions are 51 percent of Table A amounts under long-term average condition and12 percent under single-dry year condition, equivalent to 976 thousand AF and 257 thousand AF for MWD, respectively.
- Storage is a major component of MWD's dry-year resource management strategy. MWD has developed a large regional storage portfolio that includes both dry-year and emergency storage capacity. Storage programs capture surplus water in normal and wet hydrologic conditions for use in dry years where augments water supplies are needed to meet demands.

MWD's 2015 UWMP documents MWD's comprehensive plans for stages of actions it would undertake to address up to a 50 percent reduction in its water supplies and a catastrophic interruption in water supplies. MWD's 2015 UWMP describes MWD's investments in water use efficiency measures to help the region achieve the 20 percent urban water use reduction by 2020 (MWD, 2015 UWMP, June 2016).

3.8.2 IEUA Imported Water Rates

As MWD has adjusted their rates over time, IEUA has done the same. The IEUA's Board of Directors most recently established rates for the delivery of imported water supplies on May 20, 2015. Effective

January 1, 2016, IEUA's rates listed in Table 3-8 for the 2016 calendar year (IEUA, Resolution NO. 2015-5-10, May 2015).

Table 3-8: IEUA Rates Adopted for 2016 Calendar Year

Rate Type	Amount
Tier 1 Full Service Untreated	$ 609 per AF
Tier 2 Full Service Untreated	$ 743 per AF
WSAP Penalty	2 X Tier 1 (100%-115%) 4 X Tier 2 (115% or greater) Imposed by MWD
Capacity Charge	$ 10,900 per cfs

3.9 Supply Reliability

The available supplies to meet projected water demands for IEUA's service area were analyzed to assess the region's ability to satisfy demands during three scenarios: a normal water year, single-dry year, and multiple-dry years. This section presents the supply-demand balance for the various drought scenarios for the 25-year planning period 2015 to 2040. It is expected that the region will be able to meet 100 percent of its dry year demand under each scenario as shown in Tables 3-9, 3-10, and 3-11.

3.9.1 Supply Challenges

Supply reliability can be impacted by water quality and climate change. Some sources are more vulnerable to seasonal or climatic shortage than others. The supply challenges for each of the region's water sources are discussed in this section.

3.9.1.1 Chino Basin Groundwater

Chino Basin groundwater is impacted by climate change given that supplies are dependent on rainfall and supplemental sources for recharge as well as the ability of soil to absorb water during period of rainfall. Warmer temperatures and drought increase the dryness of soil, resulting in less absorption and an increase of water runoff instead of percolation through the soil. However, Chino Basin groundwater supplies are not impacted by climate once the water is stored in the groundwater basin (IEUA, Integrated Water Resources Plan, 2016).

The OBMP characterizes constituents of potential concern (COPC) in the Chino Basin. CBWM routinely collects groundwater quality data from well owners and determines any exceedances of Primary or

Secondary, federal or state, Maximum Contaminant Levels (MCL), or State Notification Levels (NL). COPCs in the Chino Basin include:

- Constituents associated with salt and nutrient management. These constituents are primarily TDS and nitrate.
- Constituents that exceeded their primary MCL in twenty or more wells from the time period of July 2009 to June 2014. These constituents include nitrate, perchlorate, total chromium, hexavalent chromium, arsenic, trichloroethene, tetrachloroethene, *cis*-1,2-dichloroethene, 1,1-dichloroethene, and 1,1-dichloroethane.
- Constituents where the California DDW is in current development of an MCL that may impact future beneficial use of groundwater such as 1,2,3-trichloropropane.

3.9.1.2 Stormwater

Stormwater is affected by temperature due to soils drying out through evaporation of moisture caused by warmer temperatures. This results in increased water runoff as water is unable to penetrate into dry soil. However, once water is in the soil column, the ground retains this moisture until the soil is saturated which helps to replenish groundwater supplies.

Other challenges that stormwater supplies face include:

- Dependence on annual rainfall and snow melt.
- Reductions in natural infiltration into the groundwater basin due to channelization, new development, hardscape, increased outdoor water efficiency, and open space conversion.
- Construction of additional stormwater recharge facilities in a highly urbanized area where land may not be available or not available in the right places to capture and recharge significant volumes of water.
- Compliance with Municipal Separate Storm Sewer System Permit LID stormwater retention/recharge requirements for new and existing development and quantification of corresponding water supply benefits.

3.9.1.3 Recycled Water

Recycled water holds the greatest potential as a source of reliable supply in the Chino Basin and in the southern California region as a whole. Recycled water is the most climate resilient water supply available to the region as wastewater flows were shown not to be impacted by climate under climate simulations according to the 2015 IEUA IRP as all supplies are generated are from indoor water use. However, the amount of wastewater available in the future may change from trends towards more efficient indoor water use.

Other supply challenges recycled water faces include increasingly strict regulatory and environmental issues for construction and operation of recycled water systems and the high amount of energy consumption required in recycled water treatment. Recycled water requires the highest level of treatment to meet Title 22 water recycling requirements. All IEUA water recycling treatment plants produce recycled water suitable for full body contact recreation and generally meet the more stringent aquatic habitat criteria (IEUA, Integrated Resources Plan, 2016).

3.9.1.4 Chino Basin Desalter

Water supply from the Chino Basin Desalter facilities is not affected by climate change as the quantity of water produced is dependent upon the capacity of the desalter facility and is not supply limited. Supply challenges that face the Chino Basin Desalters include:

- The outstanding obligation for groundwater replenishment obligation to the Chino Basin of 152,900 AF through the duration of the Peace Agreement.
- High energy needs and costs of the expanded treatment of brackish water and brine disposal.

3.9.1.5 Surface Water

Surface water supplies are highly impacted by climate due to their dependence on precipitation and snow melt. Temperature is also a factor in the reliability of surface water supplies. Higher temperatures result in increased evaporation of soil moisture, reducing the soil's ability to absorb and hold water during rainfall. Therefore, surface water supplies are highly variable from a yearly basis.

Surface water from local sources that originate in the San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek and several other smaller surface streams is generally of high quality, as these creeks are fed by snowmelt and other precipitation in the San Gabriel Mountains. Surface water sources are treated prior to introduction to the potable water supply in order to insure bacteriological quality and compliance with state and federal drinking water quality standards.

3.9.1.6 Other Groundwater

Climate effects on non-Chino Basin groundwater is expected to be similar to those identified for the Chino Basin. Supply challenges that non-Chino Basin groundwater faces are also similar to those for the Chino Basin which includes reduced natural infiltration, safe yield operating constraints, and water quality issues (IEUA, Integrated Water Resources Plan, 2016).

3.9.1.7 Imported Water

Changing climate patterns are expected to shift precipitation patterns and affect water supply. Unpredictable weather patterns will make water supply planning more challenging. The areas of concern for California include a reduction in Sierra Nevada Mountain snowpack, increased intensity and frequency of extreme weather events, and rising sea levels causing increased risk of Delta levee failure, seawater intrusion of coastal groundwater basins, and potential cutbacks on SWP. The major impact in California is that without additional surface storage, the earlier and heavier runoff (rather than snowpack retaining water in storage in the mountains), will result in more water being lost to the oceans. A heavy emphases on storage is needed in the State of California.

MWD is responsible for providing high quality potable water throughout its service area. Over 300,000 water quality tests are performed per year on MWD's water to test for regulated contaminants and additional contaminants of concern to ensure the safety of its waters.

The key water quality issues for SWP waters are disinfection byproduct precursors, in particular, total organic carbon and bromide. Disinfection byproducts result from total organic carbon and bromide in the source water reacting with disinfectants at the water treatment plant. MWD has resolved these treatment restrictions by using ozone disinfection at its treatment plants. All of MWD's treatment plants currently have ozone treatment facilities.

Arsenic is also of concern in some groundwater storage/transfer programs that MWD participates in. Groundwater inflows into the California Aqueduct are managed to comply with water quality regulations and protect downstream water quality while meeting supply targets. Additionally, nutrient levels in SWP system are relatively high, leading to the potential for algal related taste and odor issues that can affect water management strategies. MWD is engaged in efforts to protect the quality of SWP water from potential increases in nutrient loading from wastewater treatment plants (MWD, 2015 UWMP, June 2016).

3.9.2 Regional Water Supply Reliability Assessment

This section looks at the reliability of all urban water supplies within the IEUA service area. The total demand in the region is met through local groundwater, local surface water, recycled water, and supplemental imported water. This supply reliability assessment examines the reliability of urban water supplies served by IEUA (recycled water and imported water) as well as supplies served by other agencies within the IEUA's service area (groundwater and surface water). It does not include recycled water for agricultural uses. The analysis in this section examines the water supply reliability of IEUA's service area for normal (2010 hydrology), single-dry (2013 hydrology) and multiple-dry scenarios (2014 to 2015 hydrologies) for the UWMP. The region is projected to be able to meet all demands between 2015 and 2040 under all the UWMP dry year scenarios through the diverse local supply sources supplemented with imported water from MWD which projects 100 percent reliability (MWD, 2015 UWMP, June 2016).

3.9.2.1 Regional Normal Year Reliability

During periods of normal (average) levels of rainfall, total regional demand is not projected to deviate from the regional demand projected by the land use based model described in Section 2. A comparison between the urban supply and demand for projected years between 2015 and 2040 is shown in Table 3-9 recycled water for agriculture is not included in this assessment. The projected available urban supply will meet projected urban demand due to diversified supply and conservation measures. Based on IEUA IRP baseline supply projections, there are sufficient supplies to meet normal year demands and single dry year demands (Table 3-10). However, a multiple dry year scenario a local supply gap of 283 AF is projected for 2040 (Table 3-11). This supply gap presents an opportunity for the region to develop supplemental supplies. IEUA and retail agencies plan to close the supply gap through utilizing local supplemental supply opportunities and securing additional imported water as needed to accommodate for the variability in supply from SWP. IEUA and retail agencies are in the process of developing local supply strategies to meet the demand in 2040 as part of IEUA's IRP Phase 2. IEUA's IRP Phase 2 will include the disaggregation of the regional demand and supply to the local retail level and provide detailed project level analysis.

Table 3-9: Regional Normal Year Supply and Demand Comparison (AF)

IEUA's Service Area : Normal Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040
Regional baseline supply totals	236,812	270,524	278,541	283,814	289,127	294,359
Supplemental Supply Opportunities	-	-	-	-	0	283
Demand totals	199,702	210,588	225,923	242,732	254,721	278,017
Difference	**37,110**	**59,936**	**52,618**	**41,082**	**34,406**	**16,622**
NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc. not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Supply numbers from IEUA IRP's baseline supplies plus supplemental supply opportunities (excluding recycled water for agriculture). Demand numbers also excludes recycled water for agriculture. Demand numbers from land use based model projection excluding demand for recycled water for agriculture.						

3.9.2.2 Regional Single-Dry Year Reliability

A single-dry year is defined as a single year of no to minimal rainfall within a period that average precipitation is expected to occur. The IEUA IRP considers 2013 to represent the single dry year hydrologic conditions and forecasts a regional demand increase of 3.74 percent by 2040 for a single-dry year due to above normal temperature and reduced wet periods (IEUA IRP Appendix E). Demand increase for prior years are interpolated (0.62 percent in 2015 to 3.74 percent in 2040). A comparison between the supply and the demand in a single dry year is shown in Table 3-10. Based on IEUA IRP baseline supply projections, there are sufficient supplies to meet single dry year demands. However, a multiple-dry year scenario a local supply gap of 283 AF is projected for 2040 (Table 3-11). This supply gap in supply presents an opportunity for the region to develop supplemental supplies. IEUA and retail agencies plan to close these gaps through utilizing local supplemental supply opportunities and securing additional imported water as needed to accommodate for the variability in supply from SWP system. IEUA and retail agencies are also in the process of developing local supply strategies to meet the demand in 2040 as part of IEUA IRP Phase 2. IEUA IRP Phase 2 will include the disaggregation of the regional demand and supply to the local retail level and provide detailed project level analysis.

Table 3-10: Regional Single Dry Year Supply and Demand Comparison (AF)

IEUA's Service Area: Single Dry Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040
Regional baseline supply totals	236,812	270,524	278,541	283,814	289,127	294,359
Supplemental Supply Opportunities	-	-	-	-	-	283
Demand totals	200,947	213,213	230,148	248,784	262,660	288,415
Difference	**35,865**	**57,311**	**48,393**	**35,030**	**26,467**	**6,228**
NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc., not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Single dry year demands are normal year demand increased by 3.74 percent in 2040, prior year demands are interpolated. Supply numbers are IEUA IRP baseline numbers plus supplemental supply opportunities in 2035 and 2040.						

3.9.2.3 Regional Multiple-Dry Year Reliability

Multiple-dry years are defined as three or more years with minimal rainfall within a period of average precipitation. The IEUA IRP forecasts a regional demand increase of 5.98 percent by 2040 for a multiple-dry year due to extended periods of above normal temperature and reduced wet periods (IEUA IRP Appendix E). The analysis in Table 3-11 shows that the region is capable of meeting all demands in multiple-dry year scenarios with an average demand increase of 5.98 percent by 2040 through diversified supplies, conservation measures, and purchases of supplemental imported water. Based on IEUA IRP baseline supply projections, a local supply gap of 283 AF is projected for 2040. However, the gap will be closed through utilizing local supplemental supply opportunities and securing additional imported water as needed to accommodate for the variability in supply from SWP system. In addition to MWD's ability to supply supplemental imported water, through the IRP, IEUA includes an evaluation of strategies that increase investments in local resources supplies, storage, and demand management to offset any potential shortfalls due to climate change through 2040. Detailed analysis of specific projects and corresponding water supply benefits are scheduled to occur through 2017 to develop a regional supply buffer for the IEUA service area. IEUA and its retail member agencies will revise this water supply forecast after completion of the next phase of the IRP scheduled for completion by 2017.

Table 3-11: Regional Multiple Dry Years Supply and Demand Comparison (AF)

IEUA's Service Area: Multiple Dry Years Supply and Demand Comparison							
		2015	2020	2025	2030	2035	2040
First year	Supply totals	236,812	270,524	278,541	283,814	289,127	294,359
	Supplemental Supply Opportunities	-	-	-	-	-	283
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	**35,119**	**55,738**	**45,863**	**31,405**	**21,712**	**0**
Second year	Supply totals	236,812	270,524	278,541	283,814	289,127	294,359
	Supplemental Supply Opportunities	-	-	-	-	-	283
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	**35,119**	**55,738**	**45,863**	**31,405**	**21,712**	**0**
Third year	Supply totals	236,812	270,524	278,541	283,814	289,127	294,359
	Supplemental Supply Opportunities	-	-	-	-	-	283
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	**35,119**	**55,738**	**45,863**	**31,405**	**21,712**	**0**
NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc. not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Multiple dry year demands are normal year demand increased by 5.98 percent in 2040, prior year demands are interpolated. Supply numbers are IEUA IRP baseline numbers plus local supplemental supply opportunities to close any supply gaps in 2035 and 2040.							

3.9.3 WFA Water Supply Reliability Assessment

This section focuses on the reliability of imported water supply that WFA purchases from IEUA. IEUA is projecting a 100 percent reliability of its imported water supply based on MWD's 2015 UWMP findings that its imported supply will be able to meet 100 percent of its 26 member agencies in normal year, single-dry year, and multiple-dry year scenarios through 2040. Therefore, it is implied that WFA's imported water supply is also 100 percent reliable in all three hydrologic scenarios. Since WFA's supply comes from IEUA, the demand and supply numbers presented in this section is a subset of those shown in Section 3.9.3.

3.9.3.1 WFA Normal Year Reliability

WFA has entitlements to receive imported water from MWD through a connection from MWD. Although pipeline and connection capacity rights do not guarantee the availability of water, they do guarantee the ability to convey water when it is available in the MWD distribution system. All imported water supplies are assumed available to WFA from existing water transmission facilities.

WFA's imported water demand is assumed to be a constant 47 percent of IEUA demand through 2040 based on the 2015 data. Table 3-12 shows the supply/demand balance for WFA in a normal year scenario.

Table 3-12: WFA Normal Year Imported Water Supply and Demand Comparison (AF)

WFA Wholesale: Normal Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040
Supply totals	27,606	32,783	32,783	32,783	32,783	32,783
Demand totals	27,606	32,783	32,783	32,783	32,783	32,783
Difference	**0**	**0**	**0**	**0**	**0**	**0**
NOTES: In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years.						

3.9.3.2 WFA Single-Dry Year Reliability

A demand increase of 3.74 percent by 2040 is forecasted for a single-dry year scenario (IEUA IRP Appendix E). A comparison between supply and demand in a single-dry year scenario is shown in Table 3-13.

Table 3-13: WFA Single Dry Year Imported Water Supply and Demand Comparison (AF)

WFA Wholesale: Single Dry Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040
Supply totals	27,778	33,192	33,396	33,601	33,805	34,010
Demand totals	27,778	33,192	33,396	33,601	33,805	34,010
Difference	**0**	**0**	**0**	**0**	**0**	**0**
NOTES: In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years. Increase of 3.74 percent by 2040, interpolate for prior years.						

3.9.3.3 WFA Multiple-Dry Year Reliability

Based on MWD and IEUA's 100 percent reliability projection, WFA projects it will be capable of meeting all customers' demands potable water in multiple-dry years with an average demand increase of 5.98 percent by 2040 as shown in Table 3-14.

Table 3-14: WFA Multiple Dry Year Imported Water Supply and Demand Comparison (AF)

WFA Wholesale: Multiple Dry Years Supply and Demand Comparison							
		2015	2020	2025	2030	2035	2040
First year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	**0**	**0**	**0**	**0**	**0**	**0**
Second year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	**0**	**0**	**0**	**0**	**0**	**0**
Third year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	**0**	**0**	**0**	**0**	**0**	**0**
NOTES: In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years. Increase of 5.98 percent by 2040, interpolate for prior years.							

4 WATER USE EFFICIENCY PROGRAM

4.1 Overview

Over the last five years, the State of California, specifically the southern California region, has reached a critical point in water supply reliability with the convergence of several key factors that include unseasonably low rainfall, critically dry conditions, drought, economic recession, and significant population increases. As a result of these conditions, water use efficiency has become a statewide priority, and most State and local leaders recognize it as a vital component in meeting current and future water supply needs and reliability.

IEUA and retail member agencies have recognized the need for developing programs that protect existing water resources so that adequate water supplies will be available for sustainability and future growth. The development of reliable local resources has been critical to maintaining current and future water supplies. The need for regional water supply diversification and an increase in local water resources is the primary force ensuring the reliability of IEUA, WFA, and their retail agencies' water sources.

As the regional wholesale supplier of imported water for the area, IEUA has assumed the role of coordinating the region's activities and programs to reduce demand. IEUA has worked closely with IEUA's retail agencies (five of which are WFA's retail members) to facilitate the installation of thousands of water saving technologies and devices as well as the implementation of public outreach and education programs throughout the region. IEUA retail agencies, whose direct contact with retail customers is crucial to the implementation of water use efficiency measures, have co-funded these efforts with IEUA and taken a proactive approach in educating and working with their customers to conserve water.

In light of these circumstances, IEUA and their retail agencies' commitment to conservation has increased over the past 15 years as demonstrated through financial investments, policies, authorization of a broad range of water use efficiency (WUE) and conservation programs, expansion of the regional recycled water program, support for legislation, and local ordinance implementation.

IEUA provides wholesale supplier assistance programs to all retail water agencies in the region inclusive of WFA's retail agencies.

Despite this considerable progress, the future still presents uncertainties and significant challenges in maintaining regional water supply reliability. The continued development of new and expanded local resources is vital to sustaining current and future water sources.

IEUA through its retail agencies, currently serve a population of approximately 856,168 residents with an anticipated growth rate of approximately 30 percent over the next 25 years. Conservation and the efficient use of water is the most cost-effective source of water supply and essential to meeting our regions demand, today and for years to come.

4.2 Commitment to Conservation

WUE programs are a significant part of IEUA's Water Resources Program and, in light of that, IEUA recognized early on that WUE would play a fundamental role in sustaining and meeting future water supply needs.

In September 1991, IEUA became one of the first water agencies to sign the California Urban Water Conservation Council (CUWCC)'s Memorandum of Understanding Regarding Urban Water Conservation (MOU), accepting and supporting to implement a prescribed set of urban water conservation BMPs. As one of the original signatories to the MOU in 1991, IEUA's highest conservation priority has been to ensure that good-faith efforts are made on behalf of the retail agencies in implementing BMPs, locally.

Over the last 25 years, IEUA has been and will continue to be committed to developing and implementing many core regional conservation programs that have been designed on the foundation of BMPs, and these programs continue to serve as a key component in the overall regional water resource management portfolio.

Moving forward, IEUA will continue to implement active and code-based BMP related activities using strategies identified in the 2015 Regional Water Use Efficiency Business Plan (Regional WUE Business Plan). IEUA's 2015 WUE Business Plan focuses not on water conservation with its short-term focus on current emergency conditions but instead on approaches that will provide prolonged savings to achieve WUE, a sustained reduction in water use, by creating a new resource value for water in the eyes of the end user. The Regional WUE Business Plan proposes a strategy to seek out inefficient water use customers, educating them about WUE goal attainment, and providing a "road map" to accomplish this. IEUA and its eight retail member agencies, of which five members are inclusive of the WFA, have agreed to implement parallel programs that have complementary approaches. The strategies identified seek to leverage assets through regional funding opportunities, inter-agency partnerships, and grants in order to provide a greater return on the region's investment in WUE and conservation and maintain financially sustainable conservation programs.

4.2.1 Core Water Use Efficiency Strategies for the IEUA Region

Regional Goals

- Achieve and maintain compliance with other water use efficiency laws and regulations
- Achieve a reduction in per-capita water use by 20 percent by 2020, as called for by SB X7-7
- Guide regional water use efficiency programs
- Relieve drought and environmental impacts on regional water supply
- Increase water use efficiency, eliminate waste, and improve water supply reliability

- Contribute to other regional water resource management goals through the identification and integration of common interests such as groundwater recharge and recycled water.

Regional Principles

There are five key elements to the WUE strategy within the IEUA region:

- **Promote Water Resource Management**. Manage effective WUE programs at a regional level using sound business decision-making practices to develop and implement strategies to meet water use efficiency targets and stretch limited water resources.
- **Develop and Implement Regional Programs.** Take advantage of economies of scale and stretch the limited regional WUE budget by implementing programs on a regional basis. It is recognized that some programs may only be implemented at the individual agency level, such as budget-based tiered rate structures and WUE ordinances.
- **Build IEUA Retail Agency Cooperation.** Foster the cooperation, collaboration, and active participation of all IEUA retail agencies for the successful development and implementation of WUE programs. It is recognized that successful development and implementation of regional WUE programs requires retail agency cooperation in obtaining accurate water demand data, by customer class, in a timely manner, and promotion of cost-effective programs to customers.
- **Develop Incentive-Based Programs.** Develop effective incentive programs that encourage participation, provide public benefit, and achieve quantifiable water savings.
- **Public Recognition**. Provide recognition to customers who have implemented measures resulting in extraordinary water use efficiency achievements.

4.3 Legislative and Regulatory Requirements

As can be expected in a state with ongoing water resource issues, California's governing entities have issued a number of regulatory requirements and policies over the past decade.

Some of the regulations and policies have successfully driven down California's per capita water usage and increased the manufacturing standards for a number of major water consuming products utilized across all markets. Other regulations are aimed at achieving a higher level of water conservation during times of severe drought through temporary water use cutbacks and associated reporting.

Table 4-1 below is a summary of the current state regulations and information about the designated implementer for each regulation.

Table 4-1: WUE Legislative and Regulatory Requirements

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
Assembly Bill 1420	Mandatory BMP Compliance.	Implemented by Agencies & IEUA	Lines up with actions taken to meet CUWCC BMP compliance – sunsets July 1, 2016
20x2020 **(SB X7-7)**	Reduce per capita water use by 10% by 2015. AND Reduce per capita water use by 20% by 2020.	Implemented by the Regional Alliance	By implementing active water use efficiency programs and policy Initiatives the Regional Alliance are projected to be on track to meet per capita water reduction goals.
Governor's Executive Order and Emergency Regulation	Mandatory statewide reduction of 25% of residential per capita water use. Each agency assigned local target of 4 – 36%.	Implemented by retail each Agency	Implement active WUE programs, enforce mandatory watering days and eliminate water waste. All agencies are at, or near, compliance.
AB1881 - Model Water Efficiency Landscape Ordinance (MWELO)	ETo Allowances Residential 0.55 Commercial 0.45	Implemented locally by city and/or county	Agencies need to educate customers and developers about ordinance requirements
Assembly Bill 715	Requires any toilet or urinal sold or installed in California cannot have a flush rating exceeding 1.28 and 0.125 respectively	Manufacturers, distributors, retailers, plumbers and customers must all adhere to new standards	Supply chain removes non-conforming fixtures from marketplace and supplies only efficient and conforming fixtures
Senate Bill 407	Requires existing buildings comply with 1992 standards	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting
CalGreen	20% reduction of water use prescriptively designated Irrigation controllers shall be weather- or soil moisture-based	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting
Senate Bill 555	Requires water agencies to submit annual water loss reports	Implemented by Agencies	Agencies compile data and submit report to DWR

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
Assembly Bill 1	City or county cannot fine customers for failure to water	Local agencies to follow requirements of the bill	Agencies need to communicate requirements with cities and counties
Assembly Bill 349	HOAs cannot prohibit installation of artificial turf and allows for turf removal and installation of low water use plants	Local agencies to follow requirements of the bill	Agencies need to work with HOA's and community groups to educate about the bill

4.4 SB X7-7 Requirements

IEUA, as an urban wholesale water supplier, is not required to develop a baseline or set reduction targets to achieve a 20 percent reduction in GPCD by 2020 as written under SB X7-7. However, as the statute does require urban retail water suppliers to comply, IEUA takes the position of preparing a regional approach establishing a baseline and setting targets based on regional demands and in support of its seven retail agencies that must comply. All retail agencies within IEUA's service area have agreed to the formation of a regional alliance, and will continue to cooperatively participate in developing WUE programs and meeting water conservation goals.

As a wholesale water supplier, IEUA is required to provide an assessment of its present and proposed future WUE measures, programs, and policies that will help its retail water suppliers achieve their water reduction goals.

IEUA and its retail members have developed core strategies to meet compliance requirements through a collaborative process that focuses on aligning activities with established regional water use efficiency principles and goals.

4.4.1 Historical Demand, Selected Baseline, and 20x2020 Targets

In the 2010 UWMP, the baseline and water use targets for the IEUA regional alliance were calculated using an aggregate of individual agency water use and population information to calculate one baseline GPCD for the whole IEUA region. To do this, IEUA analyzed historical retail demand data from 1995 to 2010 and selected a 10-year baseline period (1999 to 2008). The aggregate of individual agency water use and population information for the same period were used to calculate the regional alliance's baseline GPCD and water use targets for 2015 and 2020. The targets set in the 20x2020 Water Conservation Plan do not include recycled water use. Thus, recycled water use was subtracted from historical recycled water production to get retail demands for non-recycled supplies. Using historical population over the same time period, the following formula was applied to calculate GPCD. The 2015 interim target and the 2020 target was a 10 and 20 percent reduction from the baseline GPCD, respectively.

Non-Recycled Demand (AF) x 325,851 gallons / population / 365 days

The GPCD baselines and targets found using the regional aggregate approach are summarized in Table 4-2.

Table 4-2: **IEUA Regional Alliance GPCD Baseline and Targets (2010 Aggregate Approach)**

Regulatory Statute	Baseline	2015 Target (10% Reduction)	2015 Actual	2020 Target (20% Reduction)
GPCD	251	226	160	201
Note: Baseline GPCD was based upon average annual water sales years 1999 to 2008.				

In 2015, an alternative approach to calculating the regional water use targets was carried out to compare findings. For this method, each water supplier in the regional alliance first calculates its individual target in its retail UWMP as if it were complying individually. Then, the individual targets are weighted by each supplier's population and averaged over all members in the alliance to determine the regional water use target. The GPCD baselines and targets found using the population weighted average approach are summarized in Table 4-3 and shown individually in Table 4-4. In 2015, each retail water supplier revised their baseline per capita water use calculations which resulted in an updated per capita water use targets.

The 2015 population for the sum of IEUA's retail member agencies within the regional alliance is 866,027 which includes IEUA's total service area as well as boundaries outside of the service area. Most of IEUA's member agencies used the Department of Finance population data. However, one agency used the persons-per-connection method, one used the DWR population tool, and one used the "other" method. The sum of the member agencies 2015 population estimate yields a regional population of 866,027. This is the 2015 population number used to determine the regional alliance's 2015 gallons per capita per day (GPCD).

Table 4-3: **IEUA Regional Alliance Summary of Baseline Period, Baselines, and Target GPCDs**

Baselines and Targets Summary *Regional Alliance Only*					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target GPCD	Confirmed 2020 Target GPCD
10-15 year	1995 – 1999	2004 – 2008	243	218	194
5 Year	2003 – 2005	2007 - 2009	227		
NOTES: Baselines and targets were determined by calculating the weighted average for each category, taken from the verification forms for each retail agency within the Regional Alliance.					

Table 4-4: **Regional Alliance Compliance by Retail Agency**

Agency	2015 Service Area Population	Baseline GPCD (5 Yrs)	Baseline GPCD (10-15 Yrs)	2015 Target GPCD	2015 Actual GPCD	2020 Target GPCD	Selected Compliance Method (1 or 3)
Chino	73,683	238	237	213	157	189	1
Chino Hills	77,596	202	217	195	162	173	1
CVWD	200,466	284	291	262	180	233	1
Fontana	215,520	204	216	194	138	173	1
MVWD	54,198	193	205	184	99	164	1
Ontario	168,777	189	235	207	152	188	1
Upland	75,787	262	271	244	233	217	1
IEUA region	**866,027**	**227**	**243**	**218**	**160**	**194**	

4.4.2 2015 Compliance

In this 2015 Regional UWMP, the region must demonstrate compliance with its 2015 water use interim compliance target indicating whether or not the Regional Alliance is on track to meet the 2020 water use target. Table 4-5 provides the regional urban water use targets for the IEUA region as well as the actual 2015 GPCD. The actual 2015 water use in the region is 160 GPCD, approximately 27 percent lower than the 2015 target of 218 GPCD which is indicative of the collective efforts of IEUA and retail agencies to reduce water use in the region.

Table 4-5: IEUA Regional Alliance's 2015 Compliance

2015 Compliance *Regional Alliance Only*								
Actual 2015 GPCD	2015 Interim Target GPCD	**Optional Adjustments to 2015 GPCD** *From Methodology 8*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
		Extraordinary Events	Economic Adjustment	Weather Normalization	TOTAL Adjustments	Adjusted 2015 GPCD		
160	218	-	-	-	0	160	160	Yes
NOTES: Actual 2015 GPCD and 2015 target was determined by calculating the weighted average for each category, taken from the verification forms for each retail agency within the Retail Alliance.								

IEUA's service area exceeds the 2015 reduction goal and also expects to exceed the SB X7-7 goal for the 2020 target. This will be accomplished through regional and local actions using:

1. **Water Use Efficiency (WUE) Active Programs** – offering customers a portfolio of programs including cost-effective indoor and outdoor water efficiency measures.
2. **WUE Passive Policy Initiatives –** including building codes and landscape ordinances.
3. **Recycled Water Use** – reducing demand for potable water by increasing recycled water supply.

Table 4-6 shows the anticipated GPCD reduction from the WUE activities and recycled water supply in 2015 and 2020 as modeled in IEUA's 2015 Water Use Efficiency Business Plan Update:

Table 4-6: Impact of WUE Activities and Recycled Water Supply

	2015 GPCD	2020 GPCD
Projected GPCD reduction from WUE Active and Passive Activities	3	6 – 11*
Projected GPCD reduction from Recycled Water Supply	21	35
TOTAL Projected GPCD Reduction	24	41 – 46*
10 Year Baseline GPCD	243	
Regional GPCD Target	218	194
Regional GPCD Projected Achievement**	160	169 – 174*

*Range represents GPCD reduction with and without Budget-based Water Rate implementation.
** 2015 GPCD numbers are reported actuals

4.5 Projected Water Savings

Table 4-7 depicts the projected annual water savings from active WUE activities projected for the five-year implementation period FY2015-16 to FY2019-20. However, as presented in Chapter 3, Table 3-1 (Current and Projected Regional Baseline Urban Water Supply Sources), savings from WUE programs are recognized as a water supply source and projected to offset water demands from 9,788 AF in 2020 to 27,802 AF in 2040. This is equivalent to a 10 percent reduction in 2040 demand from Table 2-3 as recommended through IEUA's IRP Phase I.

Table 4-7: Projected Annual Water Savings

Projected Annual Water Savings	
Fiscal Year	Annual Water Savings (AF)
2015/16	1,975
2016/17	3,083
2017/18	9,206
2018/19	9,502
2019/20	9,788

4.5.1 Water Savings by Sector

Table 4-8 below depicts the water savings by sector. 84 percent of the projected savings will be realized from the single family sector predominately through landscape measures. Savings from the programs targeted residential landscape and dedicated irrigation customers together represent nearly 99 percent of the total savings projected for FY2015-16 to FY2019-20 within IEUA's service area.

Table 4-8: Water Savings by Sector

Sector	Lifetime Water Savings (AF)	Percent of Total Water Savings
Single Family	124,389	84%
Multi-family	103	0.07%
Commercial	835	0.55%
Irrigation	22,717	14.8%
Total	**148,044**	

4.5.2 Passive versus Active Savings Assumptions

Some of the most significant and cost-effective water savings in California have come from state or national updates to plumbing and building codes. These changes are referred to as "passive" savings, simply because they require no active program efforts for local water agencies. The Alliance for Water Efficiency's (AWE) Tracking Tool calculates the passive savings from activities including:

- Residential and commercial HETs
- Single family and multi-family high efficiency clothes washers (HECW)

Table 4-9 shows the estimated passive and active water savings to be achieved through the five-year plan outlined in the 2015 Water Use Efficiency Business Plan.

Table 4-9: Estimated Passive and Active Water Savings

Water Savings Category	Five-Year Savings (AF)	Total Lifetime Savings (AF)
Passive Water Savings	3,150	146,933
Active Water Savings	33,554	147,836
Total	**36,704**	**294,769**

Over the last five years, IEUA and its regional retail member agencies have developed a strong partnership and a coordinated approach to water use efficiency and conservation management measures that reduce water use. This partnership will continue into the future as presented in the 2009 Short-Term Regional Water Use Efficiency Business Plan, the 2010 long-term Regional Water Use Efficiency Plan and the most recently completed 2015 Regional Water Use Efficiency Business Plan Update. The eight retail agencies, along with IEUA, have developed a strong collaborative working relationship and accomplished the following as a result of the planning process:

- Agreement on a regional strategy to focus on landscape water use efficiency as well as a portfolio of regional programs;
- Completion of a documented plan that provides the implementation steps necessary to launch the programs as well as clearly defined roles/responsibilities between IEUA and the retail members; and,
- Commitment from IEUA to administer the regional programs with retail members responsible for marketing, outreach, and possible augmentation of programs within their individual service areas.

4.6 Water Use Efficiency Programming (2010-2015)

It is necessary to understand past achieved conservation when determining remaining conservation potential. Data from the region's locally administered programs, as well as MWD's regional rebate programs was collected from IEUA's fiscal year (FY) reports 2002 through 2015. The data was entered into the AWE Tracking Tool and is summarized in the Table 4-10.

The total lifetime water savings for all of the measures is estimated at 89,161 AF. Toilets, HETs and ultra-low flow toilets (ULFT), have provided the most significant savings at 49,347 AF over the life of measures. This represents over 55 percent of the total water savings. Smart controllers provide savings of 8,581 AF representing over 9 percent of total savings. Over half of the smart controller savings came from central irrigation control system rebates through MWD's Public Agency Program.

Table 4-10: **Lifetime Savings by Measure for Past Achieved Conservation**

Measure	Lifetime Savings (AF)	Percent of Total Savings
High Efficiency and ULF Toilets (all markets)	49,347	55.35%
Smart Controllers (all markets)	8,581	9.62%
High Efficiency Clothes Washers (all markets)	6,669	7.48%
High Efficiency Nozzles (all markets)	5,966	6.69%
Fontana USD Retrofits	4,170	4.68%
Ultra Low Volume Urinals	4,155	4.66%
Residential Landscape Retrofits	4,104	4.60%
Turf Removal (all markets)	2,911	3.26%
Landscape Evaluations	1,855	2.08%
Water Brooms	416	0.47%
Pre-rinse Spray Valves	379	0.43%
X-ray Film Processors	304	0.34%
Cooling Tower Controllers	142	0.16%
Laminar Flow Restrictors	105	0.12%
Pool Cover	28	0.03%
Large Rotatory Nozzles	22	0.02%
Air-Cooled Ice Machines	5	0.01%
Rain Barrels	2	0.00%
Total	**89,161**	

4.6.1 Past Program Activity – Estimated Savings FY2010 – 2015

When evaluating past performance, it is also important to view activity and performance in the most recent years. This allows for better identification of trends and assessment of a given program's ability to deliver results.

Table 4-11 provides a summary of the savings by program for the last five fiscal years, FY2010-11 to FY2014-15. The total lifetime water savings is estimated at 30,856 AF. These savings are nearly double what was projected in the 2010 Water Use Efficiency Business Plan with estimated savings of 16,055 AF.

Table 4-11: Savings by Program - Last Five Fiscal Years (FY 2010-11 to FY 2014-15)

Measure	Lifetime Savings (AF)	Percent of Total Savings
High Efficiency Toilets (all markets)	8,413	27.3%
FreeSprinklerNozzles.com	5,679	18.4%
Fontana USD Retrofits	4,170	13.5%
Residential Landscape Retrofits	4,105	13.3%
High Efficiency Clothes Washers	2,826	9.2%
Turf Removal (all markets)	2,059	6.7%
Smart Controllers (all markets)	1,973	6.4%
High Efficiency Nozzle Rebates (all markets)	983	3.2%
Ultra Low Volume Urinals	775	2.5%
Landscape Evaluations	674	2.2%
Laminar Flow Restrictors	105	0.3%
Cooling Tower Conductivity Controllers	71	0.2%
Air-Cooled Ice Machines	5	0.0%
Rain Barrels	2	0.0%
Total	**30,856**	

As with previous years, toilets still represented the most significant savings (27.27 percent), however, the locally administered programs, FreeSprinkerNozzles.com, Fontana USD Retrofits, and Residential Landscape Retrofits represented over 45 percent of combined savings. Each of these programs provided landscape and irrigation measures and was implemented through voucher and direct install delivery mechanisms versus the standard rebate-style program.

In the last two years, savings from turf removal increased significantly (over 300 percent) due to the increased incentive available through MWD's Regional Rebate Program.

4.6.2 Indoor Passive Water Savings and Saturation

Water agencies have promoted indoor water use efficiency since the early 1990's. Indoor water use efficiency has focused on upgrading high water use fixtures such as toilets, showerheads, and clothes washers. Examples of common programs are rebates to upgrade fixtures and direct installation programs (active conservation). In addition, water agencies have supported upgrading plumbing codes that require high efficiency fixtures (passive conservation). Both passive and active conservation has contributed to saturation of indoor measures. For future program planning it is important to understand the saturation and thereby the remaining potential.

Single Family Homes: Saturation of High Efficiency Toilets and Clothes Washers

Table 4-12 shows the current saturation of HETs and clothes washers in single family residences. "Efficient" toilets are defined as ULFT or better (saturation includes anything 1.6 gallons per flush (gpf) or better). Recent active programs have focused on HETs (1.28 gpf) and current programs focus on "premium" fixtures (1 gpf or less).

For toilets, the saturation rate is a significant 79 percent. Of the inventory of 390,324 fixtures in IEUA's service area, there are approximately 83,383 non-efficient toilets remaining.

For HECWs, the saturation rate in single family homes is 53 percent. There are an estimated 161,925 clothes washers in the Region's single family residential sector. Of the inventory of fixtures in the IEUA service area, there are approximately 75,000 non-efficient clothes washers remaining. "Efficient" clothes washers have a water factor of 8 or better, which includes all residential front loaders and the most efficient of the newer top loaders.

Table 4-12: Single Family Market Potential: Saturation of Efficient Toilets and Clothes Washers

Single Family	Toilets	Clothes Washers
Total Devices	390,324	161,925
Remaining (Non Efficient) Devices	83,383	75,932
Devices Actively Retrofitted	18,940	15,359
Devices Passively Retrofitted	288,001	70,633
Saturation	79%	53%
Total Water Savings Potential	**3,544 AFY**	**8,163 AFY**

Multi-family Homes: Saturation of High efficiency Toilets and Clothes Washers

Table 4-13 shows the saturation in the multi-family sector. HET saturation is even higher at nearly 100 percent and saturation of HECWs is 44 percent. One reason for the high saturation rate for toilets is that the IEUA and its regional partners have been extremely aggressive implementing direct install programs for more than a decade.

Table 4-13: **Multi-Family Market Potential: Saturation of Efficient Toilets and Clothes Washers**

Multi-Family	Toilets	Clothes Washers
Total Devices	117,559	29,771
Remaining (Non Efficient) Devices	Very few	16,785
Devices Actively Retrofitted	31,534	Not categorized
Devices Passively Retrofitted	94,956	12,987
Saturation	Near 100%	44%
Total Water Savings Potential	**NA**	**1,804 AFY**

Remaining Potential for Toilets

Due to the high saturation rate of residential toilets as well as current code, it is recommended that the region no longer offer programs for toilet replacements.

Remaining Potential for Clothes Washers

There is still some market for HECWs. Future programs should offer incentives for the highest efficiency models because many customers are already choosing efficient models without incentives.

4.7 Wholesale Supplier Assistance Programs

4.7.1 FY 2010-11 to FY 2014-15 Conservation Programs

From FY 2010-11 to FY 2014-15, IEUA and its retail member agencies developed strategies and actions that exceeded the water use efficiency goals set forth in the 2010 Regional Water Use Efficiency Business Plan. Over the 5-year period, the regional program performance exceeded the water savings goal by 200 percent with half of the funding estimated to be spent in order to achieve the savings goals outlined in the 2010 Regional Water Use Efficiency Business Plan. The cornerstone of IEUA's efforts over the last five years has been the development and implementation of programs that meet and exceed the SB X7-7, Assembly Bill 1420 - mandatory implementation of Demand Management Measures (DMM), the Governor's Executive Order, statewide mandatory water use reductions, and emergency drought regulations.

IEUA works collaboratively with its retail agencies to facilitate programs and services that provide education, and distributes and installs high efficiency water saving activities throughout the region.

Each year, staff prepares a comprehensive annual report that captures all of the implemented activities from the past fiscal year. The annual report tracks the progress that has been made against the goals and objectives, identified in IEUA's long-term Water Use Efficiency Plan, and provides the retail agencies with service area specific data. All Annual Water Use Efficiency Programs Reports are posted on IEUA's website for public access.

Creating public value means to develop and implement programs that will capture the public's interest and sustain local water supplies at a reasonable cost. This ambitious goal calls for a new vision for conservation that includes a transformation in the way the public values water and embraces efficiency within individual residences, businesses, institutions, and landscapes. Achieving this vision requires a long-term coordinated effort on the part of IEUA, its retail member agencies, and other stakeholders.

Water efficiency programs connect directly to communities, necessitating citizen involvement. The programs empower water customers to manage their own use and water bills. Water efficiency programs stimulate economic growth through driving manufacturers to produce more water efficient technology innovation in product design and through the distribution of those products utilizing a variety of retail and wholesale networks. Increasing water efficiency can preempt the need for new energy-intensive water supply development while also reducing greenhouse gases (GHG).

Despite considerable progress, the region still faces water supply uncertainties and significant challenges to maintain regional reliability. Water conservation strategies have visibly changed over the past five years as a result of state and local policies that require increased water conservation and improved efficiency, technological improvements that increase water savings potential, and advancements in methods of communication that provide new opportunities to engage and educate the public. These changes create a new foundation for future water conservation efforts. The preservation of local water resources is essential to regional sustainability and is the cornerstone in shaping current and future regional water efficiency strategies.

Water use efficiency and conservation are key fundamentals of IEUA's long-term water resource management strategy. They are essential to IEUA's mission in providing regional water supply reliability and in demonstrating good stewardship of both local and imported water supplies. The objective of the water use efficiency program is to reduce the region's need for more expensive water sources and maximize the efficient use of existing supplies.

The current and future suite of water use efficiency programs focuses on increased efforts in landscape management and reducing outdoor water use. Programs are designed to positively impact long-term behavior regarding efficient use of water. Those activities include education through landscape management training workshops, rebates for residential and commercial customers, a voucher program for free high efficiency sprinkler nozzles, landscape evaluations, and landscape retrofits which incorporate hardware and climate appropriate plant recommendations that are consistent with landscape ordinances. This is combined with the ability to initiate a comprehensive marketing, education, and outreach program which includes the combined efforts of IEUA and its retail agencies.

IEUA's strategy and priorities have been realigned to maintain sustained demand reductions and exceed per capita water use reductions of 10 percent by 2015 and 20 percent by 2020. Regional planning for the next 25 years is dependent upon the savings goals for IEUA retail agencies. IEUA recognizes that its regional strategy does not, by itself, assist its retail agencies in achieving their own legislatively mandated water use reduction goals. IEUA is, thus, further committed to assisting its retail members in achieving their individual water use reduction goals through regional programs and technical assistance.

4.7.1.1 Wholesale Agency Support

IEUA provides financial assistance to each of the local retail agencies in an effort to support local WUE implementation efforts. Specifically, IEUA provides an annual grant of $2,000 to each agency for a BMP related program or project. In addition, IEUA covers dues costs for memberships in the AWE and the CUWCC on behalf of the retail members and conducts annual technical workshops that provide retail members with information related to specific water use efficiency initiatives, programs, BMP implementation and compliance with new statutory requirements.

This is part of IEUA's commitment to the DMMs (Wholesaler Assistance Programs) which requires a wholesaler to provide financial and/or technical assistance to their local retail member agencies to implement DMMs.

Over the past five years, member retail agencies have used their grant monies for a variety of conservation related activities that include purchasing materials for public outreach and education, magnetic conservation signage for vehicles, special events, Children's Environmental Educational Festivals, and expansion of school education programs.

IEUA has an annual average WUE budget of approximately $900,000 that is dedicated to supporting the local retail members in implementing WUE and conservation related programs.

4.7.1.2 Residential Programs and Accomplishments

Between 2010 and 2015, IEUA and its retail members continued implementing a variety of WUE and conservation programs and products that have led to significant accomplishments in demand reduction and sustained water savings. These programs have consisted of incentives for homeowners and businesses, landscape efficiency and educational programs. Most of these programs have been very successful and others were introduced as pilots.

The following is a list of activities and programs that were accomplished by IEUA and its retail members from 2010 to 2015:

- ***MWD So Cal Water$mart Residential Rebate Program*** IEUA's foundational WUE rebate program for residential customers provides incentives for HETs, washing machines, sprinkler nozzles, weather-based irrigation controllers, and rain barrels. IEUA and its retail members dedicate funding specifically for enhancing MWD's base rate rebate amounts to attract higher customer participation.
- ***Multi-Family Toilet Installation Program*** Beginning in October 2006, IEUA and retail members launched a DWR grant funded toilet installation program to perform 22,500 retrofits throughout the service area. The program completed in May 2013. Since program inception, there has been a total of 22,500 ultra-low flush and HETs installed region-wide through this program.
- ***IEUA Water Softener Rebate Program*** On September 15, 2008, IEUA launched its Water Softener Removal Rebate Program. This project is the third phase of the Agency's Salinity Reduction Program that is addressing the impacts of automatic water softeners on IEUA's recycled water. The goal of this project is to demonstrate the transferability of a financial incentive "rebate" for the removal of residential self-regenerating water softeners within the service area of the IEUA. Since program inception, 650 water softeners have been removed and $419,238.42 in incentives has been paid to

program participants. The removal of these devices will save approximately 12.368 AFY in addition to the removal of more than 150.15 tons of salt.

4.7.1.3 Commercial, Industrial, Institutional Programs and Accomplishments

IEUA's service area hosts a diverse range of CII activities, including numerous service industries (such as hotels and restaurants), manufacturing, agriculture and health care, and a large number of schools and colleges. Each of these sectors present unique opportunities to reduce water consumption. Although commercial accounts comprise only 5 percent of the total number of accounts in the IEUA area, they use approximately 17 percent of the overall water demand.

During 2010 to 2015, in cooperation with local retail agencies and MWD, IEUA increased its efforts in the CII sector through MWD's SoCalWater$mart Program and Save-A-Buck Program, offering an array of water saving technologies and through augmenting supplemental funding for those rebates. These rebate devices include HETs, urinals, and washing machines, cooling tower conductivity controllers, pressurized water brooms, pre-rinse spray nozzles, weather-based irrigation controllers, and high efficiency sprinkler nozzles. This program provides an important financial incentive to make it cost-effective for business and industry to participate in programs that reduce water use. For the local retail water agencies, this program helps them meet their DMM obligations under the CII DMM.

The following is a list of activities and programs that were accomplished by IEUA and its retail agencies from 2010 to 2015:

- ***MWD SoCalWaterSmart.com CII Rebate Program*** IEUA's foundational WUE rebate program for commercial, industrial and institutional customers provides incentives for a menu of devices that include plumbing fixtures, landscaping devices, and some industry specific technologies.
- ***Fontana Unified School Retrofit Program*** This joint venture project was a partnership between FWC and IEUA. FWC appropriated $210,613 in funding for conservation for the Fontana Unified School District. IEUA provided administrative oversight and management for that included the installation of HETs, high efficiency urinals (HEU), WBICs, and high efficiency sprinkler nozzles (HEN) throughout the entire school district over a three year period.
- ***MWD CII Save-A-Buck Program*** This is IEUA's foundational conservation rebate program for commercial, industrial and institutional sectors. Approximately 45,212 devices were processed for rebates over the course of the program with an estimated water savings of 2,916 AF per year and lifetime water savings of 14,134 AF. The program ended in 2012.

4.7.1.4 Landscape Programs and Accomplishments

The semi-arid climate of southern California, with only 15 inches of average annual rainfall, combined with the lush landscaping aesthetic that predominates in the region, creates a significant water demand for irrigation of outdoor landscaping. The IEUA service area reflects this demand, where outdoor water use is estimated to be nearly 70 percent of total demand across all sectors.

During 2010 to 2015, irrigation technology continued to advance and has increasingly contributed to WUE in water agencies throughout California. Outdoor irrigation is the single largest water use for residential property owners and most commercial property owners. In California, landscape irrigation is about 60 percent of overall water use. For the local retail water agencies, the landscape programs help them meet their CUWCC MOU obligations under the Landscape BMP.

The following is a list of activities and programs that were accomplished by IEUA and its retail agencies over the last five years:

- ***Weather-Based Irrigation Controller Rebate*** Launched in January 2006, this program has provided incentives for up to $300 per controller through MWD and a grant from DWR. Since program inception until FY 2014-15, there have been 549 rebates issued with an estimated annual water savings of 179 AF and savings of 1,822 AF over the life of the devices.
- ***Residential Landscape Transformation Program*** Launched on October 1, 2012, the Landscape Transformation Program offered residential participants a turnkey approach to turf removal. Participants were provided with contractor services that included landscape design, selection of climate appropriate plants from a variety of plant palettes, removal of living turf, installation of weed barriers and plants, and conversion of overhead sprinklers to drip irrigation. This program allowed customers to convert between 500 and 1,000 square feet of their landscaping for a nominal co-pay of $0.30 per square foot.
- ***IEUA Regional Residential Landscape Retrofit Program*** Initially launched in April 2011, this program provides outdoor irrigation evaluations and upgrades existing controllers and sprinkler nozzles with high efficiency landscape devices for residential customers who irrigated area is a quarter acre for larger and who have been identified as high water users within the top 10 percent of the participating retail water providers' customer base.
- ***FreeSprinklerNozzles.com Voucher Program*** Initially launched in April 2011, this online program enables residents and CII customers within IEUA's service area, regardless of water provider, to obtain a voucher for free Precision™ Series irrigation spray nozzles through a web-based portal. These nozzles are proven to provide up to a 20 percent water savings per head (1,300 gallons annually) without adjusting controllers or irrigation run times. Since program inception, a total of 5,827 vouchers have been redeemed representing 221,421 nozzles through local authorized distributors throughout IEUA's service area. The total estimated water savings from the installed devices represents 1,109 AFY.
- ***Landscape Evaluation and Audit Program (LEAP)*** The LEAP Program, administered by the Chino Basin Water Conservation District in partnership with IEUA and retail members, provides landscape and irrigation evaluations for residential, commercial, institutional and industrial customers. This program was launched in 2007 through a grant from DWR and is available region-wide and offered annually.

4.8 Public Education and Outreach

4.8.1 Education and Outreach Programs Accomplishments

Developed over the last 15 years and in cooperation with its local retail agencies, IEUA participates in and offers an array of regional educational outreach activities

These programs all help to provide support to the local retail members to help them meet their DMM requirements (School Education and Public Information).

The following is a list of programs and activities implemented over the last five years and that will continue to be foundational elements of IEUA's regional programs over the next five years (FY2015-16 to FY 2019-20).

- **National Theatre for Children Program** National Theatre for Children (NTC) delivers a package of live theatre, student curriculum and teacher guides to elementary schools throughout the region.
- **Shows That Teach** Shows That Teach (STT*)* provides educational and motivational school assembly programs that focus on water education.
- **Garden in Every School® Program** Grants are awarded to elementary schools within IEUA's service area for the establishment of a water-wise gardens. In addition, a blog is available for educators, parents, and community members to follow the development of the gardens, acquire gardening tips, curriculum tips and water savings tips at ieuagies.blogspost.com.
- **Water Discovery Field Trip Program** Free educational field trips are provided at the Chino Creek Wetlands and Educational Park to promote the public understanding of the value of natural treatment wetlands, the creation of habitat for endangered/sensitive species and environmental stewardship. A busing mini-grant is offered to schools within the state of California to take part in the field trip program, partially funded by the California Department of Parks and Recreation.
- ***Regional Water Conservation Outreach Campaign*** IEUA provides conservation and drought outreach messaging to the community by monthly ads including, water softener removal rebate ads, "No Drugs Down the Drain" ads, water saving tips, etc. In addition, IEUA staff implemented a 12 week drought campaign in local movie theaters featuring 15 second drought and water conservation ads. The ads were run annually on all screens at theaters in Ontario, Rancho Cucamonga, and Chino Hills.
- ***IEUA Regional Landscape Training Workshops*** In this series of IEUA sponsored courses; residential landscapers learn the latest ways to reduce water usage through workshops. The courses cover information on the basics of efficient irrigation systems, the benefits of properly watering and fertilizing landscaping, landscape design techniques and plant identification. Courses are held throughout IEUA's service area with participants attending workshops held by CVWD, MVWD, FWC, and the cities of Chino, Chino Hills, Ontario and Upland.
- ***Community Outreach*** IEUA annually participates in the following community outreach activities in coordination with its retail member agencies:
    - San Bernardino County Water Conference
    - Landscape and Water Conservation Fair
    - City of Chino Hills Day at the LA County Fair
    - City of Chino Day at the LA County Fair
    - CVWD's Earth Day

  - Earth Day at the Chino Creek Wetlands and Educational Park
  - Chino Valley YMCA Healthy Kids Day
  - Compost Awareness Week

- ***IEUA's Social Media Outreach*** On September 16, 2014, IEUA launched its Twitter channel- @IEUAwater. IEUA continues to offer updates via Facebook and Twitter, an educational blog as well as a Chino Creek Park blog in order to outreach and provide up-to-the-minute information on events, news, education programs, drought updates, and conservation tips and facts, including "Water Tip Wednesdays." The blogs are attached to IEUA's Facebook page and website for outreach messaging as well.
- ***IEUA's Regional "Water is Life" Student Art/Poster Contest*** IEUA hosts its annual "Water is Life" student art/poster contests for grades K-12. The theme "Water is Life" is used to help students express their creativity while focusing on the importance of water. IEUA typically receives over 1,000 entries annually. The top three winners from each category (K-5; 6-8; 9-12) are sent to MWD to be entered into their regional contest.
- ***Inland Empire Landscape Alliance (IELA)*** The IELA was established as a voluntary collaborative working group in which landscaping policies are reviewed and implementation regionally. The IELA provides a unified voice in recommending landscaping related policies within the Chino Basin, ensuring that landscaping ordinances meet or exceed new standards laid out in AB1881 (Water Model Efficient Landscape Ordinance), identify needs and share information that will support all city and agency landscape efficiency and water conservation development programs, while providing access to funding opportunities including federal, state and local grants that support this effort
- ***IELA - The California Friendly® Water Wise Landscape Manual*** was completed, printed, and distributed throughout the service area in March 2011. The initial printing of 1000 copies was so popular that an additional 1000 copies were printed a month later. To date, 2,500 copies have been distributed to residents by cities at their planning counters, Home Depot parking lot plant sales, Earth Day events and various garden workshops hosted by member agencies. At distribution events, many residents requested information about low water use landscapes in fire and erosion prone areas. As there was still time and funding available due to reduced printing costs for the California Friendly® Water Wise Landscape Manual, a complementary Water-Wise Fire Resistant Landscaping for Erosion Prone Areas guide was created, printed, and approximately 500 have been distributed to date.
- ***MWD Solar Cup*** The annual Solar Cup competition is held each year in May at MWD's Lake Skinner reservoir in the Temecula Valley. High school students from surrounding areas designed, built, equipped and raced solar-powered boats. This competition encourages well-thought out boat design, high speed and endurance, which require participants to use an alternative power source in a real world application. IEUA co-sponsors three local highs school teams annually.
- ***Water Saving Garden Friendly*** The program was developed by Eastern Municipal Water District, IEUA, San Bernardino Valley Municipal Water District and Western Municipal Water District. The program has expanded to other parts of California and as far as Texas. The program makes it easy to spot outdoor water efficient irrigation products, plants and landscape material by looking for the bright

and colorful Water Saving Garden Friendly sticker. The program is a public-private partnership open to all landscape retailers. Events take place in the spring and fall at various locations throughout the region. A partnership between Home Depot and the agencies has proved to be successful with the increasing number of returning and new customers attending the events. The events take place at Home Depot locations throughout the IEUA service area, including Rancho Cucamonga, North and South Upland, Chino and Fontana.

- ***IEUA Regional Water Use Efficiency Business Plan (5 Year Plan)*** An extension of the IEUA "Interim" Plan, the long-term business plan provides more in-depth research and technical analysis on past, present and potential future programs. The plan includes detailed sector analyses based on end-use data, a regional saturation evaluation based on implemented WUE programs, identification of active and passive water savings within the region, cost-benefit analyses for existing and potential WUE programs, and potential water savings opportunities. The purpose of the long term plan is to develop a blueprint to help IEUA and its retail members comprehensively plan for and implement future water use efficiency activities and programs over a five year period.
- ***Water Education Water Awareness Committee (WEWAC)*** Since 1989, the Water Education - Water Awareness Committee promotes the importance of water conservation in southern California through coordination and participation in community outreach projects and providing grant funded opportunities for local educators. Projects include hosting booths at local resource and educational fairs, conducting water education workshops at local primary and secondary schools, offering grant opportunities to educators, and sponsoring an annual water conservation video contest. IEUA participates with 12 other water agencies in San Bernardino County and Los Angeles County.
- ***Regional Water and Landscape Fair*** Held annually in October, the fair is a community awareness partnering event with the Chino Basin Water Conservation District, IEUA and its retail agencies created to educate the public on the importance of using water efficiently. Over 1,000 people usually attend the event where money saving devices, tips and rebate information is provided.

4.9 Water Use Efficiency Programming (2015-2020)

With major challenges ahead, IEUA recognizes that a sound, fact-based plan is needed as a tool to guide water use efficiency program implementation over the upcoming years. IEUA, working in tandem with the eight agencies, created a Regional Water Use Efficiency Partnership Workgroup and initiated an eight-step process that resulted in the creation of a Regional WUE Business Plan (see Appendix F).

The Regional Water Use Efficiency Business Plan includes the following information:

- Water reduction goals and regulatory compliance.
- Market condition and potential.
- A strategy for reaching water savings goals.
- Recommended programs with budgets, water savings, costs, marketing and operational details.
- A program implementation plan and schedule.

- A system for tracking and reporting performance over time.

4.9.1 Selected Programs

The selected programs, with their heavy emphasis on landscape opportunities, will integrate the following elements:

- **High Efficiency Nozzle Installations (FreeSprinklerNozzle.com Voucher Program)** – Retrofitting pop-up spray heads with high efficiency rotary nozzles is a low cost measure and delivers high water savings. The saturation rate of high efficiency nozzles is extremely low, and the sheer volume of spray heads offers a prime market opportunity.
- **Smart Controllers in Combination with High Efficiency Nozzle Installations for Larger Landscape Sites** – Smart controllers are cost-effective for sites with large landscape areas. By combining controllers with high efficiency nozzles, significant and cost-effective water savings can be achieved.
- **Residential Pressure Regulator Rebate Pilot Program** – A properly installed regulating valve at the main line into a residential property can reduce water flowing into irrigation systems and indoor fixtures to 60 pounds per square inch (psi) or below. This Pilot Program has created customer awareness of pressure regulators and proper pressure. It will also provide more information to IEUA and its regional partners on the importance and effectiveness of pressure regulation within their service area.
- **Turf Removal** – Although turf removal delivers extremely high water savings in most retrofit projects, it is not yet deemed cost-effective for IEUA to fund a turf removal "direct" incentive program at this time, unless substantially funded through outside sources. By offering a low interest financing option customers would not be required to pay for up-front costs and should be able to realize substantial water savings. As a result, IEUA will be driving a market transformation—away from high water use turf and towards regional plants with low precipitation rates and minimal irrigation needs.
- **Water Budgets** – A "water budget" is the calculated amount of water a customer would require over a particular time period (usually a month, billing cycle, or year) based on the lot size and local weather conditions. A Water Budget Program will educate customers about their water consumption patterns as compared to their budget. The savvy customer will be armed with a tool to better understand their usage and then independently make modifications to reduce their water use. The program is extremely cost effective because the educated customer makes the changes on their own thereby transforming the market.
- **Customer Engagement Technology and Data Analytics Program** - OmniEarth is a new technology that combines physical characteristics of parcels collected through aerial/satellite imagery (e.g. size, land cover type) with customer information (e.g. current and historical water usage) to create water budgets for each customer. The program compares water budgets with actual usage to identify customers who are exceeding their water budget and have the most room for efficiency. This information is then consolidated and presented in layered maps and easy to understand graphs.

- **Landscape Evaluations** – Comprehensive landscape evaluations provide customer education and information on landscape and irrigation system upgrades specific to each individual site. Intended to drive customers to make improvements in their landscape irrigation efficiency, the evaluations direct customers to SoCalWater$mart, Save-A-Buck or other customer incentives, as applicable.
- **MWD's SoCalWater$mart and Save-A-Buck Programs** – These programs are slated to continue until at least 2018, providing IEUA and its retail agencies with continued outside funding and program administration. Moving forward, IEUA will add additional funding to landscape water use efficiency products to provide increased customer response.
- **Education and Outreach Programs** – IEUA will continue to provide regional educational and outreach programs. Current regional education and outreach programs include the following:
    - National Theatre for Children
    - Garden in Every School
    - Residential Landscape Training Workshops
    - Water Wise Landscape Contest
    - Annual Water Fair
    - WEWAC
    - Regional Water Use Efficiency Outreach
    - No Water Waste Ordinance

On an annual basis, IEUA and its retail agencies will review the effectiveness and desirability of regional educational and outreach programs. Budget priority will be given to programs that assist retail agencies in meeting state mandates.

Table 4-14: Selected Programs and Reasoning

Program	Reasoning	Support Actions
• Budget-Based Water Rates	- Sends strong price signal - Drives over-allocation customers to consider changes - Proven effective at reducing water demand	- Member agency education - Rate evalution and implementation support through SAWPA grant
• Customer Engagement Software	- Customer-preferred communication method - Allows retailers to send messaging & program links to over-allocation users - Proven effective elsewhere for reducing demand	- Link new media and WUE programs with targeted customers

Program	Reasoning	Support Actions
• Landscape Evaluations	- Links customer with programs - Provides one-on-one customer education - Starts relationship with customer	- Use water budget data to identify customers - Provide more visual report - Implement automated and consisent follow up - Provide more cost/benefit information - Modernize data collection and reporting
• Residential Landscape Retrofit Program	- Target large water use - Site visit verifies there will be savings - Professional installation and programming of controller	- Provide electronic follow up with customer to ensure sustained savings
• Residential Smart Controller Upgrade Program	- Offering to smaller customer provides bigger pool of potential customers - Site vistis verifies there will be savings - Education workshop ensures customer can program and maintain controller and therefore sustain savings	- Use water budget and potential savings to show return on investment - Consider customer co-pay option to lower costs
• FreeSprinklerNozzles.com Program	- Cost effective - Targets large water use - Hugely scalable - Gateway measure	- Target largest users and over-allocation users to maximize savings and MWD funding - Market more aggressively
• SoCal Water$mart Regional Rebate Program	- MWD funding - MWD administration - Ease of implementation	- Continue to add dollars to priority measures - Market locally
• High Efficiency Nozzle Direct Installation Program	- Removes financial barrier of entry - Ensures quality installation - Hugh potential and scalability	- Implement aggressive marketing campaign - Hire additional contractors - Offer multiple nozzle manufacturers

4.10 Value of Conservation

Between FY2010-11 and FY2014-15, IEUA and the regional retail water agencies have developed a strong partnership and a coordinated approach to conservation management measures that reduce water use. Conservation has multiple benefits, one of which is the value of conservation to the region's ratepayers. Conservation also saves money to the ratepayer.

The eight retail agencies, along with IEUA, developed a strong working accord and accomplished the following as a result of the regional WUE planning process:

- Agreement on a regional strategy to focus on landscape WUE as well as a portfolio of regional programs;
- Completion of a documented plan that provides the implementation steps necessary to launch the programs as well as clearly defined roles/responsibilities between IEUA and the retail agencies; and,
- Commitment from IEUA to administer the regional programs with retail agencies responsible for implementing and possibly augmenting programs within their individual service areas.

Many retail agencies may need to develop an individual plan for their own agency in order to understand their specific compliance requirements and to address the local needs of their respective service areas.

Overall, there are multiple benefits of water use efficiency and conservation:

- Ratepayers save money on their water utility bills;
- Reduced urban runoff from improved irrigation efficiency;
- Avoidance of purchasing additional expensive imported water; and
- Environmental benefits

Another regional benefit for maintaining strong support for conservation is the reduced dependence on imported water. The Bay-Delta is the single most important link in California's water supply system. Two major water supply projects, SWP and the Central Valley Project convey water to more than 22 million Californians and 7 million acres of farmland. The IEUA service area receives a significant portion of its supply (about 30 percent) from SWP via MWD. Local water supply projects such as conservation help limit the amount of imported water for water supply, thus enhancing Bay-Delta environmental protection. Conservation also helps increase irrigation efficiency which reduces runoff.

4.10.1 Funding Goal

Currently, the IEUA regional conservation budget is approximately $2.2 million annually - $1.1 million of IEUA funding which leverage another $1.1 million of outside funding. These revenues are collected with the support and cooperation of the local retail water agencies. The source of IEUA revenues for the regional conservation budget is the Meter Equivalent Unit (MEU) which replaced the former imported water surcharge and the retail meter revenues.

These local funds are augmented with funding from our partner agencies such as MWD, DWR, and USBR to expand the grant funding to $1.1 million, annually. While having decreased substantially over the last several years, approximately $3 of outside funding continues to be secured for each $1 of IEUA regional revenues. Availability of outside funding to augment regional funds has steadily decreased since the economic decline.

The IEUA will continue to work on the development of new innovative conservation programs over the next twenty years. However, the foundation for future conservation programs will be built upon historical achievements, prior successful programs, available funding, evolving technologies, market transformation, and a coordinated effort on the part of IEUA, its retail agencies, and other stakeholders. The planned programs and activities for 2015 to 2020 outlined in IEUA's 2015 Regional Water Use Efficiency Business Plan.

4.10.2 Regional Educational and Outreach Programs

In addition to the nine selected active programs, IEUA and its regional partners will continue to provide regional educational and outreach programs. Current regional education and outreach programs include the following:

- **National Theatre for Children Program** NTC delivers a package of live theatre, student curriculum and teacher guides to elementary schools throughout the region.
- **Shows That Teach** STT provides educational and motivational school assembly programs that focus on water education.
- **Regional Landscape Training Workshops** In this series of regional sponsored courses; residential landscapers learn the latest ways to reduce water usage through workshops. The courses cover information on the basics of efficient irrigation systems, the benefits of properly watering and fertilizing landscaping, landscape design techniques and plant identification.
- **Garden in Every School® Program** Grants are awarded to elementary schools within IEUA's service area for the establishment of a water-wise gardens. In addition, a blog is available for educators, parents, and community members to follow the development of the gardens, acquire gardening tips, curriculum tips and water savings tips at ieuagies.blogspost.com.
- **Water Discovery Field Trip Program** Free educational field trips are provided at the Chino Creek Wetlands and Educational Park to promote the public understanding of the value of natural treatment wetlands, the creation of habitat for endangered/sensitive species and environmental stewardship. A busing mini-grant is offered to schools within the state of California to take part in the field trip program, partially funded by the California Department of Parks and Recreation.
- **IEUA Water Softener Rebate Program** The IEUA Water Softener Rebate Program is part of the third phase of the IEUA's Salinity Reduction Program that is addressing the impacts of automatic water softeners on IEUA's recycled water. The goal of this project is to demonstrate the transferability of a financial incentive "rebate" for the removal of residential self-regenerating water softeners within the service area of IEUA.
- **Water Saving Garden Friendly** The Water Saving Garden Friendly program was founded in 2011 to provide local communities with conservation-based educational opportunities, as well as information and access to climate-appropriate plants. Through partnerships with sponsors like Home Depot, Scotts Miracle Grow and others, the program hosts events, workshops, and other educational and "do-it-yourself" opportunities for local residents to learn about and enjoy sustainable landscaping. The

Garden Friendly program is a public-private partnership that welcomes the participation of all members of the public as well as interested landscape retailers.

4.10.3 Implementation Schedule and Activities per Year

Table 4-15 displays the projected annual activity for each measure. Toilets are being phased out in FY2015-16. As of October 2015, MWD only provides rebates for premium efficiency fixtures at a much discounted incentive. The model includes toilet activity prior to the change. Turf removal was not modeled after FY2015-16. It is likely that MWD will lower the current turf removal incentive and impose caps. If the regional partners chose to offer turf removal incentives more than likely they would have to fund the program themselves.

Table 4-15: Annual Activities by Measure

Activity Name	Measure Metric	FY16	FY17	FY18	FY19	FY20
	Sites Evaluated	200	150	150	150	150
Cooling Tower Controller Rebates	Cooling Tower Controllers	10	10	10	10	10
FreeSprinklerNozzles.com	HE Nozzles	50,000	50,000	50,000	50,000	50,000
High Efficiency Clothes Washer Rebate	HE Clothes Washers	500	500	500	500	500
HE Nozzle Direct Install	HE Nozzles	--	30,000	30,000	30,000	30,000
High Efficiency Nozzle Rebate (all markets)	HE Nozzles	10,750	11,000	11,000	11,000	11,000
High Efficiency Toilet Rebates (all markets)	HE Toilets	2,600	0	0	0	0
Premium Efficiency Toilet Rebate (MF)	HE Toilets	750	0	0	0	0
Rain Barrels	Rain Barrels	50	50	50	50	50
Residential Landscape Retrofit	Turf Removed (sites)	200	250	250	250	250

Activity Name	Measure Metric	FY16	FY17	FY18	FY19	FY20
Residential Smart Controller Upgrade	Smart Controllers	0	500	500	500	500
Smart Controller Rebate (SF)	Smart Controllers	50	50	50	50	50
Smart Controller Rebate (CII)	Smart Controllers	100	50	50	50	50
Technology Customer Engagement Software	Customer Accounts	0	131,376	131,376	131,376	131,376
Turf Removal Rebate (CII)	Turf Removed (SF)	11.5 M	--	--	--	--
Turf Removal Rebate (SF)	Turf Removed (SF)	1.5 M	--	--	--	--
Ultra Low Volume Urinals	ULV Urinals	5	--	--	--	--
Budget-Based Water Rates (2 Agencies)	Customer Accounts	--	--	52,551	--	--

4.11 Water Conservation Program Coordination and Funding Sources

IEUA’s Water Use Efficiency Program consists of one full time employee (FTE), one FTE at 50 percent, and two interns. The source of IEUA’s revenues for the regional conservation budget is collected through a $4 per imported AF surcharge and a $0.04 RTS charge which results in an approximately $350,000 in annual revenue, excluding labor.

In FY 2016-17, the method of revenue collection for water use efficiency and conservation will be converted to a MEU charge which will replace the AF surcharge and RTS charge. An MEU is defined as the number of active water accounts of each meter served by an IEUA Local Retail Agency. IEUA has committed to dedicate $1,120,000 annually to Wholesale Assistance Programs which are defined as IEUA’s regional water use efficiency and conservation programming portfolio. IEUA’s water use efficiency program funding is heavily leveraged by external funding through the DWR, the USBR, the MWD and inter-agency partnering programs.

IEUA prepares annual regional water use efficiency program budgets with line items dedicated to specific water use efficiency activities. The projected annual budget for each year of the five-year planning period is shown in Table 4-16. The budget amounts reflect the financial commitment of IEUA only and are exclusive of MWD or other external financial contributions. The budgets presented below do not align exactly with actual costs because the figures are based upon estimated WUE programming activity that vary depending upon program participation rates.

Table 4-16: **IEUA Annual Water Use Efficiency Budget**

Program Year	Annual Budget ($/Year)
FY 2015/16	$1,928,800
FY 2016/17	$1,120,000
FY 2017/18	$1,120,000
FY 2018/19	$1,120,000
FY 2019/20	$1,120,000
Total	**$6,408,800**

**Budget includes IEUA regional program costs exclusive of outside funding.*
**Budget includes $300,000 per year for education and outreach programs.*

Funding sources for the implementation of projects and programs to achieve the regional water use reduction goals is a combination of IEUA revenues leveraged with external funding from the DWR, the USBR, the MWD Water District and inter-agency partnering programs.

The 2010 UWMP adopted a funding strategy for the regional agencies that would have a minimal impact on each member agency's budget, yet would provide an equitable flow of funding for the regional conservation programs. Since 2010, the number of individual revenue sources has decreased due to drought and the economy. Below is a description of each of the funding sources:

The source of IEUA's revenues for the regional conservation budget has been collected through a $4 per imported AF surcharge and a $0.04 Readiness-to-Serve (RTS) charge which generates on average, revenues of approximately $350,000 annually, excluding labor.

In FY 2016-17, the method of revenue collection for water use efficiency and conservation will be converted to a MEU charge which will replace the AF surcharge and RTS charge. An MEU is defined as the number of active water accounts of each meter served by an IEUA Local Retail Agency. IEUA has committed to dedicate $1,120,000 annually to Wholesale Assistance Programs which are defined as IEUA's regional water use efficiency and conservation programming portfolio. IEUA's WUE program funding is heavily leveraged by external funding

Figure 4-1 provides an example of local revenues and the ability to substantially leverage those funds with outside funding. Over the last five years, the regional conservation programs budget has fluctuated between $700,000 to over $4,000,000 for WUE program implementation. However, whenever possible IEUA leverages these funds with external funding. IEUA's five-year annual water conservation budget is projected to be $1.1 million of local funding and $1.1 million of leveraged funding for a total maximum annual budget of $3 million.

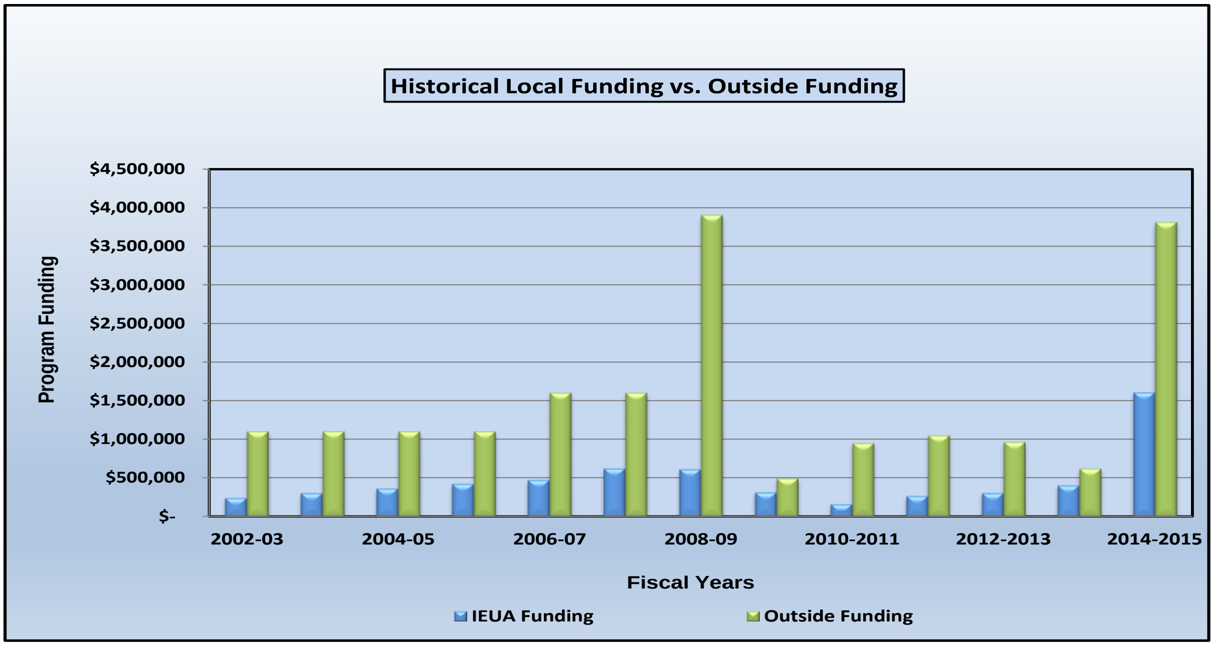

Figure 4-1: Historical Local Funding versus Outside Funding

4.12 Utility Operations

Previous sections of this UWMP describe IEUA's core WUE programs in detail. The goal of Section 4.15 is to provide additional information to satisfy the requirements set forth in DWR's 2015 UWMP Guidebook. For this 2015 UWMP, the reporting requirements for DMM has been significantly modified and streamlined in 2014 by Assembly Bill 2067. For a wholesale agency such as IEUA and WFA, the requirements changed from having 14 specific measures (following CUWCC BMPs) to six more general requirements pertaining to utility operations, including metering, public education and outreach, water conservation program coordination and staffing support, asset management, wholesale supplier assistance programs, and other DMMs as described in the following sections.

4.12.1 Metering

IEUA does not have any direct connections to potable customers. All imported water supplied to the area through IEUA is delivered through a direct connection from MWD.

WFA is fully metered. Its meter replacement program is part of its capital replacement projects forecasted and budgeted through the normal annual budget process.

WFA is fully metered. Capital replacement projects are forecasted and budgeted through the normal annual budget process. These are funded by WFA's member agencies based on four different criteria on how the equipment service life is utilized in the treatment plant process or if it is part of a member agency owned turnout. Routine preventative maintenance is conducted on a regular basis and repairs are made upon certain equipment failure or when signs of fatigue are evident. WFA owned meters are maintained by WFA staff supplemented by third party evaluations.

4.12.2 Asset Management

IEUA does not own or operate a potable water distribution system therefore this section is not applicable to IEUA.

WFA owns and operates 4.55 miles of potable distribution system. Routine preventative maintenance is conducted on a regular basis. Repairs are made upon signs of fatigue.

WFA's capital improvement projects may be developed when treatment plant enhancements are identified that provides for greater operational flexibility, productivity, service life extension, and are funded by WFA's member agencies based on their percent ownership or entitlement of the treatment plant, through the normal annual budget process. Capital replacement projects are forecasted and budgeted through the normal annual budget process. These are funded by WFA's member agencies based on four different criteria on how the equipment service life is utilized in the treatment plant process or if it is part of a member agency owned turnout. Routine preventative maintenance is conducted on a regular basis and repairs are made upon certain equipment failure or signs of fatigue are evident.

5 WATER SHORTAGE CONTINGENCY PLAN

5.1 Overview

Recent water supply challenges throughout the Southwest and the State of California have resulted in the development of a number of policy actions that water agencies would implement in the event of a water shortage. In southern California, the development of such policies has occurred at both the wholesale and retail level. This section describes how new and existing policies that MWD and IEUA have in place to respond would address supply shortages.

5.2 IEUA Drought Plan

IEUA's Drought Plan is consistent with and contributes to the existing IEUA imported water policies and programs. Principles of IEUA's Drought Plan encourage development and full use of local water resources, such as recycled water and conservation measures. The IEUA Drought Plan also addresses MWD's Chino Basin Groundwater Storage Dry Year Yield (DYY) program and the need for best management of DYY program "shift" obligations concurrent with MWD Water Supply Allocation Plan (WSAP) reductions of imported water supplies to IEUA.

IEUA's Drought Plan was developed for the purpose of implementing MWD's WSAP in a manner that is fair and equitable to IEUA's member agencies. IEUA's Drought Plan is an extension of MWD's WSAP. For example, if IEUA is not imposed a penalty from MWD, then IEUA would also not impose a penalty on its member agencies (IEUA, Inland Empire Utilities Agency Drought Plan, April 2009). Table 5-1 displays the actions that IEUA and its member agencies will take locally.

Table 5-1: IEUA and Member Agency Staged Actions

Surplus Stage	IEUA & Retail Agency General Actions	Shortage Stages			
Surplus		Shortage			
		1	2	3	4
X	Increase Imported Firm Deliveries				
X	Maximize Replenishment Activities				
X	Conservation Programs	X	X	X	X
X	Public Information and Outreach Campaign	X	X	X	X
X	Maximize Stormwater Storage	X	X	X	X
	Increase Groundwater Pumping	X	X	X	X
	Water Use Restrictions in Effect*	X	X	X	X
	Landscape Irrigation Restrictions*		X	X	X
	Dust Control w/ Recycled Water Only				X
	Landscape Irrigation w/ Recycled Water Only*				X
	Water Bill Surcharge/Fine*				X
	Potable Water Use Curtailments*				X
	Meter Flow Restricting Device*				X

*Local agencies maintain their own water use restrictions and other actions in event of a drought declaration.

5.2.1 MWD Water Surplus and Drought Management Plan

MWD has taken the lead in drought planning for the southern California region. MWD's Board of Directors adopted the Water Surplus and Drought Management (WSDM) Plan in 1998 to address surplus and shortage operating strategies. The WSDM plan reflects anticipated responses based on the water supplies available to MWD.

Surplus stages occur when net annual deliveries can be made to water storage programs. Under the WSDM Plan, there are four surplus management stages that provide a framework for actions to take for surplus supplies. Deliveries in Diamond Valley Lake (DVL) and in SWP terminal reservoirs continue through each surplus stage provided there is available storage capacity. Withdrawals from DVL for regulatory purposes or to meet seasonal demands may occur in any stage.

The WSDM Plan distinguishes between Shortages, Severe Shortages, and Extreme Shortages. The differences between each term is listed below.

- Shortage: MWD can meet full-service demands and partially meet or fully meet interruptible demands using stored water or water transfers as necessary.
- Severe Shortage: MWD can meet full-service demands only by using stored water, transfers, and possibly calling for extraordinary conservation.
- Extreme Shortage: MWD must allocate available supply to full-service customers.

There are six shortage management stages to guide resource management activities. These stages are defined by shortfalls in imported supply and water balances in MWD's storage programs. When MWD must make net withdrawals from storage to meet demands, it is considered to be in a shortage condition. Figure 5-1 gives a summary of actions under each surplus and shortage stages when an allocation plan is necessary to enforce mandatory cutbacks. The goal of the WSDM plan is to avoid Stage 6, an extreme shortage (MWD, 2015 Draft UWMP, March 2016).

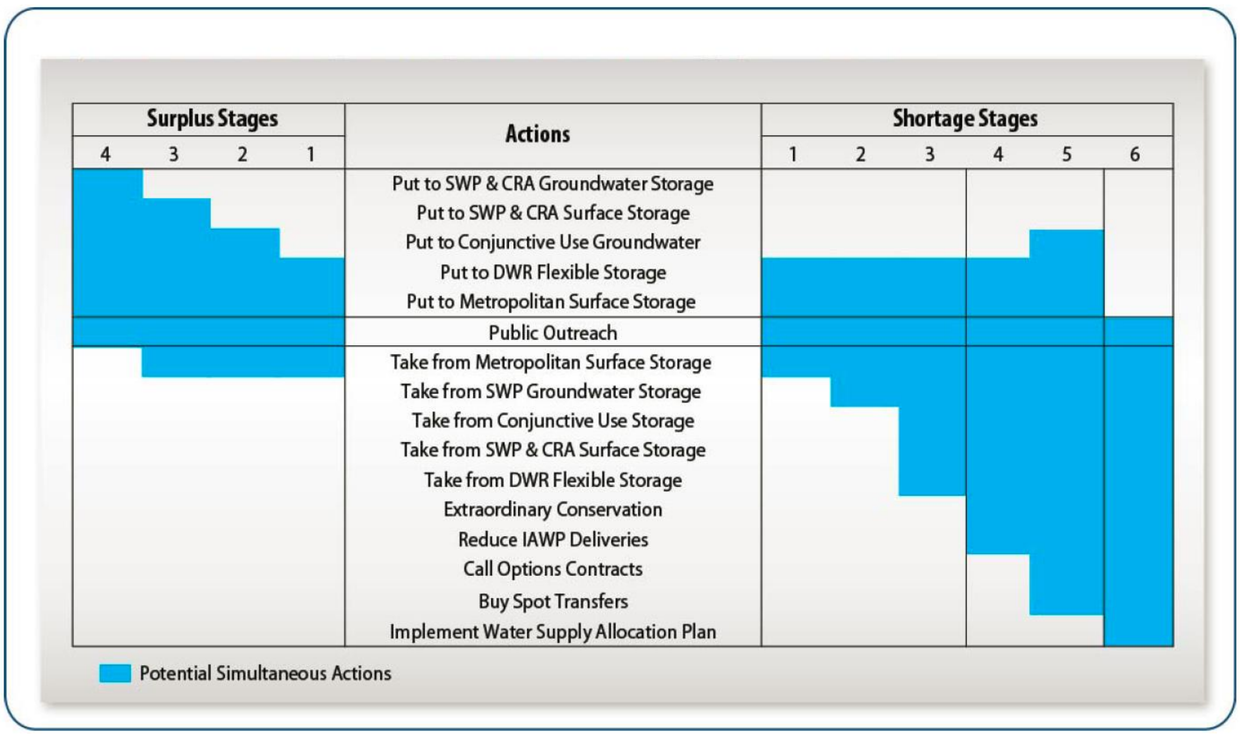

Figure 5-1: Resource Stages, Anticipated Actions, and Supply Declarations

5.2.2 MWD Water Supply Allocation Plan

MWD's Board of Directors adopted the WSAP in February 2008 in anticipation of possible water supply shortages. The WSAP provides guidance for allocating limited water supplies to member agencies should the need arise.

MWD's WSAP was developed in consideration of the principles and guidelines in MWD's 1999 WSDM Plan. The WSAP's formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of MWD supplies of up to 50 percent. The formula takes into account the impact on retail customers and the economy, growth and population, changes in supply conditions, investments in local resources, demand hardening aspects of non-potable recycled water use, implementation of conservation savings program, participation in MWD's interruptible programs, and investments in facilities.

In order to implement the WSAP, the MWD Board makes a determination on the level of the regional shortage, based on specific criteria, annually in April. The allocations, if deemed necessary, go into effect in July of the same year and remain in effect for a 12-month period. The schedule is made at the discretion of the Board (MWD, 2015 Draft UWMP, March 2016).

5.3 IEUA Emergency Drought Ordinances

IEUA's retail agencies have adopted ordinances that address urban water shortage requirements. In 2009, IEUA performed an inventory of drought related ordinances that are currently part of the municipal code or administrative code of the cities and agencies in the IEUA service area. The results of the survey are summarized in Table 5-2. The ordinances will generally come into force upon a formal declaration of drought or water shortage conditions by one or more entities such as the DWR and MWD.

If a drought is declared, financial impacts to the local retail water agencies will vary from one agency to another. As a wholesale water agency, IEUA is simply a "pass-through" wholesaler so loss of revenue has no significant impacts except possibly the conservation programs which receive a portion of funding through a surcharge on each AF of imported water sold.

The ordinances vary with different actions based upon the severity of the drought conditions. The definition of drought and water shortage stages used by Cities of Chino, Chino Hills and Ontario and the MVWD are presented in Table 5-3. Table 5-4 provides a summary of local agency drought ordinances, in the categories of prohibitions and restrictions, conservation actions, and the enforcement mechanisms available to each agency.

Table 5-2: Water Shortage Contingency Plan Checklist by Agency

	IEUA Member Agency							
Emergency Drought or Water Shortage Ordinances	**Chino**	**Chino Hills**	**MVWD**	**Ontario**	**CVWD**	**FWC**	**SAWCO**	**Upland**
Catastrophic Interruption Plan	√	√	√	√	√	√	√	√
Consumption Reduction Methods	√	√	√	√	√	√	√	√
Contingency Plan	√	√	√	√	√	√	√	√
Emergency Fund	√		√	√	√	√	√	√
Mandatory Prohibition	√	√	√	√	√	√	√	√
Ordinance/Resolution	√	√	√	√	√	√	√	√
Penalties	√	√	√	√	√	√		√
Rationing Allocation Method	√	√	√	√	√	√		√
Reduction Measuring Mechanism	√	√	√	√	√	√	√	√

Table 5-3: Drought Stage Definitions by Agency

Drought Stage	Agency			
	Chino	**Chino Hills**	**MVWD**	**Ontario**
1	Water supplies are anticipated to be reduced by up to 10%	Customers are requested to voluntarily limit water usage to the amount necessary for health, safety, business, and irrigation	Customers are required to follow water use efficiency best practices at all times.	Water conservation goals are not being met by voluntary water conservation measures or water supplies are likely to be reduced by up to 10%
2	Water supplies are reduced by approximately 10% to 20%	Water supplies are anticipated to be reduced by up to 10%	Existing or near-term water supply shortage conditions that require a 10% to 25% demand reduction.	Water supply reduction of 10% to 20%
3	Water supplies are reduced by approximately 20% or more	Water supplies are anticipated to be reduced by more than 10% and up to 25%	Existing or near-term water supply shortage conditions that require a 25% to 40% demand reduction.	Water supply reduction greater than 20%
4	No definition	Water supplies are anticipated to be reduced by more than 25% due to catastrophic events	Emergency circumstances that require a 40% or higher demand reduction.	Emergency water shortage cause by a catastrophic event such as a major earthquake, large-scale fire, or other "Act of God"
Note: Drought stages for FWC, SAWCO, CVWD, and the City of Upland are not listed numerically and are thus not included in this table.				

Table 5-4: Local Agency Drought Ordinances

	By Drought Stage as Defined in Table 5-3							
Prohibitions and Restrictions during Drought	**Chino**	**Chino Hills**	**MVWD**	**Ontario**	**CVWD**	**FWC**	**SAWCO**	**Upland**
Washing of vehicles without shut-off nozzle	1	2	1	1	X	X	X	X
Washing of sidewalks and all other hard surfaces	1	2	1	1	X	X	X	X
Water runoff into gutters from excessive or mismanaged irrigation	1	2	1	1	X	X	X	X
Non-recycling fountains/lakes/ponds restrictions	1	2	1	1	X	X	X	X
Using potable water to irrigate ornamental turf on public street medians	1	X	1	1	X	X	X	X
Unsolicited water service in eating/drinking establishments	1	2	1	1	X	X	X	X
Use of fire hydrants limited to firefighting activities		2	2	1			X	X
Restaurants using non-conserving dish spray valves	1							
Lodging establishments must offer option to not launder daily	2	3	1	1	X	X	X	X
Failure to repair leaks within reasonable amount of time		2	1	1	X	X	X	X
Irrigation during and within 48 hours after measurable rainfall	1	3	1	1	X	X	X	X
New landscaping restrictions	1	3	2	1	X	X	X	X
New turf/maximum allowable turf restrictions			2					
Water use on construction sites or for dust control			4					
New pool or spa construction and/or filling restrictions		3	3	2		X	X	X
Irrigation of golf courses and other water dependent industries restricted		3	1	2			X	X
Watering limited to prescribed times		2	1	1		X	X	X
Watering limited to prescribed days	1	3	2	2			X	X
Additional dwelling construction prohibited	3		4					
Watering of turf, landscape, or vehicles by bucket only		2		3				
	Enforcement							
Water bill surcharge/fine	√	√	√	√	√	√	√	√
Flow restricting device, locking or removal of meter, shutting off mainline	√	√	√	√	√	√	√	√

Key

1	Stage 1
2	Stage 2
3	Stage 3
4	Stage 4
X	No Defined Stage

5.4 WFA Contingency Operations Plan

WFA's staff recognizes that the projected imported water supply reductions mandated by MWD's WSAP requires collaboration and coordination with its member agencies. In cooperation with its Technical Advisory Committee, the WFA has developed planning worksheets that identify possible delivery scenarios. It is important to note that any contingency operations plan requires adaptability due to changing conditions and circumstances and as water supply updates are provided.

WFA previously used a ten year rolling average formula for distributing the available imported water allocation amongst its member agencies. The ten year rolling average is from FY 2004-14 with a one year lag. The allocation formula results are summarized in Table 5-5.

Table 5-5: WFA Determination of Available Deliveries

Agency	Allocation Formula (FY 10 Year Average)		Available Deliveries
Chino	3,575	12.6%	3,462
MVWD/Chino Hills*	7,509	26.4%	7,255
Ontario	12,286	43.2%	11,871
Upland	5,066	17.8%	4,891
Total	**28,436**	**100.0%**	**27,479**
Notes: *Per Joint water supply agreement between MVWD and City of Chino Hills.			

The contingency operations plan was designed when most of the projected available imported water supply would be delivered primarily during peak demand in the summer months, with emphasis on the months from July through October, while attempting to maintain minimum deliveries in the remainder or some portion of the year. The Agua de Lejos Water Treatment Plant has the ability to operate at a minimum 4 MGD flow since the construction of the Low Flow Modification Project. This is crucial during the off-peak months so that most of the available supplies can be directed to the higher demand peak months and a prolonged shutdown can be avoided. Therefore, the plan is to operate the Agua de Lejos Water Treatment Plant throughout the year, unless a brief shutdown is required by MWD (WFA, Contingency Operations Plan, May 2015).

5.5 Mutual Aid Agreements

Mutual aid agreements among local agencies in California are a typical way of dealing effectively with disasters such as brush fires, earthquakes, law enforcement shortages, etc., and the IEUA service area is no different.

As the agency that provides regional sewer service to the seven cities and agencies in the service area (referred to as Regional Contracting Agencies), IEUA took the lead to develop a United Response Guidance Plan for Sanitary Sewer Overflows at the request of the SARWQCB. The purpose of the SARWQCB's request was the need for a united and coordinated approach for sanitary sewer spills and their possible infiltration into the storm sewers of San Bernardino County. With the joint efforts of IEUA and the Regional Contracting Agencies, the United Response Plan was developed and submitted to the SARWQCB and the SBCFCD.

The agreement helps to minimize the environmental impact of a sanitary sewer overflow by facilitating communication, dispatching appropriate equipment, reducing spillage, and expediting cleanup. In addition to sewer spills, the Contracting Agencies also agree to provide mutual aid in the event of disruption of water service supply as well. This element of the agreement provides the basis for a full spectrum of mutual aid should any unforeseen disruption occur. Specifically, the agreement says:

"In the event of any disruption or damage to the ability of either Inland Empire Utilities Agency or the Regional Contracting Agencies to continue to serve the public or its customers with water service, sewer service or sewage treatment service, the other party will cooperate to a maximum extent possible, as determined in its discretion, to provide mutual aid assistance as requested."

5.6 Three-Year Minimum Water Supply

As a matter of practice, MWD does not provide annual estimates of the minimum supplies available to its member agencies. As such, MWD member agencies must develop their own estimates.

Section 135 of the MWD Water District Act declares that a member agency has the right to invoke its "preferential right" to water, which grants each member agency a preferential right to purchase a percentage of MWD's available supplies based on specified, cumulative financial contributions to MWD. Each year, MWD calculates and distributes each member agency's percentage of preferential rights. However, since MWD's creation in 1927, no member agency has ever invoked these rights as a means of acquiring limited supplies from MWD.

As captured in its 2015 UWMP, MWD believes that the water supply and demand management actions it is undertaking will increase its reliability throughout the 25-year period addressed in its plan. Thus for purposes of this estimate, it is assumed that MWD and IEUA will be able to maintain the identified supply amounts throughout the three-year period.

The three year minimum water supply is calculated from IEUA's baseline supplies for imported water and recycled water. IEUA's three year estimated minimum water supply is listed in Table 5-6.

Table 5-6: IEUA Minimum Supply Next Three Years (AF)

Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	102,891	105,287	107,519
NOTES: Three year minimum supply taken from the sum of IRP baseline supply for imported water, direct use recycled water, and groundwater recharge recycled water for each respective year.			

WFA's three year minimum supply is estimated based on its annual allocation of MWD's Tier 1 water supply. WFA's three year estimated minimum water supply is listed in Table 5-7.

Table 5-7: WFA Minimum Supply Next Three Years (AF)

Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	31,384	31,384	31,384
NOTES: Three year minimum supply is from WFA's annual allocation of MWD's available Tier 1 water supply as specified in the 2016 IRP.			

5.7 Catastrophic Supply Interruption

Given the great distances that imported supplies travel to reach the Inland Empire, the region is vulnerable to interruptions along hundreds of miles of aqueducts, pipelines and other facilities associated with delivering the supplies to the region. Additionally, the infrastructure in place to deliver supplies are susceptible to damage from earthquakes and other disasters.

MWD has comprehensive plans for stages of actions it would undertake to address a catastrophic interruption in water supplies through its WSDM and WSAP. MWD also developed an Emergency Storage Requirement to mitigate against potential interruption in water supplies resulting from catastrophic occurrences within the southern California region, including seismic events along the San Andreas Fault. In addition, MWD is working with the state to implement a comprehensive improvement plan to address catastrophic occurrences outside of the southern California region, such as a maximum probable seismic event in the Delta that would cause levee failure and disruption of SWP deliveries. For greater detail on MWD's planned responses to catastrophic interruption, please refer to MWD's 2015 UWMP.

In September 2005, IEUA adopted federal emergency response procedures called NIMS (National Incident Management System) which can be implemented by IEUA personnel for a localized event such as an accident at one of IEUA's facilities or on a broader based regional event such as an earthquake or flood. This system provides a consistent nationwide template to enable federal, state, and local governments (and local private sector and non-governmental organizations) to work together effectively and efficiently to prepare for, prevent, respond to, and recover from domestic incidents, regardless of cause, size, or complexity, including acts of terrorism (Homeland Security, National Incident Management System Training Program, September 2011).

5.8 Impacts to Revenue

During a catastrophic interruption of local water supplies, prolonged drought, or water shortage of any kind, IEUA will experience a reduction in revenue due to purchasing of more expensive water from MWD to offset reductions in local supplies. Throughout this period of time, expenditures may increase or decrease with varying circumstances. Expenditures may increase due to loss of incremental rate revenue due to reduced water sales in a shortage and increased cost due to purchasing Tier 2 water during high demand episodes due to drought conditions. IEUA is a "pass-through" wholesaler; however, loss of revenue does have significant impacts on the water resources programs which includes water use efficiency and conservation. Revenue is collected through an AF surcharge and a meter connection charge, but will be converted to a MEU charge in FY 2016-17.

6 RECYCLED WATER

Recycled water opportunities have continued to grow in southern California as public acceptance and the need to expand local water supplies continues to be a priority. Recycled water also provides a degree of flexibility and added reliability during drought conditions when imported water supplies are restricted.

Recycled water is wastewater that is treated through primary, secondary and tertiary processes and is acceptable for most non-potable water purposes such as irrigation, and commercial and industrial process water following Title 22 requirements.

WFA does not supply recycled water to its customers and does not have plans to do so; therefore, the remainder of Section 6 is applicable to IEUA only.

IEUA began providing recycled water to customers in 1972. Initially, recycled water was delivered to a few large water users such as the Whispering Lakes Golf Course and Westwind Park in the City of Ontario, and Prado Park and Golf Course in the City of Chino.

In the early 1990's IEUA began the construction of the first phase of the CCWRF that included treatment facilities and distribution pipelines to serve customers in Chino and Chino Hills. In conjunction with the construction of the first phase of the CCWRF, IEUA began planning for a regional recycled water delivery system to provide recycled water throughout its service area. This planning effort culminated with the completion of the IEUA Regional Recycled Water Program Feasibility Study in January 2002. The Feasibility Study identified facilities to deliver over 70,000 AFY of recycled water to customers and recharge sites throughout the IEUA service area.

In 2004 IEUA developed a regional recycled water program implementation plan to prioritize the phased construction of the adopted 2002 Recycled Water Program Feasibility Study. This major planning effort resulted in the completion of the 2005 Recycled Water Implementation Plan (RWIP). The RWIP identified projects to deliver approximately 93,000 AFY of recycled water using an interconnected distribution system supplied from all four of IEUA's major recycled water plants.

In 2007, IEUA developed the Recycled Water Three Year Business Plan. The Business Plan was intended to guide the expansion of IEUA's recycled water system. The Plan focused on the most cost effective and quickest ways to increase the amount of recycled water available and used within IEUA's service area. The Plan focused on the following three years, to be revised and updated on an annual basis. Metrics and an annual use goal where identified for each year. Revisions/updates to the Plan were made with a FY 2010-11 update memo, the Wastewater Facilities Master Plan in 2014, the Recycled

Water Program Strategy (RWPS) in 2015, and the IEUA FY 2015-16 Budget and Ten Year Capital Improvement Plan (TYCIP).

6.1 Agency Coordination

Regional Recycled Water Facilities

In September 2000, the IEUA Board and Regional Technical and Policy Committees adopted a recycled water policy document that defined the roles and responsibilities of IEUA and the Regional Contracting Agencies for the construction and ownership of the regional and local facilities. Regional recycled water facilities are facilities, pipelines, pump stations, and reservoirs that serve recycled water to a recharge site or to more than one contracting agency. Regional facilities will be constructed and owned by IEUA. Local facilities deliver recycled water from the regional facilities to customers within a contracting agency's service area and are maintained by the contracting agency. Local facilities primarily consist of pipelines (local laterals) but can also include pump stations and reservoirs. The 2015 RWPS refined these policies regarding funding of local storage facilities that reduce regional storage needs, including provisions for joint regional/local facilities (local retail water agency or developer), and IEUA financing arrangements of local facilities and customer onsite retrofits to ensure the timely implementation of the recycled water program.

The regional recycled water facilities consist of a looped pipeline system that connects all four Regional Water Recycling Plants (RWRP). The treated effluent from the four regional wastewater recycling effluent pump stations is delivered to the recycled water member agencies and customers through five pressure zones, several hundred miles of pipelines, three booster pump stations, three storage reservoirs, and pressure regulating stations (IEUA, Recycled Water Program Strategy, April 2015).

Local Recycled Water Facilities

Local recycled water facilities are those that serve the customers of only one contracting agency. Each local agency is responsible for the planning, design, construction and operation of local laterals within their service area. IEUA staff is working closely with each agency to coordinate their recycled water planning efforts and is providing technical assistance.

6.2 Wastewater Description and Disposal

IEUA manages the Regional Sewage Service within its 242 square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. IEUA's facilities serve seven contracting agencies: cities of Chino, Chino Hills, Fontana, Montclair, Ontario, and Upland, and the CVWD. A system of regional trunk and interceptor sewers convey sewage to regional wastewater treatment plants that are owned and operated by IEUA. Local sewer systems are owned and operated by local agencies.

6.2.1 Regional Facilities

The wastewater collected in the regional sewer system is treated at the four RWRP's that IEUA owns and operates. The recycled water produced at the RWRP's meets Title 22 standards for non-potable reuse and groundwater recharge. All of the RWRP's have primary, secondary, and tertiary treatment and recycled water pumping facilities that are interconnected in a regional network that IEUA also owns and operates. Effluent that is not beneficially reused from the RWRP's is discharged to nearby creeks that feed into the Santa Ana River where it is recharged into the Chino Basin.

IEUA uses bypass and diversion facilities to optimize flow and capacity within the system through the San Bernardino Avenue Lift Station, Montclair Lift Station and Diversion Structure, RP-4 and CCWRF influent bypass (CCWRF influent bypass), RP-1 primary effluent diversion, and Etiwanda Trunk Line. Flows are routed between RWRP's to maximize recycled water deliveries while minimizing overall pumping and treatment costs. Aside from the San Bernardino Avenue Lift Station and the Montclair Lift Station, IEUA also operates the Prado Park Lift Station and RP-2 Lift Station in the sewer collection system to shift flows from one portions of the service area to another and to pump from low points to high points.

The four regional facilities are the RP-1, RP-4, RP-5, and CCWRF. RP-1 and RP-4 serve the northern parts of the service area and RP-5 and CCWRF serves the southern parts of the service area as shown on Figure 6-1. RP-4 and CCWRF are scalping plants for RP-1 and RP-5 (CH2MHILL, IEUA Wastewater Facilities Master Plan DRAFT, August 2014). The RWRP's are described in further detail below based on information from IEUA's Facilities website, FY 15/16 TYCIP, Wastewater Facilities Master Plan DRAFT 2014, and the Recycled Water Program Strategy.

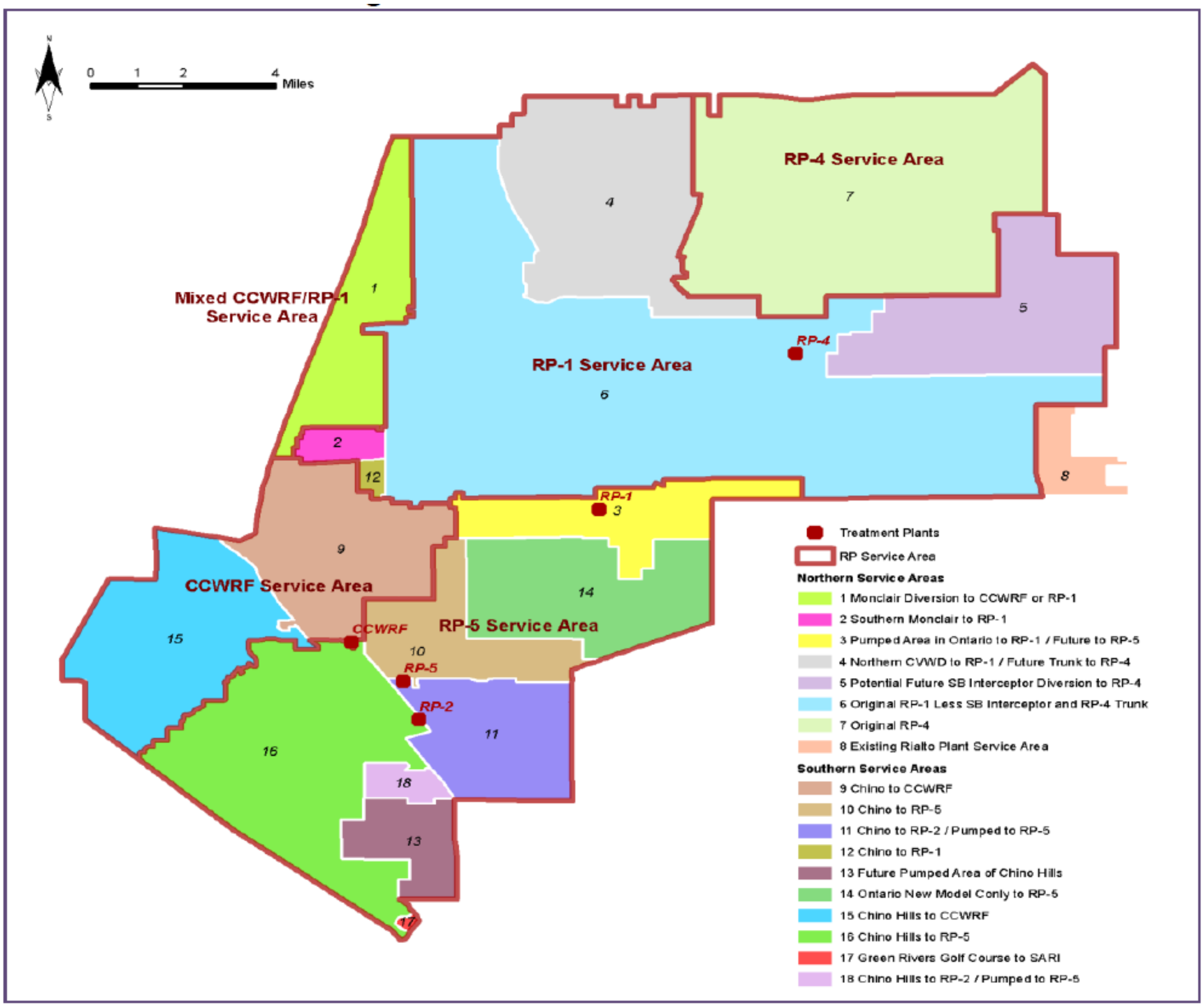

Figure 6-1: Regional Water Recycling Plan Service Areas

RP-1

RP-1 is located in the City of Ontario, has been operational since 1948, and has undergone numerous expansions to increase wastewater treatment capacity. RP-1 was originally owned and operated through a joint powers agreement between the cities of Ontario and Upland. IEUA purchased RP-1 in 1973 when it was known as the Chino Basin Municipal Water District. RP-1 receives flow from areas of Chino, Fontana, Montclair, Ontario, Rancho Cucamonga, Upland, and an unincorporated area of San Bernardino County.

The current treatment capacity is 44 MGD and the wastewater undergoes preliminary screening and grit removal, primary clarification, secondary treatment by aeration basins and clarification, tertiary treatment by filtration and disinfection, and dechlorination. The solids removed through the treatment process also undergo processing and the biosolids produced at RP-4 are sent to RP-1 for thickening, digestion, and dewatering at the solids handling facilities. Recycled water at RP-1 is sent to one of three recycled water effluent pump stations into the recycled water distribution system. Each pump station feeds three different pressure zones: 930, 1050, and 1158. The 930 Pressure Zone effluent pump station has a pumping capacity of approximately 27,030 gallons per minute (gpm) using VFD pumps. The 1050 Pressure Zone effluent pump station has a total pumping capacity of 11,250 gpm using VFD pumps. The 1158 Pressure Zone effluent pump station has a total pumping capacity of approximately 11,120 gpm.

RP-4

RP-4 is located in the City of Rancho Cucamonga and has been operating since 1997. RP-4 serves areas of Fontana, Rancho Cucamonga, and unincorporated areas of San Bernardino County. The plant underwent an expansion in 2009 increasing its treatment capacity to 14 MGD. The wastewater undergoes preliminary screening and grit removal, primary clarification, secondary treatment by aeration basins and clarification, tertiary treatment by filtration and disinfection. Biosolids from RP-4 are conveyed through the sewer system by gravity to RP-1 for processing.

Recycled water is discharged to the storage pond or pumped to provide utility water within the plant or to the recycled water distribution system for beneficial reuse. When the recycled water and utility water demand is less than the supply, the recycled water is discharged to the storage pond. RP-4 serves the 1158 Pressure Zone and the effluent pump station has a pumping capacity of 22,500 gpm.

RP-5

RP-5 is located in the City of Chino adjacent to IEUA's Administrative Headquarters. The plant serves areas of Chino, Chino Hills, and Ontario. The plant has been in operation since 2004 and has a treatment capacity of 16.3 MGD which includes 1.3 MGD of solids processing from RP-2. The treatment process consists of preliminary screening and grit removal, primary clarification, secondary treatment by aeration basins and clarification, tertiary treatment by filtration and disinfection, and dechlorination.

The solids from RP-5 are pumped to RP-2 for thickening, anaerobic digestion, and dewatering. The stabilized and dewatered solids are then transported to the Inland Empire Regional Composting Facility for processing into high quality compost for local landscaping and horticultural use. RP-2 is currently used only for processing solids as liquid wastewater processing was discontinued as portions of the plant are located in the 100-year flood plain. Biosolids processing will continue at RP-2 until solids handling facilities are constructed at RP-5 in 2022.

After disinfection, the recycled water is discharged to a creek by gravity and pumped to the recycled water distribution system. RP-5 serves the 800 Pressure Zone through the effluent pump station that has a pumping capacity of approximately 9,625 gpm.

CCWRF

The CCWRF is located in the City of Chino and has been operational since 1992 and serves areas of Chino, Chino Hills, Montclair, and Upland. The treatment capacity is 11.4 MGD and processing consists of preliminary screening and grit removal, primary clarification, secondary treatment by aeration basins and clarification, tertiary treatment by filtration and disinfection, and dechlorination. The solids are pumped to RP-2 for thickening, anaerobic digestion, and dewatering. After disinfection, the recycled water is distributed to the 930 Pressure Zone in the recycled water distribution through the effluent pump station that has a total pumping capacity of 12,925 gpm.

6.2.2 Historical, Current, and Future Wastewater Flows

IEUA's regional treated influent flow history and forecast and system capacity are shown on Figure 6-2 (IEUA, IEUA FY 15/16 Ten Year Capital Improvement Plan, March 2015). Since FY 2006-07, wastewater flows have decreased, but remained steady since FY 2010-11 due to economic conditions and conservation efforts associated with drought. Table 6-1 shows wastewater treated, recycled, and disposed in IEUA's service area in FY 2014-15. Forecast flows are based on historical wastewater flow trends, per dwelling unit wastewater generation factors, and expected future growth numbers provided by contracting agencies. Projected treated influent flow is expected to increase consistently through FY 2024-25.

Even with decreasing wastewater flows, IEUA has been able to recycle more water through diversion with the Montclair and San Bernardino Avenue Lift Stations. These lift stations provide the RWRP's in the northern service area with more wastewater as the recycled system has been expanded and is near the groundwater recharge basins.

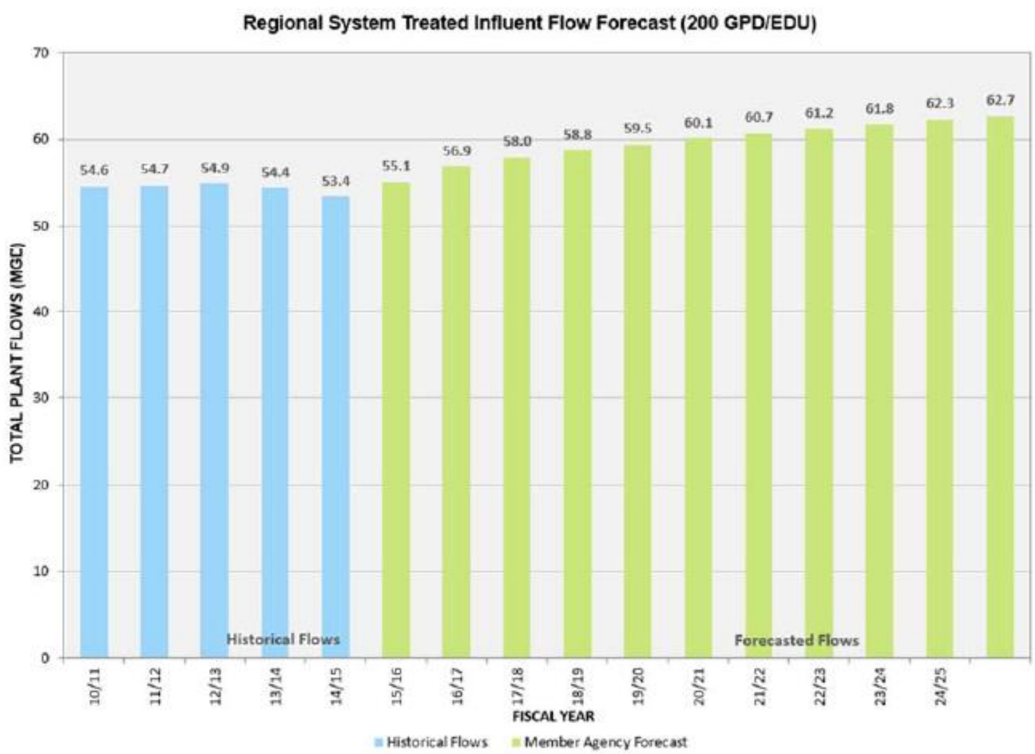

Figure 6-2: Regional System Treated Influent Flow Forecast (IEUA, IEUA FY 15/16 Ten Year Capital Improvement Plan, April 2015)

Table 6-1: Wastewater Treatment and Discharge within Service Area in 2015

Wholesale: Wastewater Treatment and Discharge Within Service Area in 2015										
							2015 volumes			
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
RP-1		Santa Ana River		River or creek outfall	No	Tertiary	28,896	23,365	33,419	
RP-4		Santa Ana River		River or creek outfall	Yes	Tertiary	10,976			
RP-5		Santa Ana River		River or creek outfall	No	Tertiary	8,960			
CCWRF		Santa Ana River		River or creek outfall	No	Tertiary	7,952			
						Total	**56,784**	**23,365**	**33,419**	**0**
NOTES: From Recycled Water Program Strategy 2015, Table 2.1.										

6.3 Current Recycled Water Uses

IEUA has served recycled water to its retail agencies since formation of the Regional Sewage Service Contract in 1972. Recycled water was originally delivered to the Whispering Lakes Golf Course in and Westwind Park in the City of Ontario, and Prado Regional Park and El Prado Golf Course in San Bernardino County. After construction of the CCWRF in the early 1990's, recycled water was delivered to the cities of Chino and Chino Hills. In 2000, recycled water was identified as a critical regional water supply and IEUA embarked on a regional recycled water program. By 2014, over $250 million was invested in the program. Recycled water and groundwater recharge sales have increased by approximately 30,000 AFY since the early 2000's.

IEUA's recycled water distribution facilities consist of a pipeline network, booster pump stations, pressure regulating stations and reservoirs. These facilities allow distribution of recycled water into six pressure zones for non-potable reuse and groundwater recharge. A large transmission line connects RP-1 and RP-4 and serves the northern portion of IEUA's service area. The Edison and San Antonio Channel Pipelines were constructed to provide recycled water to areas of Ontario, Chino and Montclair. Another transmission line ties RP-1 into RP-5 and CCWRF. Four storage reservoirs provide operational storage and are located in the 930, 1158, 1299, and 1630 pressure zones with capacities varying from 3.0 million gallons (MG) to 5.0 MG. The three booster pump stations provide water from lower to higher pressure zones including: 1158 to 1299, 1299 to 1630 East, and 1299 to 1630 West. Three pressure reducing stations provide flow from higher pressure zones to lower pressure zones when the pressure drops below a certain point (Stantec, Recycled Water Program Strategy, April 2015). This system provides water for irrigating parks and golf courses. CCWRF's distribution system delivers water to the cities of Chino and Chino Hills. Currently, there are 560 recycled water connections to the recycled water distribution system.

In FY 2014-15, IEUA's recycled water production totaled approximately 33,419 AFY of which 22,579 AF was for non-potable reuse (outdoor irrigation, industrial processes, and agriculture) and 10,840 AF was for groundwater recharge. The remaining 23,365 AF of wastewater not used for recharge or recycling was discharged to the Santa Ana River. Current and projected recycled water through 2040 and are shown in Table 6-2. Non-potable reuse is expected to increase through 2040 to 51,715 AFY and groundwater recharge is expected to increase to 13,977 AFY by 2020, remain fairly constant through 2030, and increase again in 2035 to approximately 14,871 AFY.

Table 6-2: Current and Projected Recycled Water Direct Beneficial Use within Service Area

Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment	2015	2020	2025	2030	2035	2040
GW Recharge	Tertiary	10,840	13,977	13,027	13,707	14,871	16,254*
RW Direct Use	Tertiary	22,579	30,757	36,507	40,320	43,019	51,715
	Total	**33,419**	**44,734**	**49,534**	**54,027**	**57,890**	**67,969**
NOTES: FY2014/15 is actual use. Source: Projections are from 2015 Recycled Water Program Strategy (RWPS), Tables 2.1 and ES.1. *2040 groundwater recharge volume is not provided by the RWPS therefore it is an extrapolation.							

The projected 2015 recycled water use from the IEUA's 2010 UWMP was compared to the 2015 actual recycled water use as shown in Table 6-3. Recycled water for 2015 was projected higher in the 2010 UWMP than the actual recycled water use in 2015. The actual FY 2014-15 recycled water use was much lower than the projected recycled water use in the 2010 UWMP due to the decrease in demand as a result of the economic recession and slower development coupled with increased indoor conservation limiting available supply.

Table 6-3: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual (AF)

Wholesale: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual		
Name of Receiving Supplier or Direct Use by Wholesaler	2010 Projection for 2015	2015 actual use
IEUA	66,192	33,419
Total	**66,192**	**33,419**
NOTES: FY 2014/15 actual use		

6.4 Potential Recycled Water Uses

The regional recycled water program is committed to maximizing the beneficial use of recycled water. IEUA will continue to develop, expand, and provide flexibility to allow the region to use available recycled water supplies. Expansion of the recycled water program relies on the treatment capacities at the RWRP's and wastewater flow projections (IEUA, Fiscal Year 2015/16 Ten-Year Capital Improvement Plan, March 2015).

IEUA's overall goal is to achieve maximum reuse of available recycled water. The 2015 Recycled Water Program Strategy identifies goals to increase non-potable reuse as well as provide recharge to additional basins through 2035. The 2035 recycled water demand is projected to be 43,019 AFY for non-potable reuse and 14,871 AFY for groundwater recharge.

The current distribution system is comprised of several regional pipelines that have been constructed to serve customers from the IEUA RWRP's. Recognizing that separate pumping stations, independent pressure zones (800, 930, 1050, 1158, 1299 & 1630), and multiple control interfaces will lead to complex and costly operations, the concept of a large, fully integrated regional distribution system was developed. The existing and proposed facilities will have the ability to provide recycled water to major industrial and municipal users while delivering recycled water, stormwater and imported water to groundwater recharge basins throughout IEUA's service area.

Recycled water used for groundwater recharge will be blended with MWD's imported SWP supplies and stormwater consistent with the water quality requirements of CBWM's OBMP, California Regional Water Quality Control Board, and the requirements of the California State Water Resources Control Board's (SWRCB) Division of Drinking Water (DDW).

Depending on basin specific measurements, the groundwater blending ratio will be calculated to achieve up to 50 percent with all other sources of water as determined by DDW over a 10 year period. Currently IEUA can recharge up to 14,000 AFY and may increase in the future. Additional facilities, development and modifications to new groundwater recharge basins, and additional pumping capacity will be needed to achieve the long term recycled water goals for the region.

Development of local recycled water facilities is key to expanding non-potable recycled water use. Non-potable reuse includes: irrigation for landscaping, industrial processes and cooling, and recreational uses such as decorative fountains. As the recycled water facilities expand into cities, IEUA will be looking to local water providers to construct sufficient local facilities that will reduce their dependence on imported water from MWD's Rialto Feeder.

IEUA maintains special pipelines for industries that produce wastewater that cannot be treated with conventional treatment before being discharged into the Santa Ana River or beneficially reused. These pipelines are referred to as the Non-reclaimable Wastewater System (NRWS). The NRWS carries non-reclaimable wastewater to the Los Angeles County Sanitation Districts facilities in Whittier or the OCSD for treatment and disposal. These industrial water users represent a significant amount of recycled water that could be provided for non-potable uses and are potential recycled water customers. Industrial use of recycled water is approved by DDW. In order to encourage recycled water use among NRWS users, IEUA provides incentives from time to time for the industrial users.

Recycled Water Rate – IEUA's rate for recycled water delivered to a contracting agency is $350 per AF for direct deliveries and $410 per AF for groundwater recharge. The retail water utilities that have established a recycled water rate that can be offered at a discount from their potable water rate. The amount of discount depends on each agency's existing potable water rate, existing potable infrastructure revenue needs and capital improvements needed to convey recycled water from IEUA's regional system to individual customers.

Reliability – Recycled water is a reliable resource not subject to droughts or imported water availability. Existing potable water service also remains available as a backup to recycled water, improving reliability.

Mandatory Use – In May 2002, IEUA's Board adopted Ordinance No. 75 establishing incentives and mandatory use of recycled water when available. Under the provisions of Ordinance No. 75, which is consistent with the CWC Sec 13550 and the SWRCB guidelines, potential recycled water customers who do not use recycled water when it is available are subject to a 50 percent surcharge on their potable water rate.

Technical Assistance – IEUA provides technical assistance to prepare necessary engineering reports and coordinate DDW approval of recycled water use at each customer's site. IEUA has also retained experts in industrial water use and quality to assist customers in assessing operational needs associated with using recycled water.

Increased NRWS discount – NRWS Line customers who use recycled water when available or agree to use when available will be eligible for the proposed NRWS "pass through" rate. The NRWS customer will otherwise pay the current NRWS rates. Those NRWS customers not using recycled water or not agreeing to use it will be retroactively credited the difference paid between the current rate and the "pass through" rate at the time they begin using recycled water, with the credit to first cover the cost of on-site retrofit and engineering report preparation.

6.4.1 Direct Non-Potable Potable Reuse

IEUA currently provides recycled water from their four RWRP's for direct non-potable reuse such as landscape irrigation.

6.4.2 Indirect Potable Reuse

IEUA provides recycled water for blending with imported water and stormwater to recharge the Chino Basin. IEUA's retail agencies benefit from the groundwater recharge as it provides indirect potable supplies through replenishment.

6.4.3 Recycled Water Rates

In order to encourage the use of recycled water, IEUA's Board of Directors has established service rates for FY 2015-16 through 2019-20. The recycled water rate is based on operating costs of the regional wastewater treatment system, regional wastewater distribution system, associated administrative expenses, and anticipated costs for the following fiscal year. Table 6-4 shows the rates charged for direct (non-potable uses) and recharge sales.

Table 6-4: Recycled Water Rates per AF

Type of Sale	2015/16 FY	2016/17 FY	2017/18 FY	2018/19 FY	2019/20 FY
Direct Sale	$350	$410	$470	$480	$490
Recharge Sale	$410	$470	$530	$540	$550

6.5 Optimization Plan

6.5.1 Encouraging Recycled Water Use

IEUA has organized a regional program to encourage water reuse within its service area. The establishment of new supplemental funding sources through federal, state, and regional programs now provides significant financial incentives for local agencies to develop and make use of recycled water. This removes a significant obstacle to the implementation of recycling water projects and programs.

IEUA is working closely with its local retail agencies to complete the regional recycled water distribution program that will maximize water reuse for the entire IEUA service area. Staff of all the agencies meet monthly to recycled water system master planning, to ensure that optimal capital investments are prioritized and that all potential customers are contacted regarding connection to the recycled water system. IEUA is also working with local retail agencies to ensure that all new residential, commercial and industrial developments have dual plumbing so that recycled water (when available) can be used for outdoor irrigation and other non-potable water uses. In addition, IEUA has proposed the following incentives to encourage the use of recycled water:

- Shared costs for service connections, water meters, and signage
- Loans to help finance local (non-regional) infrastructure and retrofit projects that contribute to use of recycled water
- Technical assistance with engineering, regulatory, and institutional issues, and preparation of funding applications
- Guarantee of recycled water supply reliability, especially during droughts

6.6 Funding

Implementation of the regional recycled water program has been coordinated with the availability of state and federal funds to minimize use of regional capital funds. IEUA has adopted a TYCIP that has a budget that breaks out the federal, state and local funding for recycled water projects. Local funding will be through the Regional Capital Fund, state grants, loans through DWR and the State Water Resources Control Board, and federal grant funding through the US Bureau of Reclamation's Title XVI program.

The capital and operation and maintenance funding required for recycled water system expansion are estimated at $81.8 million and $3.6 million for recharge water through FY 2025-26 per the FY 15/16 TYCIP.

As more supplemental funding becomes available, the recycled water infrastructure becomes more cost-effective to construct. IEUA staff evaluated the capital funding needs for the recycled water distribution system and determined that it can be funded through the Regional Program without an additional increase in the Regional Capital Capacity Reimbursement Amount (connection fee). This provides a significant opportunity for local retail agencies to implement the OBMP (capital costs) without impacting IEUA's water and sewer rates and charges.

Repayment of the various loans will occur through recycled water sales revenues. These revenues consist of sales of recycled water (current IEUA wholesale rate and through the MWD LRP). With certain contractual limitations, MWD provides a payment of $134 per AF of recycled water that is directly reused (not groundwater recharge) up to 13,500 AFY. This rebate expires in June 2017 (IEUA, Regional Sewerage Program Technical Committee Meeting, April 2015).

7 FUTURE WATER SUPPLY PROJECTS AND PROGRAMS

7.1 Water Management Tools

Resource optimization such as groundwater recharge minimizes IEUA's reliance on imported water. Optimization efforts are typically led by regional agencies in collaboration with local/retail agencies.

7.2 Transfer or Exchange Opportunities

Water transfers are a water management tool used to alleviate water shortages in IEUA's service area and the Santa Ana River Basin. Water transfers allow an agency to move or sell water from one service area to another, even when the agencies are not connected by pipelines. Water transfers can be effective during periods of severe drought or emergencies and take multiple forms to increase local reliability among agencies. The Chino Basin is a valuable resource for water transfers because it acts as a storage facility that has a capacity of up to 6 MAF.

IEUA has interconnections with the MVWD that provides an annual supplemental water supply up to 10,000 AFY to the City of Chino Hills. Interconnections also exist with CVWD and FWC. The Chino Basin Desalter Authority Chino 1 and Chino 2 Desalters have interconnections with all participating agencies with a common supply with booster pumps and storage reservoirs that provide flexibility and reliability during emergencies and drought conditions. The cities of Ontario and Chino also have interconnections.

WFA has interconnections with the MVWD that provides an annual supplemental water supply up to 10,000 AFY to the City of Chino Hills. Additional important interconnections have been established between the City of Ontario and the City of Chino as well as between the Chino Basin Desalter Authority and cities served within WFA's service area.

7.3 Desalination Opportunities

IEUA operates and maintains the Chino 1 Desalter that is managed by the CDA. The Chino Desalters, described in Section 7.4.2, treat groundwater from the Chino Basin with high TDS, nitrates, and VOC's. The treatment process consists of RO and ion exchange, and the Chino 1 Desalter also includes air stripping for VOC removal. There are currently no other plans to treat brackish groundwater in IEUA's service area.

WFA does not treat brackish groundwater and does not have plans to treat any.

7.4 IEUA Planned Water Supply Projects and Programs

IEUA's FY 2015-16 CIP includes recycled water, stormwater, groundwater, and conservation projects to increase local supplies for the service area. These projects provide supply reliability during drought conditions and reduce dependence on imported water. Future projects consist of groundwater recharge basin improvements, improving treatment and distribution of wastewater and recycled water facilities, and increasing conservation and water use efficiency programs. Since recycled water is not directly impacted by drought or climate change, investments in these types of projects help mitigate the impacts of regional and statewide water supply limitations. Larger volumes of high-quality stormwater, recycled water, and supplemental imported water can be captured, recharged and stored in the groundwater basin through enhancement of the recharge capacity in the Chino Basin. The additional storage would provide reliability for the region during droughts or imported water supply shortages. The expected future supply projects are described in a narrative format in this chapter and in Section 6.4 (recycled water). Additional detail is provided in the FY 2016-17 Ten Year Capital Improvement Plan.

7.4.1 Non-potable Reuse

IEUA plans to expand the capacity of RP-1 from 32 MGD to 40 MGD through the Regional Water Recycled Plant No. 1 Expansion project. This expansion project will meet the needs of projected development in the northern portion of IEUA's service area. RP-1 will be able to treat sewer flows according to regulatory requirements and produce recycled water according to Title 22 standards with this expansion project. This project is estimated to be complete in 2030.

IEUA plans to increase non-potable reuse by extending pipelines and adding pumping facilities to serve additional recycled water to the eastern portion of its service area. In addition, a pipeline will be constructed to develop a recycled water intertie between the Western Riverside County Regional Wastewater Authority and IEUA.

7.4.2 Groundwater Recovery

The projected ultimate development of the Chino Basin Desalter Program, managed by the CDA, will produce 40,000 AFY of potable water. In 2012, the Chino I and II Desalter's produced approximately 24,300 AFY of treated groundwater. Table 7-1 lists through Phase III expansion of the Chino Basin Desalter Program. The program will ultimately recover 40,000 AFY of groundwater for potable use from the Chino Basin. The Phase III expansion is expected to be complete between 2010 and 2015 with a capacity of approximately 10,000 AFY.

Table 7-1: Chino Basin Desalter Projected Production Including Phase III Expansion (AF)

Desalter No.	Year Constructed	2006	2010	2015	2020	2025	2030	2035
Desalter Phase I	2000	15,900	15,000	15,000	15,000	15,000	15,000	15,000
Desalter Phase II	2006	11,200	15,000	15,000	15,000	15,000	15,000	15,000
Desalter Phase III	2014	-	-	10,000	10,000	10,000	10,000	10,000
Total		**27,100**	**30,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**

7.4.3 Groundwater Storage Expansion

IEUA plans to expand its groundwater recharge operations with improvements at the following basins: San Sevaine, RP-3, Lower Day, and Victoria. The expansions will increase diversion and recharge capacity of recycled water, stormwater, and/or imported water. IEUA also plans to use recycled water to recharge the Wineville basin.

IEUA, CBWM and MWD are interested in expanding the existing storage account to 150,000 AF. In December 2008, the environmental study (CEQA) was completed. There are three key components to the proposed expansion:

- Increase the existing 25,000 AFY storage capacity by 15,000 AFY with Aquifer Storage Recovery wells and conveyance facilities.
- Increase the existing 33,000 AFY extraction capacity by 13,000 AFY with new wells, Ion Exchange Facilities, Aquifer Storage Recovery wells and conveyance facilities.
- Continue negotiations with MWD on expanding the conjunctive use program (CUP) to include a maximum capacity of over 300,000 AFY.

The initial MWD program is expected to be the initial phase of a CUP that will increase to 500,000 AF of storage (CBWM Peace Agreement and IEUA PEIR, July 2000).

7.4.4 Enhanced Stormwater Management

Program Element No. 2 of the OBMP was set forth to develop and implement a comprehensive recharge program. The key is to establish a well-coordinated stormwater management program to capture the maximum amount of stormwater.

Principles for Stormwater Management

It is widely recognized that the patterns of urban development, including hard surfaces (roads, roofs) and storm water management systems (concrete channels) have resulted in a significant reduction in natural infiltration of stormwater. CBMW estimated the Chino Basin was losing approximately 40,000 AF of stormwater annually that replenished the groundwater basin as a result of historic patterns of development (WEI, 2001).

LID measures reduce stormwater runoff by capturing water at or near the source of runoff and infiltrate water into the soil or harvest the water for later reuse to offset potable water supplies. LID uses a variety of innovative designs to improve the urban environment to retain, detain, filter, and recharge stormwater runoff.

Often perceived as a problem in the past due to the costs of controlling stormflows and pollutants, stormwater presents an opportunity for groundwater recharge as well as water quality improvement, water conservation, and flood reduction. LID provides options at the regional and local levels including parks, golf courses, schools, city and county streets, public and privately owned buildings and their parking facilities, and new subdivision developments.

7.5 WFA Planned Water Supply Projects and Programs

WFA does not currently have any planned future water supply projects.

WFA does not currently have any planned future water supply projects

8 VOLUNTARY REPORTING OF ENERGY INTENSITY

8.1 Overview

Water and energy resources are inextricably connected. Known as the "water-energy nexus", the California Energy Commission estimates the transport and treatment of water, treatment and disposal of wastewater, and the energy used to heat and consume water account for nearly 20 percent of the total electricity and 30 percent of non-power plant related natural gas consumed in California. In 2015, California issued new rules requiring 50 percent of its power to come from renewables, along with a reduction in GHG emissions to 40 percent below 1990 levels by 2030. Consistent with energy and water conservation, renewable energy production, and GHG mitigation initiatives, IEUA elected to voluntarily report the energy intensity of its water, wastewater, and recycled water operations.

The methodology for calculating water energy intensity outlined in Appendix O of the UWMP Guidebook was adapted from the California Institute for Energy Efficiency exploratory research study titled “Methodology for Analysis of the Energy Intensity of California’s Water Systems” (Wilkinson 2000). The study defines water energy intensity as the total amount of energy, calculated on a whole-system basis, required for the use of a given amount of water in a specific location.

UWMP voluntary reporting is limited to energy intensity associated with water management processes occurring within an urban water supplier’s direct operational control. Operational control is defined as authority over normal business operations at the operational level. Any energy embedded in water supplies imparted by an upstream water supplier (e.g., water wholesaler) or consequently by a downstream water purveyor (e.g., retail water provider) is not included in the UWMP energy intensity tables. IEUA’s calculations conform to methodologies outlined in the UWMP Guidebook and Wilkinson study.

Similar to water supply energy intensity, wastewater and recycled water energy intensities were calculated for the 2014 calendar year (January 1 thru December 31).

Energy intensity calculations for water supply, wastewater, and recycled water were done on a calendar year basis (CY 2014) consistent with The Climate Registry reporting.

Water demand and supply analyses and water use efficiency program reporting were done on a fiscal year basis consistent with IEUA IRP, Land-use based demand model, and WUEBP.

8.2 Water Supply Energy Intensity

IEUA's water supply energy intensity is provided in Table 8-1. The basis for calculations are provided in more detail below.

Table 8-1: Water Supply Energy Intensity

Urban Water Supplier: *Inland Empire Utility Agency*

Water Delivery Product (If delivering more than one type of product use Table O-1C)
Wholesale Non-Potable Deliveries

Table O-1A: Voluntary Energy Intensity - Water Supply Process Approach								
Enter Start Date for Reporting Period 1/1/2014 End Date 12/31/2014	Urban Water Supplier Operational Control							
	Water Management Process						Non-Consequential Hydropower (if applicable)	
	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process (AF)	0	19,958	0	0	0	0	0	0
Energy Consumed (kWh)	0	991,200	0	0	0	991,200		991,200
Energy Intensity (kWh/AF)	0.0	49.7	0.0	0.0	0.0	0.0	0.0	0.0

Quantity of Self-Generated Renewable Energy
35,225,315 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*
Metered Data

Data Quality Narrative:
Volume of Water Entering Process: Total recycled, imported, and storm water recharge in 2014 calendar year (see Chino Basin Recycled Water Groundwater Recharge Program 2014 Annual Report)

Narrative:
IEUA recharges recycled, imported, and storm waters on behalf of its member agencies. Control is limited to groundwater recharge and does not include upstream embedded energy consumed prior to IEUA taking control, upstream embedded energy consumed by IEUA to treat and convey reclaimed water (see Table O-2), or downstream energy consumed by IEUA's member agencies to exact, treat, and/or distribute groundwater after it has been recharged. Self-Generated Renewable Energy is reported for the agency as a whole and is not attributed to a particular operation or water treatment process (see 2015 Energy Management Plan).

8.2.1 Operational Control and Reporting Period

As described in Section 3, IEUA is a wholesale distributor of imported water. IEUA also delivers recycled water to member agencies and some large retail agricultural customers for the purposes of agriculture, municipal irrigation, industrial uses and groundwater replenishment. The UWMP Guidebook excludes recycled water from water supply energy intensity calculations (included in wastewater and recycled water intensity calculations in Section 8.3) and allows flexibility when reporting energy consumed from groundwater replenishment (banking). IEUA operationally controls groundwater replenishment in the region which is included in Table 8-1 under “Place into Storage”. While IEUA operates the Chino Desalters, operational control of the facilities is held by the Chino Basin Desalter Authority. Similarly, treatment and distribution of imported water is operationally-controlled by the WFA.

Water supply energy intensity was calculated for the 2014 calendar year. This is a standard for energy and GHG reporting to the Climate Registry, California Air Resources Board and the United States Environmental Protection Agency. Calendar year reporting provides consistency when assessing direct and indirect energy consumption within a larger geographical context, as fiscal year starting dates can vary between utilities and organizations.

8.2.2 Volume of Water Entering Processes

According to the 2014 Chino Basin Recycled Water Groundwater Recharge Program Annual Report, IEUA recharged 19,958 AF, which includes 8,166 AF of storm water and dry weather flows, 10,997 AF of recycled water, and 795 AF of imported water. Water volume is based on metered data.

8.2.3 Energy Consumption and Generation

According to IEUA’s 2014 Greenhouse Gas Report submitted to The Climate Registry, groundwater replenishment facilities consumed 991,200 kilowatt hours (kWh) of electricity. IEUA self-generated 35,225,315 kWh of renewable energy in 2014 from a variety of sources including solar, wind, and biogas. Currently, IEUA does not attribute renewable energy to specific operations but rather the agency as a whole. A description of IEUA’s energy portfolio and renewable energy goals are documented in the 2015 Energy Management Plan. Energy consumption is based on metered data.

8.3 Wastewater and Recycled Water Energy Intensity

IEUA’s wastewater and recycled water energy intensities are shown in Table 8-2. The basis for calculations are provided in more detail below.

Table 8-2: Wastewater and Recycled Water Energy Intensity

Urban Water Supplier: *Inland Empire Utility Agency*

Table O-2: Voluntary Energy Intensity - Wastewater & Recycled Water

Enter Start Date for Reporting Period 1/1/2014
End Date 12/31/2014

	Urban Water Supplier Operational Control					
	Water Management Process					
	Collection / Conveyance	Treatment	Discharge / Distribution	TCR Report	Indirect / Outside	Total
Volume of Wastewater Entering Process (AF)	57,938	57,938	55,563			57,938
Wastewater Energy Consumed (kWh)	1,316,808	104,201,227	-	167,736,290	42,524,090	105,518,035
Wastewater Energy Intensity (kWh/AF)	22.7	1798.5	0.0			1821.2
Volume of Recycled Water Entering Process (AF)	55,563	55,563	55,563	38,250	38,250	52,835
Recycled Water Energy Consumed (kWh)	-	-	16,755,061	167,736,290	111,311,030	16,755,061
Recycled Water Energy Intensity (kWh/AF)	0.0	0.0	301.6			317.1

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

35,225,315 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Volume of Water Entering Process: based on 2014 metered data

Narrative:

IEUA manages regional sewage service within its 242 square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. A system of regional trunk and interceptor sewers convey sewage to five regional wastewater treatment plants owned and operated by IEUA. Wastewater facilities utilize tertiary treatment to produce recycled water meeting Title 22 standards for non-potable reuse and groundwater replenishment. Recycled water that is not reused or replenished is discharged to the Santa Ana River. IEUA delineates wastewater from recycled water at the point following chlorination and prior to the recycled water pumps stations.

In addition to wastewater and recycled water infrastructure, IEUA also operates the Prado Dechlorination Facility, Inland Empire Regional Composting Facility, and Chino Creek Wetlands & Educational Park. While operationally-controlled by IEUA, these facilities are not directly related to the collection, treatment, or distribution of wastewater or recycled water and thus considered outside the reporting boundaries. Similarly, while much of IEUA's headquarters and vehicles are dedicated to support wastewater and recycled water operations, to maintain consistency with the UWMP Guidebook, energy consumption from these operations has also been excluded.

Energy consumed during flaring and biosolids hauling are considered integral to IEUA's wastewater treatment operations and have been included in the intensity calculations. Energy is directly metered and reported in accordance with The Climate Registry Greenhouse Gas Protocol; 2014 data are currently undergoing independent verification.

A portion of biogas produced during wastewater treatment is captured and beneficially burned as part of IEUA's treatment process. Unused biogas is flared to convert methane to carbon dioxide to reduce greenhouse gas emissions from the facilities. In 2014, IEUA utilized approximately 44 percent of the biogas for beneficial use.

8.3.1 Operational Control and Reporting Period

As described in Section 6, IEUA manages regional sewage service within its 242 square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. A system of regional trunk and interceptor sewers convey sewage to five regional wastewater treatment plants owned and operated by IEUA. Wastewater facilities use tertiary treatment to produce recycled water meeting Title 22 standards for non-potable reuse and groundwater replenishment. Recycled water that is not reused or replenished is discharged to the Santa Ana River. IEUA delineates wastewater from recycled water at the point following chlorination and prior to the recycled water pumps stations.

In addition to wastewater and recycled water infrastructure, IEUA also operates the Prado Dechlorination Facility, Inland Empire Regional Composting Facility, and Chino Creek Wetlands & Educational Park. While operationally-controlled by IEUA, these facilities are not directly related to the collection, treatment, or distribution of wastewater or recycled water and thus considered outside the reporting boundaries. Similarly, while much of IEUA's headquarters and vehicles are dedicated to support wastewater and recycled water operations, to maintain consistency with the UWMP Guidebook, energy consumption from these operations has also been excluded.

Similar to water supply energy intensity, wastewater and recycled water energy intensities were calculated for the 2014 calendar year.

8.3.2 Volume of Water Entering Processes

In 2014, IEUA collected and treated 57,983 AF of wastewater. 55,563 AF of recycled water was produced of which 24,995 AF was distributed to member agencies and retail customers, 10,997 AF was recharged, and 19,571 AF was discharged to the Santa Ana River as part of IEUA's discharge obligation. All recycled water was used for beneficial reuse; hence, wastewater discharge was 0 AF. Wastewater volume is based on metered data.

8.3.3 Energy Consumption and Generation

A summary of energy consumed during wastewater and recycled water operations as reported to The Climate Registry is shown in Table 8-3. Energy consumed during flaring and biosolids hauling are considered integral to IEUA's wastewater treatment operations and have been included in the intensity calculations. Energy is directly metered and reported in accordance with The Climate Registry Greenhouse Gas Protocol; 2014 data are currently undergoing independent verification.

As shown in Table 8-3, a portion of biogas produced during wastewater treatment is captured and beneficially burned for electricity and heat as part of IEUA's treatment process. For electricity production from biogas, energy burned is reported in lieu of electricity produced and subsequently consumed. The difference results from efficiency of combustion and transmission line losses. These energy sinks would not otherwise be reported from a utility relying on imported electricity (indirect upstream energy consumption); however, it is equally important as this energy is directly consumed by the power utility making the electricity. Unused biogas is flared to convert methane to carbon dioxide to reduce GHG emissions from the facilities. Unused biogas energy is not included in Table 8.3. In 2014, IEUA used approximately 44 percent of the biogas for beneficial use. Other renewable energy generated include solar and wind. Renewable energy production was 35,225,315 kWh in 2014. IEUA's energy portfolio and renewable energy goals are documented in the 2015 Energy Management Plan.

Table 8-3: Wastewater and Recycled Water Process Energy Consumption

Facility	Electricity (kWh)	Natural Gas (kWh)	Other Fuel (kWh)	Biogas (kWh)
Wastewater Operations				
CCWRF	6,808,570	26,500	51,800	-
RP-1	11,966,813	32,395,000	289,000	15,745,000
RP-2	481,675	2,001,900	31,800	11,896,000
RP-4	8,754,269	3,960	138,100	-
RP-5	10,028,840	2,576,900	76,300	164,800
Lift Stations	1,316,808	-	-	-
Biosolids Hauling	-	-	764,000	-
Total	**39,356,975**	**37,004,260**	**1,351,000**	**27,805,800**
Recycled Water Operations				
CCWRF	1,893,569	-	-	-
RP-1	6,634,673	-	-	-
RP-2	0	-	-	-
RP-4	4,138,123	-	-	-
RP-5	2,849,104	-	-	-
Booster Stations	1,239,592			
Total	**16,755,061**	**0**	**0**	**0**

Wastewater contains organic constituents that, when treated biologically, produce biogas. Biogas can be released to the atmosphere, captured and flared, or captured and burned for heat or electricity. While the UWMP Guidebook permits energy produced from consequential hydropower to be subtracted from the urban supplier’s total energy consumed, the Guidebook does not permit a similar credit for consequential biogas energy production. IEUA has identified biogas as a valuable renewable resource, critical to its renewable energy portfolio and goals. To demonstrate the value of biogas capture and energy production, a revised energy intensity table is shown in Table 8-4. Table 8-4 includes a credit for consequential biogas energy production.

Table 8-4: Wastewater and Recycled Water Energy Intensity (Revised to Reflect Consequential Biogas Energy Production)

Urban Water Supplier: *Inland Empire Utility Agency*

Table O-2: Voluntary Energy Intensity - Wastewater & Recycled Water (REFLECTING CONSEQUENTIAL BIOGAS GENERATION)						
Enter Start Date for Reporting Period 1/1/2014 End Date 12/31/2014	Urban Water Supplier Operational Control					
	Water Management Process					
	Collection / Conveyance	Treatment	Discharge / Distribution	TCR Report	Indirect / Outside	Total
Volume of Wastewater Entering Process (AF)	*57,938*	*57,938*	*55,563*			*57,938*
Wastewater Energy Consumed (kWh)	*1,316,808*	*76,395,427*	*-*	*167,736,290*	*70,329,890*	*77,712,235*
Wastewater Energy Intensity (kWh/AF)	*22.7*	*1318.6*	*0.0*			*1341.3*
Volume of Recycled Water Entering Process (AF)	*55,563*	*55,563*	*55,563*	*38,250*	*38,250*	*55,563*
Recycled Water Energy Consumed (kWh)	*-*	*-*	*16,755,061*	*167,736,290*	*111,311,030*	*16,755,061*
Recycled Water Energy Intensity (kWh/AF)	*0.0*	*0.0*	*301.6*			*301.6*

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

7,419,515 kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

Volume of Water Entering Process: based on 2014 metered data

Narrative:

IEUA manages regional sewage service within its 242 square mile service area to collect, treat, and dispose of wastewater delivered by contracting local agencies. A system of regional trunk and interceptor sewers convey sewage to five regional wastewater treatment plants owned and operated by IEUA. Wastewater facilities utilize tertiary treatment to produce recycled water meeting Title 22 standards for non-potable reuse and groundwater replenishment. Recycled water that is not reused or replenished is discharged to the Santa Ana River. IEUA delineates wastewater from recycled water at the point following chlorination and prior to the recycled water pumps stations.

In addition to wastewater and recycled water infrastructure, IEUA also operates the Prado Dechlorination Facility, Inland Empire Regional Composting Facility, and Chino Creek Wetlands & Educational Park. While operationally-controlled by IEUA, these facilities are not directly related to the collection, treatment, or distribution of wastewater or recycled water and thus considered outside the reporting boundaries. Similarly, while much of IEUA's headquarters and vehicles are dedicated to support wastewater and recycled water operations, to maintain consistency with the UWMP Guidebook, energy consumption from these operations has also been excluded.

Energy consumed during flaring and biosolids hauling are considered integral to IEUA's wastewater treatment operations and have been included in the intensity calculations. Energy is directly metered and reported in accordance with The Climate Registry Greenhouse Gas Protocol; 2014 data are currently undergoing independent verification.

A portion of biogas produced during wastewater treatment is captured and beneficially burned as part of IEUA's treatment process. Unused biogas is flared to convert methane to carbon dioxide to reduce greenhouse gas emissions from the facilities. In 2014, IEUA utilized approximately 44 percent of the biogas for beneficial use.

8.4 Key Findings and Next Steps

In 2014, IEUA's energy intensity of groundwater replenishment was 49.7 kWh/AF. The energy intensity of wastewater collection and treatment was 1,821 kWh/AF[1]; production and distribution of recycled water was 317 kWh/AF. Considering consequential biogas energy production, the energy intensity of wastewater was reduced to a net value of 1,341 kWh/AF. This equates to more than a 26 percent reduction in energy use, emphasizing the importance of biogas to IEUA's operations.

[1] This figure is pending final split from IEUA.

Calculating and disclosing direct operationally-controlled energy intensities is another step towards understanding the water-energy nexus. However, much work is still needed to better understand upstream and downstream (indirect) water-energy impacts. When assessing water supply energy intensities or comparing intensities between providers, it is important to consider reporting boundaries as they do not convey the upstream embedded energy or impacts energy intensity has on downstream users. Engaging one's upstream and downstream supply chain can guide more informed decisions that holistically benefit the environment and are mutually beneficial to engaged parties. Suggestions for further study include:

- Supply-chain engagement – IEUA's retail agencies rely on a variety of water sources for their customers. While some studies have used life cycle assessment tools to estimate energy intensities, there is a need to confirm this data. IEUA staff are familiar with energy reporting and could assist their retail agencies in calculating intensities for all regional supplies. Understanding the regional energy and water balance may help IEUA and its retail agencies make more informed decisions that would benefit the region as a whole. A similar analysis could be performed with upstream supply chain energy, for example, with State Project Water or surface water supplies.
- Internal benchmarking and goal setting – With a focus on energy conservation and a projected increase in water demand despite energy conservation efforts, IEUA's energy intensities will likely decrease with time. Conceivably, in a case where water demand decreases, energy intensities may rise as the energy required to pump or treat is not always proportional to water delivered. In the course of exploring the water-energy nexus and pursuing renewable energy goals, there is a need to assess whether energy intensity is a meaningful indicator or if it makes sense to use a different indicator to reflect IEUA's commitment to energy and water conservation.
- Regional sustainability – Water and energy efficiency are two components of a sustainable future. Efforts to conserve water and energy, however, may impact the social, environmental, and economic livelihood of the region. In addition to the relationship between water and energy, over time, it may also be important to consider and assess the connection these resources have on other aspects of a sustainable future.

9 CLIMATE CHANGE VULNERABILITY ASSESSMENT

9.1 Overview

Climate change is a global issue with measureable impacts to every facet of society. In southern California, climate change impacts are creating critical challenges for water utilities in procuring sustainable water resources. Assessing climate change risks and identifying climate change vulnerabilities is the first step in planning for uncertainty. Upon identifying risk, mitigation strategies can be developed and implemented to reduce risk. Over time, impacts and indicators can be monitored and strategies adjusted as knowledge improves and unknowns become better defined.

IEUA and its retail agencies recently completed Phase 1 of the IEUA IRP, a blueprint for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. The blueprint takes into consideration availability of current and future water supplies and accounts for possible fluctuations in demand forecasts resulting from climate change impacts. This is the first time that the region's planning has gone beyond a regional UWMP and the cities and water agencies have worked collaboratively to develop a comprehensive water resources plan. Two goals of the IEUA IRP are to: 1) integrate and update water resource planning documents in a focused, holistic manner, and 2) develop an implementation strategy that will improve near-term and long-term water resources management for the region. The IEUA IRP evaluates new growth, development, and water demand patterns within the service area and conducts an assessment of water needs and supply source vulnerabilities under climate change.

In April 2015, climate change vulnerabilities and impacts from the IEUA IRP were compared against the checklist in the Climate Change Handbook for Regional Water Planning (USEPA and DWR, 2011). A summary of the assessment and the current state of climate change in the region is provided below. For a thorough discussion of climate change vulnerabilities as it relates to regional and water resources, refer to the IEUA IRP included as Appendix E.

9.2 Current State of Local and Regional Climate Change

Climate change impacts have already started to create critical challenges for water resources management in southern California. More intense storm events and the changing frequency and duration of drought years are becoming evident throughout the state and the west. This makes future water supplies available to the region more uncertain, particularly imported water resources that are uniquely vulnerable to changes in the state's snowpack.

General climate change trends projected for California are that temperatures will increase and precipitation will increasingly fall as rain rather than snow. These trends will impact water supplies in two ways: higher temperatures will cause increased water demands; additionally, infrastructure to capture rain runoff is limited as water infrastructure in California was designed to capture slow melting snowpack not rapid stormwater runoff.

In addition, droughts are expected to occur more frequently, more intensely, and last longer. The Natural Resources Defence Council (NRDC) estimates that if nothing is done to address the implications associated with climate change, between the years 2025 and 2100, the cost of providing water to the western United States will increase from $200 billion to $950 billion per year.

9.3 UWMP Climate Change Risk Assessment

In April 2015, IEUA IRP climate change vulnerabilities and impacts were compared against the checklist in the Climate Change Handbook for Regional Water Planning (Handbook). Using Handbook categories and questions as a guide, regional risks were assessed to identify key climate change vulnerabilities. To the extent possible, all questions in the Handbook were addressed. Questions relating to similar risk were combined. Risks were also added to reflect region-specific conditions and uncertainties.

To aid in identifying key vulnerabilities, a high-level qualitative assessment to gauge the likelihood of impact and magnitude of risk impact was also performed. Terms used to describe likelihood were taken from Intergovernmental Panel on Climate Change (IPCC) reports and Climate Disclosure Project (CDP) methodologies. While qualitative, likelihood terms are associated with probabilities, indicating the percentage likelihood of the event occurring. Calculated probabilities were not required for the assessment, however they can give an indication as to the meaning of the terms. Likelihood terms are: Virtually certain (greater than 99 percent probability); Very likely (greater than 90 percent probability); Likely (greater than 66 percent probability); More likely than not (greater than 50 percent probability); About as likely as not (between 33 percent and 66 percent probability); Unlikely (less than 33 percent probability); Very unlikely (less than 10 percent); Exceptionally unlikely (less than 1 percent probability); and Unknown.

Magnitude terms describe the extent to which the impact, if it occurred, would affect the region. It is more than likely not all agencies in the region will be affected the same and as such, magnitudes for a particular agency may vary from the regional assessment. Qualitative in nature, magnitude terms taken from CDP risk reporting methodologies are high, medium-high, medium, low-medium, low and unknown. Factors considered when assessing magnitude were: 1) the proportion of the region affected; 2) the size of the impact on the affected portion, and 3) the potential for stakeholder or customer concern.

Climate change risks and vulnerabilities are presented in Table 9-1. Included are references to supporting documentation and general comments to support the likelihood and magnitude of climate change risk impacts. Figure 9-1 visually depicts climate change risks in relation to one another. This figure was used to identify key vulnerabilities and confirm the assessment performed in the IEUA IRP.

Table 9-1: IEUA Regional Risk Assessment Register

Category	Risk	Likelihood of Impact	Magnitude of Impact	Comments / Considerations
Water Demand	Large CII Water Users	About as likely as not	Low	CII water demand is approximately 17% of total water demand. See 2015 UWMP Table 2-5.
	Residential Water Users	Virtually certain	High	Residential water demand is approximately 63% of total water demand. See 2015 UWMP Table 2-5.
	Seasonal Water Fluctuations	Very likely	High	IEUA encourages regional members to evaluate sustainable rate structures based on an indoor/outdoor efficiency standard.
	Climate-Sensitive Crops and Agriculture	Likely	Low	Agriculture demand is less than 1% of total water demand. See 2015 UWMP Table 2-5.
	Water Curtailment Measures	Virtually certain	High	Conservation measures are expected to continue per State restrictions as seen during 2015. See Phase 1 IEUA IRP.
	Discharges to Water Bodies	Likely	Medium-high	SAR discharge is a joint obligation. Could be impacted by upstream SAR projects and minimum flow study.
Water Supply	Imported Water	Virtually certain	High	Warmer temperatures are expected to decrease snowpack that feeds SWP. This is currently the only type of imported water the region is equipped to accept. See Phase 1 IEUA IRP.
	Local Surface Water	Virtually certain	Low	Local surface supplies are understood to be directly impacted by annual precipitation, however surface water is 8% of regional supplies. See Phase 1 IEUA IRP.
	Coastal Aquifer Saltwater Intrusion	Likely	Medium	Saltwater intrusion in SWP water may reduce availability of imported water supply through reduced pumping. See Imported Water.
	Chino Basin Groundwater Resiliency	Very Unlikely	High	The region relies heavily on groundwater as a supply and for banking. Based on climate simulations, minimal impact is anticipated. See Phase 1 IEUA IRP.
	Chino Basin Groundwater Banking	Very Unlikely	High	The region relies heavily on groundwater as a supply and for banking. Based on climate simulations, minimal impact is anticipated. See Phase 1 IEUA IRP.
	Non-Chino Basin Groundwater Resiliency	Likely	Low-medium	The region relies heavily on groundwater as a supply and for banking. Based on climate simulations, minimal impact is anticipated. See Phase 1 IEUA IRP.
	Non-Chino Basin Groundwater Banking	Likely	Low-medium	The region relies heavily on groundwater as a supply and for banking. Based on climate simulations, minimal impact is anticipated. See Phase 1 IEUA IRP.
	Supply / Demand Drought Threshold	About as likely as not	Low-medium	Conservative demand estimates during climate change scenarios resulted in a small supply shortfall. See Phase 1 IEUA IRP.
	Stormwater	More likely than not	Medium	Tied to Chino Basin operating safe yield. See Phase 1 IEUA IRP.

Category	Risk	Likelihood of Impact	Magnitude of Impact	Comments / Considerations
	Recycled water	Unlikely	Medium	Phase 1 IEUA IRP findings indicate recycled water is not impacted by climate change.
	Invasive Species	Unlikely	Low	Quagga Mussels discovered in Colorado River Aqueduct; known to clog pipelines and disrupt water service.
	Endangered Species	Very likely	Medium-high	Delta smelt and Santa Ana sucker fish
Water Quality	Surface and Storm Water Quality	Likely	Low-medium	A high quality water source that improves the quality of groundwater supplies. See Phase 1 IEUA IRP.
	Imported Water Quality	Likely	High	Additional investments may need to be made to meet water quality restrictions if low-salinity imported water is not available See Phase 1 IEUA IRP.
	Groundwater Quality	Unlikely	High	Tied to Chino Basin operating safe yield. See Phase 1 IEUA IRP.
	Distribution System Water Quality	Unlikely	Low	No known historical occurrences in region.
	Wastewater Quality	Unlikely	Medium-high	Not impacted by climate change so much as conservation. See Phase 1 IEUA IRP.
	Recycled Water Quality	Unlikely	Medium-high	Not impacted by climate change so much as conservation. See Phase 1 IEUA IRP.
Sea Level Rise	Coastal Erosion / Structures	Unlikely	Low-medium	Impacts to coastal areas could drive residents inland.
	Coastal Flooding	Unlikely	Low-medium	Impacts to coastal areas could drive residents inland.
	Coastal Habitat	Very Unlikely	Low	Impacts to coastal areas could drive residents inland.
	Coastal Surges	Very Unlikely	Low	Impacts to coastal areas could drive residents inland.
Flooding / Subsidence	Direct Infrastructure Flooding	Likely	Medium-high	Region is upstream of Prado Dam.
	Indirect Infrastructure Flooding	Likely	Medium	SWP and levees could impact imported water supplies.
	Aging / Insufficient Flood Protection Infrastructure	Unlikely	Low	Region is upstream of Prado Dam and downstream of Seven Oaks Dam.
	Wildfire Related Flooding	Likely	Medium-high	Wildfires to the north could increase intensity of storm/surface water runoff
	Land Subsidence	About as likely as not	Low-medium	Despite safe yield, localized subsidence has been observed.
Ecosystem and Habitat Vulnerability	Aquatic Habitats	Likely	Medium	Prado Dam Flood Control Basin
	Estuarine Habitats	Very Unlikely	Low	Region lies inland.
	Flora and Fauna	About as likely as not	Low	Region lies south and outside San Bernardino National Forest
	Endangered or Threatened Species	More likely than not	Medium	Santa Ana sucker fish
	Recreational Water	Unlikely	Low	El Prado Park and Chino Creeks Wetlands and Educational Park supplied by recycled water

Category	Risk	Likelihood of Impact	Magnitude of Impact	Comments / Considerations
	Vulnerable Habitats	Very Unlikely	Low	Southwest Deserts are listed as one of the Top 10 habitats vulnerable to climate change.
	Movement and Migration Corridors	Very Unlikely	Low	California has a plan for migration corridors but status of implementation is unknown.
Hydropower & Energy Security	Hydropower	Very Unlikely	Low	Region relies on largely on imported grid energy.
	Renewable Supplies and Self Generation	Very likely	High	GHG reduction goals and more stringent emission limits, may require clean technologies and phase out internal combustion engines. See 2015 IEUA Energy Management Plan
	Diversification	More likely than not	Low-medium	Recommended to improve reliability. See 2015 IEUA Energy Management Plan.
	Peaking	Very likely	High	Participation in demand response and energy storage installation. See 2015 IEUA Energy Management Plan.
	Energy Efficiency	Likely	Medium	Water-energy nexus has spurred comprehensive energy efficiency goals. See 2015 IEUA Energy Management Plan.
	Carbon Emissions	Very likely	High	Impacts to energy usage and type of self-generation. See 2015 IEUA Energy Management Plan.
	Critical Infrastructure (Direct)	About as likely as not	Medium-high	Back up generation available to provide temporary power. Modification may be required to provide long term grid redundancy and independence.
	Critical Infrastructure (Indirect)	About as likely as not	Medium-high	Back up generation available to provide temporary power. Modification may be required to provide long term grid redundancy and independence.

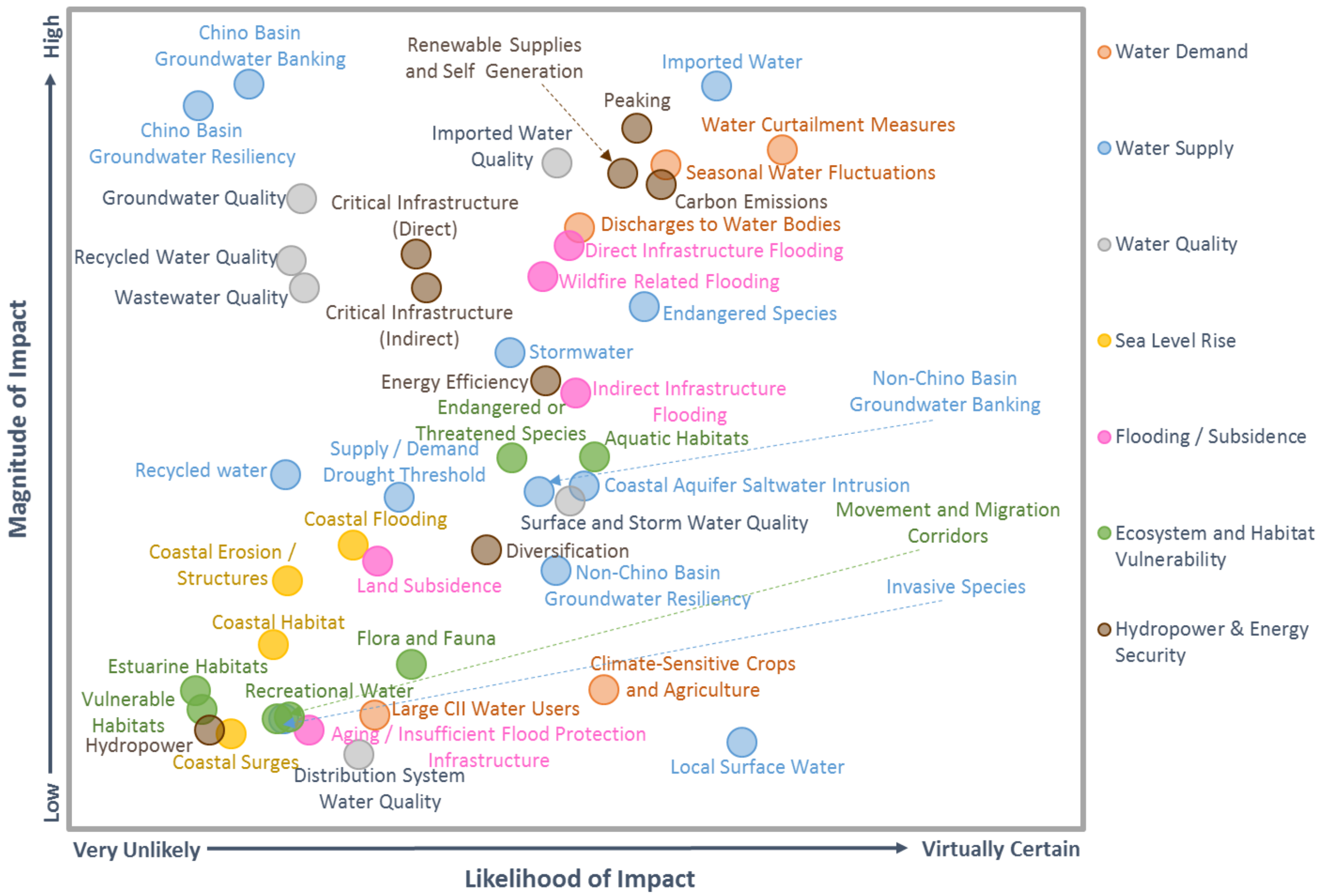

Figure 9-1: IEUA Regional Risk Likelihood and Magnitude Assessment

9.4 Climate Change Vulnerabilities and Next Steps

A summary of the climate change risk assessment and vulnerabilities is provided below:

- Consistent with the IEUA IRP, reliance on imported water supplies is a key vulnerability for the region. Indirectly, climate change impacts in northern California can affect the quality and quantity of water supplied to Inland Empire.
- Consistent with the IEUA IRP, water curtailment measures and seasonal fluctuations in water demand also have a high likelihood and magnitude of impacting the region. As drought continues in southern California, the importance of these risks will be further emphasized and more thoroughly understood as utilities focus their efforts on developing strategies to mitigate these risks.

- Although the anticipated magnitude of impact is high, the likelihood of climate change affecting groundwater resiliency, replenishment, and quality is low. This reflects the recognized importance groundwater plays in the region and the proactive steps that have already been taken to ensure sustainable groundwater supplies.
- Energy security has a high likelihood and magnitude of affecting the region as a result of climate change. While IEUA has started taking steps to reduce peaking, invest in local, renewable energy, and diversify its energy portfolio, there is a need to assess the region's energy dependence on outside energy resources to ensure sustainable water delivery in the future. While IEUA's 2015 Energy Management Plan addresses its organization's own energy risks and goals, no known plan has been developed at the regional level.
- Agriculture and large commercial, industrial, and institutional users are not anticipated to have an appreciable effect water demand. This is consistent with UWMP and IEUA IRP demand projections showing a decrease in agricultural water use and an increase in residential water use as the region grows.
- Although there are some cases where endangered species could impact the region's water supply, ecosystem and habitat vulnerability impacts to water utilities are projected to be low. This is likely the result of a largely urban region with scarce natural resources in its boundaries. However, as society places greater importance on the benefit of natural surroundings, impacts to water utilities may increase. This is the result of social, not climate change impacts and should be addressed independently.
- Climate change will inevitably have financial impacts to water utilities. While the initial climate assessment was limited to environmental impacts, there is a need to understand the financial cost of delaying risk mitigation and the financial benefit of pro-active mitigation in a time of uncertainty.

This climate change risk assessment and the climate change assessment performed in Phase 1 of the IEUA IRP demonstrate a regional commitment to identify, assess, and mitigate climate change vulnerabilities early and through partnerships and proactive engagement. Phase 2 of the IEUA IRP anticipated to begin in Summer 2016 will continue to address some of the water resource challenges in the region through the identification and prioritization of regional and local water projects. Phase 2 will also disaggregate region demand and supply and begin looking at the local retail level. It is anticipated that Phase 2 of the IEUA IRP will continue the climate change discussion and further examine the role energy plays in delivering water to communities and residents in the region.

10 UWMP ADOPTION PROCESS

10.1 Overview

Recognizing that close coordination among other relevant public agencies is key to the success of its UWMP, IEUA and WFA worked closely with entities such as MWD to develop and update this planning document. IEUA and WFA also encouraged public involvement by holding a public hearing for residents to learn and ask questions about their water supply.

This section provides the information required in Article 3 of the Water Code related to adoption and implementation of the UWMP. Table 10-1 summarizes external coordination and outreach activities carried out by the IEUA and WFA and their corresponding dates. The UWMP checklist to confirm compliance with the Water Code is provided in Appendix A.

Table 10-1: External Coordination and Outreach

External Coordination and Outreach	Date	Reference
Encouraged public involvement	06/02/16 & 06/09/16 (WFA) 05/27/16 & 06/06/16 (IEUA)	Appendix C
Notified city or county within supplier's service area that water supplier is preparing an updated UWMP (at least 60 days prior to public hearing)	03/02/16	Appendix C
Held public hearing	06/15/16	Appendix C
Adopted UWMP	06/16/16 (WFA) 06/15/16 (IEUA)	Appendix D
Submitted UWMP to DWR (no later than 30 days after adoption)	06/30/16	-
Submitted UWMP to the California State Library and city or county within the supplier's service area (no later than 30 days after adoption)	06/30/16	-
Made UWMP available for public review (no later than 30 days after filing with DWR)	05/02/16	-

This UWMP was adopted by IEUA's Board of Directors on June 15, 2016 and WFA's Board of Directors on June 16, 2016. A copy of the adopted resolution is provided in Appendix D.

A change from the 2004 legislative session to the 2009 legislative session required the IEUA to notify any city or county within its service area at least 60 days prior to the public hearing. As indicated in Table 10-2, IEUA sent a Letter of Notification to the County of San Bernardino and cities within its service area on March 2, 2016 to state that it was in the process of preparing an updated UWMP (Appendix C).

Table 10-2: Notification to Cities and Counties

Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with CWC 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
City of Chino	☑	☑
City of Chino Hills	☑	☑
Cucamonga Valley Water District	☑	☑
Fontana Water Company	☑	☑
Monte Vista Water District	☑	☑
City of Ontario	☑	☑
San Antonio Water Company	☑	☑
City of Upland	☑	☑
County Name	60 Day Notice	Notice of Public Hearing
San Bernardino County	☑	☑
NOTES: Notifications to Cities and Counties within IEUA's service area were sent out on March 2, 2016.		

10.2 Public Participation

IEUA encouraged community and public interest involvement in the plan update through a public hearing and inspection of the draft document on June 15. Public hearing notifications were published in local newspapers. A copy of the published Notice of Public Hearing is included in Appendix C. The hearing provided an opportunity for all residents and employees in the service area to learn and ask questions about their water supply in addition to the IEUA's plans for providing a reliable, safe, high-quality water supply. Copies of the draft plan were made available for public inspection at the IEUA headquarters and website.

10.3 Agency Coordination

IEUA's water supply planning relates to the policies, rules, and regulations of its regional and local water providers. IEUA is dependent on imported water from MWD, its regional wholesaler. As such, IEUA involved the water providers in this 2015 UWMP at various levels of contribution as summarized in Table 10-3.

Table 10-3: Coordination with Appropriate Agencies

	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan Preparation	Received Copy of Draft Plan*	Sent Notice of Intention to Adopt	Received Copy of Adopted Plan
City of Chino	√			√	√	√	√
City of Chino Hills	√			√	√	√	√
City of Montclair	√			√	√	√	√
City of Ontario	√			√	√	√	√
City of Rancho Cucamonga	√			√	√	√	√
City of Upland	√			√	√	√	√
Chino Basin Watermaster				√	√	√	√
Cucamonga Valley Water District	√			√	√	√	√
Fontana Water Company	√			√	√	√	√

	Participated in Plan Development	Commented on Draft	Attended Public Meetings	Sent Notice of Plan Preparation	Received Copy of Draft Plan*	Sent Notice of Intention to Adopt	Received Copy of Adopted Plan
Water Facilities Authority	√	√	√	√	√	√	√
Monte Vista Water District	√			√	√	√	√
MWD				√	√	√	√
San Antonio Water Company	√			√	√	√	√
Santa Ana Watershed Project				√	√	√	√
Santa Ana RWQCB				√	√	√	√
County, San Bernardino				√	√	√	√
LAFCO				√	√	√	√

*IEUA posted the draft 2015 UWMP to its website on May 5, 2016.

10.4 UWMP Submittal

10.4.1 Review of 2010 UWMP Implementation

As required by California Water Code, the IEUA summarized Water Conservation Programs implemented to date, and compared them to those planned in its 2010 UWMP.

Comparison of 2010 Planned Water Conservation Programs with 2015 Actual Programs

As a wholesaler, IEUA did not include a specific implementation plan in its 2010 UWMP. As a signatory to the MOU regarding urban water use efficiency, IEUA is committed to implementing BMP-based water use efficiency programs. For IEUA's specific achievements in the area of conservation, please see Section 4 of this Plan.

10.4.2 Filing of 2015 UWMP

IEUA's Board of Directors reviewed the Final Draft Plan on May 18, 2016. The five-member Board of Directors approved the 2015 Regional UWMP on June 15, 2016. See Appendix D for the resolution approving the Plan.

By July 1, 2016, the adopted 2015 Regional UWMP was filed with DWR, California State Library, County of San Bernardino, and cities within its service area, if applicable.

REFERENCES

California Department of Water Resources, 2015. Urban Water Management Plans, Guidebook for Urban Water Suppliers.

Chino Basin Watermaster, Chino Basin Optimum Basin Management Program 2014 State of the Basin Report (June 2015).

Department of Water Resources, 2015. State Water Project Final Delivery Capability Report 2015.

Inland Empire Utilities Agency, Drought Plan (April 2009)

Inland Empire Utilities Agency, Fiscal Year 2015/16 Ten-Year Capital Improvement Plan (March 2015).

Inland Empire Utilities Agency, Integrated Water Resources Plan: Water Supply & Climate Change Impacts 2015-2040 (2016).

Inland Empire Utilities Agency, Recycled Water Program Strategy (October 2015).

Inland Empire Utilities Agency, Regional Sewerage Program Technical Committee Meeting (April 2015).

Inland Empire Utilities Agency, Wastewater Facilities Master Plan (August 2014).

Metropolitan Water District of Southern California, 2016. MWD Urban Water Management Plan 2015.

Urban Water Management Planning Act, California Water Code § 10610-10656 (2010).

Water Conservation Act of 2009, California Senate SB x7-7, 7th California Congress (2009).

Water Facilities Authority, Contingency Operations Plan (May 2015)

Water Systems Optimization, 2016. California Department of Water Resources: Water Audit Manual.

APPENDIX A

UWMP Checklist

UWMP Checklist

This checklist is developed directly from the Urban Water Management Planning Act and SB X7-7. It is provided to support water suppliers during preparation of their UWMPs. Two versions of the UWMP Checklist are provided – the first one is organized according to the California Water Code and the second checklist according to subject matter. The two checklists contain duplicate information and the water supplier should use whichever checklist is more convenient. In the event that information or recommendations in these tables are inconsistent with, conflict with, or omit the requirements of the Act or applicable laws, the Act or other laws shall prevail.

Each water supplier submitting an UWMP can also provide DWR with the UWMP location of the required element by completing the last column of eitherchecklist. This will support DWR in its review of these UWMPs. The completed form can be included with the UWMP.

If an item does not pertain to a water supplier, then state the UWMP requirement and note that it does not apply to the agency. For example, if a water supplier does not use groundwater as a water supply source, then there should be a statement in the UWMP that groundwater is not a water supply source.

Checklist Arranged by Subject

CWC Section	UWMP Requirement	Subject	Guidebook Location	UWMP Location *(Optional Column for Agency Use)*
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	**Section 1.1**
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	**Section 10.3**
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	Plan Preparation	Section 2.5.2	**Section 10.2**
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	**Section 1.4.1 and 1.5.1**
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	**Section 1.4.3 and 1.5.3**
10631(a)	Provide population projections for 2020, 2025, 2030, and 2035.	System Description	Section 3.4	**Section 1.4.4 and 1.5.4**
10631(a)	Describe other demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	**Section 1.4.4 and 1.5.4**
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	**Section 1.4.4 and 1.5.4**
10631(e)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	**Section 2.3.2**
10631(e)(3)(A)	Report the distribution system water loss for the most recent 12-month period available.	System Water Use	Section 4.3	**Section 2.5.4.1**
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	**N/A**
10608.20(b)	Retail suppliers shall adopt a 2020 water use target using one of four methods.	Baselines and Targets	Section 5.7 and App E	**N/A**
10608.20(e)	Retail suppliers shall provide baseline daily	Baselines and	Chapter 5 and	**N/A**

	per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Targets	App E	
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	**N/A**
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	**N/A**
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	**N/A**
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	**Section 4.7**
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	**N/A**
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	**Section 3.1**
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	**Section 3.2**
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	**Section 3.2**
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	**Section 3.2**
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	**Section 3.2.1**
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	**Section 3.2.1**
10631(b)(3)	Provide a detailed description and analysis	System Supplies	Section 6.2.4	**Section 3.2**

	of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years			
10631(b)(4)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Sections 6.2 and 6.9	**Section 3.1 and 3.2**
10631(d)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	**Section 7.2**
10631(g)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years.	System Supplies	Section 6.8	**Section 7**
10631(h)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	**Section 7.3**
10631(j)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) – if any - with water use projections from that source.	System Supplies	Section 2.5.1	**N/A**
10631(j)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	**Section 2.4.1 and 2.5.1 and Table 1-4**
10633	For wastewater and recycled water, coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.1	**Section 6.1**
10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area. Include quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	System Supplies (Recycled Water)	Section 6.5.2	**Section 6.2**
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.2	**Section 6.2**
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and 6.5.4	**Section 6.3**
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4	**Section 6.4**
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description	System Supplies (Recycled Water)	Section 6.5.4	**Section 6.3 and 6.4**

	of the actual use of recycled water in comparison to uses previously projected.			
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	**Section 6.4**
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	**Section 6.5**
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	**Section 3.2, 3.3, 3.5, 3.6, 3.7, 4.7, 4.9, and 6.4**
10631(c)(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	**Section 3.9.1**
10631(c)(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	**Section 3.9.2 and 3.9.3**
10631(c)(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	**Section 3.9.1**
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	**Section 3.9.1**
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	**Section 3.9.2 and 3.9.3**
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	**Section 5.3**
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	**Section 5.6**
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	**Section 5.7**
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	**Section 5.3**
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency	Section 8.4	**Section 5.3**

		Planning		
10632(a)(6)	Indicated penalties or charges for excessive use, where applicable.	Water Shortage Contingency Planning	Section 8.3	**Section 5.3**
10632(a)(7)	Provide an analysis of the impacts of each of the actions and conditions in the water shortage contingency analysis on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts.	Water Shortage Contingency Planning	Section 8.6	**Section 5.8**
10632(a)(8)	Provide a draft water shortage contingency resolution or ordinance.	Water Shortage Contingency Planning	Section 8.7	**Appendix K, L, and M**
10632(a)(9)	Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.	Water Shortage Contingency Planning	Section 8.5	**Section 5.3**
10631(f)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	**N/A**
10631(f)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	**Section 4**
10631(i)	CUWCC members may submit their 2013-2014 CUWCC BMP annual reports in lieu of, or in addition to, describing the DMM implementation in their UWMPs. This option is only allowable if the supplier has been found to be in full compliance with the CUWCC MOU.	Demand Management Measures	Section 9.5	**Section 4**
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Section 10.3	**N/A**
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	**Appendix C**
10621(d)	Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	**Section 10.4.2 and Appendix D**
10635(b)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	**Section 10**

10642	Provide supporting documentation that the urban water supplier made the plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	**Section 10**
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Sections 10.2.1	**Appendix C**
10642	Provide supporting documentation that the plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	**Appendix D**
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3	**Section 10.4.2**
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	**Section 10**
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	Sections 10.4.1 and 10.4.2	**Section 10**
10645	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	**Section 10**

APPENDIX B

Standardized Tables

Table 2-2: Plan Identification			
Select Only One	Type of Plan		Name of RUWMP or Regional Alliance *if applicable* *drop down list*
☐	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☑	**Regional Urban Water Management Plan (RUWMP)**		Other
NOTES: This UWMP covers the Inland Empire Utilities Agency (IEUA) and the Water Facilities Authority (WFA)			

Table 2-3: Agency Identification	
Type of Agency (select one or both)	
☑	Agency is a wholesaler
☐	Agency is a retailer
Fiscal or Calendar Year (select one)	
☐	UWMP Tables Are in Calendar Years
☑	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Date that the Fiscal Year Begins (mm/dd)	
7/1	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
NOTES: This agency identification table applies to both IEUA and the WFA	

Table 2-4 Wholesale: Water Supplier Information Exchange (select one)	
☐	Supplier has informed more than 10 other water suppliers of water supplies available in accordance with CWC 10631. Completion of the table below is optional. If not completed include a list of the water suppliers that were informed.
	Provide page number for location of the list.
☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631. **Complete the table below.**

Water Supplier Name *(Add additional rows as needed)*
City of Chino
City of Chino Hills
Cucamonga Valley Water District
Fontana Water Company
Monte Vista Water District
City of Ontario
San Antonio Water Company
City of Upland

NOTES:

Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040*(opt)*
	856,168	896,533	955,569	1,009,349	1,067,946	1,125,203
NOTES: Total population for IEUA service area from IEUA IRP (Appendix D) based on 2012 SCAG RTP including unincorporated area population.						

Table 3-1 Wholesale: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040*(opt)*
	450,041	471,259	502,291	530,560	561,361	591,458

NOTES: 2015 population is the sum of 2015 population reported by each of WFA's five retail agencies (estimated using various methods) representing 52.6 percent of IEAU's service area population estimated by 2012 SCAG RTP.

Table 4-1 Wholesale: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Drop down list *May select each use multiple times* *These are the only use types that will be recognized by the WUE data online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Sales to other agencies		Drinking Water	58,906
		TOTAL	58,906
NOTES: Actual FY 2014/15 IEUA Annual Water Use Report/Database			

Table 4-1 Wholesale: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Drop down list *May select each use multiple times* *These are the only use types that will be recognized by the WUE data online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Sales to other agencies		Drinking Water	27,606
		TOTAL	27,606
NOTES: IEUA's imported water sales to WFA was 47 percent of its total imported water sales in FY 2014-15.			

Table 4-2 Wholesale: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Drop down list *May select each use multiple times* *These are the only Use Types that will be recognized by the WUEdata online submittal tool.*		2020	2025	2030	2035	2040 *(opt)*
Sales to other agencies		69,752	69,752	69,752	69,752	69,752
	TOTAL	69,752	69,752	69,752	69,752	69,752
NOTE: From IEUA IRP baseline supply projections for imported water						

Table 4-2 Wholesale: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool.*		2020	2025	2030	2035	2040 *(opt)*
Sales to other agencies		32,783	32,783	32,783	32,783	32,783
	TOTAL	32,783	32,783	32,783	32,783	32,783

NOTES: IEUA's imported water sales to WFA represented 47 percent of its total imported water sales in FY2014-15. Assumption is 47 percent for all future years.

Table 4-3 Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040*(opt)*
Potable and Raw Water *From Tables 4-1 and 4-2*	58,906	69,752	69,752	69,752	69,752	69,752
Recycled Water Demand* *From Table 6-4*	33,419	44,734	49,534	54,027	57,890	67,969
TOTAL WATER DEMAND	92,325	114,486	119,286	123,779	127,642	137,721
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES: 2015 values are FY 2014-15 actuals. Raw water projections are from IEUA IRP baseline projection and recycled water projections are derived from IEUA's RWPS (Table 5.4).						

Table 4-3 Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040*(opt)*
Potable and Raw Water *From Tables 4-1 and 4-2*	27,606	32,783	32,783	32,783	32,783	32,783
Recycled Water Demand* *From Table 6-4*	0	0	0	0	0	0
TOTAL WATER DEMAND	27,606	32,783	32,783	32,783	32,783	32,783
**Recycled water demand fields will be blank until Table 6-4 is complete.*						
NOTES: 2015 value represents actual demand for FY 2014-15. Projected values assume WFA's demands represent 47 percent of IEUA's imported water demand.						

Table 4-4 Wholesale: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2014	0
** Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*	
NOTES: IEUA does not own or operate any potable pipelines or connections	

Table 4-4 Wholesale: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss*
07/2014	266.6
** Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*	
NOTES: WFA's AWWA water loss audit	

Table 5-1 Baselines and Targets Summary *Retail Agency or Regional Alliance Only*					
Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*1995-1999*	*2004-2008*	*243*	*218*	*194*
5 Year	*2003-2005*	*2007-2009*	*227*		
*All values are in Gallons per Capita per Day (GPCD)					
NOTES: Baselines and targets were determined by calculating the weighted average of the retail agencies' values, taken from the verification forms for each retail agency within the Regional Alliance.					

Table 5-2: 2015 Compliance
Retail Agency or Regional Alliance Only

Actual 2015 GPCD*	2015 Interim Target GPCD*	**Optional Adjustments to 2015 GPCD** *From Methodology 8*					2015 GPCD* *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
		Extraordinary Events*	Economic Adjustment*	Weather Normalization*	TOTAL Adjustments*	Adjusted 2015 GPCD*		
160	218				0	160	160	Yes

**All values are in Gallons per Capita per Day (GPCD)*

NOTES: Actual 2015 GPCD and 2015 target were determined by calculating the weighted average of the retail agencies' values taken from the verification forms for each retail agency within the Retail Alliance.

Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
	TOTAL	0	0	0	0	0
NOTES:						

Table 6-1 Wholesale: Groundwater Volume Pumped						
☑	Supplier does not pump groundwater. The supplier will not complete the table below.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
	TOTAL	0	0	0	0	0
NOTES:						

Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2015										
☐	Wholesale supplier neither distributes nor provides supplemental treatment to recycled water. The supplier will not complete the table below.									
							2015 volumes			
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)*	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level *Drop down list*	Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
Add additional rows as needed										
RP-1		Santa Ana River		River or creek outfall	No	Tertiary	28,896	23,365	33,419	
RP-4		Santa Ana River		River or creek outfall	Yes	Tertiary	10,976			
RP-5		Santa Ana River		River or creek outfall	No	Tertiary	8,960			
CCWRF		Santa Ana River		River or creek outfall	No	Tertiary	7,952			
						Total	56,784	23,365	33,419	0

NOTES: From Recycled Water Program Strategy 2015, Table 2.1

Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
☐	Recycled water is not directly treated or distributed by the supplier. The supplier will not complete the table below.						
Name of Receiving Supplier or Direct Use by Wholesaler	Level of Treatment *Drop down list*	2015	2020	2025	2030	2035	2040 *(opt)*
Add additional rows as needed							
GW Recharge	Tertiary	10,840	13,977	13,027	13,707	14,871	16,254
RW Direct Use	Tertiary	22,579	30,757	36,507	40,320	43,019	51,715
	Total	33,419	44,734	49,534	54,027	57,890	67,969

NOTES: FY2014/15 is actual use. Source:Projections are from 2015 Recycled Water Program Strategy (RWPS), Tables 2.1 and ES.1.
*2040 groundwater recharge volume is not provided by the RWPS therefore it is an extrapolation.

Table 6-5 Wholesale: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual		
☐	Recycled water was not used or distributed by the supplier in 2010, nor projected for use or distribution in 2015. The wholesale supplier will not complete the table below.	
Name of Receiving Supplier or Direct Use by Wholesaler	2010 Projection for 2015	2015 actual use
Add additional rows as needed		
IEUA	66,192	33,419
Total	66,192	33,419
NOTES: FY 2014/15 actual use		

Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☑	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
Page 7-2	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other agencies?		Description *(if needed)*	Planned Implementation Year	Planned for Use in Year Type *Drop Down list*	Expected Increase in Water Supply to Agency
	Drop Down Menu	*If Yes, Agency Name*				
Add additional rows as needed						
NOTES:						

Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
Drop down list *May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Actual Volume	Water Quality *Drop Down List*	Total Right or Safe Yield *(optional)*
Add additional rows as needed				
Purchased or Imported Water		58,906	Raw Water	
Recycled Water		33,419	Recycled Water	
Total		92,325		0
NOTES: Imported water from Actual FY 2014-15 IEUA Water Use Report/Database. Recycled water from IEUA database.				

Table 6-8 Wholesale: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
Drop down list *May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Actual Volume	Water Quality *Drop Down List*	Total Right or Safe Yield *(optional)*
Add additional rows as needed				
Purchased or Imported Water		27,606	Drinking Water	
Total		27,606		0
NOTES: IEUA's FY 2014-15 sales of imported water to WFA.				

Table 6-9 Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	**Projected Water Supply** *Report To the Extent Practicable*				
		2020	**2025**	**2030**	**2035**	**2040** *(opt)*
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Add additional rows as needed						
Purchased or Imported Water		69,752	69,752	69,752	69,752	69,752
Recycled Water	Direct Use	30,757	36,507	40,320	43,019	51,715
Recycled Water	GW Recharge	13,977	13,027	13,707	14,871	16,254
	Total	114,486	119,286	123,779	127,642	137,721

NOTES: Imported water from IEUA IRP Baseline Supply. Recycled water from 2015 RWPS, Tables 2.1 and ES.1. 2040 groundwater recharge volume is not provided by the RWPS therefore it is an extrapolation.

Table 6-9 Wholesale: Water Supplies — Projected						
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*				
		2020	**2025**	**2030**	**2035**	**2040** *(opt)*
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume	Reasonably Available Volume
Add additional rows as needed						
Purchased or Imported Water		32,783	32,783	32,783	32,783	32,783
	Total	32,783	32,783	32,783	32,783	32,783

NOTES: Assume 47 percent of IEUA’s imported supply is for WFA for all future years (same proportion as in FY 2014-15 actual).

Table 7-1 Wholesale: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ____________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available	**% of Average Supply**
Average Year	2010	294,642	
Single-Dry Year	2013	294,642	
Multiple-Dry Years 1st Year	2014	294,642	
Multiple-Dry Years 2nd Year	2015	294,642	
Multiple-Dry Years 3rd Year	2015	294,642	

Agency may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If an agency uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.

NOTES: Volumes based on IRP baseline supply projections for 2040 plus supplemental supply opportunities to be developed (excluding recycled water for agricultural). The values represent the regional supply, not just IEUA wholesale supply.

Table 7-1 Wholesale: Basis of Water Year Data			
Year Type	**Base Year** *If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 1999-2000, use 2000*	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ___________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available	**% of Average Supply**
Average Year	2010	32,783	100%
Single-Dry Year	2013	34,010	104%
Multiple-Dry Years 1st Year	2014	34,744	106%
Multiple-Dry Years 2nd Year	2015	34,744	106%
Multiple-Dry Years 3rd Year	2015	34,744	106%

Agency may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If an agency uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.

NOTES: Volume available during average year, single-dry year, and multiple-dry years represents IRP projection for 2040.

Table 7-2 Regional: Normal Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040 *(Opt)*
Supply totals	236,812	270,524	278,541	283,814	289,127	294,642
Demand totals	199,702	210,588	225,923	242,732	254,721	278,017
Difference	37,110	59,936	52,618	41,082	34,406	16,625

NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc. not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Supply numbers from IEUA IRP’s baseline supplies plus supplemental supply opportunities (excluding recycled water for agriculture). Demand numbers also excludes recycled water for agriculture. Demand numbers from land use based model projection excluding demand for recycled water for agriculture.

Table 7-2 Wholesale: Normal Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040 *(Opt)*
Supply totals *(autofill from Table 6-9)*	92,325	114,486	119,286	123,779	127,642	137,721
Demand totals *(autofill fm Table 4-3)*	92,325	114,486	119,286	123,779	127,642	137,721
Difference	0	0	0	0	0	0

NOTES: This table is auto-filled from Table 4-3, 6-8 and 6-9 and represents IEUA's wholesale demand and supply only. This table is not included in the UWMP report but is included in the DWR submittal tool.

Table 7-2 Wholesale: Normal Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040 *(Opt)*
Supply totals *(autofill from Table 6-9)*	27,606	32,783	32,783	32,783	32,783	32,783
Demand totals *(autofill fm Table 4-3)*	27,606	32,783	32,783	32,783	32,783	32,783
Difference	0	0	0	0	0	0

NOTES: In FY 2014-15, IEUA’s imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years.

Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040 (Opt)
Supply totals	236,812	270,524	278,541	283,814	289,127	294,642
Demand totals	200,947	213,213	230,148	248,784	262,660	288,415
Difference	35,865	57,311	48,393	35,030	26,467	6,228

NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc., not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Single dry year demands are normal year demand increased by 3.74% in 2040, prior year demands are interpolated. Supply numbers are IEUA IRP baseline numbers plus supplemental supply opportunities in 2035 and 2040.

Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison						
	2015	2020	2025	2030	2035	2040 (Opt)
Supply totals	27,778	33,192	33,396	33,601	33,805	34,010
Demand totals	27,778	33,192	33,396	33,601	33,805	34,010
Difference	0	0	0	0	0	0
NOTES: In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years. Increase of 3.74 percent by 2040, interpolate for prior years.						

Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison							
		2015	2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	236,812	270,524	278,541	283,814	267,415	294,642
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	35,119	55,738	45,863	31,405	0	0
Second year	Supply totals	236,812	270,524	278,541	283,814	267,415	294,642
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	35,119	55,738	45,863	31,405	0	0
Third year	Supply totals	236,812	270,524	278,541	283,814	267,415	294,642
	Demand totals	201,693	214,786	232,678	252,409	267,415	294,642
	Difference	35,119	55,738	45,863	31,405	0	0

NOTES: The values in this table provide the demand and supply values for the region not just IEUA wholesale (i.e. including groundwater, surface water, etc. not supplied by IEUA). These regional values align with IEUA's Integrated Water Resources Plan which examine the regional demand/supply not just IEUA wholesale. Multiple dry year demands are normal year demand increased by 5.98% in 2040, prior year demands are interpolated. Supply numbers are IEUA IRP baseline numbers plus local supplemental supply opportunities to close any supply gaps in 2035 and 2040.

Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison							
		2015	2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	0	0	0	0	0	0
Second year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	0	0	0	0	0	0
Third year	Supply totals	27,881	33,437	33,764	34,090	34,417	34,744
	Demand totals	27,881	33,437	33,764	34,090	34,417	34,744
	Difference	0	0	0	0	0	0

NOTES: In FY 2014-15, IEUA's imported water sales to WFA represented 47 percent of its total imported water sales. Assume 47 percent for all future years. Increase of 5.98 percent by 2040, interpolate for prior years.

Table 8-1 Wholesale Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Supply Reduction[1]	Water Supply Condition (*Narrative description)*
Add additional rows as needed		
[1] *One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.*		
NOTES: Water Shortage Contignency Plan stages are available only at the retail agency level. These stages are specific for each retail agency.		

Table 8-4 Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	102,891	105,287	107,519

NOTES: Three year minimum supply (IEUA wholesale supply) taken from the sum of IRP baseline supply for imported water, direct use recycled water, and groundwater recharge recycled water for each respective year.

Table 8-4 Wholesale: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	31,384	31,384	31,384
NOTES: Three year minimum supply is from WFA's annual allocatation of MWD's available Tier 1 water supply as specified in the 2016 IRP.			

Table 10-1 Wholesale: Notification to Cities and Counties (select one)		
☐	Supplier has notified more than 10 cities or counties in accordance with CWC 10621 (b) and 10642. **Completion of the table below is not required. Provide a separate list of the cities and counties that were notified.**	
	Provide the page or location of this list in the UWMP.	
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
City of Chino	☑	☑
City of Chino Hills	☑	☑
Cucamonga Valley Water District	☑	☑
Fontana Water Company	☑	☑
Monte Vista Water District	☑	☑
City of Ontario	☑	☑
San Antonio Water Company	☑	☑
City of Upland	☑	☑
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
San Bernardino County	☑	☑
	☐	☐
NOTES: Notifications to Cities and Counties within IEUA's service area were sent on March 2, 2016.		

APPENDIX C

Notification of Public and Service Area Suppliers

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

**NOTICE OF PUBLIC HEARING
BY THE BOARD OF DIRECTORS OF
THE INLAND EMPIRE UTILITIES AGENCY TO ADOPT
THE 2015 REGIONAL URBAN WATER MANAGEMENT PLAN
SAN BERNARDINO COUNTY, STATE OF CALIFORNIA**

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency has scheduled a public hearing to adopt the 2015 Regional Urban Water Management Plan, San Bernardino County, State of California.

NOTICE IS FURTHER GIVEN that said public hearing will be held at the following time and place for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 15, 2016 – 10:00 a.m.

PLACE: Inland Empire Utilities Agency Board Room
6075 Kimball Avenue, Building A
Chino, CA 91710

All interested persons are invited to attend the public hearing and provide comments regarding the 2015 Regional Urban Water Management Plan that includes information for the Inland Empire Utilities Agency and the Water Facilities Authority. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing.

NOTICE IS FURTHER GIVEN that a copy of the Draft 2015 Regional Urban Water Management Plan can be found on the Agency's website at http://www.ieua.org/news_reports/notices.html or a hard copy is available at the IEUA Headquarters. Please direct comments and questions to the Planning & Environmental Compliance Department, Lisa Morgan-Perales at (909) 993-1520.

wfa
Water Facilities Authority

CALIFORNIA NEWSPAPER SERVICE BUREAU

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APRIL WOODRUFF
INLAND EMPIRE UTILITIES AGENCY
6075 KIMBALL AVE BUILDING A
CHINO, CA 91710

CNS 2885685

COPY OF NOTICE

Notice Type: HRG NOTICE OF HEARING

Ad Description NOTICE OF PUBLIC HEARING June 15, 2016

To the right is a copy of the notice you sent to us for publication in the INLAND VALLEY DAILY BULLETIN/ONTARIO. Please read this notice carefully and call us with any corrections. The Proof of Publication will be filed with the County Clerk, if required, and mailed to you after the last date below. Publication date(s) for this notice is (are):

05/27/2016 , 06/06/2016

The charge(s) for this order is as follows. An invoice will be sent after the last date of publication. If you prepaid this order in full, you will not receive an invoice.

The charge(s) for this order is as follows. An invoice will be sent after the last date of publication. If you prepaid this order in full, you will not receive an invoice.

Publication	$637.20
Total	$637.20

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NOTICE OF PUBLIC HEARING BY THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY TO ADOPT THE 2015 REGIONAL URBAN WATER MANAGEMENT PLAN SAN BERNARDINO COUNTY, STATE OF CALIFORNIA

NOTICE IS HEREBY GIVEN that the Board of Directors of the Inland Empire Utilities Agency has scheduled a public hearing to adopt the 2015 Regional Urban Water Management Plan, San Bernardino County, State of California.

NOTICE IS FURTHER GIVEN that said public hearing will be held at the following time and place for the purpose of hearing any and all public testimony on the above-stated issue.

DATE: Wednesday, June 15, 2016 – 10:00 a.m.

PLACE: Inland Empire Utilities Agency Board Room
6075 Kimball Avenue, Building A
Chino, CA 91710

All interested persons are invited to attend the public hearing and provide comments regarding the 2015 Regional Urban Water Management Plan that includes information for the Inland Empire Utilities Agency and the Water Facilities Authority. Oral statements will be heard, but for the accuracy of the record all important testimony should be submitted in writing.

NOTICE IS FURTHER GIVEN that a copy of the Draft 2015 Regional Urban Water Management Plan can be found on the Agency's website at http://www.ieua.org/news_reports/notices.html or a hard copy is available at the IEUA Headquarters. Please direct comments and questions to the Planning & Environmental Compliance Department, Lisa Morgan-Perales at (909) 993-1520.

Published: May 27, and June 6, 2016
5/27, 6/6/16
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INLAND VALLEY DAILY BULLETIN/ONTARIO

Inland Valley Daily Bulletin
(formerly The Daily Report)
9616 Archibald Avenue, Suite 100
Rancho Cucamonga, CA 91730
909-987-6397
legals@inlandnewspapers.com

(Space below for use of County Clerk Only)

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of San Bernardino

I am a citizen of the United States, I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principal clerk of the printer of INLAND VALLEY DAILY BULLETIN, a newspaper of general circulation printed and published daily in the City of Ontario, County of San Bernardino, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of San Bernardino, State of California, on the date of August 24, 1951, Case Number 70663. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

6/2/2016

I declare under the penalty of perjury that the foregoing is true and correct.

Executed at Rancho Cucamonga, San Bernardino Co. California

On this 2 day of June ,20 16.

KC

Signature

Legal Notice | Legal Notice

WATER FACILITIES AUTHORITY
NOTICE OF PUBLIC HEARING
2015 REGIONAL URBAN WATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that on June 16, 2016 at 7:30 a.m., in the Board Room of the Monte Vista Water District, located at 10575 Central Avenue, Montclair, California, 91763, the Board of Directors of the Water Facilities Authority (WFA) will conduct a public hearing pursuant to California Water Code section 10642 to consider and receive comments and input on the 2015 Regional Urban Water Management Plan that has been prepared jointly for the WFA and the Inland Empire Utilities Agency (IEUA) pursuant to Water Code section 10620(d).

A copy of the 2015 Regional Urban Water Management Plan is available for public review during normal business hours at the offices of WFA located at 1775 North Benson Avenue, Upland, California 91784. In summary, the 2015 Regional Urban Water Management Plan has been developed in accordance with the requirements of the Urban Water Management Planning Act, California Water Code sections 10610 through 10656. Public input from diverse social, cultural and economic members of the community is strongly encouraged and will be considered as part of the 2015 Regional Urban Water Management Plan process.

Any written comments regarding the 2015 Regional Urban Water Management Plan should be submitted no later than 5:00 p.m. on June 10, 2016 to 1775 North Benson Avenue, Upland, California 91784, attention Terry Catlin. Public comments also can be made at the public hearing at the time and place first set forth above. Questions regarding the public hearing or the 2015 Regional Urban Water Management Plan should be directed to Terry Catlin at (909) 981-9454.

Date: _, 2016

WATER FACILITIES AUTHORITY

Published: June 2, 2016 #809170

Inland Valley Daily Bulletin
(formerly The Daily Report)
9616 Archibald Avenue Suite 100
Rancho Cucamonga, CA 91730
909-987-6397
legals@inlandnewspapers.com

(Space below for use of County Clerk Only)

PROOF OF PUBLICATION
(2015.5 C.C.P.)

STATE OF CALIFORNIA
County of San Bernardino

I am a citizen of the United States, I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the principle clerk of the printer of INLAND VALLEY DAILY BULLETIN, a newspaper of general circulation printed and published daily in the City of Ontario, County of San Bernardino, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of San Bernardino, State of California, on the date of August 24, 1951, Case Number 70663. The notice, of which the annexed is a true printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

6/2, 6/9/16

I declare under the penalty of perjury that the foregoing is true and correct.

Executed at Rancho Cucamonga, San Bernardino Co. California

This 9 Day of June, 2016

BW

Signature

WATER FACILITIES AUTHORITY
NOTICE OF PUBLIC HEARING
2015 REGIONAL URBAN WATER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that on June 16, 2016 at 7:30 a.m., in the Board Room of the Monte Vista Water District, located at 10575 Central Avenue, Montclair, California, 91763, the Board of Directors of the Water Facilities Authority (WFA) will conduct a public hearing pursuant to California Water Code section 10642 to consider and receive comments and input on the 2015 Regional Urban Water Management Plan that has been prepared jointly for the WFA and the Inland Empire Utilities Agency (IEUA) pursuant to Water Code section 10620(d).

A copy of the 2015 Regional Urban Water Management Plan is available for public review during normal business hours at the offices of WFA located at 1775 North Benson Avenue, Upland, California 91784. In summary, the 2015 Regional Urban Water Management Plan has been developed in accordance with the requirements of the Urban Water Management Planning Act, California Water Code sections 10610 through 10656. Public input from diverse social, cultural and economic members of the community is strongly encouraged and will be considered as part of the 2015 Regional Urban Water Management Plan process.

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Date: _, 2016

WATER FACILITIES AUTHORITY

Published: June 2, 2016 #809170

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1983

www.ieua.org

NOTICE OF PREPARATION OF THE INLAND EMPIRE UTILITIES AGENCY'S 2015 URBAN WATER MANAGEMENT PLAN

December 9, 2015

Pursuant to the requirement of California Water Code, Division 6, Part 2.6 Urban Water Management Planning, Section 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify your agency that the Inland Empire Utilities Agency (IEUA) is in the process of preparing the 2015 Urban Water Management Plan (UWMP). Based on the IEUA's current schedule, we expect to have a public review draft of the 2015 UWMP available for review in April 2016, at which point your agency will receive notification that the draft UWMP is available for public review and comment.

If your agency would like to submit comments or provide input to the IEUA in anticipation of the development of the 2015 UWMP, please submit written copies to:

Lisa Morgan-Perales
Senior Water Resources Analyst
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91708
909-993-1520

Best Regards and Happy Holidays!

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

6075 Kimball Avenue • Chino, CA 91708
P.O. Box 9020 • Chino Hills, CA 91709
TEL (909) 993-1600 • FAX (909) 993-1983

www.ieua.org

NOTICE OF PREPARATION OF THE INLAND EMPIRE UTILITIES AGENCY'S 2015 REGIONAL URBAN WATER MANAGEMENT PLAN

March 2, 2016

Pursuant to the requirement of California Water Code, Division 6, Part 2.6 Urban Water Management Planning, Section 10621 (b), every urban water supplier required to prepare a plan shall, at least 60 days prior to the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

This letter is intended to notify your agency that the Inland Empire Utilities Agency (IEUA) is in the process of preparing the 2015 Regional Urban Water Management Plan (UWMP). **Pursuant to Section 10620 (d), the Water Facilities Authority is participating in IEUA's Regional Urban Water Management Plan for purposes of the Act.** Based on the IEUA's current schedule, we expect to have a public review draft of the 2015 Regional UWMP available for review in April 2016, at which point your agency will receive notification that the draft Regional UWMP is available for public review and comment.

If your agency would like to submit comments or provide input to the IEUA in anticipation of the development of the 2015 Regional UWMP, please submit written copies to:

Lisa Morgan-Perales
Senior Water Resources Analyst
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91708
909-993-1520

Best Regards

APPENDIX D

Adopted UWMP Resolution

RESOLUTION NO. 2016-6-14

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE INLAND EMPIRE UTILITIES AGENCY* (IEUA), SAN BERNARDINO COUNTY, CALIFORNIA, ADOPTING THE 2015 REGIONAL URBAN WATER MANAGEMENT PLAN FOR THE INLAND EMPIRE UTILITIES AGENCY AND THE WATER FACILITIES AUTHORITY

WHEREAS, the California Legislature enacted Assembly Bill 797, (Water Code Section 10610 et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually, prepare an Urban Water Management Plan at least once every five years; and

WHEREAS, the Inland Empire Utilities Agency* is a wholesale supplier of water for 242-square miles in the western portion of San Bernardino County; and

WHEREAS, the Water Facilities Authority* is a wholesale supplier of water for 135-square miles in the west end of San Bernardino County; and

WHEREAS, pursuant to Section 10620 of the Urban Water Management Planning Act, the Inland Empire Utilities Agency and the Water Facilities Authority have participated together to prepare the 2015 Regional Urban Water Management Plan.

NOW, THEREFORE, the Board of Directors of the Inland Empire Utilities Agency* does hereby RESOLVE, DETERMINE, AND ORDER as follows:

Section 1. The 2015 Regional Urban Water Management Plan is hereby adopted.

Section 2. The General Manager is hereby authorized to file an electronic copy of the 2015 Regional Urban Water Management Plan with the State Department of Water Resources within 30 days following its adoption and no later than July 1, 2016.

Section 3. The General Manager is hereby authorized to file a CD or hardcopy of the 2015 Regional Urban Water Management Plan with the California State Library no later than 30 days after its adoption.

Section 4. The General Manager is hereby authorized to submit an electronic copy or a CD or hardcopy of the adopted 2015 Regional Urban Water Management to any city or county in which the suppliers provide water no later than 30 days after its adoption.

Section 5. The General Manager is hereby authorized and directed to implement the adopted 2015 Regional Urban Water Management Plan, including recommendations to the Board of Directors regarding necessary procedures, rules, and regulations in an effort to carry out effective and equitable water programs.

Section 6. The Resolution shall take effect upon adoption.

ADOPTED this 15th day of June, 2016.

Terry Catlin
President of the Inland Empire Utilities Agency* and of the Board of Directors thereof

ATTEST:

Steven J. Elie
Secretary/Treasurer of the Inland Empire Utilities Agency* and of the Board of Directors thereof

(SEAL)

* A Municipal Water District

STATE OF CALIFORNIA)
) SS
COUNTY OF SAN BERNARDINO)

I, Steven J. Elie, Secretary/Treasurer of the Inland Empire Utilities Agency*, DO HEREBY CERTIFY that the foregoing Resolution being No. 2016-6-14 was adopted at a Regular Board Meeting on June 15, 2016, of said Agency by the following vote:

AYES: Hall, Elie, Camacho, Catlin

NOES: None

ABSTAIN: None

ABSENT: None

Steven J. Elie
Secretary/Treasurer of the Inland Empire Utilities Agency* and of the Board of Directors thereof

(seal)

* A Municipal Water District

RESOLUTION NO. 2016-06-01

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE WATER FACILITIES AUTHORITY ADOPTING THE 2015 REGIONAL URBAN WATER MANAGEMENT PLAN FOR THE INLAND EMPIRE UTILITIES AGENCY AND THE WATER FACILITIES AUTHORITY

WHEREAS, the Urban Water Management Planning Act requires every urban water supplier providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually to prepare an Urban Water Management Plan at least once every five years; and

WHEREAS, the Water Facilities Authority is a wholesale urban water supplier for 135-square miles in the west end of San Bernardino County; and

WHEREAS, pursuant to Section 10620(d) of the Urban Water Management Planning Act, the Inland Empire Utilities Agency and the Water Facilities Authority have participated together to prepare the 2015 Regional Urban Water Management Plan.

NOW, THEREFORE, the Board of Directors of the Water Facilities Authority does hereby RESOLVE, DETERMINE, AND ORDER as follows:

Section 1. Pursuant to the public hearing conducted on this date in accordance with Water Code section 10642, the 2015 Regional Urban Water Management Plan is hereby adopted.

Section 2. The General Manager is hereby authorized to file an electronic copy of the 2015 Regional Urban Water Management Plan with the California Department of Water Resources within 30 days following its adoption and no later than July 1, 2016.

Section 3. The General Manager is hereby authorized to file a CD or hardcopy of the 2015 Regional Urban Water Management Plan with the California State Library no later than 30 days after its adoption.

Section 4. The General Manager is hereby authorized to submit an electronic copy or a CD or hardcopy of the 2015 Regional Urban Water Management to any city or county within which the Water Facilities Authority provides water no later than 30 days after its adoption.

Section 5. This Resolution shall take effect upon adoption.

ADOPTED this 16th day of June, 2016.

Chair of the Board of Directors
Water Facilities Authority

ATTEST:

Secretary to the Board of Directors
Water Facilities Authority

APPENDIX E

IEUA 2015 Integrated Water Resources Plan

2016

Integrated Water Resources Plan:

Water Supply & Climate Change Impacts 2015—2040

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

"Our climate is rapidly changing, our population is growing and more extreme weather looms on the horizon. Now is not the time to shirk from responsibility. Storage or conveyance alone will not solve all of our problems. Recycling, groundwater management and conservation, individually, won't get us there either. It will take all of the above. ***We must think differently and act boldly*** -- and that's exactly what California is doing."

—Governor Brown

Integrated Water Resources Plan:

Water Supply & Climate Change Impacts 2015—2040

Prepared by:

Inland Empire Utilities Agency

Technical Modeling by:

A&N Technical Services

RAND Corp.

Wildermuth Environmental Inc.

Technical Advisory Committee:

City of Chino

City of Chino Hills

City of Ontario

City of Upland

Chino Basin Water Master

Cucamonga Valley Water District

Fontana Water Company

Monte Vista Water District

Table of Contents

Acronyms

AFY	Acre-Feet of Water per Year
CBWM	Chino Basin Watermaster
CDA	Chino Desalter Authority
CUWCC	California Urban Water Conservation Council
CVWD	Cucamonga Valley Water District
DWR	Department of Water Resources
DYY	Dry Year Yield
EDU	Equivalent Dwelling Unit
GPD	Gallons per Day
IERCF	Inland Empire Regional Composting Facility
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resource Plan
MGD	Million Gallons per Day
MG	Million Gallons
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
NPDES	National Pollutant Discharge Elimination System
NRW	Non-Reclaimable Wastewater
OBMP	Optimum Basin Management Plan
OSY	Operating Safe Yield
OWOW	One Water One Watershed
PEIR	Program Environmental Impact Report
SAWPA	Santa Ana Watershed Project Authority
SBCFCD	San Bernardino County Flood Control District

SRF	State Revolving Fund
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TYCIP	Ten-Year Capital Improvement Plan
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WFMP	Wastewater Facilities Master Plan
WUE	Water Use Efficiency

1. Overview & Purpose

Project Background

Climate Change

Phases of the IRP

IRP Development

Planning Process

Agricultural fields, in the City of Ontario.

I. Overview & Purpose

PROJECT BACKGROUND

The 2016 "Integrated Resources Plan: Water Supply & Climate Change Impacts 2015—2040" (IRP) is our region's blueprint for ensuring reliable, cost-effective, and environmentally responsible water supplies for the next 25 years. It takes into consideration availability of current and future water supplies and accounts for possible fluctuations in demand forecasts and climate change impacts. This is the first time that the region's planning has gone beyond a regional Urban Water Management Plan (UWMP) and the cities and water agencies (Agencies) have worked collaboratively to develop a comprehensive water resources plan. The sphere of influence for the 2015 IRP is the Inland Empire Utilities Agency's (IEUA) service area which is in southwestern San Bernardino County shown in Figure 1-1.

Two key goals of this IRP are to integrate and update water resource planning documents in a focused, holistic manner and to develop an implementation strategy that will improve near-term and long-term water resources management for the region. In addition, the IRP evaluates new growth, development, and water demand patterns within the service area and conducts an assessment of water needs and supply source vulnerabilities under climate change.

Although this is the first IRP that the region has developed, from 2000 to 2002 the region developed four foundational master planning documents which, together, functioned as an IRP. These historical documents illustrated how, since 2000, the region has recognized the increasingly uncertain future of imported water supply availability and the importance of local water supplies, particularly now with changing climate conditions. As part of its response, the region has focused infrastructure investments on local water supply development strategies to reduce dependence on imported supplies and increase drought resilient water sources (see Appendix 1 for a detailed description of foundational planning documents). These foundational documents are:

1. Chino Basin Water Master's Optimum Basin Management Plan (2000)
2. Chino Basin Organics Management Strategy (2001)
3. Recycled Water System Feasibility Study (2002)
4. Wastewater Facilities Master Plan (2002)

These documents were linked together in the Programmatic 2002 IEUA Facilities Master Plan Environmental Impact Report (EIR).

Water resources management strategies were further updated as part of the 2005 and 2010 UWMP. Individual programs were developed in reports such as the2002 Salinity Management Plan, 2005 Recycled Water Implementation Plan, 2007 Recycled Water Three Year Business Plan, 2013 Recharge Master Plan Update, 2015 Recycled Water Program Strategy, 2015 Facilities Master

Plan Update, 2015 WUE Business Plan Update, and 2015 Energy Management Plan. The number and scope of regional planning documents that have been developed in the past 15 years illustrates both the commitment to local resource development and the emphasis on water resources sustainability.

An additional driver for the creation of the IRP was the need to strategically position the region for upcoming funding opportunities. By leveraging these funding opportunities for local projects, the region will be less susceptible to the anticipated imported water rate increases of 4-5% annually through the next decade (MWD 2016 Forecast). The past success of the region to secure grant funding of over $258 million has made the expansion of the groundwater recharge, recycled water, and conservation programs possible. Over the next two years, more than a billion dollars of state and federal grants and loans will be available to support additional water supply development. The IRP will help position the region to pursue these funding opportunities by identifying regional water resources programs and ultimately project priorities.

CLIMATE CHANGE

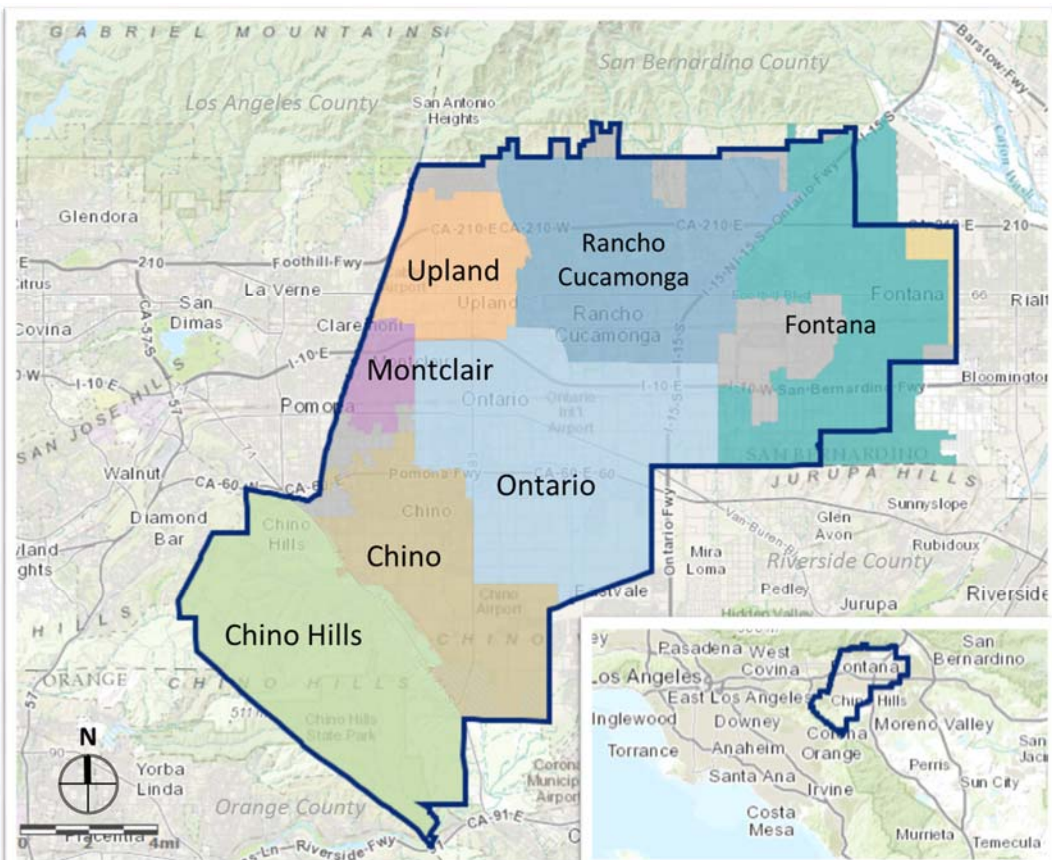
Climate change impacts have already started to create critical challenges for water resources management in Southern California. More intense storm events and the changing frequency and duration of drought years are becoming evident throughout the State and the West. This makes future water supplies available to the region more uncertain, particularly imported water resources that are uniquely vulnerable to changes in the state's snowpack.

General climate change trends projected for California are that temperatures will increase and precipitation will increasingly fall as rain rather than snow. These trends will impact water supplies in two ways: higher

The planning principal which guides the IRP is:

"... to plan for a deeply uncertain future and develop a robust strategy that can adapt and respond to a wide range of possible futures with changing conditions."

Figure 1-1: IRP Regional Planning Area Boundary



temperatures will cause increased water demands; however, infrastructure to capture rain runoff is limited as water infrastructure in California was designed to capture slow melting snowpack not rapid stormwater.

In addition, droughts are expected to occur more frequently, more intensely, and last longer. The Natural Resources Defenses Council (NRDC) estimates that if nothing is done to address the implications associated with climate change, between the years 2025 and 2100, the cost of providing water to the western United States will increase from $200 billion to $950 billion per year.

The IRP recognizes and incorporates an assessment of a range of impacts that climate change could have on water supplies for the State and region. This is done by using downscaled climate models from the Intergovernmental Panel on Climate Change (IPCC) Assessment. This IRP does not rely on historical hydrology to predict the future, but instead gathers data available from the latest climate models to project a wide range of possible future climate conditions. The information was used as a sensitivity analysis to help identify the most climate resilient water strategies and priorities for the region. This approach was selected to provide the region with a better understanding of how to effectively plan and prepare for how climate uncertainty affects our water supplies.

"Paleoclimate climate analysis has established that hydrology has the potential to vary far more widely than has been recorded in the observed record. This means that, given the scientific evidence supporting climate change, we need to look beyond historical observations to ensure that we have adequate water supplies."

"Strategies and Resources for Evaluating and Adapting to Climate Change Effects: Climate Change is Real –Now What?" Stanford Report. Fall 2014.

PHASES OF THE IRP

The development of the IRP is being done in two phases.

Phase 1 – Analysis and Recommendations: Phase 1 focuses on an extensive analysis of future projected water needs and water supply strategies under conditions of climate change and growth. Results from Phase 1 include summaries of the recommended regional water resource strategies; corresponding ranges of costs for the various supply categories; and a regionally developed, all-inclusive list of potential supply projects (local and regional). This information will be used to complete a Programmatic Environmental Impact Report (PEIR), which is needed to ensure that selected projects are grant eligible. The IRP report is the culmination of Phase 1.

Phase 2 – Implementation and Capital Improvement Program (CIP): Phase 2 will address additional detailed project level analysis including project scopes, costs, prioritization, and implementation scheduling. Phase 2 will also include the disaggregation of the regional demand and supply to the local retail level. Continued discussions will be facilitated through a Regional Water Forum. Phase 2 is anticipated to begin in Summer 2016.

IRP DEVELOPMENT

The IRP was developed from 2013-2015 by the IEUA Planning and Environmental Resources Department in conjunction with stakeholders including regional technical staff, water managers, and joint IEUA Board and Regional Policy Committee workshops.

IRP Technical Work Group: The IRP Technical Work Group consisted of IEUA member agencies, which includes the seven contracting sewerage agencies, and the retail water agencies within the IEUA service area. Meetings were held one to two times each month to discuss modeling assumptions, verify projections, establish project lists, and examine modeling results in detail. Modifications to methodology and clarifications were made with this group.

Water Managers Work Group: After technical items had been discussed and vetted, core findings and recommendations were presented at the monthly Water Managers Work Group meetings.

Joint Board and Policy Committee Workshops: The results from the IRP modeling and recommendations from the Technical and Water Managers Work Groups were presented to regional policy makers. These special joint workshops included members from IEUA's Board of Directors and the regional policy makers from the Regional Sewerage Policy Committee, as well as board members from the Monte Vista Water District (MVWD), and the General Manager from Fontana Water Company. These meetings served to update policy makers about the progress being made with the IRP as well as to receive policy direction.

Goals & Objectives: IRP Goals and Phase 1 objectives were developed by stakeholders during multiple workshops with the IRP Technical and Water Managers Work Groups, and joint IEUA Board and Regional Policy committee workshops. The overarching goals that guided the IRP process and analysis are:

- *Resilience* — Develop regional water management flexibility to adapt to climate change and economic growth and to any changes that limit, reduce, or make water supplies unavailable.
- *Water Efficiency* — Meet or exceed rules and regulations for reasonable water use.
- *Sustainability* — Provide environmental benefits, including energy efficiency, reduced greenhouse gas emissions, and water quality improvements, to meet the needs of the present without compromising the ability of future generations to meet their own needs.
- *Cost-Effectiveness* — Supply regional water in a cost effective manner and maximize outside funding.

Planning objectives for the 2015 IRP were also developed by the stakeholders. These objectives are:

- Identify key water resource supply vulnerabilities and evaluate different options that could reduce these vulnerabilities.
- Develop multiple water supply strategies to reduce future water supply imbalances.
- Evaluate strategies with different project combinations, or portfolios, to assess resiliency to climate change, including mega droughts and decadal drought impacts across future scenarios, and how the portfolios could improve regional supplies.
- Analyze portfolio results from the Water Evaluation and Planning (WEAP) model simulations to identify key tradeoffs among the portfolios.
- Develop a long-term grant application strategy for priority water resources projects.

PLANNING PROCESS

Phase I of the IRP was developed in three parts. The primary objective of Part I was to identity the water resource needs. Needs were developed based on an inventory of current and projected water supplies and demands. In Part 2, the IRP Technical Work Group discussed and developed regional water supply strategies that were then tested through modeling runs completed in Part 3. Individual Stages completed under each part are illustrated in Figure 1-2.

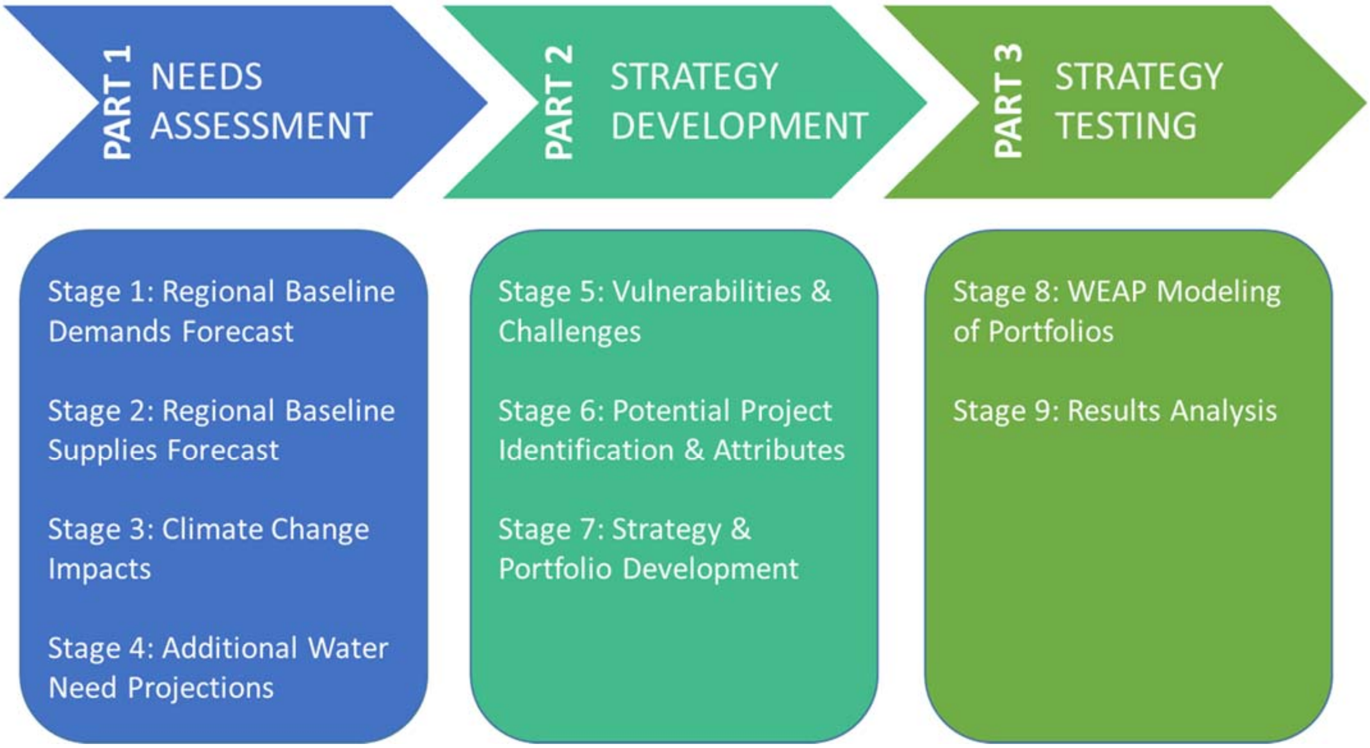
Part 1: Needs Assessment

Stage 1 - Regional Demand Forecast. Water demands for the region were projected from 2015 to 2040 using an econometric model that incorporated factors for economic conditions, growth, water efficiency, housing density, and conservation program investments approved in the FY15/16 Capital Improvement Program. Projected demands were displayed as a range to reflect trend uncertainties. The regional demand forecast is further described in Section 2 of the IRP. A complete technical description of the demand projection modeling by A&N Technical Services for this project is contained in Appendix 1.

Stage 2 - Regional Baseline Supply Forecast. Existing water resources utilized by the region were identified and analyzed to determine trends in water availability and usage through 2040. Water supplies from projects approved in the FY15/16 Ten Year Capital Improvement Program were included in this assessment. Together, these existing and new water supplies are defined as the baseline supplies through 2040.

Stage 3 - Climate Change Impacts. IEUA worked with the RAND Corporation to develop a water demand and supply model to evaluate the impact of climate change

Figure 1-2: IRP Phase 1 Planning Process Diagram



on the IEUA service area. The model, used as a baseline, tabular estimates of IEUA's supplies and demands. A set of 106 climate scenarios for the IEUA region were derived from downscaled general circulation model results used for the Intergovernmental Panel on Climate Change Assessment Reports 3 & 5. These data suggest that regional temperatures would likely increase between 0.5-3.5°F by 2040. Precipitation was highly variable and showed no clear trend across the ensemble of scenarios.

The climate scenarios and baseline water demands and supplies were then entered into a water management model developed in the Water Evaluation and Planning (WEAP) modeling system. The WEAP model used these inputs to estimate how water demands, supplies, runoff, flows, and storage would change under the 106 climate scenarios. This approach highlighted supplies that provided greater reliability and were resilient to climate change impacts. The WEAP model results are summarized in Section 3 of the IRP. A technical description of the modeling and climate assessment is presented in Appendix 3.

Stage 4 - Additional Water Need Projections. Based on the results from Stage 3, the IRP Technical Work Group evaluated the results of the climate modeling to identify the potential water supply shortfalls that the region would need to address to meet future demands. These potential shortfalls were used to develop regional water resources strategies and portfolios during Stage 7.

Part 2: Regional Strategy Development

Stage 5 - Vulnerabilities & Challenges. Key water resources vulnerabilities and challenges facing the region were identified and prioritized by the IRP Technical Work Group. Vulnerabilities and challenges for the region include:

- *Groundwater & Stormwater* — maintaining operational safe yield (OSY); preventing land subsidence; maintaining water quality; preventing loss of natural infiltration
- *Recycled Water* — addressing increased total dissolved solids (TDS) as a result of indoor water use efficiency programs; regional interest in recycled water exceeding local supplies; competing uses of

existing supplies for direct use and for groundwater recharge; energy intensity of additional treatment levels for direct potable.

- *Imported Water*— potential for catastrophic interruption; dependence on the MWD Rialto feeder pipeline; constraints on supplies due to State Water Project (SWP) availability and Colorado River Basin over allocation and drought.
- *Other*— need for infrastructure redundancy; variability of surface water supplies; impact of new energy and water use efficiency standards; increasing salinity in source water; avoiding stranded assets.

Stage 6 - Potential Project Identification and Attributes. A comprehensive list of potential water supply projects was developed based on previous and parallel planning efforts, including the Recycled Water Program Strategy, Wastewater Facilities Master Plan Update, 2013 Recharge Master Plan Update, Water Use Efficiency Business Plan (WUEBP), FY15/16 Ten Year Capital Improvement Plan, Santa Ana River Conservation and Conjunctive Use Program (SARCCUP), drought project list, and conceptual projects identified during the IRP process.

Individual projects were grouped into larger project categories. In some cases, categories were divided into multiple tiers which allowed the IRP Technical Work Group to either phase in similar projects over time or accelerate implementation by selected multiple tiers. Individual projects were also tagged according to their ability to address challenges and constraints facing the region.

Stage 7 - Strategy and Portfolio Development. Drawing upon information from Stages 3 and 4, the IRP Technical Work Group developed five water supply strategies to understand how combinations of projects could meet future water needs and address the challenges and constraints facing the region. A decision support tool, developed by the RAND Corporation and described in Appendix 3, supported this process. The five water supply strategies are:

- *Strategy 1:* Maximize Chino basin groundwater, including prior stored groundwater
- *Strategy 2:* Recycled water program expansion
- *Strategy 3:* Recycled water & conservation program expansions
- *Strategy 4:* Maximize supplemental water supplies and recycled water supplies
- *Strategy 5:* Maximize imported water supplies with moderate conservation

A total of eight project portfolios were developed to test the five strategies under the WEAP model. Strategies and results are fully described in Section 4 of the IRP.

Part 3: Strategy Testing

Stage 8 - WEAP modeling of Portfolios. Each portfolio was run through the WEAP model against the 106 climate scenarios. For comparison, a baseline portfolio that was limited to the baseline supplies identified in Stage 2, was also run through the WEAP model. WEAP model results were evaluated both in terms of the portfolio's ability to meet projected demands and whether surplus supplies were stored or used over time. Results are fully in Section 4 of the IRP.

Stage 9 - Results Analysis. Portfolio performances were compared to the baseline portfolio results in order to determine the affect of the each portfolio on water supplies. Since there were 106 results per portfolio from the climate runs, it was beyond the scope of Phase 1 of the IRP to evaluate the nuances of the individual climate runs. Instead, the range of results that fell within 75% of the model runs were analyzed. The 75% criteria was chosen to eliminate outlier results which could have large cost implications.

Regional recommendations were developed based on: (a) the ability of a strategy to meet future demands and develop a surplus supply buffer and (b) input from the IRP Technical Work Group on the strategies that best met regional interests. Conclusions and are discussed in Section 5 of the IRP. These recommendations will be used to target future grant applications. The development of future water resources projects will be done during Phase 2 of the IRP.

2. Water Demand Forecast

View of single family residential homes in Chino Hills

II. Water Demand Forecast

INTRODUCTION TO WATER DEMANDS

Section 2 outlines the process used to identify water demands for the region through 2040. These water demands include urban, environmental, and regulatory needs. Urban demands, also known as retail municipal and industrial (M&I) demands, represent the full spectrum of urban water use within the service area including commercial, institutional, industrial uses, and residential service for approximately 844,000 people. In addition to urban demands, regional water demands also include environmental discharge obligations to the Santa Ana River and contractual water commitments.

WATER DEMAND SETTING

Since the 1990s, approximately 90% of the region's water demands have come from urban M&I users with the remaining 10% coming from agricultural users (source: 2010 IEUA UWMP). Overall urban water demand since 1995 has increased by approximately 20%, despite a regional growth of 30% (approximately 200,000 more residents). This is indicative of new water use behaviors, such as efficient irrigation and more efficient indoor fixtures, which prolong the availability of current regional water supplies into the future. The 2010 UWMP estimated total urban demand by the year 2015 to be approximately 272,000 acre-feet per year (AFY). However, actual demands have grown more slowly, increasing by only 3,000 acre-feet (AF) over the past four years from approximately 197,000 AFY in FY2010/11 to 200,000 AFY in FY2014/15 as shown in Figure 2-1. This is due in part to delayed growth as a result of the economic recession, as well as changes in plumbing code, implementation of water use efficiency programs, and responses to current water supply challenges such as the drought that California has been experiencing since 2012.

The impact of plumbing code changes and the implementation of water use efficiency programs was quantified in the recent 2015 Wastewater Facilities Master Plan (WFMP) flow monitoring. IEUA monitoring of new versus older residential developments showed that urban usage patterns have decreased from a regional indoor flow average of 55 gallons per capita per day (GPCD) down to 37 GPCD in new developments. This is consistent with new development trends throughout California (Codes and Standards Research Report: California's Residential Indoor Water Use. May 2015). This indicates that future developments will require less water, reducing the overall regional need for additional water supplies. This shift has significant implications for future wastewater and recycled water planning. Regional treatment plants may not need to be expanded for hydraulic capacity as quickly as previously thought (potentially saving regional capital); however, treatment plants will have to be expanded for treatment capacity for wastewater strength (because there will be greater concentrations of solids), and future available recycled water supplies may be lower than projected.

Outdoor water use provides the largest potential for improved water efficiency and additional water savings in the region. As part of the IRP, A&N Technical Services conducted a study to estimate the amount of indoor and outdoor water use in the region. The study, which used data from the City of Ontario, found that outdoor irrigation accounts for approximately 60% of total urban demand. (Refer to Appendix 3 for the full technical memo.)

METHODOLOGY

This IRP uses an econometric model to forecast urban water demands. This water demand model incorporates various influences which impact urban water demand such as population, employment, economics, weather, and conservation activities.

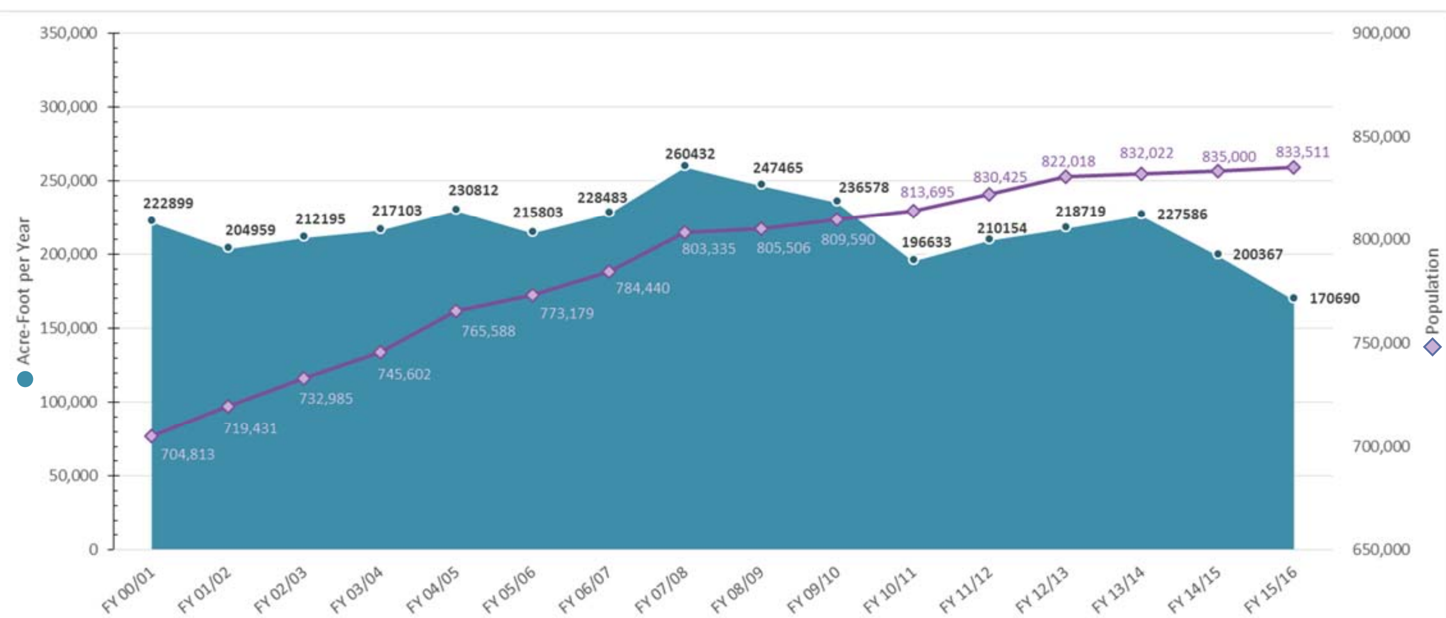
The IRP water demand model was developed by:

- Acquiring the latest regional demographic forecasts from the Southern California Association of Government "2012 Regional Transportation Plan".
- Inputting the demographic data into the econometric model equations to generate a base demand forecast.
- Calibrating the base demand forecast to identify corresponding water demand influences caused by factors including weather, employment, and economic cycles. For this IRP, a total of 12 factors were identified.
- Inputting the latest version of the Alliance for Water Efficiency (AWE) tracking tool for water savings that result from building codes and appliance standards (passive conservation) as well as regional programs that promote conservation (active conservation). Water savings are subtracted from water demand forecasts to ensure that water conservation is incorporated into the projections.
- Developing multiple water demand scenarios to plan for a range of possible futures.

URBAN M&I DEMAND PROJECTION VARIABLES

To forecast urban M&I water demand through 2040, past and present urban water uses were assessed. This included an evaluation to determine which factors or influences impact demands and the corresponding

Figure 2-1: Regional Annual Water Use



Note: Annual water use includes imported water, surface water, groundwater, recycled and desalter production. FY 15/16 usage is projected based on 25% reduction from FY13/14 magnitude of their effect. A total of twelve water demand factors were identified along with their corresponding influence on water demand. Factors that influenced regional water demand were as follows:

1. Household size — single family residential (SFR), multi-family residential (MFR)
2. Land development and community density
3. Median household income
4. Customer response and water use behavior
5. Marginal water price
6. Active and passive conservation
7. Weather and climate change
8. Economic cycle
9. Short-term weather
10. Residential community mix of SFR and MFR
11. Weather and climate change
12. Conservation activities (demand management and water use efficiency)

Of the twelve factors, four were found to have a significant impact on regional urban M&I water demands and are described below. The remaining factors are described in Appendix 4. The four main factors were:

- ***Land Development and Community Density:*** regional development trends show that per capita water usage decreases with the shift towards higher density developments featuring smaller landscape areas.
- ***Weather and Climate Change:*** water use increases under hotter and drier conditions.
- ***Customer Response and Water Use Behavior:*** public increases conservation in response to statewide calls for conservation and permanent water use reductions.
- ***Economic Cycle:*** market conditions impact water usage, with recessions reducing water use and periods of growth increasing water use.

Land Development and Community Density

In the last decade, a relatively new type of housing development has emerged with higher housing densities. This is a national as well as a regional trend. These developments feature medium to large single family homes, usually built with minimal landscaping on small lots, also known as “zero-lot-line” housing. Irrigable landscaped areas in these developments are much smaller than traditional developments in the region have been. As a result, the higher density housing caused by these type of development trends lead to lower water use per housing unit because the reduced space for landscaping requires less irrigation.

For comparison purposes and to help anticipate a range of uncertain futures, Tables 2-1 and 2-2 summarize the sources of land use data and ranges of housing density incorporated into the demand forecast model. Land use data was sourced from the General Plans of the cities in the region, the Metropolitan Water District’s (MWD) 2010 water demand model (2010 MWD_MAIN), and regional growth plans such as SCAG’s 2012-2035 RTP/ Sustainable Communities Strategy (SCS) (2012 RTP/SCS).

Land use density is the variable that will have the largest impact on future demands. Comparing the demand forecast from the cities’ General Plan data to the forecast presented in the 2010 Urban Water Management Plan (UWMP), there is a difference of at least 60,000 AF in total urban M&I demand by the year 2040.

This difference is further heightened when the UWMP urban M&I demand forecast is compared to the demands tied to higher housing density values described in recent General Plan EIR amendments throughout the region. These higher densities are also consistent with SCAG’s 2012 SCS density levels. For example, when the 2010 UWMP demands are compared to the demand associated with high density presented in Tables 2-1 and 2-2, there is a difference in total urban M&I demand in the year 2040 of approximately 105,000 AF.

Weather and Climate Change

Weather has a large impact on the amount of water that customers need. Under hotter and drier conditions, water use increases at the same time that supplies may be constrained. With climate change, this trend is likely to be exacerbated in the near future.

Table 2-1: Single Family Housing Density Variability

Data Source	Low (Units per Acre)	Average (Units per Acre)	High (Units per Acre)
General Plans	1.2	2.7	4.2
2012 RTP/SCS	2.3	3.7	5.4
2010 MWD_MAIN	3.2	3.2	3.2

Table 2-2: Multi-Family Housing Density Variability

Data Source	Low (Units per Acre)	Average (Units per Acre)	High (Units per Acre)
General Plans	9.7	13.5	17.3
2012 RTP/SCS	8.4	13.5	17.0
2010 MWD_MAIN	10.9	10.9	10.9

Table 2-3: Climate and Weather Effect on Water Demands

By Year	Increase in Temp. (F)	Effect on Water Demand	Probability
2040	3.6 degrees	+4.3%	80th percentile
Multiple Dry Years		+5.98%	Varies by climate run

In fact, climatologists have changed the way they view drought in years past and now recognize ongoing higher temperatures and longer drought conditions may be the "new normal" for California. A study conducted by scientists at Stanford University entitled "Anthropogenic Warming Has Increased Drought Risk in California" has linked climate change with "more frequent occurrences of high temperatures and low precipitation that will lead to increased severe drought conditions" (Stanford, 2015). In addition, over the past two decades, droughts have occurred more frequently than in the previous century, with 14 droughts occurring between 1896 and 1994, and six occurring between 1995 and 2014.

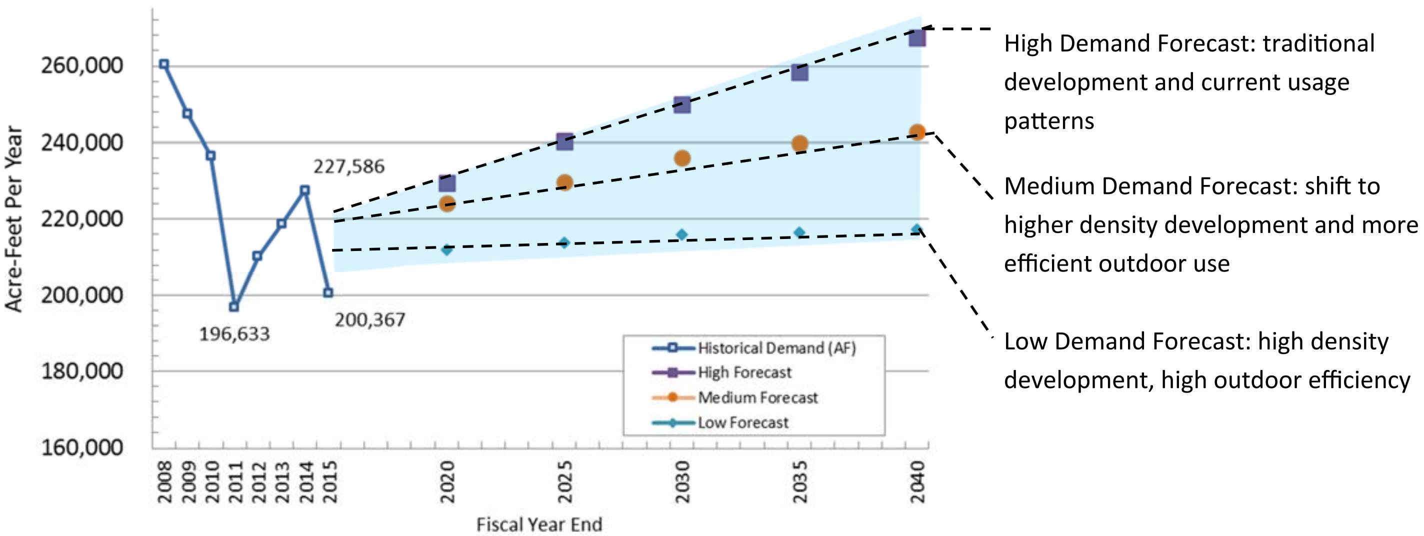
Weather-induced change in demands was accounted for in two ways. First, an adjustment was made for long term climate change based on the National Oceanic and Atmospheric Administration (NOAA) Technical Report, the National Environmental Satellite, Data, and Information Service (NESDIS) 142-5: Regional Climate Trends and Scenarios for U.S. National Climate Assessment. The report stated that increased atmospheric emissions have the potential to increase water use by as much as 4.3%.

As a result of these outlooks on future climate conditions and recent weather trends, the 2015 IRP demand forecast model includes outdoor water demand adjustments to account for climate change. IEUA performed a series of sensitivity analyses of urban outdoor demand and weather conditions. By 2040, IEUA estimated that one dry year would increase demand by 5.6%. Similarly, a one wet year would decrease outdoor demand by 5.6%. A longer period of dry weather (3-years) would increase demand by 8.9%. Separately IEUA estimated the long-term effect of warming on outdoor demand. They found that for each degree temperature increase (in Celsius), outdoor demand would increase by

Table 2-4: Urban M&I Forecast

Urban M&I Forecast	2015	2020	2040
High Forecast	225,000	230,000	267,000
Medium Demand Forecast	225,000	220,100	238,600
Low Demand Forecast	225,000	212,000	217,400

Figure 2-2: Regional Urban Water Demand Forecast



3%. Together these factors were applied to the climate scenarios to estimate how outdoor demand could change due to weather in the future.

Table 2-3 summarizes the climate factors applied to urban outdoor demand used during WEAP modeling outlined in Section 4.

Customer Response and Water Use Behavior

Since 2012, Southern California has been challenged by drought conditions. This led to calls for voluntary and mandatory water use reductions from Governor Brown, numerous news articles about water supply conditions, and massive public outreach campaigns from water agencies across the State. Increased public awareness of water supply conditions resulted in measurable water savings across the State.

Regionally, these behavioral changes reduced urban M&I demands by 4.6% in FY14/15. Lifestyle changes in combination with the anticipated permanent state water restrictions are expected to keep demands suppressed.

For the purpose of the IRP demand forecast model, it is assumed that changes in water use behavior will continue into the future and will maintain a reduced demand by 4.6% through the year 2040.

Economic Cycle

The economy is also susceptible to change and it is likely to continue to change between strong and weak market conditions. During weak market conditions, urban M&I demands decrease by 7%; conversely, during strong market conditions, demands increase by 7%.

Although this is a significant impact, for the purpose of the 2015 IRP M&I demand forecast model it is assumed that the market conditions remain normal and so no adjustment was incorporated.

URBAN M&I DEMAND FORECAST

The IRP developed a range of demand possibilities to accommodate for future uncertainty caused by the various demand factors. To determine a range of urban demand possibilities, three water demand forecasts were created:

- *High Demand Forecast* – utilized housing densities from each city's General Plan and assumed that new development would use water consistent with current usage patterns—no change for outdoor, 55 gallons per capita per day (GPCD) indoor.
- *Medium Demand Forecast* — utilized 2012 SCAG RTP average housing density for occupied housing units and applied indoor and outdoor landscape efficiency standards established by Assembly Bill 1881 (also known as the Model Water Efficient Landscape Ordinance) for existing and future development. For the medium demand forecast, existing outdoor use is limited to 70% of evapotranspiration (ETo). Future outdoor use is limited to 60% ETo, and indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.
- *Low Demand Forecast* – utilized 2012 SCAG RTP high housing density and applied indoor and outdoor landscape efficiency standards established by AB 1881. For the low demand forecast, existing outdoor use is limited to 70% of ETo. Future outdoor use is limited to 60% ETo, and indoor water use is reduced from 55 GPCD in 2015 to 35 GPCD by 2040 for new development.

The range of urban water demand possibilities for the region through 2040 are shown in Table 2-4. When compared to historical demands, the region has experienced over 25,000 acre-feet (AF), or 12% reduction since FY2013/14 as shown in Figure 2-2. This is due in part to delayed growth as a result of the economic recession, but primarily from customer response from continued drought conditions and the State mandated water use restrictions. If demand continues to trend at FY2014/15 levels, the IRP demand model (created in 2014) will need to be updated to account for this regional shift in water use behavior. Additional technical data is provided in Appendix 1 which includes technical memorandums that detail the process used to develop the econometric water demand model.

To prepare the region for future uncertainty and to ensure sufficient water resources and adequate infrastructure capacity, the high urban water demand forecast was selected by the IRP Technical Work Group. This planning assumption was recognized to be a conservative forecast as recent residential developments within the region are currently more efficient (given that they use less water for indoors and outdoor landscaped areas) than presumed in the model.

The benefits of using this conservative forecast for the baseline demand are that it:

- Provides a sizeable water supply buffer which protects the region from future uncertainties.
- Allows conservation to be counted as a future water supply in the demand model.

ADDITIONAL WATER NEEDS FORECAST

Current and future water demands include regional environmental and/or contractual stream flow obligations. These water needs are not subject to the same variables as the urban M&I demands and instead

Table 2-4: Additional Water Needs Forecast

Additional Water Needs Forecast	2015	2020	2040
SAR Discharge Joint Obligation (Chino Basin share)	17,000	17,000	17,000
Management Zone 1 Supp. Recharge	6,500	6,500	0
Chino Desalter Replenishment	1,145	2,290	11,035
Total Additional Demand	**24,645**	**25,790**	**28,035**

Figure 2-3: Total Regional Demand Forecast

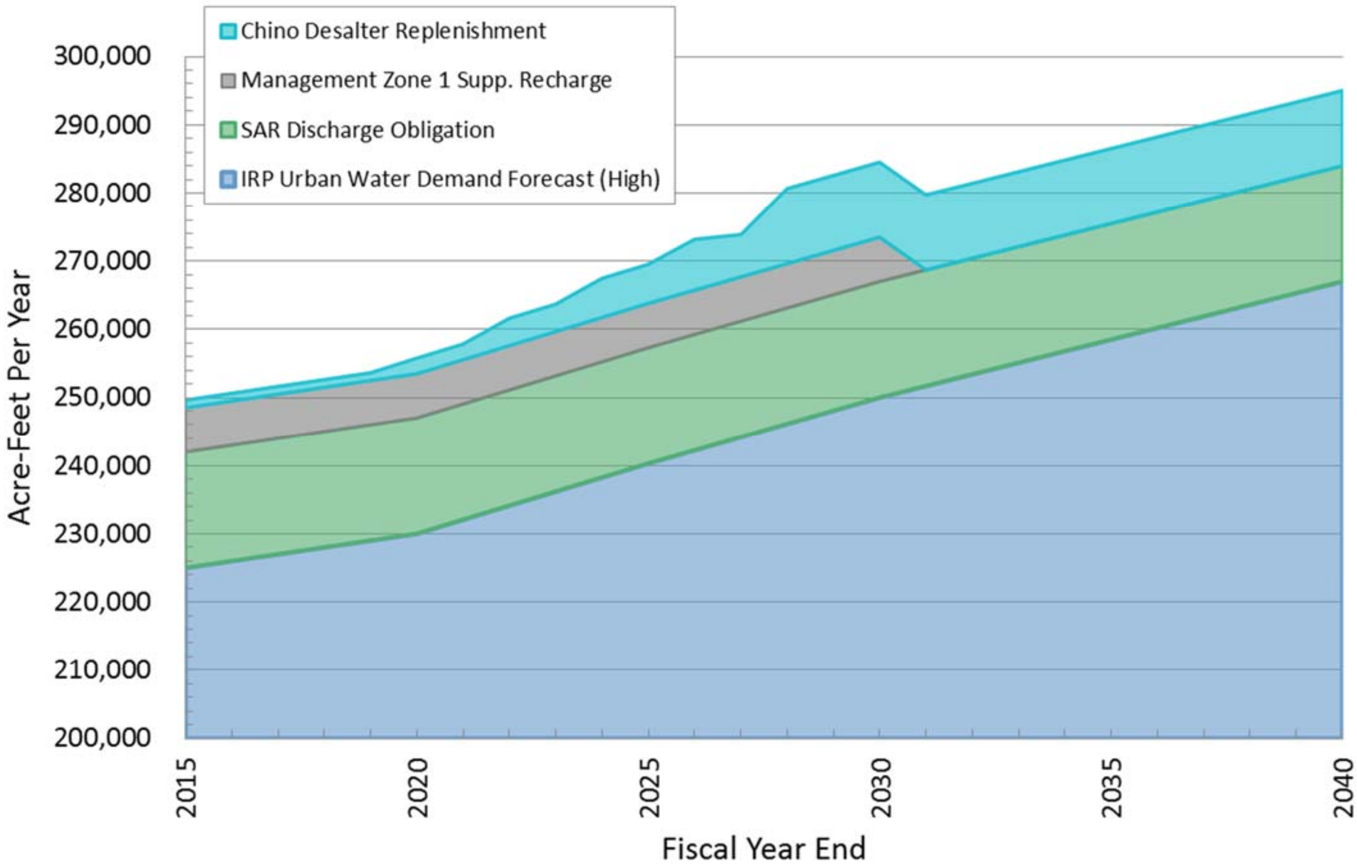


Table 2-5: Total Regional Demand Forecast

Total Regional Demand Forecast	**2015**	**2020**	**2040**
Urban M&I Demand (High Forecast)	225,000	230,000	267,000
Additional Water Needs	24,645	25,790	28,035
Total Regional Demand	**249,645**	**255,790**	**295,035**

are tied to standing contractual agreements and legal requirements. The water demand and supply models incorporate the following assumptions into the IRP forecasts:

- **Santa Ana River (SAR) Discharge Obligation** Santa Ana River (SAR) Discharge Obligation is a regional environmental obligation that requires annual water discharges to the Santa Ana River near Prado basin. For the purposes of the IRP, 17,000 AFY is used as the Agency's requirement to fulfill the obligation through 2040. The region currently meets this obligation by discharging treated wastewater to the Cucamonga and Chino Creeks.

- **Management Zone 1 Supplemental Recharge** pursuant to the PEACE II Agreement, Section 8.4. For the purposes of the IRP 6,500 acre-foot per year will be used to fulfill the supplemental groundwater recharge obligation within Management Zone 1. The obligation is met by Chino Basin Watermaster through recycled water recharge and/or imported water recharge.

- **Chino Desalter Replenishment** pursuant to the PEACE II Agreement, Section 6.2. For the purposes of the IRP, Exhibit C dated August 16, 2015 of the safe yield reset implementation plan will be used for the groundwater replenishment obligation.

TOTAL REGIONAL DEMAND FORECAST

Regional water demands for the 2015 IRP Phase 1 are the sum of the high urban M&I demand forecast and the total additional water needs forecast. Total water needs for the 2015 IRP are shown in Table 2-6. By 2040 it is projected that 45,400 AFY of additional supply will be needed to accommodate regional growth and other environmental and/or contractual stream flow obligations.

Low water use plants, including succulents, on display at a local garden center

3. Resources Inventory

Water Resource Setting

Potential Water Resource Projects

Chino Basin Groundwater

Stormwater

Recycled Water

Chino Basin Desalter

Local Surface Water

Non-Chino Groundwater

Imported Water

Conservation

A bio-swale slowly infiltrates stormwater runoff after a winter rain event in the City of Chino.

Resources Inventory

WATER RESOURCE SETTING

The region relies on imported and recycled water supplies provided by IEUA in addition to groundwater from both the Chino and non-Chino basins and local surface water from various creeks flowing through the service area which originate in the San Gabriel Mountains. As a response to the series of droughts that have impacted Southern California over the past 100 years, including the current drought that has lasted since 2012, the region has developed a sophisticated network of water supply facilities.

Climate change is one of the key factors that will have a substantial impact on water supplies. While recent droughts in California have been significant, climate change trends indicate a future of unprecedented “megadroughts” that have the potential to last multiple decades (Science Advances, 2015). To analyze the impact of potential climate change, RAND Corporation (a nonprofit research organization) evaluated IEUA’s supply and demand balance under 106 climate scenarios that were selected from the IPCC Assessment Reports 3 & 5. Climate simulations were downscaled for the region and indicated that temperatures in the region would increase between 0.5-3.5°F. Indications for changes in precipitation varied greatly and had no clear trend.

Baseline water resource supplies were stress-tested across the 106 climate simulations to determine supply availability from 2015 to 2040 in order to establish annual expected resources. The simulations included water demand and supply inputs and calculated how demands, supplies, runoff, flows, and storage would function under each climate scenario. The individual sections of this section provide the results which illustrate the impact of climate change on future water supply. For a complete technical description of the climate simulation work by RAND see Appendix 2.

This Resources Inventory section provides an overview of the water supplies that the region relies upon:

- Chino Basin Groundwater
- Stormwater
- Recycled Water
- Chino Basin Desalter
- Local Surface Water
- Non-Chino Basin Groundwater
- Imported Water
- Water Use Efficiency

Each supply section includes an overview of current supply use, management, and prioritization; baseline assumptions through 2040; supply challenges that may impact the future availability; additional potential water resource projects by supply type; and water management implications for the region.

POTENTIAL WATER RESOURCE PROJECTS

Additional future water resource projects were identified through the IRP Technical Work Group discussions. These projects are listed by category of supply. Many of these proposed projects were culled from existing planning documents, such as the Recharge Master Plan Update (RMPU) and the Recycled Water Program Strategy. The list includes conceptual level projects as well as those that have been under development but have not yet been included in adopted regional Ten Year Capitol Improvement Plans (TYCIP). For the full project list compiled by the IRP Technical Work Group see Appendix 2.

The proposed projects include capacity building and reliability investments, as well new sources of supply. Due to technical constraints, the Phase I climate simulations focused on the water supply benefits of these projects and to what extent they meet water demands. This information was used to identify portfolio scenarios where new supplies were added to the baseline annual supplies to assess water supply resilience in 2040. These scenarios are described in Section 4.


California Buckwheat growing near San Antonio Dam

CHINO BASIN GROUNDWATER

Resource Overview

The Chino Basin is one of the largest groundwater basins in Southern California containing approximately 5,000,000 AF of water with an unused storage capacity of approximately 1,000,000 AF for a total potential of 6,000,000 AF (source: CBWM website). Groundwater from the Chino Basin accounts for approximately 40% of regional water supplies.

San Bernardino County Superior Court created the Chino Basin Watermaster (CBWM) in 1978 as a solution to lawsuits over historical water right allocations. CBWM is responsible for management of the Chino Basin in accordance with the 2000 Peace Agreement, 2007 Peace II Agreement, and the Chino Basin Optimum Basin Management Program (OBMP).

CBWM is governed by three stakeholder groups, called Pools. The three Pools consist of:

- **Overlying Agricultural Pool**: representing dairymen, farmers, and the State of California
- **Overlying Non-Agricultural Pool**: representing area industries
- **Appropriative Pool**: representing local cities, public water districts, and private water companies

Although groundwater is an important local supply, the water quality in the lower Chino Basin area has been impacted by historical agricultural uses and now has high levels of nitrates and total dissolved solids (TDS). There are also some areas that exceed standards for perchlorate and volatile organic chemicals (VOCs). This lower quality of water requires additional treatment, and/or blending with higher quality imported water. The Chino Basin Watermaster works in partnership with municipalities, IEUA, and the Santa Ana Regional Water Quality Control Board to address these water quality problems, including construction and operation of the Chino Basin Desalters.

The Basin is hydrologically subdivided into five groundwater zones or systems, referred to as management zones. Each management zone has a unique hydrology, and actions within one zone has little or no impact on adjacent zones. Management zones are used to characterize the groundwater level, storage, production, and water quality conditions. Throughout these management zones, there are 19 existing spreading basins that have the capability of recharging stormwater, recycled water, and/or imported water into the Chino Basin.

Baseline Supply

The court judgment allocates groundwater rights by establishing an annual pumping "safe yield" for each Pool. The Operating Safe Yield (OSY) is the annual amount of groundwater that can be pumped from the basin by the Pool parties free of replenishment obligations. For planning purposes, controlled overdraft for the Appropriative Pool was not included in the IRP. Annual groundwater production in excess of the OSY is allowed by the adjudication, provided that the pumped water is replaced and recharged back into the groundwater basin.

The baseline amount for groundwater production between 2015 and 2020 is assumed to be 90,550 AFY, based on historical production. This amount of groundwater pumping includes recharge from natural rainfall, stormwater capture, and recharge. It does not include recharge from recycled water.

The baseline amount for groundwater production between 2020 and 2040 is assumed to be 91,300 AFY, which is the Agencies' share of the forecasted OSY for this period and increased stormwater (SW) recharge from the Chino Basin Facilities Improvement Project. The Baseline does not include stormwater recharge from the proposed 2013 RMPU projects or recycled water used for groundwater recharge.

Climate

Chino Basin groundwater is dependent on rainfall and supplemental sources for recharge. Groundwater supply is impacted by climate change given that warmer temperatures and droughts increase the dryness of soil which results in less absorption when precipitation occurs and with predicted more intense periods of rainfall, water runoff will increase instead of percolating into the soil. Simulations by Wildermuth Environment Inc. showed that natural groundwater recharge (GWR) would decrease by 0.44% for each 1% decline in long-term precipitation. Groundwater supply is also impacted

Table 3-1: Chino Basin Groundwater Supplies & Projects

Baseline Chino Groundwater			
Project Name	**Description**		**AF**
Baseline Chino Basin Groundwater -2015 – 2020	Baseline groundwater production through 2020 is assumed to be 90,550 AFY, based on historical groundwater production by the Agencies from 2009-2014. Includes replenishment from natural rainfall, SW capture, and recharge.		90,550
Baseline Chino Basin Groundwater	Baseline groundwater production from 2020 through 2040 is assumed to be 91,300 AFY: Includes Agencies' share of OSY (71.9%) of 127,000 AFY. Does not include SW from the 2013 CBWM RMPU or recycled water recharge as these are accounted for separately and in addition to the baseline Chino groundwater.		91,300

Chino Basin Groundwater Projects			
Project Name	**Description**	**ID**	**AF**
Groundwater Treatment (Rehab)-Increment 1, 2	This project category will rehabilitate existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Increased well operation could supplement annual demands or help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production. Increment 1 & 2 will provide up to 10,000 AF.	1	5,000
		2	5,000
Groundwater Treatment (new)-Increment 1, 2	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Increased well operation could supplement annual demands or help offset losses in another water supply. Each increment will provide 5,000 AF. If all increments are selected, there is a potential of up to 10,000 AFY of production.	3	5,000
		4	5,000
Production Wells-Increment 1, 2, 3, 4	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over OSY). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Each increment will provide 5,000 AF. If all increments are selected, there is a potential of up to 20,000 AFY of production.	5	5,000
		6	5,000
		7	5,000
		8	5,000
Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	18	1,500
Six Basin Water Transfer	This project would explore the idea of developing a water transfer agreement with Six Basins. One concept is to purchase imported water for recharge into Six Basins and get in return equal volume of groundwater underflow plus agreed amount of stormwater. For example, 10,000 AF of imported water could be purchased in exchange for 10,000 AF of groundwater plus 7,000 AF of stormwater. Assume benefit 1 in 5 years.	38	17,000
Cucamonga Basin Improvements	This project category will identify projects that would result in additional groundwater production benefits coming into the IEUA service area from the Cucamonga Basin. Includes recharge facilities, treatment and production facilities to maximize supply coming into the Chino Basin.	62	2,500
Prior Stored Chino Groundwater	This category will allow supply to be taken from groundwater stored in the Chino Basin, pre 2014. It is estimated that approximately 400,000 AF of stored groundwater is available, of which 280,000 AF is made available for Agencies. This supply category will be managed on a case by case basis as selected into the Regional supply portfolios. The supply will be limited, but can be used annually or intermittent as needed.	87	8,400
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only.	98	5,000
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	99	5,000
Reliability Production Wells	This project category will construct new production wells needed to replace lost production or under-performing facilities. These projects will maintain current annual groundwater production deliveries and are intended to increase operational flexibility and reliability. Increment 1 varies in capacity and will be determined on a case by case basis as selected into each of the regional supply portfolios.	100	5,000

by development patterns (increased hardscaping) and more efficient irrigation practices.

A key conclusion drawn from the simulations is that it is important to secure supplemental water when available to recharge the Chino Basin (through direct or in lieu practices) to enable sustained or increased groundwater production during droughts and emergencies.

Supply Challenges
Supply challenges facing the Chino Groundwater Basin include the need to address:

- Sustainability or increased OSY for the Chino Basin.
- Loss of natural infiltration caused by higher density development, reduced outdoor landscaping, and irrigation efficiency measures.
- Targeting of groundwater recharge or limiting localized groundwater production in specific areas to help mitigate and/or prevent land subsidence.
- Recognition that different management practices may be required for groundwater recharge in each of the five management zones.
- Identification of additional supply sources for groundwater recharge to help meet Chino Basin recharge goals.
- Slowly rising levels total dissolved solids and nitrate levels in groundwater basin and corresponding potential future loss of available supply caused by this long term trend.
- Consideration of possible additional treatment infrastructure for groundwater.
- Containment of existing groundwater contamination plumes.

Supply Opportunities
The IRP process identified the potential projects listed in Table 3-1. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available for groundwater recharge and/or increased groundwater production.

Implications
Groundwater stored in the Chino basin increases regional water supply reliability and resilience with minimal impacts from climate. It is important that the region account for diminished natural recharge resulting from climate and/or development impacts and take action to minimize these losses and to secure replacement sources. Otherwise future groundwater production will exceed sustainable levels. In addition, water quality is a key future constraint on groundwater production. The region will need to evaluate water quality improvement actions including the identification of potential blending water sources for recharge to attain long term salinity management and reliability goals.

Key findings indicate that Chino basin groundwater supplies:

- Are not impacted by climate once water is stored in the groundwater basin.
- Are slightly impacted by receiving reduced natural recharge within the basin resulting from climate and/or development impacts.
- Can be sustained or increased through use of supplemental water for groundwater recharge (through in lieu or direct recharge) when these resources are available.
- Are a vital local emergency resource to help mitigate abnormal or catastrophic events through additional groundwater production.
- Are a climate flexible supply that can be tapped to offset either short- or long-term water supply needs.
- Provide a means for sustainable regional water management by enabling exchanges and transfers among agencies within the watershed.
- Are generated locally and are the region’s least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are critical to improving the region’s water self-reliance and reducing dependence on climate variable supplies such as imported water.

STORMWATER

Resource Overview

Stormwater is water that originates during rainfall and snow melt. In the region, stormwater comes primarily from surface water runoff from rain and snow starting in the San Gabriel Mountains and moving down through the Santa Ana watershed. In undeveloped areas, the soil absorbs much of the runoff and helps retain the water within the groundwater basin. However, developed areas with a significant amount of hardscape tend to concentrate and accumulate runoff in large quantities in a relatively short amount of time. Stormwater runs off roofs, through streets, and into regional stormdrains, where these flows are largely diverted into the region's flood control channels.

The Chino basin has six flood control channels spread throughout the region. These channels collect and manage the stormwater generated within the watershed. Major flood control channels that convey stormwater within IEUA's service area include:

- San Sevaine Creek
- Day Creek
- Deer Creek
- Cucamonga and East Cucamonga Creek
- San Antonio Creek

Located adjacent to the channels are detention basins that are operated regionally under a multiple-use agreement for both flood control and groundwater recharge operations. IEUA, Chino Basin Watermaster, and other agencies work closely with the San Bernardino Flood Control District to maximize the amount of stormwater that can be captured and recharged into the Chino groundwater basin. These collection channels also pick up dry weather runoff from excessive outdoor irrigation.

Runoff that is not captured by these detention basins ultimately flows to the Santa Ana River. While there are efforts by agencies further downstream to capture these flows, large amounts of water discharge into the ocean during storm events.

Baseline Supply

The baseline amount of water that is available for stormwater recharge from existing projects is already included in the groundwater supply, described under the Chino Basin Groundwater Basin resource section. To ensure there is no double-counting in the IRP simulations, this part of the supply is not counted in the stormwater baseline.

The stormwater supply projection through 2040 includes additional water captured as the result of the construction of projects listed in the 2013 RMPU (need consistent reference). As a result, the baseline stormwater supply assumed to be available between 2020 and 2040 is 6,410 AFY according to the estimated included in the 2013 RMPU.

Climate

Stormwater supplies may also be impacted by temperature. Warmer temperatures cause soils to dry out through evaporation. This can lead to two competing effects. Because it is more difficult for water to penetrate dry soil, water runoff could increase. However, once the water is in the soil column, the ground retains this moisture until the soil is saturated which helps to replenish groundwater supplies. This outcome is also consistent to other larger basin studies performed by the Bureau of Reclamation and the Colorado River District. During dry conditions, IEUA has documented reductions in the expected amount of runoff from rain events into the groundwater recharge basins.

In absence of more detailed information on how future stormwater would vary with respect to precipitation, a regression formula was applied to develop baseline supplies as well as any additional supply that was selected as part of a water management strategy (see Section 4). Based on the results of the climate simulations, baseline stormwater supply estimates from 2015 and 2020 ranges between 900 AFY to 7,400 AFY.

Supply Challenges

Supply challenges facing stormwater supplies include the need to address:

- Dependence of these supplies on annual rainfall and snow melt.

Table 3-2: Stormwater Supplies & Projects

Stormwater Baseline		
Project Name	**Description**	**AF**
Baseline Stormwater 2015-2020	0 AF through 2020: Estimated completion of 2013 RMPU is 2020, therefore no new stormwater supply will be available until after 2020.	0
Baseline Stormwater 2021-2040	6,410 AFY for 2020 thru 2040: New stormwater supply generated from additional stormwater recharge from the recommended projects included in the 2013 CBWM RMPU.	6,410

Stormwater Projects			
Project Name	**Description**	**ID**	**AF**
Day Creek SW Capture	Modify existing basins along Day Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept of approximately 2,500 AF. Assume benefit 1 in 5 years.	54	2,500
San Sevaine Creek SW Capture	Modify existing basins along San Sevaine Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept of approximately 2,500 AF. Assume benefit 1 in 5 years.	55	2500
Regional LID-Increments 1, 2	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Each increment could provide up to 5,000 AFY of recharge for a total of up to 10,000 AFY recharge.	58 59	5000 5000

- Supply variability such as storm frequency, intensity, seasonality of rainfall events which are exacerbated by climate change.
- Reductions in natural infiltration into the groundwater basin caused by channelization, new development, hardscape, increased outdoor water efficiency, and open space conversion.
- Construction of additional stormwater recharge facilities in a highly urbanized area where available land may not be available or not available in the right places to capture and recharge significant volumes of water.
- Compliance with Municipal Separate Storm Sewer System (MS4) Permit low impact development (LID) stormwater retention/recharge requirements for new and existing development and quantification of corresponding water supply benefits.

Supply Opportunities

The IRP process identified the following list of potential stormwater projects. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available from stormwater by improving diversions to existing basins, constructing new basins and pumping facilities, or through on-site MS4 low impact development improvements.

Implications

Stormwater is an extremely valuable resource to the region because it is "free" once the necessary facilities to capture and use this water have been constructed. It is also a high quality water source that improves the quality of the groundwater supplies once it has infiltrated and become blended within the aquifer. Stormwater has and will likely continue to be an important element of the region's water resources as it can be stored and subsequently used. To capture large storm events additional infrastructure should be constructed. In addition, to help offset lost infiltration from increased urbanization and more efficient outdoor landscaping, increasing regional investment in MS4-compliant low impact development projects will be necessary.

Key findings indicate that stormwater supplies:

- Are generated locally, are the least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are highly dependent on weather and driven by climate.
- Will be significantly reduced during droughts when below average precipitation and drier conditions

exist.

- Require well-designed facilities that can operate under a wide range of flows.
- Are a high quality water supply and provide a supplemental source of water to blend with and improve groundwater quality.

RECYCLED WATER

Resource Overview
IEUA owns and operates four water reclamation plants: Regional Plant No. 1 (RP-1), Regional Plant No. 2 (RP-2), Regional Plant No. 4 (RP-4), Regional Plant No. 5 (RP-5), and the Carbon Canyon Water Reclamation Facility (CCWRF). These facilities provide tertiary treated wastewater, also known as recycled water. Recycled water supplies can be used for direct non-potable uses, groundwater recharge for the Chino Basin, and for other regional discharge obligations. Recharge of recycled water is allowed by the Regional Water Quality Control Board (RWQCB) through the Optimum Basin Management Program, and currently provides approximately 17% of the region's urban water supply. The region secured a number of permits allowing for the direct use and groundwater recharge of recycled water. These permits define requirements for the use of recycled water (both direct use and recharge), including, but not limited to, uses, water quality levels, and monitoring requirements.

The recycled water program is operated based on the following order of priorities for recycled water supply:

- Regional discharge obligations (Santa Ana River Judgement, environmental, etc.)
- Agency direct use demands
- Regional groundwater recharge

Although recycled water is an important component of the groundwater recharge program, not all of the recharge basins are able to use recycled water. Currently, 10 of the region's 16 groundwater recharge basins have State permits to receive recycled water.

During FY2014-15, the 4 regional water reclamation plants produced approximately 62,000 AF of recycled water. Based on recent wastewater projections that were calculated as part of the Wastewater Facilities Master Plan (WFMP), treated flows are expected to increase to over 85,000 AFY by 2040 as shown in Table 3-4. It is important to note that these flow estimates were based on current existing indoor water usage levels in order to ensure that facilities and pipelines are adequately sized, and are consistent with the IRP's upper demand forecast (see Section 2). However, indoor water use efficiency is increasing and new plumbing code and appliance standards are being implemented. As a result, available wastewater flows by 2040 are expected to be lower than 80,000 AFY. These water flow trends are being carefully tracked by IEUA.

Baseline Supply
As part of the 2015 Recycled Water Program Strategy, regional direct use demand forecasts were developed. Direct use for recycled water is defined in the recycled water Program Strategy as the amount of water needed for landscaping, agricultural, and industrial processes. The forecasts indicate that by 2025 direct use demands will increase by 11,000 AFY. The projects required to achieve the direct use demand forecast by 2025 are included in IEUA's FY2015-16 Ten Year Capital Improvement Plan (TYCIP).

The TYCIP includes recycled water projects that will allow the region to increase both direct use and groundwater recharge deliveries. These projects will provide 30,640 AFY of direct use (including approximately 1,700 AF agriculture use) and 18,700 AFY of groundwater recharge supply by 2025. Because the TYCIP includes recycled water projects with prior commitments from the region, the corresponding amount of recycled water supply from those projects is considered baseline recycled water supply for the IRP.

In summary, the baseline recycled water supply for direct use demands is assumed to be:

- Near Term (2015 to 2020) = 25,000 AFY by 2020
- Mid Term (2020 to 2030)
- Long Term (2030 to 2040) = 31,300 AFY by 2025

Recycled water deliveries for groundwater recharge were also updated as part of the 2015 RWPS. Similar to direct use deliveries, projects required to contribute

Table 3-3: Wastewater Projection

	2015	2020	2030	2040
Regional Recycled Water Supply	63,900 AF	66,300 AF	77,500 AF	85,500 AF

18,700 AFY to the groundwater recharge program by 2025 are included in the TYCIP.

Therefore, baseline recycled water supply for groundwater recharge is assumed to be:

- Near Term (2015 to 2020) = 16,900 AFY by 2020
- Mid Term (2020 to 2030)
- Long Term (2030 to 2040) = 18,700 AFY by 2025

Table 3-6 summarizes the baseline assumptions compared to the total available recycled water supply produced by the four water reclamation plants. Beyond 2025, there is a significant amount of recycled water supply that can be delivered for beneficial reuse. Additional projects will need to be constructed to increase the baseline amount of recycled water beneficially used to help meet the urban water demand for the region. Additional projects for increasing recycled water reuse are outlined below.

Climate

Under the climate simulations, wastewater flows were not impacted by climate. As a result, recycled water is the most climate resilient water supply available to the region.

Supply Challenges

Supply challenges facing recycled water supplies include the need to address:

- Projected available wastewater supply is not adequate to fulfill future demands for recycled water.
- Changes in the future amount of available wastewater as well as increases in wastewater strength (total dissolved solids and nitrate levels) and changes in treatment resulting from trend towards more efficient indoor water use.
- The efficient use of recycled water for outdoor irrigation (both urban and agriculture) and whether this use should be consistent with existing state efficiency standards.
- Increased energy needs for treatment and delivery of recycled water.
- Increasing regulatory and environmental issues for construction and operation of recycled water systems, in particular surface recharge of recycled water.

Supply Opportunities

The IRP process identified the following list of potential projects. Potential projects range from conceptual to well-developed proposals. Each project has the ability to increase the amount of supply available for recycled water direct use and groundwater recharge.

Implications

Due to its reliability and climate resilience, recycled water is one of the most valuable water supplies for the

Table 3-4: Recycled Water Supply & Baseline Demands

	2015	2020	2025	2030	2040
Recycled Water Supply(1)	60,200	64,300	69,700	75,100	82,900
SAR Discharge Obligation(2)	17,000	17,000	17,000	17,000	17,000
Direct Use Demands(3,4)	24,700	28,800	30,700	30,700	30,700
Groundwater Recharge (3)	14,500	16,900	18,700	18,700	18,700
Remaining Recycled Water Supply	***4,000***	***1,600***	***3,300***	***8,700***	***16,500***

Notes: (1) Regional supply per Wastewater Facilities Master Plan, includes 3% loss due to treatment waste streams.
(2) Minimum discharge required by SAR Obligation is 16,850 AFY. For planning purposes, assume 17,000 AFY
(3) Per 2015 Recycled Water Program Strategy and Agency FY2015/16 TYCIP.
(4) Includes agricultural demands.

Table 3-5: Recycled Water Supplies & Projects

Recycled Water Baseline		
Project Name	**Description**	**AF**
Baseline Recycled Water for Groundwater Recharge 2015-2020	14,500 AFY by 2015 based on 5-year historical average from 2009-2014	14,500
Baseline Recycled Water Direct Use 2015-2020	16,100 AFY by 2015 based on 5-year historical average from 2009-2014	16,100
Baseline Recycled Water for Groundwater Recharge 2021-2025	2,400 AFY of additional Recycled water by 2020 for groundwater recharge per IEUA FY15-16 TYCIP	2,400
Baseline Recycled Water Direct Use 2021-2025	8,900 AFY of additional Recycled water direct use by 2020 per IEUA FY15-16 TYCIP	8,900
Baseline Recycled Water for Groundwater Recharge 2026-2040	1,800 AFY of additional Recycled water for groundwater recharge by 2025 per IEUA FY15-16 TYCIP	1,800
Baseline Recycled Water Direct Use 2026-2040	4,000 AFY of additional Recycled water for direct use by 2025 per IEUA FY15-16 TYCIP	4,000

Recycled Water Projects			
Project Name	**Description**	**ID**	**AF**
WRCRWA Recyled Water Intertie	The Western Riverside County Regional Wastewater Authority (WRCRWA) Plant intertie would allow for the delivery of recycled water from the WRCRWA Plant to be used in the IEUA southern service area. This would also allow additional recycled water to be delivered into the northern service area groundwater recharge basins by reducing the demand from the RP-1 930 pressure zone pump station. Intertie would occur within the 800/930 Pressure Zones.	9	4,500
Rialto Recycled Water Intertie	The Rialto intertie project would allow for delivery of recycled water from the Rialto Wastewater Treatment Plant (WWTP) to be used in the IEUA service area. The intertie could occur near the RP-3 groundwater recharge basins. This concept could involve the Inland Valley Pipeline, LLC to convey water between Rialto WWTP and IEUA's recycled water distribution system. Supply could be used for direct, groundwater recharge, or other reuse strategy.	10	4,500
Pomona Recycled Water Exchange/Transfer	The City of Pomona does not currently use all of the treated effluent from the Pomona Water Reclamation Plant. One concept would involve partnering to develop and expand their recycled water facilities in exchange for an agreed amount of their Chino Basin groundwater right. Could include other supply transfer agreement such as reclaimable waste and/or groundwater.	11	2,500
RP-1 Recycled Water Injection-Increment 1, 2, 3	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increments 1-3 facility would be sized for 7,500 AFY.	12 13 14	2,500 2,500 2,500
Satellite Recycled Water Injection-Increment 1, 2, 3	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing, and volume to be produced will be determined as part of the portfolio development process. Increments 1-3 facility or facilities would have a capacity of 7,500 AFY.	15 16 17	2,500 2,500 2,500
Recycled Water Direct Use Expansion-Increment 1, 2, 3, 4	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond IEUA's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035, and potential recycled water interties. Each increment would increase direct use beyond baseline supply by 5,000 AFY. Increment 1-4 facilities would increase direct use beyond baseline supply by 20,000 AFY.	19 20 21 22	5,000 5,000 5,000 5,000
Existing Groundwater Recharge Basin Improvements beyond RMPU-Increment 1, 2, 3, 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-4 facilities would increase recharge at existing basins within the Chino Basin by an additional 15,000 AF.	23 24 25 26	2,500 2,500 5,000 5,000

Table 3-6: Recycled Water Projects Continued

Recycled Water Projects (*continued*)			
Project Name	**Description**	**ID**	**AF**
Construct New Groundwater Recharge Basins-Increment 1, 2, 3, 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water, and/or imported water for groundwater recharge. Increment 1-4 would provide up to an additional 9,800 AFY of recharge capacity, which is approximately 4 new basins at 350 AF per month for 7 months of operation.	27 28 29 30	2,450 2,450 2,450 2,450
Direct Potable Reuse-Increment 1, 2	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1+2 facility would have a capacity of 10,000 AFY.	60 61	5,000 5,000
RP-1 NRWS Treatment	The north Non-Reclaimable Wastewater System (NRWS) discharges approximately 3.5 MGD of brine to Los Angeles County annually. The project would construct a treatment facility to allow the Region to reuse this supply into the recycled water system. Requires plant expansion and partial reverse osmosis for blending.	65	3,920
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but will increase reliability and/or quality. To occur annually or intermittently. Resiliency and flexibility benefit only.	98	5,000 AF
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but will increase reliability. To occur annually or intermittently.	99	5,000 AF

region and is a high priority for additional investment. The region needs to account for the trend towards increased indoor water efficiency and evaluate opportunities to bring in supplemental wastewater flows through construction of collection systems in non-sewered areas and collaboration with neighboring jurisdictions to optimize regional infrastructure. Further, the region needs to improve efficiency of direct recycled water use to maximize its availability to all Agencies. This is particularly important for outdoor irrigation as improved efficiency can help make more recycled water available during the summer and fall when demands for recycled water are at their highest.

Findings indicate that recycled water supplies:

- Are not impacted by climate making recycled water the region's most climate resilient water supply.
- Are needed to maximize supplemental water for groundwater recharge.
- Are generated locally and can be beneficially used by all Agencies.
- Are critical to improving the region's water self-reliance and reducing dependence on climate variable supplies such as imported water.
- Are being impacted by indoor water efficiency trends so the region must anticipate the amount of supply that is likely to be available in the future and the changes in treatment that may be required to maintain the water quality of these supplies.
- Are a supplemental water source for the entire region with infrastructure that can be intertied with that of neighboring agencies to optimize availability and use of recycled water.
- Generally require a higher level of energy than other water supplies for treatment and distribution, but are less energy intensive than imported water supplies and use of this water can contribute to statewide reductions in greenhouse gas emissions.

CHINO BASIN DESALTER

Resource Overview

The Chino Basin Desalter Authority (CDA) was formed to manage the production, treatment, and distribution of highly treated potable water to cities and water agencies throughout the Chino Basin. A Joint Exercise of Powers Agency, the CDA was formed by the Jurupa Community Services District; Santa Ana River Water Company; Western Municipal Water District; the Cities of Chino, Chino Hills, Norco, and Ontario; and the Inland Empire Utilities Agency to treat brackish groundwater extracted from the lower portion of the Chino Basin. Brackish water is water that has more salt (about 1000 ppm of total dissolved solids) than fresh water, but not as high as seawater (about 3000 ppm of total dissolved solids).

The CDA operates two desalters: Chino I Desalter which began operation in 2000 and Chino II Desalter which began operation in 2006. The treatment processes at the Chino I and Chino II Desalters include Reverse Osmosis (RO) and Ion-Exchange (IX) for removal of nitrate and total dissolved solids (TDS). The Chino I Desalter also includes air stripping for removal of volatile organic chemicals (VOC).

These facilities serve three purposes. First, they convert unusable groundwater into a reliable potable water supply for the region and are part of a long-term pollution cleanup strategy for the Chino Basin. Second, they provide hydraulic control over the lower Chino Basin, which prevents the migration of poor quality water into the Santa Ana River as well as downstream impacts on groundwater basins in Orange County. Third, they maintain and enhance groundwater yield for the Chino Basin.

The Desalters are a critical component of a long-term salinity management strategy that enables the region to use recycled water in the Chino Basin. The Peace Agreement, Optimum Basin Management Program, and Maximum Benefit Plan approved by the Santa Ana Regional Water Quality Board and the State Water Resources Control Board require ongoing implementation of regional salt management and reduction actions as a condition of the regional recycled water use permits for outdoor irrigation as well as for groundwater recharge.

Baseline Supply

Chino I Desalter and Chino II Desalter currently produce 25,000 AFY of treated groundwater. These facilities are being expanded and will have the capacity to treat 35,200 AFY by 2017. The amount of water received by member agencies within IEUA's service area is approximately 50% of the total production from these facilities. The remaining water is sent to agencies within the Western Municipal Water District service area.

Member agencies that receive water from the Desalter facilities within IEUA's service area are:

- City of Chino
- City of Chino Hills
- City of Ontario

Based on information from the CDA, the baseline Chino Desalter supply for the Agency's service area is assumed to be 17,300 AFY through 2040.

Climate

Climate effects on water supply produced from the Chino Desalter facilities was not modeled as part of the IRP. Climate impacts were considered to be negligible as the quantity of water produced is dependent upon the capacity of the desalter facility and is not supply limited.

Supply Challenges

Supply challenges facing the Chino Desalters include the need to address:

The outstanding groundwater replenishment obligation to the Chino Basin of 152,900 AF through the duration of the Peace Agreement that must be fulfilled by the region.

Increased energy needs and costs for the expanded treatment of brackish water and brine disposal

The location of Desalter production wells near existing contaminated plumes in the groundwater basin, including potential costly impacts on Desalter treatment processes as well as opportunities to use the Desalters as part of a groundwater clean-up strategy.

Supply Opportunities

The IRP process identified the following list of potential projects. Each project has the ability to increase the amount of supply available, treated or produced by the Desalter facilities.

Implications

The Chino Desalters provide a new source of potable water supplies for the region by treating currently unusable groundwater, as well as providing hydraulic control of the lower Chino Groundwater Basin. This infrastructure is critical to the continued use of recycled water in the region as well as improving groundwater quality and yield in the Chino Basin.

Key findings indicate that the Chino Desalter water supplies:

- Are not impacted by climate making recycled water the region's most climate resilient water supply.
- Are critical to improving the region's water self-reliance and reducing dependence on climate variable supplies such as imported water.
- Generally require a higher level of energy than other water supplies for treatment and distribution.
- Are an essential component of the regional commitment to remove salt and nitrates in the Chino Basin.
- Are critical to the continued use of recycled water in the region for groundwater recharge and outdoor irrigation.
- Provide hydraulic control for the Chino Basin which prevents poor quality water from migrating into the Santa Ana River and downstream groundwater basins.
- Are managed under the Peace Agreement and the Optimum Basin Management Plan, which require fulfillment of a groundwater replenishment obligation of 152,900 AF.
- Are limited on the amount of water that can be produced based on the capacity and performance of the Desalter facilities.

LOCAL SURFACE WATER

Resource Overview

Agencies located the northern part of the region have long standing legal rights to divert and treat water from local creeks in the Santa Ana River watershed, including San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek, and other small surface creeks and tunnels. The amount of water from these local surface supplies is variable, depending on climate conditions.

The quality of local surface water is typically quite high as the creeks are filled by rainfall and snowmelt from the San Gabriel Mountains. However, the surface water must receive treatment to comply with state and federal drinking water quality standards before it can be served for public use. Large storm events can cause sedimentation levels to rise to levels that impact the water treatment plants. During these times, water is diverted downstream to groundwater recharge basins.

Baseline Supply

Table 3-7: Chino Basin Desalter Baseline & Projects

Baseline Chino Desalter Projects		
Project Name	**Description**	**AF**
Baseline Chino Desalter	Phase 2 Chino Basin Desalter production for IEUA service area	15,000 AF
Baseline Chino Desalter	Phase 3 Chino Basin Desalter production for IEUA service area	2,730 AF

Chino Desalter Projects			
Project Name	**Description**	**ID**	**AF**
Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	18	1,500 AF

The most recent local surface water production data received from Agencies was used to forecast the baseline water supply. The amount of local surface water supply was established using a five-year average of production during the period of FY2009-10 through FY2013-14. This period of time includes three consecutive years of below average precipitation and two year of normal or above precipitation, providing a conservative projection. Baseline local surface water before considering climate modeling effects is therefore assumed to be 11,700 AFY through year 2040.

Climate

Local surface supplies are highly impacted by climate. Due to their dependence on precipitation and snow melt, the amount of water that can be obtained from local surface sources is highly variable from year to year.

However, annual surface water supplies are highly dependent on the weather and susceptible to changes in climate and was modeled under climate influences. Based on the results of the climate simulations, the projected baseline local surface water supplies available between 2015 and 2020 ranges from 2,000 to 12,600 AFY.

Local surface supplies may also be impacted by temperature. Higher temperatures cause more evaporation, reducing the amount of soil moisture. This means that the soil is more likely to absorb and hold water when rain occurs and this can reduce the amount of water flowing into creeks and streams.

Historical variability in local surface supplies is highly correlated with precipitation but also temperature.

Records indicate that local surface flows have declined and projections indicate that flows will decline in the near future from at least 2021-2040 (Seager 2012). Based on the results of the climate simulations, local surface water supplies are expected to vary from 2,000 AFY to 12,600 AFY.

Supply Challenges

Supply challenges facing local surface water supplies include the need to address:

- Extreme variability due to their dependence on rainfall and snow melt .

Supply Opportunities

The IRP process identified the following list of potential projects. Each project has the ability to increase the amount of supply available from local surface water by either diversion and/or treatment improvements.

Implications

Local surface water, when available, is an extremely valuable resource because it is “free”, with the cost to the Agencies being the operation of the necessary facilities to capture and use this water. Where possible, use of local surface water should be maximized.

Key findings indicate that local surface water supplies:

- Are generated locally and are the region’s least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water .
- Are cost effective relative to imported water supplies.
- Are highly dependent on weather and driven by climate.
- Will be significantly reduced during droughts when below average precipitation and drier conditions exist.
- Are a high quality water supply and provide a supplemental source of water to blend with and improve groundwater quality.
- Are highly variable and require facilities to operate under a wide range of flows .

NON-CHINO BASIN GROUNDWATER

Resource Overview

Member agencies pump groundwater from basins adjacent to the Chino Basin. These basins include Cucamonga, Rialto, Lytle Creek, Colton, and the Six Basins groundwater basins. The Six Basins are comprised of the Ganesha, Live Oak, Pomona, Lower Claremont Heights, Upper Claremont Heights and Canyon Basin.

There are four agencies within the service area that include non-Chino groundwater as a water supply source. These agencies are the City of Upland, Cucamonga Valley Water District, Fontana Water Company, and San Antonio Water Company.

Baseline Supply

The most recent water production data was used to forecast the baseline water supply. The amount of non-Chino Basin groundwater supply was based on a five-year production average from FY2009-10 to FY2013-14. Baseline non-Chino groundwater supply is assumed to be 22,000 AFY through 2040.

Climate

Climate effect on non-Chino Basin groundwater was not evaluated as part of the IRP. However, it is expected that climate will have a minimal impact on these groundwater supplies based on the climate simulations performed on the Chino Basin. The non-Chino Basin groundwater baseline supply is assumed to remain constant at 22,100 through 2040.

Supply Challenges

These groundwater basins face similar supply challenges to those identified for the Chino Basin. Challenges include reduced natural infiltration, safe yield operating constraints, and water quality issues.

Supply Opportunities

The IRP process identified the following list of potential projects. Each project has the ability to increase the amount of supply available for groundwater recharge and/or increased groundwater production.

Implications

Groundwater basins outside of the Chino Basin face similar implementation hurdles as the Chino Basin.

Key findings indicate that non-Chino Basin groundwater supplies:

- Are not impacted by climate once water is stored in the groundwater basin.
- Are slightly impacted by receiving reduced natural recharge within the basin resulting from climate and/or development impacts.
- Can be sustained or increased through use of supplemental water for groundwater recharge (through in lieu or direct recharge) when these resources are available.
- Are a vital local emergency resource to help mitigate abnormal or catastrophic events through additional groundwater production.
- Provide a means for sustainable regional water management by enabling exchanges and transfers among agencies within the watershed.
- Are generated locally and are the region’s least energy intensive water supply and have minimal greenhouse gas emissions relative to imported water.
- Are cost effective relative to imported water supplies.
- Are critical to improving the region’s water self-reliance and reducing dependence on climate variable supplies such as imported water.

Table 3-8: Local Surface Water Baseline & Projects

Baseline Local Surface		
Project Name	**Description**	**AF**
Baseline Local Surface	11,700 AF based on 5-year historical average from 2009-2014.	11,700 AF

Local Surface Projects			
Project Name	**Description**	**ID**	**AF**
Dry Weather Flow Diversions	Capture and treat urban dry weather flow from Chino, Cucamonga and San Sevaine Creek into the Regional Plants. For the purposes of the IRP, a volume of 3,500 AFY was assumed as total available dry weather flow.	48	3,500 AF
Maximize Local Surface Water	This category of projects will construct facilities needed to capture additional local surface water. Projects to be defined by IEUA's Agencies. For example, increase surface flows off Lytle Creek in wet years. Assume benefit 3 in 5 years.	88	1,000 AF

- Reduce the water resource need on the Chino Basin.

IMPORTED WATER

Overview

IEUA was originally formed in 1950 as a municipal wholesale water district for the purpose of providing municipalities in the Chino Basin with supplemental imported water purchased from the Metropolitan Water District of Southern California (MWD).

MWD is a contractor to both the State Water Project (SWP), which imports water from northern California, and Colorado River Aqueduct (CRA) systems. The availability of imported water supplies is heavily dependent on hydrology and environmental regulations. This dependency can lead to high variability in the annual amount of water available to the Southern California region. For example, in the midst of the great drought, the California State Water Project was able to supply only 5 percent of its contract allocation in 2013-2014, which is a significant reduction from past allocations.

Due to water quality concerns in the Chino Basin, the region can only use imported water from the State Water Project. Imported purchases from MWD in recent decades have averaged about 70,000 AFY, providing about 30% of the water supply for the service area.

Imported water purchased from the MWD is limited by a purchase order agreement. The agreement allows the region to purchase up to a total of 93,283 AF per year at its lowest (Tier I) rate. This limit is based on historical imported water purchases for municipal use by the member agencies and for regional groundwater recharge. The agreement includes an annual minimum purchase commitment of 39,835 AF. Note that this amount is slightly less than the 40,000 AFY minimum needed for the operation of Agency treatment facilities.

There are four water treatment plants that treat imported water purchased from the MWD. These treatment facilities include:

- Water Facilities Authority's Agua de Lejos Treatment Plant (81 mgd capacity)
- Fontana Water Company's Sandhill Surface Water Treatment Plant (29 mgd capacity)
- CVWD's Lloyd W. Michael Water Treatment Plant (60 mgd capacity)
- CVWD's Royer Nesbit Water Treatment Plant (11 mgd capacity)

Each agency is allocated an annual portion of MWD's available Tier 1 water supply (shown below). The allocations do not confer a contractual right to MWD imported water but are used to determine the price paid for the water. Purchases in excess of the Tier 1 allocation are assessed by MWD at a higher Tier 2 rate.

- Water Facilities Authority - 31,384 AFY
- Cucamonga Valley Water District - 28,368 AFY
- Fontana Water Company - 10,000 AFY
- Inland Empire Utilities Agency/Chino Basin Watermaster – 23,531 AFY

The amount available to IEUA and/or the Chino Basin Watermaster is used only for groundwater recharge.

Baseline Supply

The baseline supplies for imported water are based on IEUA Resolution 2014-12-1. Supplies were set as follows:

- Current imported purchases by Agencies are assumed to be 65,000 AFY (consistent with FY2014/15 purchases).
- Imported water purchases between 2020 and 2040 are assumed to be 69,752 AFY.
- Minimum imported purchases are assumed to be 40,000 AFY to meet retail agency water treatment operational requirements .

Climate

The State Water Project's infrastructure was designed to capture snowmelt from snowpack in the Sierra Nevada Mountains. When the snow melts during the warmer spring months, this combination of reservoirs and conveyance facilities provides a steady water supply throughout the year but especially during the summer and fall when water demands peak and precipitation is limited.

Table 3-9: Non-Chino Basin Groundwater Supplies & Projects

Non Chino Basin Groundwater Baseline		
Project Name	Description	AF
Baseline Non-Chino Groundwater	22,100 AF Amount of water produced by an Agency from outside the Chino basin	22,100 AF

Non Chino Basin Groundwater Projects			
Project Name	Description	ID	AF
Maximize Other Groundwater	This project category will identify Agency projects that would result in additional groundwater production benefits coming into the IEUA service area outside of the Chino Basin. Such projects may have the potential of an additional 5,000 AF.	63	5,000 AF

However, climate change is expected to continue to significantly impact the timing and characteristics of snowpack on which the SWP system depends. Predicting MWD's ability to supply specific amounts of imported water to IEUA were beyond the scope of climate simulation. Instead, the IRP considered a wide range of potential changes in imported supply availability, including assumptions in which SWP supplies decline by 2040. To explore a range of possible climate effects of MWD supplies, the analysis varied the amount of reduction of the Tier 1 water above the minimum purchase level. Two levels were selected—a 40% reduction and an 80% reduction. This corresponds to a range of reduction of 17% to 34% in total MWD Tier 1 supplies.

An interesting finding from the climate modeling was the identification of times, particularly in the next ten years, when imported MWD water may not be needed to meet regional demand. This water, if purchased, could be placed into the Chino Basin for storage and made available to during future droughts, imported water deliveries, or catastrophic events (see Figure 3-12 below.) The modeling also shows that beyond the first ten years there are periods when there is shortage in the MWD supply, and available water is lower than the baseline assumption.

Supply Challenges

Supply challenges facing imported water supplies from Metropolitan Water District's State Water Project include the need to address:

- Catastrophic interruption—for example, an earthquake affecting the Delta or Tehachapis, or a Delta levee break.
- Maintenance interruptions—for example, Rialto line repairs.
- Operational constraints without improvements to the Bay Delta conveyance, such as the Delta Fix proposed by the Department of Water Resources.
- Colorado River over-allocation and the status of Lake Mead, including the potential impact on availability of MWD supplies which could constrain distribution of water from the State Water Project.
- The cost of supplies that are expected to increase 4-5% annually during the next decade.
- Vulnerability to climate change conditions, such as warmer temperatures, reduced snowpack, and more frequent droughts that will reduce supplies available from CRA and SWP given that both infrastructure projects are designed to capture slow melting snowpack.

Supply Opportunities

Additional opportunities for increasing supplemental water supplies from imported sources, both through MWD and from other locations, were identified during the IRP process and are summarized in Table 3-10.

Implications

Climate conditions, conveyance reliability, and the need to improve SWP infrastructure all affect the future availability of imported water to the region. Due to its high quality, including having low TDSs, SWP water should be purchased when it is available to enhance groundwater recharge and to leverage other water supply programs that benefit the region.

Key findings indicate that imported water supplies:

- Are less reliable now than they have been in the past and may further decrease in reliability with climate change and continued uncertainty about infrastructure improvements.
- Are not fully reliable, and it will be important to develop alternative supplies so that the region has the flexibility to withstand reduced SWP supply caused by extended years of limited/reduced snowpack.
- Are not fully reliable, and so additional investments may need to be made to meet water quality restrictions if low-salinity imported water is not available, such as considerations to include CRA supply.
- Should be leveraged, when available in the near-term, by the region for storage, groundwater recharge, exchanges, transfers, or in-lieu.
- Will be more expensive. The cost of supplies is expected to increase 4-5% annually during the next decade .

CONSERVATION

Overview

Unlike traditional water supplies, efficient use of water reduces demand in ways that are quantified indirectly. Demand is reduced through changes in consumer behavior and savings from water-efficient fixtures like toilets and showerheads. These water savings come from both “active” and “code-based” conservation efforts. “Active” efforts are Agency funded programs such as rebates, installations, and education. “Code-based” conservation consists of demand reductions attributable to more water efficient plumbing code and appliance standards and customer response to higher water costs and rates that encourage water efficiency.

Over the past 24 years, since signing the California Urban Water Conservation Council’s (CUWCC) memorandum of understanding (MOU) regarding Urban Water Conservation in 1991, the region has been committed to developing and implementing conservation programs that serve as a key component in the overall water resource management portfolio for the region. Such active conservation programs have traditionally included rebates for water saving devices such as ultra-low-flow toilets and high efficiency clothes washers, which are primarily administered through MWD’s “Save Water-Save A Buck” program for commercial, residential, and multi-family properties. Other programs include educational programs such as the award-winning Garden in Every School Program,

Figure 3-11: Potential Climate Change Impact on SWP Supplies

Table 3-10: Imported Water Baseline & Projects

Baseline Imported Water		
Project Name	**Description**	**AF**
Baseline Imported Water	Agencies can purchase up to 69,750 AFY per the Member Agency Tier 1 purchase limit per Resolution 2014-12-1	69,750 AF

Imported Water Projects			
Project Name	**Description**	**ID**	**AF**
Existing Groundwater Recharge Basin Improvements beyond RMPU-Increment 1 ,2, 3, 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1 and 2 would increase recharge at existing basins within the Chino Basin by 2,500 AFY each. Increments 3 and 4 are 5,000 AF each. If all increments are selected there is a potential of up to 15,000 AFY of production.	23	2,500 AF
		24	2,500 AF
		25	5,000 AF
		26	5,000 AF
Construct New Groundwater Recharge Basins-Increment 1, 2, 3, 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Each increment would provide up to an additional 2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation. If all increments are selected, there is a potential production of 9,800 AFY.	27	2,450 AF
		28	2,450 AF
		29	2,450 AF
		30	2,450 AF
ASR wells MZ1 and MZ2	Construct aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge within management zone 1 and 2. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.1 and 3 for CVWD and the City of Ontario.	31	11,500 AF
ASR wells MZ3	Construct ASR wells to increase imported water groundwater recharge within management zone 3. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.2 for JCSD.	32	3,500 AF
Maximize ASR wells	Construct other ASR wells to increase imported water recharge by 3,500 AFY within the Chino Basin during wet and dry years. Assume benefit 40% of the time (2 in 5 years). Storage to be dependent on supplemental water availability in wet years.	33	3,500 AF
Cadiz IW Transfer	The Cadiz project would allow for the import of unused groundwater from the remote Fenner Valley near Cadiz, California. For the purposes of the IRP, a 5,000 AFY increment of water is assumed. The Cadiz supply would be transferred and taken as SWP water into the Chino Basin.	34	5,000 AF
Secure SWP IW transfer outside MWD	Imported water supply is solely from MWD via the SWP and is limited by the Agency's purchase order. Other permanent, temporary or seasonally available imported water supplies could be purchased and wheeled into the Chino Basin. The volume of water available varies depending on the source of water and timing. Supplies could be purchased from various Irrigation Districts or secured via Ag Transfer. Assume benefit 1 in 10 years.	35	5,000 AF
SBVMWD IW Transfer	As a SWP contractor, San Bernardino Valley MWD (SBVMWD) has a Table A allocation. This option would involve constructing an intertie between SBVMWD's imported water system. The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	36	5,000 AF
Ocean Desalination Exchange	This project category would involve a partnership with another water agency pursuing ocean water desalination; through in-lieu exchange, the Chino basin would obtain an agreed amount of imported water. For the purposes of the IRP, a volume of 5,000 AFY was chosen. Opportunity to invest in upcoming ocean desalination plants includes Huntington Beach, Carlsbad and West Basin.	37	5,000 AF
Water Banking Facility	This project category would invest into the Semitropic Groundwater Storage Bank in Kern County or similar program. The Chino Basin could bank additional purchases of wet year water when these supplies are available and Chino Basin facilities are capacity limited.	56	5,000 AF

Imported Water Projects (*continued*)			
Project Name	**Description**	**ID**	**AF**
Max Tier 1 MWD Imported Water-Increment 1, 2, 3	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 7,850 AFY. If all increments are selected up to 23,550 AFY could be purchased purchased annually or intermittently.	89	7,850 AF
		90	7,850 AF
		91	7,850 AF
Max Tier 2 MWD Imported Water-Increment 1, 2, 3	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 5,000 AFY . If all increments are selected up to 15,000 AFY could be purchased annually or intermitently.	92	5,000 AF
		93	5,000 AF
		94	5,000 AF
MWD Replenishment or discount wet year water-Increment 1, 2, 3	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Each increment would allow for the purchase of an additional 10,000 AFY. If all increments are selected up to 30,000 AFY could be purchased annually or intermittently. Assumes benefits after 2 consecutive wet years (approx. 1 in 15 years)	95	10,000 AF
		96	10,000 AF
		97	10,000 AF
Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only	98	5,000 AF
Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	99	5,000 AF

National Theatre for Children, monthly water conservation tips, landscape audits, and turf-grass removal programs.

Water conservation strategies have changed dramatically over the past few years as a result of state and local policies that require increased conservation and improved efficiency, technological improvements that increase water savings potential, and advancements in methods of communication that provide new opportunities to engage and educate the public. To address the shift, regional efforts include securing funding for technology-based software and supporting the development of sustainable water rate structures. Both technology-based software and sustainable rate structures establish an efficiency standard for each individual customer based on their existing indoor and outdoor water use profile. These programs also have the added benefit of targeting outdoor water use, which accounts for approximately 60% of urban M&I demands.

Baseline Supply

Conservation baseline supplies are water savings from existing conservation programs' active and passive savings. Baseline conservation savings are embedded in the demands forecast, based on current annual savings (see Table 3-11). These programs are expected to continue through 2040.

Climate

Climate does not have an impact on water supply savings from conservation.

Supply Challenges

Supply challenges facing conservation programs include the need to address:

- Existing development will need incentives such as conservation rebates to meet state regulations.
- Existing development will also need targeted messaging based on state established efficiency standards to meet responsible water use and establish a new water use practices.

"And it never failed that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way."

—John Steinbeck
East of Eden

- Current efficiency standards do not include recycled water use.

Supply Opportunities
The IRP process identified the following list of potential projects. Conservation savings beyond baseline are shown as new water supplies because they offset water demands. Conservation project savings are tied to the IRP's upper demand forecast; therefore if actual demands are lower, there will be a corresponding reduction in conservation savings.

Implications
This is a key climate resistant water supply that has the best potential to augment and extend current available supplies. Since outdoor irrigation makes up 60% of urban M&I demands, this supply category has the largest potential impact for the region. The region will need to evaluate how to achieve targeted efficiency goals.

Findings indicate that water conservation programs:

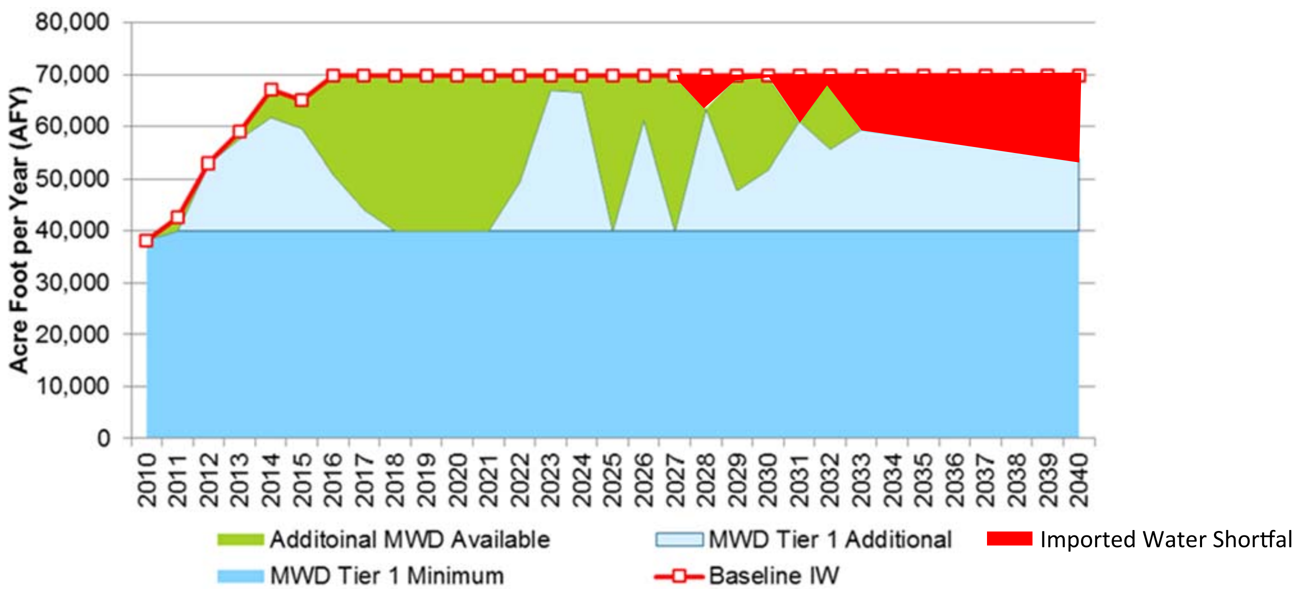
- Are cost effective relative to imported water supplies.
- Extend other water supplies and delays the need for additional system expansion because it is a demand offset.
- Are instrumental for the region to reduce dependence on climate variable supplies such as imported water.
- Are not impacted by climate change or water quality concerns.

Table 3-13: Water Use Efficiency Baseline & Projects

Water Use Efficiency Baseline		
Project Name	**Description**	**AF**
Baseline Conservation	1,000 AF per year from existing conservation programs' active and passive savings.	1,000 AF

Water Use Effiency Projects			
Project Name	**Description**	**ID**	**AF**
Expand WUE Devices	Implement additional targeted device related savings to reduce demand beyond current annual water use efficiency (WUE) savings. Provide incentives and pilot programs to roll out extremely high efficient indoor fixtures and toilets. To be verified with Water Use Efficiency Business Plan (WUEBP).	39	5,000 AF
WUE - Turf Removal-Increment 1, 2, 3	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Each increment would provide up to 5,000 AFY of savings. If all are selected, they can result in up to 15,000 AFY savings	40 41 42	5,000 AF 5,000 AF 5,000 AF
WUE - Budget Rates-Increment 1, 2, 3	Implement water budget based rates for 2 Agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Each increment would provide up to 13,350 AFY of savings. If all increments are selected, they can result in up to 40,050 AFY savings.	43 44 45	13,350 AF 13,350 AF 13,350 AF
WUE- Recycled Water Demand Management-Increment 1, 2	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Each increment would provide 2,500 AFY of demand management. If both are selected they could provide 5,000 AFY additional recycled water. This supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy	46 47	2,500 AF 2,500 AF
WUE - Advanced Metering Technologies	Install advanced metering infrastructure (AMI) between retail meters and a utility provider. Will provide real-time data about consumption and allow customers to make informed choices about usage.	66	5,000 AF

Table 3-12: Sample model run of climate impacts on imported water supply availability



4. Supply Portfolio Themes

Baseline Assessment

Single Variable Tests

Water Resource Strategies

The desert globemallow, which requires very little water, grows in a low water use landscape.

Supply Portfolio Themes

Section 4 presents the different water resource strategies developed through the IRP Technical Work Group. The purpose of each water resource strategy is to increase future water supplies, including water efficiency as a source of supply, to reduce the region's vulnerability to climate change and to ensure that future water needs for the region are met.

First, a baseline assessment was conducted to evaluate the ability of the baseline water supplies, established in Section 3, to meet projected baseline water demands. To do this, a water management mass balance model was developed by IEUA's technical consultants (see Appendix 2) to compare projections of water demand and supply under historical and future climate change conditions. Three demand scenarios were then evaluated across 106 different projections of future climate derived from two archives of downscaled global circulation models simulations. The results were reviewed to assess the extent to which baseline water supplies could NOT fulfill demands (described as supply shortfalls) under each future. This baseline assessment provided the foundation for the Work Group to identify the additional water resources needed to meet future demands.

Next, single variable tests were conducted to determine how well specific types of new water supplies could help the region meet projected demands under climate change. Single variable tests added individual supplies to the baseline to determine how well that single change performed under each of the 106 climate scenarios in the model.

Based on the outcomes of the single variable tests, the IRP Technical Work Group crafted 5 water resource strategies for further evaluation. Each strategy had an underlying theme, such as maximizing the use of recycled water or securing additional supplemental water supplies for groundwater replenishment. These five strategies were turned into project portfolios by selecting representative projects from proposed lists of future projects (see Section 3) that could be implemented to increase future water supplies above the baseline projections.

Finally, the performance of each water resource strategy was compared to the baseline assessment. The evaluation focused on two IRP criteria: (1) the ability of the scenario to generate sufficient water to meet future regional water demands under climate change conditions and (2) the amount of surplus water produced, defined as water not needed to meet demand, and placed into long term groundwater storage.

BASELINE ASSESSMENT

The regional baseline supplies and demand projections were developed in the first part of the IRP planning process and are summarized on p.X (see end of section 3). To establish how this baseline could be impacted by climate change, these projections were modeled and stress-tested under 106 separate climate scenarios, as referenced above and included in Appendix 2.

As a reminder, each of the 106 climate scenarios yields an independent model result and is depicted with a separate colored line in the figures below. Note that no one run is "more accurate" than another. However, some of the runs stand out as "outlying" results that are either higher or lower than the majority of the runs. These results are not included in the scenario evaluations. For the purposes of the IRP, the analysis was focused on the range of results for the majority (75%) of the climate scenarios.

Figure 4-1 shows the amount of unmet demand through 2040 under the baseline assessment with climate change. For the purposes of the IRP, unmet demands are defined as those times when demands exceed available water supplies. For the baseline conditions with climate change, the range of unmet demand is 0 AFY to 50,000 AFY . Note that the amount of unmet demand is smaller in the near term (about 20,000 AFY by 2030) and increases to 50,000 AFY by 2040. It is important to note that without additional water supply development the region would struggle to meet future

Figure 4-1: Baseline Unmet Demands

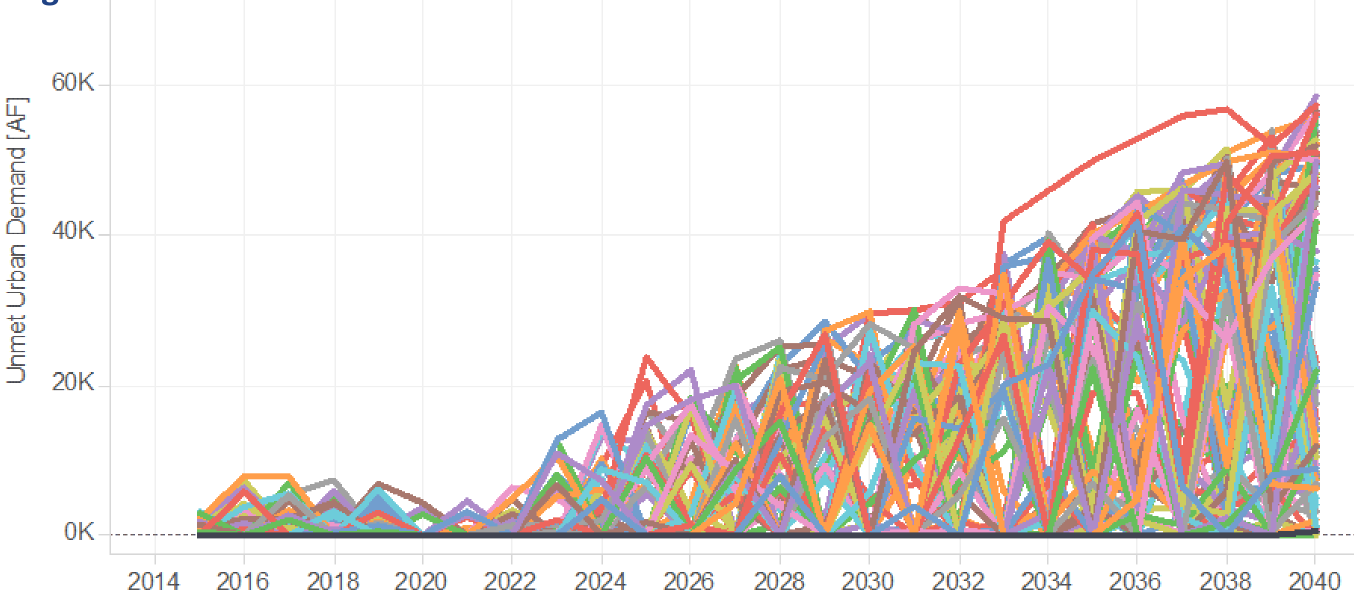
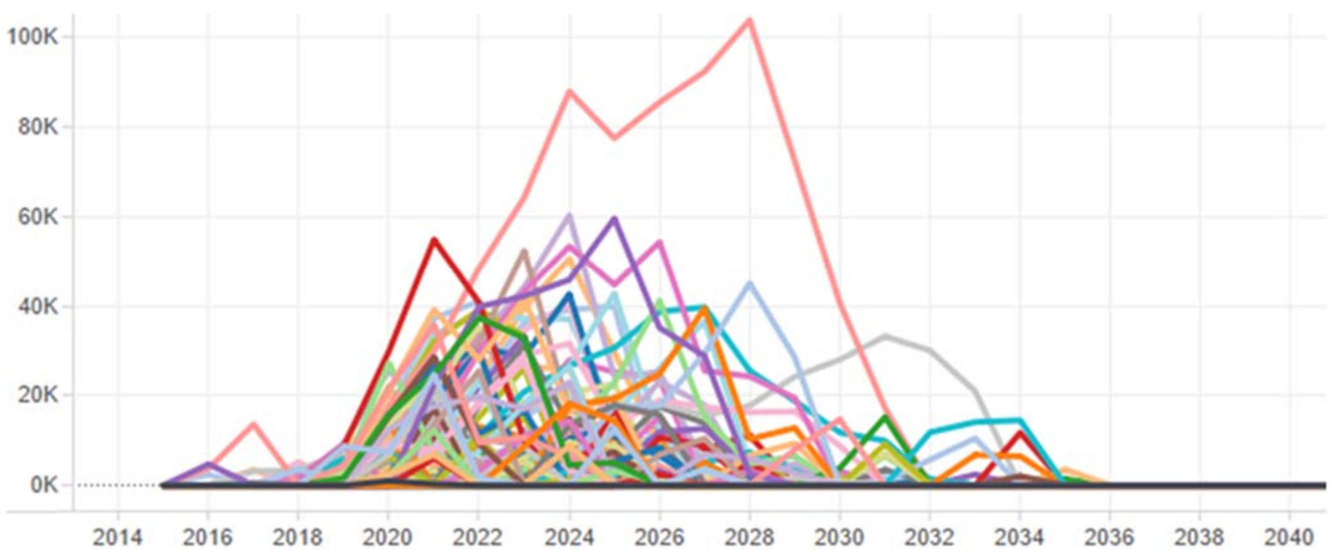


Figure 4-2: Baseline Stored Water Balance



water demands under climate change conditions.

In each climate run, there may be periods when water supplies exceed demands, creating surplus water supplies. The WEAP model tracks these surplus supplies by allocating the water to a groundwater storage account.

The IRP uses the 2014 groundwater storage level as the baseline for tracking the addition of surplus water to groundwater storage. Similarly, during periods when demands exceed supplies, the model deducts water from groundwater storage tracking account but cannot lower the groundwater below its 2014 level.

Figure 4-2 illustrates how stored water accumulates under each climate scenario through 2040. A positive or upward slope on the graphic indicates water surplus conditions and the excess water is added to the storage tracking account. A negative, or downward slope, indicates that demand is exceeding supplies, and water is pulled out of storage to meet, in whole or in part, the excess demands. As a result, the stored water creates a buffer supply that can be used offset future shortfalls. The model shows "unmet demands" only when demands exceed supplies AND no water remains in the storage tracking account created by the model.

For comparison, the thick black line in Figure 4-2 represents baseline assessment conditions without climate change. Note there is no accumulation of surplus supplies and therefore all available water supplies are needed to meet the regional demand, and no water is stored for future use.

Results of the baseline assessment with climate change indicate that the following is likely to be experienced by the region:

- 79% of the regional water demands are met by 2040.
- Water supply shortages, or unmet demand, will be more intense and frequent under climate change.
- Climate will drive unmet demand to 25,000 AFY by 2030 and up to 60,000 AFY by 2040.
- Significant water supply shortfalls could occur as soon as 2022.
- A "do nothing" approach is not sustainable, as projected demands exceed supplies under all scenarios.
- It may be possible to accumulate additional groundwater under baseline conditions, but the amount would depend on future climate scenarios (e.g., more rainfall, less variability, cooler temperatures) than currently predicted.

SINGLE VARIABLE TESTS

To evaluate how the addition of a new water supply could enhance the region's current, or baseline water supplies under climate change, a series of four single variable tests were evaluated. These tests were used to determine the potential improvement of implementing an isolated or single water supply source to help improve baseline conditions impacted by climate change.

The four single variable tests are:

1. Maximizing the Use of Prior Stored Chino Basin Groundwater
2. Maximizing the Purchase of Metropolitan Water District (MWD) Imported Water
3. Maximizing Recycled Water Supply for Groundwater Recharge
4. Reducing Urban Water Demand by Increased Conservation and Water Use Efficiency

Conclusions from comparing the tests to the baseline assessment are summarized below.

1 — Maximizing the use of prior stored Chino Basin groundwater.

Test 1, Maximizing the Use of Prior Stored Chino Basin Groundwater, does not produce new water supplies because it relies only on prior (pre-2013) stored groundwater. It is assumed that up to 8,400 AFY of groundwater can be pumped above baseline levels, and that the total amount of additional groundwater pumping cannot exceed 280,000 AF.

Results of this test are illustrated in Figure 4-3. If the region only relies upon the addition of prior stored

Chino Basin groundwater to meet future water resource needs:

- 91% of regional demands are met by 2040.
- Water supply shortages, or unmet demands, will be moderately improved by 2040 over baseline conditions.
- Unmet demand would be reduced to 18,000 AFY by 2030 and 40,000 AFY by 2040.
- Significant water supply shortfalls could occur as early as 2024.
- The approach is not sustainable given that a significant amount of prior stored groundwater is needed to meet regional demands through 2040. The median of the climate scenarios shows a reduction in this storage from 280,000 AF to approximately 130,000 AF by 2040, with scenarios dropping as low as 80,000 AF.
- It may be possible to accumulate more stored water under this strategy, but the amount would depend on more benign future climate scenarios (e.g., more rainfall, less variability, cooler temperatures) than currently predicted.

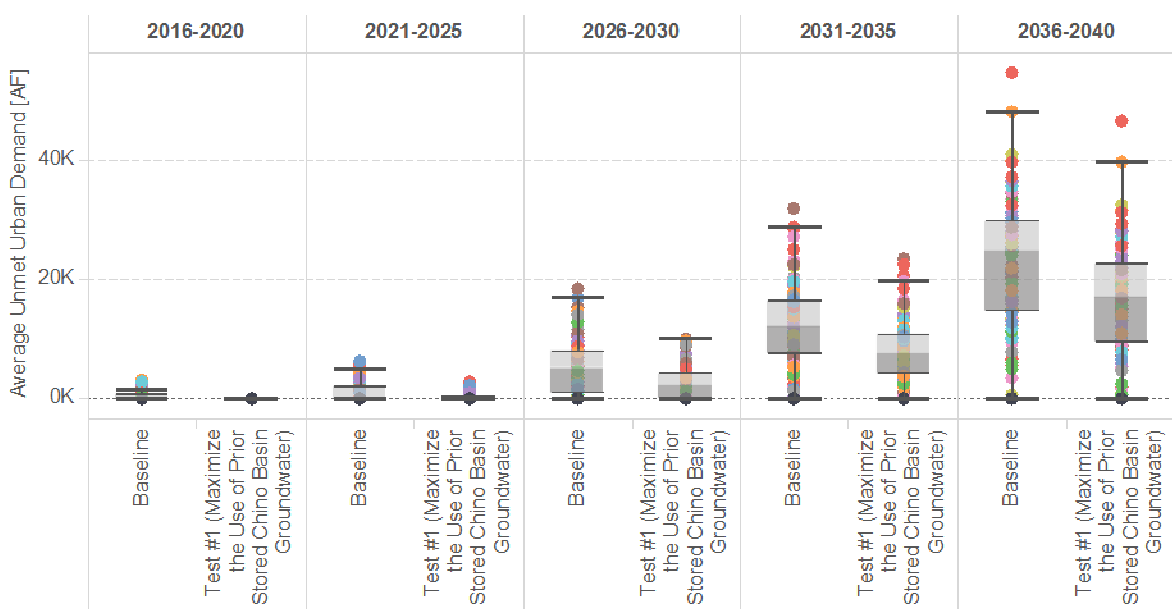
2 – Maximizing the Purchase of Metropolitan Water District (MWD) Imported Water

IEUA member agencies have the ability to purchase up to 70,000 AFY of imported water from the MWD. As discussed in Section 3, the baseline modeling assumption for imported water is that member Agencies could purchase up to 69,752 AFY (consistent with Resolution 2014-12-1), with a minimum total purchase of 40,000 AFY.

Due to the cost of imported water, Agencies typically only purchase the amount of water needed to meet their operational requirements or fulfill water demands that cannot be met through local supplies. This means there may be times when Agencies don't need the imported water but could decide to purchase this water and place it into storage for future use.

The approach of Maximizing the Purchase of MWD imported water does not add new imported water supplies to the baseline supply. However, the region's Agencies will purchase all of the water available, up to 70,000 AFY. This purchase would occur even if water supplies exceed demand. In years where Agencies make these purchases, the additional water would be put into

Figure 4-3: Baseline vs Test 1 Unmet Demand Comparison



storage via groundwater recharge or in-lieu of groundwater pumping. The quantity of supply would be dependent on imported water availability.

Results of this test are illustrated in Figure 4-4. If the region relies only upon maximizing imported water purchases to meet future needs:

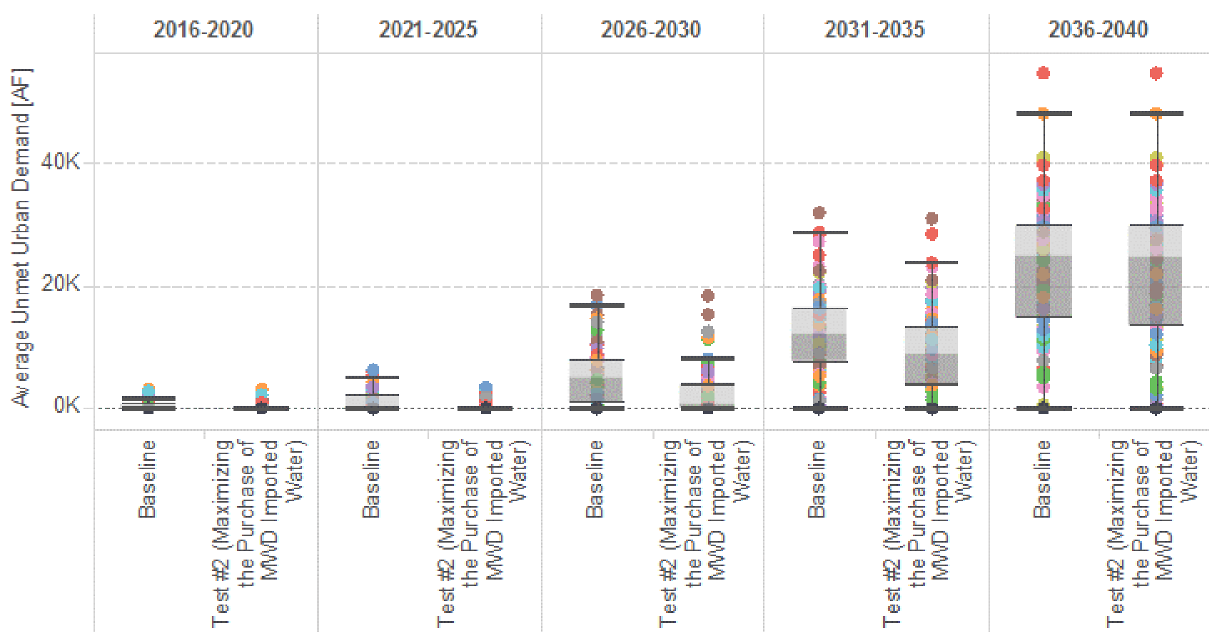
- 85% of regional demands are met by 2040.
- Water supply shortages, or unmet demands, will be slightly improved by 2040 over baseline conditions because imported water availability is adversely impacted by climate change.
- Unmet demand would be reduced to 22,000 AFY by 2030 and 55,000 AFY by 2040.
- Significant water supply shortfalls could occur as soon as 2024.
- This approach is not sustainable as a stand-alone approach and must be combined with other water resources to improve water supply conditions for the region.
- It may be possible to accumulate more stored water under this strategy, but the amount would depend on more benign future climate scenarios (e.g. more rainfall, less variability, cooler temperatures) than currently predicted.
- This could increase the region's dependence on imported water supplies, which could make the region more vulnerable to climate change.

3 – Maximizing Recycled Water Supply for Groundwater Recharge

The region has developed a successful regional Recycled Water Program for both direct use (landscaping, agricultural irrigation and industrial processing uses) and groundwater recharge. In 2000, the region identified recycled water as a critical resource needed for drought-proofing the region and maintaining its economic growth.

The approach of Maximizing Recycled Water Supply for Groundwater Recharge builds on the successful regional Recycled Water Program. As discussed in Section 3, the baseline assumption for available recycled water is 47,700 AFY by 2025. As the region continues to grow, new communities will be sewered and additional recycled water supplies will be generated. It is estimated that there will be approximately 85,500 AFY of recycled water supply from regional development by 2040.

Figure 4-4: Baseline vs Test 2 Unmet Demand Comparison



Therefore, this will deliver 37,800 AFY of additional recycled water to the groundwater recharge program.

Results of this test are illustrated in Figure 4-5. If the region relies only upon maximizing recycled water supply for groundwater recharge for future water needs:

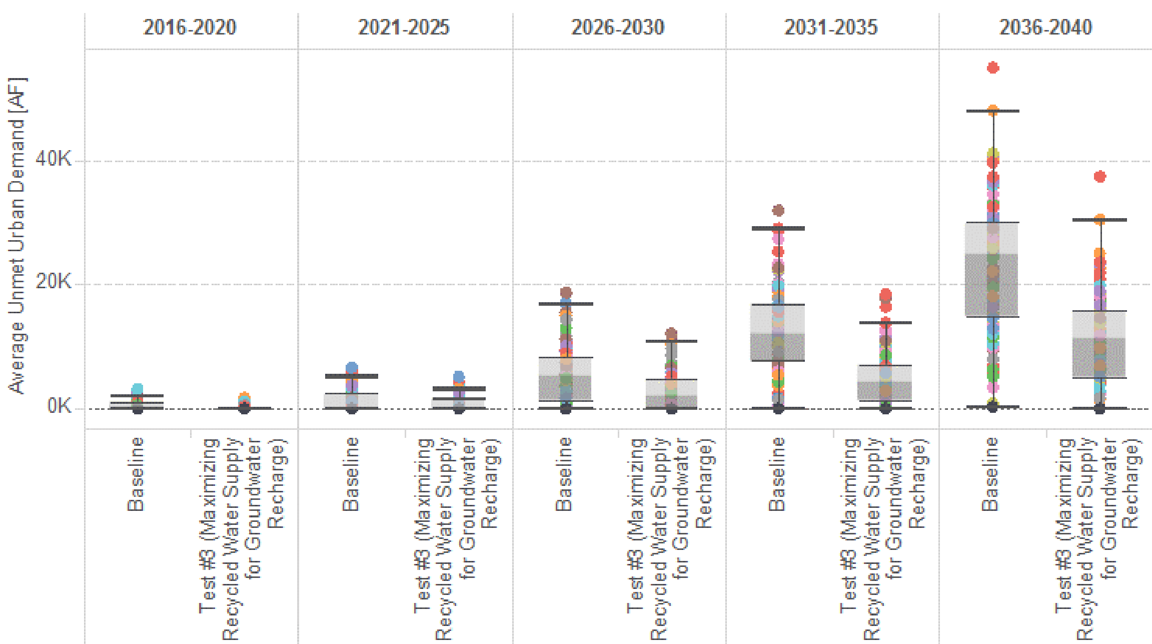
- 95% of the regional demands are met by 2040.
- Water supply shortages, or unmet demand, will be greatly improved by 2040 over baseline conditions.
- Unmet demand would be reduced to 10,000 AFY by 2030 and 17,000 AFY by 2040.
- Although water supply shortfalls are reduced, they could occur as early as 2024.
- Maximizing recycled water for groundwater recharge is sustainable as a stand-alone strategy, but would provide greater benefits if combined with other programs to enhance water supply conditions for the region.
- Provides flexibility by maximizing the amount of water stored in the Chino groundwater basin for future use.
- Recycled water is the most climate resilient water supply available to the region.
- It may is possible to accumulate more stored water under this strategy, but the amount depends on more benign future climate scenarios (e.g. more rainfall, less variability, cooler temperatures) than currently predicted.
- The volume of future recycled water supply is impacted by the amount and timing of new development in the region and indoor water efficiency trends. Additional tracking of wastewater flows is needed to accurately anticipate the amount of recycled water that will be available by 2040.

4 – Reducing Urban Water Demand by Increased Outdoor Water Use Efficiency and Conservation

Approximately 60% of the region's urban water use is for outdoor irrigation, particularly lawns. The IRP Technical Work Group requested a scenario to evaluate the implications of an increased outdoor efficiency and conservation program.

The approach of Reducing Urban Demand by Increasing Water Use Efficiency assumes that the region achieves a level of water savings that will reduce residential outdoor water usage to levels consistent with the requirements of the Department of Water Resources State Model Water Efficiency Landscape Ordinance (AB

Figure 4-5: Baseline vs Test 3 Unmet Demand Comparison



1881). This could be achieved by programs such as budget-based rates and continuation of active conservation programs. The region currently has one water agency on budget based rates.

This test assumed that four retail agencies would implement budget based rates structures by 2020. The savings are estimated to be 27,000 AFY from the rate structure changes and 11,000 AFY from active potable and recycled water conservation programs. Combined these measures are assumed to reduce urban demands by approximately 17% from 2013-14.

Results of this test are illustrated in Figure 4-6. If the region relies upon only reducing urban water demand by Increased Outdoor Water Use Efficiency and Conservation to meet future water needs:

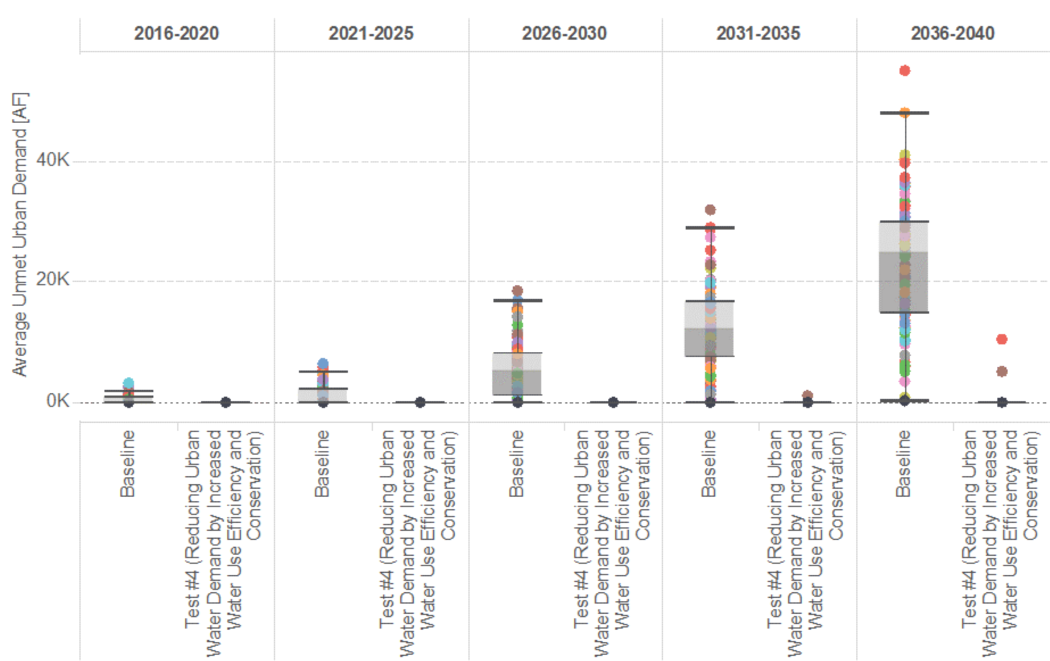
- 100% of the regional demands are met by 2040.
- Water supply shortages, or unmet demand, would be eliminated by 2040.
- Water supply shortfalls are delayed beyond 2040.
- Accumulation of stored water is very likely to occur, with more than 50% of the climate scenarios producing over 200,000 AF of stored water by 2040.
- Regional recycled water supplies would not be impacted because this approach targets outdoor conservation.
- Reduces dependence on climate dependent supplies and reduces the volume of additional water supplies needed to meet future demand.
- Requires expansion of water efficiency programs to support transition to budget based rate structure to achieve outdoor efficiency standards.

Single Variable Test Conclusions

Results from the four single variable tests show that all of the strategies helped to reduce and delay water supply shortages when compared to baseline conditions under climate change. Notably, water efficiency/ conservation is the only water supply approach that could eliminate water supply shortages through 2040 as a "stand-alone" approach. However, the expansion of local supplies such as recycled water and storm water ensures that the region is insulated from unforeseen or cataclysmic conditions.

The recommended approach in the IRP is to diversify the region's water supplies. The following conclusions were used as the basis for developing the next step in the IRP,

Figure 4-6: Baseline vs Test 4 Unmet Demand Comparison



the creation of water strategies:

- Water use efficiency and conservation provides the region with the greatest level of water supply reliability and resiliency.
- Diversification of region's water supplies minimizes the potential for water shortages under climate change and from catastrophic events.
- Increasing water supplies for Chino groundwater recharge increases storage and provides a supply buffer, enhancing the region's water supply flexibility and resilience.
- Implementing outdoor water use efficiency and conservation minimizes climate change impacts on urban water demand.

WATER RESOURCE STRATEGIES

Each water resource strategy is a combination of water supply and conservation projects or opportunities that the region could pursue to achieve the goals of the IRP. Five water resource strategies were developed during the course of the IRP workshops, with a total of eight project portfolios. Each portfolio was modeled to determine performance and resiliency across the 106 climate scenarios. These strategies and portfolios are as follows:

Strategy A – Increase Chino Basin Groundwater Production

- ***Portfolio 1****:* Maximize the Use of Prior Stored Groundwater

Strategy B– Recycled Water Program Expansion

- ***Portfolio 2****:* Maximize Recycled Water (Including External Supplies) and Local Supply Projects and Implement Minimal Water Efficiency
- ***Portfolio 3****:* Portfolio 2A Plus Secure Supplemental Imported Water from MWD and Non-MWD Sources

Strategy C– Recycled Water & Water Efficiency Program Expansions

- ***Portfolio 4****:* Maximize Recycled Water (Including External Supplies) and Implement Moderate Water Efficiency
- ***Portfolio 5****:* Portfolio 4 Plus Implement High Water Efficiency

Strategy D– Increase Groundwater Recharge Supplies

- ***Portfolio 6*****:** Maximize Supplemental Water Supplies and Recycled Water Supplies

Strategy E – Maximize Imported Water Supplies with Moderate Water Efficiency

- ***Portfolio 7***: Maximize the Purchase of Imported Water from MWD and Implement Minimal-Moderate Level of Water Efficiency
- ***Portfolio 8***: Portfolio 7 Plus Maximize Recycled Water

Table 4-1: Supply Totals for Portfolio 1

Supply Type	Baseline	Portfolio 1
Chino Groundwater	91,300	8,400
Stormwater	6,400	-
Recycled Water		-
Locally Developed[(1)]	64,700	-
External Supplies		-
Chino Desalter	17,700	-
Local Surface	22,100	-
Non-Chino Groundwater	11,600	-
Imported Water		-
MWD	69,750	-
Other		-
WUE [(2)]	1,000	-
add'l supplies subtotal		*8,400*
Total Water Supply	**283,550**	**291,950**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Strategy A – Increase Chino Basin Groundwater Production (Portfolio 1)

Under Strategy A, the IRP Technical Work Group explored the implications of expanding groundwater production without bringing in additional water resources. Strategy A is similar to Single Variable Test 1 – Maximizing the Use of Prior Stored Chino Basin Groundwater. It includes capacity building projects, the use groundwater that was previously stored in the Chino Basin, and the implementation of water efficiency programs for direct recycled water customers. Although strategy this does not generate additional recycled water supply, it allows for additional recycled water to be used for groundwater recharge. One water supply portfolio, Portfolio 1, was developed for Strategy A, with additional supply amounts shown in Table 4-1.

Portfolio 1 assumes that an additional 8,400 AFY of groundwater supply would be pumped from the Chino Basin, with a 2040 “not to exceed” limit of 280,000 AF.

Since new supplies in Portfolio 1 are limited to 8,400 AFY from stored Chino Basin groundwater the results are identical to the first test strategy. Implicit in this scenario, when there are periods where the portfolio’s water supplies exceed demands, the resulting surplus water supplies is assumed to be recharged into the groundwater basin. When this occurs, the stored water can be used at a later time.

Figure 4-7 shows unmet demands for Portfolio 1 in comparison to the baseline model run. Potential shortfalls begin to appear around 2022, which is the same as the baseline. In the majority (75%) of model runs, Portfolio 1 reduces unmet demands by 2040 from up to 27,900 AF to 12,500 AF.

Stored water balances are shown in Figure 4-8. As illustrated, groundwater balances begin to accumulate in Portfolio 1 by 2020 with storage peaking around 2025. Stored groundwater starts to be used to meet demands by 2028 and continue to be drawn down through 2040.

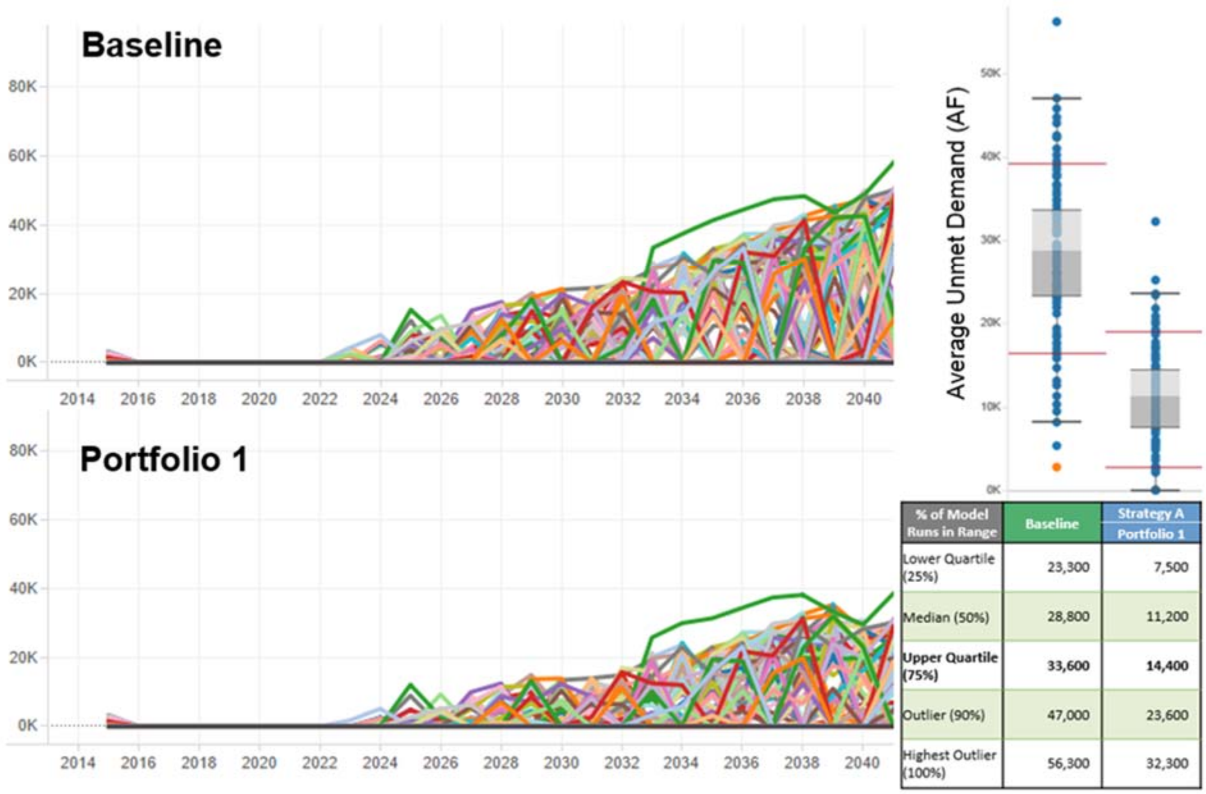
In summary, Portfolio 1

- Provides 95% of the demands under majority of climate scenarios
- Shows a 5% improvement over baseline conditions by utilizing existing stored groundwater on an annual basis
- However, the groundwater pulled from storage is a finite resource and due to the continued drawdown, this strategy is not sustainable without additional projects to replenish the storage or reduce demands.

Strategy B– Recycled Water Program Expansion (Portfolios 2 & 3)

Under Strategy B, the IRP Technical Work Group explores the continued expansion of the recycled water program. Strategy B focuses on how achieving a 40% increase in recycled water supply over the baseline condition would benefit the region. The strategy accomplishes this goal by using an additional 17,000 AF of locally generated recycled water. As mentioned in Section 3, these additional recycled water supplies will be available as growth occurs in the service area. In addition, this strategy secures 10,500 AF of external recycle water supply from neighboring jurisdictions by

Figure 4-7: Unmet Demands of Portfolio 1 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy A Portfolio 1
Lower Quartile (25%)	23,300	7,500
Median (50%)	28,800	11,200
Upper Quartile (75%)	33,600	14,400
Outlier (90%)	47,000	23,600
Highest Outlier (100%)	56,300	32,300

Figure 4-8: Stored Groundwater Balance of Portfolio 1

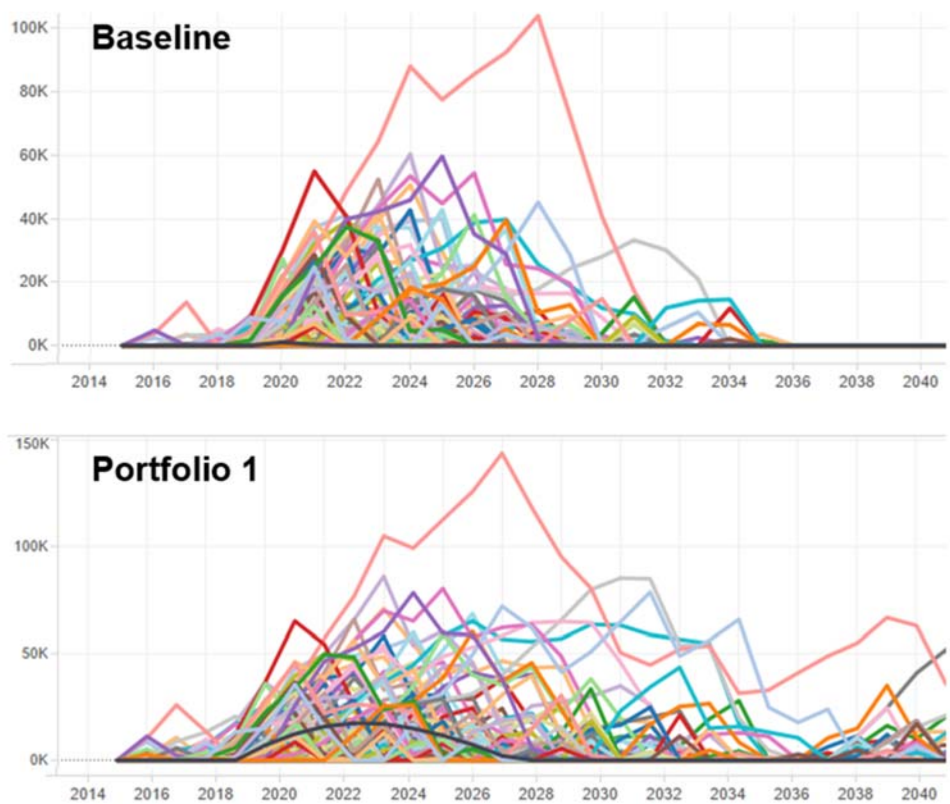


Table 4-2: Supply Totals for Portfolio 2 & 3

Supply Type	Baseline	Portfolio 2	Portfolio 3
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[(1)]	64,700	17,000	17,000
External Supplies		10,500	10,500
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	-	7,850
Other		-	4,900
WUE [(2)]	1,000	5,000	5,000
add'l supplies subtotal		*32,500*	*45,250*
Total Water Supply	**283,550**	**316,050**	**328,800**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

2040. Strategy B also includes 5,000 AF of additional device based conservation savings.

Two water supply portfolios were developed for Strategy B. The first, Portfolio 2, models the additional water supplies as described above. The second, Portfolio 3 includes all of Portfolio 2 supplies plus additional imported water as shown in Table 4-2. Imported water supplies include MWD Tier 1 and/or wet year purchases of supplemental water for groundwater replenishment. A complete list of projects in Portfolios 2 and 3 can be found in Appendix 6.

Figure 4-10 shows unmet demands for Portfolio 2 in comparison to the baseline model run. Potential shortfalls for 2 begin to appear around 2024, which is two years later than baseline conditions. In the majority of model runs, Portfolio 2 reduces unmet demands by 2040 from up to 27,900 AF to 9,000 AF.

Stored water balances for Portfolio 2 are illustrated in Figure 4-10. Groundwater balances begin to accumulate by 2018 with the majority of the model runs building around 25,000 AF or less of stored water. By 2040 the quantity of stored water is depleted in approximately 90% of the climate runs.

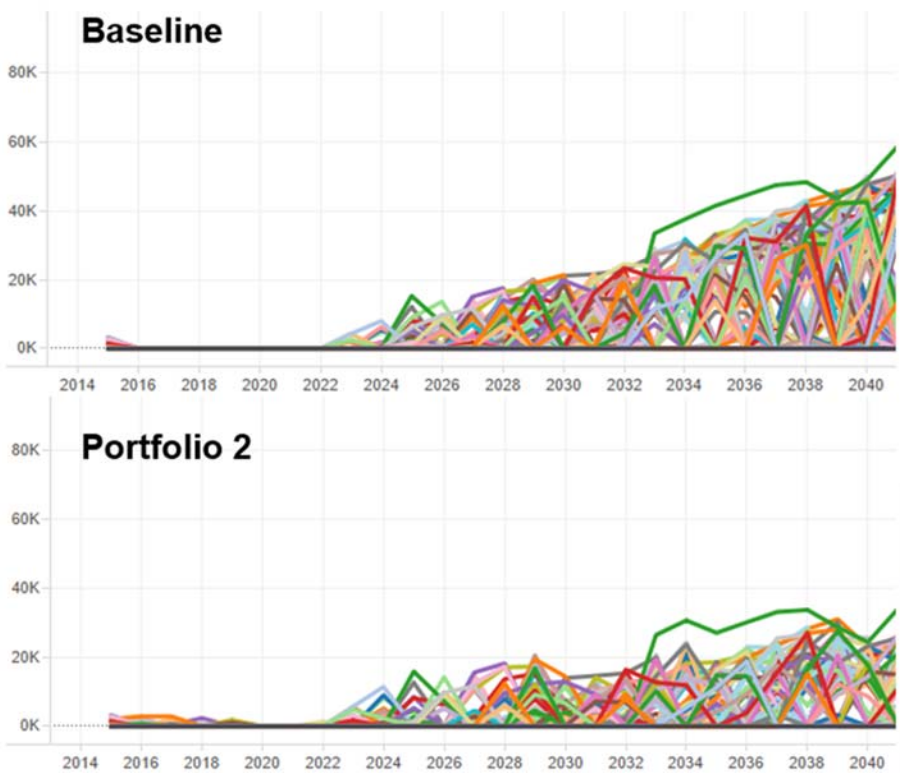
Unmet demands for Portfolio 3 in comparison to the baseline model run are shown in Figure 4-11. Potential shortfalls for Portfolio 3 begin to appear after 2035, 13 years after the baseline condition. In the majority of model runs, Portfolio 3 reduces unmet demands in 2040 from 27,900 AF to 9,000 AF.

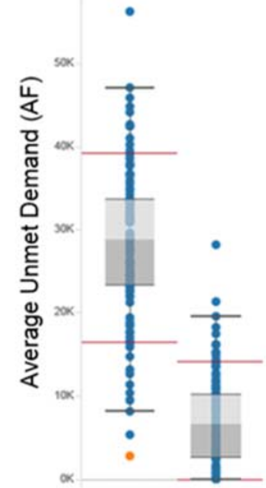
Stored water balances for Portfolio 3 are illustrated in Figure 4-12. Portfolio 3 behaves in a similar fashion to Portfolio 2, however there is a much greater probability of accumulating stored water. Approximately 70% of the runs in Portfolio 3 have water in storage by 2040. The range of stored water falls between 0 AF and 280,000 AF.

In summary, Portfolios 2 and 3 under 75% of the climate scenarios:

- Provide 90% supply reliability under majority of climate conditions.
- Show a 5% improvement over baseline conditions by utilizing existing stored groundwater on an annual basis
- Water supply shortfalls are delayed by two years as compared to baseline conditions.
- Extend the ability to produce water stored water, with the majority of climate runs having the ability to build and maintain stored supplies through 2040

Figure 4-9: Unmet Demands of Portfolio 2 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy B Portfolio 2
Lower Quartile (25%)	23,300	2,500
Median (50%)	28,800	6,600
Upper Quartile (75%)	33,600	10,000
Outlier (90%)	47,000	19,600
Highest Outlier (100%)	56,300	28,200

Figure 4-10: Stored Groundwater Balance of Portfolio 2

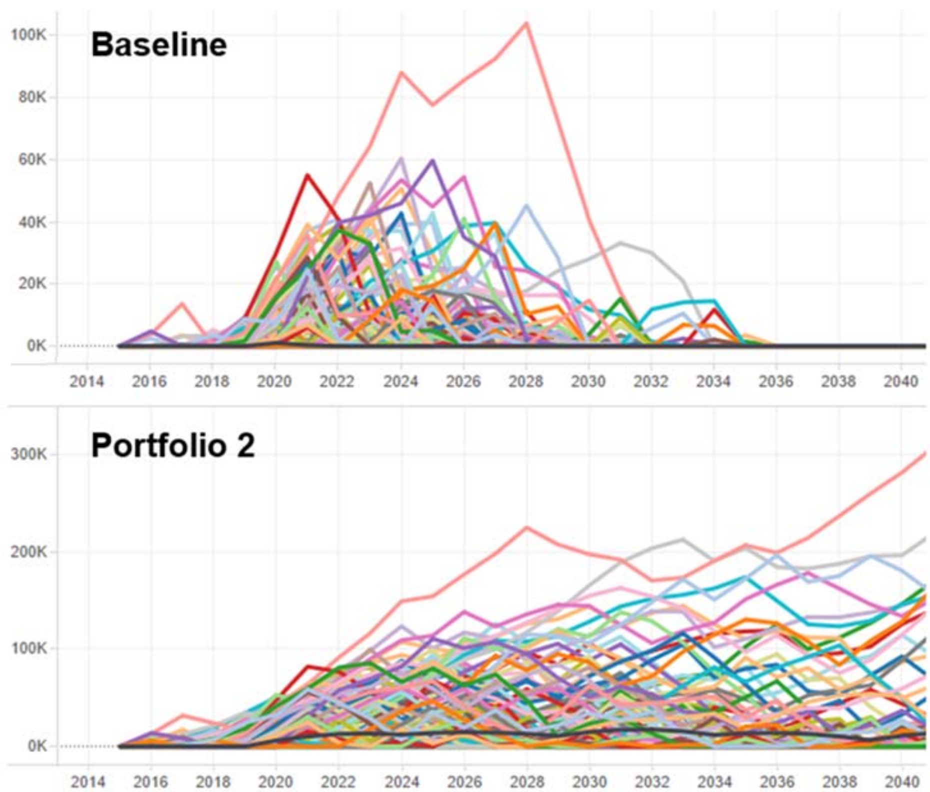
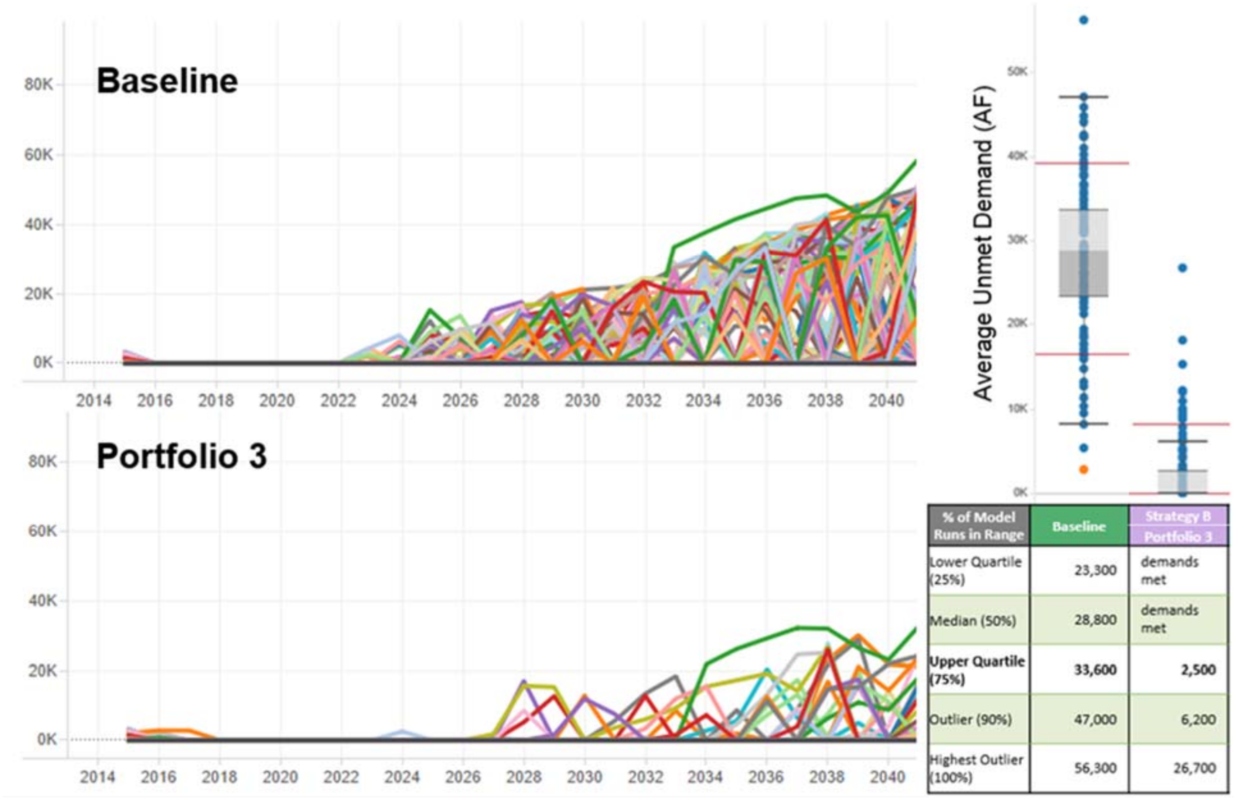
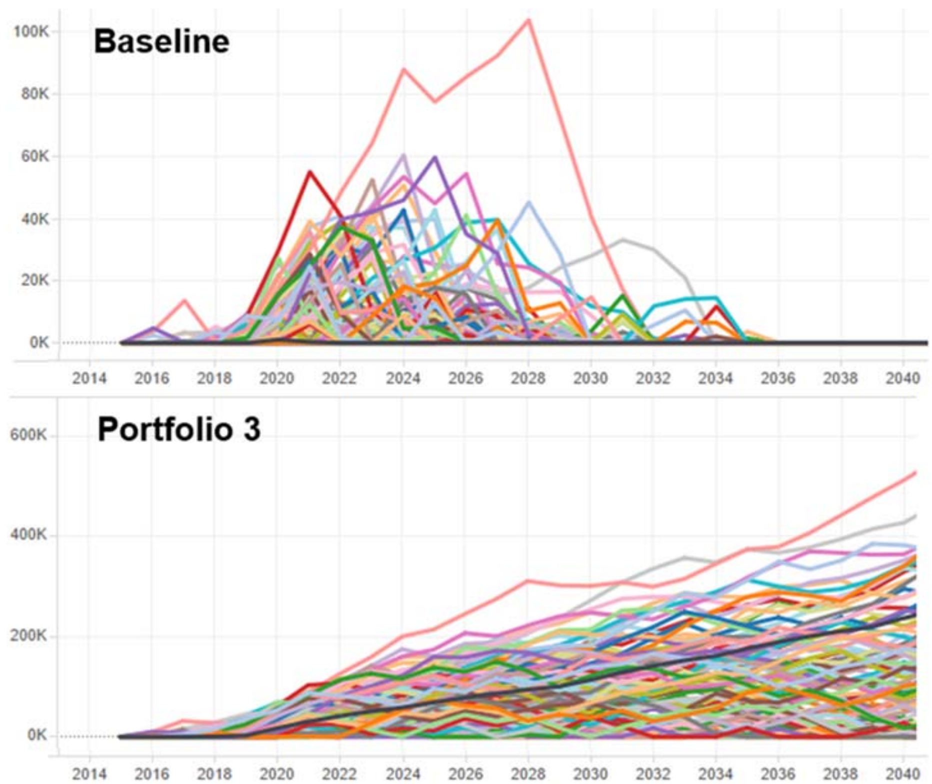


Figure 4-11: Unmet Demands of Portfolio 3 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy B Portfolio 3
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	2,500
Outlier (90%)	47,000	6,200
Highest Outlier (100%)	56,300	26,700

Figure 4-12: Stored Groundwater Balance of Portfolio 3



Strategy C – Recycled Water & Water Efficiency/ Conservation Program Expansions (Portfolios 4 & 5)

Under Strategy C, the IRP Technical Work Group evaluated how increased recycled water and water efficiency/conservation programming could benefit the region. With the focus on outdoor irrigation efficiency, there is a signification amount of water savings that could be achieved in both existing and future developments when compared with baseline conditions.

Strategy C assumes that a minimum of four agencies within IEUA's service area are implementing budget-based rates and increasing device-based conservation programming by 2020. This strategy also increases recycled water supply by utilizing an additional 17,000 AF of locally generated recycled water, securing 10,500 AF of an external recycle water supply by 2040, and implementing recycled water use efficiency programs to extend supplies.

Two water supply portfolios were developed for Strategy C. The first, Portfolio 4, models the additional water supplies as described above. The second, Portfolio 5, includes all of Portfolio 4 supplies plus the addition of two additional agencies adopting budget-based rates by 2020 and the addition of supplemental imported water as shown in Table 4-3. Imported water supplies include MWD Tier 1 and/or wet year purchases of supplemental water for groundwater replenishment. A complete list of projects in Portfolios 4 and 5 can be found in Appendix 6.

Unmet demands for Portfolio 4 are shown in comparison to the baseline conditions in Figure 4-13. Portfolio 4 meets projected demands through 2040 100% of the time.

Stored water balances are illustrated in Figure 4-14 As illustrated, groundwater balances begin to accumulate in Portfolio 4 by 2022 with the majority of model runs continuing to build stored water through 2040. By 2040, 105 of the 106 model runs accumulated a minimum of 200,000 AF of stored water.

Unmet demands for Portfolio 5 are shown in comparison to the baseline model run in Figure 4-15. Portfolio 5 meets projected demands through 2040 100% of the time.

Table 4-3: Supply Totals for Portfolio 4 & 5

Supply Type	Baseline	Portfolio 4	Portfolio 5
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[1]	64,700	17,000	17,000
External Supplies		10,500	10,500
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	667	667
Other		-	4,900
WUE [2]	1,000	36,700	55,050
add'l supplies subtotal		*64,867*	*88,117*
Total Water Supply	**283,550**	**348,417**	**371,667**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

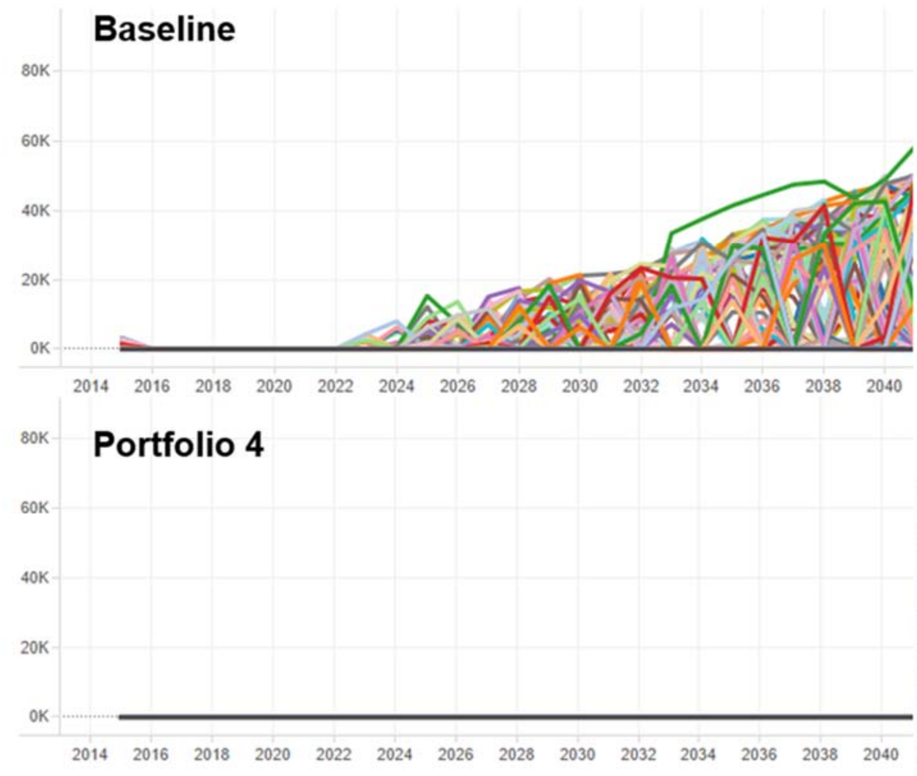
(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

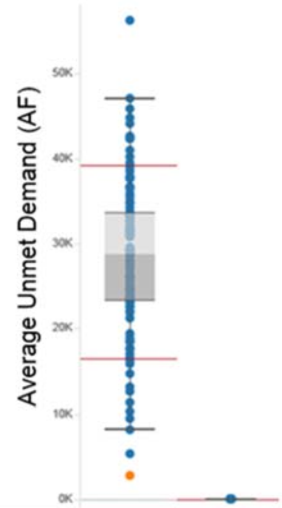
Stored water balances for Portfolio 5 are illustrated in Figure 4-16. As illustrated, groundwater balances begin to accumulate in Portfolio 3B by 2020 with majority of model runs continuing to build stored water through 2040. By 2040, 105 of the 106 model runs accumulated a minimum of 500,000 AF of stored water.

In summary, Portfolios 4 and 5 perform under 75% of the climate scenarios:

- Have no unmet demands across all climate scenarios due to reduced need for water
- Build water in storage consistently across climate scenarios, which could create an opportunity to sell surplus water
- Portfolio 4 has the potential for stored groundwater to build to over 200,000 AF by 2040
- Portfolio 5 has the potential for stored groundwater to build to over 500,000 AF by 2040

Figure 4-13: Unmet Demands of Portfolio 4 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy C Portfolio 4
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	**33,600**	**demands met**
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	demands met

Figure 4-14: Stored Groundwater Balance of Portfolio 4

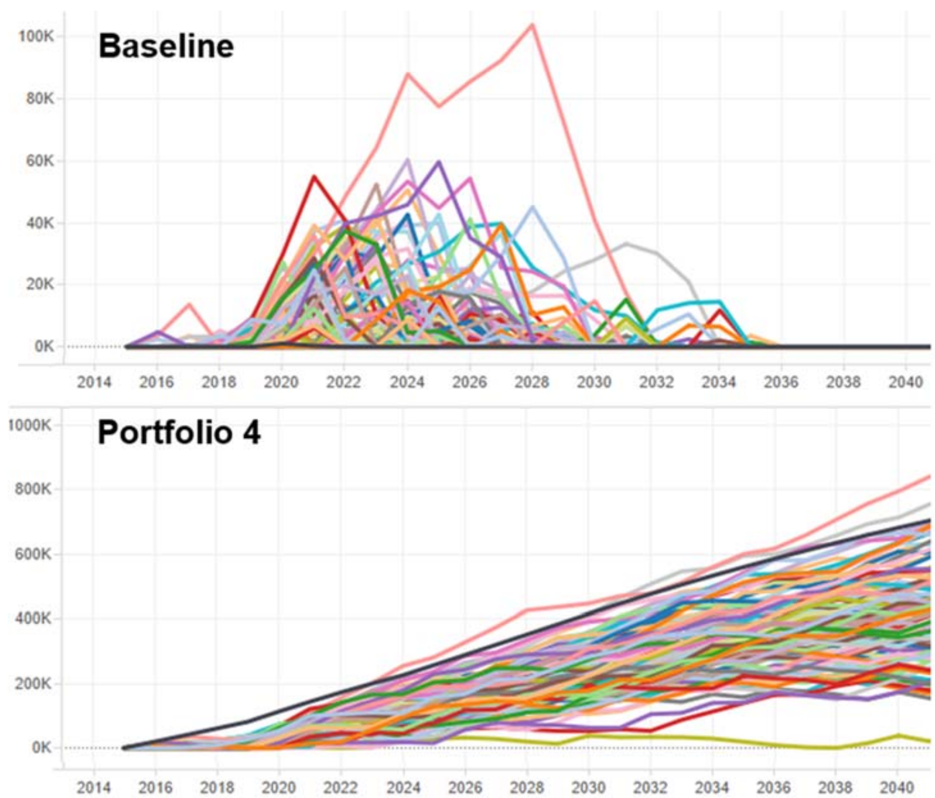
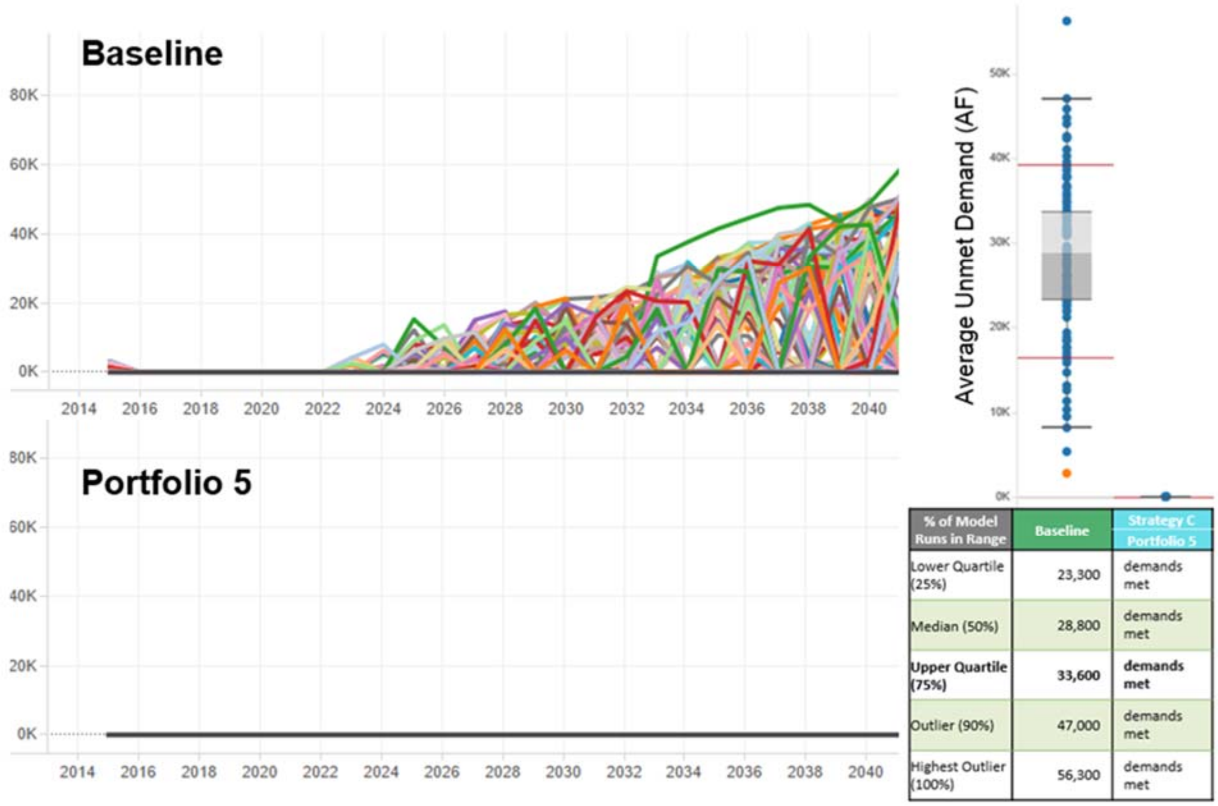


Figure 4-15: Unmet Demands of Portfolio 5 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy C Portfolio 5
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	33,600	demands met
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	demands met

Figure 4-16: Stored Groundwater Balance of Portfolio 5

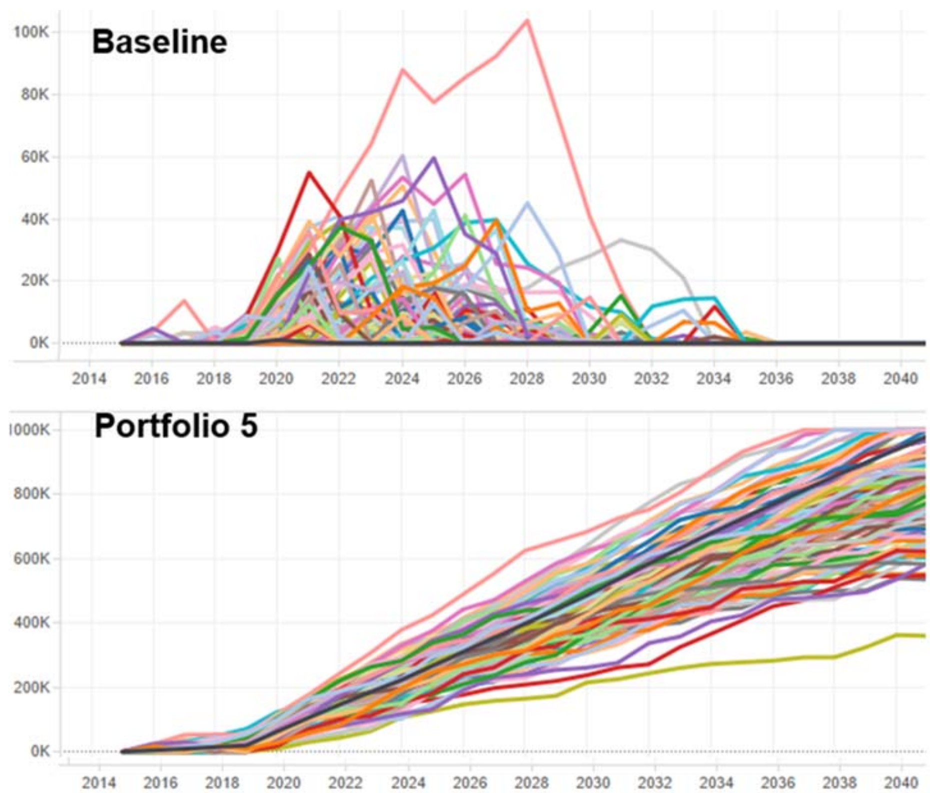


Table 4-4: Supply Totals for Portfolio 6

Supply Type	Baseline	Portfolio 6
Chino Groundwater	91,300	8,400
Stormwater	6,400	-
Recycled Water		-
Locally Developed[(1)]	64,700	20,800
External Supplies		9,000
Chino Desalter	17,700	-
Local Surface	22,100	-
Non-Chino Groundwater	11,600	2,500
Imported Water		-
MWD	69,750	667
Other		6,400
WUE [(2)]	1,000	13,500
add'l supplies subtotal		*61,267*
Total Water Supply	**283,550**	**344,817**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Strategy D– Increase Groundwater Recharge Supplies

Under Strategy D, the IRP Technical Work Group focused on developing water supply interties with neighboring agencies in the watershed. Intermediate levels of water use efficiency/conservation are implemented in the form of two agencies adopting budget-based rates by 2020. In addition, all potential locally produced recycled water would be utilized in this strategy. One water supply portfolio, Portfolio 6, was developed for Strategy 6, with water supplies shown in Table 4-4. A complete list of projects in Portfolio 6 can be found in Appendix 6.

Unmet demands for Portfolio 6 in comparison to the baseline conditions are shown in Figure 4-17. Portfolio 6 meets projected demands through 2040 95% of the time.

Stored water balances are shown in Figure 4-18. As illustrated, groundwater balances begin to accumulate in Portfolio 4 by 2020. Due to variability in wet year supplemental supplies, stored water balances become highly variable and it is unclear whether stored water continues to build or draw down through 2040.

In summary, 75% of the time Portfolio 6:

- Eliminates unmet demand through 2040 due to reduced outdoor water demands from increased water use efficiency/conservation programming
- Has the potential to build stored groundwater through 2040, but the amount varies with climate conditions
- Takes advantage of climate resistant supplies by maximizing recycled water and water use efficiency

Strategy E – Maximize Imported Water Supplies with Moderate Conservation

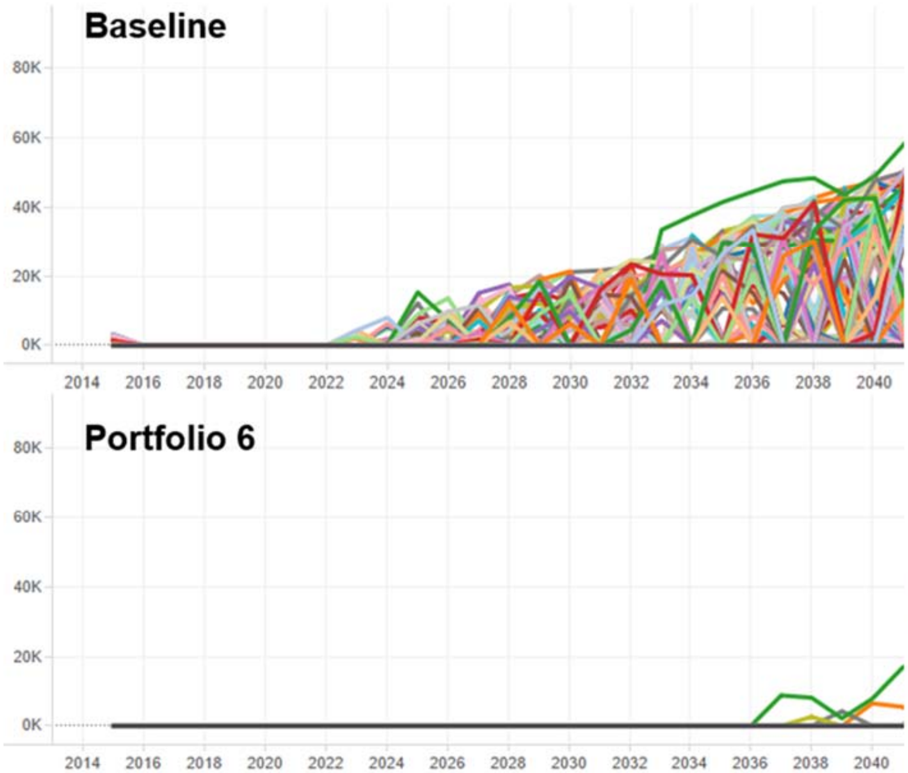
Under Strategy E, the IRP Technical Work Group evaluated how maximizing the purchase of imported water could alleviate pressure on and extend the availability of local water resources. This strategy allows for the purchase of up to 93,300 AF of imported water to meet urban demand or to be used for groundwater replenishment. In addition, the strategy includes an intermediate level of water use efficiency/conservation in the form of two agencies adopting budget-based rates by 2020.

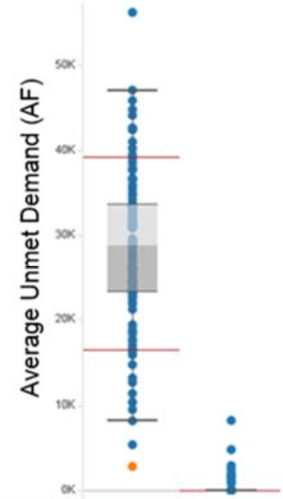
Two water supply portfolios were developed for Strategy E. The first, Portfolio 7, models the additional water supplies as described above. The second, Portfolio 8, includes all of the supplies of Portfolio 7 plus the addition of maximizing all locally produced recycled water as shown in Table 4-5. A complete list of projects in Portfolios 7 and 8 can be found in Appendix 6.

Unmet demands for Portfolio 7 in comparison to the baseline conditions are shown in Figure 4-19. Portfolio 7 meets projected demands through 2040 across 25% of the model runs.

Stored water balances are illustrated in Figure 4-20. As shown, groundwater balances begin to accumulate in Portfolio 7 by 2020 with the majority of model runs continuing to build stored water through 2040. Due to variability in wet year supplemental supplies, stored water balances become highly variable and unclear

Figure 4-17: Unmet Demands of Portfolio 6 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy D Portfolio 6
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	**33,600**	**demands met**
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	8,200

Figure 4-18: Stored Groundwater Balance of Portfolio 6

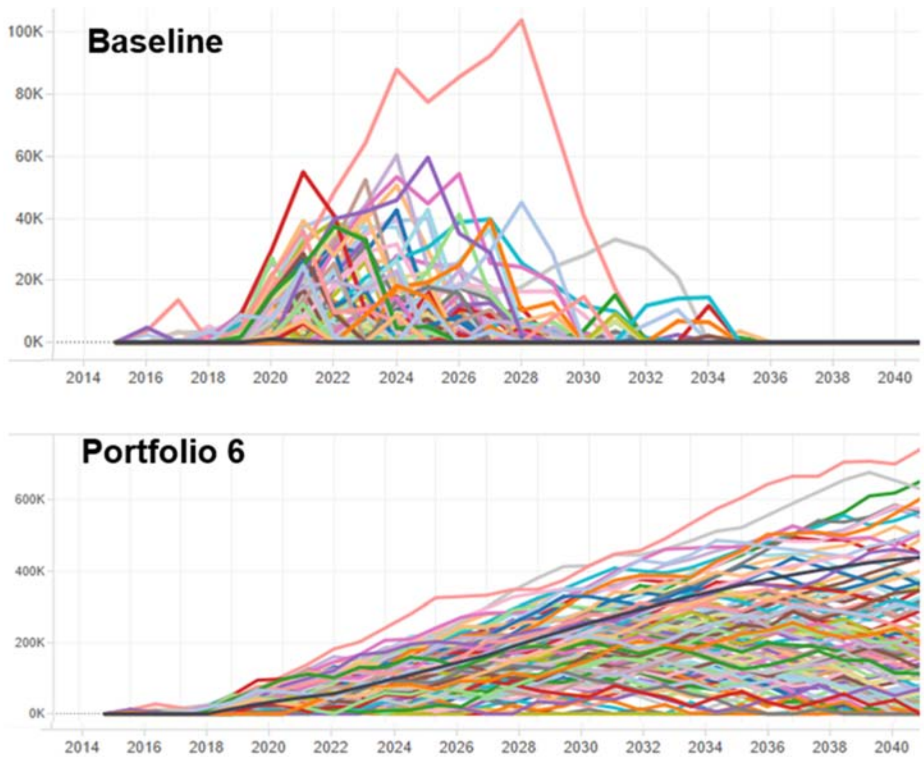
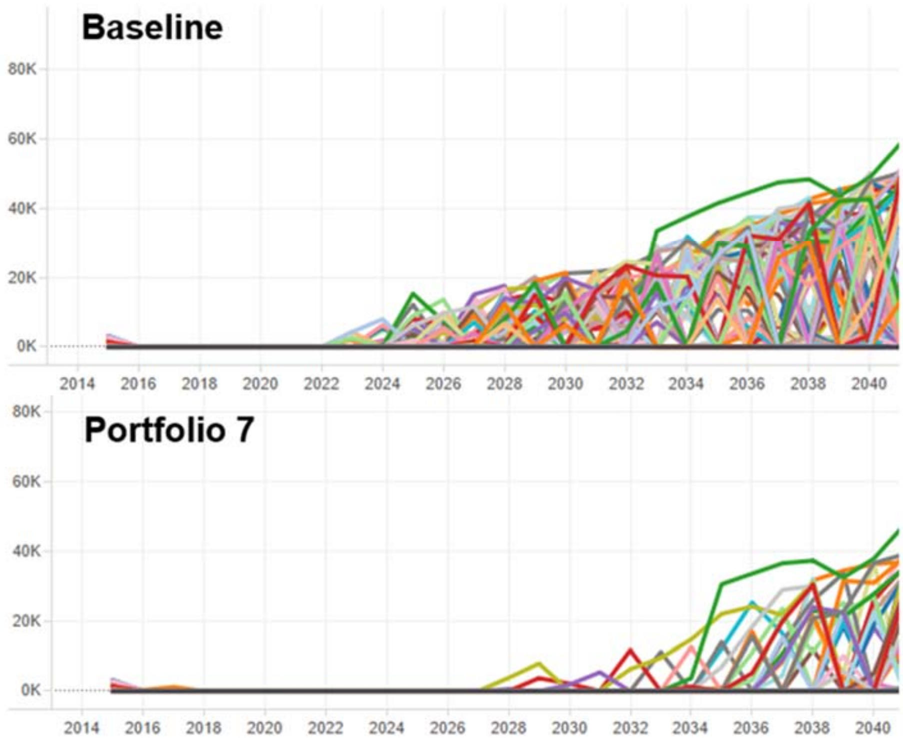
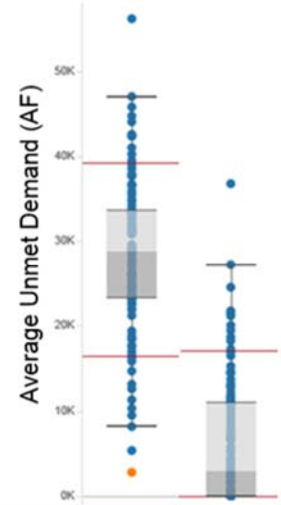


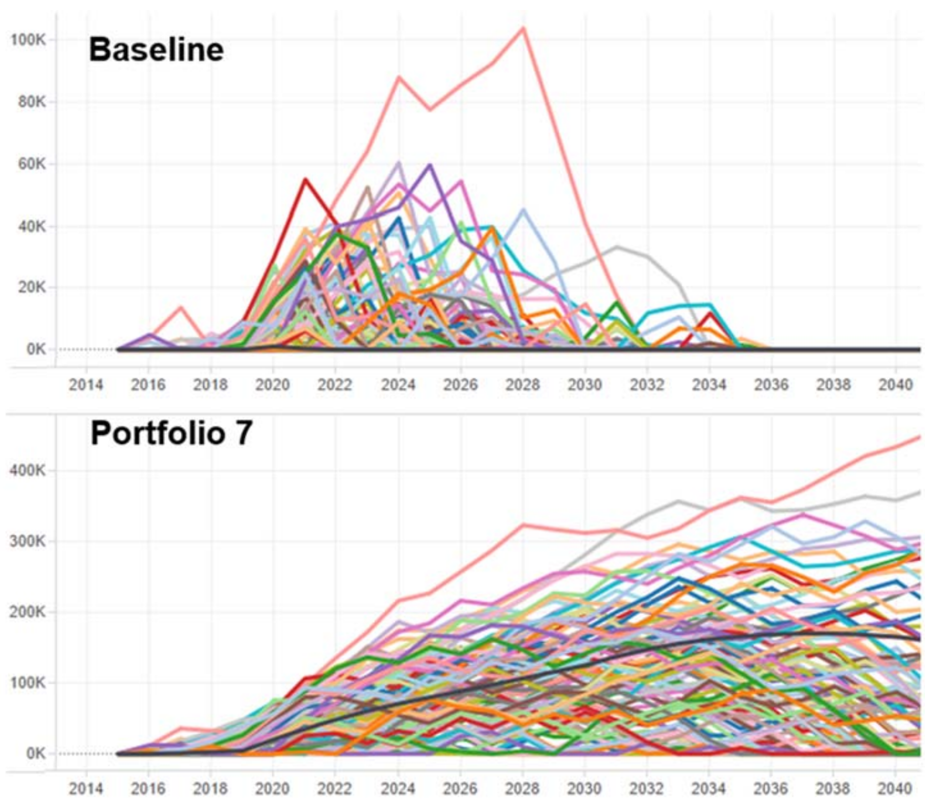
Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline





% of Model Runs in Range	Baseline	Strategy E Portfolio 7
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	2,900
Upper Quartile (75%)	**33,600**	**11,000**
Outlier (90%)	47,000	27,200
Highest Outlier (100%)	56,300	36,800

Figure 4-20: Stored Groundwater Balance of Portfolio 7



whether stored water continues to build or drawn down through 2040.

Unmet demands for Portfolio 8 in comparison to the baseline model run are shown in Figure 4-21. Portfolio 8 meets projected demands through 2040 100% of the time.

Stored water balances are illustrated in Figure 4-22. As shown, groundwater balances begin to accumulate in Portfolio 8 by 2020 with majority of model runs continuing to build stored water through 2040. Due to variability in wet year supplemental supplies, stored water balances become highly variable and unclear whether stored water continues to build or drawn down through 2040.

In summary, Portfolio 7 and 8:

- Portfolio 7 has a supply shortfall of up to 11,000 AF under 75% of the climate scenarios
- Portfolio 8 meets demand under 100% of the climate scenarios, this increase in performance is due to the addition of recycled water.
- Both portfolios have the potential to build stored groundwater through 2040, but the amount in storage varies by climate conditions
- After 2030, Portfolio 8 builds stored groundwater under majority of climate scenarios due to the addition of recycled water.

Table 4-5: Supply Totals for Portfolio 7 & 8

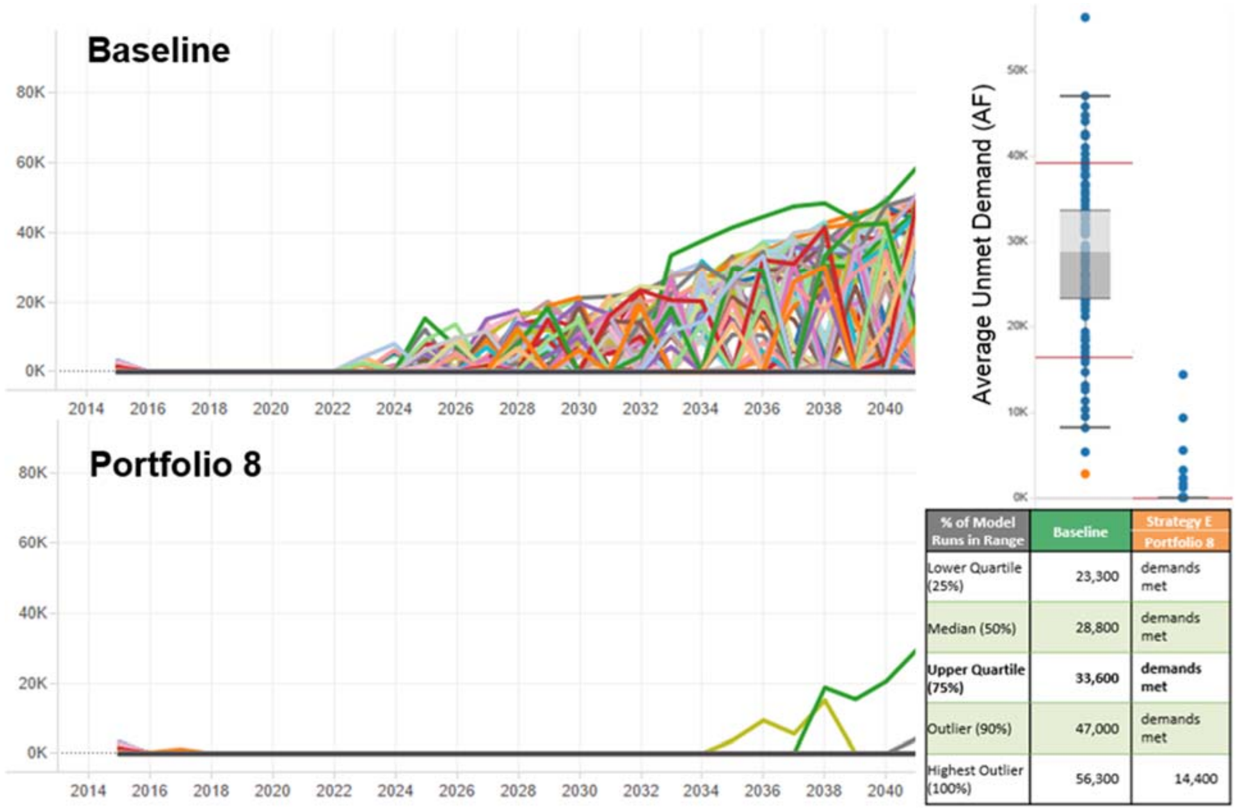
Supply Type	Baseline	Portfolio 7	Portfolio 8
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[1]	64,700	-	20,800
External Supplies		-	7,000
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	23,550	23,550
Other		1,000	1,000
WUE [2]	1,000	18,500	18,500
add'l supplies subtotal		*43,050*	*70,850*
Total Water Supply	**283,550**	**326,600**	**354,400**

Notes:

(1) Baseline Supply of 18,700 GWR + 29,000 Direct + 17,000 SAR, or total of 64,700 AFY, based on Agency TYCIP and not total available wastewater supply. Estimated total available local RW supply by 2040 to be 85,550 AFY based on 2015 WWFMPU flow monitoring.

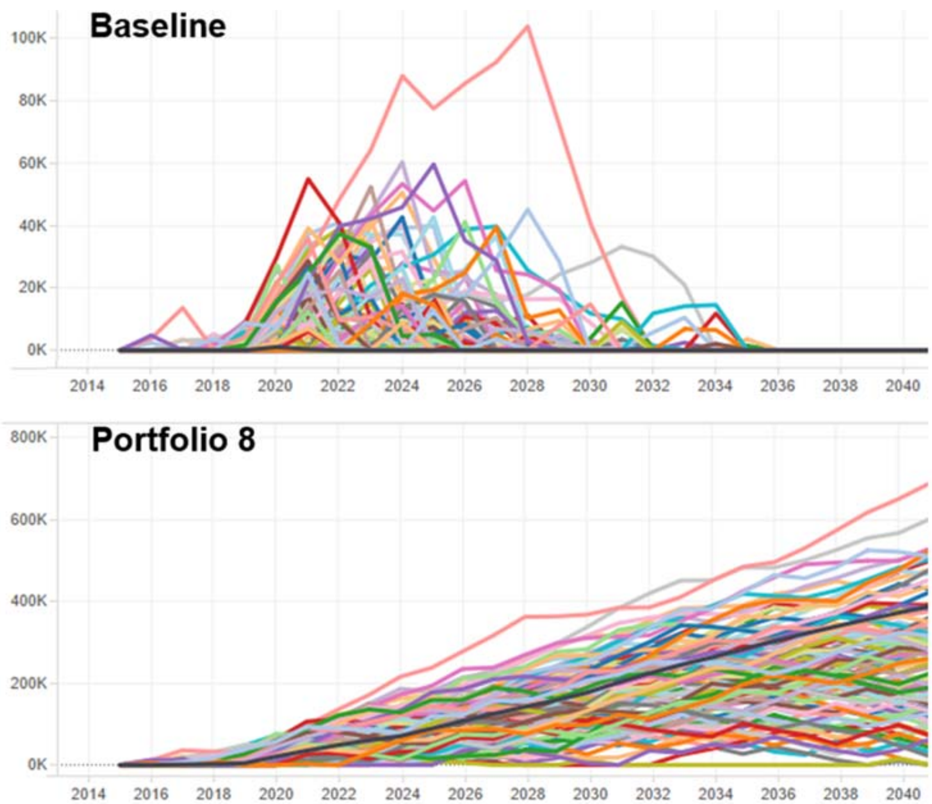
(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline



% of Model Runs in Range	Baseline	Strategy E Portfolio 8
Lower Quartile (25%)	23,300	demands met
Median (50%)	28,800	demands met
Upper Quartile (75%)	**33,600**	**demands met**
Outlier (90%)	47,000	demands met
Highest Outlier (100%)	56,300	14,400

Figure 4-20: Stored Groundwater Balance of Portfolio 7



5. Conclusions & Next Steps

Core Findings of the 2015 IRP

Lessons Learned from the Climate Simulations

Final IRP Recommendations and Next Steps

Figure XXX: caption

Conclusions & Next Steps

With the adoption of the Chino Basin Optimum Basin Management Plan in 2000, the region embarked on a new era of water management. Over the past fifteen years, more than $500 million was invested in the development of local water supplies. This resulted in the expansion of the regional recycled water program as well as in the development of significant groundwater capture, treatment, and storage programs.

As a result, when the record-breaking drought of 2012 began, the region was prepared. The region has had sufficient water supplies available to meet water needs during the great drought of the last four years without constraining new development or economic growth. These local water resource programs form the foundation for the region's future water resiliency.

Climate change is now creating uncertain conditions and new water management challenges for the region's future. The purpose of the 2015 IRP is to evaluate the resiliency of the region's water resources under climate change and to identify the best strategies for ensuring that the region's future water needs through 2040 can be sustainably met. With the information from the IRP, the region has a roadmap to guide the next 25 years of regional investments in water supply development and management programs.

CORE FINDINGS

The region adopted goals for the 2015 IRP. In looking to the future, the region wanted a water development and management plan that would accomplish the following:

Resilience — Regional water management flexibility to adapt to climate change, economic growth, and any changes that limit, reduce, or make water supplies unavailable.

Water Efficiency — Meet or exceed rules and regulations for reasonable water use.

Sustainability — Provide environmental benefits, including energy efficiency, reduced green house gas emissions, and water quality improvements to meet the needs of the present without compromising the ability of future generations to meet their own needs.

Cost Effectiveness — Supply regional water in a cost-effective manner and maximize outside funding.

To achieve these goals, the IRP evaluated projected water needs and available water supplies through 2040. Future climate change scenarios were then used to "stress-test" an array of water development actions that were organized into "portfolios".

These results form the basis for the IRP's final recommendations. The core findings are:

1. The region's past investments in local water supplies and the diversification of the available water resources have positioned the region well to deal with the future impacts of climate change. If no further actions were taken beyond the currently planned investments in regional supplies and water use efficiency, the region would be able to meet 80-

90% of its projected water needs by 2040 (see baseline).

2. Portfolios that combined water supply and water efficiency actions yielded the most adaptive strategies for the region. Many portfolios were able to reduce the region's risk of not having sufficient water supplies to meet future needs. Several portfolios were able to dramatically increase the amount of water stored in the Chino Basin. The portfolios that performed the best under the climate change scenarios were:

    - 2B – Maximize recycled water (includes bringing in external recycled water supplies), implement modest water use efficiency, and access supplemental imported water
    - 3A – Maximize recycled water (includes bringing in external recycled water supplies) and implement moderate water use efficiency
    - 3B – Maximize recycled water (includes bringing in external recycled water supplies) and implement high water use efficiency
    - 4 – Maximize supplemental water supplies and recycled water (includes bringing in external recycled water supplies)
    - 5B – Maximize the purchase of MWD water supplies, use of recycled water (includes bringing in external recycled water), and implementation of modest water use efficiency

LESSONS LEARNED FROM THE CLIMATE SIMULATIONS

Value of Water Use Efficiency — The climate scenarios reveal that the addition of very modest levels of water use efficiency (such as 10% reduction in water use) improved the performance of all portfolios and yielded significant benefits the region. The regional benefit is demonstrated through Portfolio 3B in which the actions of two Agencies achieving the State's existing water use efficiency standards results in the region's capacity to increase supplies in groundwater storage while meeting water needs through 2040.

Value of Recycled Water — The climate scenarios confirmed that recycled water is the region's most climate resilient water supply because the amount of available water to the region is not impacted by dry years. The regional benefit of maximizing recycled water is demonstrated through the comparison of Strategy B and C in which the use of recycled water enables the region to increase supplies in groundwater storage, especially in combination with increased water use efficiency.

Value of Supplemental Water — The climate scenarios highlight the importance of securing supplemental water – surface, imported, and external recycled water supplies – when it is available to build a stronger supply buffer for dry years or when State Water Project availability is limited. The regional benefit of opportunistically securing these external water supplies is demonstrated through the comparison of Portfolios 4, 5, and 6 which enables the region to increase supplies in groundwater storage, especially in combination with increased water use efficiency.

Value of Increasing Groundwater Storage — The climate scenarios affirmed the importance of adequate groundwater reserves in addressing future climate uncertainties or catastrophic events, such as a major facility or pipeline break or a loss in supplies. A broader regional benefit is the role that these reserves can play when managed as a regional water bank to enhance water supply reliability within the Santa Ana Watershed and across Southern California. Portfolios 4, 5, 6 and 8 highlight the value to the region of the increased flexibility and resiliency resulting from increased groundwater storage.

Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.

-Stewart Udall

RECOMMENDATIONS & NEXT STEPS

The region adopted the following core recommendations for the 2015 IRP:

- **Continue investment in recycled water** projects to maximize the beneficial reuse.
- **Acquire supplemental water to enhance groundwater quality** to sustain production and reduce salinity.
- **Implement water use efficiency measures** to reduce current urban demand by at least 10% to enhance water supply resiliency.
- **Strategically maximize the purchase of supplemental water** for recharge or in-lieu when available.
- **Include external supplies**, consisting of exchanges, storage, and water transfers, **strategically in combination with conservation** to augment groundwater recharge, recycled water, **and build storage reserves**. External supplies include surface, imported, and non-potable water.
- **Continue to maximize stormwater recharge projects**, including rainwater capture and infiltration.

These recommendations will be evaluated through a Programmatic Environmental Impact Report in mid-2016. As funding opportunities become available, specific project cost and environmental assessments will be conducted as needed, particularly in relation to the regional benefit of the proposed actions. Phase 2 of the IRP will address additional detailed project level analysis including project scopes, costs, prioritization, and implementation schedule.

Table 5-1: Summary of How Phase 1 Recommendations Meet the IRP Goals

Water Use Efficiency	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future.
Sustainability	Savings realized through the implementation of the program extends the groundwater production for future generations.
Resilience	When combined with other programs, such as recycled water, creates storage to accommodate for abnormal and catastrophic events.

Recycled Water	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future, especially meeting current state mandates.
Sustainability	As a climate resistant supply, the beneficial use of recycled water when combined with Water Use Efficiency builds reserves within the Chino Basin.
Resilience	When combined with other programs, such as Water Use Efficiency, creates storage to accommodate for abnormal and catastrophic events.

Supplemental Water	
Water Efficiency	This would help meet rules and regulations for reasonable water use now and in the future, especially meeting current state mandates.
Sustainability	This would help meet rules and regulations for reasona-ble water use now and in the future, especially meeting current state mandates.
Resilience	as a climate resistant supply, the beneficial use of recycled water when combined with Water Use Efficiency builds reserves within the Chino Basin.

Groundwater Storage	
Sustainability	Storage reserves reduce dependence on climate variable supplies and are not impacted by climate once the supplies are in storage. As a climate resistant supply, the reserves can be used responsibly by future generations without depleting the Chino Basin.
Resilience	When combined with other programs, such as Water Use Efficiency, Recycled Water and Supplemental Water, creates storage to accommodate for abnormal and catastrophic events.

Appendices

1. A&N Technical Services Demand Forecast

2. Draft RAND Memo: "Evaluating Options for Improving the Climate Resilience of the Inland Empire Utilities Agency in Southern California"

3. A&N Technical Services Indoor/Outdoor Demands

4. A&N Technical Services Demand Influencing Factors

5. Full IRP Technical Committee Identified Project List

6. Project Lists for Water Resource Strategy Portfolios 1-8

California native plant, *Heteromeles arbutifolia*, displays crimson berries during the winter in the Chino Creek Wetlands and Educational Park.

Appendix 1:
A&N Technical Services Demand Forecast

IEUA Long Term Demand Forecast Model User Guide

A & N Technical Services, Inc.

May 20, 2015

Table of Contents

Abbreviations List

AWE – Alliance for Water Efficiency
CDR – Center for Demographic Research
CII – Commercial-Industrial-Institutional
CVWD – Cucamonga Valley Water District
FIRE – Financial Activity & Real Estate
FWC – Fontana Water Company
GIS – Geographic Information Systems
IEUA – Inland Empire Utilities Agency
IRP – Integrated Resource Plane
MVWD – Monte Vista Water District
MWD – Metropolitan Water District of Southern California
NAICS – North American Industry Classification Systems
RMC – Raines Melton and Carella
RTP - Regional Transportation Plan
SCAG – Southern California Association of Governments
SCS – Sustainable Communities Strategy
SIC – Standard Industrial Classification
TAZ – Traffic Analysis Zone

Introduction

This user guide documents the structure and use of the IEUA Long Term Demand Forecast Model.

Objectives

The model was constructed with the following objectives:

- Forecast demand and demand variability to 2040 in support of the IRP development process.
- Forecast demand as consumption, which we define as all of the consumption within IEUA service area boundaries.
- Base the demand forecast on the latest demographic forecast.
- Utilize a demand forecast method consistent with the MWD demand forecast methods.
- Utilize a conservation forecast method consistent with the AWE Tracking Tool that IEUA currently uses for conservation planning.
- Provide a way to assess the variability of future water demand forecasts to a wide range of scenarios that are built with a range of best-available data sources to accurately depict the effect of future uncertainties.

Approach

The approach in model development can be characterized as:

1. Acquiring the latest demographic forecast data from the SCAG 2012 RTP for all of the area within IEUA, for its retail water service areas, for its cities, and for its waste water tributary areas. (Enacted by the Center for Demographic Research.)
2. Inputting the demographic forecast into the demand forecast econometric equations to create a base forecast.
3. Calibrating the base forecast to normal demand (weather-normalized, employment-normalized). A separate statistical model of historical IEUA monthly water demand was estimated to develop empirical relationships between weather variation, the business cycle, and IEUA demand variability.
4. Inputting the quantified active and passive conservation forecast from the latest version of the AWE Tracking Tool that IEUA uses for conservation planning.

Discussion

Econometric Equations. MWD has cooperated with IEUA in the development of the demand forecast methods. Appendix A provides a review of the analytic structure of their long term water demand models.

Demand as Consumption. The base forecast has been calibrated to normalize demand –that is demand conditional on normal weather and normal economic activity. Note the caveat that some pumpers who are not accounted for by retailers may not be included.

Demographics 2035 to 2040. The SCAG 2012 RTP demographics only go out to the year 2035. We utilize a trend method similar to MWD for the years 2035 to 2040.

Section A: Index

The sections of this document correspond to the worksheets in the Long Term Demand Forecast Model. The following table provides the view of the first worksheet "Index". Clicking on any hyperlink will navigate to that section of the spreadsheet.

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

IEUA Long Term Demand Forecast Model

Index of Worksheets

Sheet Name	Description
Index	Index of worksheets for navigation
ControlPanel	Make scenario choices and see results.
Chart_Data	Arrays of data for charts
Model_Base	Base Case Scenario
Model_Scenario1	Scenario 1
Model_Scenario2	Scenario 2
Model_Scenario3	Scenario 3
WBBRS_Implementation	Inputs for water budget
WUE_Inputs	Inputs for water use efficiency plans

Section B: Control Panel

The *Control Panel* worksheet contains the "Scenario Manager" that allows the user to explore up to three different scenarios that use different combinations of future demand drivers. Demand drivers can include both short term drivers—such as one year weather swings--and long term drivers of future water demand such as population or employment growth. Water Use Efficiency drivers are broken out separately and include Water Budget Based Rate Structures and more traditional WUE/conservation programs. For more information on statistical analysis of Short Term IEUA Demand refer to Appendix E.

Each demand driver is discussed in sequence.

	Scenario Manager
Item	
	Scenario Name
Short Term Drivers	Drought Persistence
	Economic Cycle
	Short-Term Weather
Long Term Drivers	Sustainable Communities Housing
	Dwelling Units per Land Area
	Median Household Income Growth
	Long Term Climate Change
WUE Drivers	Water Budget Based Rate Structure (WBBRS)
	WUE Level

Short Term Drivers – 5 Years – 2015 to 2020

- **Drought Persistence** defines how much of recent demand reductions will persist into the future
  - amount of recent reduction that is permanent
    - 0 percent implies that everything will return to the baseline forecast
    - 4.6% percent implies that the 4.6% recent reduction is a permanent lifestyle change

The unexpressed bugbear is what is the "recent reduction"? It is reasonable to assume that one would want to know how much of a raw change in consumption is due to recession or weather. Fortunately IEUA has an empirical basis for such a determination in the short term IEUA demand model that is the source of the 4.6% recent reduction in demand (not attributable to recessionary effects.)

- **Economic Cycle** –The user can specify how much recession or boom could bump demand in a single year using the estimated annual standard deviation of business cycle effects from the short term IEUA demand model.
  - Recession year – demand minus 1 standard deviation from the IEUA short run water demand forecasting model
  - Baseline year—normal business cycle, no change
  - Growth year – demand plus 1 standard deviation from the IEUA short run water demand forecasting model

- **Short Term Weather** – Single wet, single dry, three consecutive dry years (required by UWMP). The effect of weather variation is defined using the estimated annual standard deviation of weather effects from the short term IEUA demand model.
  - Single wet year – demand minus 1 standard deviation from the IEUA short run water demand forecasting model
  - Single dry year – demand plus 1 standard deviation from the IEUA short run water demand forecasting model
  - Multiple dry year – demand plus 1.6 standard deviations from the IEUA short run water demand forecasting model

Long Term Drivers—2021 - 2050

- **Sustainable Communities Housing –** Derived scenarios explored in the SCAG Sustainable Communities Strategy, 2012 Regional Transportation Plan (p.114).
  - Baseline—future residential growth resembles the past, of which approximately 40% was high density multiple family.
  - More Sustainable—future residential growth resembles is approximately 71% high density multiple family.
  - Max Sustainable—future residential growth resembles is approximately 71% high density multiple family.

- **Dwelling Units per Land Area –**This driver allows another method of exploring effects of potential future densification.
  - Low Growth—future dwelling units per land area becomes less dense (minus one percent per year)
  - Baseline—future residential growth resembles past dwelling units per land area.
  - High Growth—future dwelling units per land area becomes more dense (plus one percent per year)
  - Very High Growth—future dwelling units per land area becomes more dense (plus two percent per year)

- **Median Household Income Growth –**3 alternative assumptions: low, baseline (2012 RTP), and high
  - Low Growth—median household income grows lower (minus one percent per year)
  - Baseline— median household income grows lower at predicted rate
  - High Growth— median household income grows faster than the baseline (plus one percent per year)

- **Long Term Climate Change –** Long term climate change is modeled by using recent GCC model predictions of potential increases in temperature with the short term IEUA demand model estimated temperature elasticity to depict this effect. (http://scenarios.globalchange.gov/report/regional-climate-trends-and-scenarios-us-national-climate-assessment-part-5-climate-southwest)
  - No Change— no long term climate change
  - P50 Median Expected Climate Change— 3.2% by 2040
  - P80 Median Expected Climate Change— 4.3% by 2040

WUE Drivers

- **Water Budget Based Rate Structure (WBBRS)** are depicted with alterative assumptions of how many agencies will adopt and roll out WBBRS over the next 5 years. These will be modeled as separate activities within the AWE Water Conservation Tracking Tool.
    - Low_Rollout_1 Agency—This results in approximately 10% of Single Family and Irrigation customers being affected within 5 years.
    - Mid_Rollout_2 Agencies--This results in approximately 30% of Single Family and Irrigation customers being affected.
    - High_Rollout_All Agencies-- This results in all Single Family and Irrigation customers being affected.

Note that the Baseline IEUA Demand Model allows a "pure price" effect—how customers would respond to an increase in the real average price of water

- **WUE Level –** the level of WUE Programs being implemented derives from separate account in the AWE Water Conservation Tracking Tool
    - Programmatic (Device-driven) WUE Programs -- Tiers 1, 2, 3 developed as part of the WUE Business Plan.

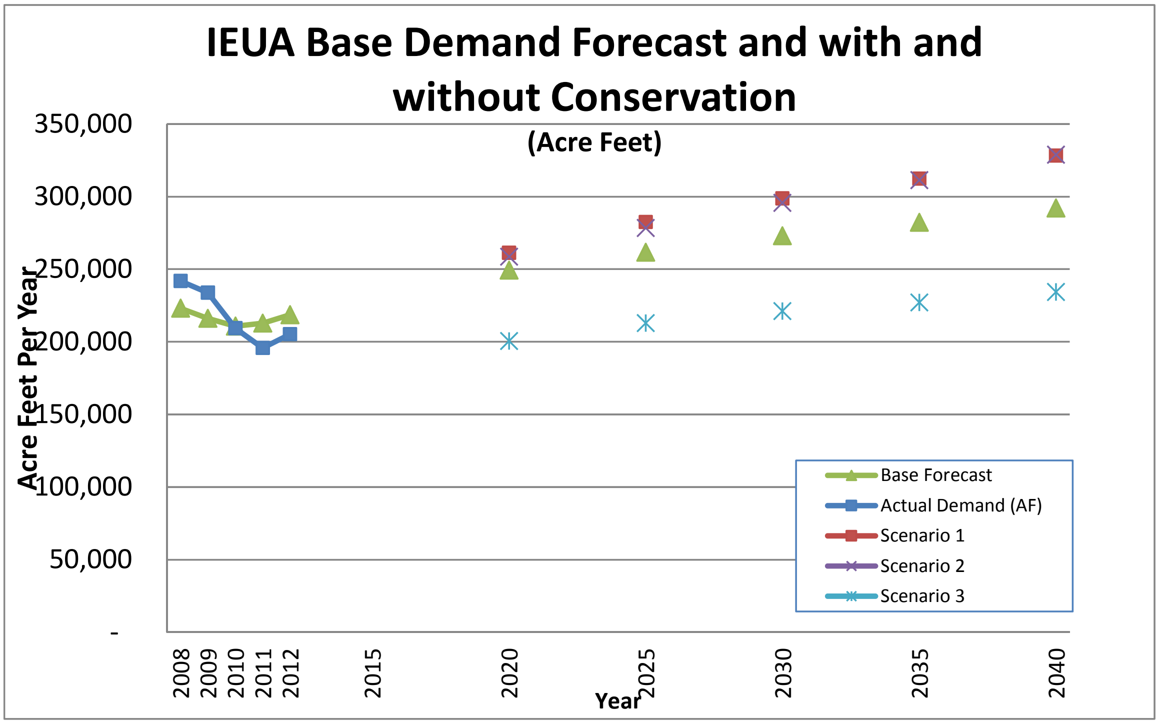
The Control Panel Worksheet contains drop down boxes to select values of demand drivers. A Collection of assumptions on demand drivers constitutes a demand forecasting scenario. Three scenarios are allowed. By allowing the user to define and control sources of forecast uncertainty in this control panel, one can more quickly develop a feel for which sources of uncertainty matter more than others using the visual feedback of dynamically changing plots of future water demand forecasts.

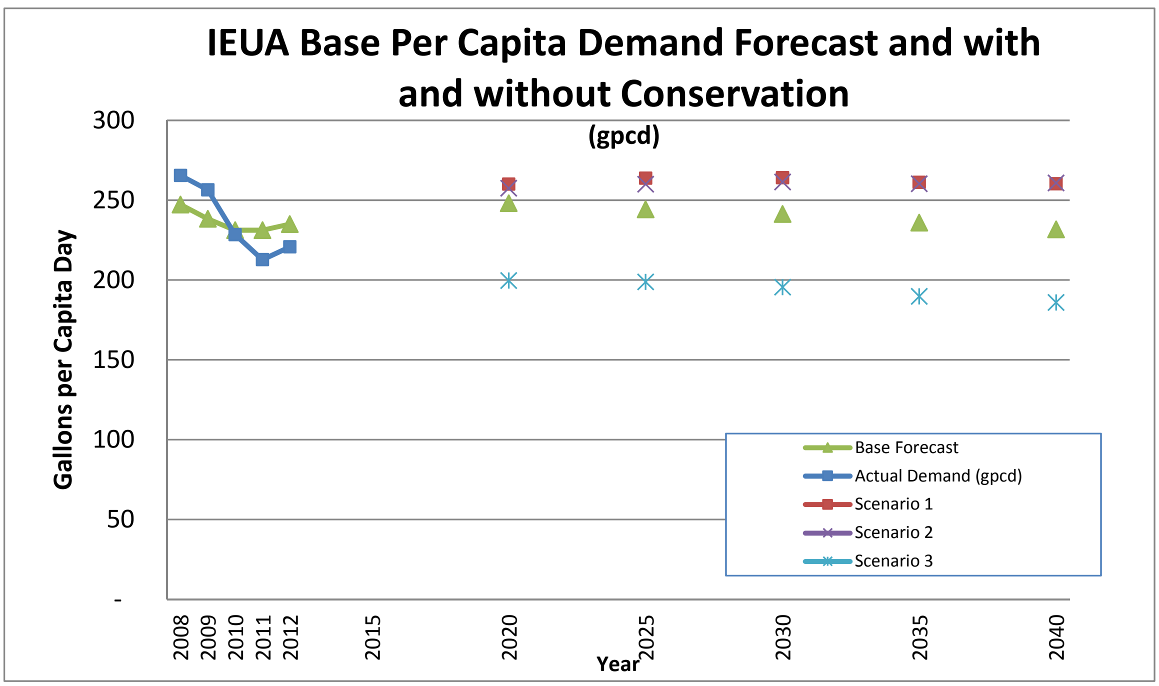
Each green box contains drop down boxes to choose values for each demand driver.

Scenario Manager Use drop down box to enter values. Do not copy and paste unless you paste values only.

	Item	Scenario 1:	Scenario 2:	Scenario 3:
	Scenario Name	High	Intermediate	Low
Short Term	Drought Persistence	Drought_4.6%Permanent	Baseline	Drought_4.6%Permanent
Drivers	Economic Cycle	Growth Year	Baseline	Recession Year
	Short-Term Weather	Multi-Yr Dry	1-Yr Dry	1-Yr Wet
Long Term	Sustainable Communities Housing	Baseline (40% MF)	More Sustainable (71% MF)	Max Sustainable (96% MF)
Long Term	Dwelling Units per Land Area	Baseline	Baseline	Baseline
Drivers	Median Household Income Growth	Baseline	High Growth	Low Growth
	Long Term Climate Change	Change 4.3%_P80	Change 3.2%_P50	No Change
WUE	Water Budget Based Rate Structure (WBBRS)	None	Low_Rollout_10pctSF/Irr	High_Rollout_100All
Drivers	WUE Level	Level 3	Level 2	Level 3

The results can be readily observed in the forecast chart below the control panel.





Section C: Chart Data

This worksheet collects and arranges data needed to create charts on the Control Panel worksheet.

Section D: Model Base

The Model_Base worksheet contains the following:

- Base Model Parameters
  - Single Family
  - Multi-Family
  - Revised Non-Residential Models
  - Price effect
- Base Model Input - Region Dependent
- Base Model Output - Demand Forecast with Price-effect
- Demand Forecast Model

Base Model Parameters

The Base Model Parameters table contains the econometric parameter estimates that drive the base model forecast. The Base Model Parameters are revised only for major updates and revisions to the model. For everyday policy scenario runs, the Base Model Parameters are left alone, generally, except for possible sensitivity testing. The lag variables refer to statistical effect at different periods of time. For example, Lag 1 indicates the effect that weather in one year has on the subsequent year. The Base Model Parameters table starts in Row 5 of the Model_Base worksheet, and the values are reproduced in Appendix D:

Single Family Model. The single family model was estimated as a function of the following:

1. Weather variables that include the amount of rain, rainy days, and temperature— all of which also included lag variables of one period. Rain and temperature included additional lag 2 variables in the model.
2. Socioeconomic variables include marginal price, income, density (housing units per acre), and people (persons per household).
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Drought indicates drought during the period.
5. Month variables are used to estimate the effect of month on seasonal demand.

MODEL PARAMETERS							
Single Family Model							
WEATHER	LAG 0	LAG 1	LAG 2				
Rain	-0.0482	-0.0589	-0.0192				
Rainy Days	-0.0088	-0.0047					
Temperature	0.4647	0.3482	0.2942				
SOCIOECONOMIC							
Marginal Price	-0.1947						
Income	0.2722			**MONTH**			
Density	-0.6154			January	0.0233	July	0.5785
People	0.5485			February		August	0.5603
				March	0.0659	September	0.4775
CONSERVATION				April	0.2166	October	0.3361
Voluntary	-0.0258			May	0.3799	November	0.1993
Mandatory	-0.1033			June	0.5128	December	0.1056
DROUGHT							
	-0.0503						

Multi-Family Model:

1. Weather variables include the amount of rain and temperature. Rain includes a variable with no lag, and also variables with 1 and 2 lag periods. Temperature includes one variable with 1 lag period.
2. Socioeconomic variables included are the same set as for the single family model.
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Month variables included are the same set as for the single family model.

Multi-Family Model							
	WEATHER	LAG 0	LAG 1	LAG 2	LAG 3		
	Rain	-0.0343	-0.0205	-0.0069			
	Temperature		0.1375				
	SOCIOECONOMIC						
	Marginal Price	-0.1626		MONTH			
	Income	0.3102		January	0.037	July	0.2255
	Density	-0.5262		February		August	0.2353
	People	0.4496		March	0.0009	September	0.1997
				April	0.0715	October	0.1414
	CONSERVATION			May	0.1405	November	0.1037
	Voluntary	-0.0452		June	0.1951	December	0.0858
	Mandatory	-0.1162					

Revised Non-Residential Model:

1. Weather variables include the amount of rain and cooling degree days, both with no lag, one period lag, and two periods lag.
2. Socioeconomic variables include one for the marginal price of water.
3. Conservation variables include one that indicates mandatory conservation, and another that indicates voluntary conservation.
4. Month variables included are the same set as for the single family model.
5. Employment variables included are Manufacture and Services as it is consistent with current MWD implementation. The model has the structure to accept, in addition, variables for Construction, Transportation, Wholesale, Retail, Finance, and Government employment.

Revised Non-Residential Model							
	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.05817	-0.04906	-0.01905			
	Cooling degree Days	0.01037	0.01171	0.01200			
	SOCIOECONOMIC			MONTH			
	Marginal Price	-0.158920		January	0.0005	July	0.4163
				February		August	0.4308
	CONSERVATION			March	0.0425	September	0.3713
	Voluntary	-0.06655		April	0.1613	October	0.2561
	Mandatory	-0.13011		May	0.2980	November	0.1438
				June	0.3623	December	0.0658
EMPLOYMENT COEFFICIENTS							
Construction	Manufacture	Transportation	Wholesale	Retail	Finance	Services	Government
0.0000	**0.80297**	0.0000	0.0000	0.0000	0.0000	**0.55242**	0.0000

Price Effect

The price effect parameters reduce the effect of price on demand to account for increasing levels of conservation over time. Customers may have fewer opportunities to conserve if they already have conservation devices and behaviors.

The Constant Price parameter (Cell J79) toggles on and off the use of constant 1990 prices. When prices are constant, there are no price impacts on demand. This parameter could be used for sensitivity testing.

Price Effect							
The price effect is reduced to	Year	Price Effect		Year	Price Effect		
account for the effects of price	2008	56%		2025	33%		
captured in the End-Use module.	2009	54%		2030	33%		
	2010	52%		2035	33%		
The original MWD model had one	2011	50%		2040	33%		
price effect across the forecast.	2012	48%		2045	33%		
This updated model allows for the	2015	42%		2050	33%		
effect to be reduced in phases, as	2020	33%					
End-Use conservation increases.							
Constant Price (effects of 1990 price across all years) Toggle: 1 = use current rate, 0 use 1990 rates							1

Base Model Input

The Base Model Input tables start in Row 82 of the Model_Base worksheet. These tables contain the demographic input data and the equations to create the demand forecast. The Base Forecast is the forecast under the assumption of no new conservation savings.

Demographic Inputs

The latest demographic forecast for IEUA was acquired from the SCAG 2012 RTP data base. The Center for Demographic Research (CDR) at California State University, Fullerton utilized geographic information system (GIS) methods to extract data only for the area within IEUA service area boundaries. Detailed analysis of boundaries was conducted to assure that households, population, and employment were properly allocated. Appendix B contains detailed description of the GIS methods used to generate the demographic data set. Appendix D contains demographic input tables. The complete set of demographic inputs is as follows:

1. Population (Total Population, SCAG 2012 RTP data from CDR)
2. Occupied Housing Units (Households, SCAG 2012 RTP data from CDR)
3. Household size (Persons per Household, MWD)
4. Housing Density (Units per Acre, MWD)
5. Median Household Income (MWD)
6. Urban Employment by Sector (SCAG 2012 RTP data from CDR)
7. Marginal Water Price (MWD)

Demographics 2035 to 2040. The SCAG 2012 RTP demographics only go out to the year 2035. We utilize a trend method similar to MWD for the years 2035 to 2040, by applying the compounded average growth rate from 2008 to 2035.

The MWD employment categories are by grouped SIC codes and the SCAG 2012 RTP are grouped by NAICS codes. The following cross walk—developed by consulting SIC and NAICS definitions—was used to group SCAG NAICS into MWD SIC categories.

MWD (SIC)	SCAG (NAICS)
Construction	CONST
Manufacturing	MANU, AG
Utilities	TRANS, .5*INFO
Trade	WHOLE
Retail Trade	RET
Real Estate	FIRE
Service	PROF, EDU, ARTENT, OTHER, .5*INFO
Government	PUBADM

Source: Demographics_Compare_1.xlsx

Employment Productivity Factors by Year

1. Construction (MWD)
2. Manufacturing (MWD)
3. Transportation & Utility's Comm (MWD)
4. Wholesale Trade (MWD)
5. Retail Trade (MWD)
6. Finance, Insurance, and Real Estate (MWD)
7. Service (MWD)
8. Government (MWD)

Drought Restrictions

The table of drought restrictions contains the set of indicator variables that can be used to create forecast scenarios with conditions of drought and conservation restrictions.

1. Residential (Voluntary/Mandatory)
    a. Single Family
    b. Multi-Family
2. Employment (Voluntary/Mandatory)
3. Hot & Dry

Model Intercept and Calibration Inputs

The table labeled Model Intercept and Calibration Inputs contains the parameters to adjust the demand forecast to calibrate to the best estimate of normal weather demand. The table contains adjustments for the single family, multi family, and non-residential sectors. In addition the table below labeled Percentage Other can be used to adjust the other demand sector.

Model Intercept and Calibration Inputs			
Model Intercept Adjustments			
		Adjusted	Model Inter
	Single-Family	5.10	4.83
	Multi-Family	5.31	5.66
	Non-Residential	0.86	0.94
			med
	Model Calibration	0.96	
	SF Site Adjustment	0.5065	
	MF Site Adjustment	-0.1143	
	NR Site Adjustment	-0.0441	

All of the values in the table are sourced from MWD with the exception of Model Calibration. Since we are calibrating for one agency, we set the Model Calibration parameter by minimizing the difference between the modeled demand and normal demand.

Normal demand was estimated by methods described in the technical memo "Statistical Analysis of Short Term IEUA Demand: Empirical Estimates of Demand Trends." This memo documents the weather-normalization and employment-normalization of time series data provided by IEUA. Water demand was approximated as the sum of delivered supplies. The advantage of using this data source is that the modeling effort was based on consistent system-wide monthly data. And in addition, the monthly water production could be adjusted for changes in storage. Although these models may be described as "demand" models, the data on which the models are estimates would be better described as "supply" measures. To the extent that storage issues are accounted for, the difference between these two constructs should be made small.

We have also provided a second calibration that isolates differences between IEUA and MWD methods. The second calibration option takes actual demand history provided by MWD and then applies the weather and employment effects from our statistical analysis to yield normal demand based on MWD data. The model provides a toggle to switch between the two calibration methods for comparison purposes (Cell G161).

Minimize Delta to 2012 Normalized Demand by Adjusting Model Calibration in Cell E138					
Source of Actual Demand	**Normal Effects Estimation**	**2012 Demand**	**Delta**	**Model Calibration**	**Toggle 1=IEUA**
IEUA	A&N	218,614	(0)	0.956	1
MWD	A&N	243,922	25,308	0.983	

To run the calibration, run a Goal Seek in Excel that sets delta in Cell E161 (or E162) to zero by changing Cell E138. (In Excel, click on Data, What If, and then Goal Seek). This method calibrates the model to normal demand in the most recent year from the statistical analysis (2012).

Adjusted Normal Weather by Month

These values are from MWD and are calculated from tables labeled Actual Climate Data, which contain Median Rainfall, Median Rain Days, Normal Temperature, and Normal Cooling Degree Days.

Base Model Output

The Base Model Output table (Row 171) is the base forecast that includes the price effect, but it does not include new conservation savings. The following is an example of the Base Model Output table for single family multi-family and total acre feet demand (Non-Residential and Other are not shown separately, but they are included in Total demand).

ACRE-FEET

	Municipal and Industrial Water Demand - Base Forecast with Price Effect (Acre-Feet)								
				by Sector					
		TOTAL		Single-Family			Multi-Family		
YEAR	Annual	Summer	Winter	Annual	Summer	Winter	Annual	Summer	Winter
2008	223,185	147,008	76,177	103,644	69,914	33,730	25,879	15,963	9,916
2009	216,118	142,398	73,720	103,031	69,501	33,531	25,815	15,924	9,891
2010	210,826	138,957	71,869	103,262	69,656	33,606	25,979	16,025	9,954
2011	212,918	140,330	72,588	103,706	69,956	33,750	25,967	16,018	9,949
2012	218,614	144,088	74,526	106,581	71,895	34,686	26,645	16,436	10,209
2015	232,443	153,406	79,037	113,054	76,315	36,740	27,994	17,268	10,726
2020	249,390	164,505	84,885	120,523	81,356	39,167	31,667	19,533	12,133
2025	263,113	173,501	89,613	126,358	85,295	41,063	34,301	21,158	13,143

Demand Forecast Model

The Demand Forecast Model tables (starting in Row 225) contain the demand forecast equations for each forecast period.

Conservation Inputs

The Conservation Inputs tables (starting in Row 696) contain output from the AWE Tracking Tool that IEUA uses to plan conservation activities.

- Plumbing Code Savings by sector
- Historically Achieved (Retrospective) Active Savings by sector for peak and off-peak sectors

The demand forecast calls for Summer and Winter demand, so we apply the peak and off-peak conservation estimates from the AWE Tracking tool to Summer and Winter respectively.

The demand forecast also calls for the following sectors: Single Family, Multi Family, Non Residential, and Other. The AWE Tracking Tool has Commercial, Industrial, and Institutional separately categorized as well as an Irrigation category. We summed these into the Non-Residential sector on the Conservation_Inputs Worksheet.

Note that refined adjustments to the conservation forecast are possible in the AWE Tracking Tool that accompanies the demand forecast model. For example, past and future conservation activities can be added or updated. Past active conservation is entered on the Model_Base worksheet. The Base

Scenario on the Model_Base worksheet assumes there is not additional future active conservation. Scenarios 1 – 3 each have different plans for future active conservation that are linked to the active conservation input worksheets on Model_Scenario1, Model_Scenario2, and Model_Scenario3 respectively.

Note also that the Conservation_Inputs Worksheet takes the results from the AWE Tracking Tool and calculates the future addition to active and passive conservation beyond what is embedded in 2012. That is the latest year of the statistical normalization analysis based on actual demand (which by definition embodies all past active and passive conservation to date). The calculations for the future additions to active conservation accounts for the fact that active conservation has a defined savings life. Unless the conservation activity is replicated in the AWE Tracking Tool, the conservation effect will expire and result in an increment rather than a decrement to future demand. As a default conditions, the model assumes that future active conservation will be maintained at the same level as the present active savings level. This is a place holder until IEUA has developed the next phase of their conservation planning.

Conservation Forecast

The Conservation Forecast tables (Row 832) contains a forecast that is constructed by starting with the Base Forecast and subtracting out the added passive and active conservation forecast moving forward.

Note that since we have calibrated to a current estimate of normal demand, we subtract out only added future conservation above and beyond what is already embedded in the current estimates. The advantage of this approach is that it allows us to anchor the demand forecast to the best estimate of current measured demand data.

Cities Forecast

The Cities Forecast (Row 937) was created by disaggregating the IEUA forecast using the following method:

- Single Family was disaggregated by the share of single family housing units in the city
- Multi Family was disaggregated by the share of multi-family housing units in the city
- Non Residential was disaggregated by the share of employment in the city
- Other was disaggregated by the share of population in the city

When comparing a disaggregate forecast of base demand at a City level to recent realized water demand, analysts will need to recognize that realized demand does not reflect, in general, normal weather and normal business cycle conditions. When comparing alternative forecasts, analysts should begin by comparing the demand driver measures of population, housing stock, and employment.

Retail Service Areas Forecast

The Retail Service Areas Forecast (Row 1219) was created by disaggregating the IEUA forecast using the following method:

- Single Family was disaggregated by the share of single family housing units in the retail water service area

- Multi Family was disaggregated by the share of multi-family housing units in the retail water service area
- Non Residential was disaggregated by the share of employment in the retail water service area
- Other was disaggregated by the share of population in the retail water service area

When comparing a disaggregate forecast of base demand at a Retail Service Area level to recent realized water demand, analysts will need to recognize that realized demand does not reflect, in general, normal weather and normal business cycle conditions. When comparing alternative forecasts, analysts should begin by comparing the demand driver measures of population, housing stock, and employment.

Indoor/Outdoor Forecast

The Indoor/Outdoor Forecast tables break down total forecasted demand into indoor and outdoor components (Row 1560).

Please refer to Appendix C for documentation on the estimate of Indoor/Outdoor end uses in the IEUA service area.

Two methods were examined to estimate outdoor use across customer classes (See Appendix C). The minimum month method is common practice, yet it ignores outdoor use in climates where there is winter irrigation. The seasonal variation method applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes. This method definitively establishes that the assumption of zero winter irrigation is untenable. The recommended seasonal variation method estimates that 62 percent of total water demand in the IEUA service area is outdoor water use. The model can provide additional estimates of how indoor and outdoor end uses are divided seasonally:

Summer (April to Oct.)		Winter (Nov. to March)	
Indoor	Outdoor	Indoor	Outdoor
33%	67%	49%	51%

Note that this split occurs in the model after the Base and Conservation Forecasts, and thus proportions of indoor and outdoor added active conservation savings will not be reflected. However, for the indoor outdoor analysis of passive conservation savings we performed to assist wastewater design team, we disaggregated passive conservation coming out of the AWE Tracking Tool into indoor and outdoor components. In addition, we disaggregated passive conservation into components derived from new construction and components derived from existing sites.

Section E: Model Scenarios (1-3)

There are three Model_Scenario worksheets that contain each of three scenarios controlled by the Control Panel. Each of these worksheets is based structurally on the Base_Model worksheet with differences in either data sources or assumptions that comprise the defined scenarios.

Section F: WBBRS Implementation

The WBBRS_Implementation worksheet contains the calculations and assumptions that underlie the alternative water budget based rate structures and their estimated water savings.

Section G: WUE Inputs

The WUE_Inputs worksheet contains the planned active conservation savings from the alternative water use efficiency scenarios.

Appendix A: Review of MWD Demand Model

Current econometric model specification

Metropolitan currently uses a customized version of the IWR-MAIN (Municipal and Industrial) sometimes referred to as MWD-MAIN. This demand model features a separate model for different customer sectors—Single Family Residential, Multifamily Residential, and Commercial, Industrial, and Institutional (CII). Table 1 depicts these key relationships in the MWD demand model. In the residential sector, the forecasts of water demand per dwelling unit are ultimately combined with the forecasts of dwelling units from the regional planning agencies to yield an estimate of total sector water demand. Similarly, in the nonresidential sector, water use per employee is combined with forecasts of employment to yield an estimate of total nonresidential water demand.

Table 1 MWD Demand Model Variables

Demand Sector	Projected Demographic	Dependent Variable	Explanatory Variables
Single Family Residential	Number of Single Family Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Multifamily Residential	Number of Multifamily Households	Water use per household	Climate Household Size Income Price and Conservation Housing Density Service Area Location
Commercial, Industrial, Institutional (CII)	Total Urban Employment	Water use per employee	Climate Price and Conservation Industrial / Service Employment Share
System Loss / Unmetered Use			Percentage of total use

Each statistical model will be analytically described.

Specification of Single Family Residential Model

The systematic form of the single family residential model is:

Equation 1

$$\ln\frac{Use_{i,t}}{Unit_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

where $\frac{Use_{i,t}}{Unit_{i,t}}$ is the interpolated quantity of single family water use per occupied single family residence of retail agency *i* within month *t*,
the parameter μ_i represents a fixed intercept parameter for each agency *i*,
$Month_t$ is an indicator variable for the month,
$Weather_t$ is weather component,
$SocioEconomic_t$ is a set of socioeconomic measures, and
Drought, are indicator variables for the presence of drought response.

Taking a closer look at each component, the dependent variable is interpolated to reflect the fact that it is a measure taken from billed consumption data. (This type of "sales" data is required for the customer class specific models of MWDMAIN.) The interpolation was performed as follows:

$$\hat{U}se_t = 0.5 \cdot Use_t + 0.5 \cdot Use_{t-1}; monthly\_data$$
$$or$$
$$\hat{U}se_t = 0.25 \cdot Use_t + 0.5 \cdot Use_{t-1} + 0.25 \cdot Use_{t-2}; bimonthly\_data$$

The monthly seasonal component includes 11 binary indicator variables, one for each month:

$$Month_t = Jan + Mar + Apr + May + Jun + Jul + Aug + Sep + Oct + Nov + Dec$$

Since 12 monthly indicator variables are perfectly correlated with the intercept, one must be excluded. Identical predictions are generated no matter which month is excluded; only the interpretation of the monthly coefficients changes.

The weather component is comprised of weather measures (monthly rainfall, rainy days in the month, and air temperature) that are transformed logarithmically with their monthly average subtracted away. Contemporaneous values (rain in the same month as use) as well as lagged values are included.

$$Weather_{i,t} \equiv dlR_{i,t} + dlR_{i,t-1} + dlR_{i,t-2} + lRDays_{i,t} + lRDays_{i,t-1} + dlT_{i,t} + dlT_{i,t-1} + dlT_{i,t-2}$$
$$dlR_{i,t} \equiv \ln(Rain_{i,t} + 1) - \overline{\ln(Rain_{i,t} + 1)}$$
$$lRDays_{i,t} \equiv \ln(number\_of\_rainy\_days\_in\_month + 1)$$
$$dlT_{i,t} \equiv \ln(Temp_{i,t}) - \overline{\ln(Temp_{i,t})}$$

The socioeconomic component for single family residential includes measures of water price, the number of occupied housing units per acre in 1990, the number of persons per household in 1990, and median household income in 1990.

$$Socioeconomic_{i,t} = \ln(real\_marginal\_price_{i,t}) + \ln\left(\frac{Units_{i,1990}}{Acres_{i,1990}}\right) + \ln\left(\frac{Persons_{i,1990}}{Units_{i,1990}}\right) + \ln\left(\frac{\overline{Income_{i,1990}}}{Unit_{i,1990}}\right)$$

Because the estimation period included periods of drought, the model controlled for customer response to agency requested curtailments by using additional, agency-specific, binary indicators for voluntary or mandatory curtailments. An additional indicator for the severe drought period 1990-1992 was also included.

$$Drought_t = IndicatorforVoluntaryConservation_{i,t} + IndicatorforMandatoryConservation_{i,t} + IndicatorforDroughtPeriod(1990-1992)$$

The single family residential model was weighted by single family use/deliveries and estimated using ordinary least squares.

Multifamily Residential

The systematic form of the multifamily residential model is:

Equation 2

$$\ln\frac{Use_{i,t}}{Unit_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

where $\frac{Use_{i,t}}{Unit_{i,t}}$ is the interpolated quantity of water use per occupied multifamily residence of retail agency *i* within month *t*, as in the single family model.

The parameter μ_i represents a fixed intercept parameter for each agency *i*,
$Month_t$ is an indicator variable for eleven months,
$Weather_t$ is a somewhat simpler weather component,
$SocioEconomic_t$ is a set of socioeconomic measures, and
$Drought_t$ are indicator variables for the presence of drought response.

The components of the multifamily residential model are somewhat simpler.

$$Weather_{i,t} \equiv dlR_{i,t} + dlR_{i,t-1} + dlR_{i,t-2} + dlT_{i,t-1}$$

$$dlR_{i,t} \equiv \ln(Rain_{i,t} + 1) - \overline{\ln(Rain_{i,t} + 1)}$$

$$dlT_{i,t} \equiv \ln(Temp_{i,t}) - \overline{\ln(Temp_{i,t})}$$

$$Drought_t = IndicatorforVoluntaryConservation_{i,t} + IndicatorforMandatoryConservation_{i,t}$$

The multifamily residential model was weighted by multifamily use/deliveries and estimated using ordinary least squares.

Nonresidential—CII

For the nonresidential sector, the dependent variable is specified in terms of use per employee.

$$\ln\frac{Use_{i,t}}{Employee_{i,t}} = \mu_i + \beta_M \cdot Month_t + \beta_W \cdot Weather_{i,t} + \beta_S \cdot SocioEconomic_{i,t} + \beta_D \cdot Drought_t$$

In the documentation provided, the *Socioeconomic* component is formed by measures of eight major types of employment (the eight two digit SIC classifications of employment), that are adjusted for changes in productivity. A simpler form of this model is currently being used to generate nonresidential projections; the working form of the nonresidential equation uses (unadjusted) measures of employment for the two largest employment groupings.

The nonresidential model was weighted by nonresidential use/deliveries and estimated using ordinary least squares.

Evaluation of current econometric model specification and estimation

Any water demand model can be described as deriving from a separation of the explanatory variable into systematic and nonsystematic portions: $Y=f(X) + \varepsilon$.

Dependent Variable: Y
This type of "smoothing" will reduce variation in the original measure and can attenuate the effect of explanatory variables that vary monthly (e.g., weather measures). This said, the use of estimated monthly data represents an improvement over the annual or semi-annual measures used in previous MAIN modeling exercises.

Functional Form of Model: f(X)
The only agency-specific parameter is the intercept. This implies that all slope parameters are restricted to be the same for each agency. Though this may not appear to be a very plausible assumption on the face of it, it does reflect some of the difficult choices between available data and the number of parameters that the modeler attempts to estimate. For example, the current model specification imposes the restriction that the seasonal shape is identical for each agency *i*. Thus, in the single family model, each agency will have January use that is 2 percent above its intercept. Further, the weather effect is identical for each agency. It is implausible that inland agencies would have the same response to weather variation that primarily coastal agencies would have.

The weather effect also imposes the restriction that the percentage response to changes in temperature or rainfall are identical throughout the year. It is implausible that rainfall in June would have the same response as rainfall in January. The specification of the climate effects constitutes an area of potential further refinement.

Estimation Method of Model: $\hat{f}$ and ε
It is well known that fixed effect models, such as those used in estimating equations for MWD-MAIN cannot directly yield slope estimates for explanatory variables that only vary cross-sectionally. Thus, the elasticity's attached to variables that do not vary with time—housing density, persons per household, and median household income—are the result of the weighting procedure and a very small amount of cross-sectionally varying agency data from 1990. The signs of the estimated coefficients are correct but I cannot attest to their validity. However, the magnitude and signs of the estimated parameters are within reasonable ranges, based on my professional experience with demand models in the literature and in use nationally. The model would be improved by the use of modern panel data estimators.

Summary
The current MWD-MAIN models represent an improvement over previous models. The evolutionary path of the MWD-MAIN has several promising alternatives for further improvement.

This review was based on documents, interviews, and data provided by Metropolitan. These included:

Development of Water Use Models for the Interim #5 Forecast: Memorandum Report, January 1995, Jack C. Kiefer, Jerzy W. Kocik, Eva M. Opitz, and Benedykt Dziegielewski of PMCL, A report for the Metropolitan Water District of Southern California.

Development of Water Use Models for the Interim #5 Forecast, ADDENDUM REPORT: MWDMOD Implementation and Calibration, May 1995, Jack C. Kiefer, Jerzy W. Kocik, Eva M. Opitz, and Benedykt Dziegielewski of PMCL, A report for the Metropolitan Water District of Southern California.

Development and Verification of Sectorial Water Demand Forecasting Models for the Metropolitan Water District of Southern California, Draft Report, Feb. 1997, Jack C. Kiefer, Jerzy W. Kocik of PMCL, A report for the Metropolitan Water District of Southern California.

Appendix B: Demographic Data Development

Summary Methodology for Socioeconomic Data Disaggregation to IEUA

In fall 2013, the Center for Demographic Research (CDR) at California State University, Fullerton was contracted to disaggregate regional socioeconomic data for a water demand model for the Inland Empire Utilities Agency (IEUA). The specific objectives of this project were to develop estimates and projections of the following variables for 2008 and 2010 through 2035 for the cities, Retail Water Service Agencies, and Wastewater Tributaries within IEUA:

1. Total Population
2. Resident/Household Population
3. Group Quarters Population
4. Households (Occupied Housing Units)
5. Single-Family Households
6. Multi-Family Households
7. Employment (Jobs) by sector:
   a. Agriculture & Mining
   b. Construction
   c. Manufacturing
   d. Wholesale
   e. Retail
   f. Transportation, Warehousing, & Utility
   g. Information
   h. Financial Activity & Real Estate (FIRE)
   i. Professional & Business Services
   j. Education & Health Services
   k. Leisure & Hospitality
   l. Other Services
   m. Public Administration

The projections database used is the Southern California Association of Governments (SCAG) 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (2012 RTP/SCS), which was allocated to the Traffic Analysis Zones (TAZ).

These were developed by first overlaying the city, water agency, and tributary boundaries on the TAZ boundaries using GIS software. Prior to overlaying the geographies, corrections and adjustments were made to the boundaries to minimize errors and differences.
First, a union of TAZ data to each of the three primary geographies (cities, Retail Service Water Agencies, and Wastewater Tributaries) was done using GIS software. TAZs wholly contained within a primary geography were assigned to that geography.
If a TAZ was split by a primary geography, the TAZ data was redistributed between two or more split polygons using a combination of GIS and Microsoft Excel. To distribute population and housing data, an area allocation method was used and then supplemented with a review of the 2010 aerial photo from ESRI. This was done by counting rooftops of single family detached homes. For multi-family housing,

Google Maps were used to find the property information, and then properties were contacted to obtain the number of housing units in the development.

Population was allocated based on the share of housing units in the split compared to the total number for the original TAZ data. For employment, employer point data from D&B was used which contained the address and number of employees by NAICS code. Each 2-digit NAICS code was assigned to one of the SCAG 13 employment sector categories. These were then subtotaled by the split TAZ geographies, and then controlled by sector to the original TAZ totals.

Summary Methodology for Socioeconomic Data Disaggregation to IEUA 2 of 2
Future growth after 2010 was allocated based on aerial review of open land by TAZ where splits occurred. After all population, housing, and employment data were allocated, the data were joined to each primary geography boundary file using GIS software. Each boundary file (shapefile) was quality-checked to verify the split TAZs correctly followed the source data for each geography type. Finally, the split TAZ data were dissolved on each of the primary geographies for cartographic representation. The outcomes were GIS shapefiles with spatially accurate, allocated population, housing, and employment data for three primary geographies: cities, Retail Water Service Agencies, and Wastewater Tributaries.

1. Total Population- Refers to all persons; sum of resident/household population and group quarters population.
2. Resident/Household Population- Resident population refers to the segment of the population that resides in non-institutionalized quarters, such as single and multiple family units, mobile homes, oats, recreational vehicles, and other miscellaneous types of residences. The resident population is synonymous with household population as defined by the California State Department of Finance.
3. Group Quarters Population- Group Quarters Population refers to the population residing in non-institutionalized group quarters, such as college dormitories, military barracks, convalescent hospitals, and shelters.
4. Total Households (Occupied Housing Units) - Occupied Total Dwelling Units and Households are synonymous. Households were calculated by summing Occupied Single-Family Households and Multi-Family Households.
5. Single-Family Households- Occupied single-family detached housing units.
6. Multi-Family Households- All other occupied housing units (includes single-family attached, multi-family, duplex, triplex, fourplex, mobile homes.
7. Employment: Total number of jobs, includes full time and part time jobs by sector
    a. Agriculture & Mining
    b. Construction
    c. Manufacturing
    d. Wholesale
    e. Retail
    f. Transportation, Warehousing, & Utility
    g. Information
    h. Financial Activity & Real Estate (FIRE)
    i. Professional & Business Services
    j. Education & Health Services
    k. Leisure & Hospitality
    l. Other Services
    m. Public Administration

Boundary Details Documentation

The IEUA official shape file was available for all IEUA-wide demographics.

To get the city boundaries, CDR utilized the RTP city files which are more accurate than the Census Tiger files.

To get the retail service area boundaries, CDR utilized the city files, and then overlaid the non-city water companies (MVWD, FWC, and CVWD).

Then special corrections were made for the following:

- West Valley Water District (northeastern IEUA area)
- Golden State Water Company (border of Upland and MVWD)
- Power Plant (Reliant Energy Etiwanda)
- IEUA facilities (adjacent to power plant)
- Yellowstone Circle (Chino Hills for water and Chino for wastewater)

To get the wastewater tributaries, RMC developed a boundary file in cooperation with IEUA.

Appendix C: Indoor/Outdoor End Uses

Introduction

This Appendix documents the estimation of indoor and outdoor water end uses for water demand in the IEUA service area. This estimation of indoor/outdoor end uses is conducted by customer class—single family residential, multi-family residential, and commercial-industrial-institutional (CII). Indoor end uses are of particular interest to planners tasked with designing wastewater systems and recycled water systems because it helps them establish capacity requirements. Both indoor and outdoor use is of great interest to planners tasked with designing Water Use Efficiency (conservation) programs. Although much has already been accomplished with indoor conservation, there is some level of remaining potential for water savings. WUE planners have particular interest in outdoor use because it is generally assumed to be a large share of total use with large remaining potential for savings.

Two methods were used to estimate outdoor use across customer classes. The first method is the minimum month method that has been historically used in the water industry—this method assumes that the minimum month of water demand is 100 percent indoor end uses. Though we believe that this is a counterfactual assumption in the IEUA service area (it assumes exactly zero outdoor irrigation in the winter) we provide estimates using the minimum month method to serve as a point of comparison. The second method develops an estimate of winter irrigation from dedicated irrigation meters and applies this nonzero assumption instead. Termed a "seasonal variation" method, it applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes.

The seasonal variation method estimates outdoor end uses to compose 62 percent of overall water demand in the IEUA service area. (Presuming all water demand in the minimum month to be all indoor end use would estimate outdoor end uses to be 46 percent of total demand.) We recommend using the seasonal variation method because we know the minimum month method systematically underestimates outdoor water use in climates where there is winter irrigation such as IEUA.

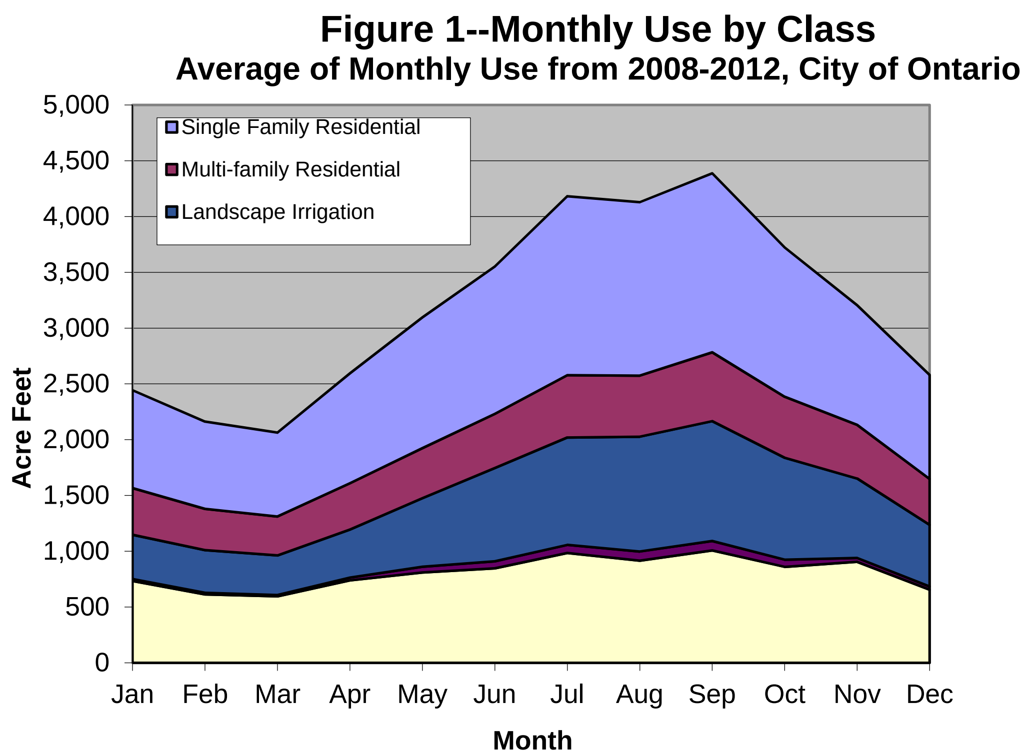
Data

The data used are from the California Department of Water Resources, Public Water System Statistics filings for the City of Ontario for the years 1993 to 2012. These data are billing system summaries at the monthly level. Several other retailers provided monthly use summaries; however, these were generated with bimonthly billing cycles. Since different retailers can apportion bimonthly billing into calendar using different methods, we stick to the monthly data generated with monthly billing.

Table 1 shows the average use from 2008 to 2012 summed by customer class. Figure 1 shows the sum of water use by month. The strong seasonal pattern reflects irrigation needs during the characteristic hot and dry summers.

Table 1 – Average Use, 2008 to 2012, City of Ontario

Class	Use (AF)	Percent
Single Family Residential	13,993	36.7%
Multi-family Residential	5,647	14.8%
Commercial/Industrial/Institutional	9,666	25.4%
Landscape Irrigation	8,259	21.7%
Other	549	1.4%
Total	38,114	100.0%



Methods

Outdoor end uses are directly measured by dedicated irrigation meters. Many other types of water meters--single family, multi family, commercial, industrial, and institutional--can be measuring both indoor and outdoor end uses. If not measured or observed directly, planners are forced to rely on inference or judgment. For IEUA, we have conducted two methods to infer outdoor use for all sectors.

Minimum Month Method

The most common method employed to infer outdoor use is to assume the winter use is all indoors. (This assumption may be closer to the truth in wetter or colder climates.) For example, if we calculate winter minimum use times 12 months we have inferred total indoor use for the year. Total use for the year minus indoor use then equals outdoor use.

In Table 2 below, we find that outdoor use calculated with the "minimum winter use is indoor use" method is 46%. The method underestimates outdoor use because there is likely to be at least some winter irrigation in dry climates. Variations on this method include daily accounting and various ways

to define winter minimum. Note the results of this method will vary considerably from year to year; the reader is cautioned when using results from one year for planning
Purposes and we used for this analysis the monthly average over the five most recent years for which data were available (2008 to 2012).

Table 2 – Percent Outdoor Use

Class	Total	Minimum Month Method	Seasonal Variation Method
Single Family Residential	13,993	36%	58%
Multi-family Residential	5,647	26%	43%
Commercial/Industrial/Institutional	9,666	26%	42%
Landscape Irrigation	8,259	100%	100%
Other	549	75%	100%
Total	38,114	46%	62%

Seasonal Variation Method

The second method to infer outdoor use consists of employing the pattern of seasonal variation with dedicated irrigation meters and applying it to other sectors with mixed meters. The reasoning is that with dedicated irrigation meters we can measure winter irrigation. Thus, we can observe the relative water use in winter and summer irrigation seasons and calculate a parameter from variables that are observable in other sectors. For example, by calculating the ratio of winter minimum to the seasonal range we have a function of variables observable for sectors other than dedicated irrigation meters. This method will result in a higher estimate of outdoor water use than using minimum month. The method relies on the assumption that the seasonal variation of outdoor use is the same for sites with dedicated meters as for sites with mixed meters.
Due to the variability of landscape water use from year to year, we expect the calculated parameter to vary considerably from year to year. For this reason, we calculated the parameter (ratio of winter minimum to seasonal range) for each year for which we could collect data (1993 to 2012) and took the average. We applied this long term average to the monthly average of the most recent five years of consumption data (2008 to 2012) because of the changing distribution of water use by customer class as more dedicated irrigation meters are employed.

Figure 2 shows the use from irrigation-only meters, with winter irrigation illustrated in blue and the seasonal range in red for one example year (2011).

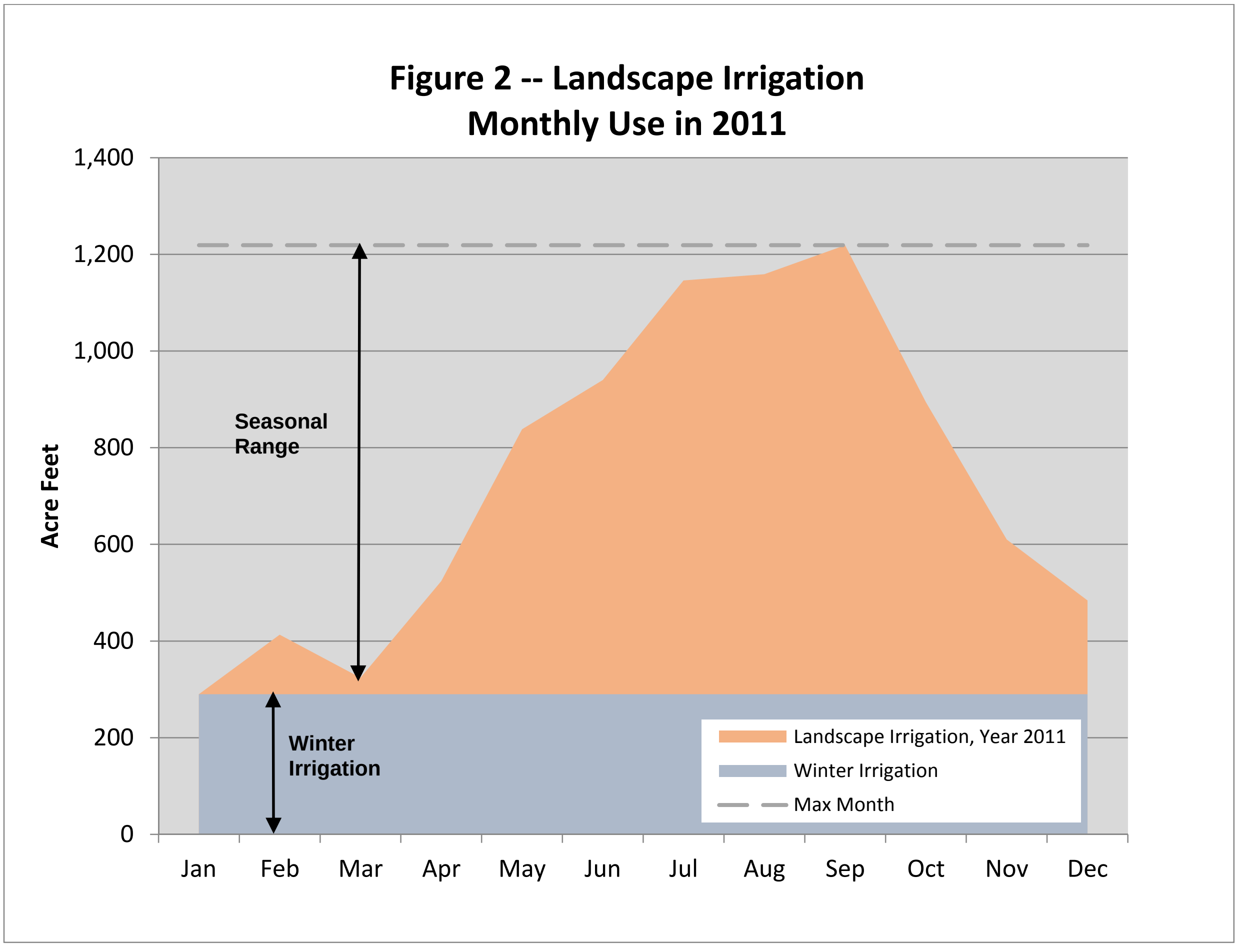
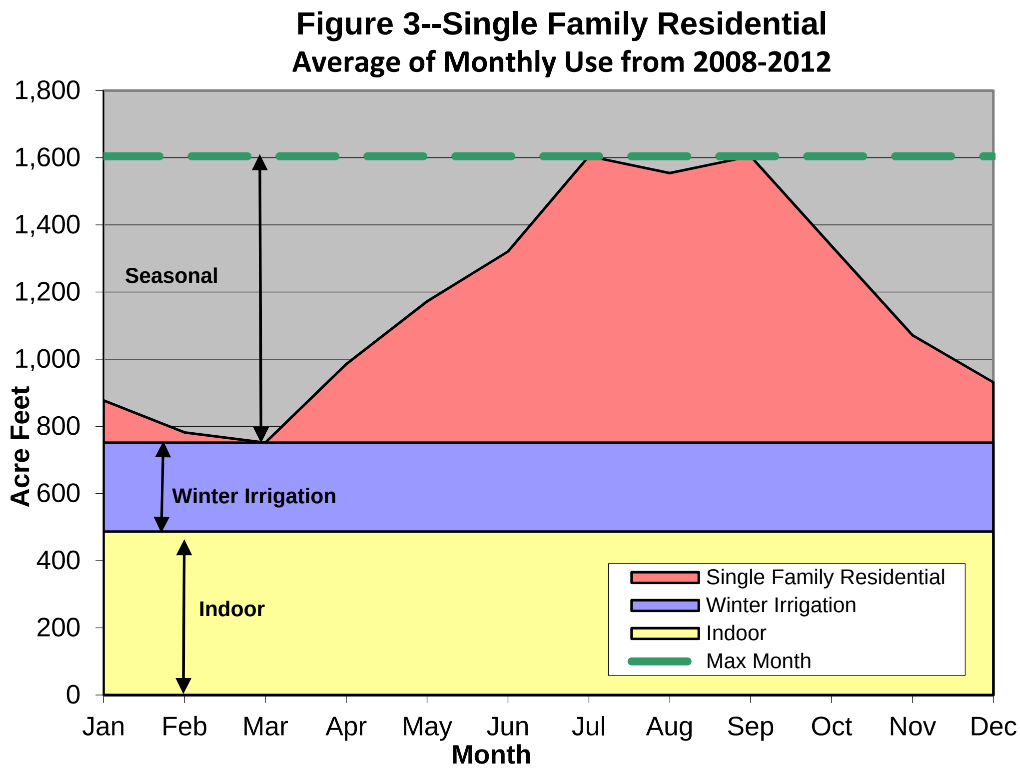


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors with mixed meters (31%).

Seasonal range and winter minimum are observable for non-irrigation classes. If we assume that winter irrigation is also 31% of seasonal range for the non-irrigation customer categories, we can infer their winter irrigation, and thus indoor and outdoor use.



For example, Figure 3 shows winter irrigation calculated as 31% of seasonal range for the single family residential sector. Total outdoor use (red+blue in this graph) is, thus, 58% of total use for the year (red+blue+yellow). In contrast, using the minimum month for the single family sector results in 36% outdoor use (red area only).

Recommendations

The minimum month method systematically underestimates outdoor use and overestimates indoor use. As such we do not recommend using it for planning water resource investments in the IEUA service area. Since it is a commonly used method, it may have comparison value. We can improve the reliability of the results by using a longer time series of data to see how the percent outdoor varies from year to year with changes in weather; however, the systematic estimation bias remains.

We recommend the seasonal variation method over the minimum month in this analysis for IEUA because the seasonal variation method does not contain the same source of systematic bias. We have reliable empirical measures using monthly-billed data from one of the larger retail water service areas.

Appendix D: Data Inputs

The following table is from the Parameters_Inputs Worksheet and it summarizes the econometrically estimated parameters that drive the demand equations. Section A defines these parameters in detail. These tables show the socioeconomic inputs from the Base_Forecast Worksheet as described in Section B:

MODEL PARAMETERS							
Single Family Model							
	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.0482	-0.0589	-0.0192			
	Rainy Days	-0.0088	-0.0047				
	Temperature	0.4647	0.3482	0.2942			
	SOCIOECONOMIC						
	Marginal Price	-0.1947					
	Income	0.2722		**MONTH**			
	Density	-0.6154		January	0.0233	July	0.5785
	People	0.5485		February		August	0.5603
				March	0.0659	September	0.4775
	CONSERVATION			April	0.2166	October	0.3361
	Voluntary	-0.0258		May	0.3799	November	0.1993
	Mandatory	-0.1033		June	0.5128	December	0.1056
	DROUGHT						
		-0.0503					
Multi-Family Model							
	WEATHER	LAG 0	LAG 1	LAG 2	LAG 3		
	Rain	-0.0343	-0.0205	-0.0069			
	Temperature		0.1375				
	SOCIOECONOMIC						
	Marginal Price	-0.1626		**MONTH**			
	Income	0.3102		January	0.037	July	0.2255
	Density	-0.5262		February		August	0.2353
	People	0.4496		March	0.0009	September	0.1997
				April	0.0715	October	0.1414
	CONSERVATION			May	0.1405	November	0.1037
	Voluntary	-0.0452		June	0.1951	December	0.0858
	Mandatory	-0.1162					
Revised Non-Residential Model							
	WEATHER	LAG 0	LAG 1	LAG 2			
	Rain	-0.05817	-0.04906	-0.01905			
	Cooling degree Days	0.01037	0.01171	0.01200			
	SOCIOECONOMIC			**MONTH**			
	Marginal Price	-0.158920		January	0.0005	July	0.4163
				February		August	0.4308
	CONSERVATION			March	0.0425	September	0.3713
	Voluntary	-0.06655		April	0.1613	October	0.2561
	Mandatory	-0.13011		May	0.2980	November	0.1438
				June	0.3623	December	0.0658
EMPLOYMENT COEFFICIENTS							
Construction	Manufacture	Transportation	Wholesale	Retail	Finance	Services	Government
0.0000	**0.80297**	0.0000	0.0000	0.0000	0.0000	**0.55242**	0.0000

Price Effect					
The price effect is reduced to	**Year**	**Price Effect**		**Year**	**Price Effect**
account for the effects of price	2008	56%		2025	33%
captured in the End-Use module.	2009	54%		2030	33%
	2010	52%		2035	33%
The original MWD model had one	2011	50%		2040	33%
price effect accross the forecast.	2012	48%		2045	33%
This updated model allows for the	2015	42%		2050	33%
effect to be reduced in phases, a	2020	33%			
End-Use conservation increases.					

YEAR	Population		Occupied Housing Units			Household Size (persons / household)			Housing Density (units / acre		Median Household Income (1990 dollars)
				by Sector			by Sector		by Sector		
	TOTAL Population	Household Population	TOTAL	Single-Family	Multi-Family	AVERAGE	Single-Family	Multi-Family	Single-Family	Multi-Family	
2008	805,506	787,995	230,915	158,948	71,967	3.42	3.60	2.89	3.20	10.90	38.18
2009	809,590	792,072	232,091	159,548	72,542	3.41	3.59	2.87	3.20	10.90	37.38
2010	813,695	796,170	233,272	160,150	73,122	3.42	3.60	2.88	3.20	10.90	37.06
2011	822,018	804,344	235,913	162,158	73,754	3.43	3.61	2.90	3.20	10.90	35.82
2012	830,425	812,603	238,583	164,192	74,391	3.45	3.62	2.91	3.20	10.90	37.72
2015	856,168	837,890	246,777	170,447	76,337	3.40	3.58	2.87	3.20	10.90	41.70
2020	896,533	877,494	262,894	178,394	84,500	3.34	3.52	2.80	3.20	10.90	46.30
2025	955,569	935,762	279,209	187,488	91,721	3.35	3.54	2.82	3.20	10.90	46.05
2030	1,009,349	988,771	295,545	197,642	97,903	3.35	3.55	2.82	3.20	10.90	45.81
2035	1,067,946	1,046,605	311,860	207,794	104,066	3.36	3.56	2.83	3.20	10.90	45.59
2040	1,125,203	1,103,084	329,707	218,366	111,422	3.33	3.54	2.81	3.20	10.90	45.43
2045	1,185,530	1,162,611	348,575	229,475	119,298	3.33	3.53	2.81	3.20	10.90	45.23
2050	1,249,091	1,225,350	368,522	241,150	127,731	3.32	3.53	2.80	3.20	10.90	45.03

YEAR	Urban Employment by Sector (Major SIC Code)								
		by Sector							
	TOTAL	Construction	Manufacturing	Transportation and Public Utilities	Wholesale Trade	Retail Trade	Finance, Insurance, and Real Estate	Service	Government
2008	330,533	21,107	42,701	39,443	24,545	46,478	13,138	137,549	5,572
2009	315,381	17,722	38,572	38,242	22,820	44,094	12,236	132,535	8,168
2010	300,924	14,880	34,843	37,077	21,217	41,833	11,396	127,704	11,974
2011	310,237	16,141	35,615	38,214	21,663	42,684	11,653	132,151	11,984
2012	319,838	17,510	36,404	39,385	22,118	43,552	11,915	136,754	11,993
2015	350,461	22,351	38,878	43,121	23,542	46,265	12,738	151,545	12,022
2020	375,653	29,099	41,667	45,467	25,409	53,494	13,213	159,272	8,032
2025	422,424	33,652	42,577	50,597	27,167	57,670	14,636	184,170	11,956
2030	462,518	37,906	43,051	54,733	28,720	62,530	16,165	206,525	12,888
2035	488,928	41,547	42,659	57,937	29,258	65,765	17,118	222,942	11,702
2040	525,693	47,098	42,651	62,213	30,225	70,131	17,978	243,799	13,426
2045	565,222	53,391	42,643	66,804	31,225	74,787	18,881	266,607	15,403
2050	607,724	60,525	42,636	71,734	32,257	79,752	19,829	291,549	17,672

Appendix E: Statistical Analysis of Short Term IEUA Demand: Empirical Estimates of Demand Trends

Introduction

For purposes of quantifying trends in IEUA Demand, one must estimate how water demand responds to predictable variations. There are numerous forces that drive demand growth in the long-term. These include changes in land use patterns and household size, growth in personal income and employment, and price and conservation. Weather conditions tend to make water demand go up or down in any given year.

For use in the Integrated Resource Plan and for calibrating long term water demand forecasts, the IEUA needs depiction of the predictable forces that cause demand to vary in the short-term so as to clarify remaining long term trends. This memorandum describes an empirical model developed to predict daily demand fluctuations. By nature, these models cannot replace long-term predictive models of water demand. However, by providing a better understanding of short-term demand variations, these models can clarify the direction of long term trends. The explanatory variables in this short-term model include:

- Deterministic functions of calendar time, including
  - The seasonal shape of demand
- Weather conditions
  - measures of maximum daily temperature, contemporaneous and time of year
  - measures of rainfall, contemporaneous and time of year
- Measures to control for long-term growth in demand
  - Trend
  - Employment growth different than trend
  - Customer response to voluntary curtailment in 2013 and 2014

The model documented here is used to create high resolution depictions of how variations in weather and the business cycle affect water demand over a wide range of conditions. These model-estimated weather and employment effects can then be used to (1) normalize observed demand and (2) serve as the basis for defining near term variability of demand and any planning dependent upon the trajectory of long term demand.

Data and Methods

Data

Water demand in the IEUA service area is approximated in this analysis as the sum of delivered supplies. This modeling effort used consistent system-wide monthly data—that is monthly water production adjusted for changes in storage. The reader is urged to keep in mind that though these models maybe described as “demand” models, the data on which these models are estimated would be better described as “supply” measures. To the extent that storage issues can be accounted for, the difference between these two constructs should be made small. Nonetheless, the issue remains.

The second major issue with using production data is the level and magnitude of noise in the data. The data generating mechanism for recording production can change over time as flow meters age or are replaced. Constructing a consistent time series requires matching two different—and possibly inconsistent—time-series. The records of flow can also embed non-ignorable meter miss-measurement.

To keep data inconsistencies from corrupting statistical estimates of model parameters, this modeling effort employed a sophisticated range of outlier-detection methods and models.

Specification

A Model of Per Capita Water Demand

The model for IEUA per capita water demand seeks to separate several important driving forces. In the short run, changes in weather can make demand increase or decrease in a given year. In the long run, increased population can drive demand higher. Strong regional economic growth can increase water demand through additional commercial or industrial water use. In addition, a rising economic tide can broadly increase personal income levels and economic activity can encourage or discourage additional population growth. Changes in water rates will change the relative attractiveness of water conservation.

These models are estimated at an aggregate level and, as such, should be interpreted as a condensation of many types of relationships — meteorological, physical, behavioral, managerial, legal, and chronological. Nonetheless, these models depict key short-run and long-run relationships and should serve as a solid point of departure for improved quantification of these linkages.

Systematic Effects

This section specifies a water demand function that has several unique features. First, it models seasonal and climatic effects as continuous (as opposed to discrete monthly, semi-annual, or annual) function of time. Thus, the seasonal component in the water demand model can be specified on a continuous basis, then aggregated to a level comparable to measured water use (e.g. monthly). Second, the climatic component is specified in "difference" form as a similar continuous function of time. The climate measures are thereby made independent of the seasonal component. Third, the model permits interactions of the seasonal component and the climatic component. Thus, the season-specific response of water use can be specific to the season of the year.

The general form of the model is:

Equation 2

$$PerCapitaWaterUse_t[GPCD] = \frac{Use_t}{Pop_t} = f(S_t + C_t + T_t)$$

where ***Use*** is the volumetric quantity of retail water use within time *t*, $\boldsymbol{S_t}$ is a seasonal component, $\boldsymbol{C_t}$ is a climatic component, and $\boldsymbol{T_t}$ is the trend component of GPCD Demand. The function *f* is the functional form of the connection between per capita water use and its explanatory components. Each of these components is described below.

Seasonal Component: A monthly seasonal component could be formed using monthly dummy variables to represent a seasonal step function. Equivalently, one may form a combination of sine and cosine terms in a Fourier series to define the seasonal component as a continuous function of time.[1] The following harmonics are defined for a given day *T*, ignoring the slight complication of leap years:

[1] The use of a harmonic representation for a seasonal component in a regression context dates back to *Hannan* [1960]. *Jorgenson* [1964] extended these results to include least squares estimation of both trend and seasonal components.

Equation 3

$$S_t \equiv \sum_{1}^{6}\left[\beta_{i,j}\cdot\sin\left(\frac{2\pi\cdot jT}{365}\right)+\beta_{i,j}\cdot\cos\left(\frac{2\pi\cdot jT}{365}\right)\right]=Z\cdot\beta_S$$

where $T = (1,...365)$ and j represents the frequency of each harmonic. Because the lower frequencies tend to explain most of the seasonal fluctuation, the higher frequencies can often be omitted with little predictive loss.

The percentage effect of the seasonal component on normal demand is given by:

Equation 3

$$S_t\% = \left[\frac{\exp(\widehat{Y}_t - T_t) - \exp(\widehat{Y}_t - T_t - S_t)}{\exp(\widehat{Y}_t - T_t - S_t)}\right]$$

where $\widehat{Y}$ is the predicted demand.

Climatic Component: The model incorporates two types of climate measures into the climatic component–rainfall and maximum daily air temperature.[2] The measures of temperature and rainfall are then logarithmically transformed to yield:

Equation 4

$$R_t \equiv \ln\left[1+\sum_{t=T}^{T_d} Rain_t\right], T_t \equiv \ln\left[\sum_{t=T}^{T_d}\frac{T_t}{d}\right]$$

Though this model extends to monthly measures while for daily measures, d takes on the value of one. Because weather exhibits strong seasonal patterns, climatic measures are strongly correlated with the seasonal measures. In addition, the occurrence of rainfall can reduce expected temperature. To obtain valid estimates of a constant seasonal effect, the seasonal component is removed from the climatic measures by construction.

Specifically, climatic measures are constructed as a departure from their "normal" or expected value at a given time of the year. The expected value for rainfall during the year, for example, is derived from regression against the seasonal harmonics. The expected value of the climatic measures ($\hat{\boldsymbol{C}}=\boldsymbol{Z}\cdot\beta_C$) is subtracted from the original climatic measures:

Equation 5

$$C_t \equiv (R_t - \widehat{R}_t)\cdot\beta_R + (E_t - \widehat{E}_t)\cdot\beta_T$$

The climatic measures in this deviation-from-mean form are thereby separated from the constant seasonal effect.[3] Thus, the seasonal component of the model captures all constant seasonal effects, as it

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[2] Specifically it uses the daily temperature and the total daily precipitation at the Ontario NOAA station summarized to a monthly level.
[3] The logarithmic transformation of the original climate variable implies that the seasonal mean climate effect is a geometric mean. Because the model is estimated on the logarithmic scale the departure-from-mean climatic effects would be more accurately termed departure-from-median. See *Goldberger* [1968].

should, even if these constant effects are due to normal climatic conditions. The remaining climate measures capture the effect of climate departing from its normal pattern.

The model can also specify a richer texture in the temporal effect of climate than the usual fixed contemporaneous effect. Seasonally-varying climatic effects can be created by interacting the climatic measures with the harmonic terms. In addition, the measures can be constructed to detect lagged effects of climate, such as the effect of rainfall a month ago on today's water demand.

The percentage effect of the climate on normal demand is given by:

Equation 6

$$C_t\% = \left[\frac{\exp(\hat{Y}_t - T_t) - \exp(\hat{Y}_t - T_t - C_t)}{\exp(\hat{Y}_t - T_t - C_t)} \right]$$

where $\hat{Y}$ is the predicted demand.

Trend Component : For the IEUA Demand model, a deterministic annual trend term was used as the primary determinant of trends in per capita water demand in the long term.

Equation 7

$$\mathbf{T}_t \equiv AnnualTrend_t \cdot \beta_T + (\ln EmpDetrended) \cdot \beta_E$$

Thus the annual long term trend in IEUA Demand from 2002-2012 on is captured by β_T while the effects of the business cycle are captured by the departure of employment from its long term trend.

Stochastic Effects

To complete the model, we must account for the fact that not every data point will lie on the plane defined by Equation **(1)**. This fundamental characteristic of all systematic models can impose large inferential costs if ignored. Misspecification of this "error component" can lead to inefficient estimation of the coefficients defining the systematic forces, incorrect estimates of coefficient standard errors, and an invalid basis for inference about forecast uncertainty. The specification of the error component involves defining what departures from <u>pure</u> randomness are allowed. What is the functional form of model error? Just as the model of systematic forces can be thought of as an estimate of a function for the "mean" or expected value, so too can a model be developed to explain departures from the mean—i.e., a "variance function" If the vertical distance from any observation to the plane defined by **(1)** is the quantity ε, then the error component is added to Equation **(1)**:

Equation 8

$$\ln \frac{Use}{Pop} = \mathbf{f}\left(\mathbf{S}_t, \mathbf{C}_t, \mathbf{T}_t\right) + \varepsilon$$

In an Ordinary Least Squares (OLS) Regression, the error term is assumed to be distributed normally with a constant variance.

$$\varepsilon \sim N\left(\mu_\varepsilon, \sigma_\varepsilon\right)$$

In the estimated retail demand model below, the variance is allowed to be nonconstant and separately modeled as an empirical variance (or link) function.

$$\sigma_{\varepsilon} = g(\mathbf{S}_t, \mathbf{C}_t, \mathbf{T}_t)$$

A variance function was estimated using the methods of Carroll and Ruppert as a two stage weighted least squares regression[4]. Briefly described, the first stage uses an OLS regression of the mean function (Equation 7) to derive a consistent estimate of the estimated error. The absolute value of the estimated error is used to estimate the variance function. The inverse of the predicted variance is used to weight the regression of the mean function in the second stage.

Estimated Per Capita Demand Model for IEUA

Table C1 presents the estimation results for the model of mean monthly per capita demand in IEUA. The independent variables 1 to 8—made up of the sines and cosines of the Fourier series described in Equation 2—are used to depict the seasonal shape of daily retail water demand (that is, $Z \cdot \widehat{\beta}_S$); this is the shape of demand in a normal weather year. This seasonal shape is important in that it represents the point of departure for the estimated climate effects (expressed as departure from what is expected in an average month).

The estimated weather effect is specified in "departure-from-normal" form. Variable 9 is the departure of monthly precipitation from the average precipitation for that month in the season. (Average seasonal precipitation is derived from a regression of monthly precipitation on the seasonal harmonics—exactly equal to monthly precipitation averaged over all years in the record.) Temperature is treated in an analogous fashion (Variables 11). The contemporaneous weather effect is interacted with the harmonics (Variables 10, 12, and 13) to produce a seasonal shape to both the rainfall and the temperature elasticities. Thus, departures of temperature from normal produce the largest percentage effect in the spring. Similarly, departures from normal rainfall produce a larger effect upon daily demand in the summer than in the winter. The lagged effect of temperature can also be detected further in time than rainfall—a detectable effect one month long.

The departure of employment growth from trend (13) and the annual trend term (variable 14) and comprise the long term determinants of demand.[5] Indicators ("dummy") variables for the years 2013 and 2014 were used to detect any customer response to the drought-induced calls for voluntary demand curtailment. (These measure the annual change in demand that was surprising: not explainable due to weather variation, recession, or ongoing trends in demand.) The constant term (17) describes the intercept for this equation.

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[4] See Carroll, R. J. and Ruppert, D. (1988). *Transformation and Weighting in Regression*. Chapman and Hall, London.

[5] A variation of the model was used to test for a detectable trend in the seasonal shape of demand by including an interaction of the trend term and the annual harmonic.

Table 1-- Estimated IEUA Per Capita Demand Model (Mean Function)

Estimated IEUA Demand Model (Mean Function) Ln IEUA Per Capita Use (Gl. Per Capita Per Day)		
Independent Variable	Coefficient	Std. Error
1. First Sine harmonic, 12 month (annual) frequency	-0.10278	0.00714
2. First Cosine harmonic, 12 month (annual) frequency	-0.37889	0.00642
3. Second Sine harmonic, 6 month (biannual) frequency	-0.00489	0.00688
4. Second Cosine harmonic, 6 month (biannual) frequency	-0.00438	0.00723
5. Third Sine harmonic, 4/12 frequency	-0.00510	0.00849
6. Third Cosine, 4/12 frequency	0.02987	0.00699
7. Fourth Sine harmonic, 3 month (quarterly) frequency	0.01300	0.00857
8. Fourth Cosine, 3 month (quarterly) frequency	0.02357	0.00820
9. Contemporaneous Rainfall Deviation [(ln (Rain+1)) – Monthly mean]	-0.13102	0.02219
10. Interaction of contemporaneous rain with annual cosine harmonic	-0.04787	0.02701
11. Contemporaneous deviation from mean ln (temperature) in the month	0.87760	0.12878
12. Interaction of contemporaneous temperature deviation with annual sine harmonic	0.14438	0.16733
13. Deviation of ln(Employment in San Bernardino County) from Trend	0.96640	0.09765
14. Overall Annual Trend 2003-2014	-0.00147	0.00207
15. Indicator for 2013	-0.02098	0.01367
16. Indicator for 2014	-0.04618	0.02613
17. Intercept	5.46346	0.01788
Obs	139	
R^2	0.9760	
Root Mean Squared Error	0.03816	
Time period (Fiscal Years)	2003-2014	

Figures 1 and 2 plot Actual IEUA Per Capita Demand against the model predictions ($\hat{Y}$) and reveals a very tight fit of predictions to actual.

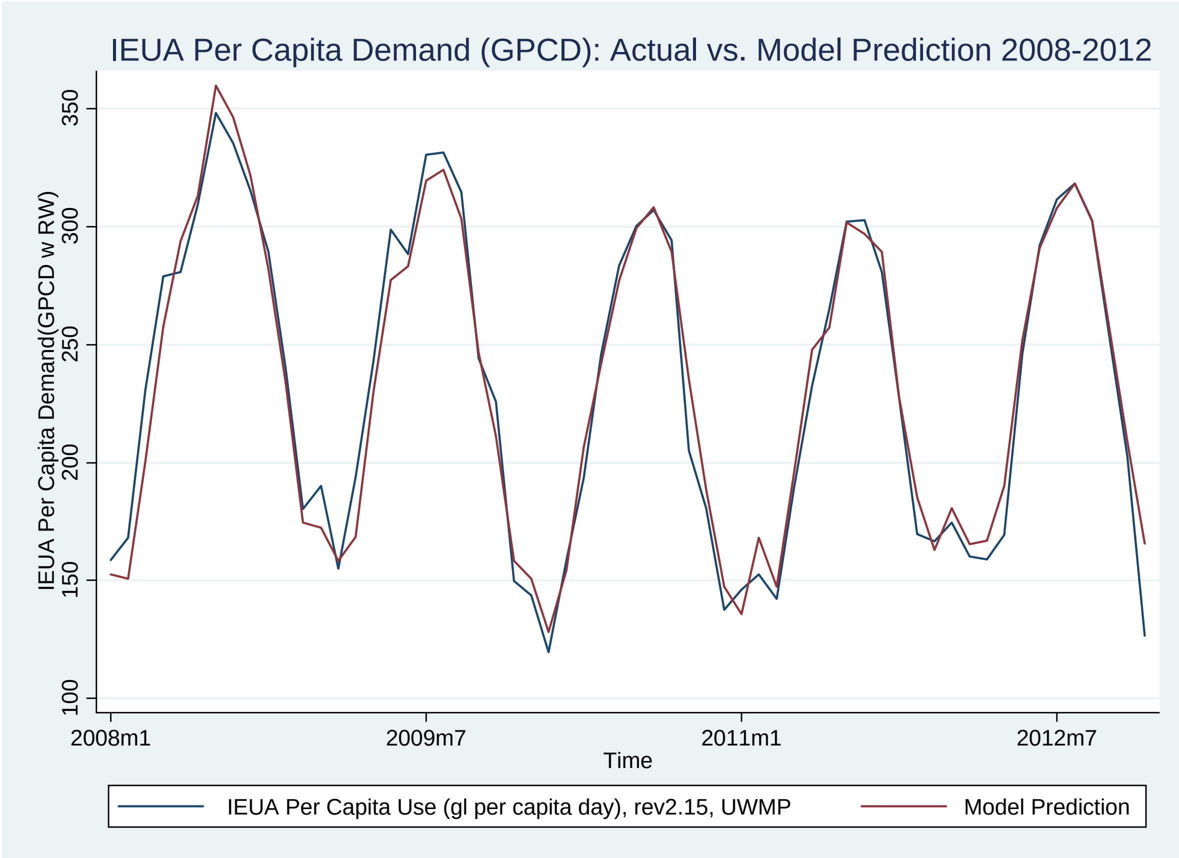

Figure 1-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2008-2012

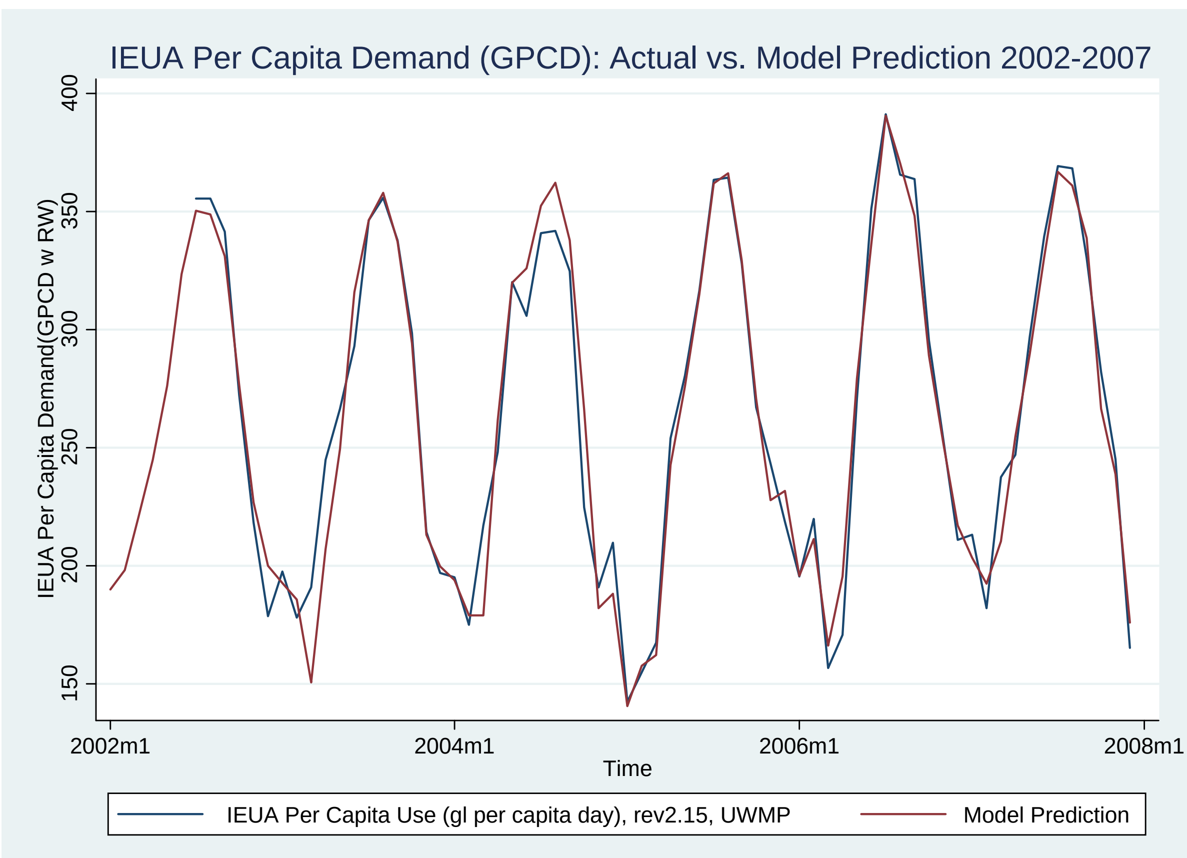

Figure 2-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2002-2007

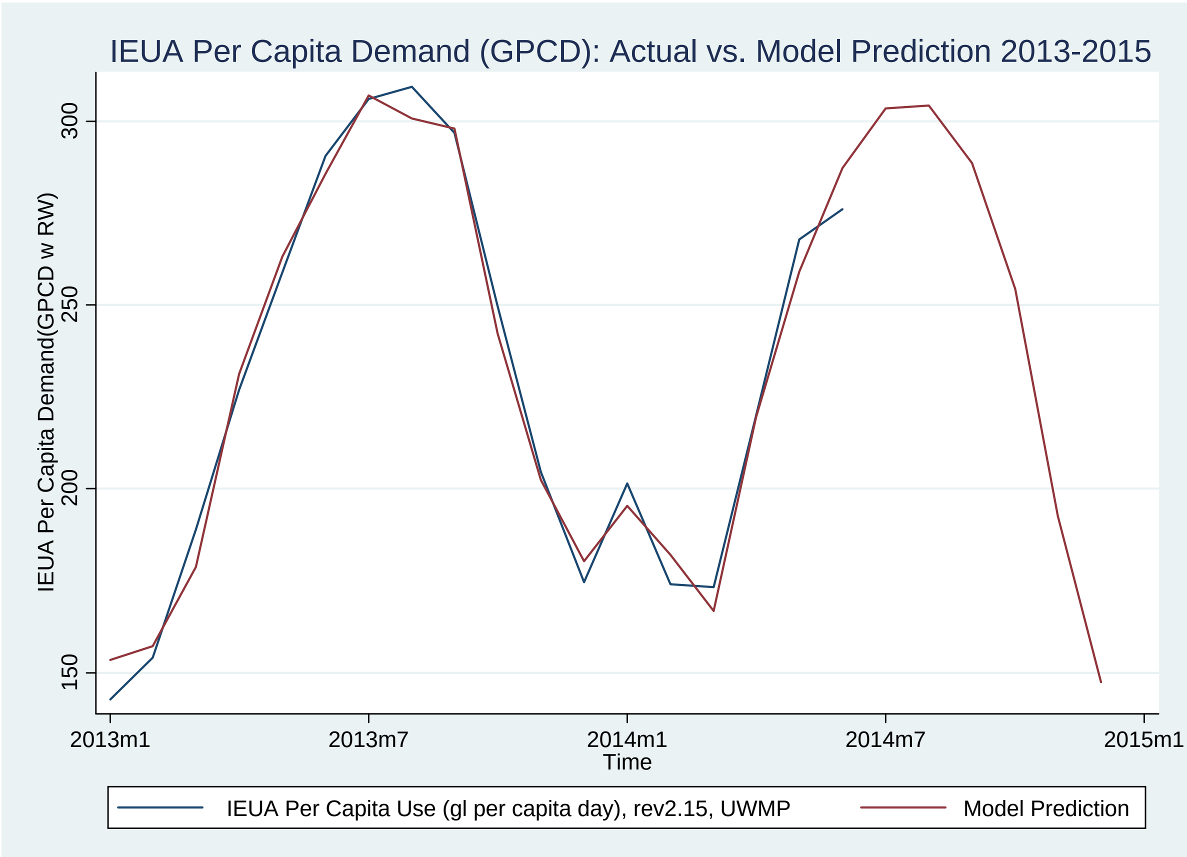

Figure 3-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction, 2013-2014

Application to Demand Trends

From the statistically estimated model documented above, one can calculate the effect of weather on per capita water demand as the difference between two predictions: a prediction of demand conditional on actual weather and a prediction of demand "as if" weather were normal[6]. Equation 5 specifies this relationship in percentage terms. Table 2 presents the summation of the estimated effect of weather for each year.

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[6] Normal weather is defined as the average values of each weather variable in each month over the period of record 1950-2012.

Table 2-- Effect of Weather on IEUA Per Capita Demand (GPCD)

IEUA Water Demand (GPCD)				
	IEUA Water Demand			
Year	Effect of Weather on Water Demand (Change in GPCD)	Effect of Weather on Water Demand (Percent)	Precipitation (inches)	Max Temperature (F)
2003	-22.85	-0.75%	16.71	77.15
2004	114.88	3.58%	8.66	79.71
2005	-170.88	-5.73%	28.20	76.19
2006	-10.02	-0.32%	12.78	78.15
2007	190.90	5.70%	3.73	79.78
2008	43.61	1.40%	11.75	78.58
2009	111.29	3.70%	9.40	79.50
2010	-15.18	-0.56%	15.34	77.95
2011	-75.60	-2.89%	16.45	76.47
2012	14.05	0.52%	9.12	78.14
2013	142.80	5.05%	5.54	80.35
2014	197.84	6.97%	4.38	81.13
Long Term Average	2003-2014		11.84	78.6
Weather Station	Ontario NOAA			

Finally, these estimated effects of non-normal weather and employment different from trend are next used to estimate what per capita water demand would have been if weather had been normal and if employment had not differed from its historical trend (that is, if the recession had not occurred.) Actual demand with weather and employment effects removed will be referred to as “normalized” per capita water demand. Figure 4 below plots the mean monthly employment for San Bernardino County and reveals the sharp effects of the recent recession.

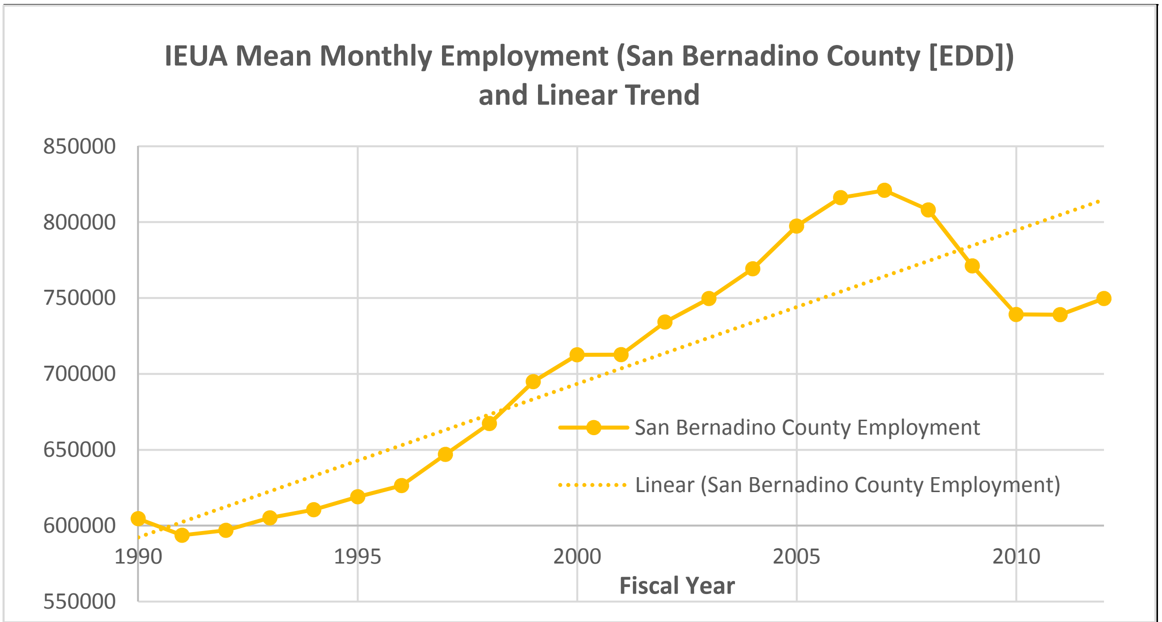

Figure 4-- IEUA Mean Monthly Employment (San Bernardino County [EDD]) and Linear Trend

Table 3 presents the derivation of normalized IEUA per capita water demand. The first column of raw demand data ("Actual Demand") is followed by demand normalized for weather. The estimated percentage effect of weather different from normal ("Effect of Weather on Water Demand (Percent)") explains how weather affected actual demand and is used to estimate the third column of retail demand ("Demand Normalized for Weather (GPCD)"). A similar estimate for the effect of employment different than trend is used to estimate the last column of retail demand ("Demand Normalized for Weather and Employment"). The assumptions implied by this "normalization" include that realized weather is exactly equal to average weather (monthly averages based on the period of record 1950-2012) and that employment continued along its long term trend (as depicted by the straight line in Figure 3).

Note that the variation of the percentage annual effect of weather and employment is summarized at the bottom of the table and is useful for risk analysis. Weather could knock per capita demand 7.3 percent either way in any year (90 percent confidence interval). The effect of the business cycle—as captured by the effect of employment swings—is very pronounced in recent years due to the Great Recession. Single year swings of 5 and a half percent occurred more than once with a very wide confidence interval required to contain 90 percent of expected annual variation due to employment variation (approximately 12.8 percent either way in any year).

The model also detects customer response in 2013 and 2014 to drought-induced calls for customers to voluntarily curtail water demand. These effects, though targeted mostly to residential customers, provide evidence of some customer response that cannot be explained by the other forces in the model—weather variation, variation in employment, and long term trends in water demand.

Table 3-- IEUA Per Capita Use (GPCD): Actual and Normalized

	IEUA Water Demand				
Fiscal Year	Actual Demand (GPCD)	Effect of Weather on Water Demand (Percent)	Demand Normalized for Weather (GPCD)	Effect of Employment on Water Demand (Percent)	Demand Normalized for Weather and Employment (GPCD)
2003	257.77	-0.75%	259.7	4.54%	247.92
2004	267.63	3.58%	258.1	5.64%	243.51
2005	245.78	-5.73%	259.9	7.71%	239.83
2006	262.56	-0.32%	263.4	8.70%	240.47
2007	283.06	5.70%	266.9	8.11%	245.29
2008	265.58	1.40%	261.9	5.52%	247.43
2009	256.55	3.70%	247.1	0.10%	246.82
2010	228.42	-0.56%	229.7	-5.56%	242.47
2011	212.70	-2.89%	218.8	-7.04%	234.25
2012	220.83	0.52%	219.7	-7.08%	235.24
2013	231.40	5.05%	219.7	-6.06%	233.03
2014	237.75	6.97%	221.2	-5.25%	232.80
	Standard Deviation of % Effects	**+/- 3.74%**		**+/- 6.55%**	
	95% Confidence Interval	**+/- 7.3%**		**+/- 12.8%**	
Percentage Annual Trend, FY2003-2007	2.4%			0.7%	-0.3%
Percentage Annual Trend, 2007-2012	-2.7%			-3.8%	-0.8%

Table 4 presents the same results as in Table 3, but in terms of acre feet rather than GPCD. Again, the first column of raw demand data ("Actual Demand") is followed by demand normalized for weather. The estimated percentage effect of weather different from normal ("Effect of Weather on Water Demand (Percent)") explains how weather affected actual demand and is used to estimate the third column of retail demand ("Demand Normalized for Weather (AF)"). A similar estimate for the effect of employment different than trend is used to estimate the last column of retail demand ("Demand Normalized for Weather and Employment").

Taken from "peak to trough," from 2007 to 2012, Table 4 also shows the decline in actual demand was an average of 4.3 percent per year, for a total of 19.6 percent decline over the five-year period. After normalizing for weather and employment, the decline was an average of 0.2 percent per year, or about a one percent decline over the five-year period.

The effect on the trend in per capita demand is easier to discern in Figures 4 and 5. Figure C5 plots actual and normalized demand in terms of GPCD. The near three percent annual decline (2.7 percent) in actual GPCD demand between fiscal years 2007 and 2012 is reduced in magnitude to less than one percent decline (0.8 percent) after normalizing for weather and employment. Figure 5 plots actual and normalized demand in terms of acre feet. The decline in actual demand (in acre feet per year) between fiscal years 2007 and 2012 was 4.3 percent per year on average. After normalizing for weather and employment, there was actually a slight decrease of 0.2 percent.

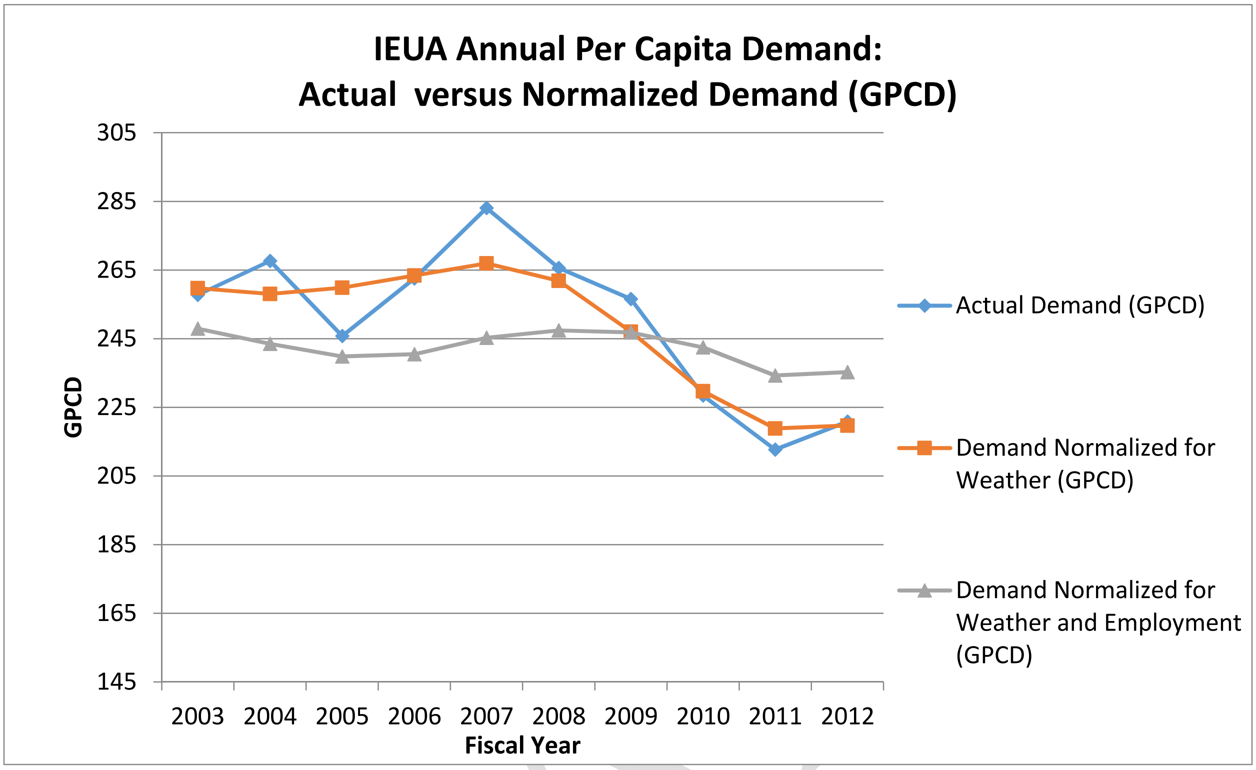

Figure 5-- IEUA Annual Per Capita Demand: Actual versus Normalized Demand (GPCD)

Table 4-- IEUA Use (Acre Feet): Actual and Normalized

	IEUA Water Demand				
Fiscal Year	Actual Demand (AF)	Effect of Weather on Water Demand (Percent)	Demand Normalized for Weather (AF)	Effect of Employment on Water Demand (Percent)	Demand Normalized for Weather and Employment (AF)
2003	215685	-0.75%	217309.4	4.54%	207434.07
2004	230498	3.58%	222247.4	5.64%	209718.74
2005	213262	-5.73%	225476.5	7.71%	208098.51
2006	230911	-0.32%	231640.4	8.70%	211482.21
2007	255280	5.70%	240727.8	8.11%	221216.62
2008	241913	1.40%	238528.0	5.52%	225372.92
2009	233799	3.70%	225147.9	0.10%	224930.13
2010	209290	-0.56%	210457.9	-5.56%	222162.16
2011	195745	-2.89%	201392.7	-7.04%	215570.59
2012	205231	0.52%	204166.6	-7.08%	218614.07
2013	216004	5.05%	205103.5	-6.06%	217527.39
2014	223435	6.97%	207870.6	-5.25%	218784.24
	Standard Deviation of % Effects	**+/- 3.74%**		**+/- 6.55%**	
	95% Confidence Interval	**+/- 7.3%**		**+/- 12.8%**	
Percentage Annual Trend, FY2003-2007	4.3%			2.6%	1.6%
Percentage Annual Trend, 2007-2012	-4.3%			-3.2%	-0.2%

Appendix 2:

RAND Memo “Evaluating Options for Improving Climate Resilience of the Inland Empire Utilities Agency in Southern California”

DRAFT. NOT CLEARED FOR OPEN PUBLICATION. DO NOT CIRCULATE OR QUOTE.

Project Report

Evaluating Options for Improving the Climate Resilience of the Inland Empire Utilities Agency in Southern California

Abbie H. Tingstad, David G. Groves, and James Syme (RAND Corporation)
Elizabeth Hurst and Jason Pivovaroff (Inland Empire Utilities Agency)

March 2016

Preface

The Inland Empire Utilities Agency (IEUA) and RAND worked together in 2003-2005 to demonstrate and evaluate how new approaches to decisionmaking under uncertainty could help a water utility evaluate the potential threats of climate change in their long-term planning. This work was performed outside IEUA's planning process and was documented in several RAND reports and scientific journal articles (Groves, Davis, *et al.*, 2008; Groves, Knopman, *et al.*, 2008; Groves, Lempert, *et al.*, 2008). In 2015, IEUA asked RAND to help it re-evaluate its water management system under a range of future conditions reflecting climate change and other drivers for its Integrated Resources Plan (IRP). This report documents the tools developed and analysis performed during 2015 for this effort. Questions or comments about this report should be sent to the project leaders, David Groves (groves@rand.org) and Abbie Tingstad (tingstad@rand.org).

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Abbreviations

BCSD	Bias-Corrected Statistically Downscaled
CMIP	Coupled Model Intercomparison Project
FWOA	Future Without Action
GCM	General Circulation Model
GHCND	Global Historical Climatology Network Database
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resources Plan
MWD	Metropolitan Water District of Southern California
NOAA	National Oceanographic and Atmospheric Administration
PDT	Portfolio Development Tool
RDM	Robust Decision Making
SAR	Santa Ana River
SEI	Stockholm Environment Institute
UWMP	Urban Water Management Plan
WCRP	World Climate Research Programme
WEAP	Water Evaluation and Planning System
WEI	Wildermuth Environmental Inc.

Introduction

Water managers continue to face challenges related to climate non-stationarity (Milly *et al.*, 2008) in their long-term planning. Even when water supplies appear sufficient to meet present and short-term demand, uncertain future changes in temperature and precipitation make decisions about investments to ensure longer-term supply sufficiency difficult. In Southern California, the recent drought has refocused attention on water resources in this semi-arid, populous area. Although this drought appears to be consistent with long-term patterns of climate variability, its effects may be exacerbated by ongoing climate change, which is anticipated to have a strong effect on the region, including on its water supplies (e.g., with respect to the length and magnitude of droughts, timing of precipitation, and temperature-driven demand) (Diffenbaugh *et al.*, 2015; Mao *et al.*, 2015; Shukla *et al.*, 2015)

Adaptive management plans are designed to evolve over time in response to new information regarding future conditions. This type of flexible approach is becoming increasingly favored in the water management community as a mechanism for planning under uncertainty. Integrative approaches, which help facilitate adaptive plans, focus on combining a variety of management options, rather than a single type of solution.

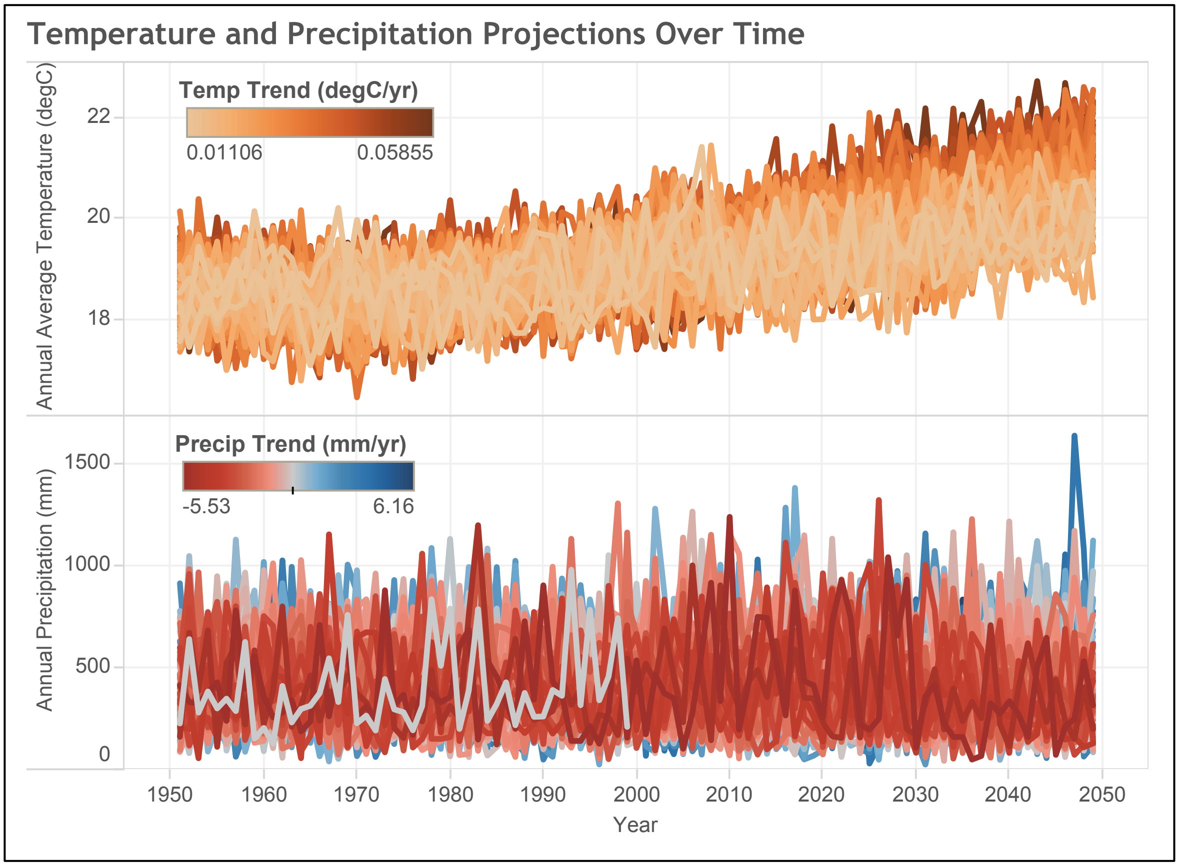
The Inland Empire Utilities Agency (IEUA), a water management agency in Southern California, recently partnered with the RAND Corporation, a multi-disciplinary, non-partisan research organization and educational institution headquartered in Santa Monica, California, to evaluate how adaptive, integrative water management options could improve IEUA's abilities to meet customer needs under a wide range of futures. This analysis was used to support the development of its Integrated Resources Plan (IRP). The purpose of the IRP is to evaluate the resiliency of water resources in the IEUA's service area over the next twenty-five years and to evaluate alternative management options for ensuring water deliveries to urban users. The IRP results will be used to recommend regional strategies and identify preferred water supply projects that, in turn, will help the IEUA and its member agencies to apply for grants and loans to implement new projects. RAND supported IEUA's IRP by developing a tool for constructing and visualizing different portfolios for water management investments and actions, and enabling an analysis of *status quo* and potential future water management activity success in meeting future urban water demand under different demand and climate change-impacted water supply conditions. This follows RAND's previous work supporting the IEUA's 2005 Urban Water Management Plan (UWMP) (Groves, Knopman, *et al.*, 2008; Groves, Lempert, *et al.*, 2008).

Current water demands in the IEUA service area are serviced by groundwater from the Chino Basin in addition to local surface supplies, recycled water, and imported water from Northern California via Metropolitan Water District of Southern California (MWD). In addition, IEUA implements water efficiency projects, such as low-flow toilet rebate programs. Depending on different estimates of future infrastructure water efficiency, this "baseline" supply (current and planned supplies from groundwater and other sources plus savings from water efficiency projects) is likely sufficient, or very nearly so, for meeting future demand assuming climatic conditions remain similar to those experienced in recent history. However, IEUA wanted to explore how shifts in stationarity assumptions through climate change, along with possible changes in demand, could impact its future water supplies and demands, and what water management projects could help meet future demand under uncertain future temperature and precipitation conditions.

A suite of global climate models suggests that temperatures over the IEUA service area will rise over the coming decades and that annual precipitation will continue to be highly variable, with no consensus on trends towards wetter or drier conditions. Figure 1 displays the annual average temperature and total precipitation estimates from 1950 to 2050 for the IEUA service area based on 106 downscaled projections of climate from a range of general circulation models (GCMs).[1] The temperature increases seen beginning around the 1980s and the uncertainty associated with local precipitation underscores the importance of carrying out an analysis of IEUA water management options to ensure that future demand can be met under a variety of different hydrologic circumstances against the backdrop of rising temperatures.

[1] Note that GCMs are not expected to simulate the precise interannual fluctuations of the historical period, because stochastic forces and sequences of events that are unresolvable by numerical models drive such historical variability. Instead, GCMs are validated based on their ability to characterize the statistical characteristics of historical climate, such as maximum and minimum temperatures or precipitation.

Figure 1: Estimates of historical and future annual average temperature and total precipitation for the IEUA service area



To support this analysis we developed (1) a simple mass balance water management model to estimate future supplies and demand across different future and (2) a decision support tool to help IEUA planners and stakeholders to compare attributes of different management options and develop portfolios for evaluation. We then performed a three-step analysis:

1. Evaluated the performance of the IEUA system under a wide range of futures to evaluate its vulnerability to climate and future demand
2. Constructed portfolios of water management projects that could help increase water management supplies in the future
3. Tested and compared how each proposed water management portfolio enhances the IEUA's ability to deliver urban water supplies in the future

In the next section we describe the methods and models used in each step. Due to the limited scope of this effort, we did not attempt to evaluate the cost-effectiveness or finer details (e.g., implementation potential at specific locations) of the different water management projects. We also did not conduct statistical analysis to determine the specific climatic conditions most conducive to different portfolio success or failure in meeting urban water demand, nor did we consider uncertainties related to budget and/or other factors that could impact our results.

Methods

The overarching methodological framework for this project is Robust Decision Making (RDM) (Groves and Lempert, 2007; Lempert *et al.*, 2003). RDM is an approach that seeks to determine what plans reduce risk over a range of assumptions, thereby facilitating deliberation among stakeholders that may have differing values and expectations about the future (Lempert, 2013). It is a methodological process, involving iterative steps including stakeholder interactions, modeling, and statistical analysis, that facilitates interactions and aims to shape decision-maker discussions around which factors lead to plan success or failure and the identification of robust solutions – those that perform well under a range of futures—rather than a single "best" solution (Hallegatte *et al.*, 2012; Lempert *et al.*, 2006). The RDM approach runs models on tens to thousands of different sets of assumptions to describe how plans perform in a range of plausible futures. Analysts then use visualization and statistical analysis of the resulting large database of model runs to help decision-makers distinguish future conditions in which their plans will perform well from those in which they will perform poorly (Bryant and Lempert, 2010). RDM has been used in a range of contexts, to include water management, flood risk assessment, and sea level rise planning (Groves *et al.*, 2013, 2014; Herman *et al.*, 2015; Tingstad *et al.*, 2013).

Many RDM analyses are conceptually organized using a framework called "XLRM", where key uncertainties (X), policy levers or strategies (L), relationships or models (R), and metrics or outcome measures (M) are summarized in a quad chart. The principal considerations around which this project is organized are summarized in XLRM format below.

Table 1: Summary of uncertainties, projects, models, and outcome measures considered

Uncertainties (X)	Projects (L)
Climate conditions Demand	75 different projects in categories • Chino Basin projects (13) • Imported Water Direct, Imported Water Recharge (14) • Imported Water Recharge (3) • Imported Water Recharge / Recycled Water (4) • Local Surface (2) • Other Groundwater (1) • Recycled Water (16) • Stormwater (6) • Stormwater, Recharge, Imported Water Recharge, Recycled Water (4) • Water Use Efficiency (10) • Chino Basin Groundwater, Recycled Water, Imported Water (2)
Models (R)	**Performance Metrics (M)**
WEAP IEUA IEUA Portfolio Development Tool	Demand Sources of supply to meet demand Unmet demand

Water Management Mass Balance Model

RAND developed a water management model developed for the IEUA service area using a simulation platform called the Water Evaluation and Planning system (WEAP) (Yates *et al.*, 2005). The purpose of this model was to help address Step One of our analysis by creating a simulation model that could evaluate the performance of the IEUA system under a wide range of futures. In brief, WEAP enables integration of physical hydrologic processes with management of water demands and supplies using a link-and-node representation of a water management system, as constructed by a user. The WEAP model was used primarily to evaluate projected annual urban demands, sources of supply, and unmet demands.

RAND previously developed a WEAP model for the IEUA service area (Groves, Lempert, *et al.*, 2008) based on information available during the 2003-2005 time period. For the present study, RAND developed a new WEAP model based primarily on IEUA's latest spreadsheet-based information about current water supplies and demands, and annual projections of them through 2050. See Appendix 2 for more detail.

Absent available detailed analyses of how climate change could affect each element of IEUA's water supply portfolio, RAND worked with the best available data to develop some coarse approximations of how different supplies and demand would change under different assumptions and projections of climate conditions. These analyses were developed as a first step towards a more comprehensive assessment of IEUA resilience to climate change, and were vetted by IEUA water managers. For the purposes of this initial work, these coarse approximations provided sufficient insights into the potential impacts of climatic changes on supply and demand to facilitate deliberation over the usefulness of different types of water management projects.

Several "simple models" were developed to estimate the impacts of climatic changes on the following elements of the IEUA system (see Appendix 2 for details):

- *Local surface supplies, storm water, and replenishment supplies*: two regression models of historical annual local surface supplies and annual climate were used to estimate future local surface supplies based on projections of temperature and precipitation. These models were applied to estimate local surface supplies, available storm water supplies, and non-MWD replenishment supplies.
- *Groundwater safe yield*: Projections of future safe yield under different trends in climate conditions were developed by Wildermuth Environmental Inc. (WEI) and provided to IEUA and the study team. The current long-term sustainable yield of the groundwater basin was then modified for each climate projection based long-term precipitation trend perturbation factors derived from the WEI analysis.
- *Imported supplies via Metropolitan Water District*: A simple linear model of supply availability over time from Northern California via MWD was used to modify IEUA's contractually available supply from MWD. Two different climate response rates were

evaluated that effectively assumed a 17% and 34% reduction in imported available water by 2040.

- *Water demand*: Demand climate adjustment factors were developed using IEUA calculations of the sensitivity of demand to climate using MWD-MAIN. These factors were used together with the climate scenarios (annual average temperature and precipitation) to adjust the demand annually.

By imbedding these models into the WEAP model, we estimated future local surface water production, groundwater sustainable yield and replenishment, outdoor urban demand, and possible adjustments to water imports under changing climate. This WEAP model was used to both test baseline supply resiliency to climate change as well as determine expected benefits from new water management projects.

Portfolio Development Tool

With inputs from the IEUA and its member agencies, RAND created a Portfolio Development Tool (PDT) using the visualization software platform Tableau. The purpose of this activity was to support Step Two of our analysis by creating a user-friendly interface through which the IEUA and its member agencies could explore a variety of water management projects and develop portfolios that included one or more projects. The PDT enables users to review individual project attributes—both quantitative (i.e., how much water they produce) and qualitative (e.g., whether they contribute to different IEUA regional goals)—and determine how combinations of these projects together would increase future supplies, moderate demand, and meet qualitative, regional goals. IEUA and RAND used the PDT to support a series of meetings between the IEUA and member agencies and a workshop co-run with member agency representatives to create different adaptive, integrative options for increasing future water supplies. The final list of portfolios selected by the IEUA using the PDT is represented in the table below (Table 2), and the IEUA IRP includes more detailed description and rationale for these portfolios.

Table 2: Management portfolios developed using the Portfolio Development Tool

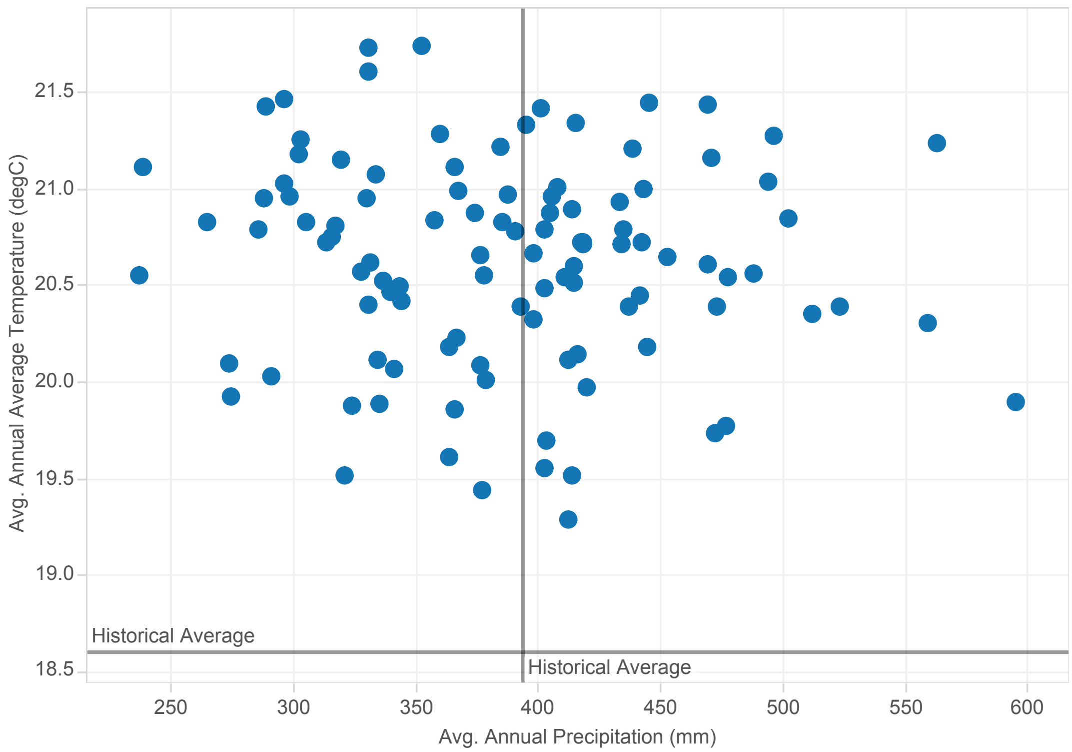
Portfolio Name	Portfolio Description
Portfolio #1	Maximize the Use of Prior Stored Groundwater
Portfolio #2A	Maximize Recycled Water (Including External Supplies) and Local Supply Projects and Implement Minimal Water Efficiency
Portfolio #2B	Portfolio 2A Plus Secure Supplemental Imported Water from MWD and Non-MWD Sources
Portfolio #3A	Maximize Recycled Water (Including External Supplies) and Implement Moderate Water Efficiency
Portfolio #3B	Portfolio 3A Plus Implement High Water Efficiency

Portfolio #4	Maximize Supplemental Water Supplies and Recycled Water Supplies
Portfolio #5A	Maximize the Purchase of Imported Water from MWD and Implement Minimal-Moderate Level of Water Efficiency
Portfolio #5B	Portfolio 5A Plus Maximize Recycled Water

Climate and Demand Futures

The WEAP model was then used to “stress test” the resiliency of the IEUA service area’s baseline water supplies, and baseline supplies plus the different future water management project portfolios, under different conditions of climate change and demand. This is Step Three of our analysis. The study considered the 106 projections of future climate displayed in Figure 1. These were downloaded from an archive of downscaled global climate model simulations, described in Appendix 2. These 106 projections of future climate were integral to our ability to stress test the IEUA water management system in its ability to meet future demand. Each projection represents a plausible climate future in our analysis. Although we cannot know with certainty what type of climatic change the future holds, having a diverse set of projections enables development of management alternatives that could be robust in adapting to a range of different conditions. Figure 2 plots the average annual temperature and precipitation from 2040-2049 for this set of climate projections.

Figure 2: Average annual temperature and precipitation over the Inland Empire Utilities Agency service area from 106 climate projections (2040-2049)



All the climate projections show higher average annual temperatures from 2040 – 2049 than the historical average (1951-1999). This is consistent with observed and projected changes around the world (IPCC, 2014). About half of the climate projections show higher precipitation and half show lower precipitation. Specifically, annual average precipitation varies between 237 mm/year to 595 mm/year, or between 60% and 151% of the historical record. This uncertainty in precipitation trends reflects the difficulty in modeling the complex atmospheric and oceanic processes that govern precipitation patterns in the Southwest United States and the stochasticity of these processes (Peterson *et al.*, 2013). Although these projections do not indicate whether the climate will get drier or wetter in the coming decades in the IEUA service area, they do provide a useful test bed of plausible climate conditions for which to stress test water management plans. Dry conditions can challenge the ability of the system to meet user demand whereas wet conditions can render additional supply investments unnecessary expenditures.

Scientists have confidence that the projections in Figure 2 are suggestive of future climate conditions that are impacted by higher greenhouse gas concentrations in the atmosphere. One reason is that these climate models, when evaluated for historical periods of time (e.g. 1950-2000), estimate past variability that is similar to the observed historical values. To illustrate this, Figure 3 shows the historical, observed annual average temperature and annual total precipitation from 1951 – 1999 for the IEUA service area (blue line on the left), along side the maximum and minimum projected annual average temperature from the 106 climate scenarios for the same time period (box charts on the right). The models, when "backcasting" the same historical time period, estimate a range of maximum and minimum temperatures that are inclusive of the historical observed maximum and minimum temperature. Figure 4 shows the same comparison for annual total precipitation. Once again, the future and historical maxima and minima appear to have some overlap.

Figure 3: Observed historical annual temperature record for the IEUA service area from 1951 – 1999 (left) compared to the distribution of predicted maximum and minimum temperatures across the 106 climate scenarios for the same historical time period (right)

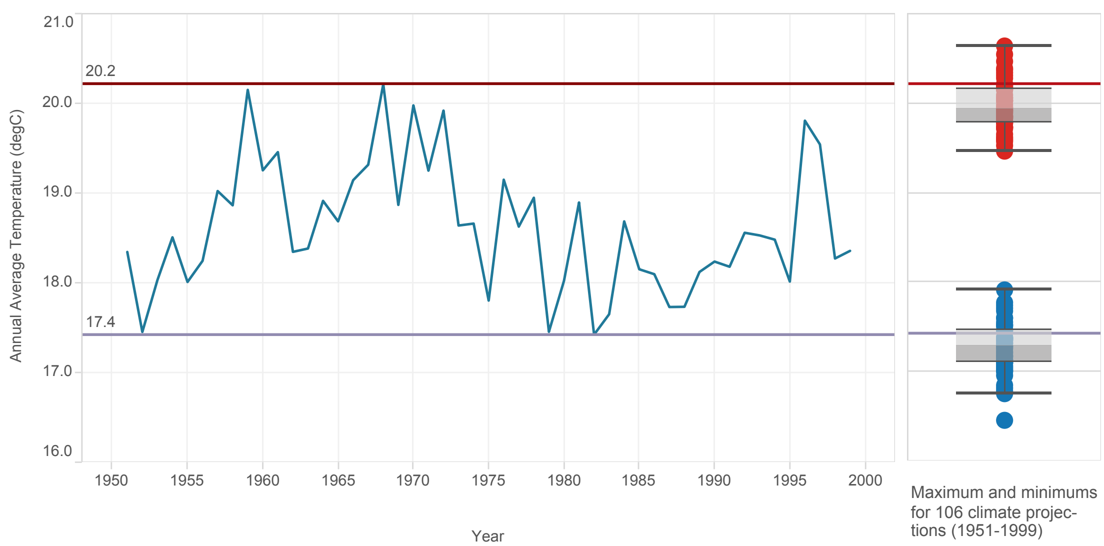
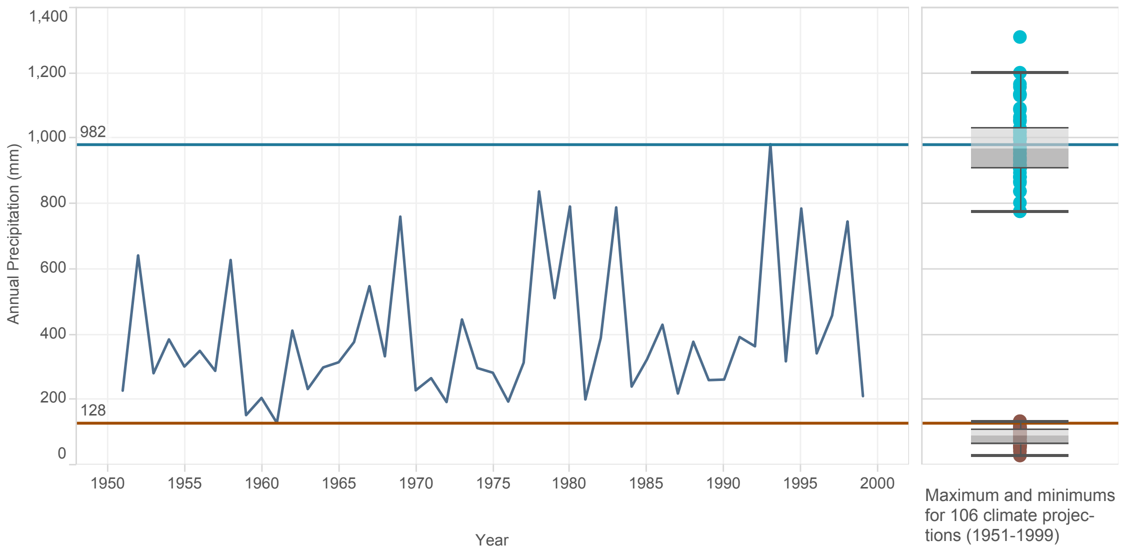
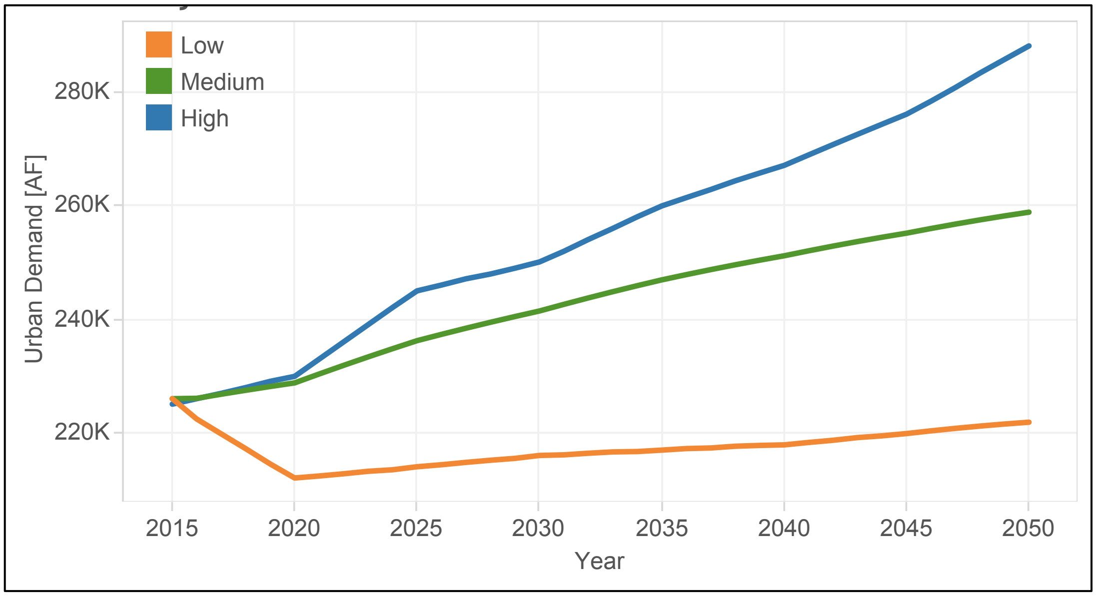


Figure 4: Observed historical annual total precipitation record for the IEUA service area from 1951 – 1999 (left) compared to the distribution of predicted maximum and minimum precipitation across the 106 climate scenarios for the same historical time period (right)



In addition to future climate, this work also examined impact of future demand. IEUA supplied two projections of future demand—a low and high demand estimate. A middle projection was then estimated within the water management model by specifying indoor and outdoor water use rates that were between those used for the high and low demand estimate. Figure 5 shows these three demand scenarios under conditions of no climate change. It also shows unmet demand under historical climate conditions.

Figure 5: IEUA demand scenarios under no climate change



Simulating future conditions

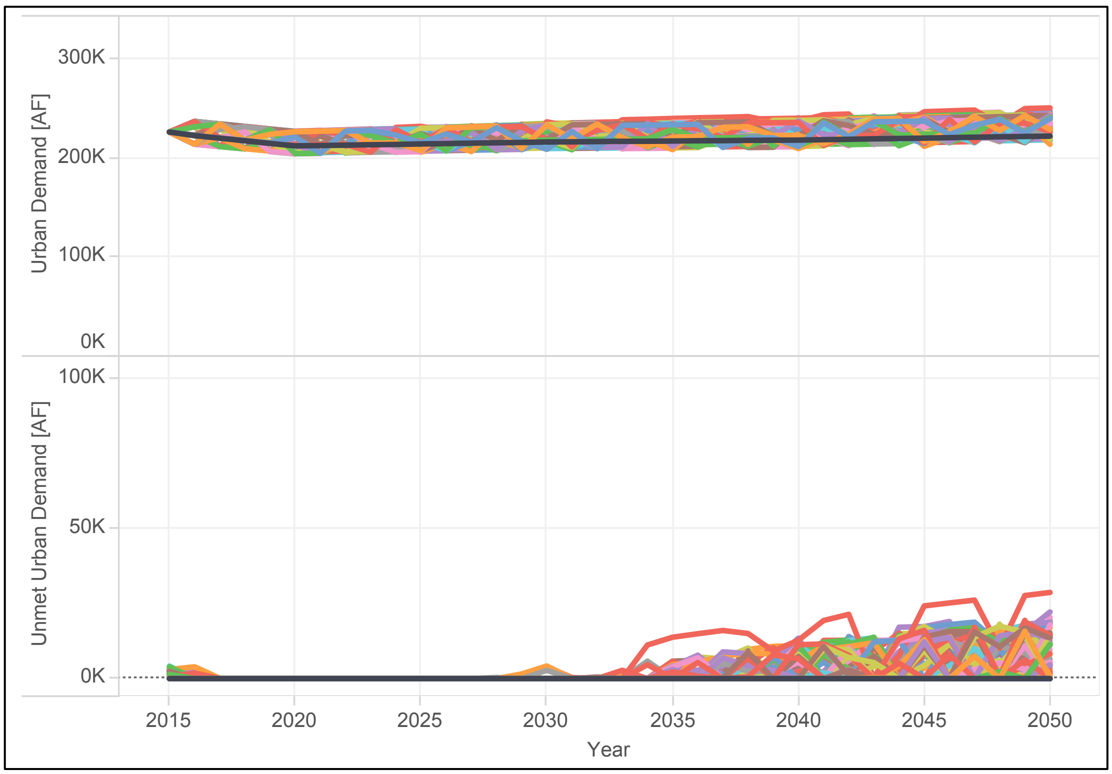
The study team used the WEAP IEUA model to stress test the IEUA's baseline supplies and proposed supply augmentation portfolios, and evaluated urban demand, supplies, and unmet demand from 2015 to 2050 for each of the 106 climate change projections as well as a projection that repeated historical climate conditions. Impacts of these 107 climate futures on IEUA's baseline supplies and proposed portfolios to augment supplies were examined in the context of the three future demand scenarios, as well as assumptions about the strength of climate change on imports, and the sensitivity of local supplies to temperature. In sum, IEUA's baseline supplies and each augmentation portfolio were tested against 1,284 futures (107 climate projections x 3 demand scenarios x 2 regressions to estimate climate impacts on local supplies x 2 levels of climate impact on water imports). The necessary computing capacity was obtained via Amazon Web Service, which enabled the WEAP model to be run hundreds of times simultaneously.

Results

IEUA baseline supplies may be insufficient to meet future demand

We found that, under the low demand scenario, supplies were sufficient under historical climate and mostly sufficient through mid-century with climate change (Figure 6). After 2035, some shortages begin to appear. The figure below shows results that assume the strongest effect of climate on imports, and that temperature changes affect local supplies. See Appendix 2 for more detail.

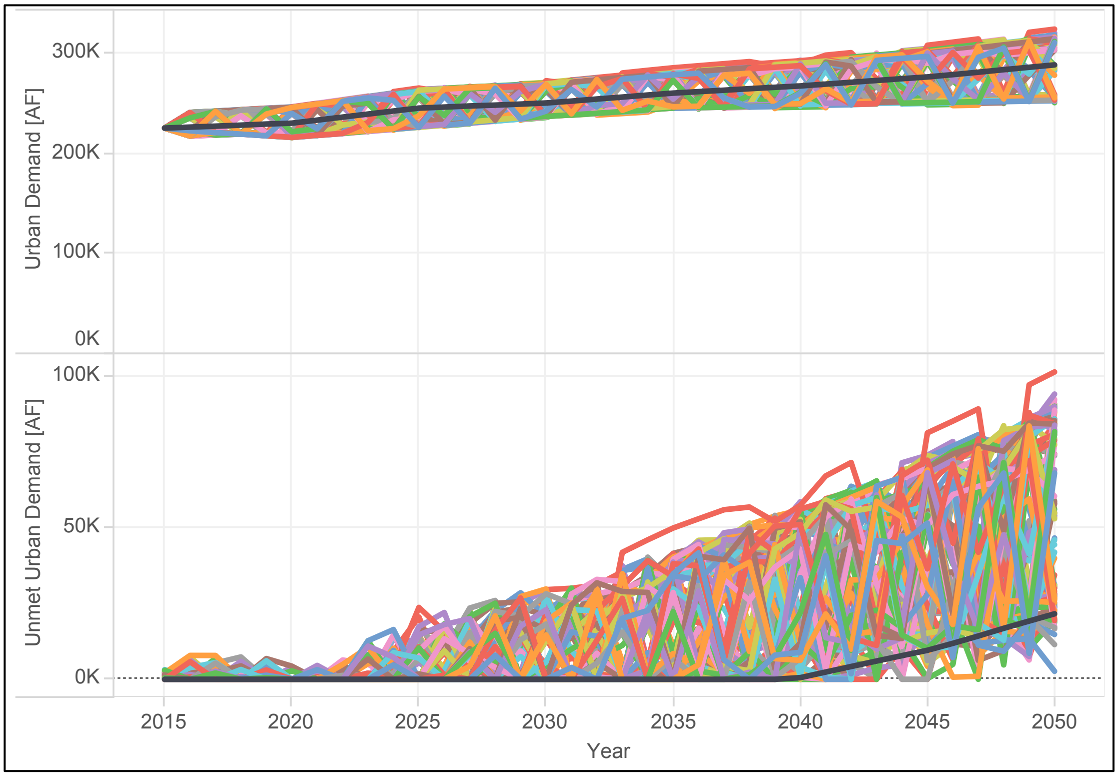
Figure 6: Unmet demand for IEUA service area by climate change scenario over time (low demand scenario)



Note: Colored lines correspond to the individual 106 climate scenarios. The black lines correspond to the historical climate scenario.

However, supplies do not appear sufficient to meet demand in the medium (not shown) and high demand scenarios as early as 2016, with the level of unmet demand ramping up significantly after 2020. Under the high demand scenario, unmet demand is nonzero even under historical climate conditions (Figure 7).

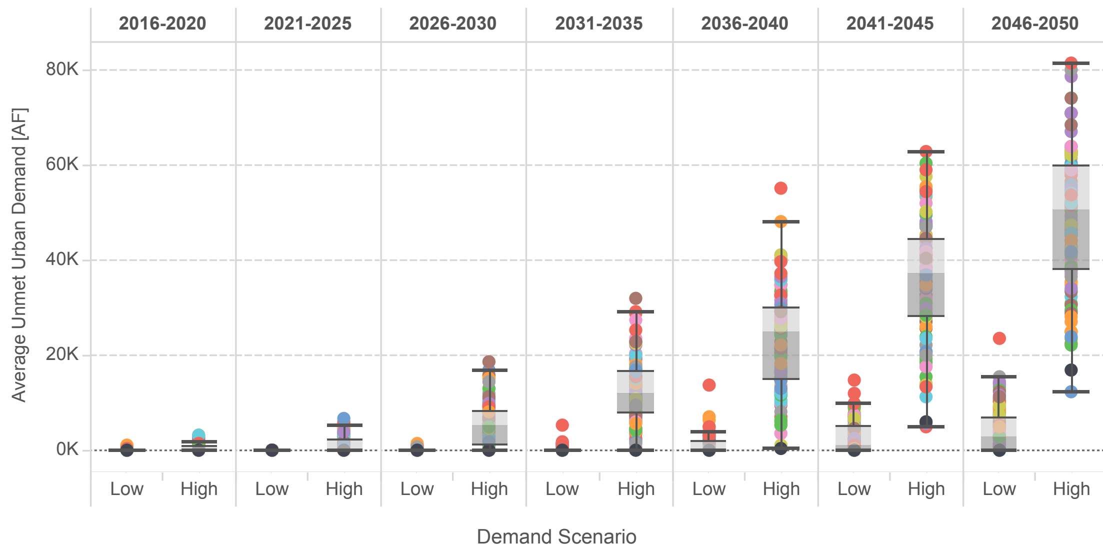
Figure 7: Unmet demand for IEUA service area by climate change scenario over time (high demand scenario)



Note: Colored lines correspond to the individual 106 climate scenarios. The black lines correspond to the historical climate scenario.

Figure 8 summarizes the results shown above by 5-year period. For the 2036-2040 period, which essentially reflects the end of IEUA's IRP timeframe, there is virtually no unmet demand for half of the 106 climate projections under the low demand scenario. In contrast, under the high demand scenario, the median result for unmet demand is about 25 TAF/year, and there is unmet demand in most of the future climates considered. Note that the IEUA IRP reports the 75th percentile unmet demand results as a characterization of the majority of plausible futures. The 75th percentile results are seen in the figure as the top of the shaded boxes.

Figure 8: Summaries of unmet demand across climate scenarios by demand scenario and 5-year period

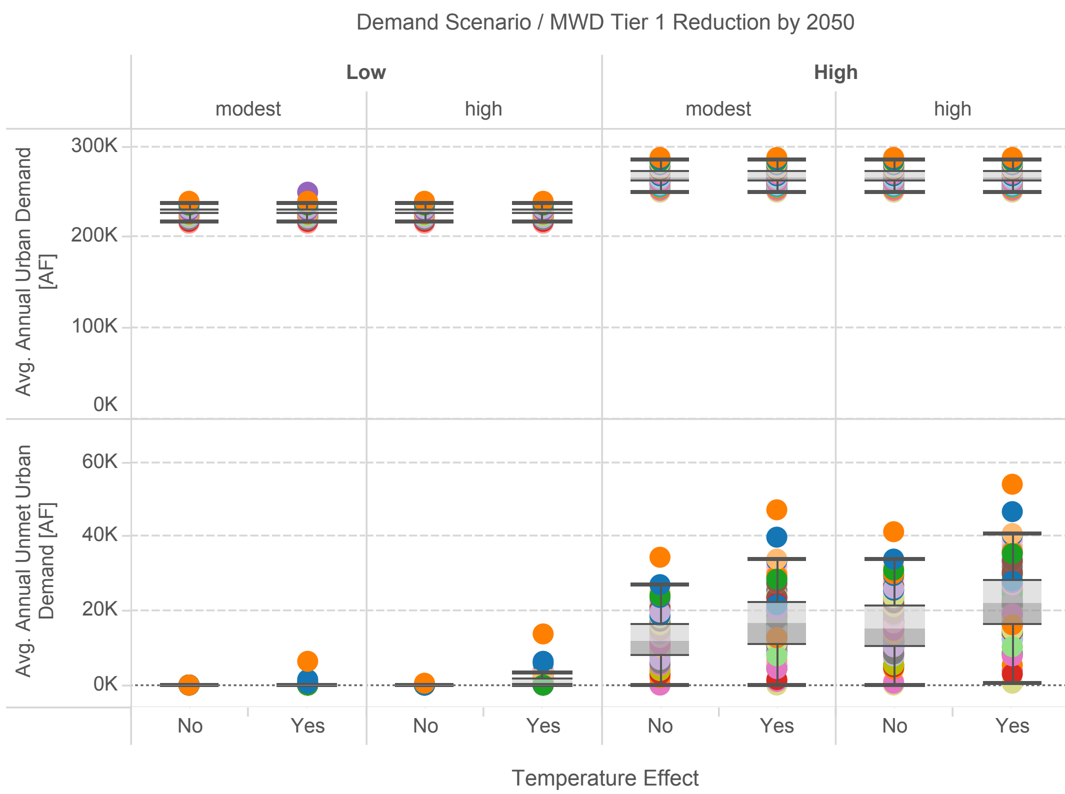


Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

RAND also investigated how the results vary with different assumptions about how much MWD supplies might decline over time in response to climate change, and whether or not local supplies, stormwater, and non-MWD replenishment supplies will fluctuate due to temperature in addition to precipitation (see Appendix 2 for more detail). Figure 9 compares the range of unmet demands for the 2036-2040 period under different assumptions about temperature effects on local supplies and climate change on MWD supplies. For the low demand scenario, the assumptions appear to have little effect on the unmet demand results across the climate scenarios. For the high demand scenario, however, there are some modest changes. The effect of going from modest to high climate impact on MWD supplies is about equal to the effect of including the temperature impacts on local, stormwater, and replenishment water supplies. For both types of uncertainties, however, the effects on the results are modest, and are much smaller in scale than differences in results between demand scenarios.

For the IRP, IEUA selected the assumptions that (1) climate change would have a high impact on MWD supplies and that (2) there would be temperature effects on local, stormwater, and replenishment supplies in order to be able to plan for more stressing future situations. These assumptions were made to ensure that IEUA has sufficient resources and necessary infrastructure under a wide range of plausible futures.

Figure 9: Average urban demand and unmet demand (2036-2040) across climate scenarios (boxes), demand scenarios (Low, Wide), climate effects on MWD supplies (modest, high), and temperature effects on local, stormwater, and replenishment supplies (No, Yes)



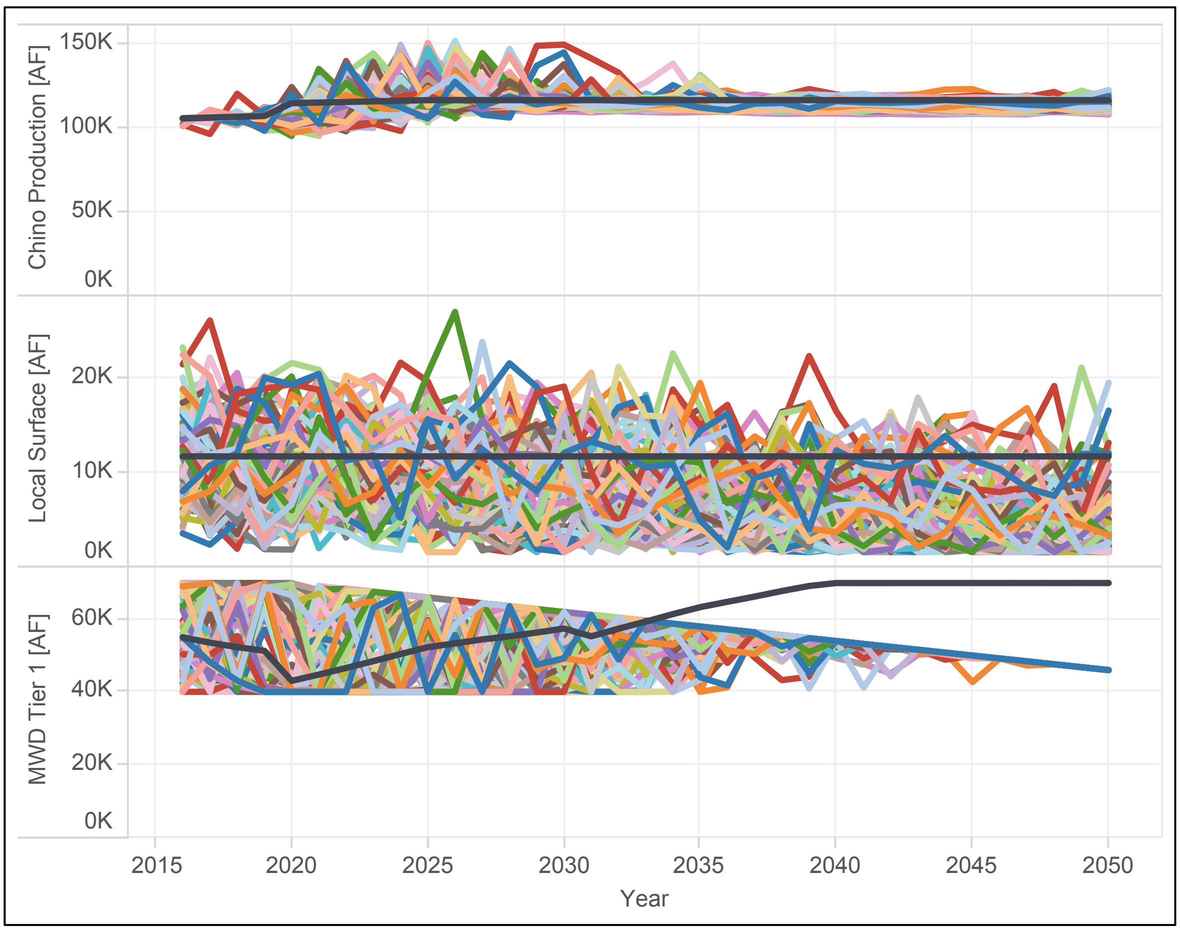
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

Figure 10 shows the major climate-dependent supplies used to meet demand over time for the 107 climate scenarios. The top panel shows these results for Chino Basin groundwater. The figure shows that during the next 15 years, when supplies generally exceed demand, there is a range of groundwater supply use, depending on the demand and availability of cheaper local surface supplies. The increased use during some years reflects deferred use of these supplies during wet years. Around 2030, increasing demand, coupled with declining surface supplies, groundwater supply becomes more stable at the maximum amount available. The slight range of use across the climate scenarios in the out years reflects the different climate effects on safe yield—which is small.

Local supply, some types of which are relatively low-cost (notably excluding recycled and desalted water), fluctuates due to its availability. Figure 10 shows significant variability as well as a tendency for declining amounts of supply, as compared to the typical IEUA assumption of stable supplies based on historical yields (the solid black line). These results reflect the projected warming conditions for all climate scenarios and variability in projected precipitation.

Lastly, the bottom panel of Figure 10 shows use of MWD Tier 1 water over time across the 107 climate scenarios. Future use under assumptions of historical climate declines initially as other supplies are developed. After 2020, however, IEUA increasingly relies on the assumed available MWD Tier 1 supply to meet growing demands. By 2040, all cheaper supplies are completely utilized and MWD Tier 1 supply is used at its maximum level. Note that 2040 is the year in which shortages are also shown to begin (see Figure 7). There is significant interannual variability in the use of MWD Tier 1 supplies across the futures, in response to variable demands and other supplies. In many years, Tier 1 use reaches the maximum available amount. Per the assumptions about climate's impact on available MWD supplies, the maximum amount available begins to decline in 2020. In those years and scenarios in which the MWD Tier 1 use is at this declining maximum level, there is also unmet demand as seen in Figure 7.

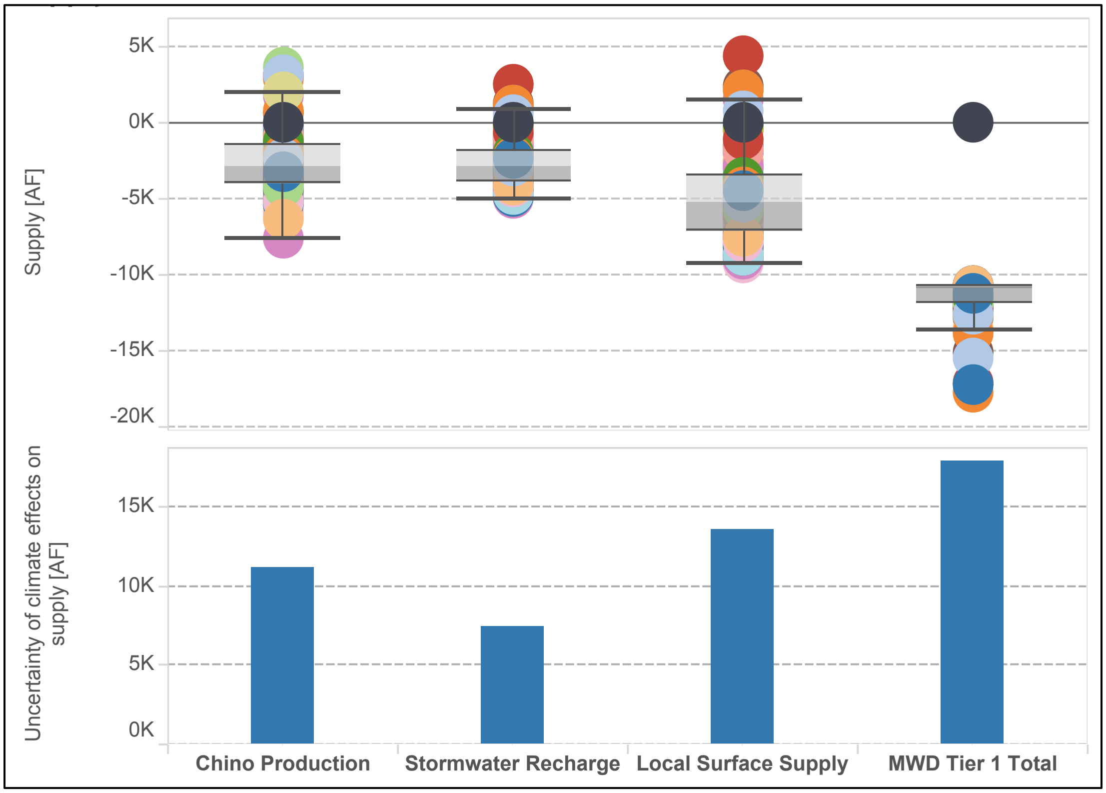
Figure 10: Baseline supply ability to meet IEUA service area in the high demand scenario by climate projection



While there is uncertainty over how climate change might affect IEUA's supplies, the climate scenarios used, combined with assumptions made in this analysis, show a tendency for supply reductions. The top panel of Figure 11 shows that for most scenarios, supplies are lower than they would be under historical climate conditions. The largest potential impact on supply is on MWD imported supply—with all climate scenarios showing a decline in accordance with the assumption that MWD supplies could experience a gradual decline in response to climate change. The second most impacted supply is on local surface supply, with a median decline of about 5 TAF/year. The overall effect on groundwater production is small, consistent with the assumptions about climate's effect on safe yield.

The bottom panel of Figure 11 shows the range in use of future supplies across the climate scenarios. For the resources that are utilized fully due to their lower cost, such as Chino groundwater and local surface supplies, the variability reflects the range of climate impacts on these supplies. For these, the larger range of uncertainty is seen in the local supplies. The range in uses of MWD Tier 1, however, reflects the range of availability of the less expensive supplies—not any assumptions of climate effects on MWD supplies. As described above, the only climate effect on MWD Tier 1 availability is specified through a steady decline in supply availability.

Figure 11: Impacts of climate on IEUA supplies across climate futures (colored dots) (2036-2040) (top) and uncertainty in the magnitude of climate impacts uncertainty (bottom)



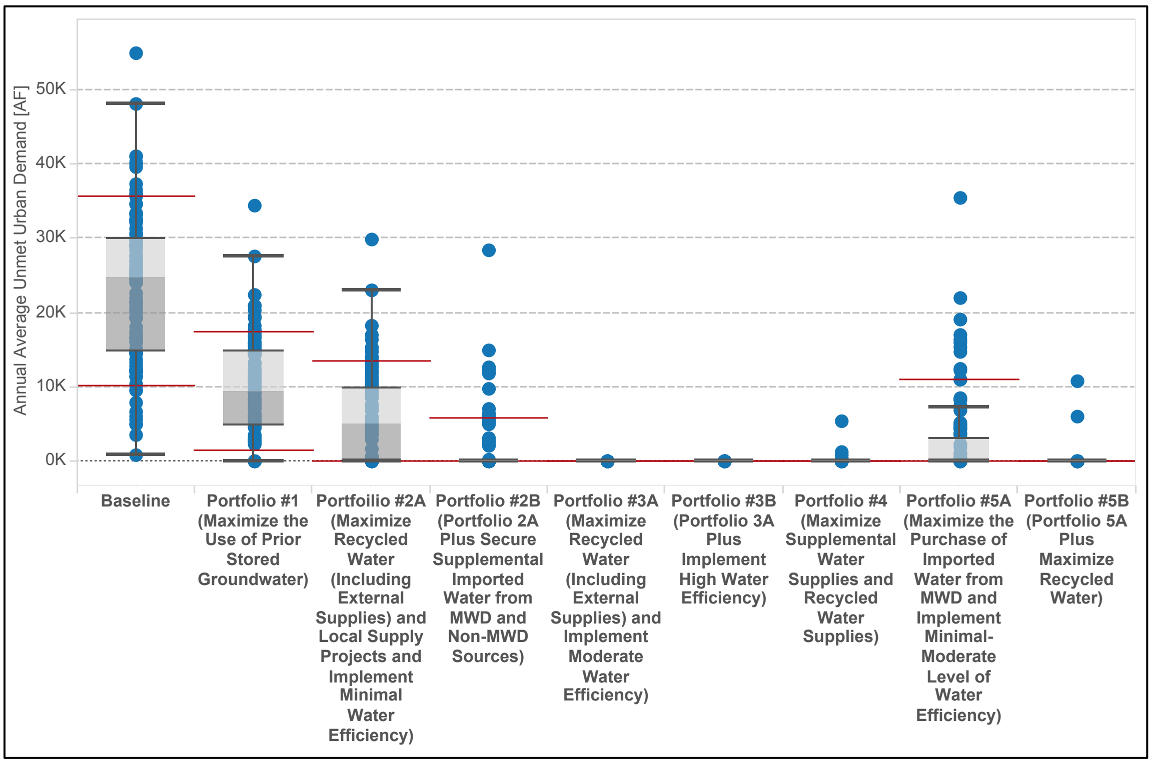
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range. The blue bars indicate the range of supply outcomes across the climate scenarios (excluding the historical simulation shown by the black dot).

Management strategies that focus on efficiency and maximizing use of recycled and imported water help close future gaps between supply and demand

Through interactions with member agencies and other stakeholders, the IEUA developed the seven portfolios discussed above in Table 2, consisting of different water management actions aimed at closing the future gap between supply and demand, and meeting other qualitative regional goals.

Using the WEAP model and the same climate projections used to “stress test” the IEUA baseline water supplies, we evaluated how well each of the seven strategies would meet demand in the future. Figure 12 summarizes the performance of the baseline strategy and the seven portfolios in terms on unmet demand from 2036-2040. All portfolios lead to an improvement in unmet demand over the baseline supply. Portfolio 1, which uses previously stored groundwater, reduces unmet demand by more than half for the median climate scenario. Portfolio #2A, which increases use of recycled water and external supplies as well as implements additional efficiency, eliminates unmet demand for more than 25% of scenarios and reduces the median unmet demand to below 10 TAF. Portfolio #2B improves upon portfolio #2A by adding additional imports—all but eliminating unmet demand. Portfolio #5A combines moderate efficiency with increased imports to eliminate unmet demand in more than half of the scenarios. Lastly, four portfolios—#3A, #3B, #4, and #5B—eliminate unmet demand in at least 90% of the scenarios. The first two do so by significantly increasing efficiency—effectively ensuring that demand follow the low growth demand trajectory. The other two (#3B and #5B) improve performance by maximizing recycled water use while also increasing imported water supplies.

Figure 12: Average unmet demand (2036-2040) across climates projections for high demand projection and different IEUA portfolios



Conclusion

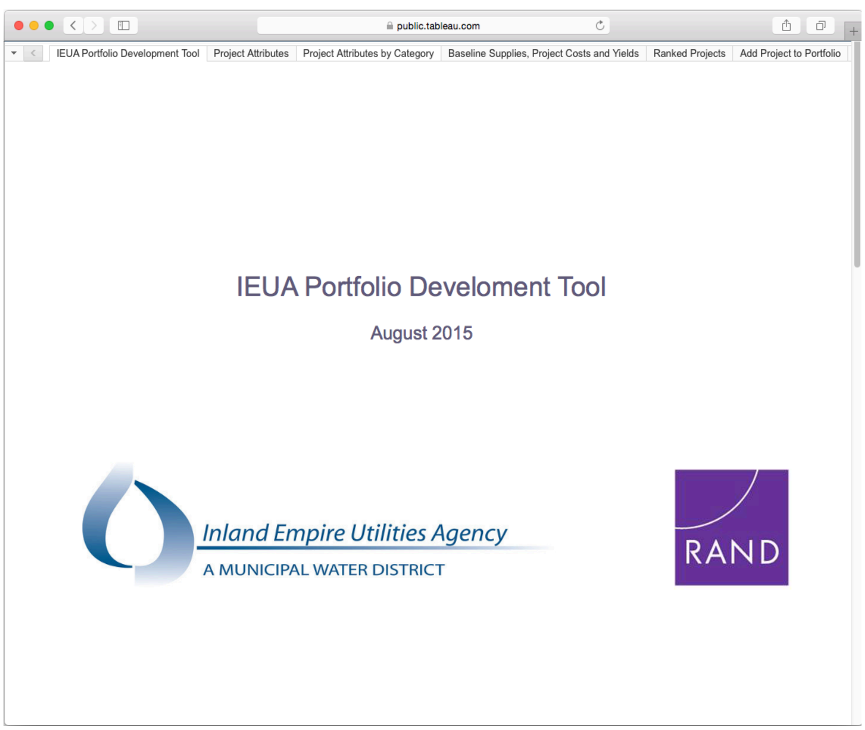
This is one of a growing number of water planning examples that highlights the benefits of examining the impacts of different climate change futures on meeting consumer demand. Here, assumptions about demand growth and climate future both had substantial impacts on ability to meet demand, and level of climate change impact on imported water as well as temperature impacts on local supplies also had some effect, especially in the most stressing demand future. Using these results, RAND and IEUA were able to identify types of management strategies focused on efficiency and maximizing available supplies that helped close the modeled future gaps between supply and demand. This work also demonstrates the value of visualization tools and water management simulations that can help facilitate discussion of alternatives for managing water resources in a very uncertain future.

For IEUA, participating in this process was not academic. As reported by IEUA management, it was a “game changer”. This is because the analytic process described herein enabled understanding of how powerful water use efficiency and local supplies are in reducing the risk of future supply shortfalls in IEUA’s service area, and also provided reassurance that their region is prepared for a future with uncertain shifts in climate. By engaging in this process, IEUA has not only identified how and when changes in temperature and precipitation could impact its water supplies, but also how demand influences the delicate balance between supply and demand. Both the timing of surges in unmet demand and the types of management actions that could help mitigate anticipated gaps in supply are helping to inform the construction of the IRP in a way that encourages adaptation and the use of integrative plans. Future work could investigate more specifically which assumptions related to future climate, demand, and supply lead to the greatest challenges in unmet demand, which could further help IEUA refine management practices and future plans.

Appendix 1 – Portfolio Development Tool

This appendix describes the IEUA Portfolio Development Tool (PDT) developed by RAND (Figure 13), with input from IEUA on its function, design, and input data. The PDT is a decision support tool designed to help IEUA and its member agencies assemble different portfolios of water management options that could help ensure the IEUA meets future water demands. IEUA used the PDT to develop a set of portfolios that were then evaluated across different climate and demand scenarios using a water management model described in Appendix 2. Although the information within and specific design of the PDT are specific to IEUA's needs, the visualization platform and methodological process could be used in the context of any water agency with similar needs for long-range planning under uncertain future conditions.

Figure 13: Title screen for the Portfolio Development Tool



The PDT was developed using Tableau—a business analytics and visualization software package. All the data used to develop the PDT were provided to RAND by IEUA, and the PDT was deployed via the Internet for IEUA and stakeholders. In the series of figures below, we walk through each of the PDT's visualizations. Once again, the design and data shown here are specific to IEUA, but this type of tool could be configured to support decision-making within numerous types of organizations.

Overview of the Portfolio Development Tool

The PDT's main function is to help the user develop a portfolio of management options that meets specified near-term and long-term water supply and demand targets. To do this, the user first specifies the projects that he or she wishes to consider. Next, the user specifies the near-term and long-term targets. The PDT then identifies the projects that would best achieve the targets from the set of eligible projects using a cost effectiveness criterion. In this context cost effectiveness is expressed in terms of levelized cost—or average cost per unit of new supply or demand reduction. Lastly, the PDT summarizes the included projects, their overall attributes, their cumulative yields, and their cumulative costs.

Portfolio Development Tool Visualizations

Figure 14 shows one visualization used to concisely display qualitative information about the attributes of different water management projects. Here, each row pertains to a different project, organized by type, with each column indicating one of 16 qualitative attributes related to IEUA's future goals (e.g., increasing water levels in critical groundwater management zones, increasing stormwater capture and associated groundwater recharge). Filled circles indicate that projects help meet certain goals, half circles indicate that a projects have no impact on goals, and open circles indicate that projects detract from efforts to meet goals. This visualization provided a reference for IEUA and member agencies used this tab to contrast how well different types of and individual projects helped meet goals.

Figure 14: Summary of how a sample of IEUA potential projects would help meet qualitative goals

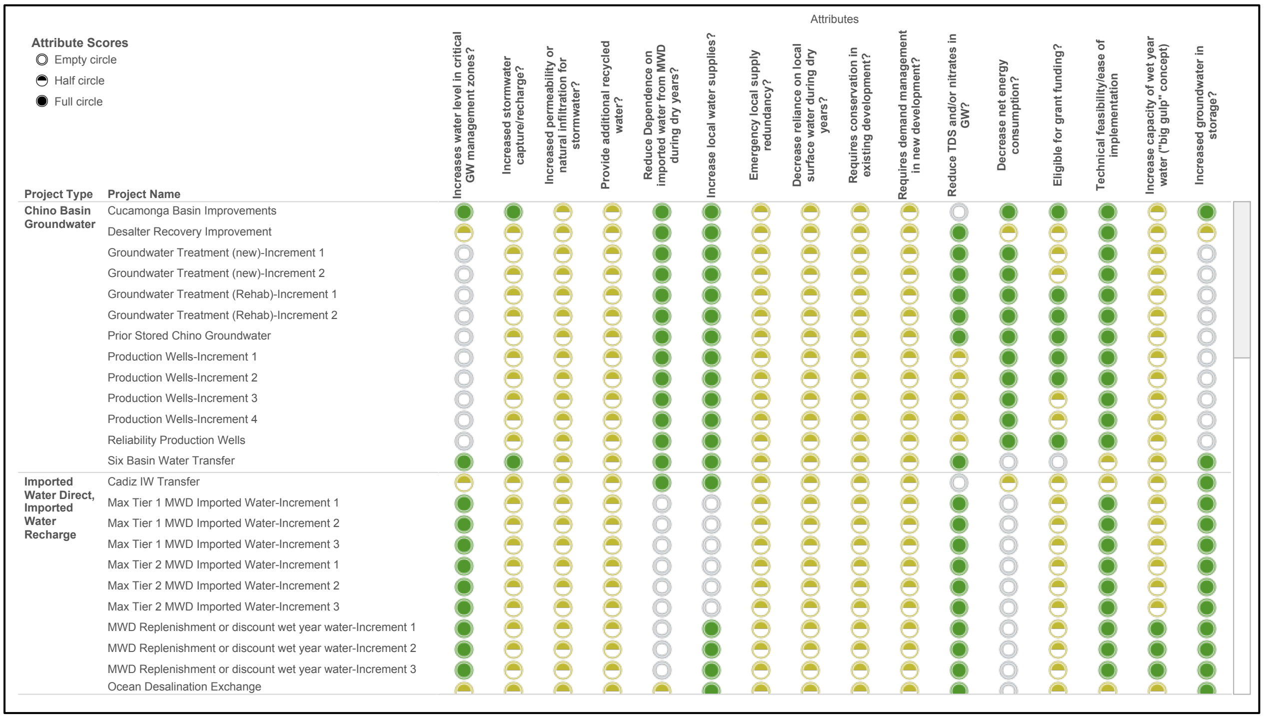
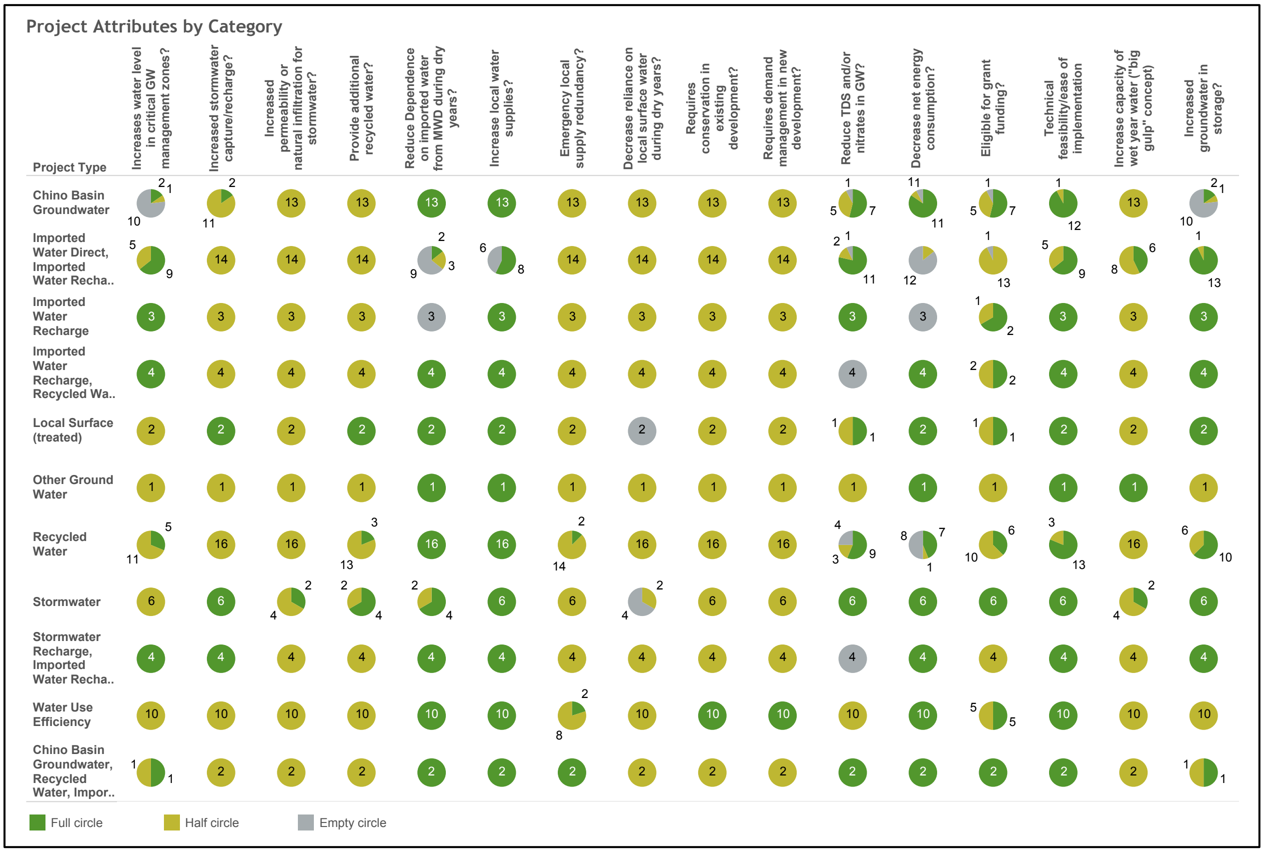


Figure 15 displays the same IEUA qualitative goals as in the previous screenshot (above), but summarizes their values within the different project categories. This shows, for example, how many projects within the more general category of "Chino Basin Groundwater" add to, detract from, or have neutral effects on different goals. This assists decision makers in identifying which categories have the most projects that might contribute to the achievement of particular goals.

Figure 15: Summary of how well projects in different categories meet various IEUA qualitative goals



IEUA has considerable supplies to meet current and future needs already. These are highlighted in the top panel of Figure 16, and include groundwater, recycled water, imported water, conservation measures, and other sources. The color bars indicate when these sources come online, and most are already available. (Note that those that come online in the future are already planned for implementation and are thus not considered in the portfolio options directly.) IEUA and member agencies requested this view of the baseline supplies because it serves as a useful perspective upon which to layer projects to bring additional future supplies. Below the baseline supply panel are the different potential projects, sorted by general categories, and with information about cost and amount of supply each is estimated to provide. Note that not all projects are visible in this screen shot.

Figure 16: Summary of baseline supplies, estimated new project supply amounts, and new project costs

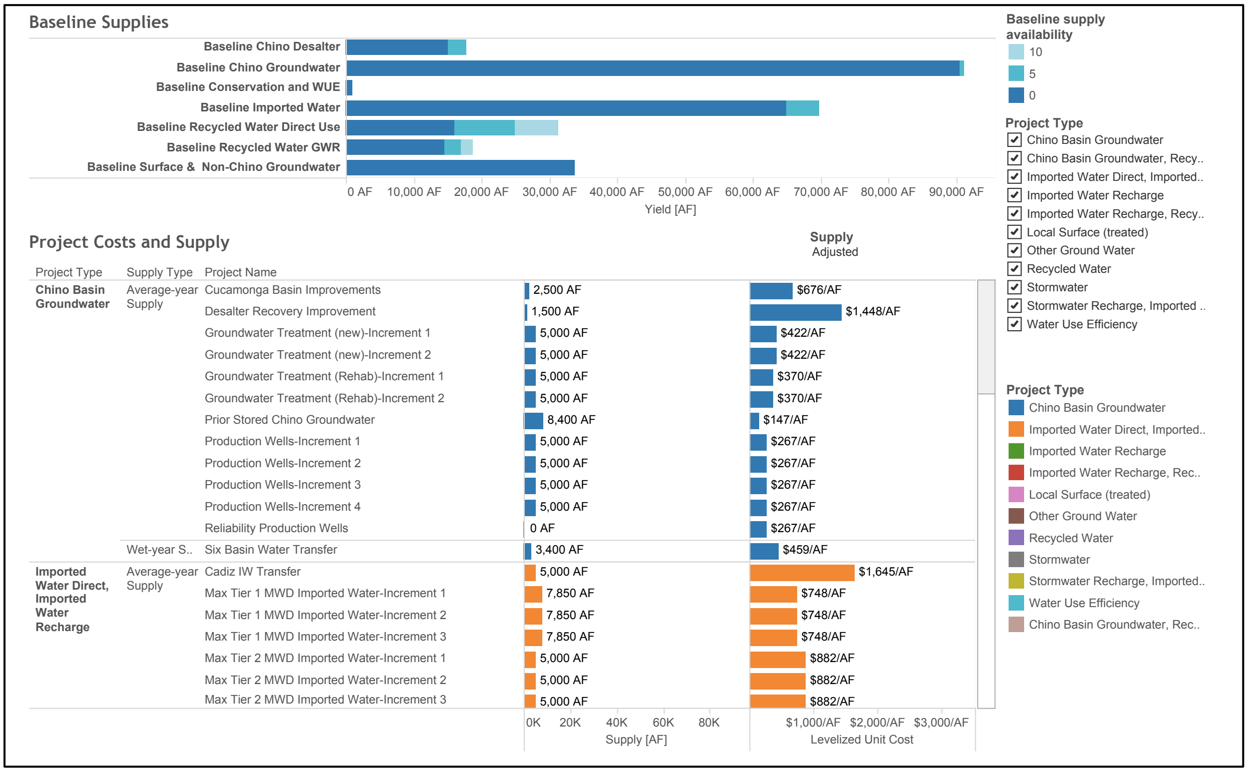
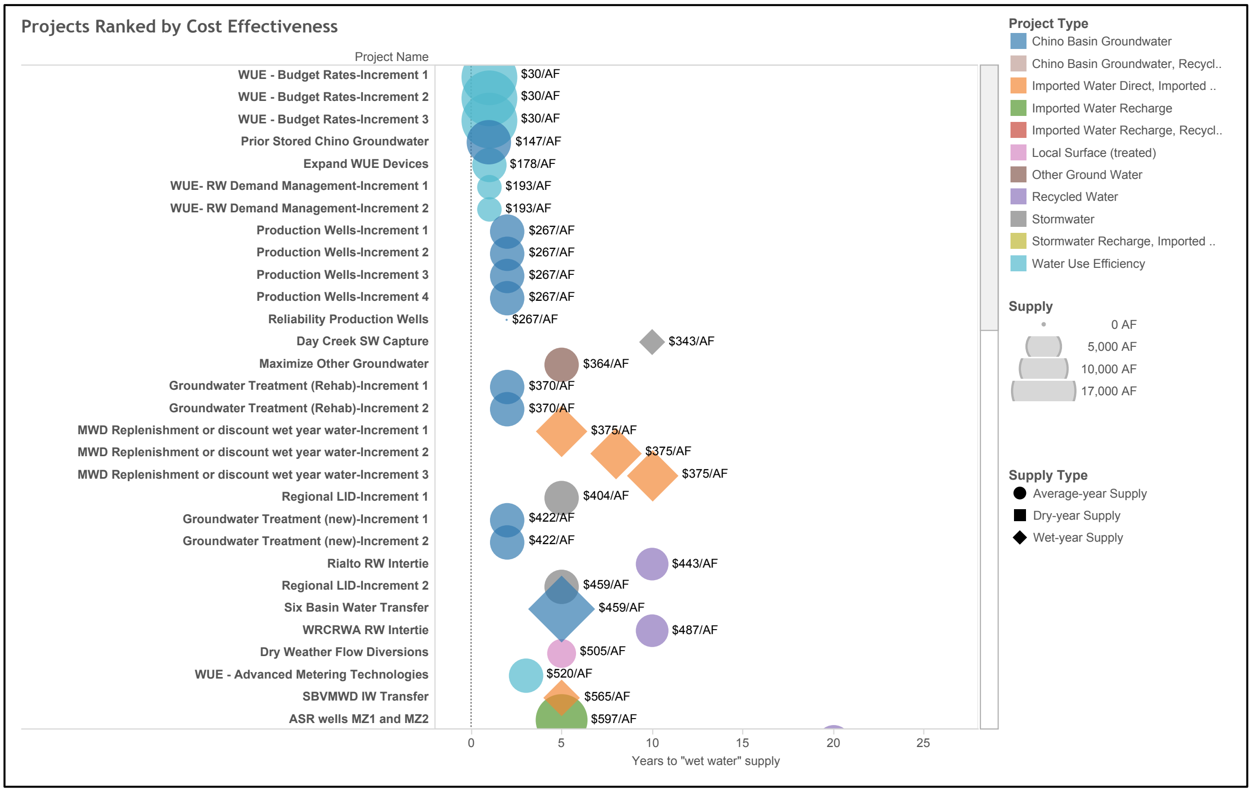


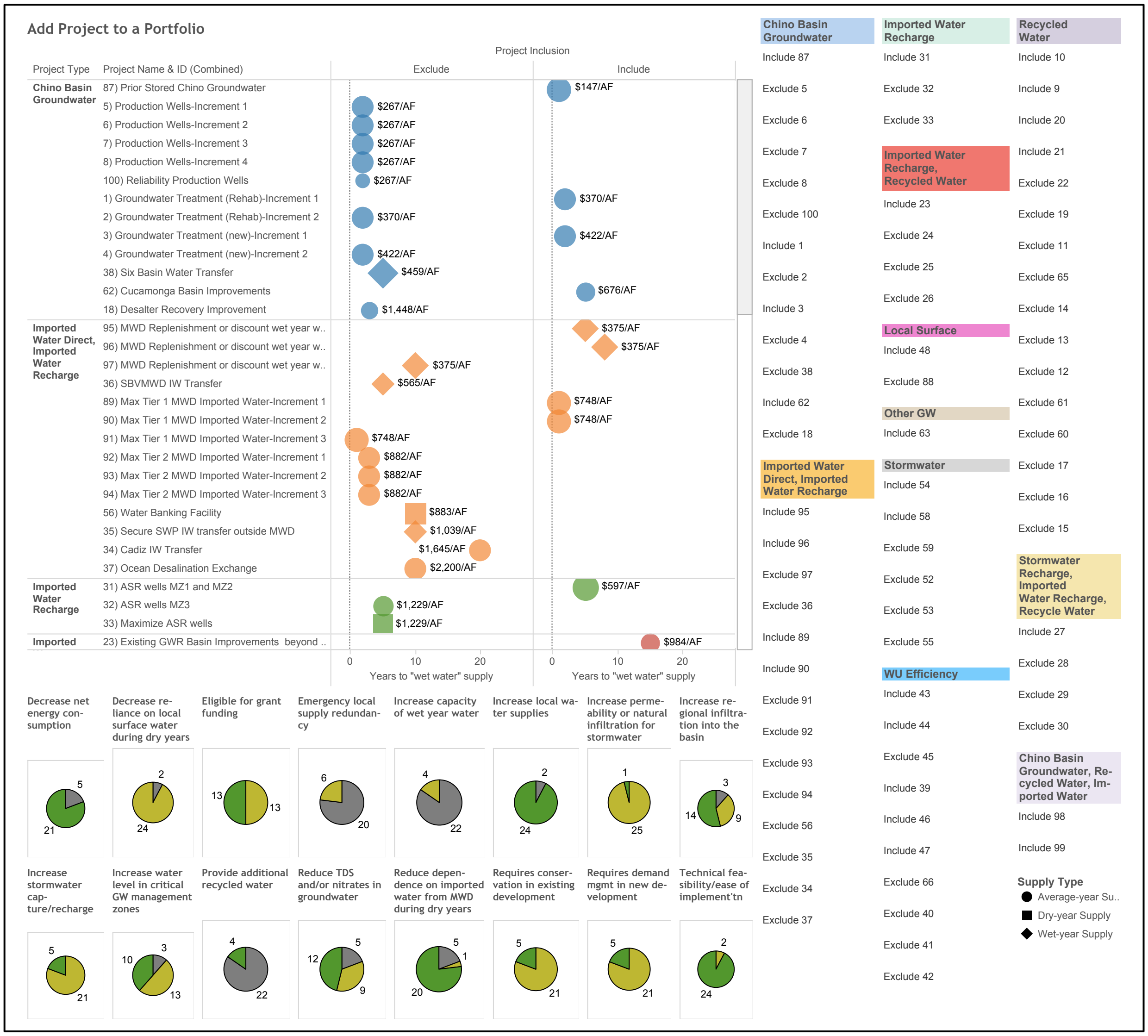
Figure 17 displays all the projects, sorted by preliminary estimates of per unit water cost (these have yet to be finalized). Symbol coloring indicates its category, size indicates its estimated volume; horizontal position indicates the number of years until which the project produces enough water to add to the supply IEUA distributes to stakeholders; the text label indicates its cost; and its symbol indicates whether the water is available during any given year or only under particularly wet or dry conditions. This view was useful for stakeholders to compare projects, and general categories of projects, by supply amount, timing, and cost.

Figure 17: Project cost per acre-foot, with information on project type, supply amount, supply type, and number of years to "wet water" supply



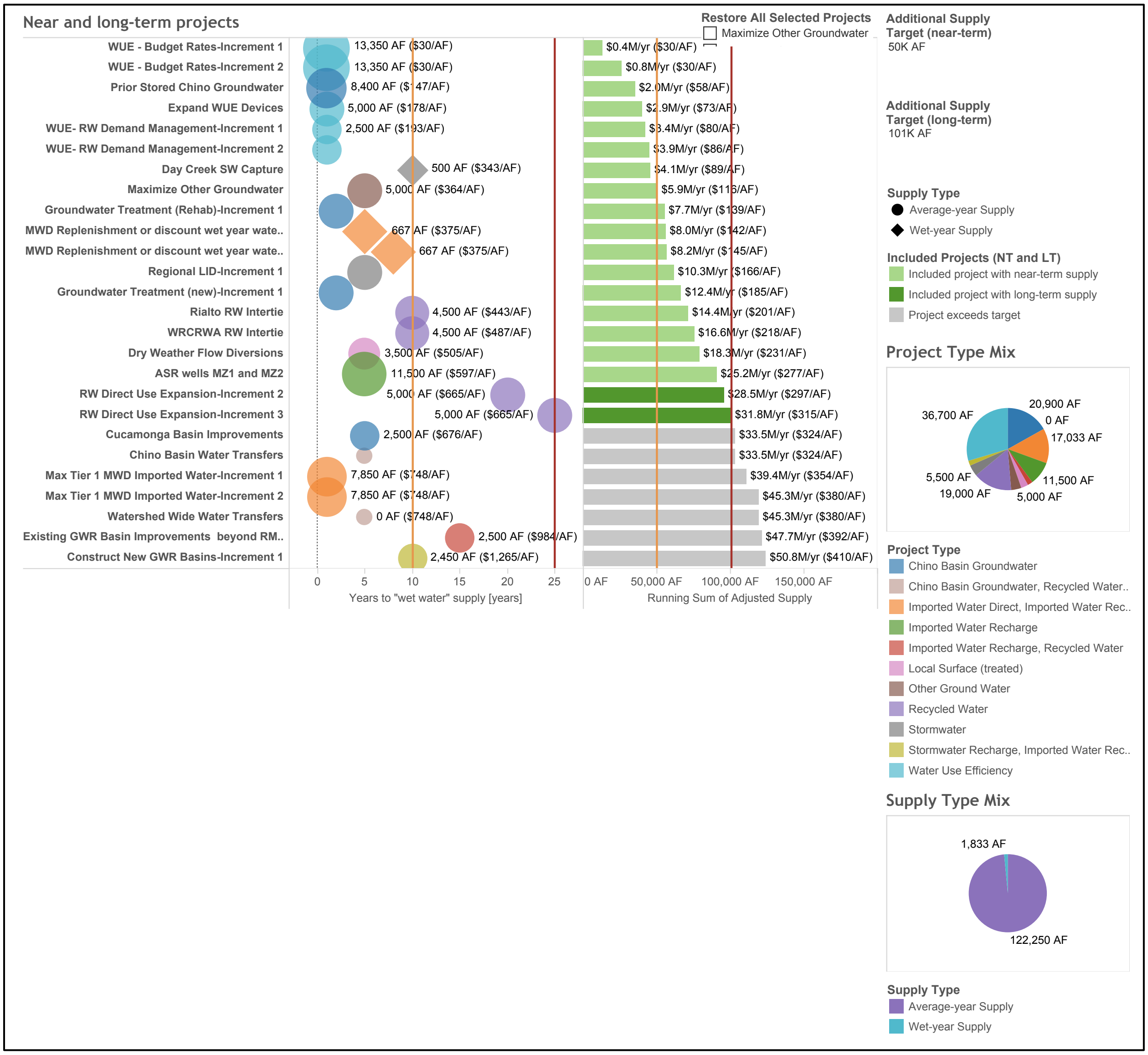
The next figures show how IEUA and member agencies were able to use the tool to create different potential portfolios of water management options. Figure 18 shows a tab in which the user is able to select individual projects to be considered in a portfolio. The user can exclude or include a project with a single click of the toggles on the right side of the screen shot. Projects' inclusion, category, cost, and years to wet water supply are tracked in real time on the left side of the screen. Aggregate summaries of the project attribute measures are shown as pie charts at the bottom of the screen. In this figure, a subset of projects is selected for inclusion, and only some projects are shown in the figure. In the tool, the user is able to scroll to see projects from all project categories.

Figure 18: Portfolio building tab enabling user to include and exclude specific projects in real time and visually track different project categories, costs, and years to "wet water" supply



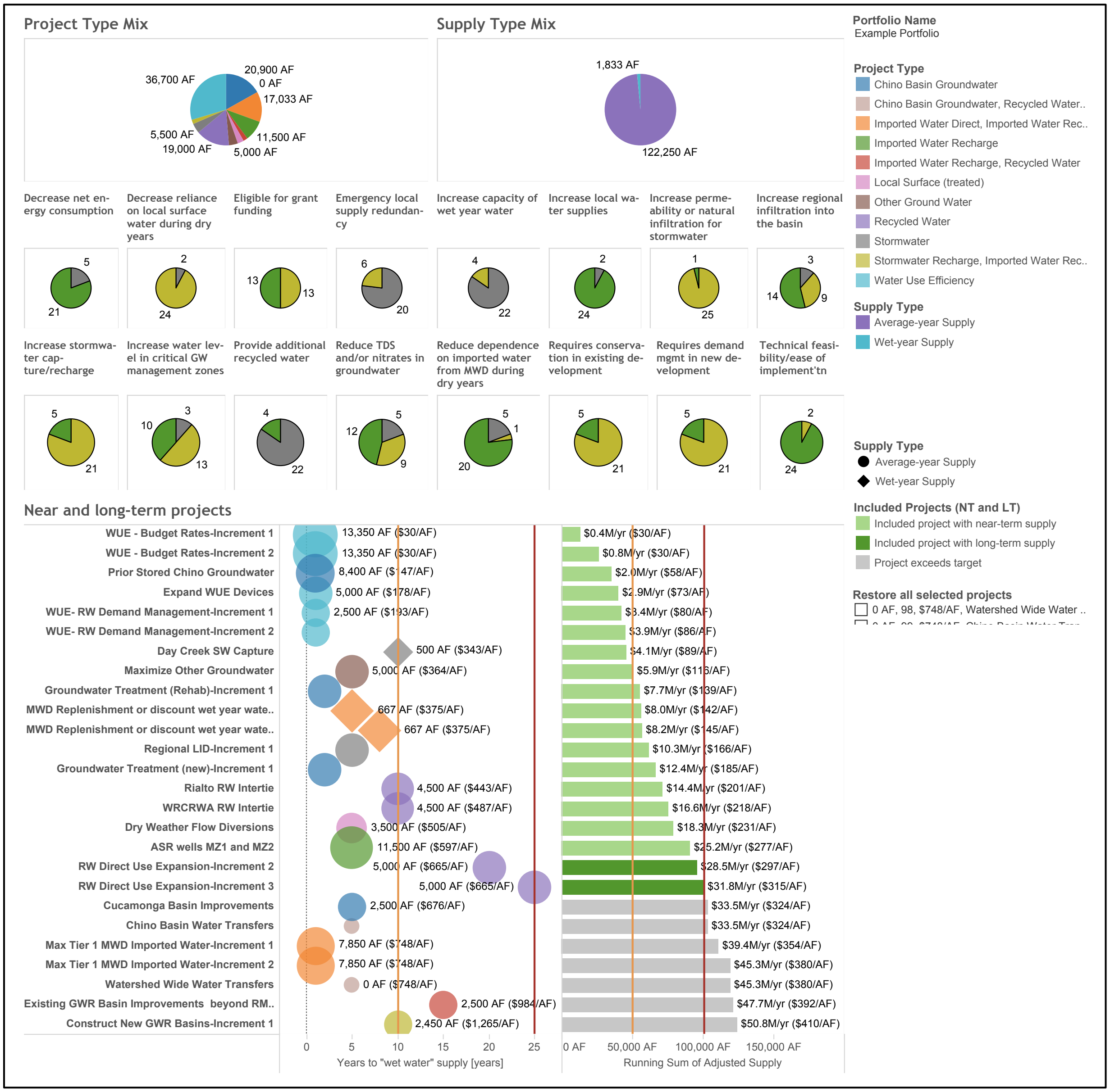
The next visualization (Figure 19) takes the options included in the previous screens and sorts them by cost effectiveness and availability to meet user-specified near-term (year 10) and long-term (year 25) targets. In this example, the near-term target is set to 50 TAF, whereas the long-term target is set to 101 TAF. On the left, projects are shown ordered by cost effectiveness. The bar chart to the right shows the cumulative new supply or demand reduction. Projects that meet the near-term or long-term targets are shaded green, indicating that they are included in the final portfolio. The project shaded dark green are only available to meet long-term demand. On the right, a pie chart summarizes the mixture of projects used to meet the supply targets and the type of projects with respect to availability (all year, wet year, or dry year).

Figure 19: Example portfolio with information on projects included therein, and how well projects meet supply goals



Lastly, Figure 20 provides another summary of the defined portfolio. This includes a summary of the supply and project category information in Figure 19, but also displays summaries of the project attributes—suggesting how well a particular portfolio meets different IEUA qualitative goals. IEUA and member agencies were able to use this display as a final summary chart for each portfolio they explored.

Figure 20: Example project portfolio summary, including how well projects meet IEUA qualitative goals



Appendix 2 – Water Management Model And Assumptions

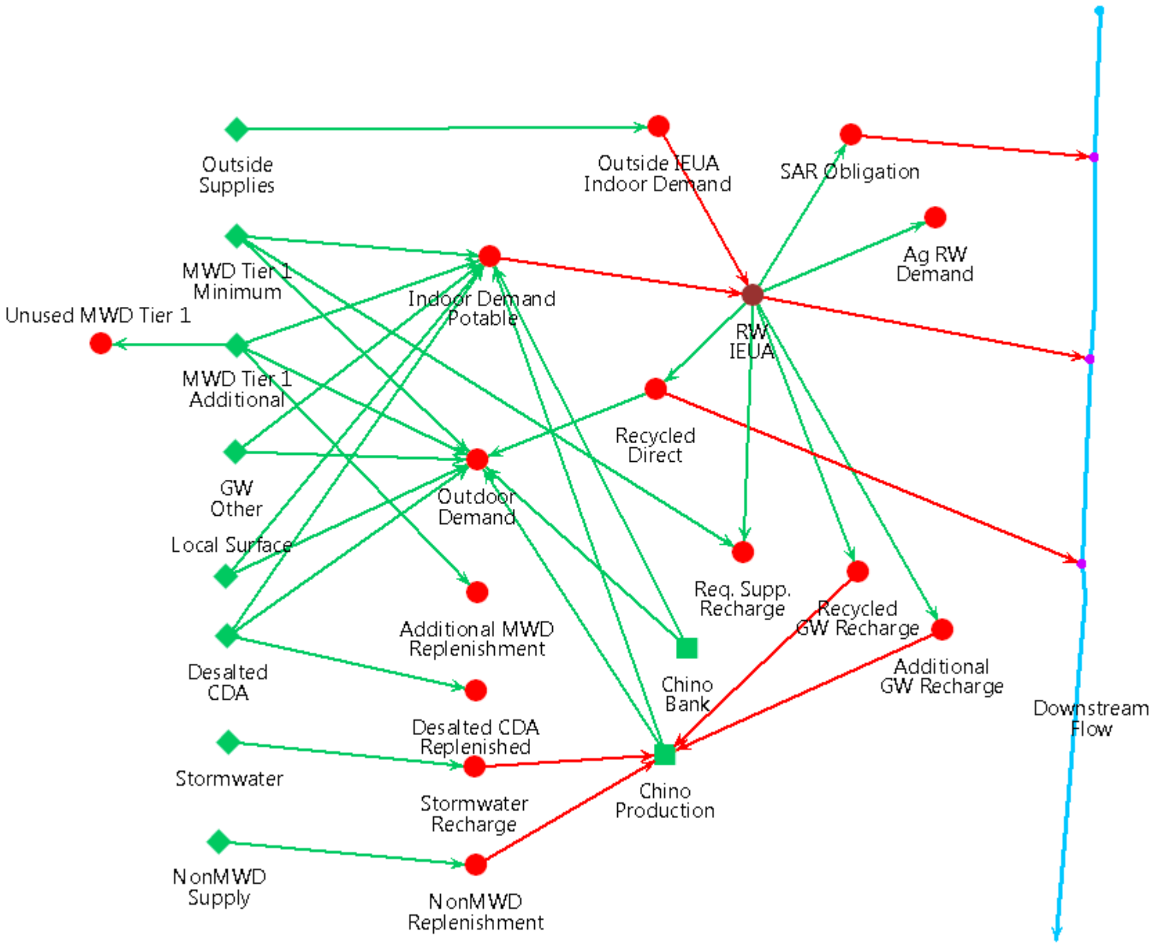
Model Overview

The study team built a model of the IEUA water management system, based on tabular monthly and annual information on historical and projected IEUA water supplies and demands provided by IEUA. The model includes simple relationships and data on estimated future climate conditions to evaluate water supply and demand balance conditions under alternative futures. Lastly, the model evaluates how different water management portfolios, developed using the Portfolio Development Tool (see Appendix 1), would improve performance over these futures.

The model is built in the Water Evaluation And Planning (WEAP) system, developed by the Stockholm Environment Institute (SEI) (Yates *et al.*, 2005). The WEAP IEUA water management model represents the IEUA system through a set of arcs and nodes. Nodes represent locations of water inflows, storage (surface or groundwater), outflows, or demand. Arcs represent conveyance, either natural or constructed, between different nodes.

The IEUA WEAP model calculates how water demand would be met by various supplies based on a system of supply preferences and priorities for each demand node. The model schematic shows the connectivity of water flows among the nodes via the arcs within the model (Figure 21). The schematic is not intended to represent the specific locations of IEUA system elements, but rather show their connectivity. Table 3 lists and describes the demand and supply nodes shown in the model schematic. More details on select demands and supplies are provided in the sections below.

Figure 21: Schematic of the WEAP model of the Inland Empire Utilities Agency service area



Note: RW = recycled water; Ag = agricultural; SAR = Santa Ana River; MWD = Metropolitan Water District of Southern California; CDA = Chino Desalter Authority; GW = Groundwater.

Table 3: IEUA WEAP model supply and demands

Node Name	Description
Demand	
Indoor Demand Potable	Indoor demand for potable (non recycled) water
Outdoor Demand	Outdoor demand for potable and recycled water
Recycled Direct	Total recycled water demand for outdoor use; met demand passes through to Outdoor Demand node or downstream flow if unneeded
Recycled GW Recharge	Demand for groundwater replenishment water; passes to Chino Production node
Additional GW Recharge	Demand for additional groundwater replenishment as specified by water management strategies; passes to Chino Production node
Outside IEUA Indoor Demand	Demand for water outside IEUA that is provided to IEUA for recycling via RW IEUA node

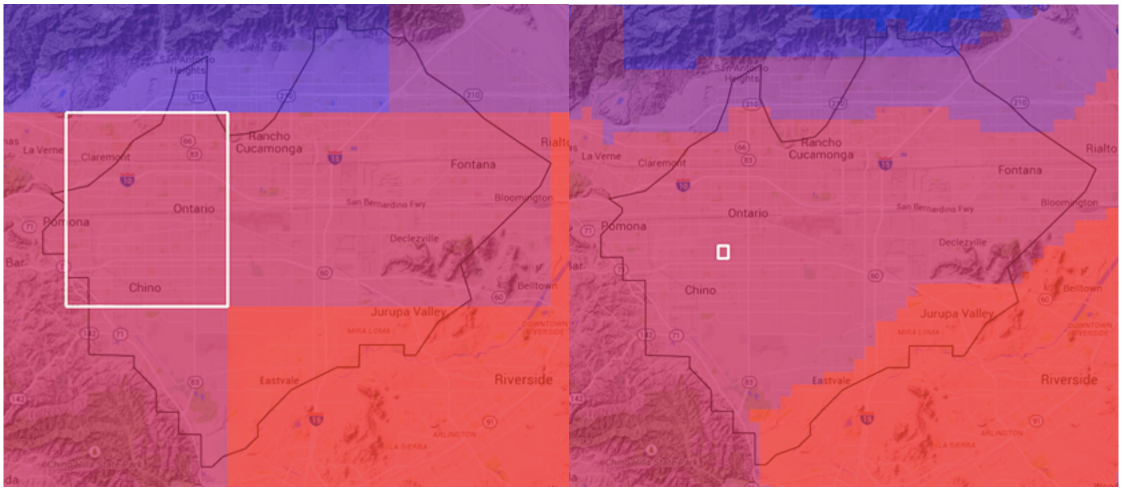
SAR Obligation	Santa Ana River flow obligation; met by recycled water
Ag RW Demand	Agricultural water demand in IEUA service area met with recycled water
Supplies	
MWD Tier 1 Minimum	Specified annual minimum Tier 1 MWD imports (about 40 TAF)
MWD Tier 1 Additional	Additional annual Tier 1 MWD imports, constrained by contract with MWD
Local Surface	Water supplies obtained from watersheds within the IEUA boundary
Desalted CDA	Desalted brackish groundwater from the Chino Desalter Authority facilities
Chino Production	Groundwater from the Chino Basins
GW Other	Groundwater from sources outside the Chino Basin
Stormwater	Additional runoff from storms captured and treated for use
NonMWD Supply	External sources of water used for groundwater replenishment

Climate Scenarios

The study uses downscaled climate data from general circulation models as the basis for a wide range of plausible future climate conditions. Historical and projected climate data from the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset were downloaded from the Downscaled CMIP3 and CMIP5 Climate and Hydrology Projections archive (Maurer *et al.*, 2007).[2] Climate data retrieved from this archive included bias-corrected statistically downscaled (BCSD) global climate model (GMD) monthly mean temperature and total precipitation observations and projections for 36 CMIP3 simulations and 70 CMIP5 model runs for years 1950-2050 (Brekke *et al.*, 2013). Note, however, that observed BCSD data were available only for years 1950-1999. These gridded climate data represented the gridded area bounded by latitudes 34.0N and 34.125N and longitudes 117.625W and 117.5W, roughly centered at Ontario International Airport (Figure 22).

[2] Data is available online at: http://gdo-dcp.ucllnl.org/downscaled_cmip_projections/.

Figure 22: Geographic scale of climate sources for CMIP-3 data (left) and CMIP-5 date (right)



Select Demands

Indoor Potable

Indoor potable demand is calculated as the population within the IEUA service area times an annual water use rate. IEUA, assisted by A&N Technical Services, specified the high and low demand scenario by varying annual water use rates. The middle demand scenario is user definable by setting the indoor and water use rates for 2050. Indoor potable demand does not vary by climate.

Table 4: Indoor potable demand parameters for historical data and scenario projections

Model Parameter	2010 (data)	2014 (data)	2020 (projection)	2050 (projection)
Population (people)	813,695	847,587	896,533	1,249,091 (all)
Water Use rates (gal/person/year)	26,061	23,981	24,090 (high) 22,959 (low)	24,017 (high) 17,082 (low)
Water Use/Demand (taf/year)	65.1	62.4	66.3 (high) 63.2 (low)	92.1 (high) 65.5 (low)

Outdoor

Outdoor demand is calculated as the population within the IEUA service area times an annual water use rate. IEUA, assisted by A&N Technical Services, specified the high and low demand scenario by varying annual water use rates. The middle demand scenario is user definable by setting the nominal outdoor and water use rates for 2050.

IEUA performed a series of sensitivity analyses of urban outdoor demand and weather conditions. By 2040, IEUA estimated that one dry year would increase demand by 5.6%. Similarly, a one wet year would decrease outdoor demand by 5.6%. A longer period of dry weather (3-years) would increase demand by 8.9%. Separately IEUA estimated the long-term effect of warming on outdoor demand. They found that for each degree temperature increase (in Celsius), outdoor demand would increase by 3%. Together these factors were applied to the climate scenarios to estimate how outdoor demand could change due to weather in the future.

Outdoor demand varies by three outdoor water demand factors that are applied depending up the projected precipitation difference from historical (or perturbation), as shown in Table 5. The outdoor water demand factors were derived from IEUA analysis.

Table 5: Climate effect factors on outdoor water demand

Precipitation Condition	Perturbation Threshold	Outdoor Water Demand Factor
Very dry	-5 cm/year	-0.089
Dry	0 cm/year	-0.056
Wet	+ 25 cm/year	+0.56

Agricultural recycled water demand

Agricultural recycled water demand is specified based on IEUA projections and does not vary by climate. This demand declines from about 10,000 AF in 2015 to 2,000 AF by 2025 and then remains constant through 2050. This is due to the transition of agricultural land to urban use.

SAR Obligations

IEUA's Santa Ana River (SAR) obligations are specified to be 17,000 AF/year per IEUA agreement.

Select Supplies

Local Surface supplies

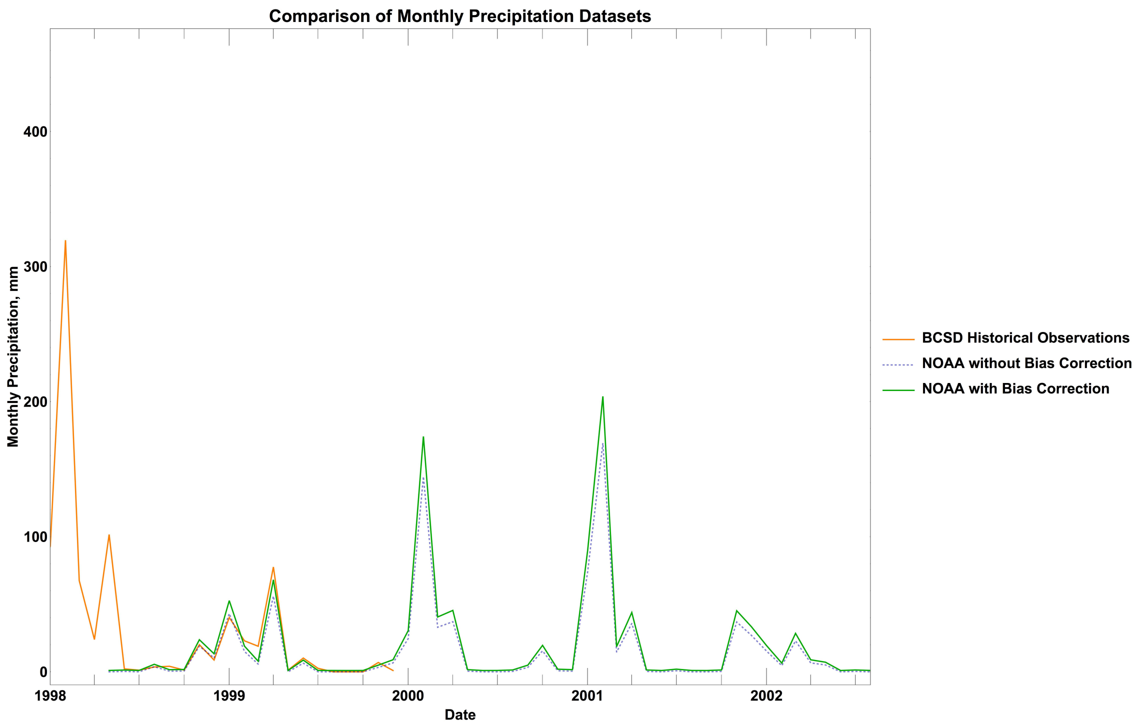
Total monthly local surface supplies within the IEUA management boundary for water years (July through June) 2010 through 2015 were provided by IEUA member agencies and represent the amount of water that is diverted, not total stream flow. To estimate these total local surface water supplies under different climate scenarios, relationships between climate variables and surface supply were derived using historical data. These relationships were then used to estimate future supplies under each climate scenario included in the analysis. Several different regression models were evaluated, and two models were found to reasonably represent the relationship between historical climate and historical supplies. One included both temperature and precipitation variables and the other only precipitation.

At the time of the analysis, the gridded BCSD historical climate observations were available only between 1950 and 1999. Therefore, to compare climate observations to the surface supply results for 2010 to 2015 an additional proxy data set for the 2010 to 2015 period was developed. Specifically, we used weather station observation at Ontario International Airport[3] (coordinates 34.05N, 117.61667W) contained in the Global Historical Climatology Network Database (GHCND) (Menne *et al.*, 2012), maintained by the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center. The Ontario International Airport observation station reports monthly total precipitation and mean temperature observations from 1998 to present day.

We compared the monthly mean NOAA observed data to the monthly mean BCSD observed data for the overlapping period of May 1998 to June 2015. As expected we found very strong relationships for both monthly temperature and precipitation, although the NOAA observations were generally slightly drier than the BCSD data. We calculated a correction factor that we subsequently applied to the NOAA observed data to generate bias corrected datasets. Figure 23 shows a comparison of BCSD observed precipitation, NOAA observed monthly precipitation, and NOAA bias-corrected precipitation. This figure shows the strong relationship between the NOAA and BCSD datasets during the overlapping period of 1998 to 2000 and the very slight adjustment that was made to the NOAA data for months from 2000 and later.

[3] This station has Station ID GHCND:USW00003102 with latitude/longitude coordinates 34.05N, 117.61667W.

Figure 23: Comparison of BCSD, NOAA, and NOAA bias corrected monthly precipitation data on overlapping dates



NOAA bias corrected temperature and precipitation data, which were available until June 2015, were used to assess linear regressions relating monthly mean temperature and mean precipitation to total observed IEUA surface supplies. Additionally, given that a significant component of surface supply is due to melting snow pack, the potential of a delayed precipitation signal was evaluated. Four regressions were considered to estimate stream flow: (1) precipitation alone, (2) temperature alone, (3) precipitation and temperature, and (4) precipitation and a 12-month moving average of temperature. These regressions were analyzed with various lag times—applied to both temperature and precipitation—ranging from 0 to 6 months to search for a significant signal; a lag time of three months was found to have the lowest p-value among for all regressions and appeared to best reflect observed stream flow patterns. Note that the minimum p-value found with a lag time of 0 months was ≈ 0.429, while the p-values of the three best-fitting regression models at a lag time of three months were < 0.005. Shown below in Figure 24 is a comparison of each of the four regressions considered—each mapped over the NOAA bias corrected precipitation and/or temperature data—against observed surface flows. Figure 25 shows the same models aggregated to annual totals.

Figure 24: The four regression models versus observed flows

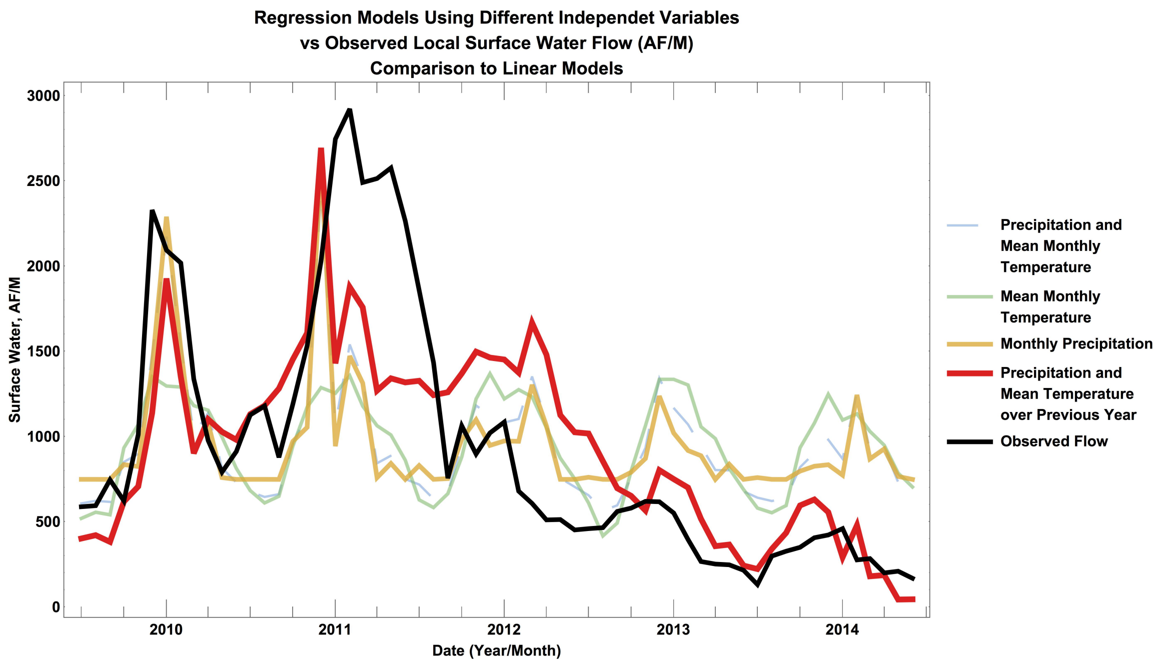
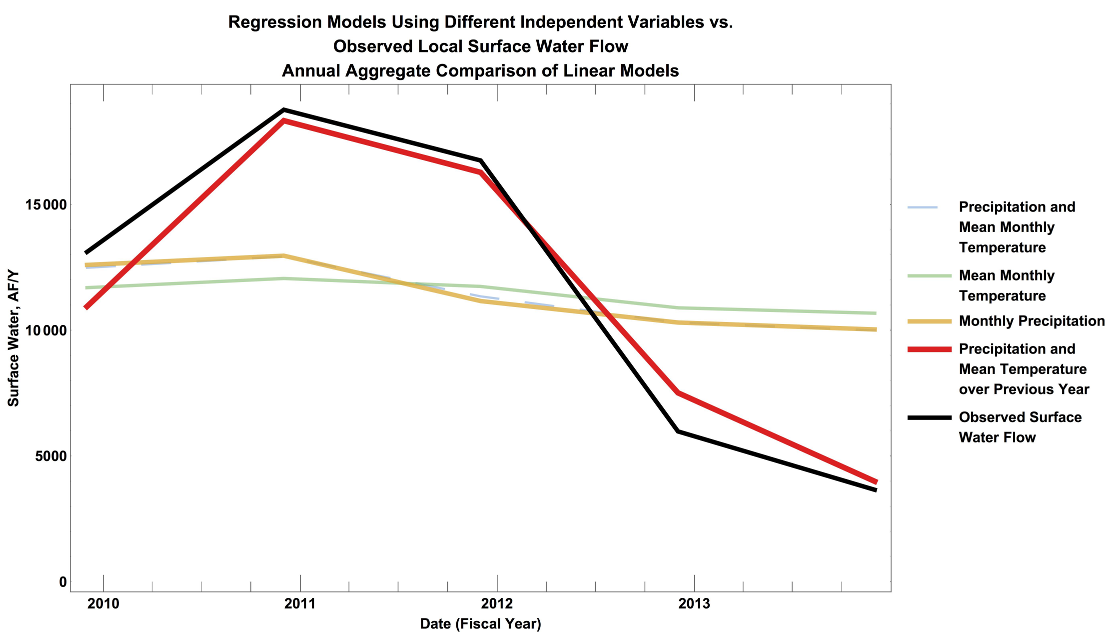


Figure 25: Four regression models averaged annually



The regression model using precipitation and the mean temperature of the previous year (a moving average of twelve months) appears to generally follow the downward trend, while the precipitation only model, while accounting for much of the same variance, does not reflect the monthly downward trend in flow shown in Figure 24.

Estimated flows using both the precipitation and mean annual temperature under all 343 climate scenarios included, in addition to the mean estimated flow across all climate model outcomes, are shown in Figure 26. These same estimates generated using the precipitation only model are shown below in Figure 27.

Figure 26: Annual projected IEUA surface supplies using the Precipitation and Temperature regression model

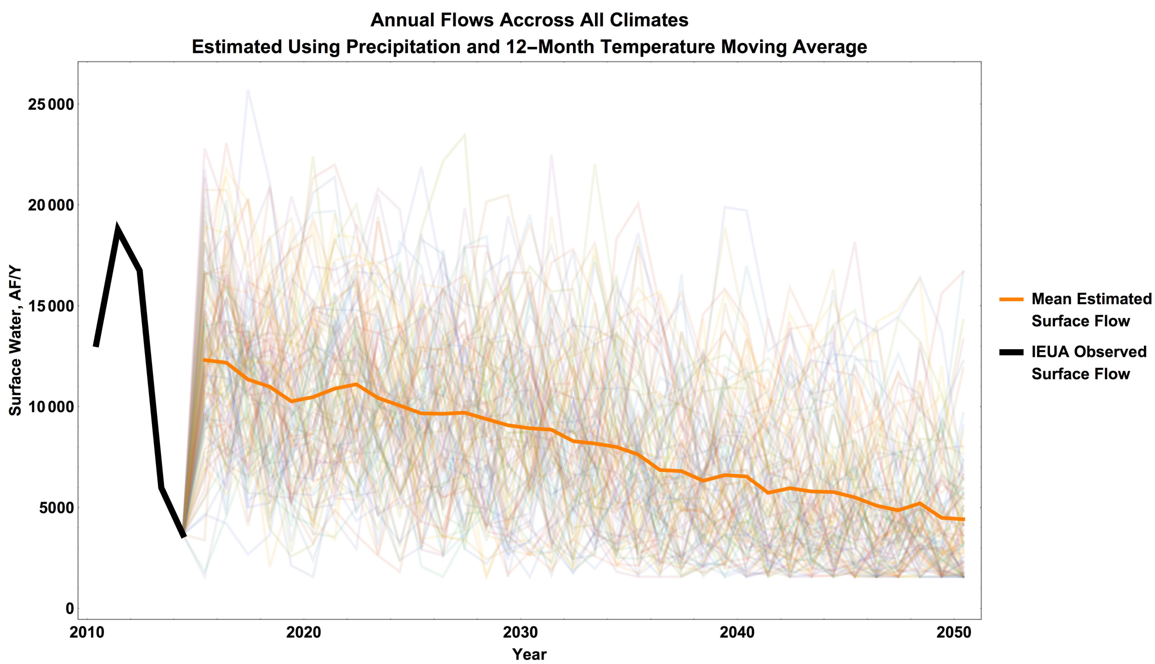
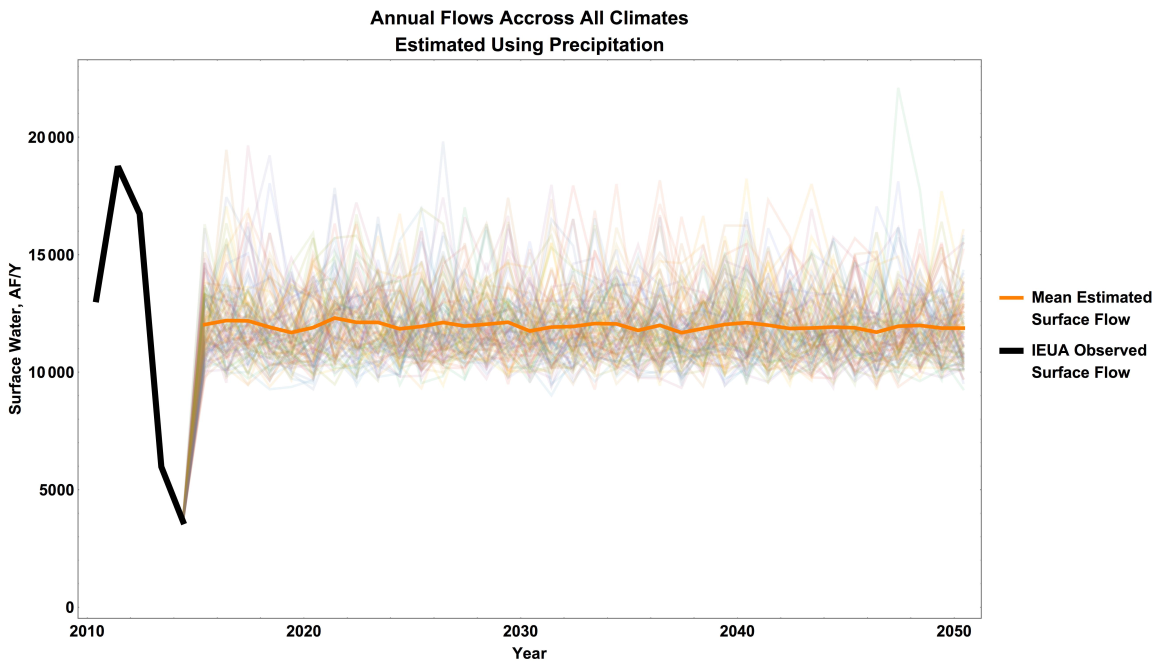


Figure 27: Annual projected IEUA surface supplies using the Precipitation regression model



Stormwater

Stormwater used for Chino Basin groundwater replenishment is projected to increase from effectively 0 to 6,400 AF by 2020. The historical stormwater recharge has been included in the Chino basin groundwater supply. Any "new" stormwater supply could be from projects constructued under the 2013 Recharge Master Plan Update prepared by the Chino Basin Water Master. In absence of more detailed information on how future stormwater would vary with respect to precipitation, we apply the same regression formula develop for surface water supply to the baseline supply as well as any additional supply specified as part of a water management strategy.

Imports via Metropolitan Water District

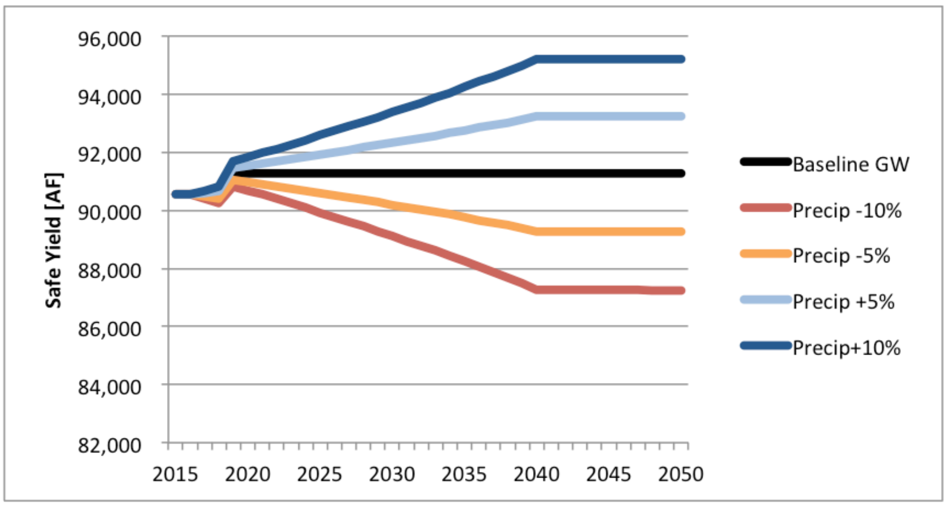
IEUA purchases water from MWD. Tier 1 water is generally used to meet urban indoor and outdoor demands. Per contract with MWD, IEUA must purchase at least 39,835 AF/year. Additional Tier 1 water, up to a total of 93,283 AF/year, is also typically made available to IEUA and is purchased when needed for direct use or groundwater replenishment. The baseline assumption for available additional Tier 1 water is 26,600 AF/year, for a total of just under 67,000 AF/year.

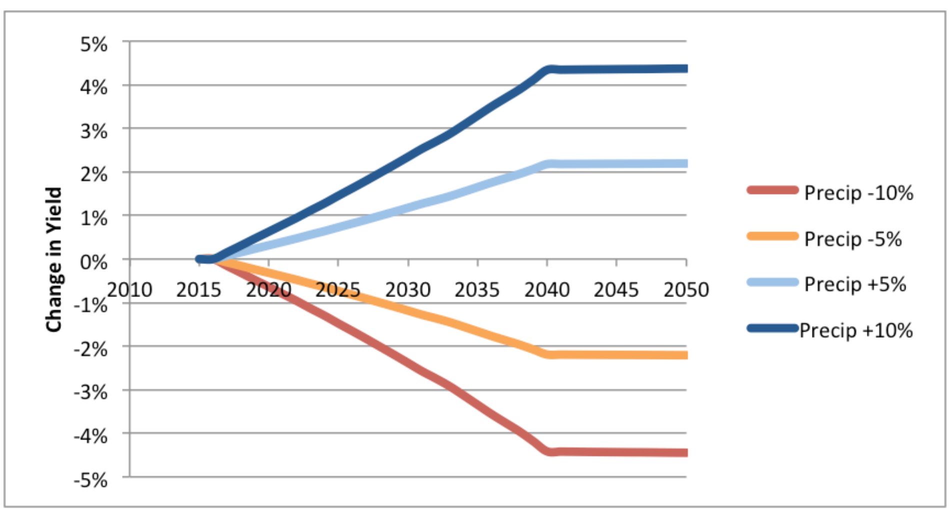
For this study we evaluate two possible levels of climate effect on additional Tier 1 water. In both cases, the total amount available declines beginning in 2021 through 2050. In one scenario, we assume additional Tier 1 water declines by 40%. In the other scenario, we assume declines of 80%. Note that these two level of water declines imply a total reduction in MWD Tier 1 water from 62,600 AF in the without climate change condition to 51,960 (for the 40% decline in additional supplies) and to 41,320 (for the 80% decline in additional supplies).

Chino Groundwater Basin

IEUA's share of Chino Basin's sustainable groundwater yield is set through actions of the Chino Basin Water Master. Under current basin conditions, the amount of groundwater available to the appropriators within the IEUA service area is 91,266 AF. An analysis by Wildermuth Environmental Inc. determined the sensitivity of IEUA's allowable production as a function of long-term precipitation trends (Figure 28). These data show that across the four scenarios evaluated, the safe yield would decline 0.44% for each 1% decline in long-term precipitation.

Figure 28: Safe yield over time for the baseline and four trends in precipitation (top); change in safe yield (as compared to 2015 across four trends in precipitation (bottom)





We then modified the Chino Basin safe yield by the product of the long-term precipitation trend and the empirically derived scaling factor. For example, groundwater safe yield would be reduced 4.4% by 2040 for a climate scenario that exhibits a long-term precipitation trend of -10%.

Key Simulation Results

The WEAP IEUA model simulates annual water supply and demand from 2010 to 2015. For this analysis, the key outputs reviewed included:

- Urban indoor and outdoor demand
- Supplies used to meet urban demand
- Unmet urban demand
- Recycled water inflows and outflows
- Chino Basin inflows and outflows

This section shows results for these outputs from the WEAP IEUA model for a single simulation—high demand scenario and historical climate.

Figure 29 shows annual indoor potable demand and outdoor demand—both potable and recycled. Note that indoor demand gradually increases each year, whereas outdoor demand varies year-to-year. The outdoor demand variation is due to the historical climate used in this simulation.

Figure 29: Urban indoor and outdoor demand for high demand scenario and historical climate

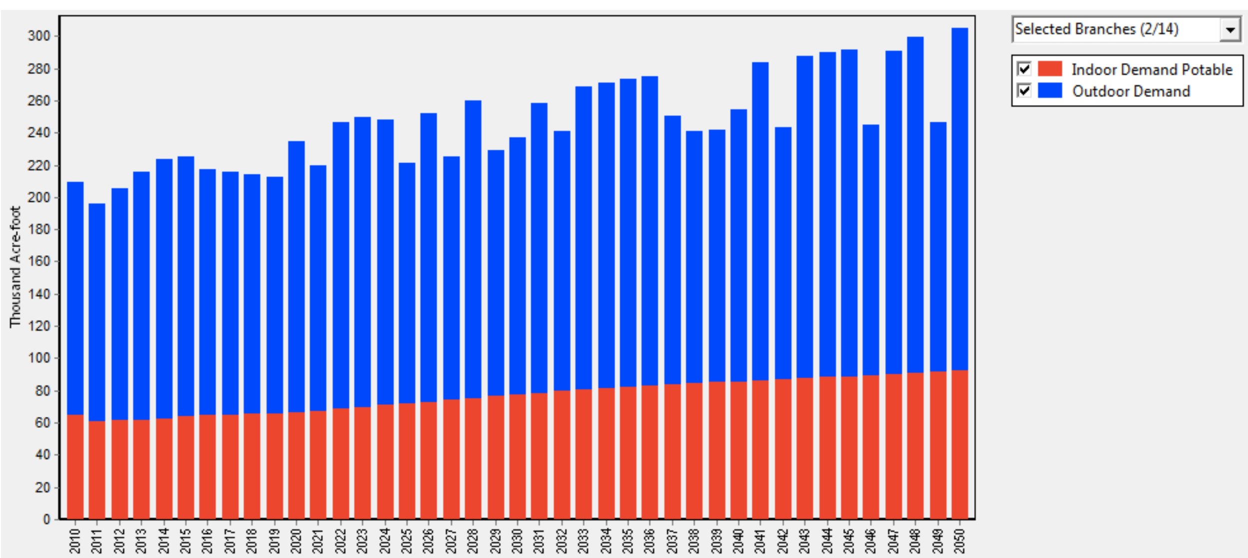


Figure 30 shows the mixture of supplies used to meet the demands in Figure 29. The largest source is Chino groundwater supplies. MWD Tier 1 supplies (minimum and additional) provide significant water. Lastly, recycled water provides about 20 percent of the supply.

Figure 30: Supplies used to meet demand for high demand scenario and historical climate

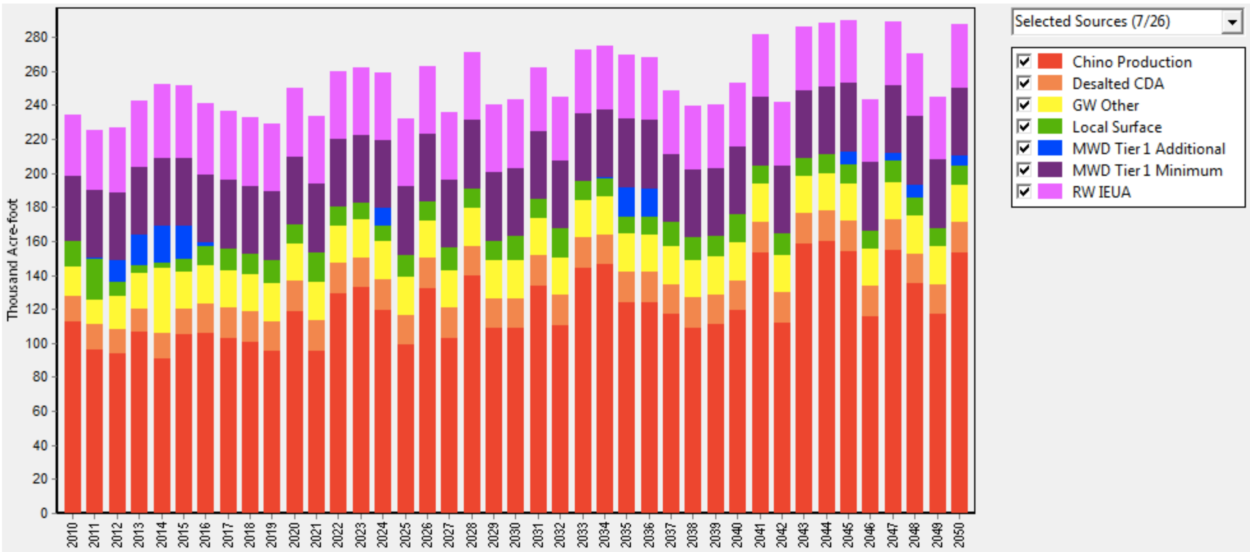


Figure 31 focuses on the recycled water portion of the IEUA system. The top bars show the inflows—return flow from IEUA indoor demand and some small amount of wastewater from outside the IEUA service area. The bottom bars show the destinations for the recycled water supply including: outdoor urban use (Recycled Direct), agricultural use (Ag RW Demand), the Santa Ana River (SAR Obligation and Downstream Flow), recharge to the Chino Basin (Req. Supp. Recharge and Recycled GW Recharge, Additional GW Recharge). Note that Downstream Flow represents more available recycled water than is needed to meet demand for recycled water. In simulations with low urban demand, there is no excess recycled water and instead shortages.

Figure 31: Sources of recycled water (top) and uses of recycled water (bottom) for high demand scenario and historical climate

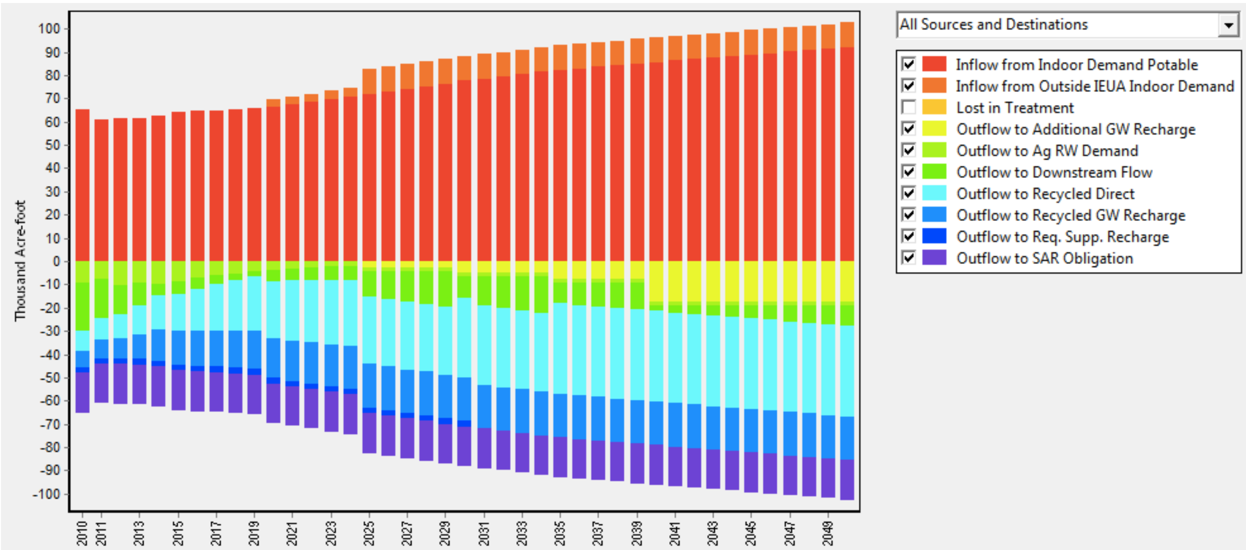
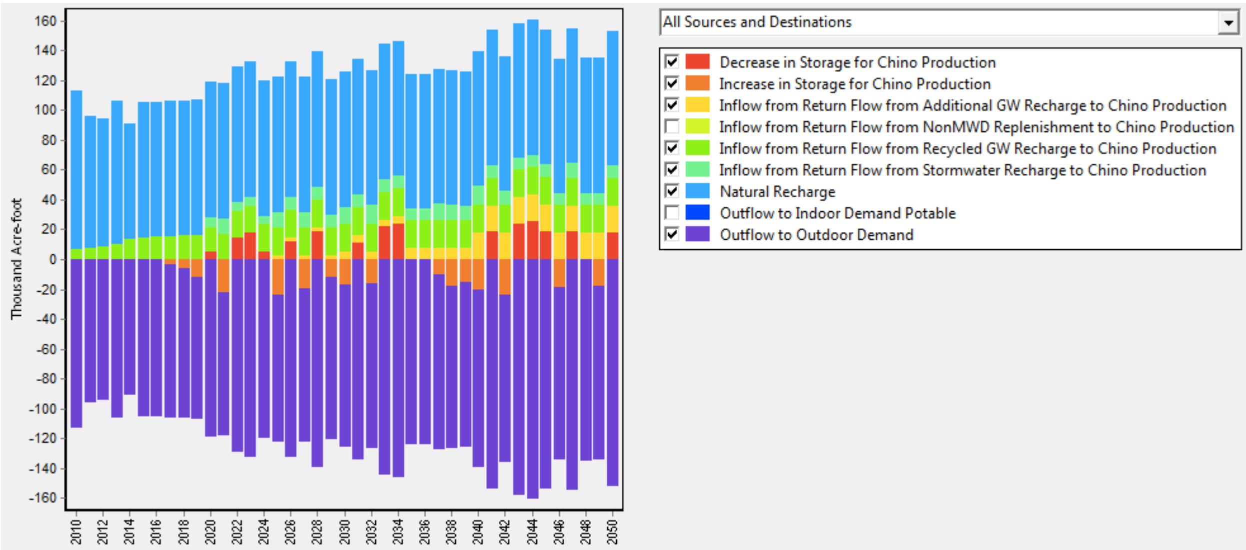


Figure 32 shows the inflows and outflows to the Chino Groundwater Basin. Natural Recharge is the largest source, but one can see how the different replenishment sources increase the inflows over time. The primary use of groundwater is to meet outdoor demands.[4] There is some modest increase and decrease in storage over the years.

[4] In reality, potable water for indoor and outdoor use are served using common water mains. The partitioning of supplies to indoor and outdoor potable use in the model reflects the priority structure used to ensure that shortages, if any, are experienced by outdoor uses first.

Figure 32: Inflows (top) and outflows (bottom) to the Chino Basin for high demand scenario and historical climate



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Appendix 3:

A&N Technical Services “Indoor and Outdoor Demands”

A & N Technical Services, Inc.

Memorandum

To: Jason Pivovaroff, IEUA

From: **David Pekelney and Thomas Chesnutt**

Date: January 24, 2014

Re: **Inferring Indoor and Outdoor Water End Uses in the IEUA Service Area**

Introduction

This memo documents the estimation of indoor and outdoor water end uses for water demand in the IEUA service area. This estimation of indoor/outdoor end uses is conducted by customer class—single family residential, multi-family residential, and commercial-industrial-institutional (CII). Indoor end uses are of particular interest to planners tasked with designing wastewater systems and recycled water systems because it helps them establish capacity requirements. Both indoor and outdoor use is of great interest to planners tasked with designing Water Use Efficiency (conservation) programs. Although much has already been accomplished with indoor conservation, there is some level of remaining potential for water savings. WUE planners have particular interest in outdoor use because it is generally assumed to be a large share of total use with large remaining potential for savings.

Two methods were used to estimate outdoor use across customer classes. The first method is the minimum month method that has been historically used in the water industry—this method assumes that the minimum month of water demand is 100 percent indoor end uses. Though we believe that this is a counterfactual assumption in the IEUA service area (it assumes exactly zero outdoor irrigation in the winter) we provide estimates using the minimum month method to serve as a point of comparison. The second method develops an estimate of winter irrigation from dedicated irrigation meters and applies this nonzero assumption instead. Termed a "seasonal variation" method, it applies the seasonal variation from dedicated irrigation meters to mixed meter customer classes.

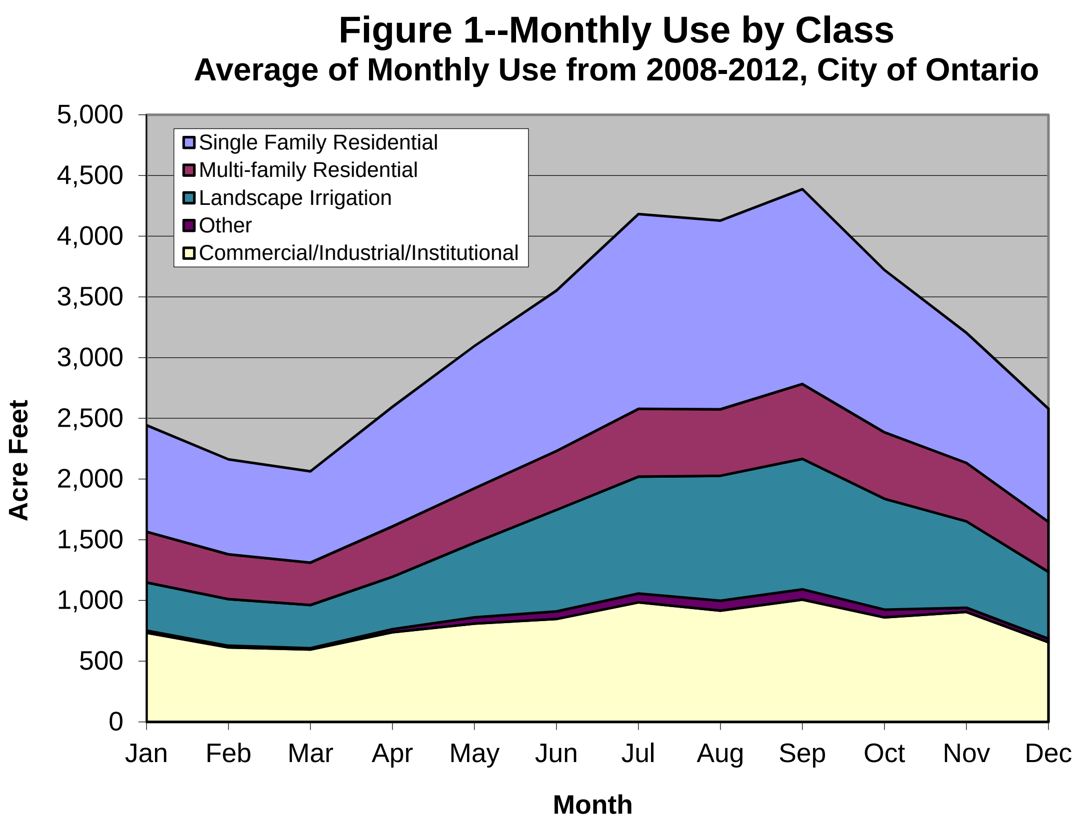
Data

The data used are from the California Department of Water Resources, Public Water System Statistics filings for the City of Ontario for the years 1993 to 2012. These data are billing system summaries at the monthly level. Several other retailers provided monthly use summaries; however, these were generated with bimonthly billing cycles. Since different retailers can apportion bimonthly billing into calendar months using different methods, it is more consistent to stick to the monthly data generated with monthly billing. Although CVWD, Upland, and MVWD provided monthly data (based on bimonthly billing), we used the City of Ontario data for this analysis because it was the only retailer to provide monthly use data generated by monthly billing.

Table 1 shows the average use from 2008 to 2012 summed by customer class. Figure 1 shows the sum of water use by month. The strong seasonal pattern reflects irrigation needs during the characteristic hot and dry summers.

Table 1 – Average Use, 2008 to 2012, City of Ontario

Class	Use (AF)	Percent
Single Family Residential	13,993	36.7%
Multi-family Residential	5,647	14.8%
Commercial/Industrial/Institutional	9,666	25.4%
Landscape Irrigation	8,259	21.7%
Other	549	1.4%
Total	38,114	100.0%



Methods

Outdoor end uses are directly measured by dedicated irrigation meters. Many other types of water meters--single family, multi family, commercial, industrial, and institutional--can be measuring both indoor and outdoor end uses. If not measured or observed directly, planners are forced to rely on inference or judgment. For IEUA, we have conducted two methods to infer outdoor use for all sectors.

Minimum Month Method

The most common method employed to infer outdoor use is to assume the winter use is all indoors. (This assumption may be closer to the truth in wetter or colder climates.) For example, if we calculate winter minimum use times 12 months we have inferred total indoor use for the year. Total use for the year minus indoor use then equals outdoor use.

In Table 2 below, we find that outdoor use calculated with the "minimum winter use is indoor use" method is 46%. The method underestimates outdoor use because there is likely to be at least some winter irrigation in dry climates. Variations on this method include daily accounting and various ways to define winter minimum. Note the results of this method will vary considerably from year to year; the reader is cautioned when using results from one year for planning purposes and we used for this analysis the monthly average over the five most recent years for which data were available (2008 to 2012).

Table 2 – Percent Outdoor Use

Class	Total	Minimum Month Method	Seasonal Variation Method
Single Family Residential	13,993	36%	58%
Multi-family Residential	5,647	26%	43%
Commercial/Industrial/Institutional	9,666	26%	42%
Landscape Irrigation	8,259	100%	100%
Other	549	75%	100%
Total	38,114	46%	62%

Seasonal Variation Method

The second method to infer outdoor use consists of employing the pattern of seasonal variation with dedicated irrigation meters and applying it to other sectors with mixed meters. The reasoning is that with dedicated irrigation meters we can measure winter irrigation. Thus, we can observe the relative water use in winter and summer irrigation seasons and calculate a parameter from variables that are observable in other sectors. For example, by calculating the ratio of winter minimum to the seasonal range we have a function of variables observable for sectors other than dedicated irrigation meters. This method will result in a higher estimate of outdoor water use than using minimum month. The method relies on the assumption that the seasonal variation of outdoor use is the same for sites with dedicated meters as for sites with mixed meters.

Due to the variability of landscape water use from year to year, we expect the calculated parameter to vary considerably from year to year. For this reason, we calculated the parameter (ratio of winter minimum to seasonal range) for each year for which we could collect data (1993 to 2012) and took the average. We applied this long term average to the monthly average of the most recent five years of consumption data (2008 to 2012) because of the changing distribution of water use by customer class as more dedicated irrigation meters are employed.

Figure 2 shows the use from irrigation-only meters, with winter irrigation illustrated in blue and the seasonal range in red for one example year (2011).

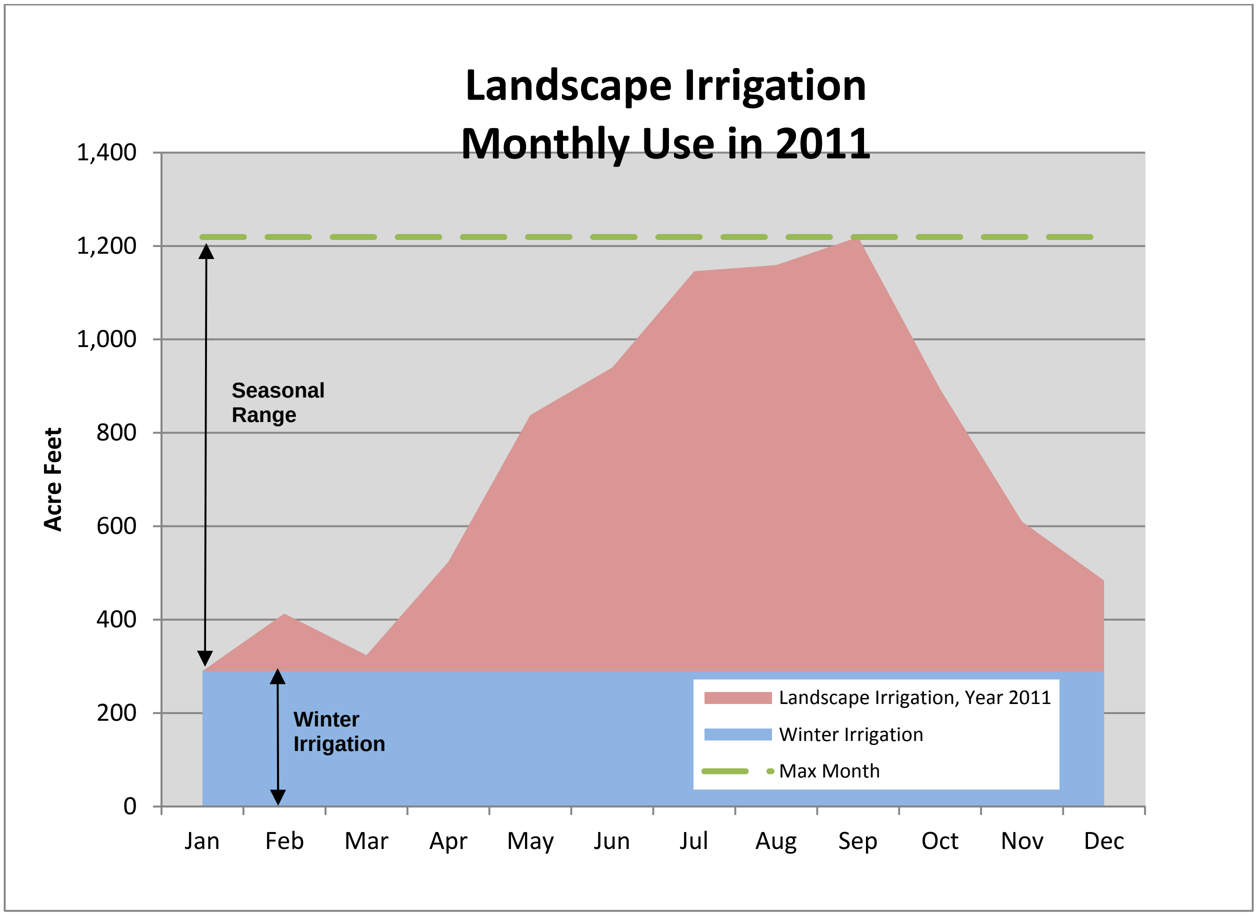
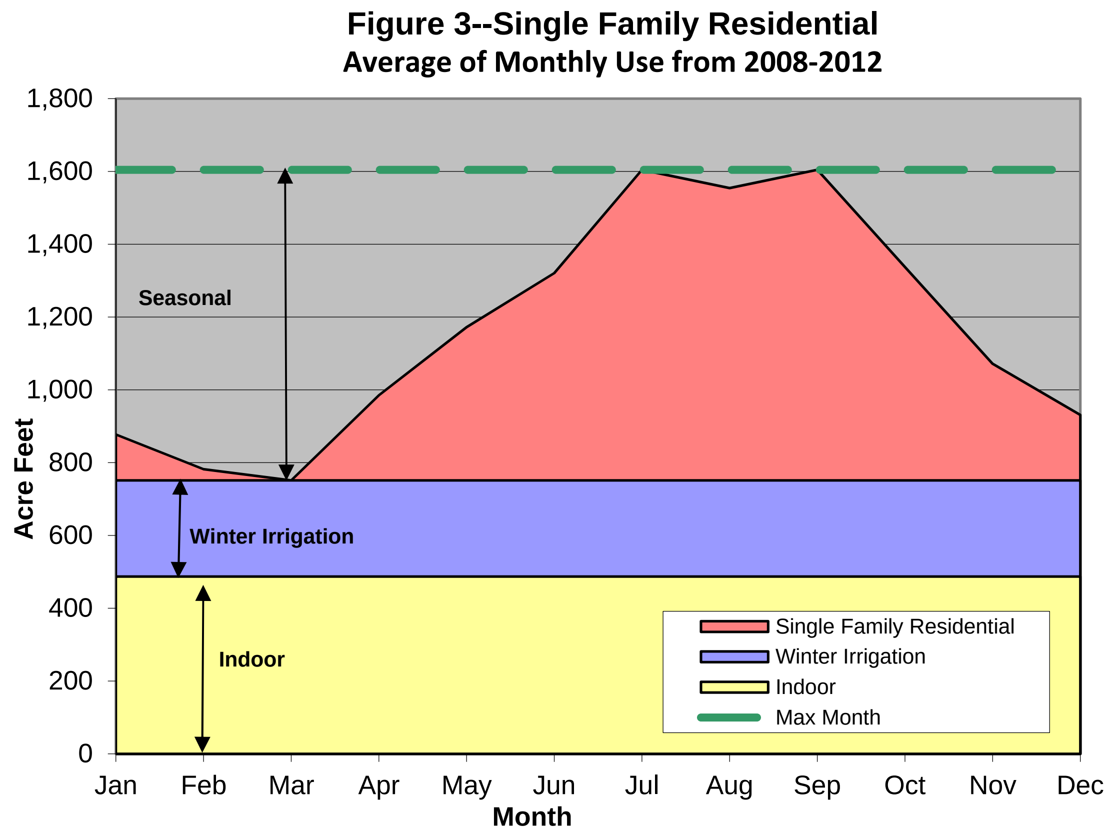


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors with mixed meters (31%).

Seasonal range and winter minimum are observable for non-irrigation classes. If we assume that winter irrigation is also 31% of seasonal range for the non-irrigation customer categories, we can infer their winter irrigation, and thus indoor and outdoor use.



For example, Figure 3 shows winter irrigation calculated as 31% of seasonal range for the single family residential sector. Total outdoor use (red+blue in this graph) is, thus, 58% of total use for the year (red+blue+yellow). In contrast, using the minimum month for the single family sector results in 36% outdoor use (red area only).

Conclusions and Recommendations

The seasonal variation method estimates outdoor end uses to compose 62 percent of M&I water demand (across all customer sectors) in the IEUA service area. We recommend using the seasonal variation method because we know the minimum month method systematically underestimates outdoor water use in climates where there is winter irrigation such as IEUA.

Although the minimum month method systematically underestimates outdoor use and overestimates indoor use--and we do not recommend using it for planning water resource investments--it is a commonly used method that is simple to implement and, thus, it may have value as a comparison benchmark.

This analysis used empirical measures using monthly-billed data from one of the larger retail water service areas. We can improve the reliability of the results by expanding the data set to include other IEUA service areas that utilize monthly billing.

As stated in the Introduction, estimation of indoor/outdoor split is of particular interest because it aids with designing wastewater system and recycled water systems to establish capacity requirements. Indoor use is directly related to wastewater flows; however, that does not mean they should be directly compared. Indoor use and wastewater flows are not commensurate without accounting for the following:

- The water volume used in the indoor/outdoor estimate derives from customer consumption measures. If a comparison to production measures is desired, one must account for factors that explain the differences between production and consumption measures: system loss, unaccounted for water, meter accuracy, and unmetered water. Additionally, if applying the estimate of indoor water use to total production, agricultural use needs to be separately accounted for because the estimates of indoor water use were constructed with M&I consumption data only.
- Some indoor use does not go down the drain because of cooking, consumption, cleaning, indoor plants, and other uses. These indoor water uses do not translate into wastewater flows.
- Parts of the unincorporated areas of IEUA are not hooked up to the sewer system—they still use septic systems—and their indoor use also does not translate to sewer flow.
- Any loss or gain in volume between the customer and the wastewater treatment plant would also need to be accounted for. For example, infiltration and inflows, wastewater system loss, and evaporation are potential effects on wastewater volume.
- It is easy to observe that water consumption data is inherently more variable than wastewater inflow measures due to outdoor use and weather variability. The estimate of indoor water use as a proportion of total M&I use in the City of Ontario is 38% over the years 1992-2012. If this proportion is calculated using the most recent five years from 2008 to 2012, the proportion of indoor water use is only 36%. This proportion should clearly not be thought of as a constant over time.

In sum, although most of indoor water use does indeed flow to the treatment plant, the estimates of wastewater flow and the indoor water use are not directly comparable without accounting for the above factors.

Appendix 4:

A&N Technical Services “Demand Influencing Factors”

Baseline Demand Influences

Table 1 summarizes the demand influences that were incorporated into the corresponding baseline demand forecast. The following sections define each level of influence, or adjustment that was applied to the normalized demand forecast.

Table 1: Baseline demand influences incorporated within each demand forecast

	Baseline Demand Influences					
	Economic Cycle	**Household Income**	**Housing Density**	**Weather**	**Climate Change**	**Customer Response**
Upper Forecast	Baseline	Baseline	City General Plan	Multiple Dry	High	Permanent
Lower Forecast	Baseline	Baseline	SCAG	Dry	Baseline	Permanent
Planning Forecast	NA	NA	DWR	NA	NA	NA

Notes: NA = Not Applicable

Economic Cycle

Ability to specify how strong and weak market conditions impact demand. The effect from market conditions was defined from historical demand data through the normalizing process.

- **Weak –** implies weak market conditions and demand is reduced by 6.55%.
- **Baseline –** implies that demand will not change and market conditions will remain normal/average.
- **Strong –** implies strong market conditions and demand will increase by 6.55%

Median Household Income

Ability to incorporate potential changes in demand related to household income. The following alternatives were based on the following assumptions.

- **Low** – median household income growth is below the baseline rate and reduces over time at minus 1% percent per year. Implies that demand will potentially be reduced.
- **Baseline—** median household income trends at the predicted rate per the 2012 SCAG RTP/SCS. Implies that demand will not change and will remain normal/average.
- **High** – median household income growth increases faster than the baseline rate and increases at plus 1% percent per year. Implies that demand will potentially be increased.

Housing Density

Ability to adjust the water use factor applied to each occupied housing unit based upon the expected density of future development. The density values below are aggregated regional values for the Agency's service area. In general, higher housing densification tends to have lower water use per unit caused by reduced landscape areas and more stringent water use efficiency standards.

- **City General Plan –** incorporates housing density reflective of the 2014 City General Plans.
  - Single family residential density range 1.2 – 4.2 units per acre
  - Multi-family residential density range 9.7 – 17.3 units per acre
- **Baseline –** implies that future residential development resembles past/traditional dwelling units per land area.
- **SCAG** - incorporates housing density reflective of the 2012 S.California Association of Governments Regional Transportation Plan/Sustainable Communities Strategy (2012 SCAG RTP/SCS).
  - Single family residential density range 2.3 – 5.4 units per acre
  - Multi-family residential density range 8.4 – 17.0 units per acre
- **DWR –** does not incorporate housing density, assumed a modified version of the current DWR State Model Water Efficient Landscape Ordinance. Assumed the following efficiency standards:
  - 70% relative evapotranspiration (Eto) for existing landscapes
  - 60% relative Eto for new landscapes
  - Indoor water use for future development of 55 gallons per capita day (GPCD) in 2015 to 35 GPCD by 2040.
  - Number of occupied housing units per SCAG RTP/SCS
  - Assumed 62% of total demand for residential use

Weather

Ability to specify how weather conditions impact demand from below and above average/normal conditions. The effect of weather variation was defined from historical demand data through the normalizing process.

- **Wet –** implies that demand will be decreased by 3.74% due to below normal temperature and increased wet periods.
- **Baseline** - implies that demand will not change and weather will remain normal/average conditions.
- **Dry –** implies that demand will increase by 3.74% due to above normal temperature and reduced wet periods.
- **Multiple Dry –** implies that demand will increase by 5.98% due to extended periods of above normal temperature and reduced wet periods.

Climate Change

Long term climate change is modeled by using recent Global Climate Change model predictions of potential increases in temperature and corresponding impact to demands. The Regional Climate Trends and Scenarios from the Southwest U.S. were referenced from the National Oceanic and Atmospheric Administration (NOAA) Technical Report NESDIS 142-5. (http://scenarios.globalchange.gov/report/regional-climate-trends-and-scenarios-us-nationalclimate-assessment-part-5-climate-southwest)

- **Baseline -** implies that demand will not change and climate will remain at normal/average conditions.
- **Median** (50th percentile) – implies that expected temperature will increase by 2.7 degree Fahrenheit due to climate change. This would increase demands by 3.2% by 2040.
- **High** (80th percentile) – implies that expected temperature will increase by 3.6 degree Fahrenheit due to climate change. This would increase demands by 4.3% by 2040.

Customer Response and Water Use Behavior

Defines how much of recent demand reductions will persist into the future that is permanent. The effect from recent customer response and water use behavior was defined from historical demand data through the normalizing process.

- **Baseline –** implies that demand will not change and everything will return to the normal, or bounce back to normal/average conditions.
- **Permanent –** implies that the 4.6% recent reduction is a permanent lifestyle change and continues to 2040.

Baseline Demand Comparison: Normalized vs. Adjusted

Figure A presents the Upper, Lower and Planning Forecasts under Baseline assumptions, therefore all demand influences are assumed to be normal or under average conditions, except for housing density. Housing density remained as indicated in Table 1. Figure B presents the same demand forecasts with the demand influences indicated in Table 1. As shown, there is a slight difference in the forecast envelope when you compare Figure A to B. The common attribute between the two Figures is housing density; therefore as shown, the other demand influences did not have as much impact to the demand forecasts as housing density did. To note, each demand influence adjusts the normalized water use factors that are applied regional growth projections for number of households and employees per sector.

Figure A: Baseline demand forecasts under normal or average conditions.

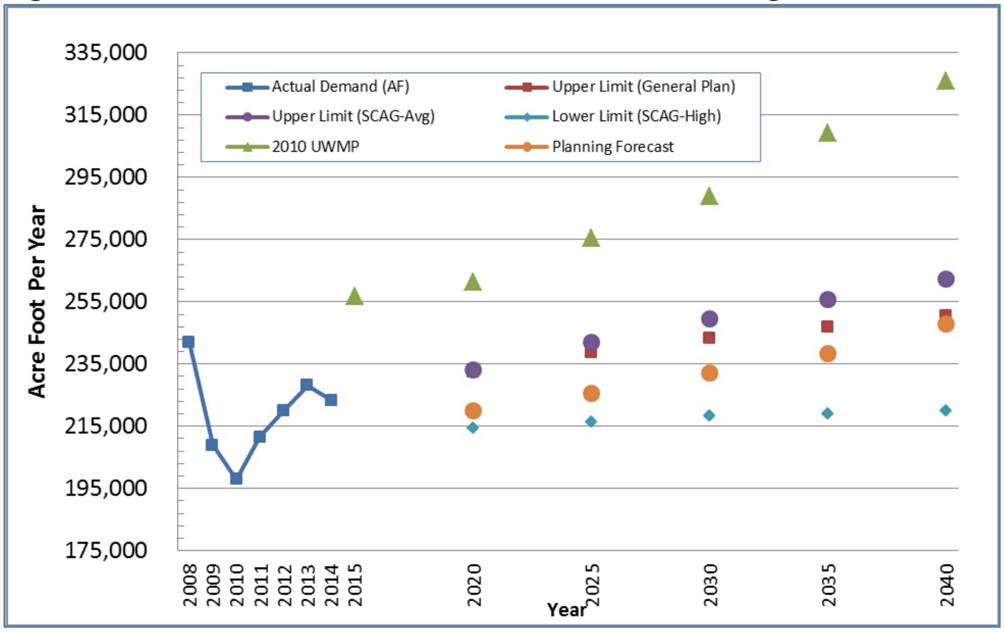
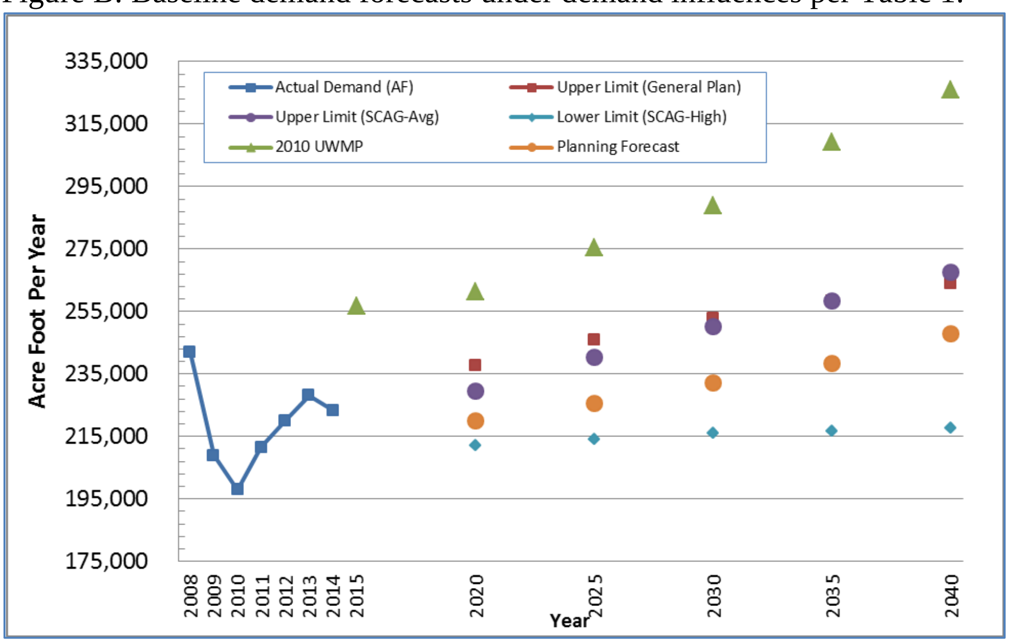


Figure B: Baseline demand forecasts under demand influences per Table 1.



Appendix 5:

Full IRP Technical Committee Identified Project List

ID	Project Name	Description	AF yield	Years to "wet water" yield	Increased groundwater in storage?	Increases water level in critical GW management zones?	Increased stormwater capture/recharge?	Increased permeability or natural infiltration for	Provide additional recycled water?	Reduce Dependence on imported water from MWD during dry	Increase local water supplies?	Emergency local supply redundancy?	Decrease reliance on local surface water during dry years?	Requires conservation in existing development?	Requires demand management in new development?	Reduce TDS and/or nitrates in GW?	Decrease net energy consumption?	Increase capacity of wet year water ("big	Eligible for grant funding?	Technical feasibility/ease of
1	Groundwater Treatment (Rehab)-Increment 1	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
2	Groundwater Treatment (Rehab)-Increment 2	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
3	Groundwater Treatment (new)-Increment 1	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
4	Groundwater Treatment (new)-Increment 2	This project category will construct a new groundwater production well and treatment facility to address water quality concerns. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Increased well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 + 2 will provide up to 10,000 AFY of production.	5,000	2	0	0	1	1	1	2	2	1	1	1	1	2	2	1	1	2
5	Production Wells-Increment 1	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1 will provide up to 5,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
6	Production Wells-Increment 2	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1+2 will provide up to 10,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2
7	Production Wells-Increment 3	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-3 will provide up to 15,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
8	Production Wells-Increment 4	With increasing groundwater recharge to the Chino Basin, new production wells may need to be constructed to recover the additional groundwater. It is assumed that additional pumping would be limited by the volume of recharge occurring (over operating safe yield). Well operation could supplement annual demands or intermittent to help offset losses in another water supply. Increment 1-4 will provide up to 20,000 AFY of production	5,000	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	1	2
9	WRCRWA RW Intertie	The Western Riverside County Regional Wastewater Authority (WRCRWA) Plant intertie would allow for the delivery of recycled water from the WRCRWA Plant to be used in the IEUA southern service area. This would also allow additional recycled water to be delivered into the northern service area groundwater recharge basins by reducing the demand from the RP-1 930 pressure zone pump station. Intertie would occur within the 800/930 Pressure Zones.	4,500	10	2	1	1	1	2	2	2	2	1	1	1	1	2	1	1	1
10	Rialto RW Intertie	The Rialto intertie project would allow for delivery of recycled water from the Rialto WWTP to be used in the IEUA service area. The intertie could occur near the RP-3 groundwater recharge basins. This concept could involve the Inland Valley Pipeline, LLC (IVP) to convey water between Rialto WWTP and IEUA's recycled water distribution system. Supply could be used for direct, GWR or other reuse strategy.	4,500	10	2	2	1	1	2	2	2	2	1	1	1	1	2	1	1	1
11	Pomona RW Exchange/Transfer	The City of Pomona does not currently use all of the treated effluent from the Pomona WRP. One concept would involve partnering to develop and expand their recycled water facilities in exchange for an agreed amount of their Chino Basin groundwater right. Could include other supply transfer agreement such as reclaimable waste and/or groundwater.	2,500	10	2	2	1	1	1	2	2	1	1	1	1	1	2	1	1	1
12	RP-1 RW Injection-Increment 1	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1 facility would be sized for 2,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2

13	RP-1 RW Injection-Increment 2	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility would be sized for 5,000 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
14	RP-1 RW Injection-Increment 3	This project would construct an advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) facility at RP-1 to further treat tertiary effluent to allow the water to be injected directly into Chino Basin. The sizing of the facility and the volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility would be sized for 7,500 AFY.	2,500	9	2	1	1	1	1	2	2	1	1	1	1	2	0	1	1	2
15	Satellite RW Injection-Increment 1	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1 facility, or facilities would have a capacity of 2,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	2	2
16	Satellite RW Injection-Increment 2	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1+2 facility, or facilities would have a capacity of 5,000 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
17	Satellite RW Injection-Increment 3	This project category would construct a satellite (outside of RP-1) wastewater treatment plant with advanced water filtration (e.g. process treatment that combines micro or ultrafiltration) to allow the water to be injected directly into Chino Basin. The location, sizing and volume to be produced will be determined as part of the portfolio development process. Increment 1-3 facility, or facilities would have a capacity of 7,500 AFY.	2,500	5	2	2	1	1	1	2	2	1	1	1	1	2	0	1	1	2
18	Desalter Recovery Improvement	The existing Chino Basin I Desalter (CD-1) recovers approximately 75 percent of water. Improvements could be done to increase recovery to approximately 90 percent. This water would be conveyed through the existing potable water system.	1,500	3	1	1	1	1	1	2	2	1	1	1	1	2	1	1	1	2
19	RW Direct Use Expansion-Increment 1	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1 facilities would increase direct use beyond baseline supply by 5,000 AFY.	5,000	15	1	1	1	1	1	2	2	1	1	1	1	0	2	1	2	2
20	RW Direct Use Expansion-Increment 2	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1+2 facilities would increase direct use beyond baseline supply by 10,000 AFY.	5,000	20	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
21	RW Direct Use Expansion-Increment 3	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-3 facilities would increase direct use beyond baseline supply by 15,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
22	RW Direct Use Expansion-Increment 4	IEUA developed a new Recycled Water Program Strategy concurrent with the IRP. This project category will be used to determine the potential interest in expanding the direct use system beyond the Agency's Ten Year CIP. Includes the reuse of regional wastewater supply, approximately 83,000 AFY by 2035 and potential recycled water interties. Increment 1-4 facilities would increase direct use beyond baseline supply by 20,000 AFY.	5,000	25	1	1	1	1	1	2	2	1	1	1	1	0	2	1	1	2
23	Existing GWR Basin Improvements beyond RMPU-Increment 1	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1 facilities would increase recharge at existing basins within the Chino Basin by an additional 2,500 AFY.	2,500	15	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
24	Existing GWR Basin Improvements beyond RMPU-Increment 2	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1+2 facilities would increase recharge at existing basins within the Chino Basin by an additional 5,000 AFY.	2,500	20	2	2	1	1	1	2	2	1	1	1	1	0	2	1	2	2
25	Existing GWR Basin Improvements beyond RMPU-Increment 3	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-3 facilities would increase recharge at existing basins within the Chino Basin by an additional 10,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2

26	Existing GWR Basin Improvements beyond RMPU-Increment 4	The 2013 Chino Basin RMPU recommended a set of preferred projects to improve recharge at the existing groundwater spreading basins. This project category represents the next increment of additional groundwater recharge (imported water and/or recycled water) capable at the existing facilities. Increment 1-4 facilities would increase recharge at existing basins within the Chino Basin by an additional 15,000 AFY.	5,000	25	2	2	1	1	1	2	2	1	1	1	1	0	2	1	1	2
27	Construct New GWR Basins-Increment 1	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1 would provide up to an additional 2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation.	2,450	10	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
28	Construct New GWR Basins-Increment 2	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1+2 would provide up to an additional 4,900 AFY of recharge capacity, which is approximately 2 new basins at 350 AF per month for 7 months of operation.	2,450	15	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
29	Construct New GWR Basins-Increment 3	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-3 would provide up to an additional 7,350 AFY of recharge capacity, which is approximately 3 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
30	Construct New GWR Basins-Increment 4	Purchase land to construct new groundwater recharge basins in the service area to capture additional stormwater, recycled water and/or imported water for groundwater recharge. Increment 1-4 would provide up to an additional 9,800 AFY of recharge capacity, which is approximately 4 new basins at 350 AF per month for 7 months of operation.	2,450	20	2	2	2	1	1	2	2	1	1	1	1	0	2	1	1	2
31	ASR wells MZ1 and MZ2	Construct aquifer storage and recovery (ASR) wells to increase improted water groundwater recharge within management zone 1 and 2. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.1 and 3 for CVWD and the City of Ontario.	11,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
32	ASR wells MZ3	Construct aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge within management zone 3. Reference projects were taken from the 2010 RMPU, Sections 6.7.2.2 for JCSD.	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	2	2
33	Maximize ASR wells	Construct other aquifer storage and recovery (ASR) wells to increase imported water groundwater recharge by 3,500 AFY within the Chino Basin during wet and dry years. Assume benefit 40% of the time (2 in 5 years). Storage to be dependent on supplemental water availability in wet years	3,500	5	2	2	1	1	1	0	2	1	1	1	1	2	0	1	1	2
34	Cadiz IW Transfer	The Cadiz project would allow for the import of unused groundwater from the remote Fenner Valley near Cadiz, California. For the purposes of the IRP, a 5,000 AFY increment of water is assumed. The Cadiz supply would be transferred and taken as SWP water into the Chino Basin.	5,000	20	2	1	1	1	1	2	2	1	1	1	1	0	1	1	1	1
35	Secure SWP IW transfer outside MWD	Imported water supply is solely from MWD via the SWP and is limited by the Agency's purchase order. Other permanent, temporary or seasonally available imported water supplies could be purchased and wheeled into the Chino Basin. The volume of water available varies depending on the source of water and timing. Supplies could be purchased from various Irrigation Districts or secured via Ag Transfer. Assume benefit 1 in 10 years	5,000	10	2	1	1	1	1	1	2	1	1	1	1	1	0	2	1	1
36	SBVMWD IW Transfer	As a SWP contractor, San Bernardino Valley MWD (SBVMWD) has a Table A allocation. This option would involve constructing an intertie between SBVMWD's imported water system. The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	5,000	5	2	1	1	1	1	1	2	1	1	1	1	2	0	2	1	1
37	Ocean Desalination Exchange	This project category would involve a partnership with another water agency pursuing ocean water desalination; through in-lieu exchange, the Chino basin would obtain an agreed amount of imported water. For the purposes of the IRP, a volume of 5,000 AFY was chosen. Opportunity to invest in upcoming ocean desalination plants includes Huntington Beach, Carlsbad and West Basin.	5,000	10	2	1	1	1	1	1	2	1	1	1	1	2	0	1	1	1
38	Six Basin Water Transfer	This project would explore the idea of developing a water transfer agreement with Six Basins. One concept is to purchase imported water for recharge into Six Basins and get in return equal volume of groundwater underflow plus agreed amount of stormwater. For example, could purchase 10,000 AF of IW for exchange of 10,000 AF of groundwater plus 7,000 AF of stormwater. Assume benefit 1 in 5 years.	17,000	5	2	2	2	1	1	2	2	1	1	1	1	2	0	1	0	1
39	Expand WUE Devices	Implement additional targeted device related savings to reduce demand beyond current annual water use efficiency savings. Provide incentives and pilot programs to roll out extremely high efficient indoor fixtures and toilets. To be verified with WUEBP.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
40	WUE - Turf Removal-Increment 1	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1 would provide up to 5,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
41	WUE - Turf Removal-Increment 2	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1+2 would provide up to 10,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
42	WUE - Turf Removal-Increment 3	Implement turf removal and landscape transformational programs to reduce outdoor demand. To be verified with WUEBP. Increment 1-3 would provide up to 15,000 AFY of savings.	5,000	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
43	WUE - Budget Rates-Increment 1	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 13,350 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2

44	WUE - Budget Rates-Increment 2	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 26,700 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
45	WUE - Budget Rates-Increment 3	Implement water budget based rates for 2 member agencies (assuming 15% total savings per Agency after 3 years). To be verified with WUEBP. Increment 1 would provide up to 40,050 AFY of savings.	13,350	1	1	1	1	1	1	2	2	1	1	2	2	1	2	1	2	2
46	WUE- RW Demand Management-Increment 1	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1 would provide 2,500 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
47	WUE- RW Demand Management-Increment 2	Implement demand management devices and programs for direct recycled water customers. Does not generate additional supply, aids in managing the supply during peak demand. Increment 1+2 would provide 5,000 AFY of demand management, this supply could be used for increasing direct use demands, groundwater recharge or other reuse strategy.	2,500	1	1	1	1	1	1	2	2	2	1	2	2	1	2	1	2	2
48	Dry Weather Flow Diversions	Capture and treat urban dry weather flow from Chino, Cucamonga and San Sevaine Creek into the Regional Plants. For the purposes of the IRP, a volume of 3,500 AFY was assumed as total available dry weather flow.	3,500	5	2	1	2	1	2	2	2	1	0	1	1	1	2	1	1	2
52	San Antonio Creek SW Capture	Modify existing basins along San Antonio Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years	1,000	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
53	Cucamonga Creek SW Capture	Modify existing basins along Cucamonga Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
54	Day Creek SW Capture	Modify existing basins along Day Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
55	San Sevaine Creek SW Capture	Modify existing basins along San Sevaine Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept. Assume benefit 1 in 5 years.	2,500	10	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2
56	Water Banking Facility	This project category would invest into the Semitropic Groundwater Storage Bank in Kern County or similar program. The Chino Basin could bank additional purchases of wet year water when these supplies are available and Chino Basin facilities are capacity limited.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	1	1	2	0	1
58	Regional LID-Increment 1	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1 facilities could provide up to 5,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
59	Regional LID-Increment 2	Construct or modify urban development to better manage and infiltrate rainfall at the source. Projects could include bioswales and or pervious concrete installation in parking lots, street drainages. Increment 1+2 facilities could provide up to 10,000 AFY of recharge.	5,000	5	2	1	2	2	1	1	2	1	1	1	1	2	2	2	2	2
60	Direct Potable Reuse-Increment 1	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1 facility would have a capacity of 5,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
61	Direct Potable Reuse-Increment 2	This project would construct an advanced water filtration and treatment (e.g. process treatment that combines micro or ultrafiltration) facility at a Regional Plant. The treatment process would allow the recycled water to be introduced into the potable water system. Increment 1+2 facility would have a capacity of 10,000 AFY.	5,000	10	1	1	1	1	1	2	2	1	1	1	1	2	0	1	2	2
62	Cucamonga Basin Improvements	This project category will identify projects that would result in additional groundwater production benefits coming into the IEUA service area from the Cucamonga Basin. Includes recharge facilities, treatment and production facilities to maximize supply coming into the Chino Basin.	2,500	5	2	2	2	1	1	2	2	1	1	1	1	0	2	1	2	2
63	Maximize Other Groundwater	This project category will identify local member agency projects that would result in additional groundwater production benefits coming into the IEUA service area outside of the Chino Basin.	5,000	5	1	1	1	1	1	2	2	1	1	1	1	1	2	2	1	2
65	RP-1 NRWS Treatment	The north Non Reclaimable Wastewater System (NRWS) discharges approx.. 3.5 MGD of brine to Los Angeles County annually. The project would construct a treatment facility to allow the Region to reuse this supply into the recycled water system. Requires plant expansion and partial reverse osmosis for blending.	3,920	9	2	1	1	1	2	2	2	1	1	1	1	2	1	1	2	2
66	WUE - Advanced Metering Technologies	Install advanced metering infrastructure (AMI) between retail meters and a utility provider. Will provide real-time data about consumption and allow customers to make informed choices about usage.	5,000	$ 3	1	1	1	1	1	2	2	1	1	2	2	1	2	1	1	2
87	Prior Stored Chino Groundwater	This category will allow supply to be taken from groundwater stored in the Chino Basin, pre 2014. It is estimated that approximately 400,000 AF of stored groundwater is available, of which 280,000 AF is made available for IEUA member agencies. This supply category will be managed on a case by case basis as selected into the Regional supply portfolios. The supply will be limited, but can be used annually or intermittent as needed.	8,400	1	0	0	1	1	1	2	2	1	1	1	1	2	2	1	2	2
88	Maximize Local Surface Water	This category of projects will construct facilities needed to capture additional local surface water. Projects to be defined by IEUA's member agencies. For example, increase surface flows off Lytle Creek in wet years. Assume benefit 3 in 5 years	1,000	1	2	1	2	1	2	2	2	1	0	1	1	2	2	1	2	2

89	Max Tier 1 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 7,850 AFY. Can be purchased annually or intermittently.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
90	Max Tier 1 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 15,700 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
91	Max Tier 1 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 1 rate. Total available supply at Tier 1 rate is 93,283 AFY or cumulative purchase order maximum of 932,830 AF through December 31, 2024. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 23,550 AFY. Can be purchased annually or intermittent.	7,850	1	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
92	Max Tier 2 MWD Imported Water-Increment 1	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 5,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
93	Max Tier 2 MWD Imported Water-Increment 2	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittent.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
94	Max Tier 2 MWD Imported Water-Increment 3	Maximize imported water from MWD at Tier 2 rate. Could be taken annually or intermittent, availability pending MWD supply. Supply can be taken directly, in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 15,000 AFY. Can be purchased annually or intermittently.	5,000	3	2	2	1	1	1	0	0	1	1	1	1	2	0	1	1	2
95	MWD Replenishment or discount wet year water-Increment 1	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1 would allow for the purchase of an additional 10,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	5	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
96	MWD Replenishment or discount wet year water-Increment 2	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1+2 would allow for the purchase of an additional 20,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	8	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
97	MWD Replenishment or discount wet year water-Increment 3	Maximize replenishment or discount wet year imported water from MWD. Availability pending MWD supply and pricing. Supply can be taken in-lieu or for supplemental recharge. Increment 1-3 would allow for the purchase of an additional 30,000 AFY. Can be purchased annually or intermittently. Assume benefit after 2 consecutive wet years (assume 1 in 15 years)	10,000	10	2	2	1	1	1	0	2	1	1	1	1	2	0	2	1	2
98	Watershed Wide Water Transfers	This category of projects will construct or arrange other water transfers external to the Chino Basin. For example, dry weather flow exchange of recycled water to Orange County Water District for an equivalent amount of purchased imported water. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability and/or quality. To occur annually or intermittent. Resiliency and flexibility benefit only	-	5	1	1	1	1	1	2	2	2	1	1	1	2	2	1	2	2
99	Chino Basin Water Transfers	This category of projects will construct or arrange other water transfers within the Chino Basin. Projects to also include inter-agency interties for increased reliability. For the purposes of the IRP, it is assumed that this category of projects will not increase supply, but increases reliability. To occur annually or intermittent.	-	5	2	2	1	1	1	2	2	2	1	1	1	2	2	1	2	2
100	Reliability Production Wells	This project category will construct new production wells needed to replace lost production or under performing facilities. These projects will maintain current annual groundwater production deliveries and are intended to increase operational flexibility and reliability. Increment 1 varies in capacity and will be determined on a case by case basis as selected into each of the regional supply portfolios.	-	2	0	0	1	1	1	2	2	1	1	1	1	1	2	1	2	2

Appendix 6:

Project Lists for Water Resource Strategy Portfolios 1-8

Project List for Strategy A Portfolio 1

Strategy A		
Project ID #	Portfolio 1	Project Name
1	x	Groundwater Treatment (Rehab)-Increment 1
2	x	Groundwater Treatment (Rehab)-Increment 2
5	x	Production Wells-Increment 1
6	x	Production Wells-Increment 2
23	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
26	x	Existing GWR Basin Improvements beyond RMPU-Increment 4
46	x	WUE- RW Demand Management-Increment 1
47	x	WUE- RW Demand Management-Increment 2
87	x	Prior Stored Chino Groundwater
88	x	Maximize Local Surface Water

Project List for Strategy B Portfolios 2 & 3

Strategy B			
Project ID #	Portfolio 2	Portfolio 3	Project Name
1	x	x	Groundwater Treatment (Rehab)-Increment 1
5	x	x	Production Wells-Increment 1
9	x	x	WRCRWA RW Intertie
11	x	x	Pomona RW Exchange/Transfer
12	x	x	RP-1 RW Injection-Increment 1
19	x	x	RW Direct Use Expansion-Increment 1
20	x	x	RW Direct Use Expansion-Increment 2
23	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
26	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 4
27	x	x	Construct New GWR Basins-Increment 1
35		x	Secure SWP IW transfer outside MWD from Irrigation Districts or Ag Transfers
36		x	SBVMWD IW Transfer
38		x	Six Basin Groundwater Transfer
39	x	x	Expand WUE Devices
48	x	x	Dry Weather Flow Diversions
89		x	Max Tier 1 MWD Imported Water-Increment 1

Project List for Strategy C Portfolios 4 & 5

Strategy C			
Project ID #	Portfolio 4	Portfolio 5	Project Name
12	x	x	RP-1 RW Injection-Increment 1
13	x	x	RP-1 RW Injection-Increment 2
14	x	x	RP-1 RW Injection-Increment 3
21	x	x	RW Direct Use Expansion-Increment 3
23	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 1
24	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 2
25	x	x	Existing GWR Basin Improvements beyond RMPU-Increment 3
33	x	x	Maximize ASR wells
35		x	Secure SWP IW transfer outside MWD
36		x	SBVMWD IW Transfer
38		x	Six Basin Water Transfer
39	x	x	Expand WUE Devices
40		x	WUE - Turf Removal-Increment 1
43	x	x	WUE - Budget Rates-Increment 1
44	x	x	WUE - Budget Rates-Increment 2
45		x	WUE - Budget Rates-Increment 3
46	x	x	WUE- RW Demand Management-Increment 1
47	x	x	WUE- RW Demand Management-Increment 2
66	x	x	WUE - Advanced Metering Technologies
88	x	x	Maximize Local Surface Water
95	x	x	MWD Replenishment or discount wet year water-Increment 1
96		x	MWD Replenishment or discount wet year water-Increment 2

Project List for Strategy D Portfolio 6

Strategy D		
Project ID #	Portfolio 6	Project Name
9	x	WRCRWA Intertie
10	x	Rialto Intertie
36	x	SBVMWD IW Transfer
38	x	Six Basin Groundwater Transfer
43	x	WUE - Budget Rates- Increment 1 (2 agencies, 15% savings per agency)
56	x	Water Banking Facility - Increment 1
62	x	Cucamonga Basin Upgrades
87	x	Prior Stored Chino Groundwater
95	x	MWD Replenishment or discount wet year water-Increment 1

Project List for Strategy E
Portfolios 7 & 8

Strategy E			
Project ID #	Portfolio 7	Portfolio 8	Project Name
9		x	WRCRWA Intertie
11		x	Pomona RW Exchange/Transfer
12		x	RP-1 advanced treatment RW Injection - Increment 1
19		x	Recycled Water Direct Use System Expansion - Increment 1
20		x	Recycled Water Direct Use System Expansion- 5,000 AF increment 2
23		x	Existing GWR Basin Improvements beyond RMPU - Increment 1
24		x	Existing GWR Basin Improvements beyond RMPU- 2,500 AF increment 2
25		x	Existing GWR Basin Improvements beyond RMPU- 5,000 AF increment 3
26		x	Existing GWR Basin Improvements beyond RMPU- 5,000 AF increment 4
27		x	Purchase Land to Construct New GWR Basins - Increment 1
36	x	x	SBVMWD IW Transfer
43	x	x	WUE - Budget Rates- Increment 1 (2 agencies, 15% savings per agency)
66	x	x	Advanced Metering Technologies
89	x	x	Max Tier 1 MWD Imported Water-Increment 1
90	x	x	Max Tier 1 MWD Imported Water-Increment 2
91	x	x	Max Tier 1 MWD Imported Water-Increment 3

Baseline Supply Forecast to 2040

								Acre-Foot per Year (AFY)							
FY End	Total Regional Supply	Total Urban Supply	Total Potable Supply	Imported-MWD	GW-Chino	GW-Other	Local Surface	Total RW-Direct	RW-Direct Ag	StormWater	RW-Direct	RW-GWR	Desalted-CDA	Other	RW-SAR Obligation	Supp. Recharge
09-10	226,290.0	209,290.0	201,004.1	38,243.9	105,594.8	17,286.6	13,109.9	17,312.8	9,026.9	-	8,285.9	7,208.0	14,623.6	12,145.4	17,000.0	
11	212,744.8	195,744.8	186,762.4	42,730.2	88,366.5	14,459.1	18,761.3	16,655.9	7,673.5	-	8,982.4	8,028.0	14,440.8	8,004.6	17,000.0	
12	222,230.9	205,230.9	194,886.1	52,876.1	85,345.8	19,507.2	16,744.3	20,605.5	10,260.8	-	10,344.8	8,634.0	13,961.0	6,451.8	17,000.0	
13	233,004.3	216,004.3	203,379.7	59,013.0	95,955.5	21,145.4	5,980.2	21,840.0	9,215.4	-	12,624.6	10,479.0	13,671.4	7,614.2	17,000.0	
14	240,435.2	223,435.2	208,836.9	67,055.4	77,429.9	38,092.2	3,658.3	24,657.2	10,058.9	-	14,598.3	13,593.0	14,735.4	7,865.8	17,000.0	
15	242,000.0	225,000.0	208,950.0	65,000.0	90,538.5	22,098.1	11,650.8	24,600.0	8,550.0	-	16,050.0	14,500.0	15,000.0	8,416.4	17,000.0	
16	261,910.8	244,910.8		69,752.0	90,538.5	22,098.1	11,650.8	25,426.0	7,267.5	-	18,158.5	14,980.0	17,733.0	-	17,000.0	
17	264,306.9	247,306.9		69,752.0	90,538.5	22,098.1	11,650.8	26,252.0	6,177.4	-	20,074.6	15,460.0	17,733.0	-	17,000.0	
18	266,539.6	249,539.6		69,752.0	90,538.5	22,098.1	11,650.8	27,078.0	5,250.8	-	21,827.2	15,940.0	17,733.0	-	17,000.0	
19	268,633.2	251,633.2		69,752.0	90,538.5	22,098.1	11,650.8	27,904.0	4,463.2	-	23,440.8	16,420.0	17,733.0	-	17,000.0	
20	277,736.2	260,736.2		69,752.0	91,266.0	22,098.1	11,650.8	28,730.0	3,793.7	6,400	24,936.3	16,900.0	17,733.0	-	17,000.0	
21	279,047.2	262,047.2		69,752.0	91,266.0	22,098.1	11,650.8	29,112.0	3,224.6	6,400	25,887.4	17,260.0	17,733.0	-	17,000.0	
22	280,272.9	263,272.9		69,752.0	91,266.0	22,098.1	11,650.8	29,494.0	2,740.9	6,400	26,753.1	17,620.0	17,733.0	-	17,000.0	
23	281,426.1	264,426.1		69,752.0	91,266.0	22,098.1	11,650.8	29,876.0	2,329.8	6,400	27,546.2	17,980.0	17,733.0	-	17,000.0	
24	282,517.5	265,517.5		69,752.0	91,266.0	22,098.1	11,650.8	30,258.0	1,980.3	6,400	28,277.7	18,340.0	17,733.0	-	17,000.0	
25	283,556.6	266,555.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
26	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
27	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
28	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
29	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
30	283,556.6	266,555.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	
31	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
32	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
33	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
34	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
35	283,556.6	266,555.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
36	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
37	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
38	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
39	283,556.6	266,556.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-
40	283,556.6	266,555.6		69,752.0	91,266.0	22,098.1	11,650.8	30,640.0	1,683.3	6,400	28,956.7	18,700.0	17,733.0	-	17,000.0	-

Chino Basin Groundwater - Baseline Supply Calculation

Chino Groundwater baseline Supply Calculation Sheet

GW Pumping - Available to Appropriators	Year 2040	
Developed Yield	135,000	
SARUNY	-	50% of CDA Production
Operating Safe Yield	135,000	OSY = DY - SARUNY
Ag	5,000	at 2040
Non-Ag	3,000	at 2040
Operating Safe Yield Available to Appropriators	127,000	AFY
IEUA Member Share of OSY Available to Appropriators (%)	71.9%	See below
IEUA Member Share of OSY Available to Appropriators	91,266	AFY
IEUA Member Share of SARUNY Credit (%)	57%	Based upon FY2012-13 productions
IEUA Member Share of SARUNY Credit	-	AFY
Total IEUA Member Share of GW available to Appropriators	91,266	Included SY + SARUNY credit

APPROPRIATIVE RIGHTS
(AS OF JUNE 30, 2011)

Party	Appropriative Right (Acre-Feet)	Share of Initial Operating Safe Yield (Acre-Feet)	Share of Operating Safe Yield (Percent)
City of Chino [A]	5,794.25	4,033.857	7.356
City of Chino Hills [B]	3,032.86	2,111.422	3.851
City of Norco	289.50	201.545	0.368
City of Ontario	16,337.40	11,373.816	20.742
City of Pomona	16,110.50	11,215.852	20.454
City of Upland	4,097.20	2,852.401	5.202
Cucamonga Valley Water District [C]	5,199.00	3,619.454	6.601
Jurupa Community Services District [D]	2,960.60	2,061.118	3.759
Monte Vista Water District [E]	6,929.15	4,823.954	8.797
West Valley Water District [F]	925.50	644.317	1.175
Fontana Union Water Company [G]	9,181.12	6,391.736	11.657
Fontana Water Company [H]	1.44	1.000	0.002
Los Serranos County Club [I]	-	-	-
Marygold Mutual Water Company	941.30	655.317	1.195
Monte Vista Irrigation Company	972.10	676.759	1.234
Niagara Bottling, LLC [J]	-	-	-
Nicholson Trust [K]	5.75	4.000	0.007
San Antonio Water Company	2,164.50	1,506.888	2.748
Santa Ana River Water Company	1,869.30	1,301.374	2.373
Golden State Water Company [L]	591.05	411.476	0.750
West End Consolidated Water Company	1,361.30	947.714	1.728
San Bernardino County (Shooting Park) [M]	-	-	-
Arrowhead Mountain Springs Water Company [N]	-	-	-
City of Fontana [O]	-	-	-
Total	78,763.82	54,834.000	100.000

[A] In 1990, Chino received a portion of San Bernardino County Water Works #8 (WW#8) OSY (363.790 AF) as a result of a permanent transfer.
[B] City of Chino Hills incorporated in 1991 and assumed the responsibility for providing the public services formerly provided by WW#8. WW#8 acquired a portion of the rights of Park and Pomona Valley Water Companies in 1983.
[C] CCWD acquired the rights to Etiwanda Water Company (upon dissolution) in 1986. CCWD changed its name to CVWD in 2004.
[D] JCSD acquired the rights of Mira Loma Water Company in 1979 (776.940 AF OSY), Feldspar Gardens in 1986 (47.545AF OSY) and Mutual Water Company of Glen Avon Heights in 1997 (467.574 AF OSY).
[E] MVCWD changed its name to MVWD in 1980. In 1990, MVWD received 675.618 AF of WW#8 OSY as a result of a permanent transfer.
[F] WSBCWD changed its name to WVWD in 2003.
[G] In FY 01-02, 5.000 AF OSY was reassigned: 1.000 AF to FWC and 4.000 AF to the Nicholson Trust.
[H] FWC intervened in 1989 and was assigned 1.000 AF OSY as a result of a permanent transfer of water rights from FUWC.
[I] Los Serranos intervened into the Appropriative Pool in 1990 with 0.000 AF OSY, and it was later determined that they are not within the Basin.
[J] Niagara Bottling intervened in FY 02-03 with 0.000 AF OSY.
[K] Nicholson Trust intervened in FY 01-02 and was assigned 4.000 AF OSY as a result of a permanent transfer of water rights from FUWC.
[L] GSWC permanently transferred 623.300 AF OSY to Park Water Company in 1980. Park Water Co was acquired by WW#8 which was subsequently acquired by the City of Chino Hills. SCWC changed its name to GSWC in 2005.
[M] San Bernardino County Prado Tiro (now known as Prado Shooting Park) was involuntarily reassigned to the Appropriative Pool from the Agricultural Pool in 1986.
[N] Arrowhead intervened in 1992 with 0.000 AF OSY.
[O] City of Fontana intervened in 1998 with 0.000 AF OSY.

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APPENDIX F

IEUA 2015 Water Use Efficiency Business Plan

INLAND EMPIRE UTILITIES AGENCY

REGIONAL WATER USE EFFICIENCY

BUSINESS PLAN 2015–2020

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Section 1 – Executive Summary

Introduction

Inland Empire Utilities Agency (IEUA) and its regional water use efficiency (WUE) partners actively strive to increase regional sustainability through the development of local water supplies and reduced dependence on costly and increasingly unreliable imported water.

These efforts focus on using water more efficiently, eliminating water waste, and drought proofing the region through increased use of recycled water, groundwater, storm water and other local water supplies.

Water use efficiency is universally regarded as the most cost effective method in which to reduce water demand. As such, the region has heavily invested in water use efficiency initiatives over the years.

Water Conservation VS Water Use Efficiency

There is a major difference between ***water conservation*** and ***water use efficiency*** and it is important to understand the dissimilarity.

The objective of this plan is ***not*** to focus on ***water conservation*** with its short-term focus on current emergency conditions. This approach will not provide sustainable savings. As drought restrictions are lifted, per capita water use will gradually rebound upwards, although not as high as previously levels, as people breath a sigh of relief that the crisis is over and return to life as usual.

Instead the regional goal is to achieve ***water use efficiency,*** a sustainable reduction in water use, by creating a new resource value for water in the eyes of the end user.

For the most part, customers do not yet "get" water use efficiency. They believe that they're using water efficiently because they only water when requirements allow or don't wash their car. The State and the region must create a new reality about reasonable water usage for customers and show them the path to achieving it.

Optimizing Results

Traditional Water Use Efficiency (WUE) efforts characteristically offer programs to all customers without regard to their efficiency level. Often these program respondents are more sophisticated and aware of efficiency methods and measures – and are actually some of the most efficient users in the system.

The actual target should ***not be the "general responders"***, but instead, ***the inefficient water users***. To hit these target customers, the more sophisticated and effective strategies employ the rigorous use of data and analytics from GIS mapping, satellite imaging and disciplined water budget protocols, along with diligent measurement to ensure results. The results are broader and longer lasting across all market segments.

State Efficiency Standards Effectively Facilitate WUE

IEUA supports the reasonable and efficient use of water as defined by State standards. By creating broadly stated, but absolute, standards, the regional WUE partners can design programs that are tailored specifically to their customer base.

State water use efficiency standards are imbedded in both the SB X7-7 – requiring 20 percent per capita water use reduction by 2020 and Assembly Bill 1881, the Model Water Efficiency Landscape Ordinance (MWELO). Indoor efficiency is deemed to be 55 gallons per person per day (55 GPCD). Outdoor efficiency is levels are set at 80% of the local ET for existing landscapes.

This standard is supported by numerous agencies because it:

- Offers a more equitable method for considering conservation levels during drought.
- Will enable the State to consolidate the various conservation codes or actions into a single, impartial measurement.
- Provides a clear message to the public about what a reasonable amount of water to use is given their local conditions.
- Creates a single water management tool where efficiency targets can be ratcheted up or down as needed.

The use of water efficiency performance-based standards provides the foundation for more efficient regional and statewide water use that improves the resiliency of California's water supplies as we deal with population growth, future droughts and the serious impacts of climate change.

The Regional Water Use Efficiency Business Plan

The objective of the Regional WUE plan is to deliver a prolonged, increased level of water efficiency for a price far less than the region's cost to purchase water. To accomplish this, it is recommended IEUA and its regional partners seek out inefficient water use customers, educate them about WUE attainment, and provide a "road map" to accomplish this.

To create the WUE Business Plan, a thorough review of current, past and potential new programs was conducted, with calculations performed for costs, savings and overall benefits to the region. In addition, there was an evaluation of developing WUE trends, including emerging technologies such as Budget-Based Water Rates and Customer Engagement Software and Analytics. Potential Metropolitan Water District's (MWD) WUE funding availability and potential grants were additionally factored into the evaluation. A portfolio of recommended programs is presented in the WUE Business Plan. These are directly quantifiable and provide cost-effective water savings below the region's cost to purchase water from Metropolitan Water District.

It is important to recognize that IEUA's member agencies may elect to modify the design of one or more of the programs presented in the WUE plan. Each agency may choose to participate in all programs or opt in for a limited number only. IEUA will collaborate with all of the member agencies to continually evaluate and modify the plan to meet the goals and objectives of the region.

While it is up to each member agency to determine their specific course of action, IEUA encourages each agency to adapt new approaches and new technologies in order to increase the collective knowledge of *where* and *how* to best help end-users to use water efficiently and to keep water bills affordable.

Water Reduction Goals and Regulatory Compliance

The Regional Water Use Efficiency Business Plan is to be used as a blueprint to help the region to plan and implement WUE activities and programs over the next five years. The strategies and programs included in the plan are designed to meet the requirements of the:

- Assembly Bill 1420 Statute requiring BMP compliance
- SB X7-7 requiring 20 percent per capita water use reduction by 2020
- Governor's Executive Order and Emergency Regulation mandating a 25 percent statewide reduction in water use including individual targets set for each agency

Table 1 on the following page highlights these regulatory statues, their general requirements, the local approach to meeting the requirements and the current status.

WUE Regulatory Compliance Requirements

Table 1: WUE Regulatory Compliance

Regulatory Statute	Requirements	Approach	Status
Assembly Bill 1420	Mandatory BMP Compliance.	Lines up with actions taken to meet CUWCC BMP compliance	In compliance – requirement sunsets July 1, 2016.
20x2020 (SB X7-7)	Reduce per capita water use by 10% by 2015. AND Reduce per capita water use by 20% by 2020.	By implementing active WUE programs and policy Initiatives the Regional Alliance is projected to be on track to meet per capita reduction goals.	2015 Target = 226 2015 Reported = 188 2020 Target = 201 2020 Projected = 182
Governor's Executive Order Regulations	Mandatory statewide reduction of 25% of residential per capita water use. Each agency assigned local target of 4 – 36%.	Implement active WUE programs, enforce mandatory watering days and eliminate water waste.	Most agencies at or near mandated %. Collective % Goal = 28% Collective % Saved = 29.5%

The region is in compliance with the AB 1420 BMP requirements. Most agencies are currently at or near mandated conservation levels under the Governor's Executive Order. It is also expected that the region will <u>exceed</u> the 20x2020 goal. This will be accomplished through regional and local actions utilizing:

- **Water Use Efficiency Active Programs** – offering customers a program portfolio with cost-effective water efficiency measures,
- **WUE Passive Policy Initiatives –** including building codes and landscape ordinances,
- **Recycled Water Supply** – reducing demand for potable water by increasing recycled water supply.

Table 2 on the following page shows the anticipated GPCD reduction from the WUE activities and recycled water supply. The 2020 GPCD reduction estimates from WUE activities is shown as a range to represent the reduction with and without Budget-based Water Rate implementation. It is estimated that with 2 agencies implementing Budget-based Water Rates will represent a GPCD reduction of 11 by 2020 and without any agencies implementing the new rate it will be a reduction of 6.

Impact of WUE Activities and Recycled Water Supply

Table 2: Impact of WUE Activities and Recycled Water Supply

	YEAR	
	GPCD Reduction by 2015	**GPCD Reduction by 2020**
Projected GPCD reduction from WUE Active and Passive Activities	3	6 – 11*
Projected GPCD reduction from Recycled Water Supply	21	35
TOTAL Projected GPCD Reduction	24	41 – 46*
10 Year Baseline GPCD	**251**	
Regional GPCD Target	226	201
Regional GPCD Projected Achievement**	188	169 – 174*

**Range represents GPCD reduction with and without Budget-based Water Rate implementation.*
*** 2015 GPCD numbers are reported actuals*

In order to achieve the WUE active programs' goal, it is recommended IEUA and its regional partners implement nine active programs. The programs will deliver water savings through 2020 and beyond due to the life of the measures being offered. Table 3 below provides an overview of the lifetime water savings for each of the programs:

Lifetime Water Savings by WUE Active Programs

Table 3: Lifetime Water Savings by WUE Active Programs

WUE Active Program	Estimated Lifetime Water Savings (AF)
Budget-Based Water Rates	116,390
Turf Removal	16,900
FreeSprinklerNozzles.com Program	5,689
SoCal Water$mart Regional Rebate Program	3,262
Customer Engagement Software	3,093
High Efficiency Nozzle Direct Installation Program	1,101
Residential Smart Controller Upgrade Program	828
Residential Landscape Retrofit Program	447
Landscape Evaluations	126
Total	**147,836**

The plan, as designed with 2 agencies implementing Budget-based Water Rates, is estimated to save nearly 148,000 acre-feet of water at an expected cost to the region of $52 per acre-foot. This falls well below the region's avoided cost to purchase water from Metropolitan Water District of $1,122 per acre-foot[1] (MWD's Tier 1 rate for untreated water). The value of the avoided purchases of MWD imported equate to nearly $153 Million to the member agencies. If none of the agencies chose to implement Budget-based Water Rates, the plan is estimated to save over 31,000 acre-feet at a cost of $208 per acre-foot. This too falls well below the cost to purchase water from MWD.

Below are highlights of the plan with and without Budget-base Water Rate implementation:

Table 4: Plan Overview

Plan Overview		
	With Budget-Based Rates	**Without Budget-Based Rates**
Regional IEUA Cost per Acre-foot	$52 per acre-foot	$208 per acre-foot
Five-Year Water Savings (*active programs*)	33,554 acre-feet	16,095
Lifetime Water Savings (*active programs*)	147,836 acre-feet	31,446
Avoided Costs (NVP)	$152.7 Million	$28.9 Million
Five-Year Total Budget*	$7.5 Million	$7.5 Million

**Budget includes IEUA regional program costs exclusive of outside funding.*
**Budget includes $300,000 per year for education and outreach programs.*

Selected Programs

The Regional WUE Business Plan makes a number of recommendations moving forward. It is advised that the following changes be made:

- Scale and modify most of the existing programs
- Sunset several programs
- Incorporate new technologies and approaches for program outreach
- Implement a number of pilot programs

[1] The project team applied the CUWCC/WaterRF Avoided Cost Model to develop a forecast of avoided supply costs for IEUA. These avoided costs include the avoided variable operating costs of MWD's 2015 Tier 1 rate for full service treated water (923$/AF in 2015), an estimate of power costs past the point of imported water delivery (approximately 76$/AF) , plus MWD's Capacity Charge (approximately 67$/AF) with all costs adjusted upward for system loss. Tier 2 rates apply in 2020 as MWD's stated long run supply development costs. MWD's treatment costs embedded in the full service rate pertain as a reasonable proxy for long run avoided treatment costs. Since these costs do not include avoided Greenhouse Gas Emissions they can be considered as a lower bound. These costs are projected to increase in real terms during the forecast horizon.

The portfolio of programs included in the plan are directly quantifiable and provide cost-effective water savings below the region's cost to purchase water from Metropolitan Water District.

With 66% of demand being outdoor water usage, program offerings focus predominantly on landscape opportunities. An overview of the selected programs is below.

Budget-Based Water Rates or allocation-based rates have proven to be one of the most cost effective WUE programs. Each individual account is allocated an amount that would be required for efficient indoor and outdoor water use, adjusted to real-time actual weather and customer characteristics such as size of landscape area. Budget-based rates are also designed to recover necessary agency costs recognizing that customers will be more water efficient over time. Customers are able to compare their individualized water budget with their actual usage. The appropriate economic signal rewards efficient use. With a clear financial incentive, the customer is motivated to maintain efficient use patterns. Budget-based rates also, when properly designed, target revenue generation specifically toward those inefficient customers who are causing higher costs. Budget-based rates are a legal method to increase the agency's ability to fund cost reducing and cost-effective WUE programs.

Customer Engagement Software and Data Analytics – Customer engagement software and data analytics provide tools for water agencies to more accurately identify customers with excess water usage and communicate with customers on how their usage compares against accepted water use efficiency standards. It addition, the software offers the ability for a customer to track their usage against a budget through web-based and mobile interfaces and presents them with practical options to become a more efficient water user.

Landscape Evaluations – Comprehensive landscape evaluations provide customers education and information on landscape and irrigation system upgrades specific to each individual site. Intended to motivate customers to make improvements in their landscape irrigation efficiency, the evaluations direct customers to applicable programs. Landscape evaluations would be targeted towards large landscape sites with the most potential to save water, as identified through water budget data.

High Efficiency Nozzle Vouchers, Rebates, and Installations – Retrofitting pop-up spray heads with high efficiency nozzles is a low cost measure and delivers high water savings. The saturation rate of high efficiency nozzles is extremely low, and the sheer volume of spray heads offers a prime market opportunity.

Smart Controller Installations and Rebates – Smart controllers are cost-effective for over irrigated sites, as well as large landscape areas. By offering direct installation for residential sites and rebates for large landscape sites, significant and cost-effective water savings can be achieved.

MWD's SoCal Water$mart Regional Rebate Programs – The SoCal WaterSmart Program provides the region with continued funding and program administration for a variety of water use efficiency measures. Moving forward, IEUA and its regional partners would augment funding for landscape water use efficiency products to provide increased customer response.

Turf Removal – Although turf removal delivers extremely high water savings in most retrofit projects, it requires a significant incentive to motivate customers. At this time, turf removal has not been included in the program portfolio after fiscal year 2015/16. And although it is not yet deemed cost-effective for the region to fund the full incentive, IEUA and its regional partners will continue evaluating turf removal as a customer program. IEUA and its regional partners will seek MWD and other outside funding as available.

Education and Outreach Programs – IEUA and its regional partners will continue to provide regional educational and outreach programs. Current regional education and outreach programs include the following:

- National Theatre for Children Program
- Shows That Teach
- Regional Landscape Training Workshops
- Garden in Every School® Program
- WEWAC, The Water Education – Water Awareness Committee
- Water Saving Garden Friendly
- Water Softener Rebate Program

The table on the following pages lists the recommended programs, the reasoning for their selection and the associated savings. The list is ordered from highest volume of total water savings activity to lowest.

Table 5: Recommended Programs

Recommend Program and Water Savings	Reasoning for Selection
Budget-Based Water Rates: *116,390 Lifetime Water Savings* *79% of Total Savings*	- Sends strong price signal, rewarding efficient users and penalizing inefficient users - Motivates over-allocation customers to consider changes - Proven effective for revenue stability, increased WUE and positive customer relations
Turf Removal (All Measures): *16,900 Lifetime Water Savings* *11% of Total Savings*	- Targets large water use - Transforms landscape and irrigation market - Significant funding provided by MWD
FreeSprinklerNozzles.com Program: *5,689 Lifetime Water Savings* *4% of Total Savings*	- Cost-effective - Targets large water use - Huge potential and scalability
SoCal Water$mart Regional Rebates: *3,914 Lifetime Water Savings* *3% of Total Savings*	- MWD funding and administration - Ease of implementation
Customer Engagement Software: *3,093 Lifetime Water Savings* *2% of Total Savings*	- Technology based communication method - Allows retailers to send messaging & program links to high water users - Proven effective
High Efficiency Nozzle Direct Installation: *1,101 Lifetime Water Savings* *1% of Total Savings*	- Removes financial barrier of entry - Ensures quality installation - Huge potential and scalability
Residential Smart Controller Upgrade: *828 Lifetime Water Savings* *1% of Total Savings*	- Offering direct installation to smaller customer provides bigger pool of potential customers - Site visit verifies there will be savings - Education workshop ensures customer can program and maintain controller and therefore sustain savings
Residential Landscape Retrofit Program: *447 Lifetime Water Savings* *0.3% of Total Savings*	- Targets large water users - Site visit verifies there will be savings - Professional installation and programming of controller ensure savings

Recommend Program and Water Savings	Reasoning for Selection
Landscape Evaluations: *126 Lifetime Water Savings* *0.1% of Total Savings*	- Links customer with programs - Provides one-on-one customer education - Starts relationship with customer
Education and Outreach Programs: *Savings not estimated**	- Provides education to students at all levels - Equips customers with foundational information regarding value of water, water use and efficiency opportunities

**Many of the programs have water savings, but due to the variability of the savings they were not included in the assessment.*

The following sections of the Regional Water Use Efficiency Business Plan provide details of the region's usage patterns, specific market opportunities, strategies for reaching water savings goals, and recommended programs. The plan provides the following information:

Section 2 – Relevant Regulation and Policies provides a summary and analysis of current water use efficiency regulations and requirements expected to impact future water use within IEUA's service area.

Section 3 – Market Condition and Potential assesses potential for water savings across customer classes and water uses. Specific opportunities are identified as well as barriers to market penetration for those measures.

Section 4 – Implementation Strategy outlines the recommended strategies and tactics needed in order for the region to drive down demand and increase water use efficiency.

Section 5 – Potential Programs and Analysis examines a comprehensive list of programs and measures that correspond to the region's water demand and measure savings potential.

Section 6 – Selected Programs provides a final list of cost-effective programs recommended for implementation and includes the following: program descriptions, measure(s) offered, target customer segments, delivery mechanisms, annual activity, program costs, and economic evaluation results.

Section 7 – Five Year Plan presents the implementation details for the plan if two agencies implement Budget-Based Water Rates. This includes annual program activity estimates, annual budgets, water savings, cost and benefits, as well as energy savings and greenhouse emission reduction.

Section 2 – Relevant Regulations and Policies

As can be expected in a state with ongoing water resource issues, California's governing entities have issued a number of regulatory requirements and policies over the past several decades.

Some of the regulations and policies have successfully driven down California's per capita water usage and increased the manufacturing standards for a number of major water consuming products utilized across all markets. Other regulations are aimed at achieving a higher level of water conservation during times of severe drought through temporary water use cutbacks and associated reporting.

Listed in the charts below is a summary of the current state regulations and information about the designated implementer for each:

WUE Laws and Agreements

Table 6: WUE Laws and Agreements

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
Assembly Bill 1420	Mandatory BMP Compliance.	Implemented by Agencies & IEUA	Lines up with actions taken to meet CUWCC BMP compliance – sunsets July 1, 2016
20x2020 (SB X7-7)	Reduce per capita water use by 10% by 2015. AND Reduce per capita water use by 20% by 2020.	Implemented by the Regional Alliance	By implementing active water use efficiency programs and policy Initiatives the Regional Alliance are projected to be on track to meet per capita water reduction goals.
Governor's Executive Order and Emergency Regulation	Mandatory statewide reduction of 25% of residential per capita water use. Each agency assigned local target of 4 – 36%.	Implemented by each Agency	Implement active WUE programs, enforce mandatory watering days and eliminate water waste. All agencies are at, or near, compliance.

WUE Codes, Standards and Regulations

Table 7: WUE Codes, Standards and Regulations

Regulatory Statute	Requirements	Agency or Regional Implementation	Approach
AB1881 - Model Water Efficiency Landscape Ordinance (MWELO)	ETo Allowances Residential 0.55 Commercial 0.45	Implemented locally by city and/or county	Agencies need to educate customers and developers about ordinance requirements
Assembly Bill 715	Requires any toilet or urinal sold or installed in California cannot have a flush rating exceeding 1.28 and 0.125 respectively	Manufacturers, distributors, retailers, plumbers and customers must all adhere to new standards	Supply chain removes non-conforming fixtures from marketplace and supplies only efficient and conforming fixtures
Senate Bill 407	Requires existing buildings comply with 1992 standards	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting
CalGreen	20% reduction of water use prescriptively designated Irrigation controllers shall be weather- or soil moisture-based	Implemented locally by city and county	Difficult to enforce. Could be added to current criteria for change of ownership inspections and reporting
Senate Bill 555	Requires water agencies to submit annual water loss reports	Implemented by Agencies	Agencies compile data and submit report to DWR
Assembly Bill 1	City or county cannot fine customers for failure to water	Local agencies to follow requirements of the bill	Agencies need to communicate requirements with cities and counties
Assembly Bill 349	HOAs cannot prohibit installation of artificial turf and allows for turf removal and installation of low water use plants	Local agencies to follow requirements of the bill	Agencies need to work with HOA's and community groups to educate about the bill

The following section details current water use efficiency regulations and requirements. Divided into two parts, the first presents a comprehensive review of agreements, codes, and regulations guiding conservation by California urban water suppliers. The second part provides an assessment of the region's current and expected compliance status for each of these codes and regulations.

Existing Codes, Regulations, and Agreements

Existing codes, regulations, and agreements affecting the efficiency of water using fixtures and landscapes, and establishing water use reduction targets for urban water suppliers will continue to reduce per capita residential and non-residential water demands over the coming decades. These codes, regulations, and agreements can be divided into three broad categories:

- Codes and standards that dictate the maximum acceptable level of water use by newly manufactured water using fixtures and appliances. Examples include statewide standards for toilet and urinal water use enacted under AB 715 and federal standards for residential and commercial clothes washer water use promulgated by the U.S. Department of Energy under the Energy Policy and Conservation Act.
- Regulations that govern the maximum acceptable level of water use by water using fixtures, appliances, and landscapes installed in existing and new residential and non-residential properties. Examples include SB 407, which enacted plumbing fixture efficiency requirements in new and existing buildings, and AB 1881, which established landscape design and water use requirements.
- Laws and agreements that establish water use reduction goals and targets for urban water supply agencies. An example is SB X7-7, which set maximum allowable GPCD targets for urban water suppliers.

The codes, regulations, and agreements, falling into one of the above three categories, are described in the following sections.

Requirements for Newly Manufactured Plumbing Fixtures and Appliances

Toilets, Urinals, and Showerheads – AB 715, enacted in 2007, requires that any toilet or urinal sold or installed in California on or after January 1, 2014, cannot have a flush rating exceeding 1.28 and 0.5 gallons per flush, respectively. AB 715 superseded the state's previous standards for toilet and urinal water use set in 1991 of 1.6 and 1.0 gallons per flush, respectively. On April 8, 2015, in response to the Governor's Emergency Drought Response Executive Order (EO B-29-15), the California Energy Commission approved new standards for urinals requiring that they not consume more than 0.125 gallons per flush, 75% less than the standard set by AB 715.

The 1994 amendments to the Federal Energy Policy and Conservation Act established a maximum flow rate for newly manufactured showerheads of 2.5 gallons per minute. However, as will be discussed in the next section, California's Green Building Standards Code (CalGreen), which became effective January 1, 2011, mandates a maximum flow rate of 2.0 gallons per minute for showerheads in newly constructed residential and commercial buildings.

Clothes Washers and Dishwashers -- Water use standards for residential and commercial clothes washers and dishwashers are established by the U.S. Department of Energy through its authority under the federal Energy Policy and Conservation Act. The maximum water factor for residential clothes washers under current federal standards is 9.5.[2] In March of this year, the federal standard will reduce the maximum water factor for top- and front-loading machines to 8.4 and 4.7, respectively. In 2018, the maximum water factor for top-loading machines will be further reduced to 6.5. For commercial washers, the maximum water factors were reduced in 2010 to 8.5 and 5.5 for top- and front-loading machines, respectively. Starting this year, the maximum water factor for Energy Star certified washers is 3.7 for front-loading and 4.3 for top-loading machines. EPA estimates that Energy Star washers comprised more than 60% of the residential market and 30% of the commercial market circa 2011.[3] A new Energy Star compliant washer uses about two-thirds less water per cycle than washers manufactured in the 1990s. Effective May 30, 2013, the federal standard for the maximum allowable water use for standard and compact sized dishwashers is 5.0 and 3.5 gallons per cycle, respectively.

Requirements for Existing and New Buildings and Landscapes.

Indoor Water Use -- SB 407, enacted in 2009, mandates all buildings in California come up to 1992 State plumbing fixture standards within this decade. This law establishes requirements that residential and commercial properties built and available for use on or before January 1, 1994, replace plumbing fixtures that are not water conserving, defined as "non-compliant plumbing fixtures" as follows:

- Any toilet manufactured to use more than 1.6 gallons of water per flush
- Any urinal manufactured to use more than one gallon of water per flush
- Any showerhead manufactured to have a flow capacity of more than 2.5 gallons of water per minute
- Any interior faucet that emits more than 2.2 gallons of water per minute

[2] Water factor equals the number of gallons used per cycle per cubic foot of capacity. Prior to 2000, the water factor for a typical new residential clothes washer was about 12.

[3] Energy Star Unit Shipment and Market Penetration Report Calendar year 2011 Summary. Accessed on January 28, 2015 from: http://www.energystar.gov/ia/partners/downloads/unit_shipment_data/2011_USD_Summary_Report.pdf

The compliance date for single family residential properties is January 1, 2017. For multi-family and commercial properties, the date is January 1, 2019. State law required, as of January 1, 2014, that when there are building alterations and improvements to residential and commercial properties, water-conserving plumbing fixtures replace all noncompliant plumbing fixtures as a condition for issuance of a certificate of final completion and occupancy or final permit approval by the local building department.

SB 407 also requires, effective January 1, 2017, that a seller or transferor of a single family residential property disclose to the purchaser or transferee, in writing, the specified requirements for replacing plumbing fixtures and whether the real property includes noncompliant plumbing. Similar disclosure requirements go into effect for multi-family and commercial transactions January 1, 2019. SB 837, passed in 2011, reinforces the disclosure requirement by amending the statutorily required transfer disclosure statement to include disclosure about whether the property is in compliance with SB 407 requirements. Through these two laws, California has effectively adopted a statewide retrofit-on-resale requirement for single family residential properties effective January 1, 2017, and for multi-family and commercial properties effective January 1, 2019.

Although SB 407 allows for replacement of noncompliant toilets with toilets flushing no more than 1.6 gallons, noncompliant urinals with urinals flushing no more than 1.0 gallons, and noncompliant showerheads with showerheads using no more than 2.5 gallons per minute, the more stringent requirements in AB 715 and CalGreen Code supersede the equipment flow standards included in SB 407. Therefore, as of January 1, 2014, noncompliant toilets must be replaced with toilets flushing no more than 1.28 gallons, noncompliant urinals must be replaced with urinals flushing no more than 0.5 gallons, and noncompliant showerheads must be replaced with showerheads using no more than 2.0 gallons per minute.[4] As of January 1, 2016, noncompliant urinals must be replaced with urinals flushing no more than 0.125 gallons.

New construction and renovations in California are now subject to CalGreen Code requirements. Listed in Table 8 below are the CalGreen prescriptive indoor provisions for maximum water consumption of plumbing fixtures and fittings in new and renovated properties. CalGreen also allows for an optional performance path to compliance, which requires an overall aggregate 20% reduction in indoor water use from a calculated baseline using a set of worksheets provided with the CalGreen guidelines.

[4] As noted above, the CEC adopted new standards for urinals in April setting a maximum allowable flush volume of 0.125 gallons.

Table 8: CalGreen Fixture Code Requirements

Fixture/Fitting	Baseline Consumption	Maximum Allowed Under CalGreen
Toilets	1.6 gal/flush	1.28 gal/flush
Urinals	1.0 gal/flush	0.5 gal/flush
Residential showerheads	2.5 gal/minute	2.0 gal/minute
Residential bathroom faucets	2.2 gal/minute	1.5 gal/minute[5]
Kitchen faucets	2.2 gal/minute	1.8 gal/minute
Replacement faucet aerators	2.2 gal/minute	NA
Non-residential bathroom faucets	0.5 gal/minute	0.4 gal/minute
Metering faucets	0.25 gal/minute	0.2 gal/minute

Landscape Water Use -- For landscape water use, CalGreen requires that automatic irrigation system controllers, provided by the builder and installed at the time of final inspection, be weather- or soil moisture-based controllers designed to automatically adjust irrigation in response to changes in plant water needs as weather or soil conditions change.

In addition to CalGreen's mandatory requirements, further efficiencies are possible through application of voluntary tiers, as follows:

- Tier 1 Residential – kitchen faucet flow rate not to exceed 1.5 gallons/minute; potable water use for landscape not to exceed 65% of ETo; and incorporation of at least one other measure from a list of measures provided by CalGreen (e.g. waterless toilet, rainwater capture system).

- Tier 2 Residential – kitchen faucet flow rate not to exceed 1.5 gallons/minute; potable water use for landscape not to exceed 60% of ETo; dishwashers be Energy Star qualified and use no more than 5.8 gallons per cycle; and incorporation of at least two other measures from a list of measures provided by CalGreen.

- Tier 1 Non-Residential – aggregate indoor water use reduction of 30% from the established baseline or 30% reduction in individual water use for each of the plumbing fixtures listed in Table 8; potable water use for landscape not to exceed 60% of ETo; and incorporation of at least one elective measure from a list of measures provided by CalGreen (e.g. efficient ice maker, graywater irrigation system).

[5] On April 8, 2015, the California Energy Commission adopted new standards reducing the maximum flow rate of residential bathroom faucets to 1.2 gallons per minute.

- Tier 2 Non-Residential – aggregate indoor water use reduction of 35% from the established baseline or 35% reduction in individual water use for each of the plumbing fixtures listed in Table 8; potable water use for landscape not to exceed 55% of ETo; and incorporation of at least three elective measures from a list of measures provided by CalGreen.

Assembly Bill 1881 - The Water Conservation in Landscaping Act of 2006 - Assembly Bill 1881 has had several revisions in recent years. The initial requirements and current changes are chronicled below. AB 1881 requires cities and counties to either adopt the state's model landscape ordinance or their own ordinance that is at least as effective as the state's model ordinance by January 1, 2010. At that time, the Department of Water Resources prepared a Model Water Efficient Landscape Ordinance for use by local agencies. After January 1, 2010, the model ordinance (or the locally adopted ordinance) applies to all of the following landscape projects:

1. New construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;
2. New construction and rehabilitated landscapes which are developer-installed in single family and multi-family projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review; and
3. New construction landscapes which are homeowner-provided and/or homeowner-hired in single family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check, or design review.

For new and rehabilitated landscapes installed on or after January 1, 2010 and meeting the above requirements, the model ordinance establishes a maximum water use allowance equal to 70% of reference evapotranspiration. The maximum water use allowance for special landscape areas, which include recreational turf projects (parks, golf courses, ball fields), projects irrigated with recycled water, and edible landscapes is 100% of reference evapotranspiration.

For existing landscapes of one acre or more installed before January 1, 2010, the model ordinance also requires cities and/or counties to administer programs that may include irrigation water use analyses, irrigation surveys, and irrigation audits to evaluate water use and provide recommendations as necessary to reduce landscape water use to a level that does not exceed the Maximum Applied Water Allowance for existing landscapes equal to 80% of reference evapotranspiration.

The model landscape ordinance is directed to cities and counties. However, a city or county may designate another agency, such as a water supplier, to assume some or all of the responsibilities of enforcing the ordinance, provided the designated agency agrees to assume these responsibilities.

In 2006, IEUA and its regional partners developed the Inland Empire Landscape Alliance (IELA). The IELA spent two years working with local agencies to evaluate existing landscape policies and to provide information about all aspects of landscape water efficiency, through a series of educational newsletters, workshops and tours focused on plant palettes, irrigation materials and techniques, low impact development practices, and measures that cities are currently implementing within their communities to be wise water stewards.

When, in February 2008 the Department of Water Resources released the Model Water Efficient Landscape Ordinance, the IELA came together to evaluate and comment on the ordinance. Members found the February 2008 DWR Model Ordinance to be cumbersome. As a result, the IELA formed a Technical Committee that created the Chino Basin Water Efficient Landscape Ordinance in January 2009, incorporating the requirements of AB1881 while establishing regional consistency, and actively promoting the best interest of the region.

Governor Brown's Drought Executive Order of April 1, 2015 directed DWR to update the State's Model Water Efficient Landscape Ordinance (MWELO) through expedited regulation. The California Water Commission approved the revised MWELO Ordinance on July 15, 2015.

Local agencies had until December 1, 2015 to adopt the MWELO or to adopt a Local Ordinance which must be at least as effective in conserving water as MWELO. Local agencies working together to develop a regional ordinance had until February 1, 2016 to adopt, but they are still subject to the December 2015 reporting requirements. A local agency will either integrate MWELO into an existing ordinance or establish a new, separate program. To comply, a local agency must perform one of the following actions:

- Adopt by reference Sections 490-495, Chapter 2.7, Division 2, Title 23 in the California Code of Regulations
- Adopt the MWELO in detail - Sections 490-495, Chapter 2.7, Division 2, Title 23 in the California Code of Regulations
- Amend an existing or adopt a new local ordinance or regional ordinance to meet the requirements contained in the regulations
- Take no action and allow the MWELO to go into effect by default

A local agency may choose to allow MWELO to become effective by default and then adopt a local or regional ordinance at a later time. Subsequent reporting must include the details of local or regional ordinances.

Changes to MWELO

Projects Subject to the Ordinance - The size of landscapes subject to the ordinance has been lowered from 2,500 sq. ft. to 500 sq. ft. The size threshold applies to residential, commercial, industrial and institutional projects that require a permit, plan check or design review. To reduce the complexity and costs for the smaller landscapes now subject to ordinance, the revised MWELO has a prescriptive compliance approach for landscapes between 500 and 2,500 sq. ft. The size threshold for existing landscapes that are being rehabilitated has not changed, remaining at 2,500 square feet. Only rehabilitated landscapes that are associated with a building or landscape permit, plan check, or design review are subject to the Ordinance.

Water Efficient Worksheet and Water Budget - The maximum applied water allowance (MAWA) has been lowered from 70% of the reference evapotranspiration (ETo) to 55% for residential landscape projects, and to 45% of ETo for non-residential projects. This water allowance reduces the landscape area that can be planted with high water use plants such as cool season turf. For typical residential projects, the reduction in the MAWA reduces the percentage of landscape area that can be planted to high water use plants from 33% to 25%. In typical non-residential landscapes, the reduction in MAWA limits the planting of high water use plants to special landscape areas. The revised MWELO still uses a water budget approach and larger areas of high water use plants can be installed if the water use is reduced in the other areas provided the overall landscape stays within the budget. The use of special landscape areas was not changed in the revised MWELO.

ETo Allowance in MAWA (Proportion of ETo)

	MWELO 2010	MWELO 2015	Percentage Reduction
Residential	0.7	0.55	21.4%
Non-residential	0.7	0.45	35.7%

The revised ordinance also precludes the use of high water use plants in street median strips. Also because of the requirement to irrigate areas less than ten feet wide with subsurface irrigation or other means that produces no runoff or overspray, the use of cool season turf in parkways is limited.

Soil Management Report - For multi-lot projects, the revised MWELO added clarification that soil testing should be completed using a soil sampling rate of approximately 1 in 7 lots or 15 percent.

Landscape Design Plan - The following changes were made to Landscape Design Plan section: Prior to planting, 4 yards of compost must be incorporated per 1,000 sq. ft. of permeable area. Compacted soils must be transformed to a friable condition. The depth of mulch required was increased from 2 to 3 inches. Graywater and storm retention components must be indicated on the landscape plan.

Irrigation Design Plan - Dedicated landscape water meters or submeters are required for residential landscapes over 5,000 square feet and non-residential landscapes over 1,000 square feet. Irrigation systems are required to have pressure regulation to ensure correct and efficient operation. All irrigation emission devices must meet the American National Standards Institute standard, American Society of Agricultural and Biological Engineers'/International Code Council's 802-2014 "Landscape Irrigation Sprinkler and Emitter Standard". Flow sensors that detect and report high flow conditions due to broken pipes and/or popped sprinkler heads are required for landscape areas greater than 5,000 square feet. Master shut-off valves that prevent water waste in case of large failures of irrigation systems due to breakage or vandalism are required on all landscapes except where sprinklers can be individually controlled. The minimum width of areas that can be overhead irrigated was increased from 8 feet to 10 feet; areas less than 10 feet wide must be irrigated with subsurface drip or other technology that produces no over spray or runoff. The revised update requires the irrigation auditor to be a local agency auditor or third party auditor to reduce conflicts of interest. All landscape irrigation auditors must be certified by one of the U.S. EPA WaterSense labeled auditing programs.

Graywater Systems - The revised MWELO added a graywater section that specifies that landscapes less than 2,500 square feet that are irrigated entirely with graywater or captured rainwater are subject only to the irrigation system requirements of the Prescriptive Compliance Option. Graywater is allowed throughout the state under the California Plumbing Code.

Stormwater and Rainwater Retention - A requirement was added that landscape area should have friable soil to maximize stormwater infiltration. Additional stormwater measures were recommended, but not required.

Reporting - Executive Order and the revised ordinance require that local agencies report on the implementation and enforcement of their single agency Local Ordinances to DWR by December 31, 2015. Local agencies developing a Regional Ordinance must report on adoption by March 1, 2016. Reporting for all agencies is due by January 31st of each year thereafter. The reporting requirement is a new addition to the MWELO.

In addition to the revised MWELO requirements and ordinance changes, there are several bills designed to increase state-wide performance standards and enhance water efficiency policies. Below are highlights of those requirements.

Senate Bill 555

Senate Bill 555 requires retail water suppliers to submit annual water loss audit reports starting October 2, 2017. The bill requires the Department of Water Resources to post the results of each agency's audit report to allow for comparison amongst water suppliers. In addition, the bill requires the State Water Resources Control Board to set performance standards for volume of water losses by July 1, 2020.

Assembly Bill 1
AB 1 prohibits a city or county from imposing fines for a failure to water a lawn or having a brown lawn during a time in which the Governor has declared a State of Emergency based upon drought conditions.

Assembly Bill 349
AB 349 amends the Civil Code to state that homeowner associations can no longer prohibit the use of artificial turf or other synthetic surface that resembles grass. In addition, AB 349 prohibits associations from requiring the removal or reversal of water-efficient landscaping measures once the drought is declared over.

Now, under California law, an association's governing documents must:

- Allow artificial turf or other synthetic surface that resembles grass
- Allow at least some with low water-using plants
- Allow the replacement of existing turf with low water-using plants
- Not restrict an owner's compliance with a water-efficient landscape ordinance adopted by a local government or other restrictions on the use of water imposed by the state, a water agency or local government
- Not impose "a fine or assessment" against an owner for reducing or eliminating the water of vegetation or lawns during any period for which either the Governor or a local government has declared an emergency due to drought.
- Not require the removal or reversal of water-efficient landscaping measures installed in response to the drought once the Governor of California declares that the drought is over.

Water Demand Reduction Requirements for Urban Water Suppliers

The primary laws and agreements establishing water use reduction goals and targets for urban water supply agencies are the Water Conservation Act of 2009 (SB X7-7) and the Memorandum of Understanding Regarding Urban Water Conservation in California (California Urban Water Conservation Council MOU). SB X7-7 set a requirement for urban water suppliers to reduce their per capita water use by the year 2020. The overall goal is to reach a statewide reduction in per capita urban water use of 20% by December 31, 2020. The MOU is a voluntary agreement. Signatories to the MOU agree to make a good faith effort to implement a prescribed set of urban water conservation best management practices (BMPs) or to take other actions resulting in an equivalent level of water savings. While the MOU is voluntary, state law (AB 1420) conditions eligibility for certain state grants and loans on compliance with it. AB 1420 sunsets in June of 2016 to be replaced by each agencies 20x2020 target for meeting the intent of AB 1420.

SB X7-7 – Under SB X7-7 urban water suppliers were required to provide a target for per capita water use in 2020 in their 2010 UWMPs. The target must be calculated using one of four methods specified by the legislation. The four methods are:

1. Set the target to 80% of baseline per capita water use. The legislation dictates the method for calculating baseline per capita water use.
2. Set the target based on efficient water use standards for indoor residential water use, commercial, industrial, and institutional water use, landscape water use, and (optionally) agricultural water use.
3. Set the target to 95% of the applicable state hydrologic region target developed by DWR and published in the state's 20x2020 Water Conservation Plan.
4. Set the target based on expected reductions in residential and non-residential water use due to implementation of the MOU BMPs and other actions.

Urban water suppliers are required to calculate an interim GPCD target for 2015 from the 2020 target. The interim target is also reported in the 2010 UWMP. Urban water suppliers must report their compliance status with their interim and 2020 GPCD targets in their 2015 and 2020 UWMPs. Effective July 1, 2016, urban water supplier eligibility for water grants or loans awarded or administered by the state is conditional on compliance with these targets. Additionally, effective January 1, 2021, failure to meet the 2020 target can be used in administrative or judicial proceedings to establish a violation of state law by the urban water supplier.

Executive Order B-29-15 - With California facing one of the most severe droughts on record, Governor Brown declared a drought State of Emergency in January 2014 and directed state officials to take all necessary actions to reduce water use.

On April 1, 2015, Governor Brown mandated a 25 percent water use reduction for cities and towns across California. In May 2015, the State Water Resources Control Board (SWRCB) adopted an emergency regulation requiring an immediate 25 percent reduction in overall potable urban water use. The regulation uses a sliding scale for setting conservation standards, so that communities that have already reduced their R-GPCD through past conservation will have lower mandates than those that have not made such gains since the last major drought.

The SWRCB tracks water conservation for each of the state's larger urban water suppliers on a monthly basis, but compliance with individual water supplier conservation requirements and the statewide 25 percent mandate is based on cumulative savings. Cumulative tracking means that conservation savings will be added together from one month to the next and compared to the amount of water used during the same months in 2013.

Table 9 below provides the reduction targets for each IEUA member agency.

Table 9: Retail Agency Emergency Regulation Mandatory Reduction %

Retail Agency	Mandatory Reduction Percent
Chino, City of	24%
Chino Hills, City of	28%
Cucamonga Valley Water District	32%
Fontana Water Company	28%
Monte Vista Water District	24%
Ontario, City of	24%
Upland, City of	36%

Regional Compliance Status

As stated, IEUA and its regional partners are committed to meeting or exceeding all compliance requirements put forth.

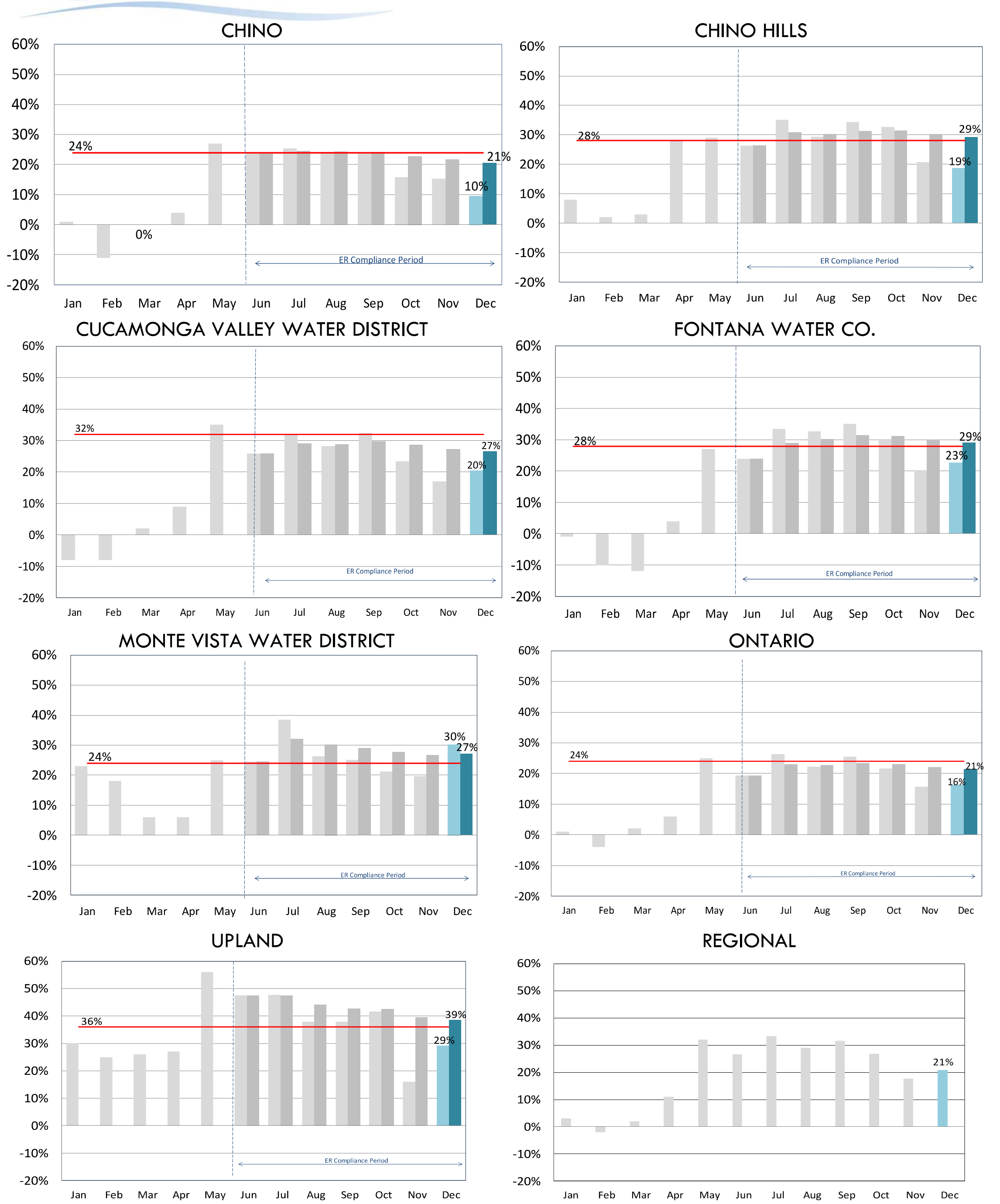
Governor's Executive Order and Emergency Regulation Compliance

As stated above, the SWRCB approved an emergency regulation to implement a mandatory 25 percent statewide reduction in potable urban water use for the period between June 2015 and the end of February 2016. As of June 2015, member agencies are required to track monthly water use savings, as compared with 2013 water usage, and report the total potable water production to the SWRCB.

On the following page, Figure 1, is a copy of the December 2015 report submitted to the SWRCB. The report indicates that each water district exceeded or came close to meeting their respective reduction level for the June through December 2015 reporting period. The collective goal is 28% reduction and the collective saved through December is 29.5%.

EMERGENCY REGULATIONS WATER USE TRACKER

December 2015



Target Savings Monthly Savings Cumulative Savings

- Monthly Savings compared to 2013 Water use
- Emergency Regulations of cumulative water use savings compliance begins June 2015

Figure 1: Retail Agency Emergency Regulation Water Use Tracker

SB X7-7 Compliance

IEUA and its regional partners, through their Regional Alliance, used method 1 to set its interim and 2020 GPCD targets. Because this method requires landscape area and population data in the compliance years (2015 and 2020) to calculate the targets, the targets reported in the Region's 2010 Urban Water Management Plan (UWMP) are estimates that will be updated in its 2015 and 2020 UWMPs. The estimated targets for 2015 and 2020 are 226 and 201 GPCD respectively.[6]

As shown in Table 10, measured GPCD within the Regional Alliance service area for the last five years has averaged 220 gallons, 3% less than the 2015 target. 2015 estimates show per capita use at 188 well below the 226 target. It is certain the region will comply with its 2015 interim target and absent a sharp rebound in per capita water use in the next five years, the odds are strongly in its favor that it will meet its 2020 target. The current projection for 2020 is reported GPCD of 169 - 174, well below the target of 201. The current numbers being used by IEUA's planning team shows a 6 GPCD reduction for WUE in 2020. The plan as projected in this document, assuming 2 agencies implement Budget-based Water Rates, estimates an 11 GPCD reduction for WUE.

Table 10 reports regional SB X7-7 compliance. In comparing per capita use to targets, the law allows accounting allowances for recycled water (RW) and water use efficiency (WUE) in the reported GPCD. Table 10 depicts this logic for showing how the per capita water use (Actual GPCD) is adjusted by WUE and RW to yield the reported GPCD.

Table 10: 20x2020 Regional Compliance

Fiscal Year	GPCD without WUE & Recycled Water	Water Use Efficiency	Recycled Water	Reported GPCD*
UWMP 2010 Baseline				**251**
2010	260	1	10	249
2011	215	1	12	202
2012	229	2	15	212
2013	237	2	18	217
2014	243	2	21	219
2015 Target				**226**
2015 Actual	212	3	21	188
2020 Target				**201**
2020 Projection*	215	6 - 11	35	169 - 174

***Projection: 2020 assumes 2.5% increase/year water use from FY2014/15.*

[6] IEUA updated its service area population estimates and GPCD calculations following the release of 2010 Census data. The targets reported here differ from the targets reported in IEUA's 2010 UWMP. IEUA will be updating its baseline GPCD, interim, and compliance GPCD targets in its 2015 UWMP.

California Urban Water Conservation Council MOU Compliance

In December 1991, IEUA, along with 120 other urban water agencies and environmental groups signed a historic Memorandum of Understanding and since then the California Urban Water Conservation Council (Council) has grown to over 400 members. Those signing the MOU pledge to develop and implement urban water conservation practices to reduce the demand of urban water supplies. During its 20-year history, the Council has successfully established itself as a collaborative forum within which water agencies and the environmental community work together to advance urban water conservation throughout the state.

As a part of regional water use efficiency programming, IEUA and its regional partners agree to allocate funding annually to pay membership dues and to support Council activities. In addition, IEUA also has a designated staff person who serves as a Group 1 - Board Member.

AB 715, SB 407, CalGreen, AB 1881 Compliance

IEUA does not have statutory obligations under AB 715, SB 407, CalGreen, and AB 1881, which govern the manufacture, sale, installation, and replacement of toilets, urinals, and faucets and the installation and rehabilitation of landscaping in California. The property inspection, plan approval, and construction permitting obligations of SB 407 and AB 1881 fall to cities and/or counties, not special water districts. The same is also true for adoption and enforcement of CalGreen building codes.

IEUA and its regional partners will continue to support and pursue new building codes and landscape measures which drive water efficiency including adding irrigation and landscape measures to local and state retrofit on resale regulations.

In addition, IEUA and its regional partners will work with developers and push for installation of premium toilets and ultra-high efficient development projects. This will require that IEUA and its regional partners actively interact with developers, homeowner associations, and the real estate industry in order to educate all parties, focusing on single family projects and appropriate design and product choices for water efficient back yards.

The region should also consider focusing on efforts to drive up standards for irrigation equipment being sold in California including: pressure regulation spray bodies with built-in check valves, high efficiency sprinkler nozzles, smart controllers and other efficiency equipment.

Section 3 - Market Condition and Potential

One of the first tasks undertaken in the WUE planning process was to collect and compile a database in order to disaggregate end-use data within the IEUA service area. Analysis of the region's customer demand is an important step in developing the WUE plan because it lays the foundation for understanding the potential for water savings from efficiency measures. For the purposes of this five-year plan, water consumption and inferred outdoor water use was used. The region's recent efforts with GIS mapping and analytics will provide significantly more accuracy regarding landscape area and irrigation use.

In addition, evaluating what's been achieved through past WUE activities helps assess the remaining potential. Lastly, appraising the market conditions and barriers to implementing WUE measures is necessary as they impact program feasibility and again potential to achieve water savings.

The following items were analyzed in order to determine remaining market potential in the IEUA's service area:

- Current Water Consumption
- Indoor and Outdoor Water Use
- Past Conservation and Device Saturation
- Market Conditions
- High Level Measure Potential

Regional Water Consumption

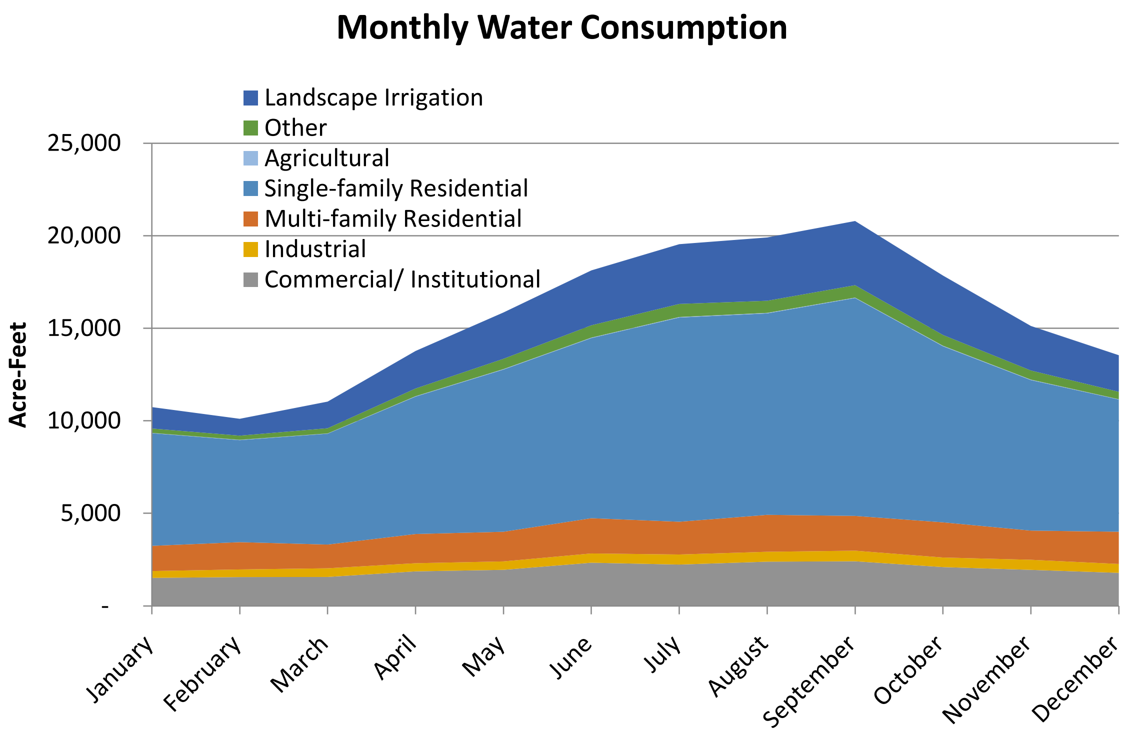
Table 11 shows the 2013 water consumption and number of water accounts by customer type for all seven IEUA member agencies combined.

Table 11: 2013 Regional Water Consumption

Customer Type	Number of Accounts in 2013 (PWSS)	Annual Consumption (Weather Normalized AF)	Customer Class Share of Total Demand
Single Family	171,309	112,171	48.5%
Multi-Family	7,286	27,818	12.0%
Commercial	12,912	25,668	11.1%
Industrial	870	6,342	2.7%
Landscape	5,332	31,119	13.5%
Other	599	27,893	12.1%
Total	**198,308**	**231,092**	

Figure 2 plots the monthly water consumption by month to reveal seasonal patterns by customer type. Note the pronounced seasonal variation with summer high deliveries approximately twice the level of winter deliveries. Single family and landscape irrigation show the largest seasonal variation. The graph is sorted with the highest seasonal variation presented on top. For example, landscape irrigation is the sector with the highest ratio of peak month to minimum month while commercial customers have the lowest.

Figure 2: Monthly Water Consumption by Customer Type



Indoor vs. Outdoor Water Use

WUE measures address either indoor or outdoor water use. For this reason, it is important to know how much water is used for each. Determining water usage indoors vs. outdoors can be difficult. Some outdoor end uses can be directly measured by dedicated irrigation meters. However, many types of water meters -- single family, multi-family, and commercial -- are "mixed," measuring both indoor and outdoor end uses. Therefore, agencies are forced to rely on inference to determine outdoor water usage.

Two methods can be used to estimate outdoor use across customer classes. The first method is the minimum month method that has seen wide use due to its ease of implementation. This method assumes that the month of minimum water demand is completely made up of indoor end uses; thus, any water consumption greater than the minimum month would be outdoor water use. To be accurate, this method requires that at least one month per year (typically in the winter) has zero outdoor water usage. Because of the region's location, irrigation occurs even in the winter and makes this method ineffective.

The second method, termed "seasonal variation," develops an estimate of winter irrigation from dedicated irrigation meters and applies this seasonal variation to mixed meter customers. The seasonal variation method will result in a higher estimate of outdoor water use than using minimum month because it captures winter irrigation end uses. This method was chosen for the region's planning process because it more accurately captures the winter irrigation occurring in the region's arid climate.

Table 12 shows the estimated outdoor end use constituting **66%** (153,435 acre-feet) of the total volume of water use.

With this high percentage of outdoor water usage, it is important to recognize that, with just a 20% reduction each year, over 30,000 acre-feet of water can be saved annually.

Table 12 Inferred Outdoor Use

Inferred Outdoor Use			
Customer Class	Total Volume (AF/Year)	Seasonal Variation Method % Use	Estimated Outdoor Use (AF)
Single Family	112,171	62%	70,071
Multi-Family	27,818	33%	9,314
Commercial	32,010	47%	14,959
Landscape	31,199	100%	31,199
Other	27,893	100%	27,893
Total	**231,092**	**66%**	**153,435**

Past Achieved Conservation

It is necessary to understand past achieved conservation when determining remaining conservation potential. Data from the region's locally administered programs, as well as MWD's regional rebate programs, was collected from IEUA's fiscal year reports 2002 through 2015. The data was entered into the AWE Tracking Tool and is summarized in the Table 13.

The total lifetime water savings for all of the measures is estimated at 89,161 acre-feet. Toilets, both HET and ULFT, have provided the most significant savings at 49,347 acre-feet over the life of measures. This represents over 55% of the total water savings. Smart controllers provide savings of 8,581 acre-feet representing over 9% of total savings. Over half of the smart controller savings came from central irrigation control system rebates through MWD's Public Agency Program.

Table 13: Lifetime Savings by Measure for Past Achieved Conservation

Measure	Lifetime Savings Acre-feet	% of Total Savings
High Efficiency and ULF Toilets (all markets)	49,347	55.35%
Smart Controllers (all markets)	8,581	9.62%
High Efficiency Clothes Washers (all markets)	6,669	7.48%
High Efficiency Nozzles (all markets)	5,966	6.69%
Fontana USD Retrofits	4,170	4.68%
Ultra Low Volume Urinals	4,155	4.66%
Residential Landscape Retrofits	4,104	4.60%
Turf Removal (all markets)	2,911	3.26%
Landscape Evaluations	1,855	2.08%
Water Brooms	416	0.47%
Pre-rinse Spray Valves	379	0.43%
X-ray Film Processors	304	0.34%
Cooling Tower Controllers	142	0.16%
Laminar Flow Restrictors	105	0.12%
Pool Cover	28	0.03%
Large Rotatory Nozzles	22	0.02%
Air-Cooled Ice Machines	5	0.01%
Rain Barrels	2	0.00%
Total	**89,161**	

Past Program Activity – Estimated Savings: FY2002 – 2015

In order to better understand activity and savings at a more granular level, Table 14 below displays the measures by market segment and delivery mechanism, if available. Of significance is that 23,395, or 26% of the total savings, came from ultra low flush toilets installed in multi-family sites through the region's locally administrated program. Other local programs with significant savings are:

- FreeSprinklerNozzles.com Program providing vouchers for free high efficiency sprinkler nozzles produced 4,696 acre-feet of savings.
- Fontana USD Retrofits, which provided free product and installation of high efficiency toilets and urinals as well as smart controllers and high efficiency sprinkler nozzles, shows savings of 4,170 acre-feet.
- Residential Landscape Retrofits providing free product and installation of smart controllers and high efficiency sprinkler nozzles delivered 4,104 acre-feet of savings.

Table 14: Lifetime Savings by Measure and Delivery Mechanism for Past Achieved Conservation

Measure	Lifetime Savings Acre-feet
Ultra Low Flush Direct Install (MF)	23,395
Ultra Low Flush Toilet Rebates (SF)	9,101
Smart Controllers Rebates (CII)	8,301
High Efficiency Clothes Washer Rebates (SF)	6,015
High Efficiency Toilets Rebates (MF and CII)	5,144
Fontana USD Retrofits	4,170
Ultra Low Volume Urinal Rebates	4,155
Residential Landscape Retrofits	4,104
High Efficiency Toilets Rebates (SF)	3,992
High Efficiency Toilet Direct Install (MF)	3,409
High Efficiency Toilet Direct Install (SF)	3,140
FreeSprinklerNozzles (MF and CII)	2,470
FreeSprinklerNozzles (SF)	2,226
Turf Removal Rebates (CII)	1,899
Phase III Landscape Evaluations	1,181
Ultra Low Flush Toilet Rebates (MF and CII)	1,166
High Efficiency Nozzles Rebates (CII)	1,111
Turf Removal Rebates (SF)	1,012
Landscape Evaluations	674
High Efficiency Clothes Washer Rebates (CII)	654
Water Brooms Rebates	416
Pre-rinse Spray Valves	379
X-ray Film Processors Rebates	304

Measure	Lifetime Savings Acre-feet
Smart Controllers Rebates (SF)	280
High Efficiency Nozzles Rebates (SF)	159
Laminar Flow Restrictors Rebates	105
Cooling Tower Conductivity Controller Rebates	84
pH Controllers for Cooling Tower Rebates	58
Pool Covers	28
Large Rotatory Nozzle Rebates	22
Air-Cooled Ice Machine Rebates	5
Rain Barrel Rebates	2

Past Program Activity – Estimated Savings: FY2010 - 2015

When evaluating past performance, it's also important to view activity and performance in the most recent years. This allows for better identification of trends and assessment of a given program's ability to deliver results.

Below in Table 15 are the savings by program for the last five fiscal years, FY2010/11 – FY2014/15. The total lifetime water savings is estimated at 30,856 acre-feet. These savings are nearly double what was projected in the 2010 Water Use Efficiency Business Plan with estimated savings of 16,055 acre-feet.

Table 15: Savings by Program - Last Five Fiscal Years

Measure	Lifetime Savings Acre-feet	% of Total Savings
High Efficiency Toilets (all markets)	8,413	27.3%
FreeSprinklerNozzles.com	5,679	18.4%
Fontana USD Retrofits	4,170	13.5%
Residential Landscape Retrofits	4,105	13.3%
High Efficiency Clothes Washers	2,826	9.2%
Turf Removal (all markets)	2,059	6.7%
Smart Controllers (all markets)	1,973	6.4%
High Efficiency Nozzle Rebates (all markets)	983	3.2%
Ultra Low Volume Urinals	775	2.5%

Measure	Lifetime Savings Acre-feet	% of Total Savings
Landscape Evaluations	674	2.2%
Laminar Flow Restrictors	105	0.3%
Cooling Tower Conductivity Controllers	71	0.2%
Air-Cooled Ice Machines	5	0.0%
Rain Barrels	2	0.0%
Total	30,856	

As with previous years, toilets still represented the most significant savings (27.27%), however, the locally administered programs, FreeSprinkerNozzles.com, Fontana USD Retrofits, and Residential Landscape Retrofits represented over 45% of combined savings. Each of these programs provided landscape and irrigation measures and was implemented through voucher and direct install delivery mechanisms vs the standard rebate-style program.

In the last two years, savings from turf removal increased significantly (over 300%) due to the increased incentive available through MWD's Regional Rebate Program.

Indoor Passive Water Savings and Saturation

Water agencies have promoted indoor water use efficiency since the early 90's. Indoor WUE has focused on upgrading high water use fixtures such as toilets, showerheads, and clothes washers. Examples of common programs are rebates to upgrade fixtures and direct installation programs (active conservation). In addition, water agencies have supported upgrading plumbing codes that require high efficiency fixtures (passive conservation). Both passive and active conservation has contributed to saturation of indoor measures. For future program planning it is important to understand the saturation and thereby the remaining potential.

The passive conservation engine from the AWE Tracking Tool was used to calculate device saturation for residential toilets and clothes washers to assess remaining use efficiency potential. Unfortunately, at this time there is not sufficient market information to conduct this analysis for commercial measures without significant investment. The AWE Tracking Tool creates a year-by-year inventory of water-consuming devices and the transformation over time to efficient devices driven by plumbing and building code.

Active conservation was then subtracted and thus, the remaining potential was calculated.

Single Family Homes: Saturation of High Efficiency Toilets and Clothes Washers

Table 16 shows the current saturation of high efficiency toilets and clothes washers in single family residences. "Efficient" toilets are defined as ULFT or better (saturation includes anything 1.6 gpf or better). Recent active programs have focused on high efficiency toilets (1.28 gpf) and current programs focus on "premium" fixtures (1 gpf or less).

For toilets, the saturation rate is a significant 79% percent. Of the inventory of 390,324 fixtures in IEUA's service area, there are approximately 83,383 non-efficient toilets remaining.

For high efficiency clothes washers, the saturation rate in single family homes is 53 percent. There are an estimated 161,925 clothes washers in the Region's single family residential sector. Of the inventory of fixtures in the IEUA service area, there are approximately 75,000 non-efficient clothes washers remaining. "Efficient" clothes washers have a water factor of 8 of better, which includes all residential front loaders and the most efficient of the newer top loaders.

Table 16: Single Family Market Potential: Saturation of Efficient Toilets and Clothes Washers

Single Family	Toilets	Clothes Washers
Total Devices	390,324	161,925
Remaining (Non Efficient) Devices	83,383	75,932
Devices Actively Retrofitted	18,940	15,359
Devices Passively Retrofitted	288,001	70,633
Saturation	79%	53%
Total Water Savings Potential	3,544 AFY	8,163 AFY

Multi-family Homes: Saturation of High efficiency Toilets and Clothes Washers

Table 17 shows the saturation in the multi-family sector. High efficiency toilet saturation is even higher at nearly 100% and saturation of high efficiency clothes washers is 44%. One reason for the high saturation rate for toilets is that the IEUA and its regional partners have been extremely aggressive implementing direct install programs for more than a decade.

Table 17: Multi-Family Market Potential: Saturation of Efficient Toilets and Clothes Washers

Multi-Family	Toilets	Clothes Washers
Total Devices	117,559	29,771

Remaining (Non Efficient) Devices	Very few	16,785
Devices Actively Retrofitted	31,534	Not categorized
Devices Passively Retrofitted	94,956	12,987
Saturation	Near 100%	44%
Total Water Savings Potential	NA	1,804 AFY

Remaining Potential for Toilets

Due to the high saturation rate of residential toilets as well as current code, it is recommended that the region no longer offer programs for toilet replacements.

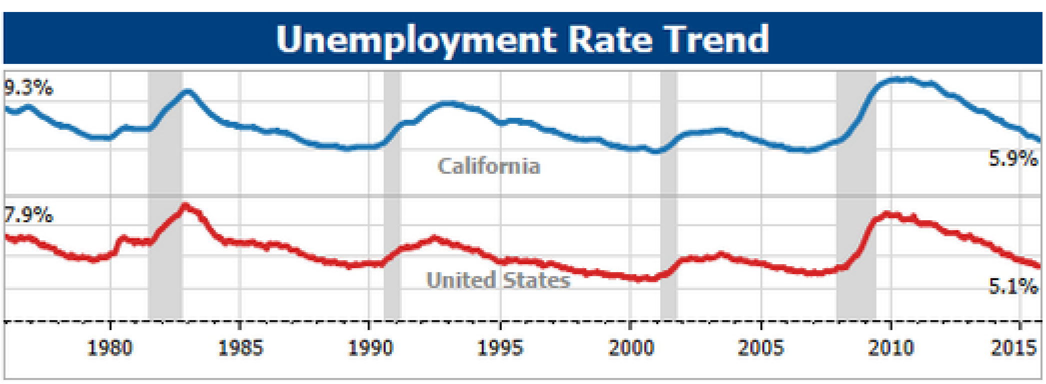
Remaining Potential for Clothes Washers

There is still some market for high efficiency clothes washers. Future programs should offer incentives for the highest efficiency models because many customers are already choosing efficient models without incentives.

Market Conditions

As economic outlooks shift, so too do attitudes about major purchasing and upgrade decisions regarding homes and businesses. When economic indicators such as unemployment, interest rates, and property values are favorable, customers are much more likely to make longer term investments in their properties including WUE upgrades.

Figure 3 shows unemployment rates over the years for California and San Bernardino County:



Unemployment Rate San Bernardino County

June '11	14.0%
June '12	12.8%
June '13	10.4%
June '14	8.4%
June '15	7.1%

Source: BLS via CA DOF

Figure 3: Regional Unemployment Trend

Besides weathering California's drought emergency, IEUA's service area, like much of California, has experienced small steady improvements in its unemployment rate since the peak of the great recession. Median household income has also exhibited improvements since bottoming out in the recession. The real estate market has shown upturns, with an increasing median price for single family homes and multifamily buildings, increasing occupancy and rents for commercial properties, and increasing single family housing new development.

The improving economic and real estate market conditions affect the different market segments targeted by WUE programs, and their drivers need to be considered when designing water use efficiency programs. Figure 4 *Market Conditions* address each market segment—broken into multifamily and HOA, Commercial/Industrial/Institutional (CII), and Single Family—for insights as to how market conditions can influence WUE program considerations.

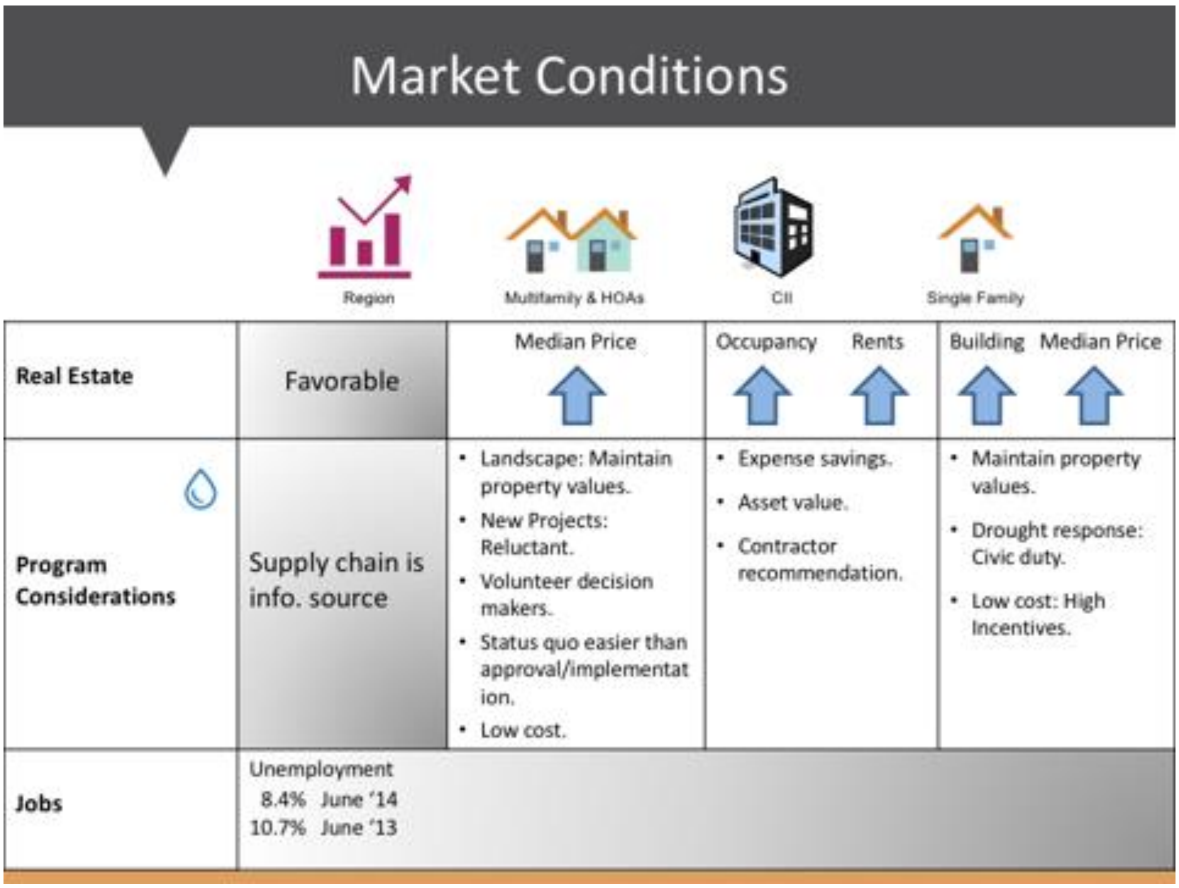


Figure 4: Market Conditions

The improving real estate market in the region gives new impetus for customers to make improvements to their properties. Since some landscape upgrades require fairly high up-front investments and longer term payback periods, customers need to believe that the real estate market will recognize the value of these investments.

The competitive multi-family and Homeowners Association (HOA) markets lead to customer's desire to have well-maintained and attractive landscapes to maintain property values. However, HOAs are typically governed by volunteer decision makers, and many are not willing to take risks or make investments in new technologies or alternative landscape designs. As well, many HOAs lack the capital funds to make such improvements. They must plan years in advance to fund any large-scale project.

For commercial properties, business owners and managers have a known focus on the bottom line, requiring WUE measures to pay for themselves over a short time. Improving asset values is always a plus and contractors can have an inside edge in pushing new WUE technologies and practices due to years of developed business relationships.

The single family market sector is also characterized by customer demand for landscapes that maintains property values. However, single family customers take a more vested interest in maintaining their civic duty for drought response. Hence, messaging for support of community values such as drought response can have more traction. Increased new housing developments provides the opportunity to influence the highest efficiency fixtures, landscapes, and irrigation systems.

Significant economic incentives are motivating to all markets.

New Water Savings Approaches and Technologies

As new approaches and technologies become available in the market, or have proven savings, it is important to evaluate these opportunities. Two approaches being considered by the IEUA and its regional partners are Budget-Based Water Rates and Customer Engagement Technologies.

Budget-Based Water Rate Opportunities

Budget-based water pricing is a type of increasing block rate structure in which the block sizes vary according to household-specific characteristics (# of residents, irrigated area, local weather) and the use of indoor and outdoor efficiency standards (as a benchmark). Customers who manage their water consumption within their efficient allocation/water-budget pay a lower water rate; customers who exceed their efficient allocation/water-budget pay higher water rates.

The emphasis on account-by-account water use efficiency requires, with a budget-based design, that agency fixed costs be collected in large part on a fixed service charge and the remaining fixed costs are imbedded in the customers "efficiency" tiers. This helps protect the agency from losing necessary fixed revenues when customers save or use less water. Agencies with well-designed budget-based rates weather water demand changes associated with wet years, drought restrictions and economic downturns.

A recent UC Riverside study[7] of the impact of implementing budget-based water rate structures found a pronounced effect that this type of rate reform can have, specifically in a nearby service area, Eastern MWD (EMWD).

Examining more than 12,000 residential customer's consumption records from January 2003 through September 2012, the analysis arrived at the following findings:

- Average prices rose less than 4% under water budgeting, but would have had to rise 34% under flat rate pricing to achieve the same reduction in customer water use.

- EMWD's budget-based rate structure resulted in at least a **15% reduction in residential water use,** controlling for the effects of inflation and the recent economic downturn.

Comparison of Observed Demand Against Model Predictions

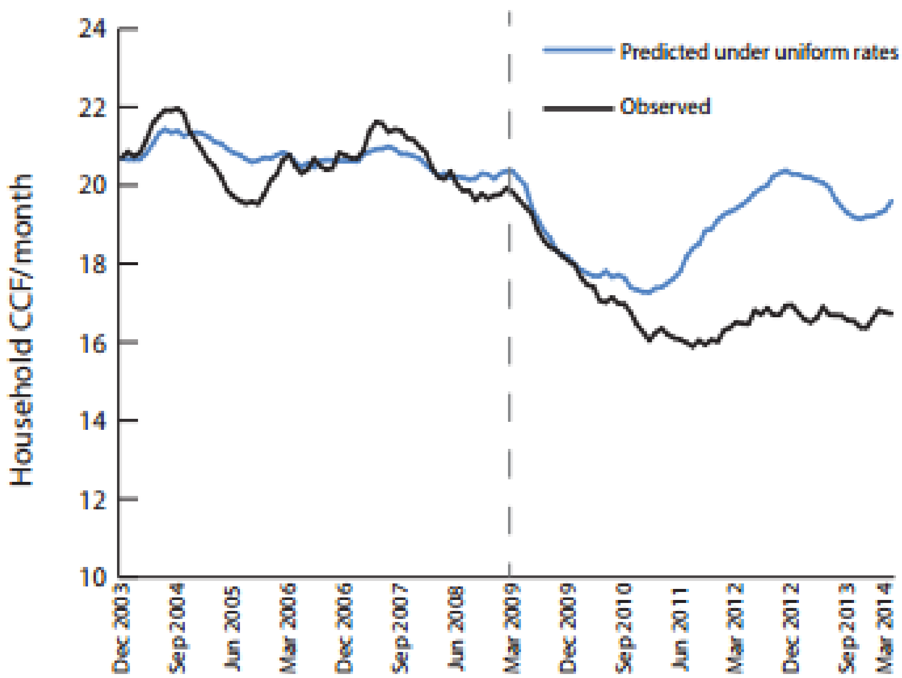


Figure 5: EMWD BBR Demand Against Model Predictions

There is also evidence that budget-based water rates are more desirable from a customer perspective especially when conservation targets must be achieved. Another UC Riverside Study[2] found that EMWD customers were better-off under budget-based water rates

[7] Baerenklau, Kenneth A., Kurt A. Schwabe and Ariel Dinar. 2014a. "The Residential Water Demand Effect of Increasing Block Rate Water Budgets." Forthcoming in Land Economics 90(4): 683-699. Baerenklau, Kenneth A., Kurt A. Schwabe, and Ariel Dinar. 2014b. "Allocation-Based Water Pricing Promotes Conservation While Keeping User Costs Low." Agricultural and Resource Economics Update 17(6): 1-4.

rates than under either a uniform price increase or a uniform curtailment that would achieve the same levels of conservation and agency revenues. Of the three policies examined, budget-based rates were the only policy that improved average customer welfare relative to the old pricing policy, and the only policy that effectively rewarded water use efficiency.

Depicting Rate Change Savings

For the purposes of this plan and savings modeling, budget-based water rates were depicted as a WUE activity in the AWE Tool by contrasting different numbers of the IEUA's member agencies rolling out the new rate over the 5-years of the implementation plan—either 2 or all of the member agencies. The agency-level savings assumption in Table 18 below is derived by translating the water use per account (AF/Account) into a weighted average water savings per account.

The econometric estimate of water savings includes the effect of the budget-based rates, increased customer outreach, and implemented water use efficiency measures. Another recent econometric study estimated customer engagement technology and associated increase in participation of water use efficiency programs to have resulted in a 4.6% reduction in a random sample controlled evaluation design.[8] To avoid double counting, a water savings assumption of 11% was determined to be a reliable savings estimate solely attributable to budget-based rates and directly applied to single family accounts. Multi-family accounts are typically composed of mostly indoor uses and only 40% of the level of single family savings was assumed to apply. The 11% water savings was also applied to irrigation accounts. A volumetrically weighted savings per account across these three customer classes was then obtained and is presented in the last row of the table below.

Table 18: BBWR Water Savings Assumptions

Customer Type	AFY/ Account	Savings %	Savings AFY/Acct	Notes
Single Family	0.79	11%	0.09	Direct Effect of BBRS Implementation, Reliable Est.
Multi-Family	3.67	4.4%	0.16	MF mostly indoor, assume 40% of SF savings
Irrigation	7.19	11%	0.79	CIII - CII not affected, Irrigation affected
Weighted Use in AF/Account	1.09		0.11074	Weighted Average Savings (SF + MF + Irrig.) in AFY/ Acct
			Savings Gallons /Acct	(x325851 gallons/AF)

[8] Mitchell, David and T.W. Chesnutt, *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports,* Prepared for California Water Foundation & East Bay Municipal Utility District, December 2013.

Customer Type	AFY/ Account	Savings %	Savings AFY/Acct	Notes
			36,085	Weighted Average Savings (SF + MF + Irrig.) in Gallons/ Acct

Two additional member agencies rolling out budget-based rate structures was translated into two-sevens of the 183,927 applicable accounts (SF+MF+Irrig.) or 52,551 accounts. An all agency rollout was also modeled using all 183,927 accounts.

These per account savings translate into total annual savings for each model of:

- Two agency implementation of budget-based water rates: 5,820 AF
- Region-wide agency implementation of budget-based water rates: 20,368 AF

Customer Engagement Technology Opportunities

Customer Engagement Software is used to better inform customers of their real time water use and possibilities for improving water use efficiency. As discussed above, a recent study estimated customer engagement software and increased participation in water use efficiency programs to have resulted in a 4.6% reduction in water use.[9]

Table 19 below provides the savings assumption used for savings directly attributable to Customer Engagement Software (excluding the effect of increased participation in WUE programs.)

Table 19: Customer Engagement Software Water Savings Assumptions

Customer Class	AFY/ Account	Assumed Savings %	Savings AFY/Acct	Notes
Single Family	0.79	2%	0.0158	Direct Effect of Customer Engagement Software, Reliable Estimate
			Savings Gallons /Acct	(x325851 gallons/AF)
			5,148 Gallons per Year	Avg Savings (SF) in Gallons/ Acct

High Level Measure Potential Assessment

In order to select measures for further evaluation, it is necessary to understand the high level potential of specific measures within each market segment. Table 20 summarizes

[9] Mitchell, David and T.W. Chesnutt, *Evaluation of East Bay Municipal Utility District's Pilot of WaterSmart Home Water Reports,* Prepared for California Water Foundation & East Bay Municipal Utility District, December 2013.

sources of remaining water use efficiency potential by market sector. Within each sector the table lists sources of water use efficiency, the stage of programmatic development (early to late), and the qualitative range (low to high). This broad overview acts as a guide in selecting measures for further consideration.

Table 20: High Level Market Potential by Measure

Sector, Measures, End Uses	Stage	Description of Potential	
Residential Indoor			
Toilets	Late	Small number 3.5gpf, ULF to HET less savings	Low
Faucets, Aerators, Flow Restrictors	Late	Small remaining potential	Low
Showerheads	Late	Very low flow rates existing fixtures	Low
Clothes Washers	Mid	Medium saturation - many freeriders	High
Pressure Regulating Valves	Pilot	Covers all end uses	High
Surveys, Education, Outreach	Ongoing	Gateway program	Low-Mid
Budget-Based Water Rates	Early	Covers all end uses	High
Landscape			
Controllers	Early	SF Residential large remaining potential	High
Nozzles	Early	Large remaining potential	High
Turf Replacement, Low Water Plants	Early	Large technical potential; small economic potential	High
Artificial Turf	Early	Large technical potential; small economic potential	High
Pressure Regulating Valves	Pilot	Covers all end uses	High
Landscape Management	Ongoing	Gateway program	High
Surveys, Education, Outreach	Ongoing	Gateway program	Low-Mid
Budget-Based Water Rates	Early	Covers all end uses	High
CII (Non-Landscape)			
Toilets	Mid	Small number 3.5gpf, valve type expensive replacement	Mid
Urinals	Mid	High traffic sites could be target	Mid
Faucets, Aerators, Flow Restrictors	Late	Small remaining potential	Low
Showerheads	Mid	Sports facilities, accommodation could be target	Mid
Food Service Equipment	Mid	Limited number of food steamers, offer upstream incentives	Mid
Laundry	Mid	Limited number in region	High
Industrial Processes and Manufacturing	Mid	Limited number in region	High
Cooling	Mid	Limited number in region	High
Pressure Regulating Valves	Pilot, Research	Covers all end uses	High
Surveys, Education, Outreach	Ongoing	Gateway program	Low-Mid
Budget-Based Water Rates	Early	Covers all end uses	High

Outdoor Water Savings Opportunities

Comprising an estimated 66% of the region's total demand, outdoor water use is clearly the prime opportunity for water savings.

Outdoor water efficiency is focused on reducing irrigation needs for landscapes by upgrading either the irrigation system or planted landscape to more water use efficient options. Examples of device upgrades for irrigation systems are high efficiency nozzles, micro and low precipitation irrigation, smart controllers, irrigation repairs, and pressure regulation. Turf removal and replacement with a more sustainable landscape is an example of an "upgrade" to a traditional landscape.

To determine the best water savings opportunities, the plan looks at two factors:

1) Sectors and customers with the highest outdoor water use and highest potential savings;
2) Available devices and programs with highest market potential.

Opportunities by Customer Type

The analysis of water usage by account type found that the account types with the highest total volume of water usage in the region, single family, multi-family and landscape accounts, also have the largest percentage of outdoor water use. These accounts use over an estimated 171,108 acre-feet of water per year and an estimated 110,584 acre-feet per year just for irrigation. A reduction of 10% could yield over 11,000 acre-feet in water annual water savings.

These account types should be targeted when pursuing outdoor water conservation programs.

Opportunities by Measure

There are several existing outdoor water efficient technologies that have a high potential for water savings.

High Efficiency Nozzles and Low Precipitation Systems

Most customers in the region, no matter their type, have some irrigated area within their property. These areas are typically irrigated by in-ground systems with inefficient nozzles (ex: pop-up spray heads). There are virtually millions of nozzles in the region. These irrigation systems can be easily retrofitted with high efficiency nozzles or micro or low precipitation systems. Market studies show that only around 20% of irrigation purchases are for high efficiency products. This low market saturation, coupled with the incredibly high number of nozzles within the region, provides a high potential for increased efficiency.

Smart Controllers

The majority of customer sites also utilize standard timers to operate their irrigation system. There are tens of thousands of timers throughout the region. As with nozzles, less than 20% of controllers purchased are smart controllers. Smart controllers can be a great water saving measure for sites over irrigating as well as large landscape areas. When offering smart controller programs, IEUA and its regional partners needs to incorporate potential savings verification into the program design.

Turf Removal

The square feet of irrigated turf within the region is estimated at 434 million square feet for single family residential parcels (OmniEarth aerial imagery). GIS data calculating irrigated area will be made available to every IEUA member agency. It is clear that cutting across all sectors with landscape, turf replacement has enormous potential. Turf is the predominant landscape in Southern California and the potential for turf removal within the Inland Empire market is high.

Pressure Regulating Devices

Excessive water pressure in an irrigation system can cause increased and unnecessary water output from nozzles, and can also increase the chance of damage or leaks in the system. It is unknown how many customers suffer from excessive water pressure, however, it is known that most customers do not install outdoor pressure regulating devices. Regulating pressure is a potential area of high water savings worth further exploration through pilot studies.

Irrigation Repairs

Irrigation repairs are also an area that could assist customers with ongoing excessive water use. Using customer level water budget data can help identify sites with leaks. It is unknown how many customers have irrigation leaks, but the potential for savings is high.

Section 4 – Recommended Implementation Strategy

As discussed in the Executive Summary, there is a major difference between ***water conservation*** and ***water use efficiency*** and it is important to understand the dissimilarity.

The objective of this plan is ***not*** to focus on ***water conservation*** with its short-term focus on current emergency conditions. This approach will not provide prolonged savings. As drought restrictions are lifted, per capita water use will gradually rebound upwards as people breath a sigh of relief that the crisis is over and return to life as usual.

Instead the goal is to achieve ***water use efficiency,*** a sustainable reduction in water use, by creating a new resource value for water in the eyes of the end user.

The Regional WUE Business Plan proposes a five-year strategy to seek out inefficient water use customers, educating them about WUE goal attainment, and providing a “road map” to accomplish this.

It is important to understand that, while IEUA and its regional partners strive to offer an array of valuable programs and services, it is the retail water agency that ultimately determines the final design and level of participation for programs offered within their service area.

Proposed Strategy for Customer Interactions

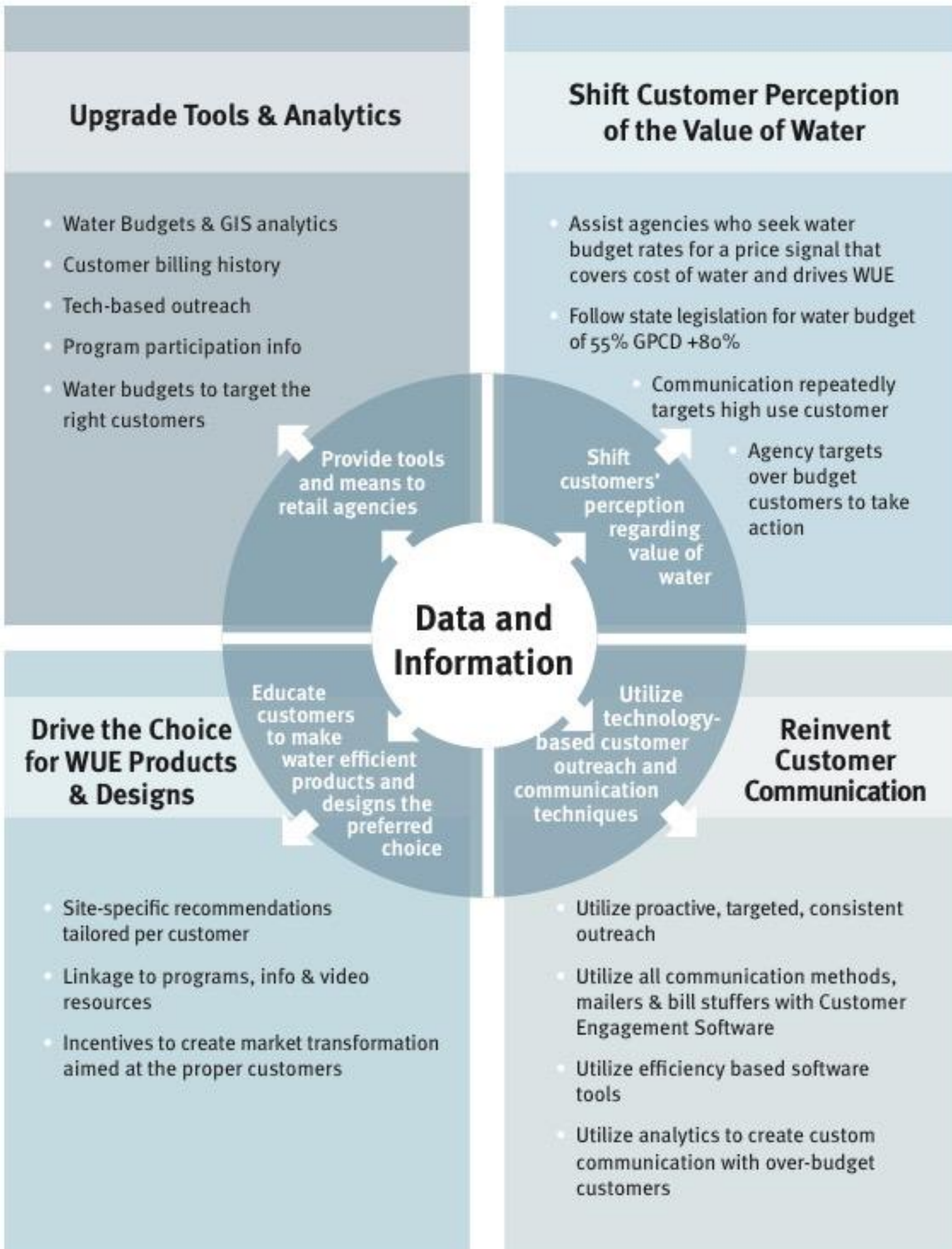
In order to achieve efficient water use, it is recommended IEUA and its regional partners conduct the in the following:

1. **Provide the tools and means** for retail water agencies to motivate the end use customers to meet reasonable and efficient water use targets. Personalized information, based on actual customer water use, measured against accepted State efficiency standards is necessary.
2. Accomplish this by **shifting customers’ perception regarding acceptable levels of usage.**
3. Assist customers to **make water-efficient products and landscape designs the preferred choice.**
4. **Utilize technology outreach and communication techniques** to provide refined and individualized communication with each customer.

Figure 6 illustrates the four major changes, over traditional plans, which should be considered in order for the region to achieve reasonable and efficient water use.

Four Major Changes to Achieve Efficient Regional Water Use

Figure 6: Major Changes Required to Achieve Efficient Regional Water Use



As illustrated in the chart above, there are a number of new, tech-based services and applications available to support WUE goals. These include:

Geographic information systems (GIS) designed to capture, store, analyze, manage, and present an array of geographical data.

Customer engagement software designed specifically for utilities to connect and communicate with their customers via web and mobile devices.

Water budgeting software that provides parameters for efficient water usage per billing period and compare customers' actual usage.

Adaptors of these technologies are seeing a number of positive outcomes. Utilities have more robust data for strategic WUE program targeting and greater ability to manage supplies and distribution. Additionally, the end use customer receives accurate and personalized information about water usage at their site as well as steps to eliminate excessive water use.

It is recommended that IEUA and its regional partners consider utilizing the new tech-based software. The benefits of enhanced customer engagement for an agency can be achieved through implementation of a plan composed of eight strategic elements. Each was selected, as shown in the chart on the following page, because they provide an important piece of the puzzle for a successful customer engagement process:

Eight Strategic Elements of the Regional Plan

Strategic Element:	Reason Selected:
Provide satellite-based COMPUTER MAPPING DATA for each retail agency	Delivers valuable site-specific data on all customers that can be used to target inefficient water users.
Encourage retail agencies to utilize WATER EFFICIENCY PRICING SIGNALS	Proven to be equitable and effect change at least cost to the agencies. Helps agencies achieve revenue and conservation balance.
Focus on OUTDOOR water use	Outdoor use is 66% of total water demand.
Use TECHNOLOGY-BASED SOFTWARE designed to engage, educate, and motivate customers	Provides convenient, interactive connection with customer via mobile device or computer.
Implement WUE CODE requirements for new construction	Lowest cost opportunity for lifetime water use efficiency.
TARGET OVER-ALLOCATION CUSTOMERS and offer ACTIONABLE water saving solutions	Best opportunities for cost effective savings .
Provide INCENTIVE-BASED & Regional INFORMATION-BASED Programs for IRRIGATION & LANDSCAPE MEASURES	Drives customers to act on their own and pushes market transformation.
TRACK WUE RESULTS & MAKE ADJUSTMENTS when necessary	To meet changing regional demand reduction goals.

Figure 7: Strategic Elements of the Regional Plan

Section 5 - Potential Programs and Analysis

With opportunities and markets identified for specific technologies and a recommended strategy developed, the next step in the WUE planning process was to evaluate all programs—both new and existing. A list of programs and measures was created and compared with the region's water demand and measure savings potential. At this stage of the process numerous possibilities were listed, with the understanding that many of these programs would not make the final cut.

The List of Potential Programs and the reasoning for consideration are shown in Table 21.

Table 21 Potential Programs and Reasons for Consideration

Program/Measure	Reasons for Consideration
SoCal WaterSmart Rebate Program	- Majority of funding from MWD. - Ease of operation.
High Efficiency Toilet Incentives and Direct Installation Programs	- Has provided long-term cost effective water savings in the past.
Turf Removal Incentives and Direct Installation	- Abundant opportunity that results in market transformation.
Smart Controller Direct Installation Programs	- Targets large use outdoor water and verifies savings will occur.
High Efficiency Nozzle Voucher and Direct Installation Programs	- Large number of pop-up heads to be retrofitted. - Program is easily scalable.
Landscape Evaluations	- Targets over-allocation landscape customers and motivates them to make water use efficiency improvements.
Submetering Incentive Program	- Saturation is low and potential water savings are high volume.
Graywater Incentive Program	- High water savings potential.
Pressure Regulation Incentives	- Known issue with homes and irrigation system.
Irrigation Repair Incentives and Direct Installation	- Addresses fundamental issues. Issues are exasperated with installation of efficiency measures.
Leak Detection and Flow Monitoring Incentives	- Could save huge amounts of water and reduce damage at properties.
Drip Irrigation Incentives	- Currently most efficient and viable method for irrigation.

Program/Measure	Reasons for Consideration
Budget-Based Water Rates	- Sends strong price signal, stable agency revenue recovery, and provides excess revenue for local agency programs - Drives over-allocation customers to consider changes, with little impact to low-income (UCR; Baerenklau) - Proven effective for long-term water demand reduction
Customer Engagement Software	- Technology based communication method - Allows retailers to send messaging & program links to over-allocation customers - Proven effective elsewhere for reducing demand

As importantly, it is necessary to understand the issues and possible risks when considering a potential program and/or measure. Table 22 lists these other considerations.

Table 22: Potential Programs and Other Considerations

Program/Measure	Consideration
SoCal WaterSmart Rebate Program (multiple measures)	- MWD controls measures to be incentivized, incentive levels, and budgets. - Marketing is not consistent.
High Efficiency Toilet Incentives and Direct Installation Programs	- Saturation is high. - Code requires high efficiency fixtures. - Premium fixtures are not easily available and provide only incremental savings.
Turf Removal Incentives and Direct Installation	- Expensive and not cost effective. - Quality of installations vary. - Drip systems have maintenance issues. - Requires a significant amount of resources to manage a “best practices” program.
Smart Controller Voucher and Direct Installation Programs	- Cost is higher than traditional controllers. - Many contractors have not bought into technology. Customers are unfamiliar with technology. Can be complicated to install and program. - Many customer under-irrigate.

Program/Measure	Consideration
High Efficiency Nozzle Voucher and Direct Installation Programs	- More expensive than traditional nozzles. - Many customers do not know what a nozzle is.
Landscape Evaluations	- Duration of behavioral savings are unknown. - Measure savings are usually associated with another program.
Submetering Incentive Program	- Extremely expensive. - Reading meters and billing is complicated.
Graywater Incentive Program	- As a retrofit option, graywater is not cost effective. Re-plumbing is costly.
Pressure Regulation Incentives	- Savings are not known. Hard to set average incentive. - Requires more extensive installation. All installations are different.
Irrigation Repair Incentives and Direct Installation	- Savings are not known. Hard to set average incentive. - Requires digging, additional equipment, etc. All installations are different. - Potential liability for water agency if repairs conducted by staff or contractor.
Leak Detection and Flow Monitoring Incentives	- Savings are not known. Breaks are different sizes therefore different savings. Hard to set average incentive. - Many solutions require extensive digging. Could create more liability for water agency.
Drip Irrigation Incentives	- Drip systems can have maintenance issues. - Savings are not known. Hard to set average incentive.
Budget-Based Water Rates	- Requires significant investment of time, resources and dollars - Must be clearly communicated to customers
Customer Engagement Software	- Duration of savings may be limited

For each program, a high level of costs and water savings were estimated. Additionally, each program was assessed for its ability to deliver desired outcomes.

Program selection was not a cut-and-dry process. Some of the water efficiency possibilities would not meet other regional criteria for selection such as customer acceptability or market need. Others could meet regional goals to achieve market transformation, although they were not cost-effective. IEUA and its regional partners also needed to take advantage of MWD funding and grant opportunities.

After the first pass, several programs were removed or otherwise not selected and are listed below:

- ***Toilet Replacement Programs.*** As discussed in the previous chapter, efficient toilets have a saturation of 80% in single family and nearly 100% in multi-family sites. Based on this evidence as well as the current code, it is recommended that IEUA and its regional partner not implement direct installation programs or offer enhanced incentives.
- ***Submetering Incentive Program.*** Submetering individual apartment units or landscape use for residential and mixed-use meters has proven to reduce water use. However, installing, maintaining and reading those meters is complicated and costly from both a water agency and customer perspective. Therefore, submetering was deemed not feasible or cost effective.

In addition, several programs were tabled for later consideration because although they have potential for significant savings there is not sufficient information on savings and costs necessary to conduct a comprehensive evaluation. These programs are:

- Graywater Incentiive Program
- Irrigation Repair Incentives and Direct Installation
- Leak Detection and Flow Monitoring Incentives

Cost-Effectiveness Analysis

The next action was to run each of the remaining program measures through the economic analysis model and compare against the region's overall strategy to better examine the pros and cons of each. The AWE Tracking Tool v3 was utilized to conduct the analysis.

In order to determine the cost-effectiveness threshold for a program, it is first necessary to determine the avoided costs of supply. The significance of the avoided costs is that for each acre-foot of water savings, IEUA and its regional partners can avoid the variable costs, which include power costs and purchasing MWD water.

The region's avoided cost ranges from $1,122 in 2015 to $1,285 in 2020 and $2,231 in 2040.

The portfolio of programs being considered should fall below the current $1,122 avoided cost.

Cost-effectiveness analysis is the process of weighing the costs and benefits of a WUE program. For the regional plan, the relevant cost perspective for decision-making on WUE investments is the cost to IEUA and its member agencies alone. The benefits of the program are defined as the value of the water savings in dollar terms using the avoided costs estimates above. Finally, the dollar costs are compared to the dollar benefits. For sustainability purposes, the embedded energy savings and avoided greenhouse gas emissions calculated by the AWE Water Conservation Tracking Tool are also reported.

Table 23 shows the cost-effectiveness results for the potential program measures. A program such as SoCal WaterSmart has multiple measures and because each measure may have different savings and costs, it is represented on separate lines. Several measures are funded 100% by MWD or other grants and therefore have zero cost to the IEUA and its member agencies and are not listed in the table.

Table 23: Potential Program Cost per Acre-foot

Activity Name	Regional Cost to IEUA ($/AF)
Budget-based Water Rates*	$0
Residential Landscape Retrofit Program*	$0
Cooling Tower Controllers SCWS Rebate	$124
Technology Customer Engagement Software	$127
Smart Controllers SCWS Rebate (Commercial) $50 per Station	$130
Ultra-Low Volume Urinals SCWS Rebate	$148
FreeSprinklerNozzles.com Voucher (All Classes)	$185
High Efficiency Sprinkler Nozzles SCWS Rebate (CII)	$202
Smart Controllers SCWS Rebate (SF)	$221
High Efficiency Clothes Washers SCWS Rebate (SF)	$303
Air-Cooled Ice Machine SCWS Rebate	$744
Turf Removal $1.00	$879
HE Sprinkler Nozzle Direct Installation Program (All classes)	$931
Landscape Evaluation Program	$1,286
Turf Removal $2.00	$1,783
Residential Smart Controller Upgrade Program	$2,215

** Program has outside funding.*

Most measures, except the programs/measures below, fall below the region's current avoided cost of $1,122 per acre-foot.

- Landscape Evaluations
- Residential Smart Controller Upgrade (direct installation)
- Turf Removal Rebates of $2.00 per square foot

These programs offer other benefits and assist in moving the landscape and irrigation efficiency (L&I) markets forward.

- Landscape evaluations provide customers with education as well as direction in implementing measures.
- The direct installation of smart controllers introduce customers to the new technology, educates them on their specific site water needs and ensures correct installation and programming.
- Enhanced turf removal incentives overcome the initial cash outlay barrier and drive market transformation.

Additionally, a scorecard was created and the programs rated by its ability to deliver desired outcomes.

Table 24: Potential Program Qualitative Scoring

	Scalability	Impact on L&I Market Transformation	Speed of Implementation
Budget-Based Water Rates	High	High	Medium
Cooling Tower Controller SCWS Rebates	Low	Low	Immediate
Customer Engagement Software	High	High	Medium
FreeSprinklerNozzles.com Vouchers	High	Medium	Immediate
HE Clothes Washers SCWS Rebates (SF)	Low	Low	Immediate
HE Nozzle Direct Installations	High	Medium	Short
HE Sprinkler Nozzles SCWS Rebates (CII)	Medium	Medium	Immediate
Landscape Evaluations	Low	Medium	Immediate
Residential Landscape Retrofits	Low	Medium	Immediate
Residential Smart Controller Upgrades	Medium	Medium	Short
Smart Controllers SCWS Rebates (CII)	Low	Medium	Immediate
Smart Controllers SCWS Rebates (SF)	Low	Medium	Immediate
Turf Removal Rebates ($2.00)	High	High	Short
Ultra-Low Volume Urinals SCWS Rebates	Low	Low	Immediate

The above programs offer varying levels of scalability; ability to transform the WUE market, and feasibility of implementation. Despite the range of ratings, each program contributes a worthwhile volume of cost-effective water savings. This high level scoring can be used as a guide in the future as conditions change such a needing to scale program activity.

Section 6 - Selected Programs

With the analysis completed, it was clear that most of the current programs proved to be cost-effective and each provided significant benefits. Each program was next assessed for potential refinement.

The programs below are shown to deliver effective levels of water efficiency and are available whether or not an agency chooses to implement Budget-Based Water Rates or the Customer Engagement Software. Table 25 provides the final list of programs, along with the reasoning for selection and potential support actions to improve results.

Table 25: Selected Programs and Reasoning

Program	Reasoning	Support Actions
Budget-Based Water Rates	- Sends strong price signal - Drives over-allocation customers to consider changes - Proven effective at reducing water demand	- Member agency education - Rate evalution and implementation support through SAWPA grant
Customer Engagement Software	- Technology based communication method - Allows retailers to send messaging & program links to over-allocation users - Proven effective elsewhere for reducing demand	- Link new media and WUE programs with targeted customers.
Landscape Evaluations	- Links customer with programs - Provides one-on-one customer education - Starts relationship with customer	- Use water budget data to identify customers - Provide more visual report - Implement automated and consisent follow up - Provide more cost/benefit information - Modernize data collection and reporting
Residential Landscape Retrofit Program	- Target large water use - Site visit verifies there will be savings - Professional installation and programming of controller	- Provide electronic follow up with customer to ensure sustained savings.

Program	Reasoning	Support Actions
Residential Smart Controller Upgrade Program	- Offering to smaller customer provides bigger pool of potential customers - Site vistis verifies there will be savings - Education workshop ensures customer can program and maintain controller and therefore sustain savings	- Use water budget and potential savings to show return on investment - Consider customer co-pay option to lower costs.
FreeSprinklerNozzles.com Program	- Cost effective - Targets large water use - Hugely scalable - Gateway measure	- Target largest users and over-allocation users to maximize savings and MWD funding - Market more aggressively
SoCal Water$mart Regional Rebate Program	- MWD funding - MWD administration - Ease of implementation	- Continue to add dollars to priority measures - Market locally
High Efficiency Nozzle Direct Installation Program	- Removes financial barrier of entry - Ensures quality installation - Hugh potential and scalability	- Implement aggressive marketing campaign - Hire additional contractors - Offer multiple nozzle manufacturerers

In addition to the nine selected active programs, IEUA and its regional partners will continue to provide regional educational and outreach programs. Current regional education and outreach programs include the following:

National Theatre for Children Program National Theatre for Children (NTC) delivers a package of live theatre, student curriculum and teacher guides to elementary schools throughout the region.

Shows That Teach Shows That Teach (STT*)* provides educational and motivational school assembly programs that focus on water education.

Regional Landscape Training Workshops In this series of regional sponsored courses; residential landscapers learn the latest ways to reduce water usage through workshops. The courses cover information on the basics of efficient irrigation systems, the benefits of properly watering and fertilizing landscaping, landscape design techniques and plant identification.

Garden in Every School® Program Grants are awarded to elementary schools within IEUA's service area for the establishment of a water-wise gardens. In addition, a blog is available for educators, parents, and community members to follow the development of the gardens, acquire gardening tips, curriculum tips and water savings tips at ieuagies.blogspost.com.

Water Discovery Field Trip Program Free educational field trips are provided at the Chino Creek Wetlands and Educational Park to promote the public understanding of the value of natural treatment wetlands, the creation of habitat for endangered/sensitive species and environmental stewardship. A busing mini-grant is offered to schools within the state of California to take part in the field trip program, partially funded by the California Department of Parks and Recreation.

IEUA Water Softener Rebate Program The IEUA Water Softener Rebate Program is part of the third phase of the IEUA's Salinity Reduction Program that is addressing the impacts of automatic water softeners on IEUA's recycled water. The goal of this project is to demonstrate the transferability of a financial incentive "rebate" for the removal of residential self-regenerating water softeners within the service area of IEUA.

Water Saving Garden Friendly The Water Saving Garden Friendly program was founded in 2011 to provide local communities with conservation-based educational opportunities, as well as information and access to climate-appropriate plants. Through partnerships with sponsors like Home Depot, Scotts Miracle Grow and others, the program hosts events, workshops, and other educational and "do-it-yourself" opportunities for local residents to learn about and enjoy sustainable landscaping. The Garden Friendly program is a public-private partnership that welcomes the participation of all members of the public as well as interested landscape retailers.

Recommended Program Summary Pages

Implementation details for each recommended program including: program descriptions, measure(s) offered, target customer segments, delivery mechanisms, annual activity, program costs and economic evaluation results are included on the following pages.

<table>
<tr><th colspan="2">Budget-based Water Rates</th></tr>
<tr><td>Target Customer
Customers exceeding their water budget</td><td rowspan="7">A budget-based water rate design identifies efficient and inefficient water users. The rate, as designed, then sends an economic message to over-allocation water users. Customers are provided a context for efficient water use and driven to make efficiency improvement. Budget-Based Water Rates provide the retail agency with the most cost-effective means to reduce demand.

As depicted by university studies, the pace and longevity of achieving water use efficiency is significantly enhanced with budget-based rate implementation.

At least two IEUA member agencies are expected to utilize the SAWPA grant and IEUA assistance for Budget-Based Water Rate implementation.

Typical costs for agencies the size of those in the region range from $250,000 - $350,000. The SAWPA grant provides all single family residential landscape square footage and ET data for use by the local agency. Ongoing costs are similar to any tiered rate structure design. Agency costs for implementation are expected to be recovered within 3 months for every $1,000,000 dollars of agency revenue loss being incurred.

In addition, IEUA provides support for rate design, staff training, public outreach and Prop 218 assistance.

Benefits
- Customer educated on their specific water efficiency
- Sends strong price signal
- Drives over-allocation customers to consider changes and implement water use efficiency measures
- Proven effective at reducing demand and stabilizing agency revenue
- Water budgets, based on State efficiency standards, gives the local agency a defensible rate design and efficiency benchmark</td></tr>
<tr><td>Potential for the Region
High</td></tr>
<tr><td>Estimated Activity
52,551 residential accounts</td></tr>
<tr><td>Water Savings
11-15% average savings across the agency
Program: 5,819 AF over 5-year Lifetime</td></tr>
<tr><td>Costs
Implementation: Average of $300,000 per agency $5.7 per account Paid for by grants or local agencies
Zero regional costs to IEUA</td></tr>
<tr><td>Funding Source
SAWPA GRANT</td></tr>
<tr><td>Other Benefits
Customer engagement and education</td></tr>
</table>

<table>
<tr><th colspan="2">FreeSprinklerNozzles.com Voucher Program</th></tr>
<tr><td>Target Customer
All customers with pop-up spray irrigation systems.</td><td rowspan="7">There are millions of pop-up spray nozzles being used in IEUA’s service area in all types of landscapes. These nozzles are installed as part of an in-ground irrigation systems and can be easily upgraded with high efficiency (HE) nozzles or rotating nozzles. When correctly installed, high efficiency fixed spray and rotating nozzles can have an immediate and drastic impact on outdoor water efficiency. All customers, even those with average or below average water usage, can see a reduction by upgrading to HE nozzles.

However, many customers without knowledge of their irrigation systems are intimidated by HE nozzle retrofits because the product is relatively unknown and more expensive than standard nozzles. The FreesprinklerNozzle.com program is designed to assist customers in gaining knowledge about HE nozzles and overcoming the initial cash outlay barrier.

Program Delivery
The FreeSprinklerNozzle.com program is a web-administered program that provides vouchers for free high efficiency nozzles to all eligible customers. Customers must first view online videos explaining how the nozzles work with their irrigation system, how to survey their landscape to determine which nozzles are needed, and how to install and adjust the nozzles. Customers are then given a voucher for free nozzles.

These vouchers can be redeemed at participating irrigation stores. Residential customers can receive up to 25 free nozzles. Commercial customers can receive as many nozzles as needed for their site.

Benefits
The most common barriers to purchase and installation of HE nozzles are: 1) lack of knowledge on how to choose, purchase, and install the appropriate nozzles; and 2) cost of nozzles. FreeSprinklerNozzle.com addresses both of these barriers with a voucher and required educational component. FreeSprinklerNozzle.com is a multi-agency program, administered by Western MWD. IEUA and its regional partners benefits from the economies of scale and ease of implementation.</td></tr>
<tr><td>Potential for the Region
High
Millions of pop-up spray nozzles with all customer types.</td></tr>
<tr><td>Estimated Activity
60,000 nozzles/year</td></tr>
<tr><td>Water Savings
Device: 757 gpy per nozzle
Program: 5,689 AF over Lifetime</td></tr>
<tr><td>Costs
Device: $2.75
Per AF savings: $185</td></tr>
<tr><td>Funding Source
• IEUA and its regional partners
• MWD</td></tr>
<tr><td>Other Benefits
• Reduced runoff
• Customer education
• Market transformation</td></tr>
</table>

<table>
<tr><th colspan="2">SoCal Water$mart Rebate Program</th></tr>
<tr><td>Target Customer
All customers classes

Potential for the Region
High
Multiple measures available for all customers.

Estimated Activity
See Estimated Activity in Table

Water Savings
3,254 AF over Lifetime

Costs
FY16: $1 Million for Turf Year 1 + $400,000 for devices
FY17-20: $100,000

Funding Source
• IEUA and its regional partners
• MWD

Other Benefits
• Runoff reduction
• Waste water savings
• Market transformation</td>
<td>SoCal Water$mart (SCWS) is MWD's regional rebate program offering incentives for a menu of indoor and outdoor water saving measures for both residential (RES) and commercial/industrial/institutional (CII) customers. Current incentives include:

• High Efficiency Sprinkler Nozzles (CII, RES)
• High Efficiency Clothes Washers (RES)
• Premium High Efficiency Toilets (MF 1.0 gpf/less)
• Smart Controllers (RES, CII)
• Cooling Tower Conductivity & pH Controllers (CII)
• Rain Barrels (RES)
• Air-Cooled Ice Machine (CII)
• Soil Moisture Sensors (RES, CII)
• Drip Irrigation (RES, CII) –Available in 2016

Member and retail agencies have the option of adding additional incentives onto MWD's base incentive. The region will add additional incentive dollars to several devices including:

• Residential high efficiency clothes washers
• Residential and commercial smart controllers
• High efficiency sprinkler nozzles
• Air-cooled ice machines

Benefits

SoCal Water$mart provides regional rebates to all Regional customers reducing customer confusion regarding availability in their specific area. The Region benefits from MWD paying for the majority of the incentive dollars as well as administration.

Estimated Annual Activity

• High Efficiency Sprinkler Nozzles - 10,750 across all markets per year
• High Efficiency Clothes Washers – 500 per year
• Smart Controllers (commercial sites) – 100 year 1, 50 years 2 - 5
• Smart Controllers (single family sites) – 50 per year
• Cooling Tower Controllers – 10 per year

All other measures have negligible participation and no additional funding from the Region.</td></tr>
</table>

Customer Engagement Technology and Data Analytics Program	
Target Customer Customers exceeding their water budget	OmniEarth is a new technology that combines physical characteristics of parcels collected through aerial/satellite imagery (ex: size, land cover type) with customer information (ex: current and historical water usage) to create water budgets for each customer. The program compares water budgets with actual usage to identify customers who are exceeding their water budget and have the most room for efficiency. This information is then consolidated and presented in layered maps and easy to understand graphs. DropCountr is a complementary program that can share OmniEarth's information directly with customers. DropCountr utilizes OmniEarth's customer water budget information to show customers how their usage compares to households with similar geographic and household qualities. Customers can also track their usage and budget information through web-based and mobile interfaces. To maximize this information, DropCountr also provides personalized conservation tips. *Program Delivery* If a retail agency opts in, the Program utilizes OmniEarth to target high yield customers, identify geographic areas of highest water use for targeted marketing, and match customers with best-suited WUE programs. *Benefits* OmniEarth provides vital information for both targeting customers and executing efficient programs such as: - logical and defendable water budgets for each customer - Identification of over-allocation customers with high savings potential - Geographical location of over-allocation customers for identifying trends DropCountr takes this information to the next step by interacting directly with the customer.
Potential for the Region High	
Estimated Activity 131,376 residential accounts	
Water Savings *Device*: 4.6% per account *Program*: 3,093 AF over Lifetime	
Costs *Device*: $3.05 per account. *Per AF*: $190 *Estimate include $.75 per GIS mapping SF account for all agencies for 2 years plus $2 per SF account for 2 agencies for 5 years for DropCountr.*	
Funding Source SAWPA GRANT IEUA and its regional partners	
Other Benefits Customer engagement and education	

High Efficiency Nozzle Direct Installation Program

Target Customer

High water use customers across all classes with pop-up spray head irrigation systems.

Potential for the Region

Medium-

For high water use customers only

Estimated Activity
10,000 nozzles/year

Water Savings

Device:
757 gpy per nozzle

Program:
1,101 AF over Lifetime

Costs

Device: $6

Per AF savings: $931

Funding Source

IEUA and its regional partners

MWD

Other Benefits

Reduced runoff

The largest water consumption in the region is outdoor landscape usage. Retrofitting existing systems with high efficiency (HE) nozzles is an easy way to increase efficiency of irrigation systems and reduce water usage. HE nozzles can be used to replace any inefficient standard pop-up sprinkler head creating instant water savings. However, the majority of customers are not aware of HE nozzles, where to purchase them, or how to install and maintain them.

Program Delivery

The goal of the HE Nozzle Direct Installation Program is to target high water use customers and assist them in overcoming any barriers to HE nozzle installation at their site. This program would be free to customers and executed by a contractor who would:

- Work with retail agencies to identify the highest water use customers.
- Market the program directly to high water use customers.
- Perform on-site visits to ensure customers have functional irrigation systems and meet other eligibility requirements.
- Schedule and perform retrofit of pop-up sprinkler heads with HE nozzles.
- Educate the customer while on-site about how to identify, install, adjust, and maintain the HE nozzles.
- Provide educational materials on HE nozzles and other water saving resources

Benefits

There are many benefits from a direct installation program including:

- Ability to target specific customers or sectors
- Assurance that HE nozzles were installed and not just purchased
- Guarantee that nozzles are installed correctly
- Opportunities for on-site customer education.

<table>
<tr><th colspan="2">Residential Smart Controller Upgrade Program</th></tr>
<tr><td>Target Customer
Residential customers with 500 sq ft – ¼ Acre of irrigated area</td><td>Smart controllers adjust irrigation based on weather, plant type, and other factors. These controllers save water by automatically adjusting irrigation to meet plant needs with minimal customer intervention.</td></tr>
<tr><td>Potential for the Region
Medium</td><td>Program Delivery
The Residential Smart Controller Upgrade Program will be offered to residential customers with 500 square feet to ¼ acre of irrigated area. The program will be implemented by a vendor and contains several steps.</td></tr>
<tr><td>Estimated Activity
500 per year</td><td>- First, a site survey of the customer's property would be performed by a contractor to confirm that they have an eligible irrigation system and will in fact see water savings.</td></tr>
<tr><td>Water Savings
Device: 13,490
Program: 828 AF over Lifetime</td><td>- Second, customers would attend a workshop to learn about the maintenance and use of their controller.
- Third, a contractor would install a smart controller at the customer's home and program it to meet the property's needs. Controllers and installation would be provided free of charge to the customer.</td></tr>
<tr><td>Costs
Device: $800
Per AF: $2,215</td><td>Benefits
There are several barriers stopping many residential customers from installing smart controllers including:</td></tr>
<tr><td>Funding Source
IEUA and its regional partners</td><td>- complex installation process
- need for initial set-up/programming to meet site specific zones</td></tr>
<tr><td>Other Benefits
• Runoff reduction
• Customer education
• Market transformation</td><td>- lack of knowledge on adjusting the automated controller

This direct installation program is designed to address all of these barriers. It ensures correct installation of the product and an opportunity for property-specific training by the installing contractor on the maintenance of the product.</td></tr>
</table>

Residential Landscape Retrofit Program

Target Customer Residential customers over ¼ Acre of irrigated area **Potential for the Region** Low **Estimated Activity** 150 per year **Water Savings** *Device*: 13,490 gpy *Program*: 447 AF over Lifetime **Costs** *Device*: \$800 *Per AF*: \$0 **Funding Source** • MWD • USBR Grant **Other Benefits** • Runoff reduction • Customer education • Market transformation	The largest water consumption sector in the region is single family residential landscape and irrigation. Single-family site with large landscape provide a significant opportunity to reduce water use. The goals of the Residential Landscape Retrofit Program is to reduce use through the installation of smart controllers and high efficiency (HE) sprinkler nozzles. Smart controllers adjust irrigation based on weather, plant type, and other factors. These controllers save water by automatically adjusting irrigation to meet plant needs with minimal customer intervention. High efficiency nozzles reduce use through reduced water flow. *Program Delivery* The Residential Landscape Retrofit Program is offered to residential customers with ¼ acre or more of irrigated area. The program is implemented by an outside contractor. The contractor conducts a site visit to verify eligibility. The contractor then installs the smart controller and nozzles at no cost to the customer. *Benefits* There are several barriers stopping many residential customers from installing smart controllers including: - complex installation process - need for initial set-up/programming to meet site specific zones - lack of knowledge on adjusting the automated controller This direct installation program is designed to address all of these barriers. It ensures correct installation of the product. The program is funded by MWD and a grant from USBR requiring no funding from IEUA and its regional partners.

Landscape Evaluations	
Target Customer Large landscape customers, residential and commercial	Customers with large landscapes require proportionally larger amounts of water to maintain the health of the landscapes. In addition, many large landscape sites are hard to irrigate such as turf located in street medians. Major areas of opportunities include: repairs to existing system, micro-zone planting, removal of non-functional turf, improvements to the distribution uniformity and finally hardware upgrades. Site surveys or customer audits are an effective tool for determining the best opportunities at a specific site and assisting the customer in evaluating the opportunity and moving forward with the measures.
Potential for the Region Low	
Estimated Activity 200 Year 1 150 Years 2 - 5	*Program Delivery* The Landscape Evaluation Program offers customers a comprehensive outdoor water use evaluation. Note that there are large landscape surveys offered by Metropolitan Water District. These are abbreviated versions of the evaluations conducted by the IEUA and its regional partners.
Water Savings *Device*: 25,742 GPY *Program*: 126 AF	The Landscape Evaluations are free to customers and provide an assessment of a site's irrigation system, including the controllers, valves, heads, layout, and performance including:
Costs *Device*: $200 *Per AF*: $1,286 over Lifetime	• Pressure testing • Valve operation per controller • Distribution uniformity tests The auditor also evaluates landscape design, vegetation types and local conditions for potential reductions in water use. The customer receives a written report that outlines recommended water efficiency measures and available programs and incentives.
Funding Source IEUA and its regional partners MWD	*Benefits and Recommendations* Landscape evaluations are an important tool in customer outreach and education. Recently, many energy and water audits have taken advantage of automation to reduce the time needed to survey the site or produce an customer report. A contractor utilizing an automated audit system could provide customers with immediate results and feedback while on-site. They would also have the opportunity to walk the customer through their options and answer any questions face-to-face. In addition, the customized reports should contain customer-friendly visuals, graphs, and aids that help customers understand their water usage and opportunities for efficiency.
Other Benefits • Runoff reduction • Customer education • Market transformation	Utilizing an automated audit system coupled with more comprehensive follow-up could significantly improve implementation of recommended water saving measures.

New Programs and Pilots Summary Pages

IEUA and its regional partners will continue to test new technologies and program delivery mechanisms. A pilot scheduled for implementation in 2016 is the Home Pressure Regulator Pilot described below.

<table>
<tr><th colspan="2">Residential Pressure Regulator Rebate Pilot Program</th></tr>
<tr><td>Target Customer
Residential customers with high water pressure</td><td rowspan="7">Pressure regulators are compact valves installed on water pipes to reduce the speed, or pressure, of water as it flows into a home or irrigation system. Water pressure in the distribution system can vary widely. Ten water districts in Southern California were surveyed in 2013 and found water pressure to range from 63 pounds per square inch (psi) to 113 psi. The ideal pressure for fixtures and irrigation systems at a residential home is 45 to 60 psi. A properly installed regulating valve at the main line into a residential property can reduce water flowing into irrigation systems and indoor fixtures to 60 psi or below. Regulating water pressure saves water by:
- Reducing the “push” of water coming out of fixtures and irrigation systems, and thus the amount of water per second. Even low-flow fixtures will have increased water use at higher pressures. Reducing water pressure ensures that every fixture lives up to its water conserving potential.
- Preventing slow leaks caused by increased wear and tear on fixtures, pipes, and irrigation systems.
- Reducing pipe breakages caused by elevated pressure.

Program Delivery
The pressure regulator rebate pilot program will provide a rebate for customers who install qualifying pressure regulating systems on their main line that will reduce pressure to both outdoor irrigation systems and indoor fixtures. IEUA would contract with a vendor to market the program, review rebate applications, verify eligibility, and issue incentives to qualifying customers. Site inspections of a set number of customers may take place.

Benefits
Not many customers know their water pressure or the importance of maintaining a proper pressure. This Pilot Program will create customer awareness of pressure regulators and proper pressure. It will also provide more information to the IEUA and its regional partners on the importance and effectiveness of pressure regulation within their service area.</td></tr>
<tr><td>Potential for the Region
TBD</td></tr>
<tr><td>Estimated Activity 110 pressure regulating valves/year over</td></tr>
<tr><td>Water Savings
Device: 57,050 gallons per year.
Program: 962 AF over Lifetime</td></tr>
<tr><td>Costs
$30 - $140 per regulator</td></tr>
<tr><td>Funding Source
• IEUA and its regional partners
• MWD</td></tr>
<tr><td>Other Benefits
• Customer education</td></tr>
</table>

Section 7 – Five Year Plan

At the inception of the Regional WUE Business Plan development the exact water savings goal and budgets had not yet been determined. Due to this uncertainty and as part of the initial Integrated Resource Planning (IRP) process, five levels of WUE budgets and productivity were modeled. These were conducted as a preliminary test to explore the impact varying amounts of water savings would have on water resources programs. Below are the modeled tiers estimated savings and costs. Details on the different models are described in Technical Memo, *IEUA Preliminary Test of WUE Tiers for IRP*, provided as an appendix.

IEUA Preliminary Test of WUE Tiers for IRP Process		
Tier Name	**Estimated Peak Annual Savings** (AF/Year)	**Estimated Annual Cost** (IEUA+Outside)
Tier 1: Current Path	3,700 AF by 2020	$1.5M
Tier 2: New Programs	6,000 AF by 2020	$3.5M
Tier 3: High WUE Implementation	10,000 AF by 2029	$6.5M
Tier 4: 20% reduction (WUE Active Programs Alone)	48,000 AF 2035	$30M
Tier 5: 40% reduction (WUE Active Programs Alone)	98,700 AF by 2035	$79M

It is important to note that WUE projects included in the IRP were structured differently than in the WUE Business Plan. Project categories in the IRP which included WUE devices, turf removal, budget-based rates, recycled water demand management, and advanced metering technologies will be refined and updated in the portfolio building and modeling tools per the project specifications during the IRP Phase 2.

In addition, as part of the WUE Business Plan planning process and detailed in Section 3, Budget-Based Water Rates were depicted as a WUE activity by contrasting different levels of IEUA's member agencies rolling out the new rate structure—either 2 member agencies or region-wide implementation.

This plan is estimated to produce peak annual water savings of 11,000 acre-feet (active and passive savings) in fiscal year 2019/20. The annual peak savings are estimated at half the cost projected through the IRP process. This is because the majority of estimated savings, 5,820 acre-feet per year, are derived from Budget-Based Water Rates at zero cost to IEUA. The plan assumes the costs associated with implementing the new rates would be covered under the SAWPA grant. Table 26 presents an overview of the plan if 2 agencies implement Budget-based Water Rates.

Table 26: Plan Overview with Budget-Based Water Rates

Plan Overview With Budget-Based Water Rates	
Regional IEUA Cost per Acre-foot	$52 per acre-foot
Five-Year Water Savings (*active programs*)	33,554 acre-feet
Lifetime Water Savings (*active programs*)	147,836 acre-feet
Avoided Costs (NPV)	$152.7 Million
Five-Year Total Budget*	$7.5 Million

**Budget includes IEUA regional program costs exclusive of outside funding.*
**Budget includes $300,000 per year for education and outreach programs.*

Table 27 presents an overview if none of IEUA's member agencies elect to implement Budget-based Water Rates.

Table 27: Plan Overview without Budget-based Water Rates

Plan Overview Without Budget-Based Water Rates	
Regional IEUA Cost per Acre-foot	$208 per acre-foot
Five-Year Water Savings (*active programs*)	16,095 acre-feet
Lifetime Water Savings (*active programs*)	31,446 acre-feet
Avoided Costs (NPV)	$28.9 Million
Five-Year Total Budget*	$7.5 Million

Implementation Schedule and Activities per Year

Table 28 displays the projected annual activity for each measure. Toilets are being phased out in FY2015/16. As of October 2015, MWD only provides rebates for premium efficiency fixtures at a much discounted incentive. The model includes toilet activity prior to the change. Turf removal was not modeled after FY2015/16. It is likely that MWD will lower the current turf removal incentive and impose caps. If the regional partners chose to offer turf removal incentives more than likely they would have to fund the program themselves.

Table 28: Annual Activities by Measure

Activity Name	Measure Metric	FY16	FY17	FY18	FY19	FY20
	Sites Evaluated	200	150	150	150	150
Cooling Tower Controller Rebates	Cooling Tower Controllers	10	10	10	10	10
FreeSprinklerNozzles.com	HE Nozzles	50,000	50,000	50,000	50,000	50,000
High Efficiency Clothes Washer Rebate	HE Clothes Washers	500	500	500	500	500
HE Nozzle Direct Install	HE Nozzles	--	30,000	30,000	30,000	30,000
High Efficiency Nozzle Rebate (all markets)	HE Nozzles	10,750	11,000	11,000	11,000	11,000
High Efficiency Toilet Rebates (all markets)	HE Toilets	2,600	0	0	0	0
Premium Efficiency Toilet Rebate (MF)	HE Toilets	750	0	0	0	0
Rain Barrels	Rain Barrels	50	50	50	50	50
Residential Landscape Retrofit	Turf Removed (sites)	200	250	250	250	250
Residential Smart Controller Upgrade	Smart Controllers	0	500	500	500	500
Smart Controller Rebate (SF)	Smart Controllers	50	50	50	50	50
Smart Controller Rebate (CII)	Smart Controllers	100	50	50	50	50
Technology Customer Engagement Software	Customer Accounts	0	131,376	131,376	131,376	131,376
Turf Removal Rebate (CII)	Turf Removed (SF)	11.5 M	--	--	--	--
Turf Removal Rebate (SF)	Turf Removed (SF)	1.5 M	--	--	--	--
Ultra Low Volume Urinals	ULV Urinals	5	--	--	--	--
Budget-Based Water Rates (2 Agencies)	Customer Accounts	--	--	52,551	--	--

Water Savings

The following chart depicts the annual savings from active water use efficiency activities for the five-year implementation FY2015/16 – FY2019/20.

Table 29: Annual Water Savings

Annual Water Savings	
Fiscal Year	**Annual Water Savings (AF)**
2015/16	1,975
2016/17	3,083
2017/18	9,206
2018/19	9,502
2019/20	9,788

Water Savings by Sector

Table 30 below depicts the water savings by sector. Eighty-four percent of the projected savings will be procured from the single family sector predominately through landscape measures. When you add the savings from the program targeted at dedicated irrigation customers, nearly 99% of the savings are derived from landscape measures.

Table 30: Water Savings by Sector

Sector	Lifetime Water Savings (Acre-feet)	% of Total Water Savings
Single Family	124,389	84%
Multi-family	103	0.07%
Commercial	835	0.55%
Irrigation	22,717	14.8%
Total	**147,836**	

Savings by Activity

Table 31 below presents the acre-feet savings by activity for the five-year period and the respective percent of total savings. Budget-Based Water Rates at 116,390 acre-feet or 79% is clearly the highest water savings.

Table 31: Water Savings by Activity

Activity Name	Lifetime Water Savings (AF)	% of Total Savings
Budget-Based Water Rates	116,390	79%
Turf Removal (CII)	14,950	10%
FreeSprinklerNozzles.com Voucher (All Classes)	5,689	4%
Technology Customer Engagement Software	3,093	2%
Turf Removal (SF)	1,950	13%
HE Sprinkler Nozzle Direct Installation Program (All classes)	1,101	0.6%
High Efficiency Toilet SCWS Rebate (All markets)	892	0.6%
High Efficiency Sprinkler Nozzles SCWS Rebate (All markets)	890	0.6%
High Efficiency Clothes Washers SCWS Rebate (SF)	863	0.6%
Residential Smart Controller Upgrade Program	828	0.5%
Premium Efficiency Toilet Rebate (CII)	561	0.4%
Residential Landscape Retrofit Program	447	0.3%
Cooling Tower Controllers SCWS Rebate	161	0.11%
Landscape Evaluation Program	126	0.09%
Smart Controllers SCWS Rebate (SF)	104	0.07%
Smart Controllers SCWS Rebate (Commercial)	39	0.03%
Ultra Low Volume Urinals SCWS Rebate	12	0.01%
Air-Cooled Ice Machines	2	0.00%
Rain Barrels	2	0.00%

Passive vs Active Savings Assumptions

Some of the most significant and cost-effective water savings in California have come from state or national updates to plumbing and building codes. These changes are referred to as "passive", simply because they require no active program efforts for local water agencies. The AWE Tracking Tool calculate the passive savings from activities including:

- Residential and commercial high efficiency toilets
- Single family and multi-family high efficiency clothes washers

Below is the estimated passive and active water savings to be achieved through the five-year plan.

Table 32: Estimated Passive and Active Water Savings

Water Savings Category	Five-Year Savings (AF)	Total Lifetime Savings (AF)
Passive Water Savings	3,150	146,933
Active Water Savings	33,554	147,836
Total	**36,704**	**294,769**

Budget by Year

IEUA prepares annual regional program budgets with line items dedicated to water use efficiency activities. The projected annual budget for each year of the five-year planning period is below. The budget amounts reflect the financial commitment only of IEUA and are exclusive of MWD or other financial contributions. The budgets presented below will not exactly line up with actual costs because they are based upon activity estimates which vary depending upon program participation rates.

Table 33: Annual Budgets

Program Year	Annual Budget ($/Yr)
FY 2015/16	$1,928,800
FY 2016/17	$1,394,335
FY 2017/18	$1,394,335
FY 2018/19	$1,394,335
FY 2019/20	$1,394,335
Total	**$7,506,140**

**Budget includes IEUA regional program costs exclusive of outside funding.*
**Budget includes $300,000 per year for education and outreach programs.*

Regional Costs and Benefits

The plan is estimated to save over 147,836 acre-feet of water at a cost to IEUA and its regional partners of $52 per acre-foot. This falls well below the region's avoided cost to purchase water from MWD of $1,122 per acre-foot. The avoided purchases equate to a net present value (NPV) of over $152 Million. The overall benefit to cost ratio is 27.9.

Figure 8 and Table 34 show the cost per acre-foot per activity. The amounts reflect the financial commitment only of IEUA and are exclusive of MWD or other financial contributions.

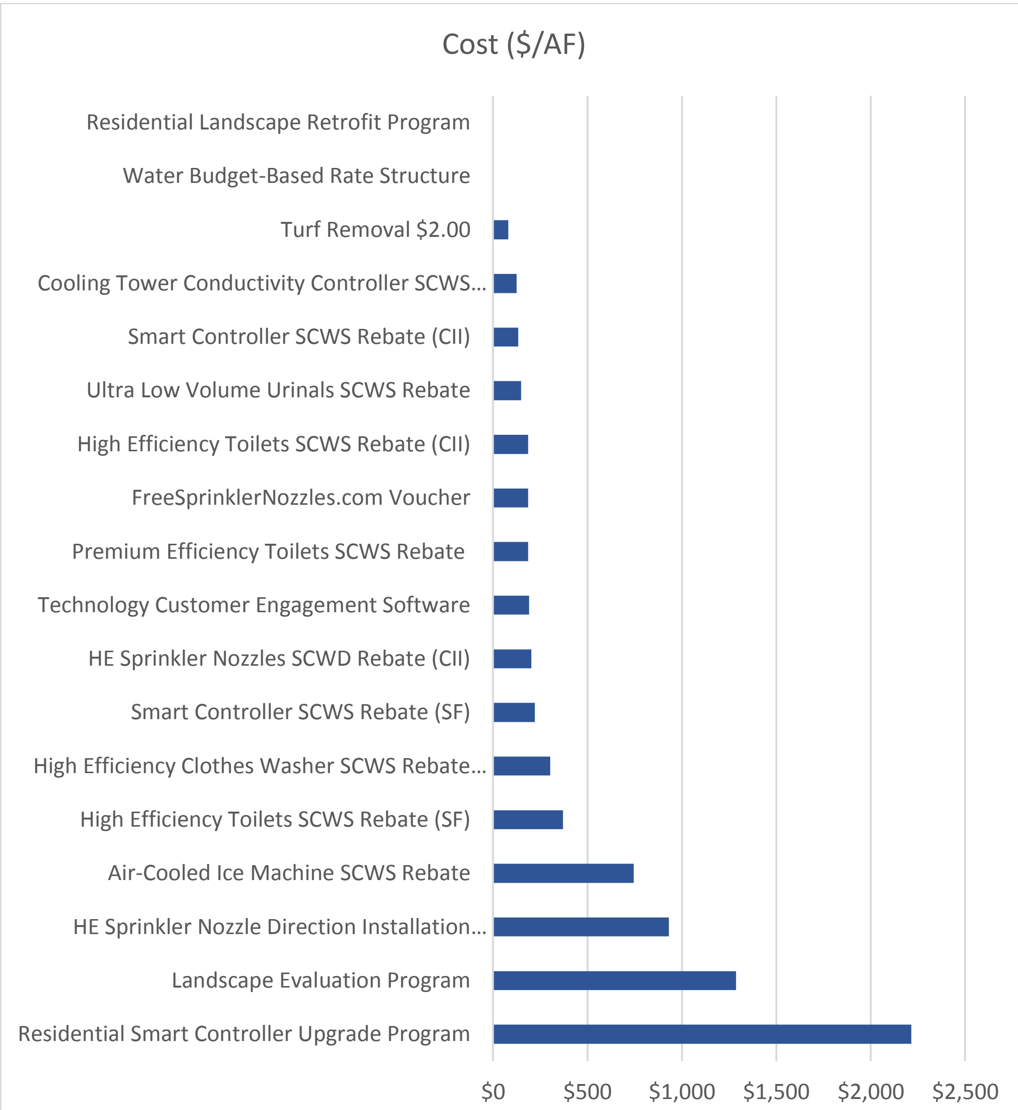


Figure 8: Cost per Acre Foot

Table 34 shows the cost-effectiveness for the selected program measures. A program such as SoCal WaterSmart has multiple measures and because each measure may have different savings and costs, it is represented on separate lines. Several measures are funded 100% by MWD or other grants and therefore have zero cost to the IEUA and its member agencies and are not listed in the table.

Table 34: Selected Programs - IEUA Cost per Acre-foot

Measure	IEUA Only Cost ($/AF)
Budget-Based Water Rates	$0
Residential Landscape Retrofit Program	$0
Turf Removal $2.00	$81
Cooling Tower Controller SCWS Rebate	$124
Smart Controller SCWS Rebate (CII)	$133
Ultra Low Volume Urinals SCWS Rebate	$148
FreeSprinklerNozzles.com Voucher	$185
High Efficiency Toilets SCWS Rebate (CII)	$185
Premium Efficiency Toilets SCWS Rebate	$186
Customer Engagement Software	$190
HE Sprinkler Nozzles SCWD Rebate (CII)	$202
Smart Controller SCWS Rebate (SF)	$221
High Efficiency Clothes Washer SCWS Rebate (SF)	$303
High Efficiency Toilets SCWS Rebate (SF)	$370
Air-Cooled Ice Machine SCWS Rebate	$744
HE Sprinkler Nozzle Direction Installation Program	$931
Landscape Evaluation Program	$1,286
Residential Smart Controller Upgrade Program	$2,215

The Net Present Value (NPV) is the sum of the benefits of the water use efficiency program for all units implemented minus the sum of the costs - “net benefits” or also known as Net Present Value. NPV is, perhaps, the most useful of the cost-effectiveness criteria in that is shows the absolute size of the program benefits not just the value of one acre-foot of savings. The Benefit/Cost (B/C) column contains the ratio of benefits to costs. For B/C ratios greater than one the program is cost effective. The higher the ratio the most cost effective.

The avoided purchases equate to a NPV of over $152 Million. The overall benefit to cost ratio is 27.9. Table 35 on the following page details the NPV and B/C for each program/measure.

Table 35: Benefits by Activity

Activity Name	NPV ($)	B/C Ratio
Budget-Based Water Rates	$123,792,926	NA
Turf Removal $2.00 (CII)	$15,475,316	15.7
FreeSprinklerNozzles.com Voucher (All Classes)	$5,373,192	7
Technology Customer Engagement Software	$2,863,880	6.3
Turf Removal $2.00 (SF)	$2,156,070	NA
High Efficiency Sprinkler Nozzles SCWS Rebate (CII)	$755,762	6.4
Premium High Efficiency Toilets SCWS Rebate (MF)	$502,097	7.4
High Efficiency Toilets SCWS Rebate (SF)	$530,605	3.7
Residential Landscape Retrofit Program	$491,254	NA
High Efficiency Clothes Washers SCWS Rebate (SF)	$493,107	4.2
HE Sprinkler Nozzle Direct Installation Program	$328,316	1.4
Cooling Tower Controllers SCWS Rebate	$156,512	9.9
High Efficiency Toilets SCWS Rebate (CII)	$94,591	7.3
Smart Controllers SCWS Rebate (SF)	$94,725	6
High Efficiency Sprinkler Nozzles SCWS Rebate (SF)	$85,163	NA
High Efficiency Toilets SCWS Rebate (MF)	$79,591	3.7
Smart Controllers SCWS Rebate $50 per Station	$38,231	9.9
Ultra Low Volume Urinals SCWS Rebate	$8,110	9.1
Rain Barrels SCWS Rebate (SF)	$2,637	NA
Air-Cooled Ice Machine SCWS Rebate	$886	1.8
Landscape Evaluation Program	-$10,117	0.9
Residential Smart Controller Upgrade Program	-$574,331	0.6
Total	**$152,738,523**	**27.9**

Energy and Greenhouse Emissions

The collection, distribution, and treatment of drinking water as well as wastewater treatment consume tremendous amounts of energy and release significant amounts of carbon dioxide (greenhouse emissions). Saving water reduces energy usage through out the water cycle and thereby greenhouse emissions. The following calculations as based on the energy embedded in delivering potable water through 2050, the region's five-year plan is expected to cumulatively save 182,555 MWh of electricity, 3,747 thousand therms of natural gas, and to avoid 505,983 tons of greenhouse emissions. Figures 9 -12 visually depict the annual savings and benefits. The embedded energy and avoided greenhouse gas emissions reflect all "upstream" embedded energy--source, conveyance, treatment, distribution pumping and pressurization. Wastewater flows and treatment that involve additional "downstream" embedded energy was not quantified.

Figure 9: Annual Electric Savings

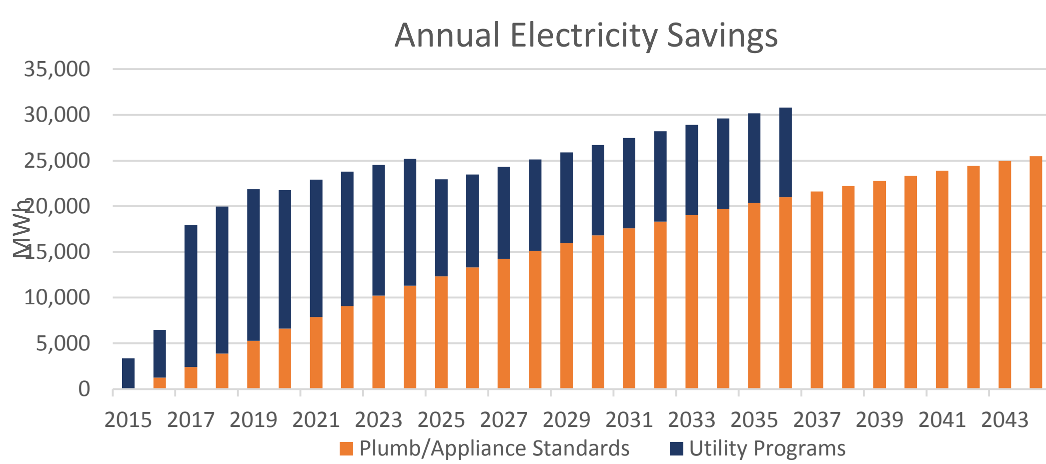


Figure 10: Annual Gas Savings

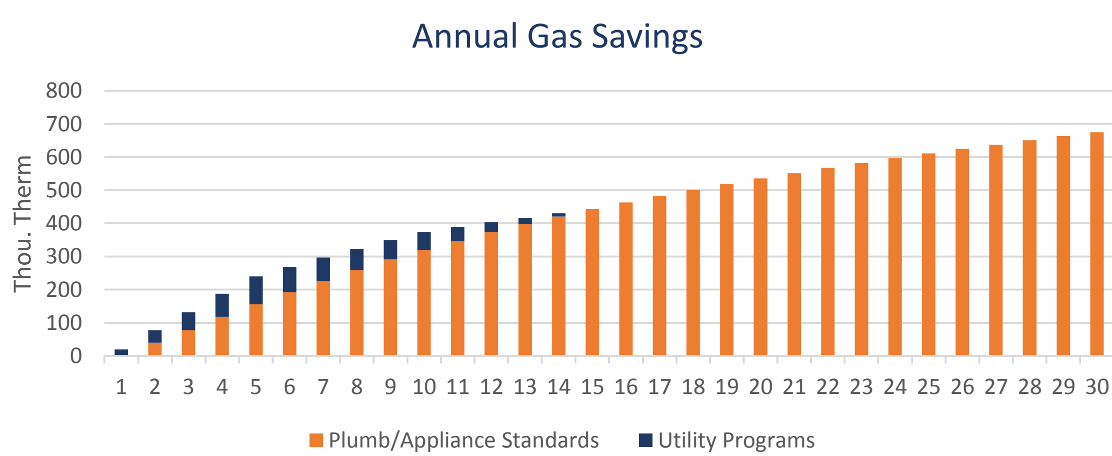


Figure 11: Annual CO2-Equivalent Emission Reductions

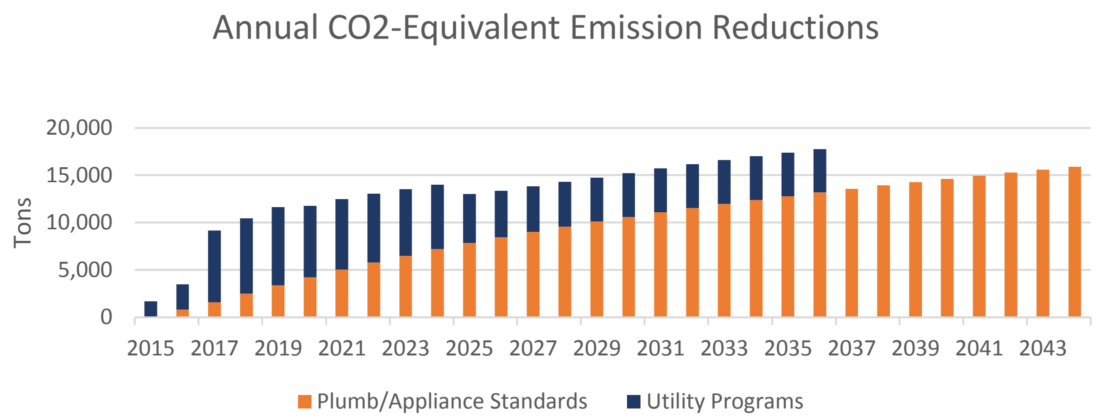
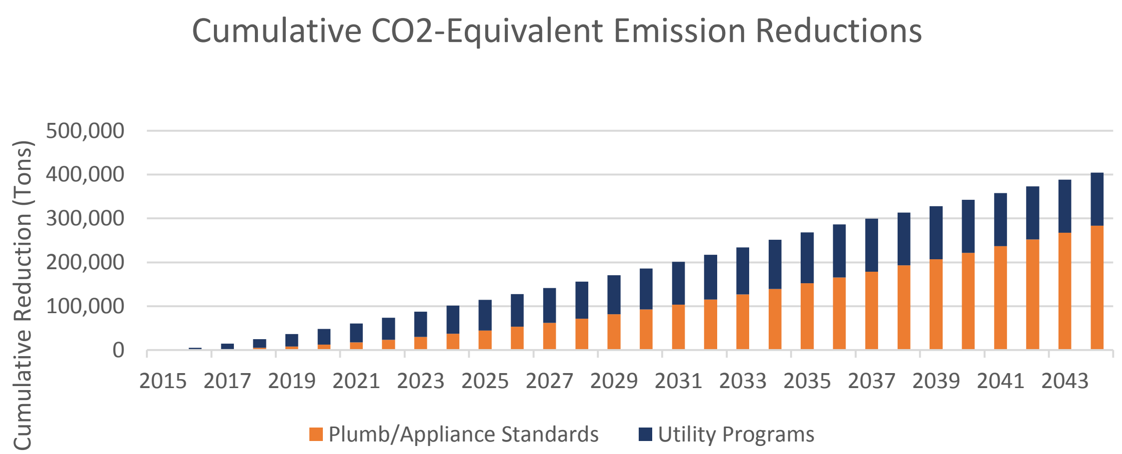


Figure 12: Cumulative CO2-Equivalent Emission Reductions



Sustainable Communities Strategy

Drawing from IEUA's 2015 Integrated Resources Plan, the water demand analysis underlying the WUE Business Plan incorporated alternative low impact development/smart growth scenarios from the Sustainable Communities Strategy outlined in the 2012 Regional Transportation Plan of Southern California Association of Governments (RTP-SCAG).

RTP-SCAG's Sustainable Communities Strategy provides the regional planning assumptions for Southern California that integrates land-use, transportation and housing policies to achieve the greenhouse gas emissions targets for the region (consistent with the requirements of SB 375, the Sustainable Communities and Climate Protection Act of 2008). SCG's strategies for sustainable communities embed higher-density housing, sustainable landscaping, living soils, and stormwater capture into an integrated watershed approach for future development.

Three demand scenarios were considered using IEUA's IRP Scenario Manager from the Water Demand Forecasting Model (CDR data based on 2012 RTP-SCAG):

1. "Sustainable" Strategy: 40% of new growth is anticipated to be Multi-Family housing in Baseline along with 60% of new growth captured in smaller single family lot sized homes;
2. "More Sustainable" Strategy: 71% of new growth is anticipated to be Multi-Family housing, with 29% of new single family housing development weighted toward much smaller lot sizes as compared to more traditional older developments;
3. "Maximum Sustainable" Strategy: 96% of new growth is anticipated to be Multi-Family housing.

New mandatory landscaping requirements also occurred when Governor Brown issued an Executive Drought Order in April 2015 to update the State's Model Water Efficient Landscape Ordnance (MWELO) through an expedited regulation. The directive outlined five specific areas to address:

1. More efficient irrigation systems
2. Limiting the percentage of turf planted in landscapes
3. Onsite stormwater capture
4. Graywater Usage
5. Required reporting on the implementation and enforcement of the ordinance by local agencies

All revisions to the MWELO became effective December 1, 2015 with affected agencies provided with a February 1, 2016 deadline to adopt the new requirements.

The WUE Business Plan is the product of collaboration across jurisdictions involving multiple agencies and stakeholders in the development of regional programs. The WUE Business Plan reflects a suite of innovative water management approaches that includes but goes beyond traditional water efficiency rebates. The new program emphases in the WUE Business Plan approach, consistent with the 2015 IRP include:

- Multi-beneficial projects and programs that are linked together for improved synergy
- Integration of water use efficiency, water-energy nexus (with quantifiable avoided Greenhouse Gas Emissions attributable to water use efficiency), low impact development, run-off prevention, stormwater management, including onsite capture/recharge and low impact development, and water quality, among others;

- Proactive, innovative, and sustainable solutions;
- Sustainable landscaping in which every garden is viewed as a mini-watershed, holding on to or cleaning all the water that falls on it and supporting a diverse habitat of plants and insects.
- Integrated regional solutions supporting local water reliability and local priorities for water management, and
- Watershed approaches based project and programs that effectively leverage limited resources and maximize the greatest potential benefits.

A snapshot of the proposed programs and their integration with Sustainable Communities are highlighted in the chart below.

Table 36: Sustainable Communities - Program Integration

WUE Active Program	Multiple Benefits	Energy-Water Nexus	Run-off Prevention	Stormwater Mgmt	Sustainable Landscapes
Budget-Based Water Rates	√	√	√		√
Turf Removal	√	√	√	√	√
FreeSprinklerNozzles.com Program	√	√	√		√
SoCal Water$mart Regional Rebate Program	√	√	√	√	√
Customer Engagement Software	√	√	√		√
High Efficiency Nozzle Direct Installation Program	√	√	√		√
Residential Smart Controller Upgrade Program	√	√	√		√
Residential Landscape Retrofit Program	√	√	√		√
Landscape Evaluations	√	√	√	√	√
Regional Landscape Training Workshops	√	√	√	√	√
Water Saving Garden Friendly Program	√	√	√	√	√

APPENDIX G

IEUA 2015 Recycled Water Program Strategy

3rd DRAFT

Recycled Water Program Strategy

Facility Master Planning Study

Stantec

Prepared for:
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

Prepared by:
Stantec Consulting Services Inc.
38 Technology Drive, Suite 100
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April 10, 2015

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Stantec

Abbreviations

AF	Acre-Feet
AFM	Acre-Feet per Month
AFY	Acre-Feet per Year
BPS	Booster Pump Station
CBWCD	Chino Basin Water Conservation District
CBWM	Chino Basin Water Master
CCWRF	Carbon Canyon Wastewater Reclamation Facility
CIP	Capital Improvement Plan
CVWD	Cucamonga Valley Water District
ft	feet
fps	feet per second
FWC	Fontana Water Company
gpm	gallons per minute
GWR	Groundwater Recharge
HGL	Hydraulic Grade Line
Hp	Horsepower
HWL	High Water Level
IEUA	Inland Empire Utilities Agency
IW	Imported MWD Water
LF	Linear feet
LR	Local Runoff
MG	Million Gallons
MGD	Million Gallons per Day
MVWD	Monte Vista Water District
MWD	Metropolitan Water District
PRV	Pressure Reducing Valve
psi	pounds per square inch
RMPU	Recharge Master Plan Update
RP	Regional Recycling Plant
RW	Recycled Water
RWC	Recycled Water Contribution
RWIP	Recycled Water Implementation Plan
RWPS	Recycled Water Program Strategy
SARB	Santa Ana River Baseflow
SB	San Bernardino
SBCFCD	San Bernardino County Flood Control District
TDH	Total Dynamic Head
TYCIP	Ten Year Capital Improvement Plan
VFD	Variable Frequency Drive
WW	Wastewater
WFMP	Wastewater Facilities Master Plan

Executive Summary

The purpose of the Recycled Water Program Strategy (RWPS) was to update the 2005 Recycled Water Implementation Plan and the 2007 Recycled Water Three Year Business Plan. The primary objective of the RWPS was to update supply and demand forecasts and to help map changes for the Recycled Water Program (RW Program) to maximize the beneficial use of recycled water throughout the year. This approach is consistent with prior commitments of the Inland Empire Utilities Agency (Agency) to meet its projections for demands of recycled water for direct use. In addition to meeting the direct use demand projections from its member agencies, this RWPS also investigated the impacts and recommendations for elevating the priority of groundwater recharge of recycled water supply that is available throughout the year based on the latest recycled water effluent supply projections from the recent Wastewater Facilities Master Plan. The RWPS will be reevaluated at a minimum once every five years, but additional studies will be performed in the coming years to identify and present changes needed to accommodate any potential shift in recycled water use.

The planning period of the RWPS was through 2035, with a focus on the first ten years, through 2025. Through this planning period, modeling was performed for a variety of demand conditions, including changes in direct use and groundwater recharge. Modeling evaluated what the remaining supply (reuse supply) would be after direct use demands and the Santa Ana River discharge obligation have been met. To achieve a greater annual yield from the RW Program, groundwater recharge was maximized to utilize the reuse supply when available. The RWPS also performed modeling to determine the ability to accommodate and absorb changes in direct use demand. This would identify the capability to increase delivery to groundwater recharge if an increased in reuse supply was available.

The projects proposed through Year 2035 address improvements necessary to achieve the goal of maximizing beneficial use of recycled water throughout the year. Majority of the recommended projects focus on either increasing the ability to deliver reuse supply to groundwater recharge, or relieving capacity constraints in order to meet the demand (direct and groundwater recharge) forecast.

ES.1 - Projected Recycled Water Demands and Supplies

The analyses and facility recommendations for this RWPS are based on the recycled water demands and effluent supplies provided by the Agency and their member agencies. Table ES.1 shows the demands and supplies used for this study. The total projected annual recycled water available for recharge into the proposed groundwater basins is also shown in Table ES.1. The total annual recharge projection is based on a 9-month recharge operation between March and November.

Table ES.1 Summary of Recycled Water Demands and Supplies

	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Total Recycled Water Supply	61,944	66,312	71,913	77,514	82,330
Total Direct Use Demand	24,655	30,757	36,507	40,320	43,019
Total Supply Available for GW Recharge[1]	16,095	13,977	13,027	13,707	14,871

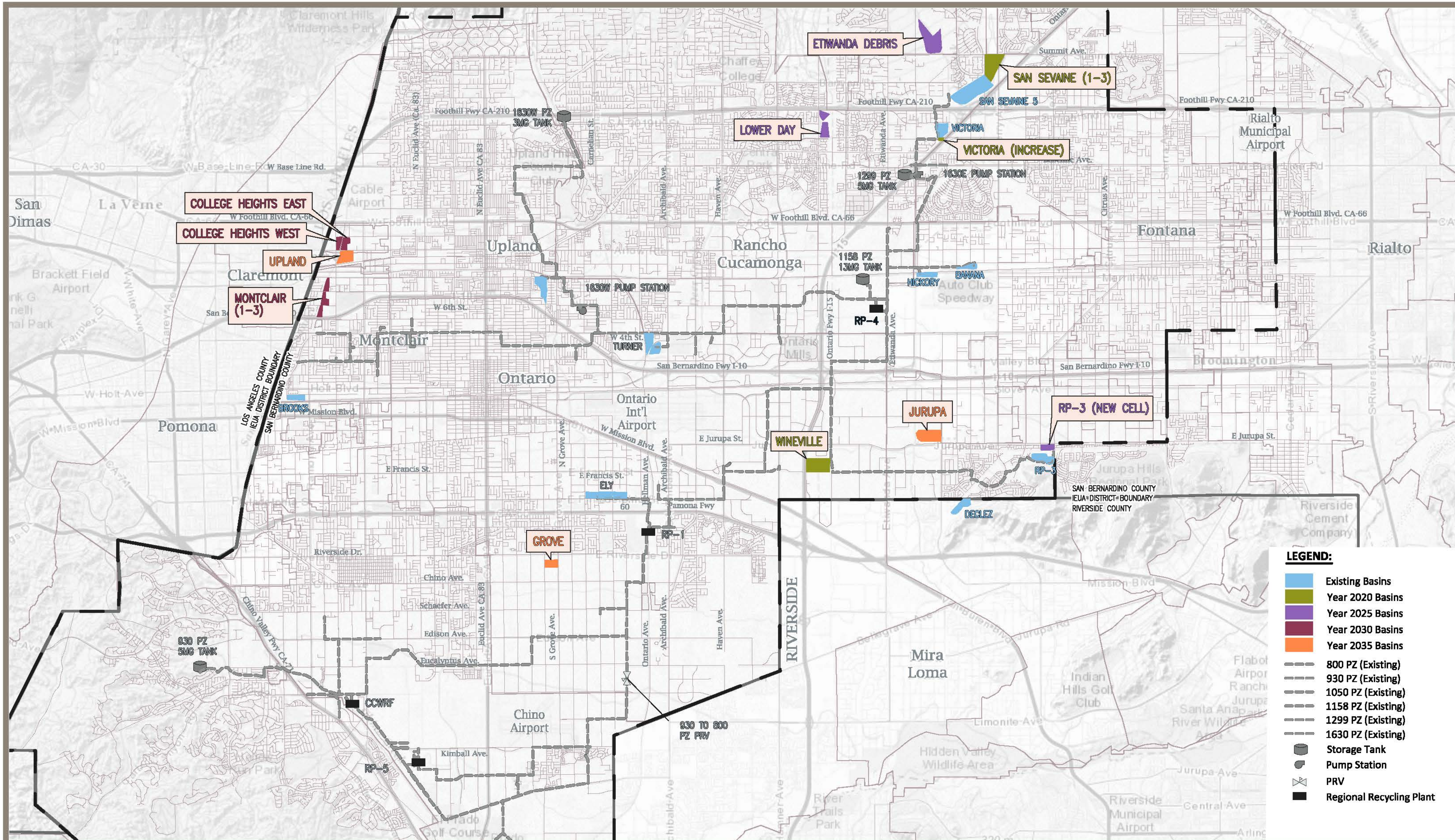
[1] Based on a 9-month recharge program between March and November and Monthly Mass Balance analyzed in this RWPS.

ES.2 - Potential GWR Basin Implementation

The proposed recycled water implementation strategy associated with the Agency's goal to increase GWR to a higher priority use of recycled water along with direct use. The strategy proposed has a 20-year planning horizon, which is analyzed and planned in 5-year increments to Year 2035. The strategy includes identifying the proposed basins to be connected to the recycled water system, when they will be connected, and a mass balance of demands and basin flows versus the recycled water supply projections.

The Agency operates approximately 11 existing groundwater basins that are currently connected to the recycled water system (i.e., currently receiving recycled water for recharge). The Agency operates several other basins that are currently configured only to recharge storm water, local runoff, and/or imported MWD water. The new recycled water program assumes that each of these basins could potentially be connected to the recycled water system and could receive recycled water recharge. These basins are at various stages of planning and permitting. Some of these new basins are at existing basin sites where basin capacities will be expanded by adding new cells.

Table ES.2 provides a list of the basins that could be added to the recycled water groundwater recharge program and those that were studied for this RWPS, along with anticipated size and recharge capacity. Figure ES-1 is a map of the location of each of these basins.



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Prepared For:
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

GRAPHIC SCALE
0 4250' 8500' 17000'
(IN FEET) 1 inch = 8500 FT

IEUA RWPS
Potential GWR Basin Implementation Strategy
FIGURE ES-1

Table ES.2 Potential GWR Basins to Receive Recycled Water

Basin/Site	Basin Status[1]	Size (acres)	Storage Volume (AF)
Lower Day	RW Connection	15.0	179
Etiwanda Debris	RW Connection	14.6	73
San Sevaine (1-3)	RW Connection	21.4	99
Victoria (Increase)	RW Connection	17.4	237
Lower San Sevaine	New	23.0	230
Wineville	New	30.0	240
RP-3 (New Cell)	New	3.5	35
Vulcan	New	30.0	450
College Heights East	RW Connection	6.2	112
College Heights West	RW Connection	5.8	110
Grove	RW Connection	10.0	114
Jurupa	RW Connection	17.0	249
Montclair (1-3)	RW Connection	22.5	518
Montclair 4	RW Connection	5.8	139
Upland	RW Connection	16.6	392
	Total	**238.8**	**3,177**

[1] "RW Connection" implies that the basin is a currently operating basin as part of the groundwater recharge program for storm water/local runoff and imported water, and will require modifications and facilities to connect to the recycled water system to receive recycled water recharge. "New" is a new basin that is currently not in the groundwater recharge program.

For purposes of this RWPS, the GWR basins with potential to be converted to receive recycled water supply for recharge were analyzed and prioritized to determine which basins will be brought online for each of the planning years out to Year 2035 for this study. Based on the ranking criteria and priority determine, including committed basins from the 2013 RMPU, Table ES.3 shows the strategy proposed for the timing of implementing each of these basins for purposes of analysis for this RWPS. Table ES.3 also includes the proposed demand and flow rate assumed for this RWPS for each basin.

Table ES.3 Potential GWR Basins
RWPS Implementation Strategy and Flows

Planning Year	Basin/Site	Daily Demand[1] (MGD)	Flow Rate[2] (gpm)
Year 2020	Wineville	2.8	3,889
	Victoria (increase)	5.5	7,639
	San Sevaine (1-3)	3.1	4,306
Year 2025	RP-3 (New Cell)	0.8	1,111
	Lower Day	5.0	6,944
	Etiwanda Debris	1.7	2,361
Year 2030	Montclair (1-3)	4.0	5,556
	College Heights East	2.6	3,611
	College Heights West	2.5	3,472
Year 2035	Upland	6.8	9,444
	Jurupa	8.9	12,361
	Grove	2.7	3,750

[1] Daily demand is based on the basin storage volume divided by 14 days for a 14-day fill period.
[2] The flow rate for each basin is based on a 12-hour per day operation, with the fill period occurring during the day outside the peak irrigation direct use demand period.

ES.3 - Summary of System Facilities Analysis

Hydraulic model analyses were performed for several demand and operational scenarios as described in Sections 6 and 7 of the RWPS. Section 6 describes the analyses for two baseline scenarios analyzed for 1) only the direct use demands and 2) the direct use demands plus GWR flows to all of the potential basins to be converted to receive recycled water supply as shown in Table ES.3 above.

Section 7 describes the Sensitivity Analysis scenarios that were analyzed to investigate the impacts of the proposed recommendations assuming a) an external supply sources is retained by the Agency to meet the SARBF at Prado Obligation demands and b) limiting the basins that are to receive recycled water supply for recharge to only the existing basins and the committed basins contained in the 2013 RMPU. Three (3) additional scenarios were analyzed for this Sensitivity Analysis in addition to the two baseline scenarios to better understand the impacts and improvements to be recommended for this RWPS.

A total of five (5) demand and operational scenarios were analyzed as described below.

Table ES.4 Description of Hydraulic Analysis Scenarios

Scenario	Description
Direct Use Demands	Maximum Day Direct Use Demands anticipated during the Summer
Base GWR Implementation	Assumes all of the potential GWR Basins listed in Table ES.3 are converted and connected to the recycled water system to recharge available recycled water supply; includes analysis for Average Day (Spring/Fall) and Maximum Day (Summer) recycled water availability and recharge capability. The Agency also meets the SARBF at Prado Obligation from their recycled water effluent.
Sensitivity Analysis – Scenario A	Assumes that an external supply is obtained by the Agency to meet the SARBF at Prado Obligation demand and all of the potential GWR Basins listed in Table ES.3 are converted and connected to the recycled water system to recharge available recycled water supply.
Sensitivity Analysis – Scenario B	Assumes that only the existing GWR basins and committed 2013 RMPU Basins are connected to receive recycled water supply for recharge and that the Agency continues to meet the SARBF at Prado Obligation from their recycled water effluent.
Sensitivity Analysis – Scenario C	Assumes that only the existing GWR basins and committed 2013 RMPU Basins are connected to receive recycled water supply for recharge and that the Agency obtains an external supply to meet the SARBF at Prado Obligation.

ES.5 – Summary of Scenario and Project Cost Analysis

A comparison of total estimated project costs was performed to analyze and develop an overall recommendation for an implementation strategy. The Base GWR implementation project recommendations were compared with the project improvements recommended for the Sensitivity Analysis scenarios A, B, and C.

Table ES.5 on the following page shows the cost summary analysis that was performed. The overall project costs for each of the implementation scenarios are listed with the total estimated annual recycled water supply recharge benefit for that scenario.

Based on the total project costs for the different operational conditions, Scenario B of the Sensitivity Analysis herein shows the lowest total project costs. It also appears to be the lowest cost per annual acre-feet of recycled water recharge to the basins. This scenario assumes that IEUA will continue to meet SARBF at Prado Obligation as it currently does from the effluent supply from RP5 and RP-1.

Table ES.5 Summary of Scenario Improvements Project Costs Analysis

Year	Previous Costs	Direct Use (DU) Only Improvements Costs	DU Improvements Cumulative Costs	Annual DU Demands (AFY)	Spring/Fall DU plus GWR Improvement Costs	Summer DU plus GWR Improvement Costs	GWR plus DU Improvements Cumulative Costs	Total Annual Recharge (AFY)	Total Cumulative Costs	Total Annual Demand (AFY)
BASE GWR IMPLEMENTATION PROJECT IMPROVEMENTS (SEE CHAPTER 6) – All GWR Implementations with IEUA Meeting Prado Obligation										
Exist	$ -	$ -	$ -	24,655	$ -	$ -	$ -	16,095	$ -	40,750
2020	$ -	$ 6,220,000	$ 6,220,000	30,757	$ 7,250,000	$ -	$ 7,250,000	13,977	$ 13,470,000	44,734
2025	$ 13,470,000	$ 6,280,000	$ 12,500,000	36,507	$ 6,060,000	$ 11,690,000	$ 25,000,000	13,027	$ 37,500,000	49,534
2030	$ 37,500,000	$ 34,300,000	$ 46,800,000	40,320	$ 39,000,000	$ -	$ 64,000,000	13,707	$ 110,800,000	54,027
2035	$110,800,000	$ 12,520,000	$ 59,320,000	43,019	$ 16,030,000	$ -	$ 80,030,000	14,871	$139,350,000	57,890
SCENARIO A - PROJECT IMPROVEMENTS – All GWR Implementation Basins plus External Supply for Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	23,917	$ 20,000,000	48,572
2020	$ 20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 4,130,000	$ -	$ 24,130,000	21,427	$ 30,350,000	52,184
2025	$ 30,350,000	$ 5,120,000	$ 11,340,000	36,507	$ 6,060,000	$ -	$ 30,190,000	19,797	$ 41,530,000	56,304
2030	$ 41,530,000	$ 41,550,000	$ 52,890,000	40,320	$ 71,730,000	$ 7,610,000	$ 109,530,000	19,422	$ 162,420,000	59,742
2035	$ 62,420,000	$ 3,460,000	$ 56,350,000	43,019	$ 16,030,000	$ -	$ 125,560,000	19,906	$181,910,000	62,925
SCENARIO B - PROJECT IMPROVEMENTS – Existing/RMPU Basins with IEUA Meeting Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ -	$ -	$ -	16,095	$ -	40,750
2020	$ -	$ 6,220,000	$ 6,220,000	30,757	$ 6,860,000	$ -	$ 6,860,000	13,977	$ 13,080,000	44,734
2025	$ 13,080,000	$ 17,970,000	$ 24,190,000	36,507	$ -	$ -	$ 6,860,000	13,027	$ 31,050,000	49,534
2030	$ 31,050,000	$ 34,300,000	$ 58,490,000	40,320	$ -	$ -	$ 6,860,000	13,707	$ 65,350,000	54,027
2035	$ 65,350,000	$ 12,520,000	$ 71,010,000	43,019	$ -	$ -	$ 6,860,000	14,871	$ 77,870,000	57,890
SCENARIO C - PROJECT IMPROVEMENTS – Existing/RMPU Basins plus External Supply for Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	23,917	$ 20,000,000	48,572
2020	$20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 3,740,000	$ -	$ 23,740,000	21,427	$ 9,960,000	52,184
2025	$29,960,000	$ 5,120,000	$ 11,340,000	36,507	$ -	$ -	$ 23,740,000	19,797	$ 35,080,000	56,304
2030	$35,080,000	$ 41,110,000	$ 52,450,000	40,320	$ 33,310,000	$ 7,610,000	$ 64,660,000	19,422	$117,110,000	59,742
2035	$117,110,000	$ 3,460,000	$ 55,910,000	43,019	$ -	$ -	$ 64,660,000	19,906	$120,570,000	62,925

Additionally, it should be noted that the basins assumed for Existing/RMPU scenarios will be able to recharge the total annual recycled water supply available. Therefore, the cost of recharge of annual acre-feet of recycled water is much less than the program required for implementing all of the GWR proposed basins.

However, other considerations should be given to utilizing only the Existing/RMPU basins:

- Using only the Existing/RMPU basins limits the basins to be down for maintenance, leaving no operational redundancy.
- If the direct use demands do not meet the projections shown, the additional recycled water supply available would be limited for recharge use.
- If the Agency decides to secure an additional external supply source in the future to meet the SARBF at Prado Obligation, there would need to be additional basins to receive the additional recharge capacity available.

Based on the overall goals of the RWPS to meet the projected direct use and then to maximize the remaining recycled water supply effluent for GWR to the basins, the Scenario B facilities of the Sensitivity Analysis are recommended. This program meets the goals of the RWPS with the most cost efficiency to the Agency.

ES.6 – Summary of Project Recommendations for the RWPS

Based on the sensitivity analysis performed and comparison of project costs and flows for each analysis scenario, the proposed RWPS projects recommended are those identified in Scenario B.

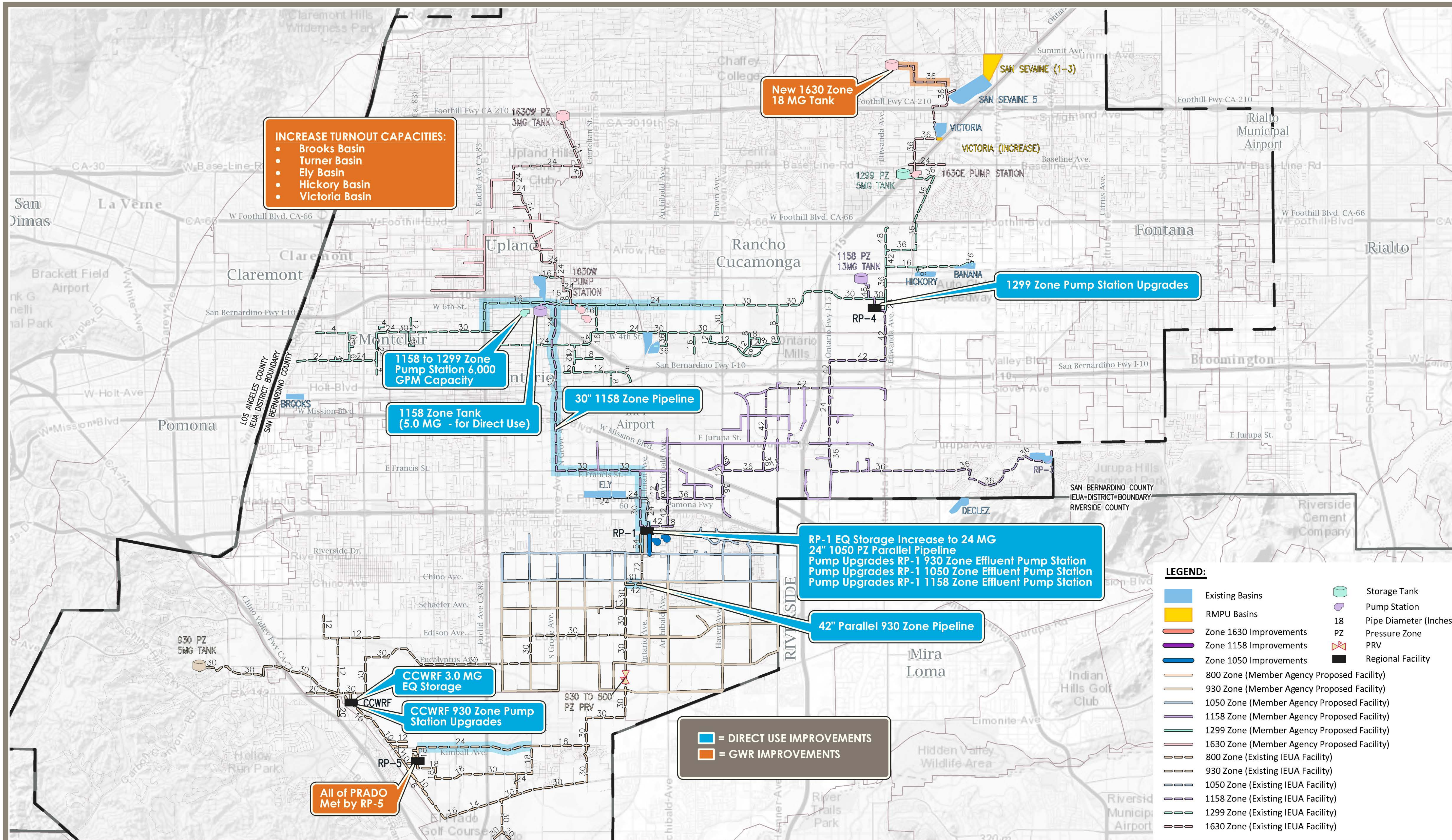
Table ES.6 is provided to show the comprehensive list of projects and project costs identified for each planning year. Since the proposed improvements recommended are required to either meet direct use demands or groundwater recharge purposes, the table includes a description of the demand condition that triggers the need for the project as well as the type of deficiency that the project is intended to mitigate. Figure ES-2 shows the locations of the recommended improvements.

Project costs and total CIP costs are based on 2015 dollars and do not include cost escalations.

These recommendations and analyses herein should be reevaluated at least every five (5) years or as planning policies and demand projections change from those described herein.

Table ES.6 Recommended RWPS Projects

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	Unit Cost	Total Const. Cost	Cont. / Admin./ Eng.	Total Estimated Project Cost	Cumulative CIP Costs	GWR Program Improvement	Direct Use Improvement
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1 LS	$ 500,000	$ 500,000	$ 225,000	$ 730,000	$ 730,000	$ 730,000	$ -
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6,715 LF	$ 495	$ 3,323,925	$ 1,495,766	$ 4,820,000	$ 5,550,000	$ 4,820,000	$ -
2020	GWR to basins in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1 LS	$ 900,000	$ 900,000	$ 405,000	$ 1,310,000	$ 6,860,000	$ 1,310,000	$ -
2020	Average Direct Use	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12,620 LF	$ 340	$ 4,290,800	$ 1,930,860	$ 6,220,000	$ 13,080,000	$ -	$ 6,220,000
							Year 2020 Improvement Costs	**$13,080,000**	**$ 13,080,000**	**$ 6,860,000**	**$ 6,220,000**
2025	Max Summer DU & GWR	Insufficient supply capacity from RP-1	24 MG EQ Storage at RP-1	1 LS	$ -	$ -	$ -	$ -	$ 13,080,000	$ -	$ -
2025	Max Summer Direct Use	Deficient 1299 PZ transmission mains, to serve east & 7th/8th Street Basins	16-inch Parallel 1299 PZ Pipeline	15,289 LF	$ 225	$ 3,440,025	$ 1,548,011	$ 4,990,000	$ 18,070,000	$ -	$ 4,990,000
2025	Max Summer Direct Use	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	24-inch Parallel 1299 PZ Pipeline	13,600 LF	$ 340	$ 4,624,000	$ 2,080,800	$ 6,700,000	$ 24,770,000	$ -	$ 6,700,000
2025	Max Summer Direct Use	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	54-inch 930 PZ Parallel Pipeline	2,300 LF	$ 860	$ 1,978,000	$ 890,100	$ 2,870,000	$ 27,640,000	$ -	$ 2,870,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-4 1158 PZ PS Capacity Upgrades	1 LS	$ 950,000	$ 950,000	$ 427,500	$ 1,380,000	$ 29,020,000	$ -	$ 1,380,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 930 PZ PSCapacity Upgrades	1 LS	$ 800,000	$ 800,000	$ 360,000	$ 1,160,000	$ 30,180,000	$ -	$ 1,160,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	CCWRF PS Capacity Upgrades	1 LS	$ 600,000	$ 600,000	$ 270,000	$ 870,000	$ 31,050,000	$ -	$ 870,000
							Year 2025 Improvement Costs	**$ 17,970,000**	**$ 31,050,000**	**$ -**	**$ 17,970,000**
2030	Max Summer Direct Use	Capacity in the 930 PZ	42-inch Parallel Pipeline in Chino Ave.	1,680 LF	$ 590	$ 991,200	$ 446,040	$ 1,440,000	$ 32,490,000	$ -	$ 1,440,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	30-inch 1158 PZ Pipeline	31,800 LF	$ 420	$ 13,356,000	$ 6,010,200	$ 19,370,000	$ 51,860,000	$ -	$ 19,370,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	5.0 MG 1158 PZ Storage Tank	5 MG	$ 1.50	$ 7,500,000	$ 3,375,000	$ 10,880,000	$ 62,740,000	$ -	$ 10,880,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	New 1158 to 1299 Booster Pump Station	1 LS	$1,800,000	$ 1,800,000	$ 810,000	$ 2,610,000	$ 65,350,000	$ -	$ 2,610,000
							Year 2030 Improvement Costs	**$ 34,300,000**	**$ 65,350,000**	**$ -**	**$ 34,300,000**
2035	Max Summer Direct Use	Capacity in the 930 PZ, reduce supply constraint from RP-1	3 MG EQ Storage at CCWRF	3 MG	$ 1.75	$ 5,250,000	$ 2,362,500	$ 7,610,000	$ 72,960,000	$ -	$ 7,610,000
2035	Max Summer Direct Use	Increase capacity at the CCWRF 930 PZ Pump Station	CCWRF Pump Station Capacity Upgrades	1 LS	$ 1,000,000	$ 1,000,000	$ 450,000	$ 1,450,000	$ 74,410,000	$ -	$ 1,450,000
2035	Max Summer Direct Use	Pipeline undersized for demands condition	24-inch 1050 PZ Parallel Pipeline	2,000 LF	$ 340	$ 680,000	$ 306,000	$ 990,000	$ 75,400,000	$ -	$ 990,000
2035	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 930 Pump Station Capacity Upgrades	1 LS	$ 1,000,000	$ 1,000,000	$ 450,000	$ 1,450,000	$ 76,850,000	$ -	$ 1,450,000
2035	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 1050 Pump Station Capacity Upgrades	1 LS	$ 700,000	$ 700,000	$ 315,000	$ 1,020,000	$ 77,870,000	$ -	$ 1,020,000
							Year 2035 Improvement Costs	**$ 12,520,000**	**$ 77,870,000**	**$ -**	**$ 12,520,000**
							Total Program Improvement Costs	**$ 77,870,000**		**$ 6,860,000**	**$ 71,010,000**



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IEUA RWPS
Recommended Recycled Water System Improvements
FIGURE ES-2

1.0 INTRODUCTION

The purpose of this document is to update the information contained in the 2005 Recycled Water Implementation Plan based on changes to IEUA's recycled water priorities. IEUA plans to switch from treating direct use recycled water demands as the only high priority to including recycled water groundwater recharge as a high priority as well.

The primary objective of this study is to help map the changes in the region's needs to maximize groundwater recharge as opposed to the previous principle, which treated direct use as the only high priority, with an interruptible groundwater recharge system. The goal of this document is to have a cohesive transfer of information for additional sources of recycled water to augment IEUA's recycled water system to maximize the beneficial reuse of the recycled water at all times, with an increased focus in groundwater recharge.

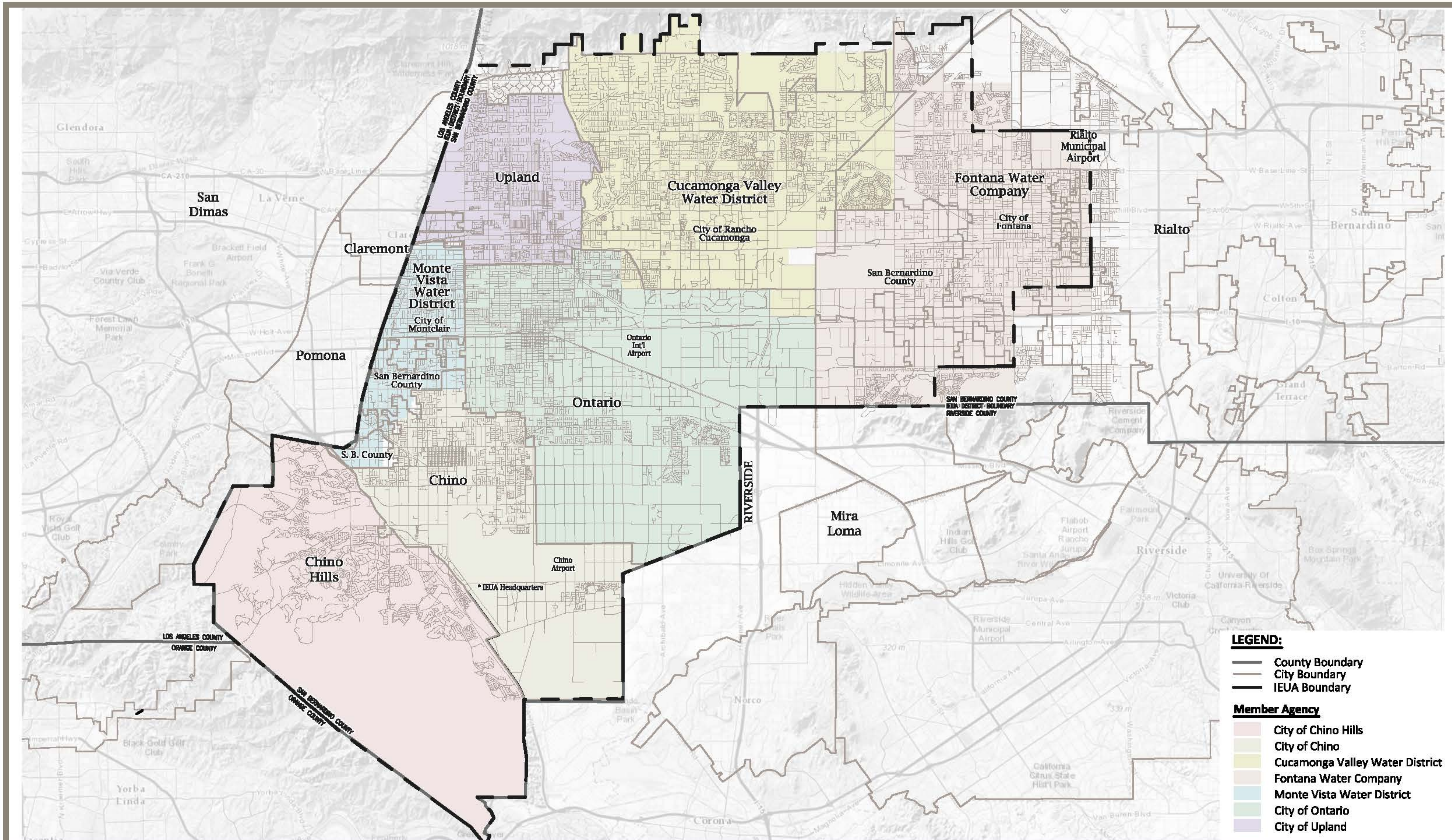
A new control strategy for the overall system will be developed in theory that can be utilized to develop the capital projects from this RWPS document. Since the priorities of the recycled water program have changed from the 2005 Recycled Water Implementation Plan, the current control strategy is updated to reflect the new direction to lead the region.

This RWPS is intended to analyze the recycled water demands over the next 20 years out to Year 2035, with implementation strategies for every 5 year incremental periods.

1.1 STUDY AREA

The IEUA service area encompasses approximately 242 square miles in the western end of the San Bernardino County. As shown in Figure 1-1, the service area is generally bordered by the San Gabriel Mountains to the north, Riverside County line to the southeast, County of Los Angeles to the northwest, County of Orange to the southwest, City of Chino Hills to the west, and Jurupa Mountains to the east.

IEUA owns and operates regional sewer pipelines that collect wastewater from all the cities within the IEUA service area. All the wastewater collected is treated at the four (4) IEUA owned and operated regional wastewater recycling plants. These four regional wastewater recycling plants provide recycled water supply to the IEUA owned and operated recycled water distribution system.



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GRAPHIC SCALE
0 6,000' 12,000' 24,000'
(IN FEET) 1 inch = 12,000'

IEUA RWPS
IEUA Service Area
FIGURE 1-1

1.1.1 Member Agencies

IEUA wholesales disinfected tertiary recycled water to its seven (7) member agencies. With the exception of Reliant Energy, located in the City of Rancho Cucamonga, the majority of the current recycled water users are located in IEUA's Southern Service Area. The following are the IEUA member agencies:

- City of Chino
- City of Chino Hills
- Cucamonga Valley Water District (CVWD)
- Fontana Water Company
- Monte Vista Water District (MVWD)
- City of Ontario
- City of Upland

1.1.2 Current Groundwater Recharge

IEUA, Chino Basin Watermaster (CBWM), Chino Basin Water Conservation District (CBWCD), and the San Bernadino County Flood Control District (SBCFCD) are partners in the implementation of the Chino Basin Recycled Water Groundwater Recharge Program. This recharge program is part of a comprehensive program to enhance water supply reliability and to improve groundwater quality in local drinking water wells throughout the portion of the Chino Groundwater Basin within IEUA's service area. The recharge program includes increasing recharge of storm water, imported water, and recycled water.

IEUA operates several groundwater recharge basin sites as part of the Chino Basin Recycled Water Groundwater Recharge Program. Table 1-1 lists these basins.

The total groundwater recharge was investigated for the previous twelve months from the time of this report preparation. Based on the IEUA GWR Quarterly Report for the First Quarter of 2014, between April 2013 and March 2104, approximately 16,373 AF of water was recharged in the Chino Basin, including 13,237 AF of recycled water, 2,780 AF of storm water and local runoff, and 356 AF of imported water. It should be noted that the recycled water recharge occurred during all twelve (12) months of the year.

Table 1.1 IEUA Existing Groundwater Recharge Basins and Supply Source

Basin/Site	Supply Source		
	SW/LR	IW	RW
7th/8th Street	✓	✓	✓
Banana	✓	✓	✓
Brooks	✓	✓	✓
College Heights	✓	✓	
Declez	✓	✓	✓
Ely (1-3)	✓	✓	✓
Etiwanda Debris	✓	✓	
Grove	✓		
Hickory	✓	✓	✓
Lower Day	✓	✓	
Montclair (1-4)	✓	✓	
RP-3 (1,3,4)	✓	✓	✓
RP-3 2	✓	✓	
San Sevaine 5	✓	✓	✓
San Sevaine (1-4)	✓	✓	
Turner (1-4)	✓	✓	✓
Upland	✓	✓	
Victoria	✓	✓	✓

SW = Storm Water
LR = Local Runoff
IW = Imported MWD Water
RW = Recycled Water

2.0 RECYCLED WATER DEMANDS

This section provides the existing and projected recycled water direct use demands, as reported for each of the IEUA member agencies to IEUA staff. IEUA provided the direct use demands according to pressure zone as well as by member agency for each of the 5-year planning increments.

2.1 DIRECT USE DEMANDS BY MEMBER AGENCY

The direct use demands include uses for irrigation of golf courses, freeway and street landscaping, residential landscaping, parks, school yards, food crops, commercial car washes and laundries, industrial cooling towers, process water, and other miscellaneous construction and dust control uses.

Table 2.1 shows the existing and projected direct use demands used for this study. For purposes of this study period, the demands provided by IEUA for the Year 2015 are assumed to be the Existing Demand Conditions. The direct use demands are the projections provided to IEUA by each of the member agencies.

Table 2.1 Existing and Projected Direct Use Demands by Member Agency

Member Agency	Demand Year (AFY)					
	Existing	Year 2020	Year 2025	Year 2030	Year 2035	Ultimate[1]
Chino	8,915	9,935	8,523	6,844	6,257	6,210
Chino Hills	2,001	2,600	3,000	3,400	3,800	4,004
CVWD	1,651	1,540	1,770	2,000	2,000	2,000
MVWD	339	600	725	850	1,000	1,220
Ontario	8,427	10,323	15,705	18,440	21,176	26,645
Upland	868	800	800	800	800	800
Fontana	0	2,500	3,500	5,500	5,500	8,350
Other Usage:						
San Bernardino County	1,611	1,611	1,611	1,611	1,611	1,611
IEUA	843	848	873	875	875	875
Total Direct Use Demand	**24,655**	**30,757**	**36,507**	**40,320**	**43,019**	**51,715**

[1] Ultimate demands are shown for reference only. This RWPS has a 20-year planning horizon to Year 2035. The direct use demands GWR implementation and system analyses herein include demand conditions out to Year 2035.
2 The direct use demand projections are the member agency projections that were provided to IEUA.

Table 2.2 shows the direct use demand projections by pressure zone.

Table 2.2 Existing and Projected Direct Use Demands by Pressure Zone

Pressure Zone	Demand Year (AFY)					
	Existing	Year 2020	Year 2025	Year 2030	Year 2035	Ultimate[1]
800 Zone	8,884	9,696	7,728	6,207	5,374	4,667
930 Zone	7,684	9,895	13,137	14,873	16,996	20,693
1050 Zone	1,262	966	2,337	3,335	4,327	5,926
1158 Zone	2,106	4,467	5,994	6,500	6,771	7,609
1299 Zone	3,158	4,173	5,531	5,905	6,051	6,470
1630 Zone	1,561	1,560	1,780	3,500	3,500	6,350
Total Direct Use Demand	**24,655**	**30,757**	**36,507**	**40,320**	**43,019**	**51,715**

[1] Ultimate demands are shown for reference only. This RWPS has a 20-year planning horizon to Year 2035. The GWR implementation and analyses herein include demand conditions out to Year 2035.
2 The direct use demand projections are the member agency projections that were provided to IEUA.

2.2 EXISTING GWR BASIN RECYCLED WATER RECHARGE DEMANDS

As described in Chapter 1, IEUA operates several groundwater recharge basins that are recharged with storm water/ local runoff, imported MWD water, and recycled water. Not all of the basins are permitted or have connections to receive recycled water supply. The existing basins that currently receive recycled water supply are listed in Table 2.3, which also includes previous year's annual recharge totals.

Table 2.3 Existing GWR Basins Recycled Water Annual Demands

Basin/Site	Existing Annual Recharge[1] (AF)	Percent of Total Recycled Water Recharge
7th/8th Street	1,930	15%
Banana	727	5%
Brooks	1,697	13%
Ely (1-3)	3,199	24%
Hickory	1,221	9%
RP-3	2,022	15%
San Sevaine 5	328	2%
Turner (1-4)	1,070	8%
Victoria	1,043	8%
Total	**13,237**	**100%**

[1] Based on the IEUA Chino Basin Recycled Water Groundwater Recharge Program Quarterly Monitoring Report for January through March 2014, Table 3-1. Existing Annual Recharge reported is for the previous 12 months of this report, April 2013 through March 2014.

It should be noted that recharge with recycled water to the existing groundwater basins shown in Table 2.3 was provided to each of the basins for all 12 months of the reporting period, including December, January, and February. The strategy proposed for this study for future planning conditions assumes these months are wet weather months and no recycled water is used for recharge to allow the basins to fully capture the storm water and local runoff.

3.0 RECYCLED WATER SYSTEM AND SUPPLY

This section provides a description of the recycled water supply and existing distribution system owned and operated by IEUA. The existing recycled water system includes the distribution facilities (i.e., pipelines, reservoirs, booster pump stations, and pressure regulating valves) that deliver to the recycled water users.

3.1 RECYCLED WATER SUPPLY

IEUA's supply to meet the direct use and GWR basin demands is the tertiary treated effluent from their four (4) regional wastewater recycling plants. IEUA is currently preparing a Wastewater Facilities Master Plan (WFMP) that will address facility improvements and supply projections related to the wastewater collection and treatment supply system. Descriptions of facilities herein are based on the current published information, and do not necessarily reflect the latest facility updates and planning from the WFMP. Estimated supply projections were obtained using information provided in the WFMP.

3.1.1 Recycled Water Supply Projections

Coordination was provided with the WFMP to obtain the latest wastewater flow projections to each of the regional wastewater recycling plants. This information is provided in Table 3.1 as the recycled water supply projections available to the recycled water system.

Table 3.1 Recycled Water Supply Projections

Facility	Existing	Year 2020	Year 2025[1]	Year 2030	Year 2035[1]	Ultimate
	MGD					
RP-5	6.5	10.2	13.1	15.9	18.4	25.3
CCWRF	6.9	6.9	7.0	7.1	7.3	7.9
RP-1	30.4	30.4	31.3	32.2	33.1	36.3
RP-4	11.5	11.7	12.9	14.0	14.7	18.4
Total Recycled Water Supply, MGD	**55.3**	**59.2**	**64.2**	**69.2**	**73.5**	**87.9**
Total Recycled Water Supply, AFY	61,944	66,312	71,913	77,514	82,330	98,460

[1] The Recycled Water Supply projections for the years 2025 and 2035 are estimated based on a linear interpolation from the Year 2020, Year 2030, and Year 2040 projections provided by the WFMP.

3.2 REGIONAL RECYCLING PLANTS AND EFFLUENT PUMP STATIONS

A brief description of the existing regional recycling plants and recycled water supply facilities is provided in the following sections. The regional water recycling plants are graphically shown on Figure 3-1.

3.2.1 RP-1

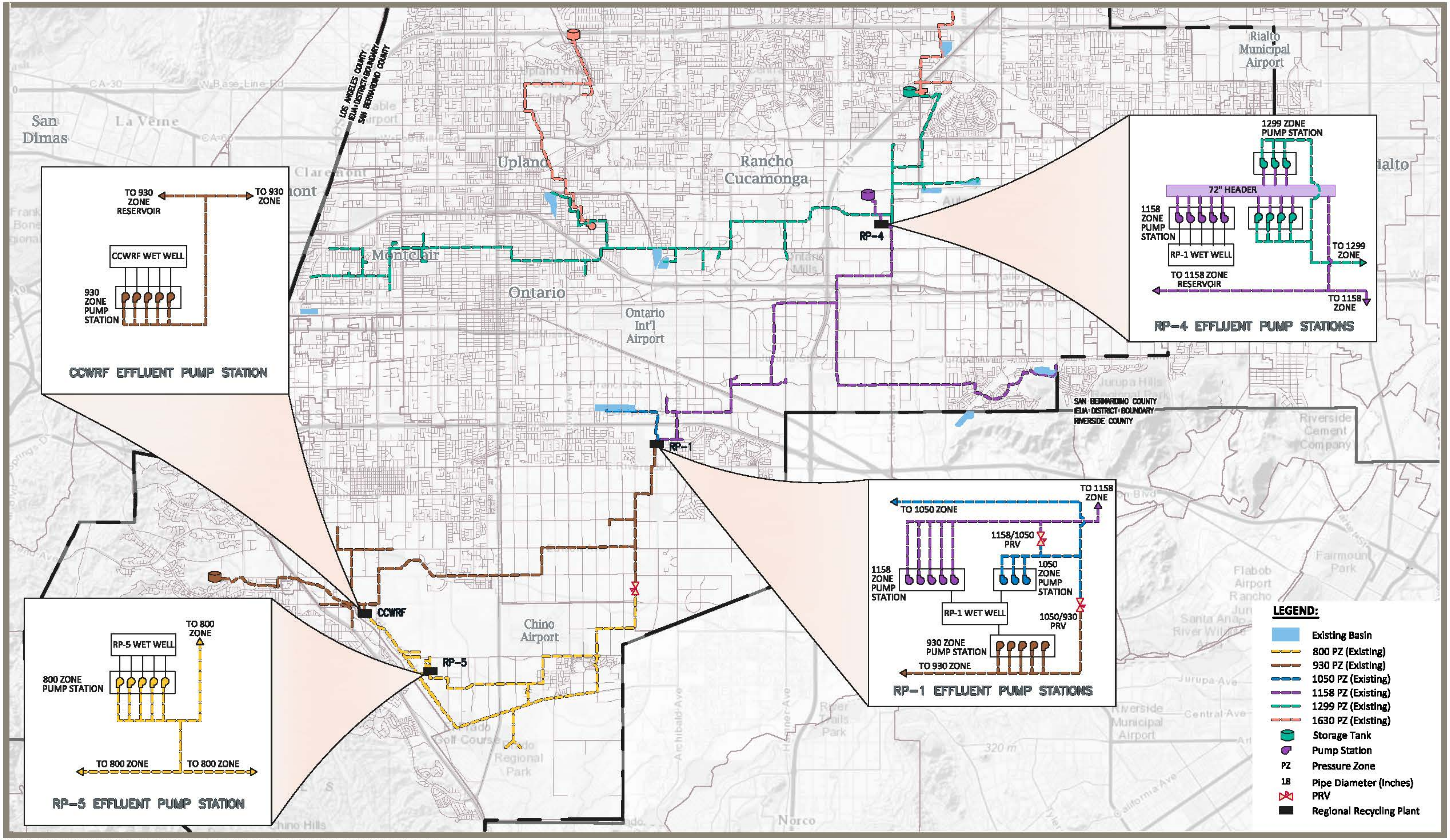
Regional Water Recycling Plant No. 1 (RP-1) is located in the City of Ontario near the intersection of State Highway 60 and Archibald Avenue. This facility was originally commissioned in1948 and has undergone several expansions to increase the design wastewater treatment capacity to the current 44.0 million gallons per day (MGD) and biosolids treatment capacity equivalent to a wastewater flow rate of 60.0 MGD. This facility serves the Cities of Ontario, Rancho Cucamonga, Upland, Montclair, Fontana, and an unincorporated area of San Bernardino County.

RP-1 includes several treatment processes that contribute to providing a quality recycle water pursuant to the State of California Title 22 regulations. The major treatment processes include preliminary and primary treatment, primary effluent flow equalization and diversion, secondary treatment, tertiary treatment, and biosolids treatment. Nitrified and de-nitrified secondary effluent flows by gravity to tertiary treatment containing a network of filters designed to remove in excess of 99% of the remaining total solids.

Before the filtered reclaimed wastewater (tertiary effluent and therefore, recycled water) can be used for irrigation and groundwater recharge purposes and/or be discharged to any other body of surface water, it must be disinfected to comply with the State of California Title 22 bacteriological water quality regulations.

Upon being disinfected, the recycled water flows by gravity from the chlorine contact tanks to the recycled water pumping stations at RP-1. From these pumping facilities, the water is pumped into the recycled water distribution system.

There are three (3) sets of recycled water effluent pump stations that pump from RP-1 and supply three different pressure zones; the 930, 1050, and 1158 Pressure Zones.



IEUA RWPS

Regional Recycling Plants and Effluent Pump Stations

FIGURE 3-1

3.2.1.1 RP-1 930 Zone Effluent Pump Station

The existing RP-1 930 Zone Effluent Pump Station includes 3 small identically sized pumps and 2 large identically sized pumps. Each pump is equipped with VFD driven motors. The pumps are staged on and off to maintain an operator adjustable set point pressure in the 930 Zone.

Supply from RP-1 into the 930 Zone has two control strategies for dry weather peak demand periods and wet weather peak demand periods. During dry weather peak demand periods, the 930 Zone Effluent Pump Station pumps are first in the control sequence and the 1050/930 PRV is last. During wet weather low demand periods, the 1050/930 PRV is first in the control sequence, and the 930 Zone pumps are turned on when the 1050/930 PRV cannot maintain pressure.

3.2.1.2 RP-1 1050 Zone Effluent Pump Station

The existing RP-1 1050 Zone Effluent Pump Station includes 3 identically sized pumps. Each pump is equipped with VFD driven 350 Hp motors. The pumps are staged on and off to maintain an operator adjustable set point pressure in the 1050 Zone.

Supply from RP-1 into the 1050 Zone has two control strategies for dry weather peak demand periods and wet weather peak demand periods. During dry weather peak demand periods, the 1050 Zone Effluent Pump Station pumps are first in the control sequence and the 1158/1050 PRV is last. During wet weather low demand periods, the 1158/1050 PRV is first in the control sequence, and the 1050 Zone pumps are turned on when the 1158/1050 PRV cannot maintain pressure.

3.2.1.3 RP-1 1158 Zone Effluent Pump Station

The existing RP-1 1158 Zone Effluent Pump station includes 4 identical pumps. Each pump is equipped with VFD driven 400 Hp motors. The pumps are controlled by the 1158 Zone Reservoir water level.

The 1158 Zone Effluent Pump Station is the third supply priority to the 1158 Zone after the RP-4 1158 Zone Pump Station and 1158 Zone Reservoir.

Table 3.2 shows the pump characteristics for the three RP-1 Effluent Pump Stations.

Table 3.2 Existing RP-1 Effluent Supply Pump Stations

Effluent Supply Pump Station	To Pressure Zone	No. of Pumps/Capacity	Control
RP-1 930 Zone Effluent Pump Station	930	3 Pumps @ 2,790 gpm 2 Pumps @ 9,330 gpm Total Capacity = 27,030 gpm	Pressure in 930 Zone (VFD pumps)
RP-1 1050 Zone Effluent Pump Station	1050	3 Pumps @ 3,750 gpm Total Capacity = 11,250 gpm	Pressure in 1050 Zone (VFD pumps)
RP-1 1158 Zone Effluent Pump Station	1158	4 Pumps @ 2,780 gpm Total Capacity = 11,120 gpm	1158 Zone Reservoir Level

3.2.2 RP-4

Located in the City of Rancho Cucamonga, the Regional Water Recycling Plant No. 4 (RP-4) has been in operation and producing recycled water since 1997. RP-4 treats an average flow of 10 MGD and is operated in conjunction with RP-1 to provide recycled water to non-potable water users. The RP-4 facility has been recently expanded to a capacity of 14 MGD.

RP-4 includes several treatment processes that contribute to providing quality recycled water pursuant to the State of California Title 22 regulations. The major treatment processes include raw wastewater pumping, preliminary and primary treatment, primary effluent flow equalization and diversion, secondary treatment, and tertiary treatment.

Upon being disinfected, the recycled water flows by gravity from the chlorine contact tanks into a common channel and wet well, where it can be discharged to the plant storage pond or pumped to provide utility water for within the facility and for beneficial reuse into the recycled water distribution system.

When the demand for utility water or recycled water is less than the amount of water being produced, the excess recycled water is discharged to the storage pond and the filter backwash water is sent to RP-1.

3.2.2.1 RP-4 1158 Zone Effluent Pump Station

The existing RP-4 1158 Zone Effluent Pump station includes 2 large pumps and 3 small pumps. Each pump is equipped with VFD driven motors. The pumps are controlled by maintaining the RP-4 wet level at 13-ft.

The 1158 Zone Effluent Pump Station is the first supply priority to the 1158 Zone.

Table 3.3 shows the pump characteristics for the RP-4 1158 Zone Effluent Pump Station.

Table 3.3 Existing RP-4 Effluent Supply Pump Station

Effluent Supply Pump Station	To Pressure Zone	No. of Pumps/Capacity	Control
RP-4 1158 Zone Effluent Pump Station	1158	2 Pumps @ 7,200 gpm 3 Pumps @ 2,700 gpm Total Capacity = 22,500 gpm	RP-4 Wet Well (13-ft)

3.2.3 RP-5

Regional Water Recycling Plant No. 5 (RP-5), located immediately east of the IEUA Administrative Headquarters in the City of Chino, began operation in March 2004. The first phase of RP-5 is designed to treat 15 million gallons of wastewater per day. Ultimately, RP-5 will treat 60 million gallons of wastewater per day and process 68 MGD of solids combined from RP-5 and IEUA's Carbon Canyon Waste Recycling Facility (CCWRF).

RP-5 includes several treatment processes that contribute to providing quality recycled water pursuant to the State of California Title 22 regulations. The major treatment processes include raw wastewater pumping, preliminary and primary treatment, primary effluent flow equalization and diversion, secondary treatment, and tertiary treatment.

Upon being disinfected, the recycled water flows by gravity from the chlorine contact tanks into a common channel, where it can be discharged to a creek by gravity and also pumped to the 800 Pressure Zone recycled water distribution system.

3.2.3.1 RP-5 800 Zone Effluent Pump Station

The existing RP-5 800 Zone Effluent Pump station includes 5 pumps of equal size. Two of the pumps are equipped with VFDs and all five pumps have 150 Hp motors. The pumps are controlled by maintaining the RP-4 wet level at 13 feet.

Supply from RP-5 into the 800 Zone has two control strategies for dry weather peak demand periods and wet weather peak demand periods. During dry weather peak demand periods the 800 Zone Effluent Pump Station pumps are first in the control sequence and the 930/800 PRV is last. During wet weather low demand periods, the 930/800 PRV is first in the control sequence, and the 800 Zone pumps are turned on when the 930/800 PRV cannot maintain pressure. The 800 Zone Effluent Pump Station will turn on when the pressure falls below 100 psi.

Table 3.4 shows the pump characteristics for the RP-5 800 Zone Effluent Pump Station.

Table 3.4 Existing RP-5 Effluent Supply Pump Station

Effluent Supply Pump Station	To Pressure Zone	No. of Pumps/Capacity	Control
RP-5 800 Zone Effluent Pump Station	800	5 Pumps @ 1,925 gpm Total Capacity = 9,625 gpm	Operator defined Wet Well level, and system pressure

3.2.4 CCWRF

CCWRF is located in the City of Chino, and has been in operation since May 1992. This facility serves the Cities of Chino, Chino Hills, Montclair, and Upland. Liquids are treated at CCWRF, while the solids removed from the waste flow are treated at RP-2. CCWRF treats an annual average flow of 9.5 MGD.

CCWRF includes several treatment processes that contribute to providing quality recycle water pursuant to the State of California Title 22 regulations. The major treatment processes include raw wastewater pumping, preliminary and primary treatment, primary effluent flow equalization and diversion, secondary treatment, and tertiary treatment.

Upon being disinfected, the recycled water flows by gravity from the chlorine contact tanks to the recycled water pumping station at CCWRF. From those pumping facilities, the water is pumped into the recycled water distribution system 930 Pressure Zone.

3.2.4.1 CCWRF 930 Zone Effluent Pump Station

The existing CCWRF 930 Zone Effluent Pump station includes 5 pumps of equal size. Two of the pumps are equipped with VFD's motors and all five pumps have 150 Hp motors. The pumps are controlled by maintaining the RP-4 wet level at 13 feet.

Supply from CCWRF into the 930 Zone has two control strategies for dry weather peak demand periods and wet weather peak demand periods. During dry weather peak demand periods, the CCWRF 930 Zone Effluent Pump Station pumps are first in the control sequence, the RP-1 930 Zone Pump Station is second, and the 1050/930 PRV is last. During wet weather low demand periods, the priority sequence is reversed: the 1050/930 PRV is first in the control sequence, the RP-1 930 Zone Pump Station is second, and the CCWRF 930 Zone pumps are last priority.

Table 3.5 shows the pump characteristics for the CCWRF 930 Zone Effluent Pump Station.

Table 3.5 Existing CCWRF Effluent Supply Pump Station

Effluent Supply Pump Station	To Pressure Zone	No. of Pumps/Capacity	Control
CCWRF 930 Zone Effluent Pump Station	930	5 Pumps @ 2,585 gpm Total Capacity = 12,925 gpm	Operator defined Wet Well level, and 930 Zone Reservoir level

3.3 EXISTING DISTRIBUTION SYSTEM FACILITIES

The treated effluent from the four (4) regional wastewater recycling effluent pump stations is delivered to the recycled water member agencies and customers via 5 pressures zones, several hundred miles of pipelines, three booster pump stations, three storage reservoirs, and pressure regulating stations. These facilities are shown in Figure 3-2.

3.3.1 Pressure Zones

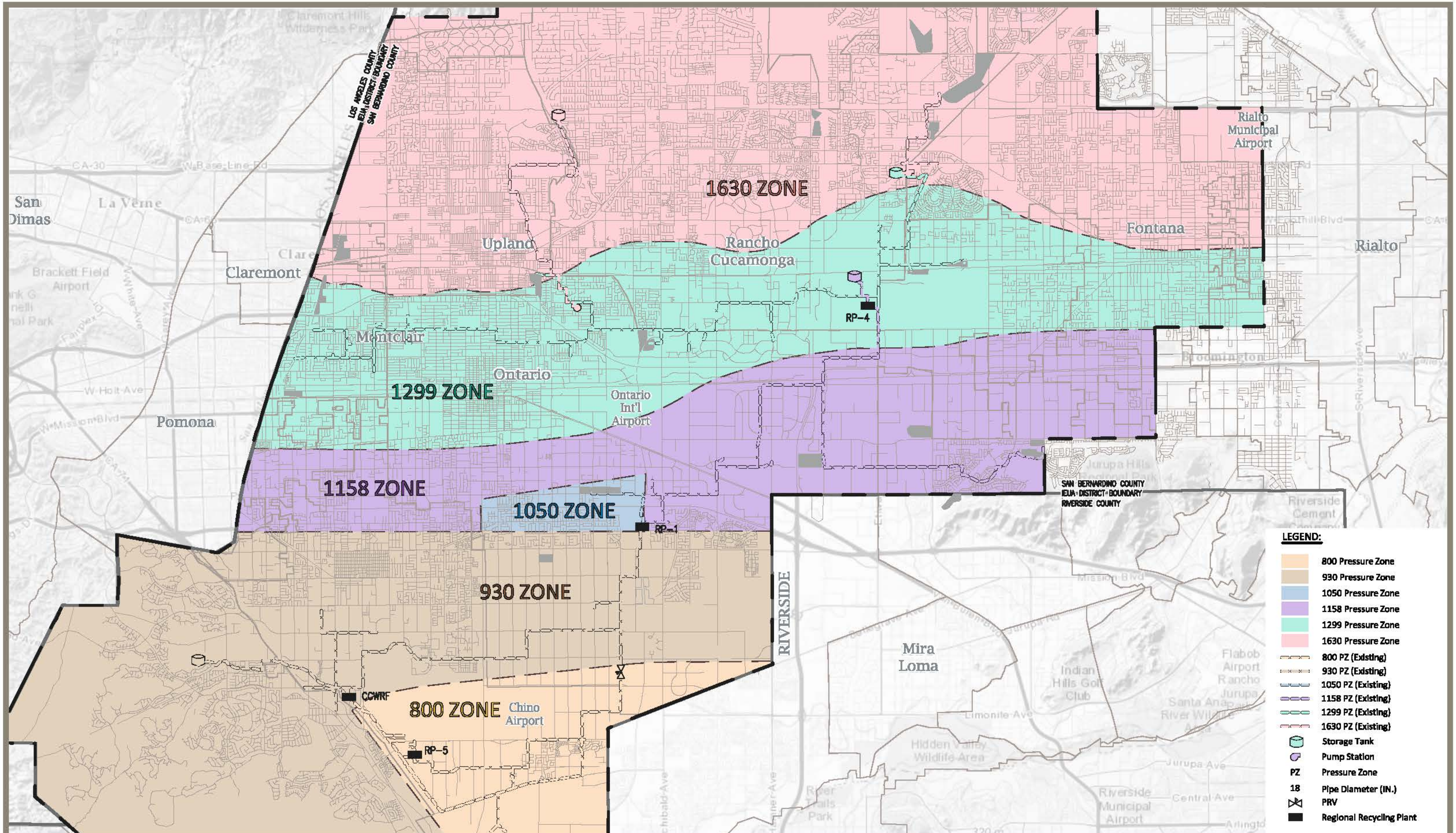
Six (6) pressure zones are utilized to deliver recycled water to the IEUA customers with the appropriate service pressures. These pressure zones are listed in Table 3.6 and illustrated in Figure 3-2. The pressure zones are established based on the following set of criteria:

- Minimum regional service pressure = 50 psi
- Maximum regional system pressure = 150 psi
- Minimum Basin service pressure = 25 psi

The regional system pressures listed above are used to establish pressure zones for appropriate service pressures to IEUA customers and member agencies. Localized pressures near reservoirs, regulating valves, and pump stations may vary from those listed.

Table 3.6 Pressure Zone Characteristics

Pressure Zone/HGL	Minimum Elevation	Maximum Elevation	RP Supply
800	510-ft	660-ft	RP-5, RP-1
930	600-ft	778-ft	CCWRF, RP-1
1050	746-ft	843-ft	RP-1
1158	813-ft	1,042-ft	RP-1, RP-4
1299	971-ft	1,183-ft	RP-4
1630 (East & West)	1,283-ft	1,465-ft	RP-4



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GRAPHIC SCALE
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(IN FEET) 1 inch = 8500 FT

IEUA RWPS
Existing Recycled Water Pressure Zones
FIGURE 3-2

3.3.2 Storage Tanks

There are four (4) existing storage tank sites to provide operational storage for the recycled water system. These tanks and their characteristics are provided in Table 3.7.

Table 3.7 Existing Storage Tanks

Storage Tank/ Pressure Zone	HWL	Capacity
930 Reservoir	930-ft	5.0 MG
1158 Reservoir	1158-ft	2 tanks – 4.0 MG each (8.0 MG Total)
1299 Reservoir	1299-ft	3.5 MG
1630 West Reservoir	1630-ft	3.0 MG

3.3.3 Booster Pump Stations

In addition to the effluent pump stations supplying the distribution from the regional wastewater recycling plants, there are three (3) other booster pump stations to boost water from one pressure zone up to a higher pressure zone. These booster pump stations are described in Table 3.8.

Table 3.8 Existing Booster Pump Stations

Booster Pump Station	From Pressure Zone	To Pressure Zone	No. of Pumps/Capacity	Control
1299 Pump Station	1158	1299	7 Pumps @ 4,600 gpm	1299 Reservoir Level
1630 East Pump Station	1299	1630E	2 Pumps @ 3,000 gpm 1 Pumps @ 1,500 gpm 2 Pumps @ 750 gpm	Pressure (VFDs) - 150 psi set point
1630 West Pump Station	1299	1630W	3 Pumps @ 2,000 gpm	1630 W Reservoir Level

3.3.4 Pressure Reducing Stations

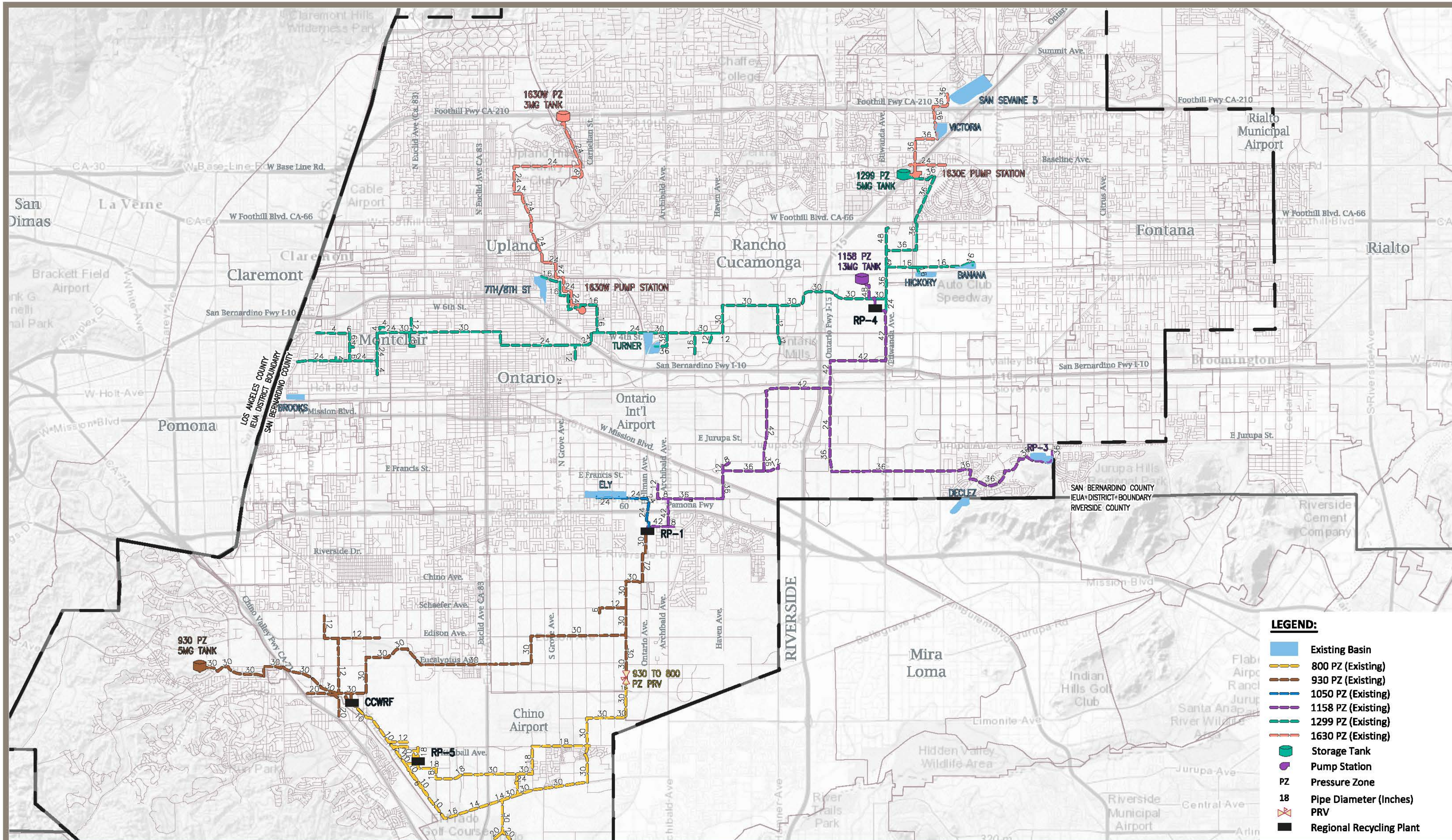
There are three (3) pressure reducing stations that allow flow from a higher pressure zone down to a lower pressure zone. These pressure reducing stations are designed to open and supplement the lower zone with recycled water when the system pressure drops below a set point in the lower zone. Table 3.5 is provided to show the characteristics for each station.

Table 3.5 Existing Pressure Reducing Stations

Pressure Reducing Station	Location	Description	Downstream Pressure Setting[1]
1630 West PRV to 1299 Zone	1630 West Pump Station	Functions as Pressure Reducing, Manual Operation, Currently Normally Closed	n/a
1158 PRV to 1050 Zone	RP-1 Effluent Pump Station	Functions as Pressure Sustaining and Reducing	115-118 psi
1050 PRV to 930 Zone[2]	RP-1 Effluent Pump Station	Functions as Pressure Sustaining and Reducing	55-65 psi
930 PRV to 800 Zone	Carpenter & Eucalyptus Ave	Pressure Reducing Only – No Electronic Controls	55 psi

[1] Pressure settings are subject to change periodically depending on demand conditions or system operation requirements, and actual settings in the field may be different from reported herein.

[2] As described in Section 3.2.1 for the RP-1 930 Zone Effluent Pump Station, the 1050/930 PRV is last in the control sequence during dry weather peak demand periods, but is first in the control sequence during wet weather low demand periods. The 1050/930 PRV is modulated by the operator.



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GRAPHIC SCALE
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IEUA RWPS
Existing Recycled Water System Conveyance Facilities
FIGURE 3-3

4.0 IMPLEMENTATION OF PROPOSED GWR BASINS

This section describes the proposed recycled water implementation strategy associated with the IEUA goal to increase GWR to a high priority use of recycled water along with direct use. The strategy proposed has a 20-year planning horizon, which is analyzed and planned in 5-year increments to Year 2035. The strategy described in this section includes identifying the proposed basins to be connected to the recycled water system, when they will be connected, and a mass balance of demands and basin flows versus the recycled water supply projections.

4.1 PROPOSED GWR BASINS

Section 2.2 in this report identified the existing groundwater basins that are currently connected to the recycled water system and receive recycled water for recharge. IEUA operates several other basins that are currently configured only to recharge storm water, local runoff, and/or imported MWD water. The new recycled water program assumes that each of these basins will be connected to the recycled water system and receive recycled water recharge. In Table 4.1, each basin is given a label based on its status. A label of "RW Connection" status implies that the basin is a currently operating basin as part of the groundwater recharge program for storm water/local runoff and imported water, and will require modifications and facilities to connect to the recycled water system to receive recycled water for recharge.

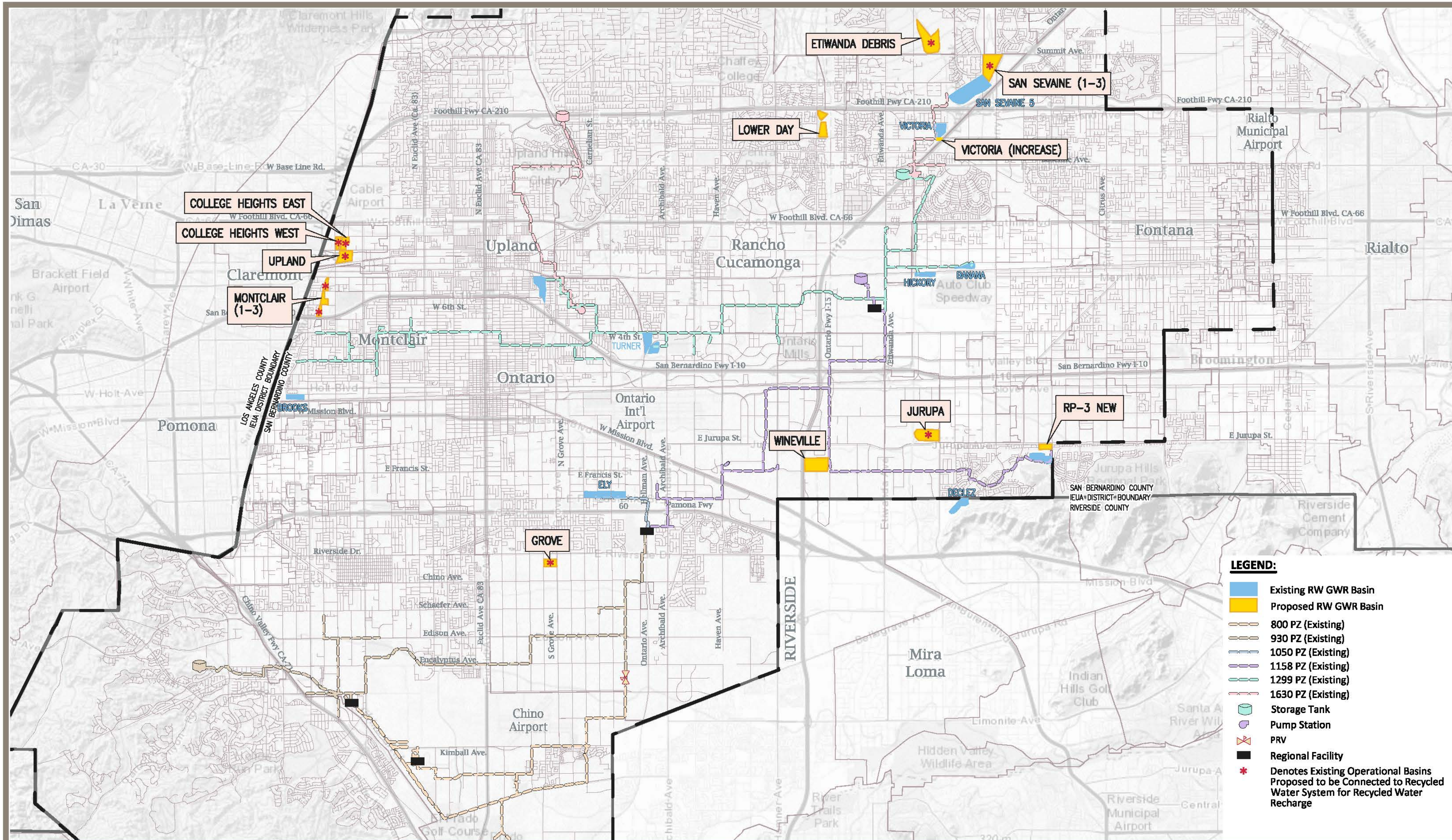
In addition to the existing basins that will be connected to the recycled water system, several sites or basins have been identified by IEUA as new basins that will come online in the future. These basins are at various stages of planning and permitting. Some of these new basins are at existing basin sites where basin capacities will be expanded by adding new cells.

Table 4.1 provides a list of the basins that are proposed to be added to the recycled water groundwater recharge program, along with anticipated size and recharge capacity. Figure 4-1 is a map of the location of each of these basins.

Table 4.1 Proposed GWR Basins to Receive Recycled Water

Basin/Site	Basin Status[1]	Size (acres)	Storage Volume (AF)
Lower Day	RW Connection	15.0	179
Etiwanda Debris	RW Connection	14.6	73
San Sevaine (1-3)	RW Connection	21.4	99
Victoria (Increase)	RW Connection	17.4	237
Lower San Sevaine	New	23.0	230
Wineville	New	30.0	240
RP-3 (New Cell)	New	3.5	35
Vulcan	New	30.0	450
College Heights East	RW Connection	6.2	112
College Heights West	RW Connection	5.8	110
Grove	RW Connection	10.0	114
Jurupa	RW Connection	17.0	249
Montclair (1-3)	RW Connection	22.5	518
Montclair 4	RW Connection	5.8	139
Upland	RW Connection	16.6	392
	Total	**238.8**	**3,177**

[1] "RW Connection" implies that the basin is a currently operating basin as part of the groundwater recharge program for storm water/local runoff and imported water, and will require modifications and facilities to connect to the recycled water system to receive recycled water recharge. "New" is a new basin that is currently not in the groundwater recharge program.



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(IN FEET) 1 inch = 8500 FT

IEUA RWPS
Existing and Proposed Recycled Water GWR Basins

FIGURE 4-1

4.2 PROPOSED BASIN IMPLEMENTATION

The strategy for implementing the proposed basins listed in Table 4.1 is based on the basins coming online in the next 20 years, with a small group of basins coming online every 5 years. The general overall goal of the strategy is to implement basins in the early phases that will maximize infiltration and minimize facility improvements and costs at the same time.

Identifying the basins proposed to come online in each 5-year increment was performed by ranking the basins against a few simple criteria. The following sub-sections briefly describe the criteria and implementation strategy.

The implementation criteria described below are grouped into two major categories as they will either have impacts related to infrastructure costs and system operation efficiency primarily, or impacts related to scheduling and miscellaneous items.

4.2.1 Implementation Criteria

The criteria used to determine which basins will come online in each 5-year period during the next 20 years were based on the criteria described below.

<u>Costs Related Criteria</u>

- *Pressure Zone Demand Distribution* – consideration is given to how the basins will be implemented over the next 20 years based on the geographic location within each pressure zone, and how many basins are supplied by the same pressure zone. This criterion groups the basins for each 5-year increment to evenly spread out the basin demands within each pressure zone and spread the demands over multiple basins, if possible, in order to limit the amount of new infrastructure required during the same planning year. Based on the hydraulic evaluations, the pressure zones in the eastern portion of the system have more current available capacity than do those in the western portion of the system. Basins are ranked on a scale of 1 to 10 points, where points are assigned to the pressure zone service area where each basin is located, with 10 points given to the zone service area with the most available capacity. The criteria points assigned are as follows:

Pressure Zone Service Area	Criteria Points
1050	1 pt
1158	5 pts
1299 West Area	1 pt
1299 East Area	5 pts
1630 West	1 pt
1630 East	10 pts

- *Average Infiltration Rate* – the average infiltration rate for each basin was provided by IEUA and was utilized in determining the total infiltration rate for the pressure zones. The fifteen basins proposed are ranked from 1 to 15 points depending on the individual basin's infiltration rate, in acre-feet per month (AFM). The larger the infiltration rate, the higher the ranking points assigned. See the table below for infiltration rates and points assigned for each basin.

GWR Basin	Average Infiltration Rate (AFM)	Criteria Points
Grove	75	1
Lower San Sevaine	90	2
Montclair 4	95	3
Wineville	117	4
College Heights West	155	5
Vulcan Pit	171	6
Victoria (increase)	212	7
Jurupa	233	8
Etiwanda Debris	263	9
College Heights East	302	10
Lower Day	340	11
Upland	370	12
Montclair (1-3)	1,107	13
RP-3 (New Cell)	1,366	14
San Sevaine (1-3)	1,508	15

- *Average 14-Day Fill Rate* – the 14-day fill rate as described in Section 4.3.2 is the basin storage volume divided by 14 days, based on the operation cycled assumed for this study. All of the basin fill rates are listed in Table 4.4. The fifteen (15) basins are ranked by points, 1 to 15 points, with the basin having the highest required fill rate ranked with the lowest points. This implies that a basin requiring a higher flow rate will have the most impact to the existing system and will require system upgrades and improvement costs accordingly.

GWR Basin	14-Day Fill Rate (MGD)	Criteria Points
Jurupa	8.9	1
Upland	6.8	2
Victoria (increase)	5.5	3
Lower San Sevaine	5.4	4
Grove	5.3	5
Lower Day	5	6
Montclair (1-3)	4	7
Montclair 4	3.3	8
San Sevaine (1-3)	3.1	9
Wineville	2.8	10
College Heights East	2.6	11
College Heights West	2.5	12
Vulcan Pit	2.1	13
Etiwanda Debris	1.7	14
RP-3 (New Cell)	0.8	15

- *Vicinity to Existing RW System* – this criterion ranks the basins based on their location relative to the existing recycled water system facilities. For example, a basin that is immediately adjacent to an existing transmission main would be of a higher priority to come online sooner than a basin that is further away, as it would require additional pipelines to receive recycled water. For ranking purposes, the following ranking scale of points are assigned to each basin:

Vicinity to Existing RW System	Criteria Points
Greater than 1 ½ Miles from RW System	1 pt
Within 1 ½ Miles from RW System	5 pts
Immediately Adjacent to RW System	10 pts

Schedule Related Criteria

- *Basin Status* – as shown in Table 1.1, some basins are existing basins but are equipped or permitted to only recharge with storm water, local runoff, and/or imported MWD water. These basins are identified as "RW Connection" since they will only require the modifications and facilities necessary for them to be connected to the recycled water system. The remaining proposed basins that are not identified as "RW Connection" are identified as "New."

Basin Status	Criteria Points
RW Connection	1 pt
New	10 pts

- *Permitted* – basins are ranked by points based on whether or not they are already permitted. Some existing basins may not be permitted for recycled water recharge. If the basin is already permitted, then it may be easier to recharge the basin with recycled water, and therefore, the basin would be ranked as a higher priority to implement.

Permit Status	Criteria Points
No	1 pt
Yes	10 pts

- *Property Ownership* – consideration is given to the property ownership for each basin. The different property owners may have different requirements in place for allowing IEUA to recharge the basin with recycled water. Ownerships where IEUA does not have a basin currently for example will receive fewer ranking points. The table below shows the points assigned for each property owner.

Permit Status	Criteria Points
IEUA	10 pts
SBCFCD	8 pts
CBWCD	6 pts
Upland	4 pts
Calmat	2 pts

- *Planned Basin in RMPU* – some of the basins have already been planned in IEUA's RMPU. If a basin has already been planned in the RMPU, it will receive a higher priority ranking than those that have not yet been planned.

Planned in RMPU	Criteria Points
No	1 pt
Yes	10 pts

- *Production Wells* – some of basins include production wells for recovery of groundwater. The implementation strategy considers which basins have production wells to spread them out over the planning horizon to avoid added infrastructure costs, and even distribution of wells coming online. Basins are ranked with points according to the table below.

Production Wells	Criteria Points
Not Existing Existing	1 pt 10 pts

4.2.2 Proposed Basin Implementation Strategy

For Years 2020, 2025, 2030, 2035, and Ultimate analysis scenarios, it was assumed that three (3) future or planned basins would come online in each 5-year planning increment. This provided for an even and balanced distribution of recycled water recharge demand and infrastructure costs while maintaining the goal to maximize the infiltration rate in the early phases with minimum cost allocations.

The priorities of the basins coming online are assigned according to the criteria described in Section 4.2.1.

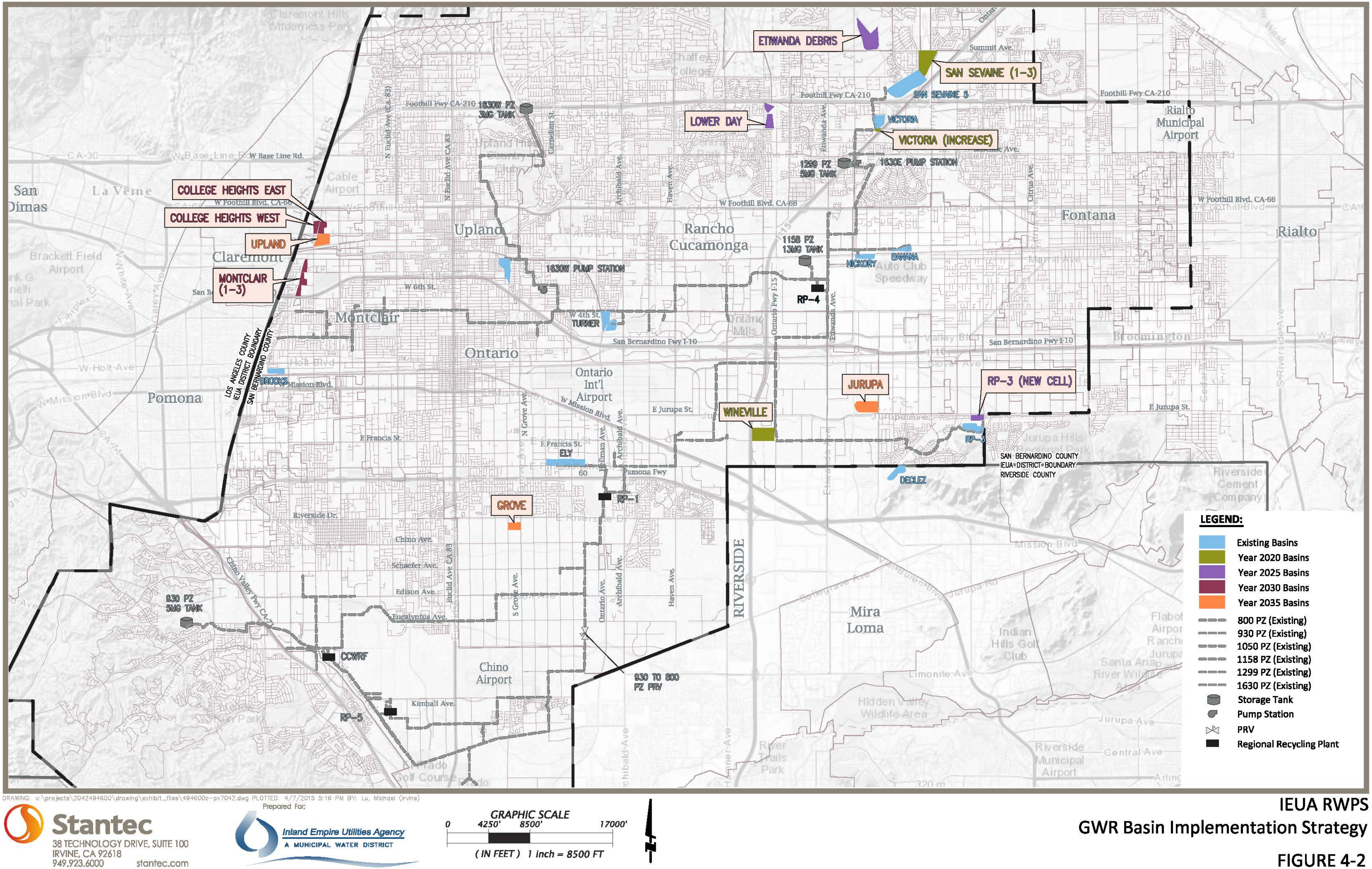
It should be noted though that the priority order in which the basins were grouped together for implementation considered the required total demand of all three basins for each planning year. The basins' implementation (or total flow requirements) was generally spread evenly throughout the planning horizon.

The GWR Basin implementation strategy is shown in Table 4.2. The ranking assumes that the basin with the highest total points is ranked as the highest priority. The basins shown for Year 2020 and 2025 are located in pressure zones near existing infrastructure that has sufficient existing capacity to supply the additional demand without requiring significant improvement costs. The majority of them are already permitted.

The GWR Basin implementation strategy is graphically illustrated in Figure 4-2.

Table 4.2 Proposed GWR Basin Implementation Priority Ranking

Planning Year	Basin	Costs Related Criteria				Schedule Related Criteria					Total Points	Total Priority Ranking
		Pressure Zone	Ave. Infilt. Rate	14-Day Fill Rate	Vicinity to Existing RW System	Basin Status	Permit Status	Property Owner	Planned Basin in RMPU	Prod. Well		
Year 2020	Wineville	10	4	10	10	1	10	10	10	10	**80**	**1**
	Victoria (increase)	10	7	3	10	10	10	8	10	10	**78**	**2**
	San Sevaine (1-3)	10	15	9	10	10	10	8	10	1	**83**	**3**
Year 2025	RP-3 (New Cell)	1	14	15	5	1	10	10	10	10	**76**	**4**
	Lower Day	10	2	4	10	1	10	8	10	10	**65**	**5**
	Etiwanda Debris	10	9	14	5	10	1	8	1	1	**59**	**6**
Year 2030	Montclair (1-3)	5	13	7	5	10	1	6	1	1	**49**	**7**
	College Heights East	1	10	11	1	10	10	6	1	10	**60**	**8**
	College Heights West	1	5	12	1	10	10	6	1	10	**56**	**9**
Year 2035	Upland	10	11	6	1	10	1	8	1	1	**49**	**10**
	Jurupa	1	8	1	5	10	10	8	1	10	**54**	**11**
	Grove	1	1	5	1	10	10	8	1	10	**47**	**12**
Ultimate[1]	Vulcan Pit	1	12	2	1	10	1	4	1	1	**33**	**13**
	Lower San Sevaine	5	6	13	1	1	10	2	10	10	**58**	**14**
	Montclair 4	1	3	8	5	10	1	6	1	1	**36**	**15**



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IEUA RWPS
GWR Basin Implementation Strategy

FIGURE 4-2

5.0 MASS BALANCE ANALYSIS

The following is a brief description of the approach taken in performing the mass balance of recycled water supply and direct use demands to determine the amount of recycled water supply that will be available for recharge in the existing and proposed groundwater basins.

5.1 EXISTING AND PROJECTED ANNUAL DEMANDS

The annual demand projections provided by IEUA were subtotaled by member agency and by pressure zone, and provided for existing demand conditions through Year 2035 demand conditions, in 5-year increments. These annual demands are used as the basis for the direct use demand projections for the study.

Table 5.1 Summary of Supplies and Demands

	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Total Supplies	61,944	66,312	71,913	77,514	82,330
Direct Use Demands	24,655	30,757	36,507	40,320	43,019
Surplus	**37,289**	**35,555**	**35,406**	**37,194**	**39,311**

5.1.1 Monthly Demands

Direct use demands for existing Year 2013 conditions were obtained from Agency's monthly customer billing data. (The Agency recharge billings were separated from the direct use billing). This information was used to establish the existing direct use demands for each month, subtotaled by pressure zone.

Future demands for each member agency was provided by the Agency for each planning horizon. The monthly demand patterns from the 2013 billing information were extrapolated to the future annual demand projections for each 5-year increment to obtain future monthly direct use demand projections. The demand projections assume that existing agricultural irrigation will be reduced as development increases over time. These monthly demand estimates are used to analyze the spring (average demands) and summer (maximum demands) analysis scenarios for each 5-year planning increment.

5.1.1.1 Santa Ana River Base Flow (SARBF) at Prado Obligation

In addition to the current direct use demands, IEUA maintains an annual base flow obligation to the Santa Ana River at Prado Dam. IEUA provided the SARBF at Prado Obligation annual demands and monthly management of the demands to be used for this study.

This obligation is an annual demand ranging from 14,000 AF to 17,000 AF. Due to other flows to the Santa Ana River and water quality credits, 14,000 AFY, or approximately 12.5 MGD, is used for this study. Approximately 2.0 MGD can be delivered from RP-5 through the 800 Pressure Zone. The remaining demand is met by discharging directly into the nearby creek from either RP-5 or RP-1. This study assumes that the SARBF at Prado Obligation is met by RP-5 as the first source of supply and then by RP-1 as the supplementary supply as necessary.

The supply priority assumed in this study is to first meet direct use demands, and then the SARBF at Prado Obligation. Therefore, the SARBF at Prado Obligation is assumed to be as much as 40% of the total annual obligation in the winter demand months of December, January, and February when the direct use demands are low. This will make available more supply to meet the direct use demands and proposed GWR flow in the higher summer demand months. The minimum flow rate to SARBF at Prado Obligation in any one month is 3.5 MGD, or approximately 5.4 cfs average.

5.1.1.2 Existing and Projected Wastewater Supply

The wastewater flow projections were provided by IEUA from the WFMP project, and shown in Table 3.1. These flows were provided for existing conditions through Year 2035 conditions, in 5-year increments. The monthly wastewater supply is assumed to be constant for each month in each year of the planning study.

5.1.1.3 Southern and Northern Service Areas

The supplies and demands were divided into two services areas; the Southern and Northern Service Areas. The service areas are grouped by the pressure zones that are primarily supplied by the regional recycling plants. Table 4.3 shows the service areas that are assumed for the mass balance analysis.

Table 5.2 Southern and Northern Service Areas

Service Area	Supply from Regional Recycling Plant	Pressure Zones Served
Southern Area	RP-5 CCWRF	800 930
Northern Service Area	RP-1 [1] RP-4 [2]	1050 1158 1299 1630E 1630W

[1] RP-1 is the only facility that can supply both the Southern and Northern Service Areas via the 930 PZ Effluent Pump Station, 1050 PZ Effluent Pump Station, and the 1158 PZ Effluent Pump Station. For the mass balance analysis, RP-1 is assumed to supply only the Northern Service Area for the calculations and tables presented herein.

[2] RP-4 supplies directly to the 1158 PZ. Other Booster Pump Stations are required to supply the higher pressure zones.

5.1.2 GWR Basin Demand Assumptions

For the existing scenario, the existing GWR Basins were assumed to flow at 14-day fill periods. The average daily base flow rate for each basin was assumed to be the basin volume divided by 14 days. Each basin's flow rate is listed in Table 5.3.

The GWR Basin recharge water was assumed to flow daily for a 12-hour period outside the normal night irrigation period; therefore, the instantaneous flow rate is twice the daily average flow rate. Reducing the hours of demand to the basins was done to accommodate the low wastewater flows from each treatment facility, and the peak irrigation demands during the night. Most of the additional supply available from each treatment facility is provided during the day outside the peak irrigation demand period.

The 14-day fill cycle repeats for every 6-week period for each basin when possible. Some large basins with a longer infiltration period may require a longer period between filling cycles. For the analysis in section 5.1.3, the GWR basin demands are limited by the supply of recycled water from the regional recycling plants.

It should be noted that all of the existing and proposed basins are within the Northern Service Area.

Table 5.3 Proposed GWR Basins Recycled Water Demands

Basin/Site	Daily Demand[1] (MGD)	Flow Rate[2] (gpm)
7th/8th Street	5.3	7,361
Banana	1.0	1,389
Brooks	5.5	7,639
Ely (1-3)	4.9	6,806
Hickory	3.7	5,139
RP-3/Declez	4.3	5,972
San Sevaine 5	17.4	24,167
Turner (1-4)	10.2	14,167
Victoria	3.7	5,139
Wineville	2.8	3,889
Victoria (increase)	5.5	7,639
San Sevaine (1-3)	3.1	4,306
RP-3 (New Cell)	0.8	1,111
Lower Day	5.0	6,944
Etiwanda Debris	1.7	2,361
Montclair (1-3)	4.0	5,556
College Heights East	2.6	3,611
College Heights West	2.5	3,472
Upland	6.8	9,444
Jurupa	8.9	12,361
Grove	2.7	3,750
Vulcan Pit	2.1	2,917
Lower San Sevaine	5.4	7,500
Montclair 4	3.3	4,583
Total	**113.2**	

[1] Daily demand is based on the basin storage volume divided by 14 days for a 14-day fill period.

[2] The flow rate for each basin is based on a 12-hour per day operation, with the fill period occurring during the day outside the peak irrigation direct use demand period.

5.1.3 Supply versus Demands Analysis

For each 5-year demand scenario, a monthly supply versus direct use demands analysis was performed for the Southern and Northern Service Areas, which were defined previously in Section 5.1.1.3. The monthly direct use demand projections were compared with the monthly wastewater supply flow projections. It was assumed that the wastewater flows were constant for each month throughout the year. The difference between the wastewater supply and direct use demands plus the SARBF at Prado Obligation yields the supply available to the GWR program for each month.

Table 5.4 shows the supply and demand analysis, with the available supply to recharge the GWR basins by month for each planning year. This table assumes a 9-month GWR operation, where the monthly GWR is limited by the wastewater supply from the regional recycling plants.

Table 5.4 Supply versus Demands Mass Balance

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area					
Southern Area Recycled Water Supply (RP-5, CCWRF)	15,010	19,154	22,459	25,763	28,788
Southern Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Total to SARBF at Prado Obligation[1]	4,497	5,428	6,513	8,168	9,446
Southern Area Supply Surplus/(Deficit)	(6,056)	(5,865)	(4,919)	(3,484)	(3,028)
Northern Service Area					
Northern Area Recycled Water Supply (RP-1, RP-4)	46,934	47,158	49,454	51,750	53,543
Northern Area Direct Use Demands	8,087	11,166	15,642	19,240	20,650
Supplemental Supply to Southern Area	6,056	5,865	4,919	3,484	3,028
Total to SARBF at Prado from North[2]	9,502	8,571	7,487	5,832	4,554
Northern Area Supply Surplus/(Deficit)	23,289	21,556	21,406	23,194	25,311
GWR 9-Month Operation RW Availability[3]	**16,095**	**13,977**	**13,027**	**13,707**	**14,871**
3-Month Un-Used Winter Surplus	7,194	7,579	8,379	9,487	10,440

[1] The Total to SARBF at Prado Obligation from the South is calculated based on the monthly mass balance analysis, and assumes a base flow of 2.6 MG per month, plus the sum of any additional available for each month.

[2] The Total to SARB at Prado Obligation from the North is calculated based on the monthly mass balance analysis, and assumes a base flow of 0.9 MG per month, plus additional flows needed to meet the 14,000 AFY requirement and limit the 3-month winter period to 40% of the annual flow.

[3] The GWR 9-Month Operation RW Availability shown is calculated based on the monthly mass balance and surplus analysis for the 9-month GWR operation period.

A summary of the mass balance analysis and total recycled water supply available for the GWR program, listed for each service area by planning horizon, is provided in Table 5.5.

Table 5.5 Summary of Mass Balance

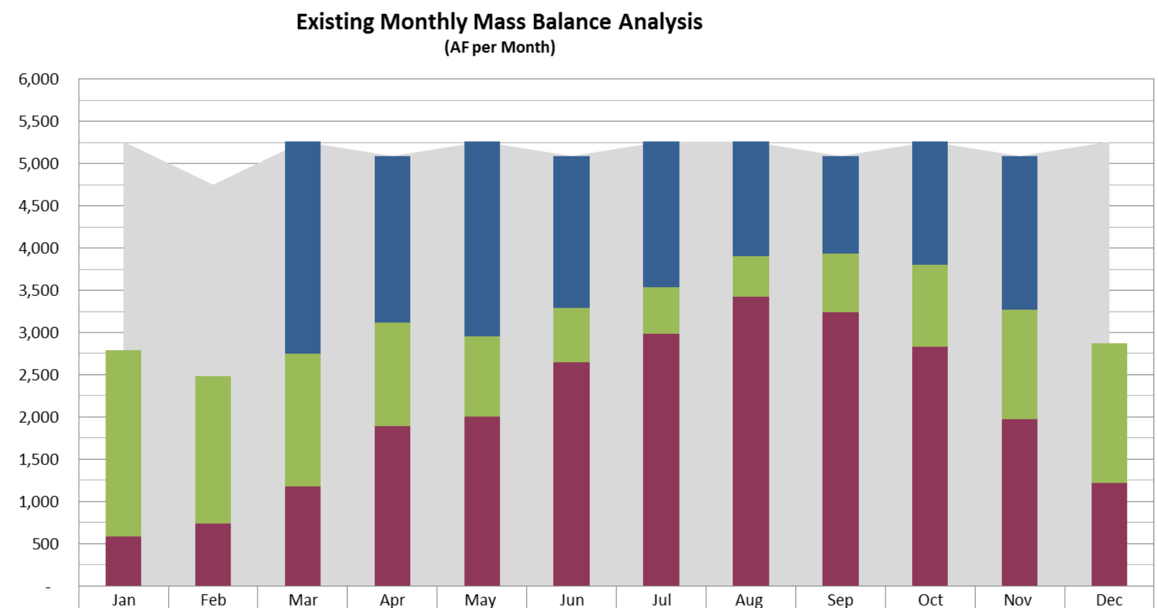
Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area Supply/(Deficit)	(6,056)	(5,865)	(4,919)	(3,484)	(3,028)
Northern Service Area Supply/(Deficit)	23,289	21,556	21,406	23,194	25,311
GWR 9-Month Operation RW Availability	16,095	13,977	13,027	13,707	14,871
Un-Used Winter Months RW Surplus	7,194	7,579	8,379	9,487	10,440

Tables 5.6 through 5.10 on the following pages and Figures 5-1 through 5-5 illustrate the relationship of the mass balance shown in Tables 5.4 and 5.5 on a monthly basis for the IEUA service area as a whole. The monthly mass balance assumes a 9-month GWR operation.

Table 5.6 Existing Monthly Mass Balance Analysis

EXISTING	Monthly Flow/Demand (MGD)												Ave.	Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(MGD)	(AFY)
Southern Service Area														
Southern Area Recycled Water Supply	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	13.4	15,010
Southern Area Direct Use Demands	3.2	6.0	8.2	14.4	12.6	18.7	20.5	23.3	25.4	21.3	15.1	8.9	14.8	16,568
Southern Area Min. Base Flow to SARBF at Prado	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2,940
Additional Supply Available to SARBF at Prado	7.5	4.8	2.6	-	-	-	-	-	-	-	-	1.9	3.4	1,557
Total to SARBF at Prado from Southern Area	10.2	7.4	5.2	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	4.5	4.0	4,497
Southern Area Supply Surplus/(Deficit)	0.0	0.0	0.0	(3.6)	(1.8)	(7.9)	(9.7)	(12.5)	(14.7)	(10.6)	(4.3)	0.0	(9.0)	(6055.6)
Northern Service Area														
Northern Area Recycled Water Supply	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	41.9	46,934
Northern Area Direct Use Demands	2.9	2.7	4.2	6.1	8.5	10.1	10.9	12.7	9.8	8.5	6.4	3.9	7.2	8,087
Supplemental Supply to Southern Area	-	-	-	3.6	1.8	7.9	9.7	12.5	14.7	10.6	4.3	-	9.0	6,056
Northen Area Minimum Base Flow to SARBF at Prado	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	980
Additional Supply to SARBF at Prado	12.1	12.0	10.5	9.8	6.5	3.5	2.3	1.6	4.0	6.7	10.6	12.0	7.6	8,522
Total to SARBF at Prado from North Area	13.0	12.9	11.4	10.7	7.4	4.4	3.2	2.5	4.9	7.6	11.5	12.9	8.5	9,502
Northern Area Supply Surplus/(Deficit)	26.0	26.4	26.3	21.5	24.3	19.5	18.1	14.2	12.6	15.3	19.7	25.1	20.7	23,289
Total SARBF at Prado Obligation	23.1	20.3	16.6	13.3	10.0	7.0	5.8	5.1	7.5	10.2	14.1	17.4	12.5	14,000
GWR 9-Month Operation Availability	**-**	**-**	**26.3**	**21.5**	**24.3**	**19.5**	**18.1**	**14.2**	**12.6**	**15.3**	**19.7**	**-**	**19.1**	**16,095**

Figure 5-1 EXISTING Monthly Mass Balance Analysis

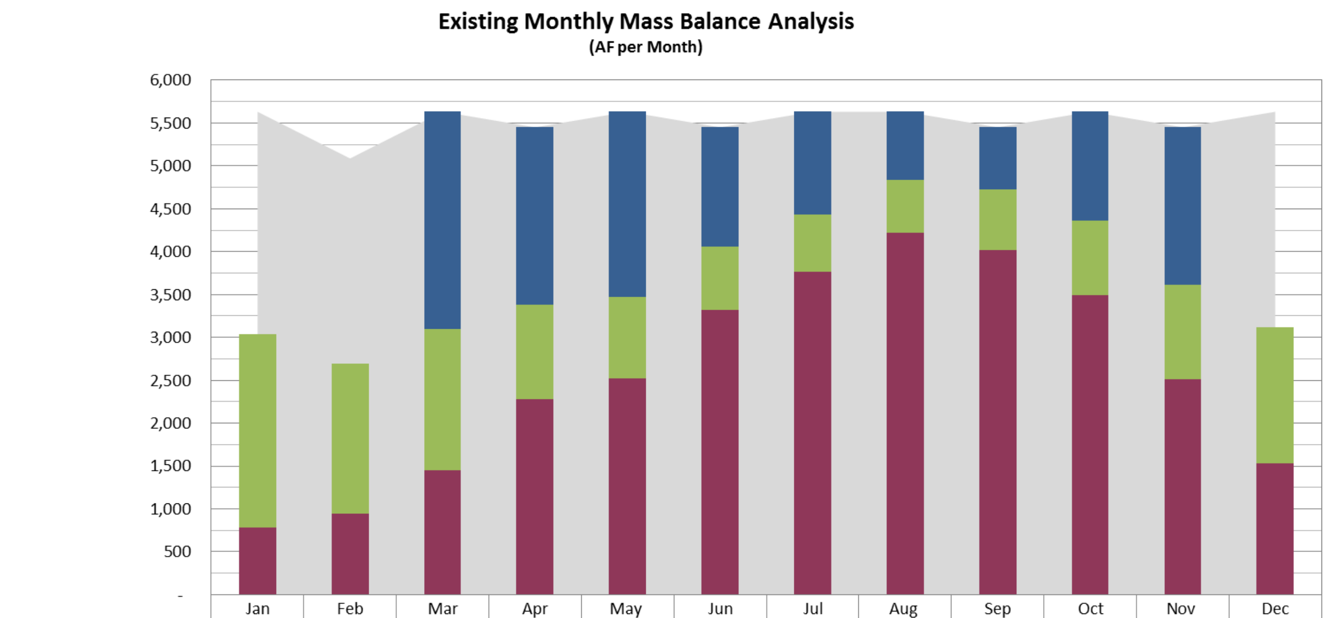


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,261	4,752	5,261	5,091	5,261	5,091	5,261	5,261	5,091	5,261	5,091	5,261
Groundwater Recharge	-	-	2,506	1,979	2,309	1,797	1,720	1,355	1,157	1,457	1,817	-
SARB at Prado Obligation	2,201	1,746	1,581	1,224	951	644	555	485	690	970	1,298	1,653
Direct Use Demands	587	742	1,174	1,888	2,001	2,650	2,986	3,421	3,244	2,834	1,976	1,220

Table 5.7 YEAR 2020 Monthly Mass Balance Analysis

Year 2020	Monthly Flow/Demand (MGD)												Ave.	Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(MGD)	(AFY)
Southern Service Area														
Southern Area Recycled Water Supply	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	19,154
Southern Area Direct Use Demands	3.8	7.0	9.6	16.7	15.0	22.1	24.4	27.6	30.0	25.1	18.0	10.6	17.5	19,591
Southern Area Min. Base Flow to SARBF at Prado	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2,940
Additional Supply Available to SARBF at Prado	10.7	7.5	4.8	-	-	-	-	-	-	-	-	3.8	5.4	2,488
Total to SARBF at Prado from Southern Area	13.3	10.1	7.5	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	6.5	4.9	5,428
Southern Area Supply Surplus/(Deficit)	0.0	0.0	0.0	(2.2)	(0.5)	(7.7)	(10.0)	(13.1)	(15.5)	(10.6)	(3.5)	0.0	(8.9)	(5865.2)
Northern Service Area														
Northern Area Recycled Water Supply	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	42.1	47,158
Northern Area Direct Use Demands	4.5	4.0	5.6	8.1	11.6	14.0	15.2	16.8	13.6	11.6	9.3	5.5	10.0	11,166
Supplemental Supply to Southern Area	-	-	-	2.2	0.5	7.7	10.0	13.1	15.5	10.6	3.5	-	8.9	5,865
Northen Area Minimum Base Flow to SARBF at Prado	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	980
Additional Supply to SARBF at Prado	9.5	9.4	9.0	8.5	6.4	4.5	3.5	3.0	4.2	5.7	8.5	9.4	6.8	7,591
Total to SARBF at Prado from North Area	10.4	10.3	9.9	9.3	7.3	5.4	4.4	3.9	5.1	6.6	9.4	10.3	7.7	8,571
Northern Area Supply Surplus/(Deficit)	27.2	27.9	26.6	22.5	22.8	15.1	12.6	8.4	7.9	13.3	19.9	26.4	19.2	21,556
Total SARBF at Prado Obligation	23.7	20.4	17.3	12.0	9.9	8.0	7.0	6.5	7.7	9.2	12.0	16.7	12.5	14,000
GWR 9-Month Operation Availability	**-**	**-**	**26.6**	**22.5**	**22.8**	**15.1**	**12.6**	**8.4**	**7.9**	**13.3**	**19.9**	**-**	**16.6**	**13,977**

Figure 5-2 YEAR 2020 Monthly Mass Balance Analysis

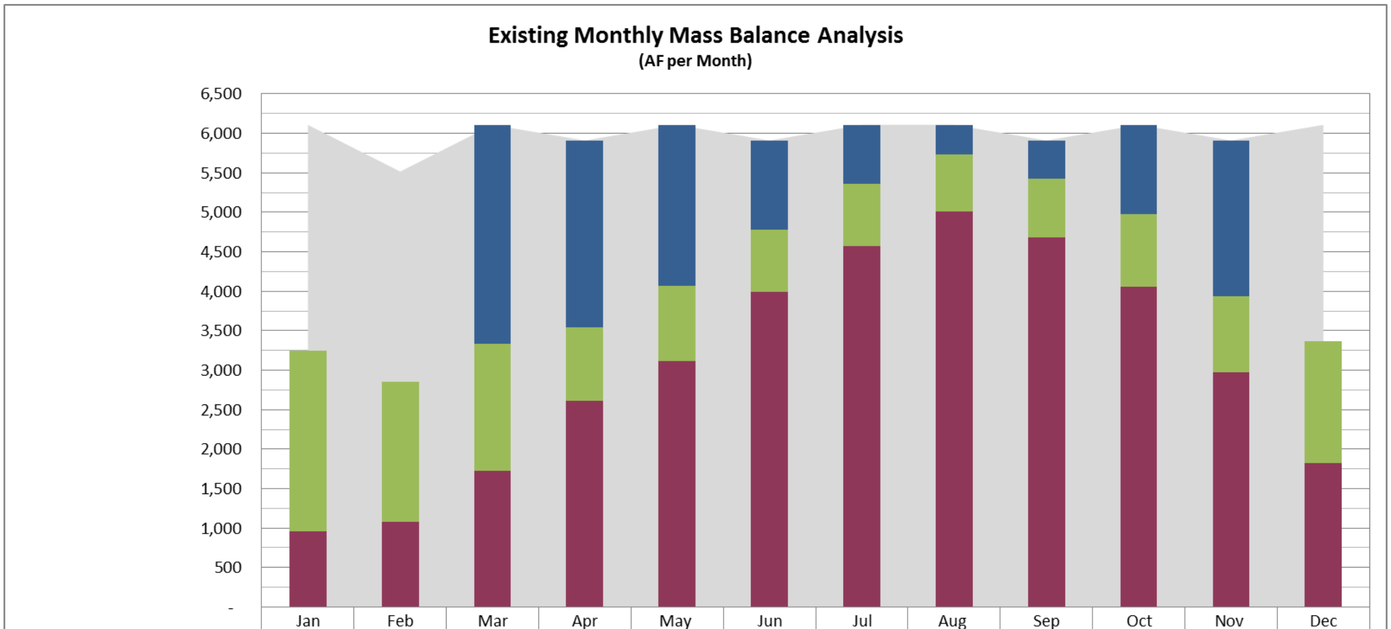


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,632	5,087	5,632	5,450	5,632	5,450	5,632	5,632	5,450	5,632	5,450	5,632
Groundwater Recharge	-	-	2,529	2,073	2,165	1,389	1,196	797	726	1,267	1,835	-
SARB at Prado Obligation	2,255	1,753	1,649	1,100	942	737	666	618	709	875	1,105	1,591
Direct Use Demands	786	940	1,454	2,277	2,525	3,325	3,770	4,217	4,015	3,490	2,510	1,532

Table 5.8 YEAR 2025 Monthly Mass Balance Analysis

Year 2025	Monthly Flow/Demand (MGD)												Ave.	Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(MGD)	(AFY)
Southern Service Area														
Southern Area Recycled Water Supply	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	20.1	22,459
Southern Area Direct Use Demands	3.9	7.2	10.3	16.7	16.4	23.6	26.8	29.5	31.6	26.4	19.6	11.6	18.6	20,865
Southern Area Min. Base Flow to SARBF at Prado	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2,940
Additional Supply Available to SARBF at Prado	13.6	10.3	7.2	0.7	1.0	-	-	-	-	-	-	5.8	7.6	3,572
Total to SARBF at Prado from Southern Area	16.2	12.9	9.8	3.4	3.7	2.6	2.6	2.6	2.6	2.6	2.6	8.4	5.8	6,513
Southern Area Supply Surplus/(Deficit)	0.0	0.0	0.0	0.0	0.0	(6.2)	(9.3)	(12.1)	(14.2)	(9.0)	(2.2)	0.0	(7.6)	(4918.8)
Northern Service Area														
Northern Area Recycled Water Supply	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2	49,454
Northern Area Direct Use Demands	6.2	5.4	7.9	11.7	16.4	19.8	21.3	23.1	19.2	16.2	12.7	7.5	14.0	15,642
Supplemental Supply to Southern Area	-	-	-	-	-	6.2	9.3	12.1	14.2	9.0	2.2	-	7.6	4,919
Northen Area Minimum Base Flow to SARBF at Prado	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	980
Additional Supply to SARBF at Prado	7.0	6.8	6.2	5.8	5.4	5.0	4.8	4.1	4.6	6.2	7.0	6.9	5.8	6,507
Total to SARBF at Prado from North Area	7.9	7.7	7.1	6.7	6.3	5.9	5.7	5.0	5.4	7.1	7.9	7.8	6.7	7,487
Northern Area Supply Surplus/(Deficit)	30.0	31.1	29.2	25.8	21.5	12.3	7.8	3.9	5.3	11.9	21.4	28.8	19.1	21,406
Total SARBF at Prado Obligation	24.1	20.6	16.9	10.0	9.9	8.5	8.3	7.6	8.1	9.7	10.5	16.2	12.5	14,000
GWR 9-Month Operation Availability	**-**	**-**	**29.2**	**25.8**	**21.5**	**12.3**	**7.8**	**3.9**	**5.3**	**11.9**	**21.4**	**-**	**15.4**	**13,027**

Figure 5-3 YEAR 2025 Monthly Mass Balance Analysis

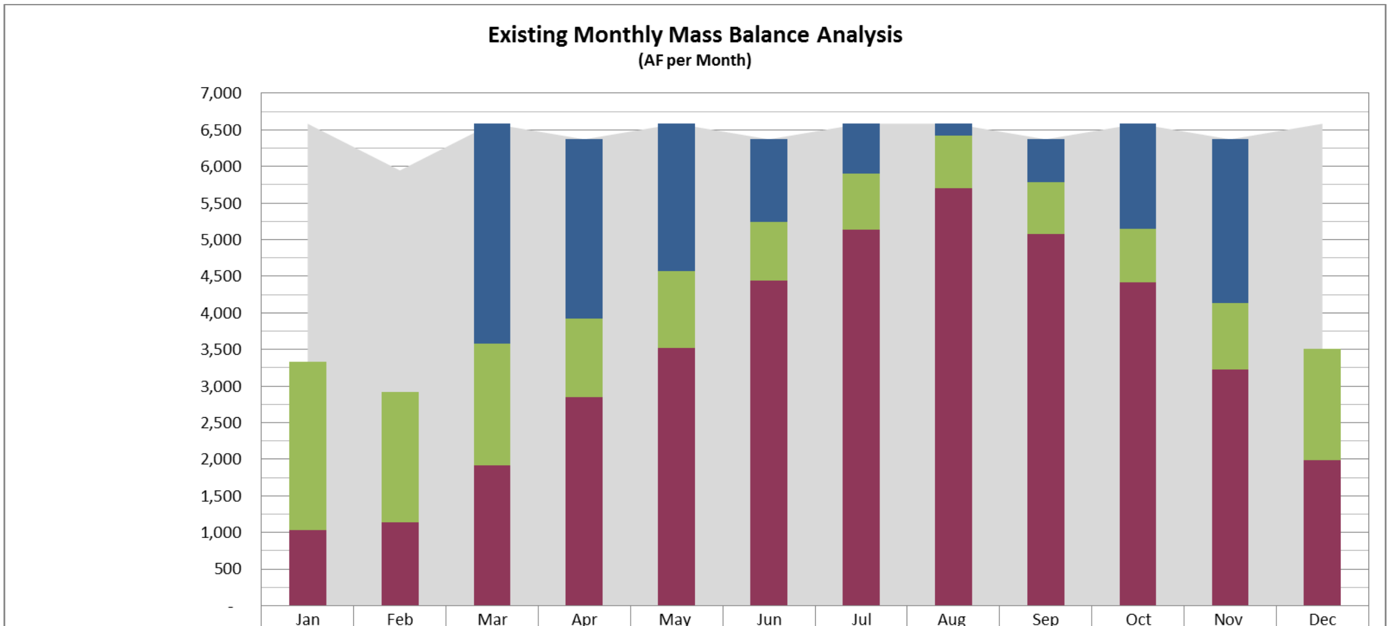


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,108	5,517	6,108	5,911	6,108	5,911	6,108	6,108	5,911	6,108	5,911	6,108
Groundwater Recharge	-	-	2,777	2,373	2,042	1,131	742	374	485	1,132	1,970	-
SARB at Prado Obligation	2,289	1,767	1,605	924	946	783	790	723	743	923	967	1,542
Direct Use Demands	960	1,081	1,725	2,614	3,120	3,997	4,576	5,011	4,683	4,052	2,974	1,823

Table 5.9 YEAR 2030 Monthly Mass Balance Analysis

Year 2030	Monthly Flow/Demand (MGD)												Ave.	Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(MGD)	(AFY)
Southern Service Area														
Southern Area Recycled Water Supply	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	25,763
Southern Area Direct Use Demands	3.8	7.1	10.4	16.2	16.8	23.9	27.5	30.0	31.8	26.4	20.1	11.9	18.8	21,080
Southern Area Min. Base Flow to SARBF at Prado	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2,940
Additional Supply Available to SARBF at Prado	16.6	13.3	10.0	4.2	3.6	-	-	-	-	-	0.3	8.4	10.4	5,228
Total to SARBF at Prado from Southern Area	19.2	15.9	12.6	6.8	6.2	2.6	2.6	2.6	2.6	2.6	2.9	11.1	7.3	8,168
Southern Area Supply Surplus/(Deficit)	0.0	0.0	0.0	0.0	0.0	(3.6)	(7.1)	(9.6)	(11.4)	(6.1)	0.0	0.0	(5.4)	(3484.5)
Northern Service Area														
Northern Area Recycled Water Supply	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	46.2	51,750
Northern Area Direct Use Demands	7.0	6.2	9.8	14.7	20.2	24.3	26.5	30.0	23.4	20.0	15.0	9.0	17.2	19,240
Supplemental Supply to Southern Area	-	-	-	-	-	3.6	7.1	9.6	11.4	6.1	-	-	5.4	3,484
Northen Area Minimum Base Flow to SARBF at Prado	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	980
Additional Supply to SARBF at Prado	4.1	4.0	4.0	4.0	4.0	5.2	4.5	4.0	4.1	4.2	6.0	4.0	4.3	4,852
Total to SARBF at Prado from North Area	4.9	4.8	4.9	4.9	4.9	6.1	5.4	4.9	5.0	5.1	6.9	4.9	5.2	5,832
Northern Area Supply Surplus/(Deficit)	34.2	35.2	31.5	26.6	21.1	12.3	7.2	1.7	6.4	15.1	24.4	32.3	20.7	23,194
Total SARBF at Prado Obligation	24.1	20.7	17.5	11.7	11.1	8.7	8.0	7.5	7.6	7.7	9.8	15.9	12.5	14,000
GWR 9-Month Operation Availability	**-**	**-**	**31.5**	**26.6**	**21.1**	**12.3**	**7.2**	**1.7**	**6.4**	**15.1**	**24.4**	**-**	**16.3**	**13,707**

Figure 5-4 YEAR 2030 Monthly Mass Balance Analysis

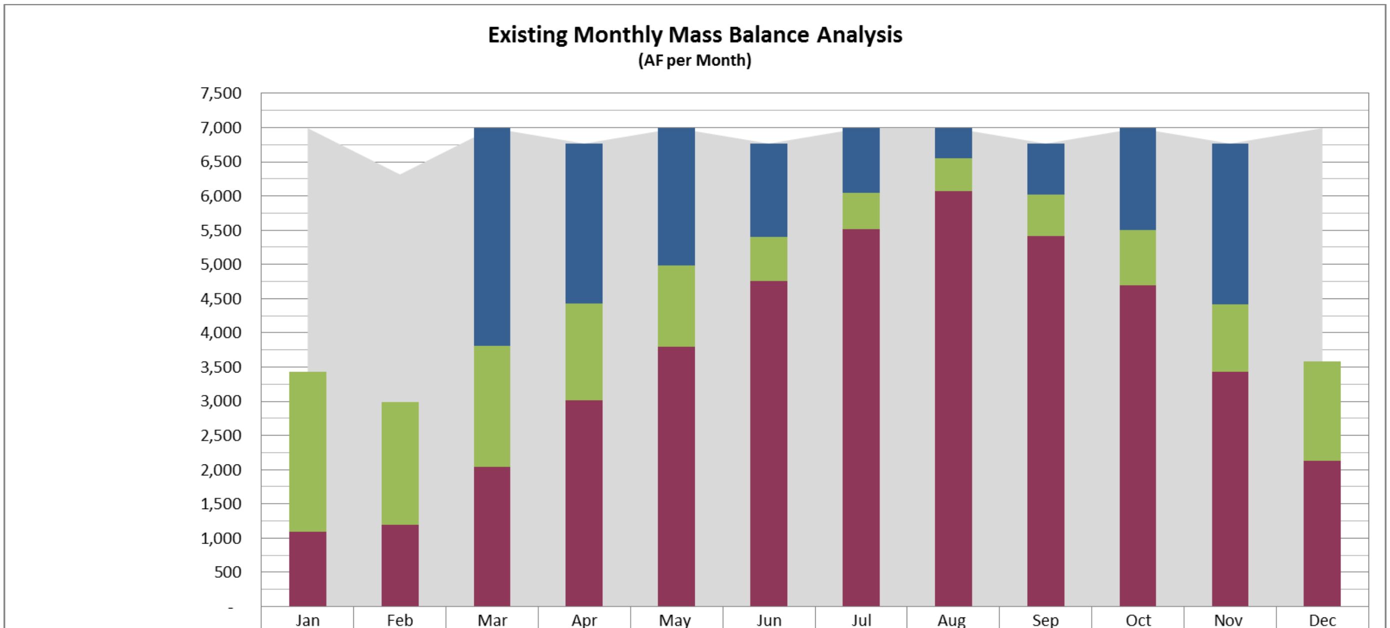


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,583	5,946	6,583	6,371	6,583	6,371	6,583	6,583	6,371	6,583	6,371	6,583
Groundwater Recharge	-	-	2,999	2,452	2,011	1,128	686	166	589	1,433	2,243	-
SARB at Prado Obligation	2,297	1,782	1,667	1,073	1,053	799	761	714	700	733	904	1,517
Direct Use Demands	1,029	1,141	1,917	2,845	3,519	4,444	5,136	5,704	5,082	4,417	3,224	1,991

Table 5.10 YEAR 2035 Monthly Mass Balance Analysis

Year 2035	Monthly Flow/Demand (MGD)												Ave. (MGD)	Annual (AFY)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Southern Service Area														
Southern Area Recycled Water Supply	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	28,788
Southern Area Direct Use Demands	4.0	7.4	11.0	16.7	18.0	25.4	29.5	31.9	33.6	27.9	21.5	12.8	20.0	22,369
Southern Area Min. Base Flow to SARBF at Prado	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2,940
Additional Supply Available to SARBF at Prado	19.1	15.7	12.1	6.4	5.0	-	-	-	-	-	1.6	10.3	12.4	6,506
Total to SARBF at Prado from Southern Area	21.7	18.3	14.7	9.0	7.7	2.6	2.6	2.6	2.6	2.6	4.2	12.9	8.5	9,446
Southern Area Supply Surplus/(Deficit)	0.0	0.0	0.0	0.0	0.0	(2.3)	(6.5)	(8.8)	(10.5)	(4.8)	0.0	0.0	(4.7)	(3028.3)
Northern Service Area														
Northern Area Recycled Water Supply	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	47.8	53,543
Northern Area Direct Use Demands	7.5	6.5	10.5	16.1	21.8	26.3	28.5	32.0	25.3	21.5	15.8	9.5	18.4	20,650
Supplemental Supply to Southern Area	-	-	-	-	-	2.3	6.5	8.8	10.5	4.8	-	-	4.7	3,028
Northen Area Minimum Base Flow to SARBF at Prado	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	980
Additional Supply to SARBF at Prado	2.0	1.8	3.0	5.5	4.0	3.5	2.0	1.5	3.0	5.0	5.5	1.5	3.2	3,574
Total to SARBF at Prado from North Area	2.9	2.6	3.9	6.4	4.9	4.4	2.9	2.4	3.9	5.9	6.4	2.4	4.1	4,554
Northern Area Supply Surplus/(Deficit)	37.5	38.7	33.4	25.4	21.1	14.8	10.0	4.6	8.1	15.7	25.6	35.9	22.6	25,311
Total SARBF at Prado Obligation	24.6	20.9	18.6	15.4	12.5	7.0	5.5	5.0	6.5	8.5	10.6	15.3	12.5	14,000
GWR 9-Month Operation Availability	**-**	**-**	**33.4**	**25.4**	**21.1**	**14.8**	**10.0**	**4.6**	**8.1**	**15.7**	**25.6**	**-**	**17.6**	**14,871**

Figure 5-5 YEAR 2035 Monthly Mass Balance Analysis



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,992	6,316	6,992	6,767	6,992	6,767	6,992	6,992	6,767	6,992	6,767	6,992
Groundwater Recharge	-	-	3,180	2,335	2,007	1,364	951	440	749	1,489	2,357	-
SARB at Prado Obligation	2,342	1,798	1,769	1,414	1,194	644	523	476	602	809	976	1,454
Direct Use Demands	1,087	1,196	2,044	3,018	3,792	4,759	5,518	6,076	5,415	4,695	3,435	2,127

5.1.4 Additional Supply Needed to Supplement Southern Area

This section evaluates the amount of additional external supply required to eliminate the need for the Northern Service Area to supplement the Southern Service Area. As shown in Table 5.2, the Southern Service Area (supplied by RP-5 and CCWRF) cannot meet all of the direct use demands and SARBF at Prado Obligation during the higher demand periods, particularly during the summer months.

The amount of water available to the GWR could be increased if additional external supply is provided to supplement the Southern Service Area. RP-1 could then be utilized to exclusively meet the needs for direct use and GWR to the Northern Service Area.

Table 5.11 is provided to identify the annual external supply for each planning year that would be required for the Southern Service Area.

Table 5.11 Potential External Supply Needs to the Southern Service Area

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area Recycled Water Supply	15,010	19,154	22,459	25,763	28,788
Southern Service Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Southern Service Area Min. Base Flow to SARBF at Prado[1]	2,940	2,940	2,940	2,940	2,940
Additional Supply Available to SARBF at Prado[2]	1,557	2,488	3,572	5,228	6,506
Total to SARBF at Prado from Southern Area	4,497	5,428	6,513	8,168	9,446
Southern Area Supply (Deficit)	(6,056)	(5,865)	(4,919)	(3,484)	(3,028)
Total SARBF at Prado Obligation	*14,000*	*14,000*	*14,000*	*14,000*	*14,000*
Remaining Required to Meet Full SARBF at Prado[3]	9,502	8,571	7,487	5,832	4,554
Total Additional External Supply Needed for Southern Service Area	**15,558**	**14,436**	**12,406**	**9,316**	**7,582**

[1] Southern Service Area Min. Base Flow to SARBF at Prado Obligation is the base flow each month from RP-5 and CCWRF, and is assumed to be approximately 2.6 MGD, or 2,940 AFY.

[2] Additional Supply Available to SARBF at Prado Obligation is based on the monthly mass balance analysis, and is the amount of surplus of available water from RP-5 and CCWRF after the direct use demands and Min. Base Flow to SARBF at Prado Obligation are used. This surplus is typically only available during the winter or low direct use demand months.

[3] Remaining Required to Meet Full SARBF at Prado is the difference between the total 14,000 AF required and the total supply provided by the Southern Service Area, and is met by the Northern Service Area.

As shown in Table 5.11, the amount of additional supply would be needed to serve either the 800 or 930 Pressure Zones. With the growth anticipated in the 930 Pressure Zone, it would be recommended to supplement the 930 Pressure Zone with an additional supply. Supply to this pressure zone could be pressure reduced through the existing 930/800 PRV if supplemental supply to the 800 Pressure Zone is needed without additional pumping facilities.

5.1.5 Supply Needs to Maximize GWR

This section investigates the maximum potential of GWR assuming additional supplies would be acquired. The GWR maximum potential was previously investigated in a separate study for IEUA and addressed in the Technical Memorandum, dated December 13, 2013, entitled "Recycled Water System Hydraulic Analysis for the Enhanced GWR Program."

This previous Technical Memorandum assumed that the recycled water supply was unlimited and identified system improvements to deliver the maximum potential GWR flows. The GWR flows for that study were assumed to flow during the 14-day fill period cycle throughout the 9-month operation period without being reduced or limited by the available recycled water supply.

In order for the GWR program to operate in this fashion, additional supplies would need to be acquired. Table 5.12 shows the amount of additional supply that would be needed for each planning year.

Table 5.12 Potential External Supply Needs for Maximum Basin Recharge

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area Recycled Water Supply	15,010	19,154	22,459	25,763	28,788
Southern Service Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Southern Service Area Min. Base Flow to SARBF at Prado[1]	2,940	2,940	2,940	2,940	2,940
Additional Supply Available to SARBF at Prado[2]	1,557	2,488	3,572	5,228	6,506
Total to SARBF at Prado from Southern Area	4,497	5,428	6,513	8,168	9,446
Southern Service Area Supply (Deficit)	(6,056)	(5,865)	(4,919)	(3,484)	(3,028)
Total SARBF at Prado Obligation	*14,000*	*14,000*	*14,000*	*14,000*	*14,000*
Remaining to Meet Full SARBF at Prado[3]	9,502	8,571	7,487	5,832	4,554
Southern Deficit plus SARBF at Prado Supplement from North[4]	15,558	14,436	12,406	9,316	7,582
Proposed 9-Month GWR Program	*16,095*	*13,977*	*13,027*	*13,707*	*14,871*
Maximum 9-Month GWR Program[5]	23,272	23,272	23,272	23,272	23,272
Total Additional External Supply Needed[6]	**22,734**	**23,731**	**22,651**	**18,881**	**15,983**

[1] Southern Service Area Min. Base Flow to SARBF at Prado Obligation is the base flow each month from RP-5 and CCWRF, and is assumed to be approximately 2.6 MGD, or 2,940 AFY.

[2] Additional Supply Available to SARBF at Prado Obligation is based on the monthly mass balance analysis, and is the amount of surplus of available water from RP-5 and CCWRF after the direct use demands and Min. Base Flow to SARBF at Prado Obligation are used. This surplus is typically only available during the winter or low direct use demand months.

[3] Remaining Required to Meet Full SARBF at Prado is the difference between the total 14,000 AF required and the total supply provided by the Southern Service Area, and is met by the Northern Service Area.

[4] The Southern Deficit plus SARBF at Prado Supplement from North is the sum of the "*Southern Area Supply Deficit*" plus the "*Remaining to Meet Full SARBF at Prado*" demands.

[5] The Maximum 9-Month GWR Program is the total estimated maximum recycled water recharge potential as identified in the Technical Memorandum, dated December 13, 2013, entitled "*Recycled Water System Hydraulic Analysis for the Enhanced GWR Program*".

[6] The Total Additional External Supply Needed is the "*Southern Deficit plus SARBF at Prado Supplement from North*" plus the difference between the "*Maximum 9-Month GWR Program*" and the "*Proposed 9-Month GWR Program*".

6.0 IMPLEMENTATION OF GWR BASINS HYDRAULIC ANALYSIS

This section provides a brief description of the hydraulic model analysis performed based on the monthly mass balance analysis, and the proposed improvements from the results of the hydraulic model analysis for the planning years proposed. The groundwater recharge goals for the hydraulic model analysis were shown in Table 5.3.

6.1 HYDRAULIC MODEL ANALYSIS

IEUA's hydraulic computer model that was provided for use in the InfoWater modeling software was utilized for the hydraulic analysis. The computer model was analyzed as a 24-hour extended period simulation for average day and maximum day direct use demand conditions. The average day demand condition was assumed to be the spring and fall months of March, April, May and November. The average of the direct use demands for these four months was utilized in the model. The maximum day demand condition was assumed to be the maximum month demands between the months of June and October.

SARBF at Prado Obligation was accounted for in the computer model analysis by subtracting this demand from the net available recycled water supply after the direct use demands were met. The remaining available supply after the direct use and Prado Obligation is available for groundwater recharge.

Table 6.1 shows the demand conditions assumed for the hydraulic model analysis. The average demands (AD) for the direct use, Prado, and GWR demands shown in the table are the average demands for the months of March, April, May and November. The maximum demand conditions (MD) are the maximum month demand direct use demand conditions. The values for SARBF at Prado Obligation and GWR available flows are based on the average monthly demand between June and October.

Table 6.1 Summary of Demands Used for Hydraulic Analysis

	Existing		Year 2020		Year 2025		Year 2030		Year 2035	
	AD	MD	AD	MD	AD	MD	AD	MD	AD	MD
	MGD									
Recycled Water Supply	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
Direct Use Demands[1]	22.0	36.0	27.5	44.4	32.6	52.7	36.0	60.0	38.4	63.9
SARBF at Prado Obligation[2]	12.5	5.1	12.5	6.5	12.5	7.6	12.5	7.5	12.5	5.0
GWR Available Flows[3]	**20.8**	**14.2**	**19.2**	**8.3**	**19.1**	**3.9**	**20.7**	**1.7**	**22.6**	**4.6**
Total Demand	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5

[1] The Direct Use Demands for the "AD" condition are the average demands for the spring/fall months of March, April, May, and November. The "MD" condition demands are the maximum month's demands between June and October.
[2] The SARBF at Prado Obligation demands are the average demands for the appropriate demand period described in Footnote 1 above.
[3] The GWR Available Flows are the average monthly flow available for the appropriate demand period described in Footnote 1 above.

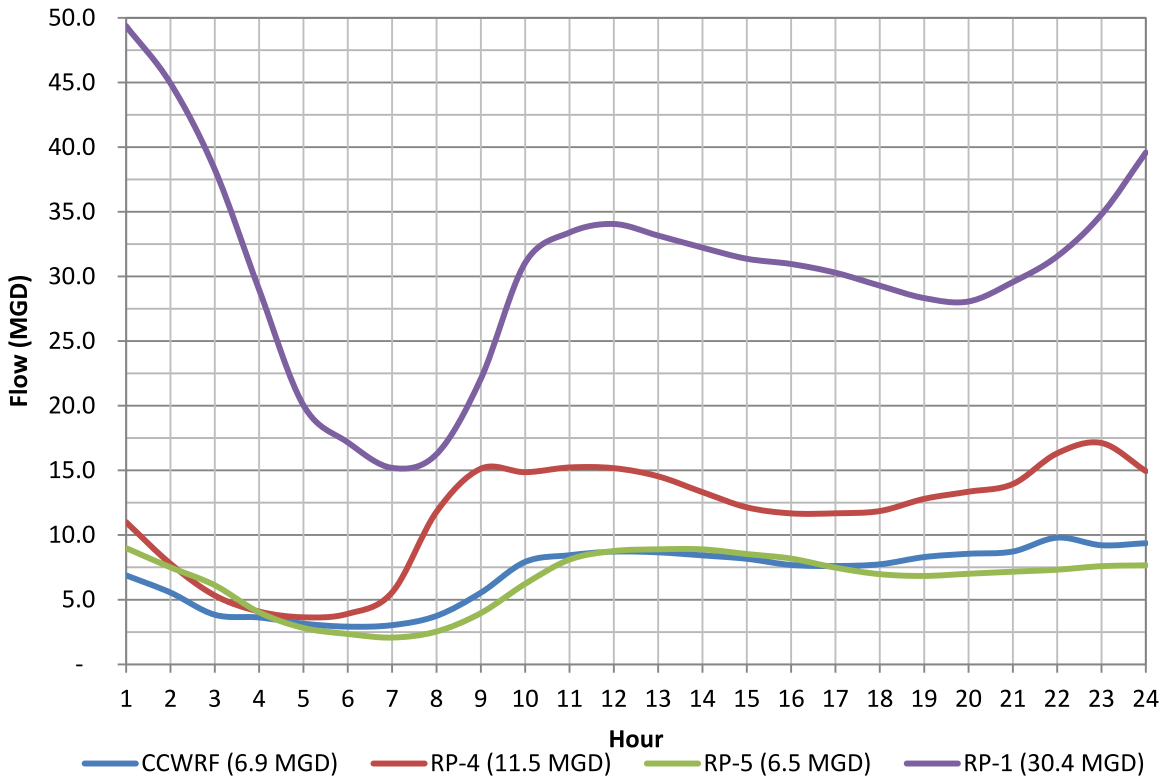
6.1.1 Summary of Model Analysis Assumptions

The flows to the GWR basins are based on the basin volumes and fill periods during the year to include only the spring, summer, and fall months where direct use demands are added with the GWR demands. However for modeling purposes, system performance is analyzed with average day demands and maximum day direct use demands plus GWR flows as shown in Table 6.1. IEUA provided the information regarding the basins volumes and infiltration data, as well as which basins will be supplied by recycled water.

The following assumptions are made for this study:

- Supply to the system was modeled to be from only the existing Regional Wastewater Recycling Plants.
- The effluent from each of the Regional Wastewater Recycling Plants was assumed to be available to the effluent pump stations based on the wastewater 24-hour diurnal pattern that was provided by IEUA in their calibrated hydraulic model.

Figure 6-1 Wastewater Supply 24-Hour Diurnal Pattern



Note: Existing daily flows are shown in the Legend for Figure 5-1.

- GWR fill rates are based on the basin storage volumes, areas, and infiltration rates, and filled in 14-days, and repeated every 6 weeks for the 9-month operation period. Additionally:
    - No RWC limitations (only for purposes of this study to determine maximum capacity limitations of the recycled water system)
    - No operational constraints (i.e., permits, agreements, land acquisitions, mounding, etc)
- The SARBF at Prado Obligation demands were assumed to be met directly from the Regional Wastewater Recycling Plants, and therefore, not included as demand nodes in the model. The available supply from the treatment plants were reduced accordingly in the model analyses. The exception to this is the minimum 2.6 MGD demand to Prado from the 800 Pressure Zone.
- Imported water would be made available if there are RWC issues; however, this study assumes the recharge volume is met 100% by recycled water.

6.1.1.1 Model Analysis Criteria

The following criteria were used to evaluate facility performance and to determine any deficiencies in the conveyance system:

- Minimum regional service pressure = 50 psi (at demand nodes)
- Minimum Basin service pressure = 25 psi
- Maximum pipeline velocity = 7 fps

6.2 DIRECT USE DEMANDS ANALYSIS AND IMPROVEMENTS

The hydraulic model analysis first included an analysis of the projected direct use demands only, without any flow to the GWR basins. This analysis is intended to produce a set of recommendations that are directly as a result of the Agency's ability to meet the maximum day direct use demands as shown in Tables 2.2 and 6.1. Only the summer maximum day demand conditions were analyzed for this purpose.

6.2.1 Existing Direct Use Demands Analysis

The existing demands condition model analysis did not show any deficiencies that required recommended improvements.

6.2.2 Year 2020 Direct Use Demands Analysis

The Year 2020 direct use demands analysis showed two areas that are considered to be deficient. The first is the 800 Zone pipeline in Bickmore Avenue that experiences high velocities and limits the flow out of RP-5 into the 800 Zone distribution system. A new 24-inch pipeline is recommended in Kimball Avenue from the RP-5 Recycled Water Effluent Pump Station to approximately Rincon Meadows Avenue, approximately 12,260 lf. The second improvement area is the RP-1 1158 Zone Recycled Water Effluent Pump Station. This pump station operates too far out on their pump curves for the operation conditions resulting in lower pressures than desired. Therefore, it is recommended to replace two of the pumps with large capacity.

6.2.3 Year 2025 Direct Use Demands Analysis

The Year 2025 analysis showed deficiencies in the 1299 Zone, 930 Zone and in several recycled water effluent pump, station facilities. The 930 Zone supply facilities from the RP-1 930 Pump Station and CCWRF Effluent Pump Station could not meet the summer maximum day demands. These pump stations should be upgraded. The CCWRF Effluent Pump Station is recommended to have two pumps replaced with larger capacity pumps to increase the station output to 13,000 gpm. The RP-1 930 Zone Pump Station is recommended to have one of the smaller pumps replaced with a larger capacity pump to match the existing large capacity pumps.

Pump upgrades are also recommended for the RP-4 1158 Zone Pump Station to increase station capacity by replacing three pumps with the larger 7,200 gpm capacity and adding one pump as a standby pump.

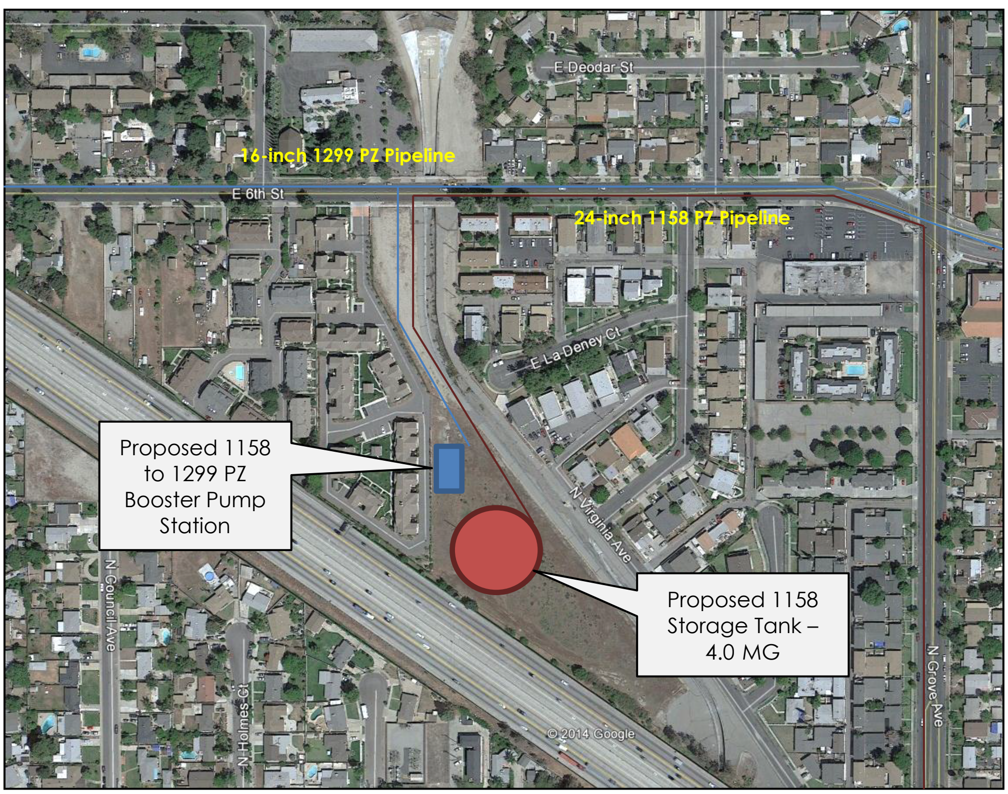
The 30-inch 930 Zone pipeline between RP-1 and Riverside Drive should be paralleled with a 42-inch pipeline to alleviate velocities and low pressures in the 930 Zone.

The 1299 Zone showed deficiencies and low service pressures in the western portion of the zone. To alleviate these concerns, a parallel pipeline system is recommended. A new 24-inch and 16-inch pipeline is recommended in 6th Street from Haven Avenue to Euclid Avenue, approximately 28,900 lf.

6.2.4 Year 2030 Direct Use Demands Analysis

The 1158 Zone and 1299 Zone in the western portion of the service areas were shown to be deficient with high velocities and low service pressures, in addition to the supply facilities inability to adequately keep up with the demands during the demand period. To mitigate these issues, it is recommended that a new 1158 Zone Storage Tank, 4.0 MG, be installed as shown in Figure 6-2.

Figure 6-2 Proposed 1158 Storage Tank Site



In addition to the storage tank, a new 30-inch 1158 Zone pipeline from RP-1 to the storage tank is required to be routed along East Francis Street and Grove Avenue to the tank site. A new 1299 Zone Pump Station will pump from the storage tank into the 1299 Zone pipeline in 6th Street.

6.2.5 Year 2035 Direct Use Demands Analysis

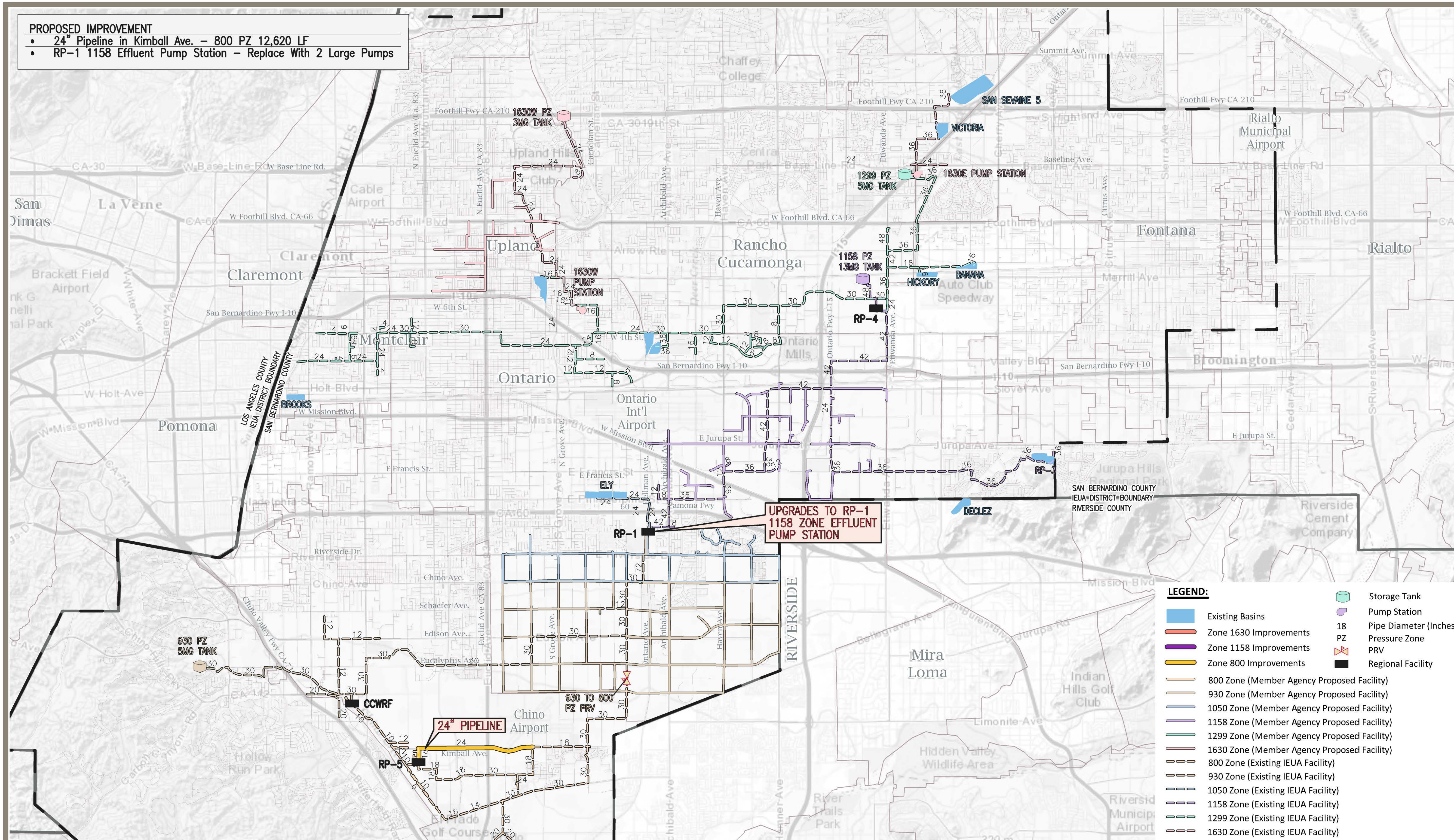
The Year 2035 analysis and recommendations are primarily due to the growth associated with development in the 930 Zone and 1050 Zone service areas.

To meet the 930 Zone summer demands requires additional upgrades to the RP-1 930 Zone Effluent Pump Station and CCWRF Effluent Pump Station. The RP-1 930 Zone Effluent Pump Station requires two pumps to be replaced with larger capacity pumps, assumed to be the same as the existing large capacity pumps with 9,330 gpm capacity. The CCWRF Effluent Pump Station requires the addition one pump with the same capacity as the existing large capacity pumps.

Additionally, the CCWRF facility will require an additional 3.0 MG of equalization storage to meet the flows required from the facility during low effluent flow periods.

To mitigate low pressures and high velocities in the 1050 Zone, it is recommended to upgrade the RP-1 1050 Zone Effluent Pump Station. Two of the pumps should be replaced with larger capacity pumps for a station capacity of 16,000 gpm. The 1050 Zone pipeline from RP-1 to Riverside Drive should have a 24-inch parallel pipeline installed, approximately 2,000 lf.

See Figures 6-3, 6-4, 6-5, and 6-6 for illustrations of the recommended improvements to meet the direct use demands.



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Proposed Recycled Water System Improvements
YEAR 2020 - Direct Use Demands Only
FIGURE 6-3

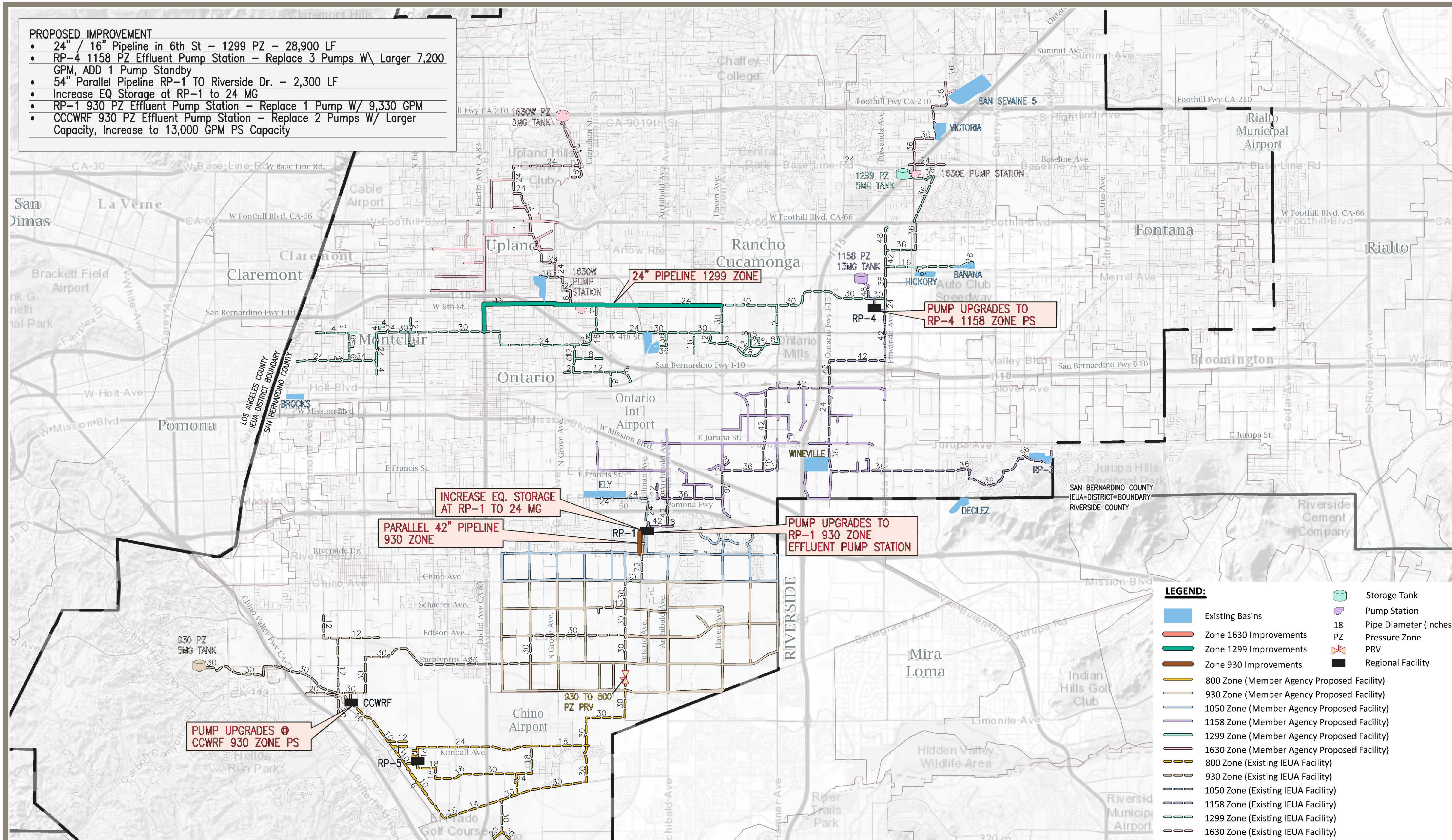

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FIGURE 6-4

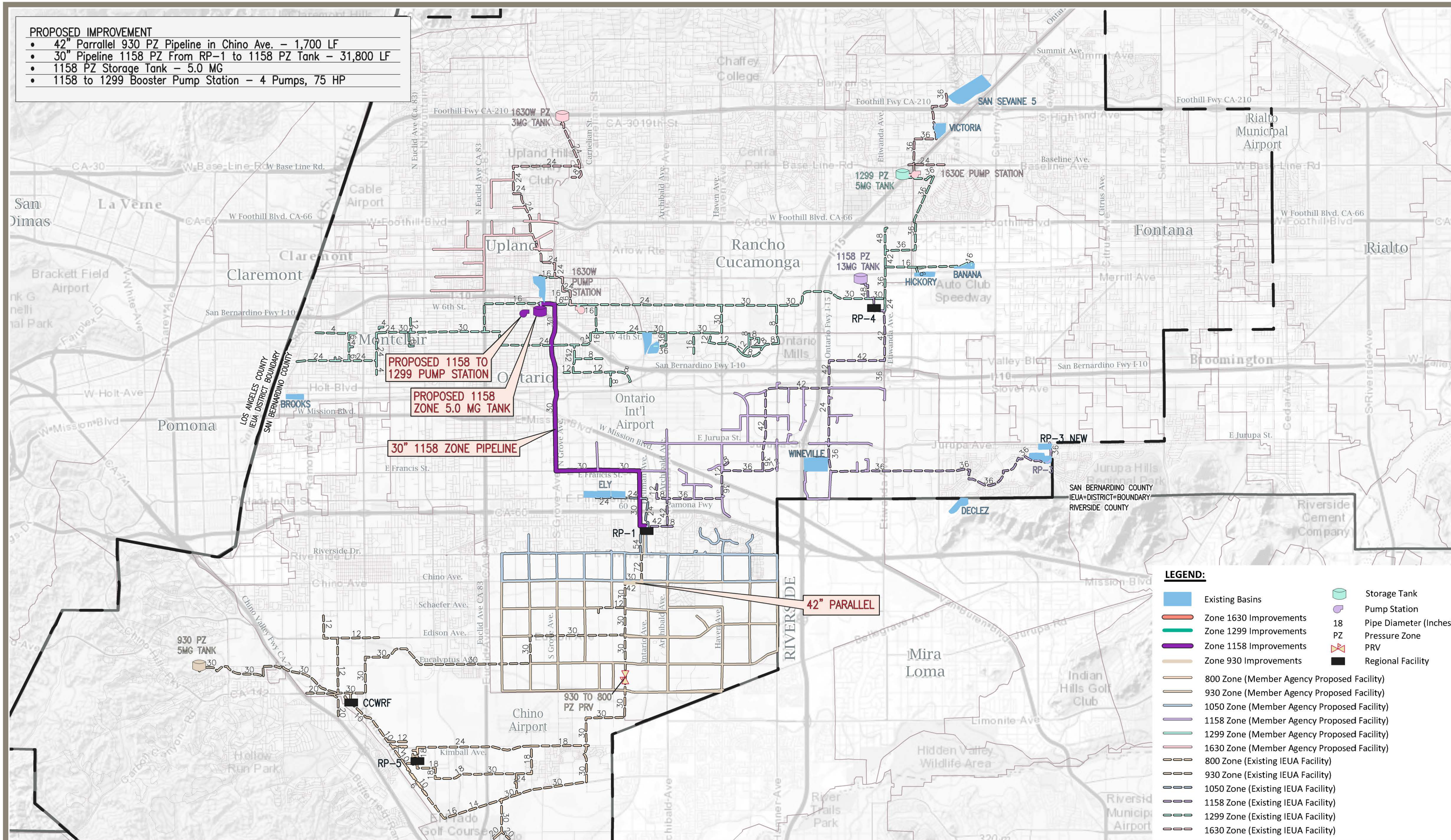

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FIGURE 6-5

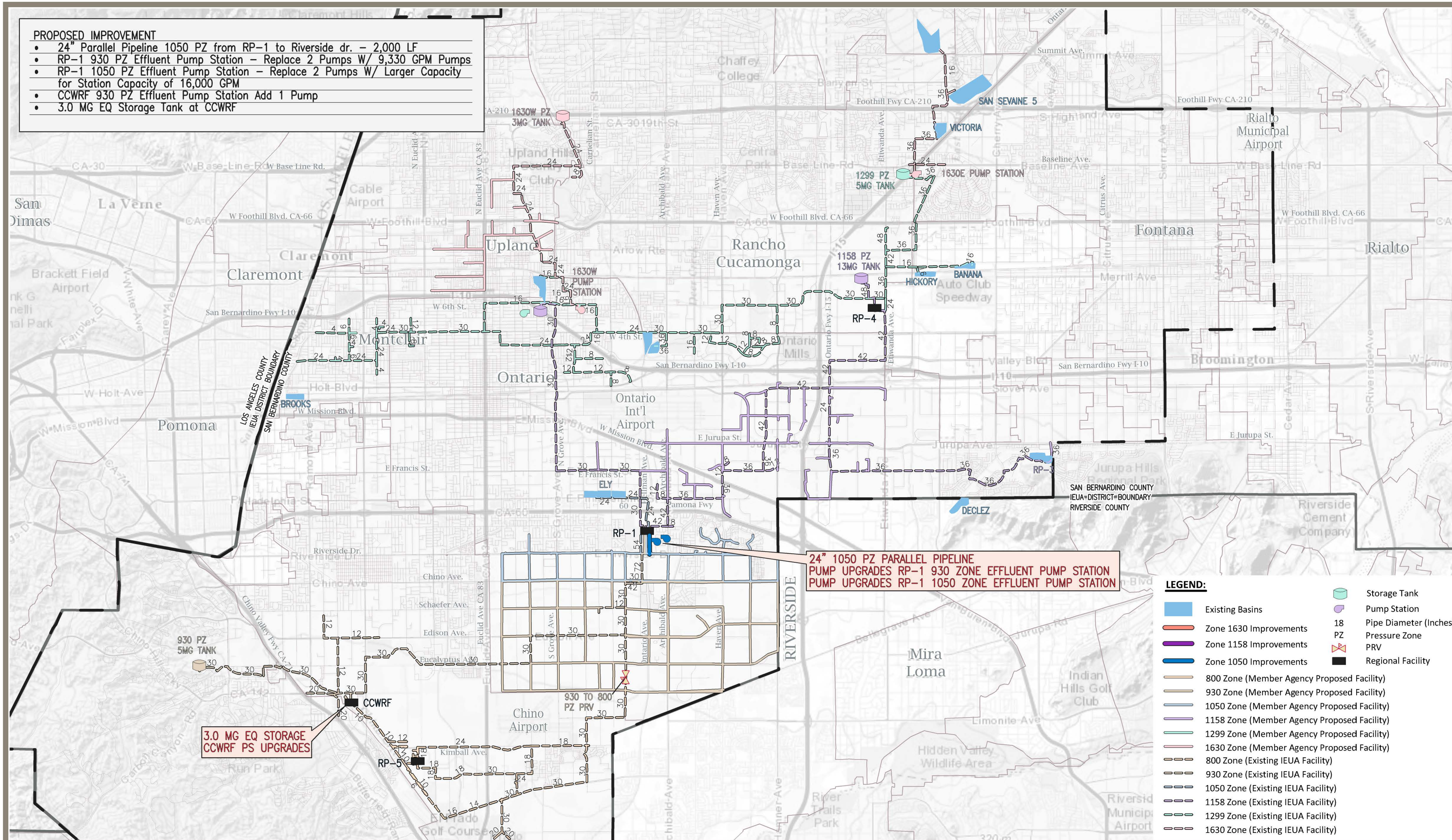

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FIGURE 6-6

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6.3 GWR IMPLEMENTATION ANALYSIS AND IMPROVEMENTS

6.3.1 Existing GWR Conditions Analysis and Improvements

The existing analysis and demands were considered to be those for the Year 2015. The demands shown in Table 6.1 were applied to the model nodes and an EPS model was run. The results of the model show that for both average and maximum demand conditions there are no system improvements proposed other than to increase turnout capacities for some of the basins. The turnout capacity upgrades are required since the GWR Implementation program results in recharging additional recycled water supply than under current operations and within a 9-month period as opposed to be able to over the entire year. The following basin turnout capacity upgrades are proposed as shown in Table 6.2.

Table 6.2 GWR Implementation Proposed Basin Turnout Upgrades

Basin	Existing Turnout Flow Capacity (cfs)	Proposed Flow/Turnout Capacity (cfs)
Ely (1-3)	6.00	6.19
Hickory	4.00	4.64
Turner	8.00	9.28
Victoria	8.00	10.52

6.3.2 Year 2020 GWR Implementation Analysis and Improvements

6.3.2.1 Year 2020 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The hydraulic model analysis scenario analyzed the system for a GWR Basin demand of 20.8 MGD, including the Wineville, San Sevaine (1-3), and Victoria (increase) basins scheduled to come on line for this planning year.

The analysis showed that increased flow is required to the Northern Service Area to meet the increased direct use demands and demands to the GWR basins. More flow from the RP-1 effluent pump stations was required by the RP-1 1158 Pump Station. In order to increase the flow through this pump station without exceeding the capacity of the RP-1 supply, the 930 PS Pump Station was required to be limited.

To limit the flow from the RP-1 930 Pump Station, the flow through the 930/800 PRV could be reduced. This reduction in flow could take place if more effluent from RP-5 could be pumped to meet demands in the 800 PZ. The 18-inch pipeline in Bickmore is a restriction in the 800 PZ as it has velocities that exceed 7 fps, even under existing demand conditions. Therefore, a new 24-inch pipeline in Kimball Avenue, from RP-5 to connect to the existing 18-inch pipeline at Millcreek is proposed.

To meet the needs of the GWR Basins in the 1630E PZ while avoiding suction pressure concerns at the 1630E Booster Pump Station and depleting the 1299 Storage Tank, the proposed 18 MG 1630E Storage Tank is required. Therefore, it is recommended to install the 36-inch pipeline from the existing 1630E pipeline north of Baseline Road to the new 1630E Storage Tank. The proposed 18 MG 1630E Storage Tank is an existing tank build for the Lloyd W. Michael Water Treatment Plant by the CVWD. This tank will be converted to the IEUA recycled water system and 1630E pressure zone.

Additionally, the pressures to the 7th/8th Street Basins were low and even negative at some hours of the day. The suction line to the basins is 16-inch and is undersized to allow the full basin recharge demand as shown in Table 4.4 plus allow both pumps at the 1630 West Recycled Water Pump Station to operate. The fill rate to the 7th/8th Street Basins should be limited to approximately 1.1 MGD, or 1,500 gpm. When the 7th/8th Street Basins are flowing, the 1630 West Recycled Water Pump Station should be limited to one pump in operation.

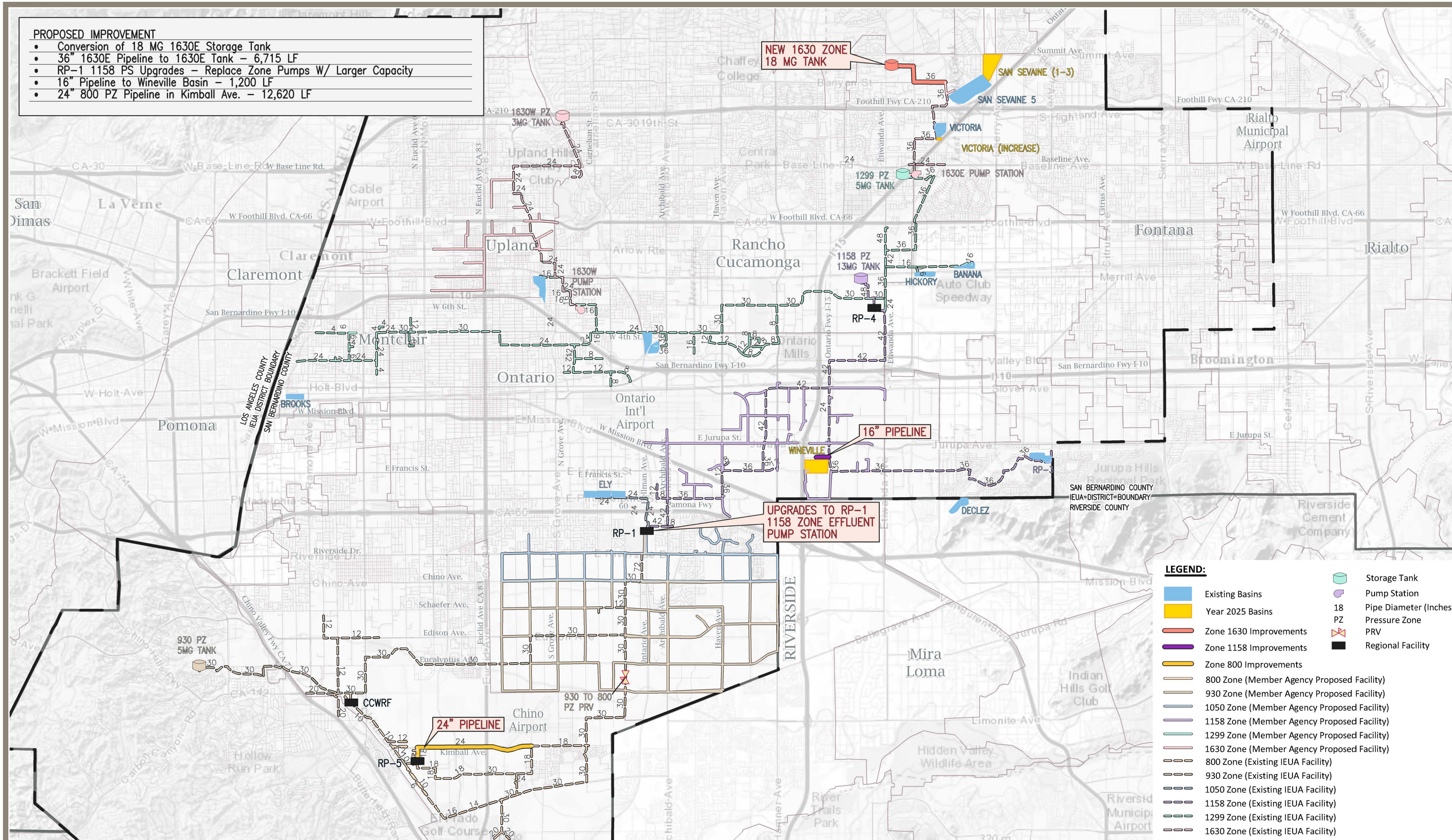
6.3.2.2 Year 2020 GWR plus Maximum Direct Use Demand Conditions (Summer)

The same GWR Basins were analyzed. Due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 14.2 MGD from the 20.8 MGD during the average demand conditions for Year 2020.

No other deficiencies were recognized in the model analysis for the maximum day Year 2020 demand conditions.

For the Year 2020 analysis, one existing pump station is proposed to require upgrades, RP-1 1158 Zone Effluent Pump Station. The current design capacity and proposed pump station capacity is shown below. Other Year 2020 facility improvements are shown in Figure 6-7.

Pump Station	Current Design Capacity	Year 2020 Proposed Design Capacity	Pump Upgrade
RP-1 1158 Zone Effluent Pump Station	11,100 gpm	12,700 gpm	Replace 2 Pumps with Larger Capacity



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Proposed Recycled Water System Improvements
YEAR 2020 - Base GWR Implementation
FIGURE 6-7

6.3.3 Year 2025 GWR Implementation Analysis and Improvements

6.3.3.1 Year 2025 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The Year 2025 model analysis scenario analyzed the system for a GWR Basin demand of 19.2 MGD, including the addition of the following basins: RP-3 (New Cell), Lower Day, and Etiwanda Debris basins, which are scheduled to come on line for this planning year.

Due to the increased direct use demands, the RP-1 diurnal supply pattern is not able to meet the demands during the peak irrigation period. The supply pattern from the RP-1 facility will be required to flow more evenly throughout the day. This is proposed to be accomplished by increased equalization storage upstream of the RP-1 effluent pump stations. The existing 6.0 MG equalization storage should be increased to 13.0 MG.

In addition, a 16-inch pipeline is required from the existing 36-inch 1630E pipeline to the proposed Etiwanda Debris Basin.

6.3.3.2 Year 2025 Maximum Direct Use Demand Conditions (Summer)

The same GWR Basins were analyzed. Due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 12.6 MGD from the 19.2 MGD during the average demand conditions for Year 2025.

To meet the maximum day demands in the Southern Service Area, the RP-1 930 Zone Effluent Pump Station capacity should be increased. Also, the existing 30-inch diameter pipeline from the 930 Zone Effluent Pump Station to the existing 930 Zone pipeline in Riverside Drive experiences velocities up 8 fps. A parallel 42-inch diameter pipeline is recommended.

The CCWRF 930 Zone Effluent Pump Station is modeled to utilize all five of the existing pumps with each operating on far right side of the pump curve. Therefore, for reliability it is recommended that 2 new pumps of equal size to the existing pumps or replace a minimum of 2 pumps with larger capacity pumps.

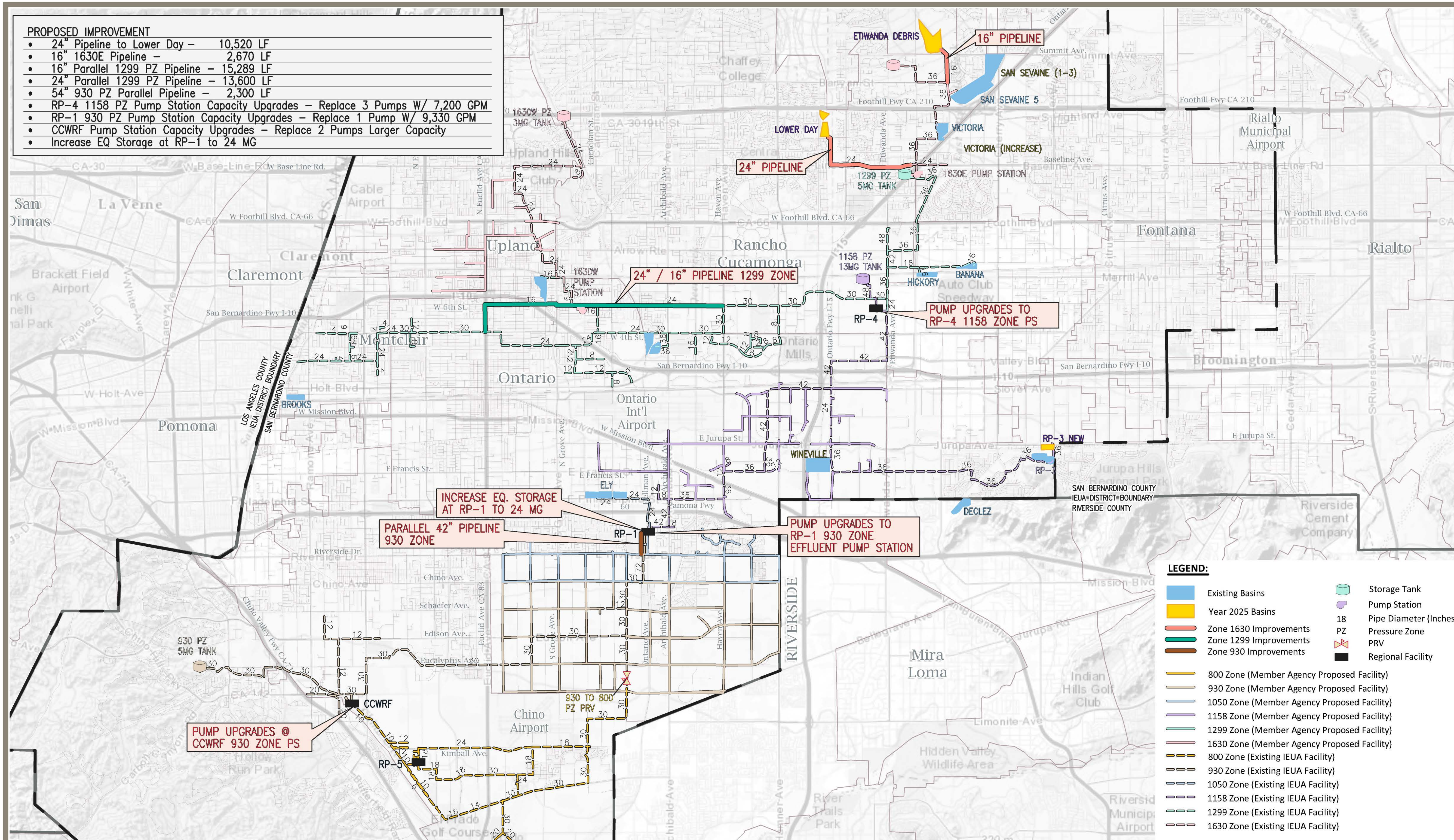
The demand increase in the Northern Service Area requires additional capacity to the RP-4 1158 Zone Effluent Pump Station. It is recommended that two pumps are replaced with larger capacity pumps at this station.

The pressures in the west portion of the 1299 Zone do not meet the minimum pressure criteria and the 24-inch transmission main experiences high velocities. Therefore, a 16-inch diameter pipeline is proposed from the existing 30-inch along 6th Street to the existing 30-inch transmission main at Euclid Avenue. (See Figure 6-8)

For the Year 2025 analysis, three existing pump stations are proposed to require upgrades, CCRWF 930 Zone Effluent Pump Station, RP-1 930 Zone Effluent Pump Station, and RP-4 1158 Zone

Effluent Pump Station. The current design capacity and proposed pump station capacity is shown below. Other Year 2025 facility improvements are shown in Figure 6-8.

Pump Station	Current Design Capacity	Year 2025 Proposed Design Capacity	Pump Upgrades
RP-4 1158 Zone Effluent Pump Station	22,500 gpm	29,100 gpm	Replace 3 pumps and add 1 pump with larger capacity
RP-1 930 Zone Effluent Pump Station	27,030 gpm	30,700 gpm	Replace 1 pump with larger capacity
CCWRF 930 Zone Effluent Pump Station	10,340 gpm	13,000 gpm	Replace 2 pumps with larger capacity



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IEUA RWPS
Proposed Recycled Water System Improvements
YEAR 2025 - Base GWR Implementation
FIGURE 6-8

6.3.4 Year 2030 GWR Implementation Analysis and Improvements

6.3.4.1 Year 2030 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The Year 2030 model analysis scenario analyzed the system for a GWR Basin demand of 20.7 MGD, including the addition of the following basins: Montclair (1-3), College Heights East, and College Heights West basins, which are scheduled to come on line for this planning year.

The additional College Heights East and West basins are located in the 1630W PZ and there are currently no pipelines to convey recycled water from the existing infrastructure to the basins. Approximately 19,600 lf of 36-inch new pipeline in Foothill Boulevard is required to serve these basins.

The Montclair basin in the 1299 PZ and will require approximately 7,800 lf of new 30-inch diameter pipeline.

The 1630W PZ is deficient in supply capacity for this GWR condition as well. The hydraulic analysis indicates additional capacity is needed at the 1299 to 1630W Booster Pump Station. Due to space constraints at this facility, it is assumed existing pumps will be replaced with larger capacity pumps.

6.3.4.2 Year 2030 GWR plus Maximum Direct Use Demand Conditions (Summer)

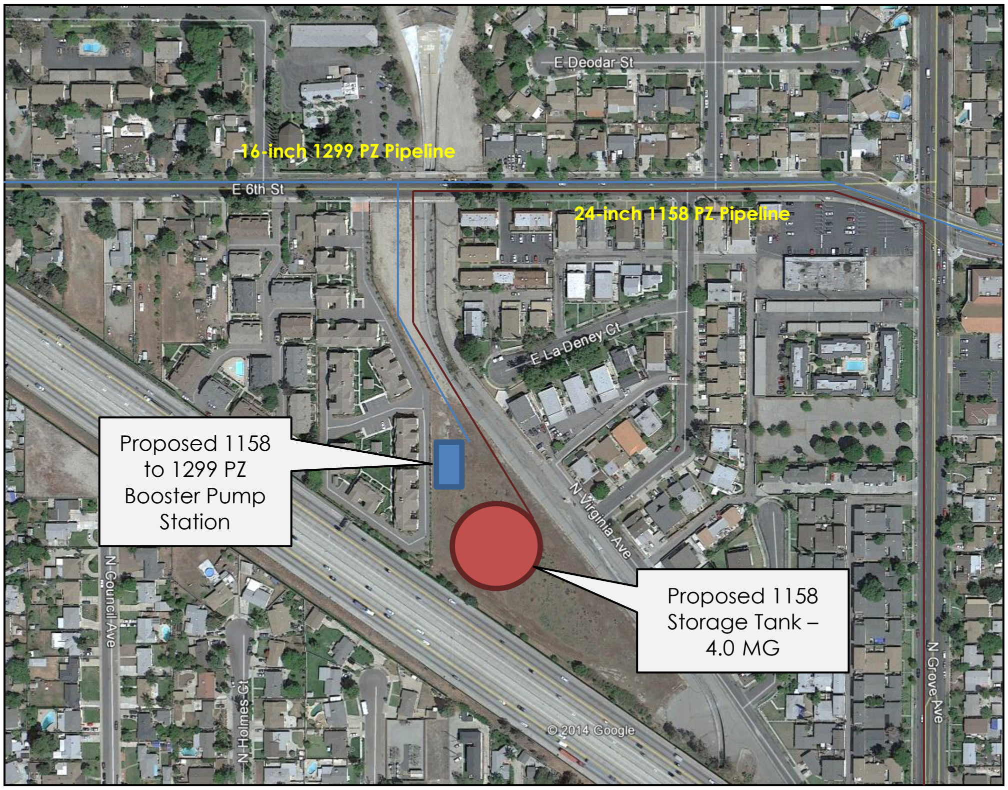
The same GWR Basins were analyzed as was the Year 2030 Average Demand Conditions; however, due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 1.7 MGD from the 20.7 MGD during the average demand conditions for Year 2030.

Due to the increased direct use demands, the 1158 PZ and 1299 PZ are deficient. Velocities in the pipelines exceed 7 fps and the effluent pumps from the RP-1 and RP-4 facilities cannot meet the demands.

In order to mitigate the deficiencies in the 1158 PZ and 1299 PZ, a new 1158 PZ Storage Tank, and new 1158 to 1299 Booster Pump Station are proposed.

The 1158 Storage Tank is proposed to be 4.0 MG and located in the City of Upland, between 6th Street and the 10-Fwy within the SBCFCD property along the existing flood control channel south of the 7th/8th Street Basins. (See Figure 6-9)

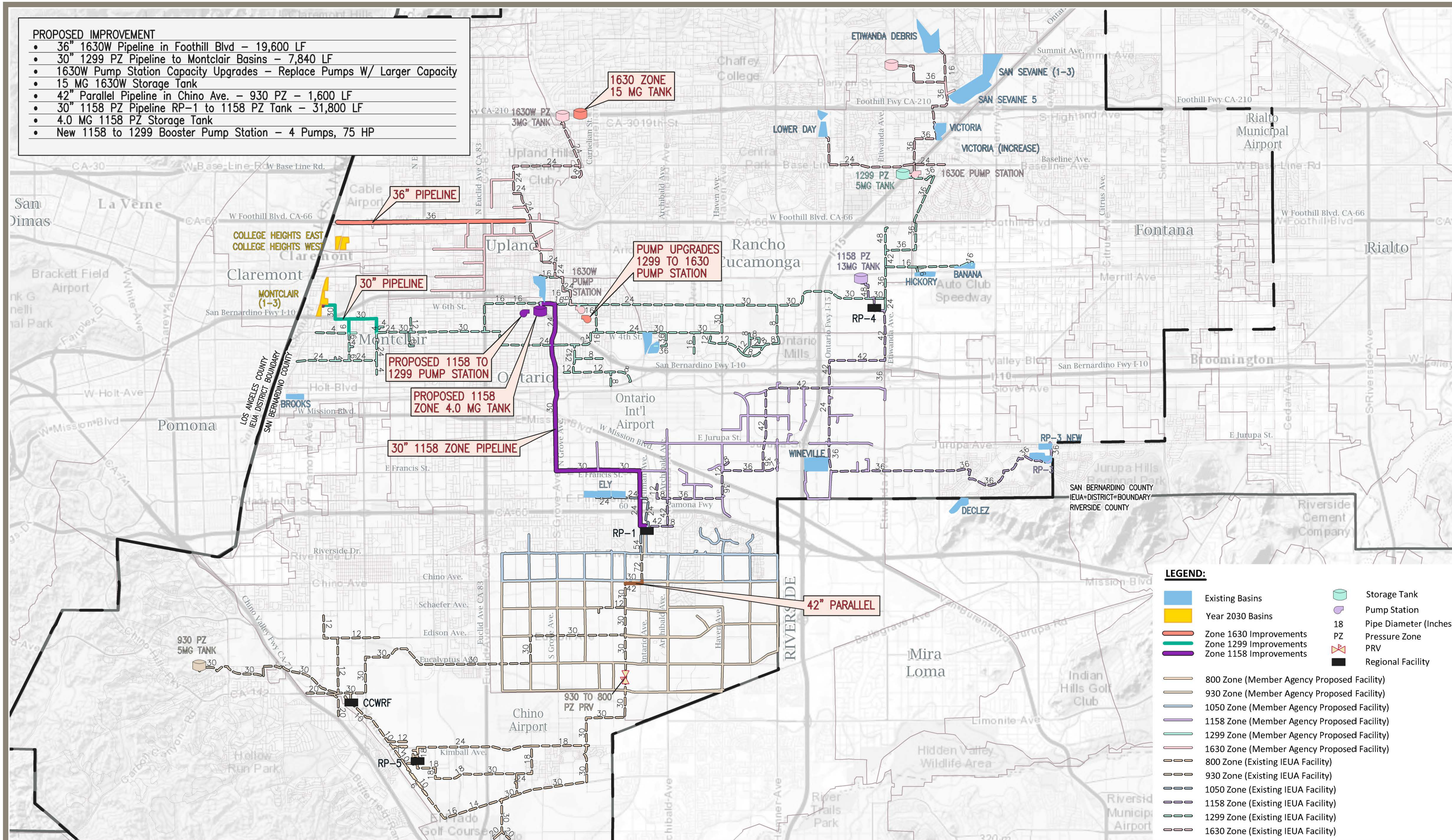
Figure 6-9 Proposed 1158 Storage Tank Site



The proposed 1158 PZ pipeline would be routed from the RP-1 1158 Pump Station northerly to Francis Street, and then westerly along Francis Street to Grove Avenue. The pipeline would then be routed northerly along Grove Avenue to 6th Street, and then westerly along 6th Street to the 1158 Storage Tank site.

A new 1158 to 1299 Booster Pump Station is proposed to be located at the 1158 Storage Tank Site. The pump station will boost pressure in the westerly end of the 1299 PZ during peak demand and GWR basin fill periods. The pump station is assumed to have four (4) pumps of equal size, each with 75 Hp motors with VFD's.

Other Year 2030 facility improvements are shown in Figure 6-10.



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YEAR 2030 - Base GWR Implementation
FIGURE 6-10

For the Year 2030 analysis, in addition to the new 1158 to 1299 Zone RW Pump Station, two existing pump stations are proposed to require upgrades, the 1630 West RW Pump Station and the 1630 East RW Pump Station. The current design capacity and proposed pump station capacity is shown below.

Pump Station	Current Design Capacity	Year 2030 Proposed Design Capacity	Pump Upgrades
1630 West RW Pump Station	6,000 gpm	6,350 gpm	Replace 3 pumps with larger capacity
1630 East RW Pump Station	8,250 gpm	9,140 gpm	1 New Pump

6.3.5 Year 2035 GWR Implementation Analysis and Improvements

6.3.5.1 Year 2035 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The Year 2035 model analysis scenario analyzed the system for a GWR Basin demand of 22.6 MGD, including the addition of the following basins: Upland, Jurupa, and Grove basins which are scheduled to come on line for this planning year.

The addition of the Upland Basin in the 1630W PZ will be supplied from the 36-inch pipeline in Foothill Boulevard that was constructed for the two College Heights Basins.

The Jurupa Basin will require a new 30-inch pipeline from the existing 36-inch Wineville Pipeline in Francis Street and the SBCFCD channel. This pipeline is proposed to be routed northerly along the SBCFCD channel to the Jurupa Basin.

In addition to the pipeline to the Jurupa Basin, the existing 1158 PZ is deficient and creates low pressures in the easterly end of the zone when applying the GWR Basin demands. To mitigate this condition, approximately 5,366-lf of 36-inch pipeline is proposed in Etiwanda Avenue from Valley Boulevard to Jurupa Street. A 30-inch pipeline is proposed in Jurupa Street from Etiwanda Avenue to the 30-inch Jurupa Basin pipeline. A 20-inch pipeline is proposed in Jurupa Street from Etiwanda Avenue westerly to the existing 20-inch pipeline. (See Figure 6-11)

The Grove Basin is within the 1050 PZ and is assumed to come online after the proposed New Model Colony streets and pipelines are installed. It is assumed that the New Model Colony will construct 24-inch and 20-inch pipelines in Riverside Drive. A 12-inch pipeline is required in Grove Avenue between Riverside Drive and Chino Avenue.

6.3.5.2 Year 2035 GWR plus Maximum Direct Use Demand Conditions (Summer)

The same GWR Basins were analyzed for this condition as for the Year 2035 Average demand conditions. Due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 4.6 MGD from the 22.6 MGD during the average demand conditions for Year 2035.

The RP-1 930 Pump Station was not able to keep up with demands for the direct use peak demand periods. Therefore, two (2) pumps are proposed to be replaced with larger capacity pumps, each to be equal to the largest existing pump.

The pipeline from the RP-1 1050 Pump Station to Riverside Drive is deficient. A parallel 24-inch 1050 PZ pipeline is recommended.

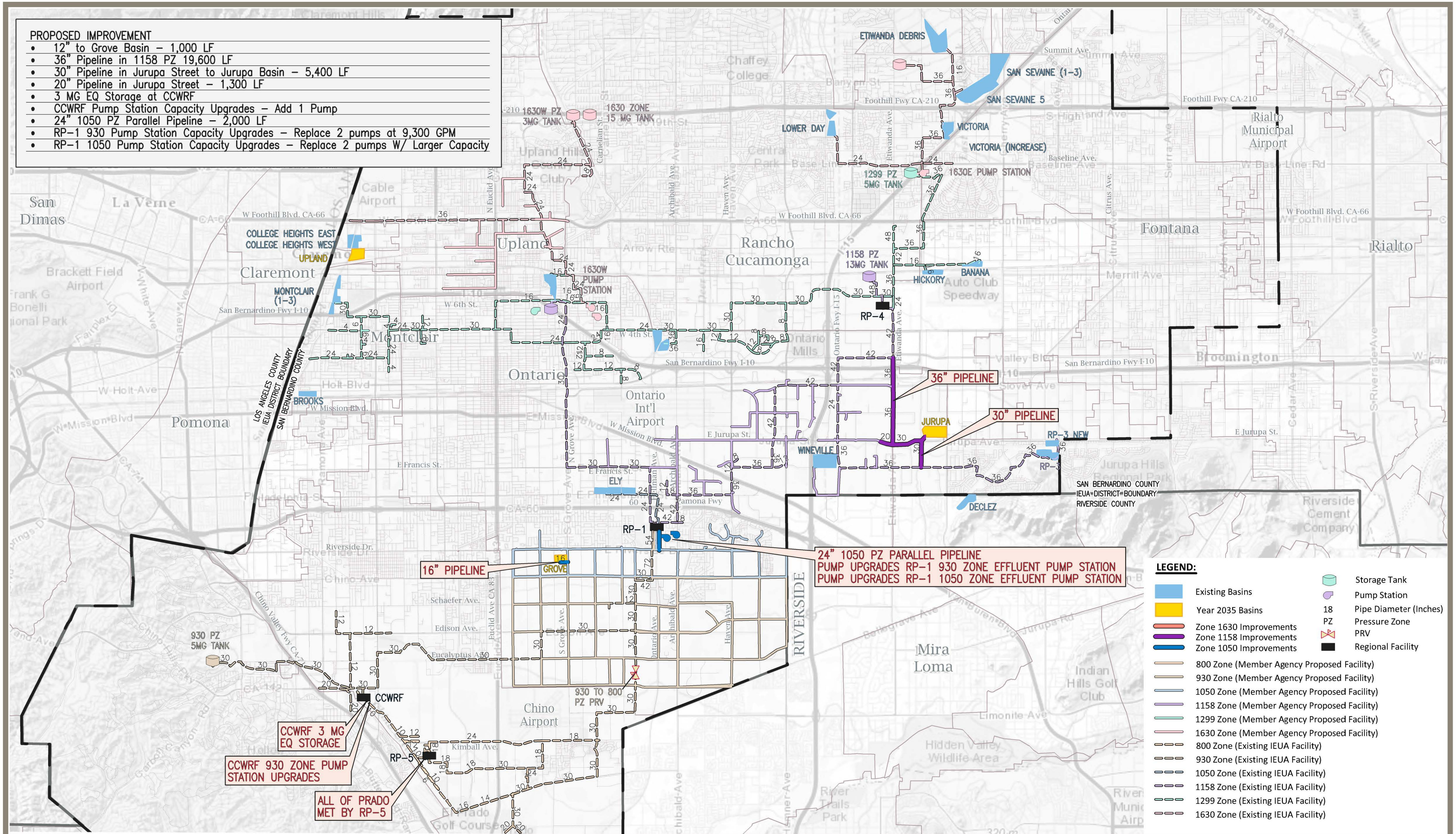
For the Year 2035 analysis, two existing pump stations are proposed to require upgrades, the RP-1 930 Zone Effluent Pump Station and the RP-1 1050 Zone Effluent Pump Station. The current design capacity and proposed pump station capacity is shown below. Other Year 2035 facility improvements are shown in Figure 6-11.

Pump Station	Current Design Capacity	Year 2035 Proposed Design Capacity	Pump Upgrades
RP-1 930 Zone Effluent Pump Station	27,030 gpm	39,000 gpm	Replace 2 pumps with larger capacity
RP-1 1050 Zone Effluent Pump Station	11,250 gpm	15,879 gpm	Replace 2 pumps with larger capacity

6.3.6 Year 2035 Additional External Supply Analysis

A model analysis was conducted assuming an external supply source is provided to the 930 PZ, and to be supplied to the existing 30-inch pipeline just north of the existing 930 PZ to 800 PZ PRV's location. The average day demand analysis assumes an external supply of 15,000 AFY, which equates to approximately 13 MGD. In order for the system to operate, it was necessary to control the supply source by the 930 West Reservoir level. Approximately 7.7 MGD was able to be supplied into the system. This supply resulted in the CCWRF supply reduced to less than 1 MGD. No other system facility improvements were required.

The maximum day analysis shows that approximately 11 MGD can be provided by the supply source, and was also required to be controlled by the 930 West Reservoir level. Approximately 3.8 MGD was supplied by the CCWRF. The RP-1 930 Zone Effluent Pump Station pump capacity improvements for Year 2035 could be eliminated. No other changes to improvement recommendations are required.



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IEUA RWPS
Proposed Recycled Water System Improvements
YEAR 2035 - Base GWR Implementation
FIGURE 6-11

7.0 PROGRAM SENSITIVITY ANALYSIS

Section 6 analyzed the recycled water system assuming the groundwater recharge program will include all potential basins listed and phased, or implemented, as shown in Table 4.2. This section analyzes various operational scenarios to understand the needs and impacts on the recycled water system assuming the number of groundwater basins to be converted to recycled water supply is limited and assuming an external supply is available for IEUA to meet their Prado Obligation. The basins that would be included in the analysis include only the already existing basins and those committed in the 2013 RMPU. Additionally, a brief analysis was conducted to estimate when the RMPU basins would be appropriate come on line.

7.1 SENSITIVITY ANALYSIS SCENARIOS

In addition to the GWR implementation analyses discussed in Section 6, three (3) additional sensitivity analysis scenarios were analyzed to understand the limitations on the recycled water system and recharge capacities, as described below:

Scenario A – All Basins with External Supply to meet Prado Obligation
This scenario assumes all of the GWR implementation basins are able to be recharged with recycled water as shown in Tables 4.2 and 5.3 in the previous sections. However, rather than IEUA meeting their entire Prado Obligation directly from treated effluent, the Prado Obligation is met by an external supply source. This external supply source is unknown at this time, but it is assumed to be able to replace IEUA's current Obligation met directly from RP-5 and RP-1.

Scenario B – Existing/RMPU Basins Only and IEUA Meeting Prado Obligation
This scenario assumes that the number of groundwater recharge basins to be converted and receive recycled water supply for recharge is limited to a few from the current RMPU. The analysis assumes all of the existing basins will remain operational plus the following RMPU basins:

- RP-3 New Cell
- WIneville
- Etiwanda Debris
- San Sevaine (1-3)

Also, under this scenario, IEUA will continue to fulfill the Prado Obligation directly from the treated effluent as is done for current operations.

Sensitivity Scenario C – Existing/RMPU Basins Only with External Supply to meet Prado Obligation
This scenario assumes that the number of groundwater recharge basins to be converted and receive recycled water supply for recharge is limited to a few from the current RMPU. The analysis assumes all of the existing basins will remain operational plus the following RMPU basins:

- RP-3 New Cell
- WIneville
- Etiwanda Debris
- San Sevaine (1-3)

However, rather than IEUA meeting their entire Prado Obligation directly from treated effluent, the Prado Obligation is met by an external supply source. This external supply source is unknown at this time, but it is assumed to be able to replace IEUA's current Obligation met directly from RP-5 and RP-1.

7.2 SENSITIVITY ANALYSIS MASS BALANCE ANALYSIS

Scenarios A and C as described above assume an external supply source will be able to meet the IEUA Prado Obligation. This type of operation will yield more recycled water supply that will become available from the IEUA treatment facilities. Therefore, a mass balance analyzing the proposed direct use demands versus the new supply availability was performed that removed the Prado Obligation annual demand. A summary of the annual supply availability to the GWR program is provided in Table 7.1.

Table 7.1 Sensitivity Analysis Supply versus Demands Mass Balance

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area					
Southern Area Recycled Water Supply (RP-5, CCWRF)	15,010	19,154	22,459	25,763	28,788
Southern Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Total to SARBF at Prado Obligation[1]	-	-	-	-	-
Southern Area Supply Surplus/(Deficit)	(4,206)	(4,186)	(3,540)	(2,309)	(1,858)
Northern Service Area					
Northern Area Recycled Water Supply (RP-1, RP-4)	46,934	47,158	49,454	51,750	53,543
Northern Area Direct Use Demands	8,087	11,166	15,642	19,240	20,650
Supplemental Supply to Southern Area	4,206	4,186	3,540	2,309	1,858
Total to SARBF at Prado from North[1]	-	-	-	-	-
Northern Area Supply Surplus/(Deficit)	33,083	31,369	30,272	30,201	31,035
Sensitivity Analysis GWR 9-Month Operation RW Availability[2]	**23,917**	**21,427**	**19,797**	**19,422**	**19,906**
3-Month Un-Used Winter Surplus	9,165	9,942	10,475	10,779	11,129

[1] The SARBF at Prado Obligation is assumed to be met by an external supply source.

[2] The GWR 9-Month Operation RW Availability shown is calculated based on the monthly mass balance and surplus analysis for the 9-month GWR operating period.

The recycled water supply availability is significantly more assuming IEUA's Prado Obligation is met from an external supply source. This is shown in Table 7.2 below.

Table 7.2 Comparison of Recycled Water Supply Availability

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Sensitivity Analysis GWR 9-Month Operation RW Availability – with External Supply Meeting Prado Obligation	23,917	21,427	19,797	19,422	19,906
GWR 9-Month Operation RW Availability – IEUA RW Effluent Meeting Prado Obligation	16,095	13,977	13,027	13,707	14,871
Difference in GWR Availability	7,822	7,450	6,770	5,715	5,035

7.3 SENSITIVITY ANALYSIS HYDRAULIC ANALYSIS DEMANDS

The demands used for the sensitivity analysis hydraulic model analysis utilized the same direct use demands used for the GWR implementation analyses described in Section 6. The demand changes in the model were assumed to be the increased flow to the groundwater basins that resulted from the additional supply available, by not providing flow to the Prado Obligation.

Table 7.3 Sensitivity Analysis Demands Used for Hydraulic Analysis

	Existing		Year 2020		Year 2025		Year 2030		Year 2035	
	AD	MD	AD	MD	AD	MD	AD	MD	AD	MD
	MGD									
Recycled Water Supply	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
Direct Use Demands[1]	22.0	36.0	27.5	44.4	32.6	52.7	36.0	60.0	38.4	63.9
SARBF at Prado Obligation[2]	-	-	-	-	-	-	-	-	-	-
GWR Available Flows[3]	**33.3**	**21.8**	**31.7**	**14.8**	**31.6**	**11.5**	**33.2**	**9.2**	**35.1**	**9.6**
Total Demands	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
GWR Available Flows if IEUA Effluent Meets Prado Obligation[4]	**20.8**	**14.2**	**19.2**	**8.3**	**19.1**	**3.9**	**20.7**	**1.7**	**22.6**	**4.6**
Net Increase to GWR	12.5	7.6	12.5	6.5	12.5	7.6	12.5	7.5	12.5	5.0

[1] The Direct Use Demands for the "AD" condition are the average demands for the spring/fall months of March, April, May, and November. The "MD" condition demands are the maximum month's demands between June and October.
[2] The SARBF at Prado Obligation demands for this sensitivity analysis are assumed to be met from an external supply source.
[3] The GWR Available Flows are the average monthly flow available for the appropriate demand period described in Footnote 1 above.
[4] See Table 6.1.

7.4 SENSITIVITY HYDRAULIC ANALYSIS

Computer model analyses were conducted for the three (3) sensitivity analyses, and for each scenario the analysis was conducted for each the planning years out to Year 2035. The following is a brief description of the analysis and resulting improvements proposed.

7.4.1 Scenario A – Hydraulic Analysis

7.4.1.1 Scenario A - Existing Conditions Analysis

As a result of the increased flow to the GWR basins, some of the basins would require upgrades to the turnout and delivery structures to the basins to accommodate the higher flowrates to the basins. The following is a preliminary list of the basins that are proposed to require upgrades along with their proposed capacity required.

Table 7.4 Scenario A Proposed Basin Turnout Upgrades

Basin	Existing Turnout Flow Capacity (cfs)	Proposed Flow/Turnout Capacity (cfs)
Brooks[1]	12.00	13.93
Ely (1-3)	6.00	12.01
Hickory	4.00	7.98
San Sevaine (5)[1]	24.00	28.90
Turner	8.00	12.38
Victoria	8.00	11.45

[1] Additional basin requiring upgrades beyond those identified in the based GWR Implementation analysis.

Other system improvements were required for this existing conditions demand and basin flow scenario. The system improvements that were proposed and related to the Year 2020 GWR Implementation analysis are required earlier in the planning horizon for this Existing Conditions scenario. These improvements are shown in the summary of improvements table for Scenario A, Table 7.6.

7.4.1.2 Scenario A - Year 2020 Analysis

The Year 2020 analysis showed that in addition to the facilities proposed for GWR Implementation analysis, upgrades to the 1630 East Recycled Water Pump Station and a parallel 16-inch 1299 Zone pipeline are required. These improvements are shown in the summary of improvements table for Scenario A, Table 7.6.

7.4.1.3 Scenario A - Year 2025 Analysis

The Year 2025 analysis showed that no additional facility improvements are required than already are proposed to meet direct use demands and GWR Implementation as described in Section 6.

7.4.1.4 Scenario A - Year 2030 Analysis

Significant system facility improvements are required to meet the Year 2030 conditions for this scenario. A new 30-inch 1158 Zone pipeline is proposed from RP-5 to the 30-inch 1158 Zone pipeline previously proposed for the direct use demands analysis. This will require a new 1158 Pump Station at RP-5. This scenario also requires capacity upgrades at the 1299 Zone Pump Station at RP-4 and increased equalization storage at RP-4 of approximately 1.6 MG. These improvements are shown in the summary of improvements table for Scenario A, Table 7.6.

7.4.1.5 Scenario A - Year 2035 Analysis

No additional system improvements are required beyond those already identified from the direct use and GWR Implementation analysis scenarios discussed in Section 6.

See Figure 7-1 an illustration of the proposed facilities related to Scenario A for Years 2020 through Year 2035.

7.4.2 Scenario B – Hydraulic Analysis

This scenario assumes that IEUA will continue to meet Prado Obligation and that the proposed basins to be implemented for recycled water recharge are only the RMPU basins as described in Section 7.1.

7.4.2.1 Scenario B - Existing Conditions Analysis

No additional facility improvements are required for this scenario condition beyond those already identified for the direct use and base GWR Implementation program described in Section 6.

7.4.2.2 Scenario B - Year 2020 Analysis

No additional facility improvements are required for this scenario condition beyond those already identified for the direct use and base GWR Implementation basins described in Section 6. These improvements are shown in the summary table for Scenario B, Table 7.7.

7.4.2.3 Scenario B - Year 2025 Analysis

No additional facility improvements are required for this scenario condition beyond those already identified for the direct use and base GWR Implementation program described in Section 6. However, since only the RMPU basins described in Section 7.1 are proposed, any facilities required for the other base GWR Implementation basins described in Section 6 are not included. These improvements are shown in the summary of improvements table for Scenario B, Table 7.7.

7.4.2.4 Scenario B - Year 2030 Analysis

Since only the RMPU basins described in Section 7.1 are proposed, any facilities required for the other base GWR Implementation basins described in Section 6 are not included. The only additional improvement shown to be required beyond those required for the base GWR Implementation program is to increase the capacity of the proposed 1158 Zone Storage Tank from 5.0 MG to 8.0 MG. These improvements are shown in the summary of improvements table for Scenario B, Table 7.7.

7.4.2.5 Scenario B - Year 2035 Analysis

Since only the RMPU basins described in Section 7.1 are proposed, any facilities required for the other base GWR Implementation basins described in Section 6 are not included. No additional facilities other those required for the base GWR Implementation program in Section 6 are proposed. These improvements are shown in the summary of improvements table for Scenario B, Table 7.7.

See Figure 7-2 an illustration of the proposed facilities related to Scenario B for Years 2020 through Year 2035.

7.4.3 Scenario C – Hydraulic Analysis

This scenario assumes that IEUA will obtain an external supply source to meet Prado Obligation and that the proposed basins to be implemented for recycled water recharge are only the RMPU basins as described in Section 7.1.

7.4.3.1 Scenario C - Existing Conditions Analysis

As a result of the increased flow to the GWR basins, some of the basins would require upgrades to the turnout and delivery structures to the basins to accommodate the higher flowrates to the basins. The following is a preliminary list of the basins that are proposed to require upgrades along with their proposed capacity required. It should be noted that the basin capacity upgrades shown are the same as those required for Scenario A conditions.

Table 7.5 Scenario C Proposed Basin Turnout Upgrades

Basin	Existing Turnout Flow Capacity (cfs)	Proposed Flow/Turnout Capacity (cfs)
Brooks[1]	12.00	13.93
Ely (1-3)	6.00	12.01
Hickory	4.00	7.98
San Sevaine (5)[1]	24.00	28.90
Turner	8.00	12.38
Victoria	8.00	11.45

[1] Additional basin requiring upgrades beyond those identified in the based GWR Implementation analysis.

Other system improvements were required for this existing conditions demand and basin flow scenario. The system improvements that were proposed and related to the Year 2020 base GWR Implementation analysis are required earlier in the planning horizon for this Existing Conditions scenario. These improvements are shown in the summary of improvements table for Scenario C, Table 7.8.

7.4.3.2 Scenario C - Year 2020 Analysis

The Year 2020 analysis showed that in addition to the facilities proposed for the base GWR Implementation analysis, upgrades to the 1630 East Recycled Water Pump Station and a parallel 16-inch 1299 Zone pipeline are required. These improvements are shown in the summary of improvements table for Scenario C, Table 7.8.

7.4.3.3 Scenario C - Year 2025 Analysis

No additional facility improvements are required for this scenario condition beyond those already identified for the direct use and base GWR Implementation program described in Section 6. However, since only the RMPU basins described in Section 7.1 are proposed, any facilities required for the other base GWR Implementation basins described in Section 6 are not included. These improvements are shown in the summary of improvements table for Scenario C, Table 7.8.

7.4.3.4 Scenario C - Year 2030 Analysis

Significant system facility improvements are required to meet the Year 2030 conditions for this scenario. A new 30-inch 1158 Zone pipeline is proposed from RP-5 to the 30-inch 1158 Zone pipeline previously proposed for the direct use demands analysis. This will require a new 1158 Pump Station at RP-5. This scenario also requires capacity upgrades at the 1299 Zone Pump Station at RP-4 and increased equalization storage at RP-4 of approximately 1.6 MG. These improvements are shown in the summary of improvements table for Scenario C, Table 7.8.

7.4.3.5 Scenario C - Year 2035 Analysis

Since only the RMPU basins described in Section 7.1 are proposed, any facilities required for the other base GWR Implementation basins described in Section 6 are not included. No additional facilities other those required for the base GWR Implementation program in Section 6 are proposed. These improvements are shown in the summary of improvements table for Scenario C, Table 7.8.

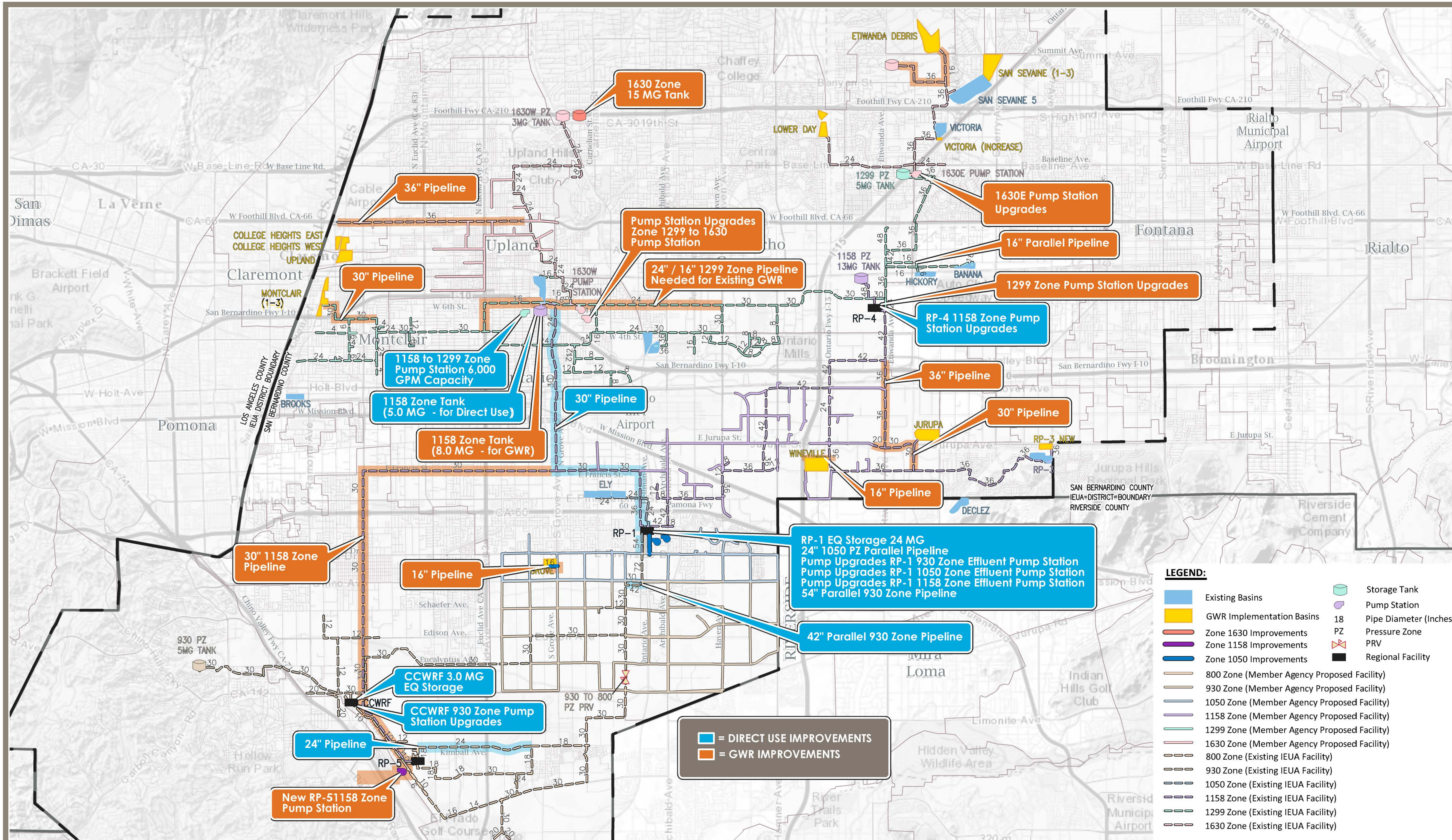
See Figure 7-3 an illustration of the proposed facilities related to Scenario C for Years 2020 through Year 2035.

Table 7.6 Scenario A Sensitivity Analysis Facility Improvements

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	
Exist	GWR in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1	LS
Exist	GWR in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6715	lf
Exist	GWR in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1	LS
Exist	GWR Increase Flow	Deficient 1299 PZ transmission mains, serve east & 7th/8th St Basins	16-inch Parallel 1299 PZ Pipeline	15289	lf
Exist	GWR Increase Flow	Deficient 1299 PZ transmission mains, serve east & 7th/8th St Basins	24-inch Parallel 1299 PZ Pipeline	13600	lf
Exist	GWR Increase Flow	Turnout Capacities undersized at Brooks, Ely, Hickory, Turner, Victoria	Increase Basin turnout capacities	1	LS
2020	GWR to Wineville Basin	System expansion to serve GWR Basin	16-inch Pipeline to Wineville Basin	1200	lf
2020	Average Direct Use	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12620	lf
2020	GWR Increase to 1630E PZ	Capacity in 1630 E PZ	1630E Pump Station Upgrades	1	LS
2020	GWR increase to Upper Zones	Pump capacity exceeded	RP-4 1158 PZ Pump Station Capacity Upgrades	1	LS
2020	GWR to Banana	Pipe capacity exceeded from Etiwanda to Hickory turnout	16-inch Parallel 1299 PZ Pipeline	3000	lf
2025	GWR to Lower Day Basin	System expansion to serve GWR Basin	24-inch Pipeline to Lower Day	10520	lf
2025	GWR to Etiwanda Debris Basin	System expansion to serve GWR Basin	16-inch 1630E Pipeline	2670	lf
2025	Max Summer Direct Use & GWR	Supply Deficiency in RP-1	24 MG EQ Storage	1	LS
2025	Max Summer DU	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	54-inch 930 PZ Parallel Pipeline	2300	lf
2025	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 PZ Pump Station Capacity Upgrades	1	LS
2025	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	CCWRF Pump Station Capacity Upgrades	1	LS
2030	GWR to College Heights Basin	System expansion to serve GWR Basin	36-inch 1630W Pipeline in Foothill Blvd	19600	lf
2030	GWR to Montclair Basin	System expansion to serve GWR Basin	30-inch 1299 PZ Pipeline to Montclair Basins	7840	lf
2030	GWR to 1630W PZ	System expansion to serve GWR Basin	1630W Booster Pump Station Capacity Upgrades	1	LS
2030	GWR to 1630W PZ	System operations for 1630W PZ and reduce impacts to 1299 PZ	15 MG 1630W Storage Tank	15	MG
2030	GWR Supply to Upper Zones	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5	New RP5 1158PZ Pump Station	1	LS

Table 7.6 Scenario A Sensitivity Analysis Facility Improvements

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	
2030	GWR Supply to Upper Zones	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-6	30-inch 1158PZ Pipeline from RP5	48500	lf
2030	GWR to 1630E PZ	Increased flow to 1630E PZ, deficient capacity in 1299 PS	Capacity Upgrades to 1299PS at RP-4	1	LS
2030	Max Summer Direct Use & GWR	Supply Deficiency in RP-4	1.6 MG EQ Storage at RP-4	1.6	MG
2030	Max Summer Direct Use & GWR	Capacity in the 930 PZ, reduce supply constraint from RP-1	3 MG EQ Storage at CCWRF	3	MG
2030	Max Summer DU	Increase capacity at the CCWRF 930 PZ Pump Station	CCWRF Pump Station Capacity Upgrades	1	LS
2030	Max Summer DU	Capacity in the 930 PZ	42-inch Parallel Pipeline in Chino Avenue	1680	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	30-inch 1158 PZ Pipeline	31800	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	1158 PZ Storage Tank	8	MG
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	New 1158 to 1299 Booster Pump Station	1	LS
2035	GWR to Grove Basin	System expansion to serve GWR Basin	12-inch to Grove Basin	1000	lf
2035	GWR to Jurupa (1158 PZ)	System expansion to serve GWR Basin	36-inch Pipeline in 1158 PZ	19600	lf
2035	GWR to Jurupa (1158 PZ)	System expansion to serve GWR Basin	30-inch Pipeline in Jurupa Street to Jurupa Basin	5400	lf
2035	GWR to Jurupa (1158 PZ)	System expansion to serve GWR Basin	20-inch Pipeline in Jurupa Street	1300	lf
2035	Max Summer DU	Pipeline undersized for demands condition	24-inch 1050 PZ Parallel Pipeline	2000	lf
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 Pump Station Capacity Upgrades	1	LS
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 1050 Pump Station Capacity Upgrades	1	LS



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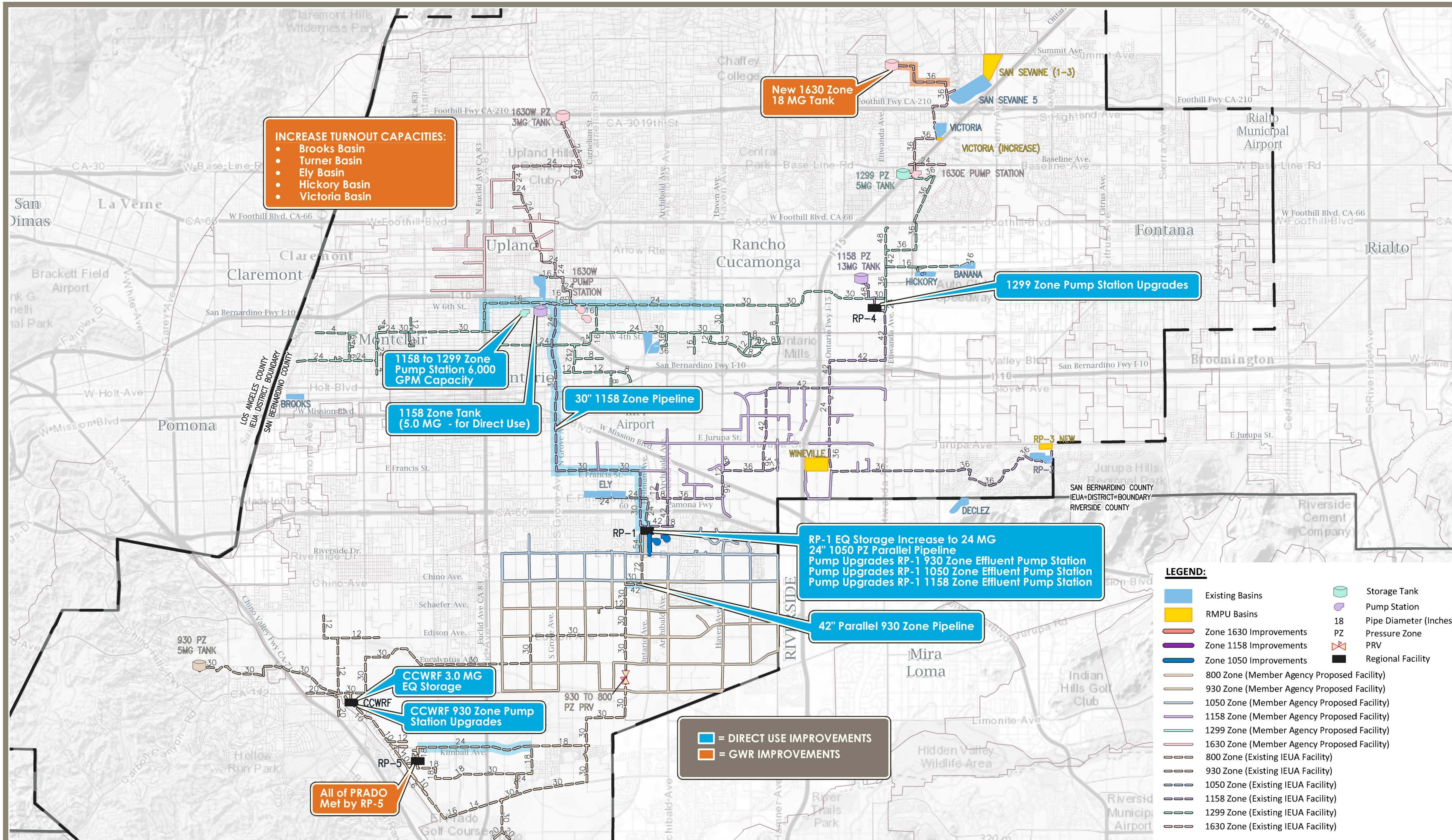
Recycled Water System Improvements
Sensitivity Analysis - Scenario A
FIGURE 7-1

Table 7.7 Scenario B Sensitivity Analysis Facility Improvements

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1	LS
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6715	lf
2020	GWR to basins in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1	LS
2020	Average Direct Use	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12620	lf
2025	Summer DU & GWR	Insufficient supply capacity from RP-1	24 MG EQ Storage at RP-1	1	LS
2025	Summer DU & GWR	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	16-inch Parallel 1299 PZ Pipeline	15289	lf
2025	Summer DU & GWR	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	24-inch Parallel 1299 PZ Pipeline	13600	lf
2025	Summer DU & GWR	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	54-inch 930 PZ Parallel Pipeline	2300	lf
2025	Summer DU & GWR	Pump capacity exceeded to serve peak DU demand periods	RP-4 1158 PZ Pump Station Capacity Upgrades	1	LS
2025	Summer DU & GWR	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 PZ Pump Station Capacity Upgrades	1	LS
2025	Summer DU & GWR	Pump capacity exceeded to serve peak DU demand periods	CCWRF Pump Station Capacity Upgrades	1	LS
2030	Max Summer DU	Capacity in the 930 PZ	42-inch Parallel Pipeline in Chino Avenue	1680	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	30-inch 1158 PZ Pipeline	31800	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	5.0 MG 1158 PZ Storage Tank	5	MG
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	New 1158 to 1299 Booster Pump Station	1	LS
2035	Max Summer DU	Capacity in the 930 PZ, reduce supply constraint from RP-1	3 MG EQ Storage at CCWRF	3	MG
2035	Max Summer DU	Increase capacity at the CCWRF 930 PZ Pump Station	CCWRF Pump Station Capacity Upgrades	1	LS
2035	Max Summer DU	Pipeline undersized for demands condition	24-inch 1050 PZ Parallel Pipeline	2000	lf
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 Pump Station Capacity Upgrades	1	LS
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 1050 Pump Station Capacity Upgrades	1	LS



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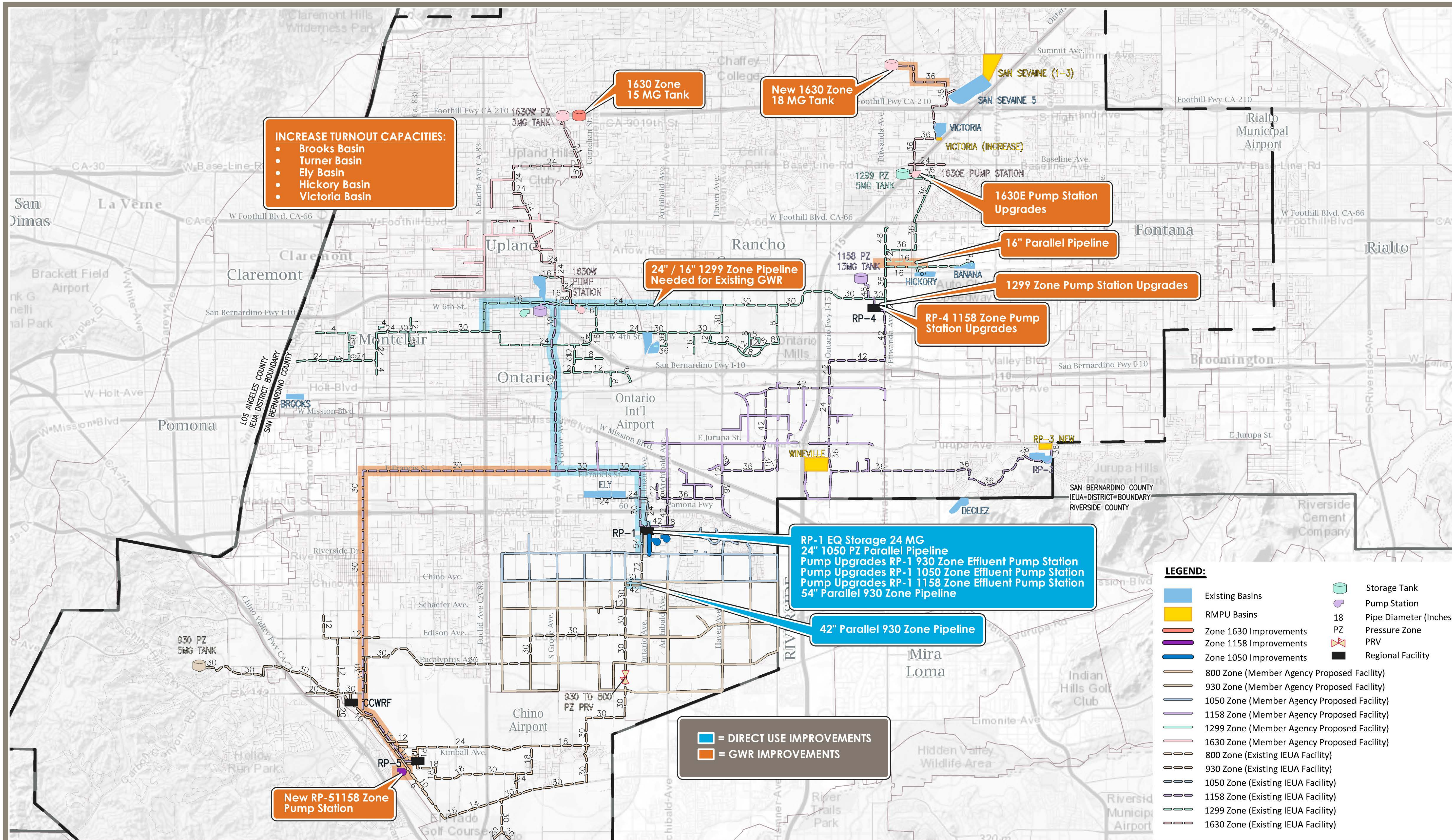
Sensitivity Analysis - Scenario B
FIGURE 7-2

Table 7.8 Scenario C Sensitivity Analysis Facility Improvements

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	
Exist	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1	LS
Exist	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6715	lf
Exist	GWR to basins in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1	LS
Exist	GWR Increase Flow	Deficient 1299 PZ transmission mains, serve east & 7th/8th St Basins	16-inch Parallel 1299 PZ Pipeline	15289	lf
Exist	GWR Increase Flow	Deficient 1299 PZ transmission mains, serve east & 7th/8th St Basins	24-inch Parallel 1299 PZ Pipeline	13600	lf
Exist	GWR Increase Flow	Turnout Capacities undersized at Brooks, Ely, Hickory, Turner, Victoria	Increase Basin turnout capacities	1	LS
2020	Average Direct Use	Ex. 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12620	lf
2020	GWR Increase to 1630E PZ	Capacity in 1630 E PZ	1630E Pump Station Upgrades	1	LS
2020	GWR increase to Upper Zones	Pump capacity exceeded	RP-4 1158 PZ Pump Station Capacity Upgrades	1	LS
2020	GWR to Banana	Pipe capacity exceeded from Etiwanda to Hickory turnout	16-inch Parallel 1299 PZ Pipeline	3000	lf
2025	Summer DU & GWR	Supply Deficiency in RP-1	24 MG EQ Storage	1	LS
2025	Max Summer DU	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	54-inch 930 PZ Parallel Pipeline	2300	lf
2025	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 PZ Pump Station Capacity Upgrades	1	LS
2025	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	CCWRF Pump Station Capacity Upgrades	1	LS
2030	GWR Supply to Upper Zones	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5	New RP5 1158PZ Pump Station	1	LS
2030	GWR Supply to Upper Zones	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5	30-inch 1158PZ Pipeline from RP5	48500	lf
2030	GWR to 1630E PZ	Increased flow to 1630E PZ, deficient capacity in 1299 PS	Capacity Upgrades to 1299PS at RP-4	1	LS
2030	Summer DU & GWR	Supply Deficiency in RP-4	1.6 MG EQ Storage at RP-4	1.6	MG
2030	Summer DU & GWR	Capacity in the 930 PZ, reduce supply constraint from RP-1	3 MG EQ Storage at CCWRF	3	MG
2030	Max Summer DU	Increase capacity at the CCWRF 930 PZ Pump Station	CCWRF Pump Station Capacity Upgrades	1	LS
2030	Max Summer DU	Capacity in the 930 PZ	42-inch Parallel Pipeline in Chino Avenue	1680	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	30-inch 1158 PZ Pipeline	31800	lf
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	8.0 MG 1158 PZ Storage Tank	8	MG
2030	Max Summer DU	Capacity in the 1158 PZ and 1299 PZ	New 1158 to 1299 Booster Pump Station	1	LS
2030	GWR Supply to Upper Zones	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5	New RP5 1158PZ Pump Station	1	LS
2035	Max Summer DU	Pipeline undersized for demands condition	24-inch 1050 PZ Parallel Pipeline	2000	lf
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 930 Pump Station Capacity Upgrades	1	LS
2035	Max Summer DU	Pump capacity exceeded to serve peak DU demand periods	RP-1 1050 Pump Station Capacity Upgrades	1	LS



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Sensitivity Analysis - Scenario C
FIGURE 7-3

7.5 SENSITIVITY ANALYSIS PROJECT COSTS AND EVALUATIONS

A comparison of total estimated project costs was performed to analyze and develop an overall recommendation for an implementation strategy. The GWR implementation project recommendations described in Section 6 were compared with the project improvements recommended for the sensitivity analysis scenarios A, B, and C as shown in Tables 7.6, 7.7, and 7.8.

Table 7.9 on the following page shows the cost summary analysis that was performed. The overall projects costs for each of the implementation scenarios are listed with the total estimated annual recycled water supply recharge benefit for that scenario.

Based on the total project costs for the different operational conditions, Scenario B of the Sensitivity Analysis herein shows the lowest total project costs. It also shows to be the lowest cost per annual acre-feet of recycled water recharge to the basins. This scenario assumes that IEUA will continue to meet SARBF at Prado Obligation as it currently does from the effluent supply from RP5 and RP-1.

Additionally, it should be noted that the basins assumed for Existing/RMPU scenarios will be able to recharge the total annual recycled water supply available. Therefore, the cost of recharge of annual acre-feet of recycled water is much less than the program required for implementing all of the GWR proposed basins.

However, other considerations should be given to utilizing only the Existing/RMPU basins:

- Using only the Existing/RMPU basins limit the basins to be down for maintenance, leaving no operational redundancy.
- If the direct use demands do not meet the projections shown, the additional recycled water supply available would be limited for recharge use.
- If the Agency determines to secure an additional external supply source in the future to meet the SARBF at Prado Obligation, there would need to be additional basins to receive the additional recharge capacity available.

Based on the overall goals of the RWPS to meet the projected direct use and then maximize the remaining recycled water supply effluent for GWR to the basins, the Scenario B of the Sensitivity Analysis is recommended. This program most the goals of the RWPS with most cost efficiency to the Agency.

Table 7.9 Sensitivity Analysis Project Costs Analysis

Year	Previous Costs	Direct Use (DU) Only Improvements Costs	DU Improvements Cumulative Costs	Annual DU Demands (AFY)	Spring/Fall DU plus GWR Improvement Costs	Summer DU plus GWR Improvement Costs	GWR plus DU Improvements Cumulative Costs	Total Annual Recharge (AFY)	Total Cumulative Costs	Total Annual Demand (AFY)
BASELINE GWR PROJECT IMPROVEMENTS (SEE CHAPTER 6) – All GWR Implementations with IEUA Meeting Prado Obligation										
Exist	$ -	$ -	$ -	24,655	$ -	$ -	$ -	16,095	$ -	40,750
2020	$ -	$ 6,220,000	$ 6,220,000	30,757	$ 7,250,000	$ -	$ 7,250,000	13,977	$ 13,470,000	44,734
2025	$ 13,470,000	$ 6,280,000	$ 12,500,000	36,507	$ 6,060,000	$ 11,690,000	$ 25,000,000	13,027	$ 37,500,000	49,534
2030	$ 37,500,000	$ 34,300,000	$ 46,800,000	40,320	$ 39,000,000	$ -	$ 64,000,000	13,707	$ 110,800,000	54,027
2035	$110,800,000	$ 12,520,000	$ 59,320,000	43,019	$ 16,030,000	$ -	$ 80,030,000	**14,871**	**$139,350,000**	57,890
SCENARIO A - PROJECT IMPROVEMENTS – All GWR Implementation Basins plus External Supply for Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	23,917	$ 20,000,000	48,572
2020	$ 20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 4,130,000	$ -	$ 24,130,000	21,427	$ 30,350,000	52,184
2025	$ 30,350,000	$ 5,120,000	$ 11,340,000	36,507	$ 6,060,000	$ -	$ 30,190,000	19,797	$ 41,530,000	56,304
2030	$ 41,530,000	$ 41,550,000	$ 52,890,000	40,320	$ 71,730,000	$ 7,610,000	$ 109,530,000	19,422	$ 162,420,000	59,742
2035	$ 62,420,000	$ 3,460,000	$ 56,350,000	43,019	$ 16,030,000	$ -	$ 125,560,000	**19,906**	**$181,910,000**	62,925
SCENARIO B - PROJECT IMPROVEMENTS – Existing/RMPU Basins with IEUA Meeting Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ -	$ -	$ -	16,095	$ -	40,750
2020	$ -	$ 6,220,000	$ 6,220,000	30,757	$ 6,860,000	$ -	$ 6,860,000	13,977	$ 13,080,000	44,734
2025	$ 13,080,000	$ 17,970,000	$ 24,190,000	36,507	$ -	$ -	$ 6,860,000	13,027	$ 31,050,000	49,534
2030	$ 31,050,000	$ 34,300,000	$ 58,490,000	40,320	$ -	$ -	$ 6,860,000	13,707	$ 65,350,000	54,027
2035	$ 65,350,000	$ 12,520,000	$ 71,010,000	43,019	$ -	$ -	$ 6,860,000	**14,871**	**$ 77,870,000**	57,890
SCENARIO C - PROJECT IMPROVEMENTS – Existing/RMPU Basins plus External Supply for Prado Obligation										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	23,917	$ 20,000,000	48,572
2020	$20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 3,740,000	$ -	$ 23,740,000	21,427	$ 9,960,000	52,184
2025	$29,960,000	$ 5,120,000	$ 11,340,000	36,507	$ -	$ -	$ 23,740,000	19,797	$ 35,080,000	56,304
2030	$35,080,000	$ 41,110,000	$ 52,450,000	40,320	$ 33,310,000	$ 7,610,000	$ 64,660,000	19,422	$117,110,000	59,742
2035	$117,110,000	$ 3,460,000	$ 55,910,000	43,019	$ -	$ -	$ 64,660,000	**19,906**	**$120,570,000**	62,925

8.0 RWPS RECOMMENDED PROJECTS

This section provides a list of the recommended projects and identifies the project to meet the Agency's projected direct use demands while maximizing the use of the available recycled water supply. The list of recommended projects is based on the Sensitivity Analysis Scenario B described in the previous section. Also, based on the project improvement costs, the total cost of water is determined for the proposed GWR Implementation Strategy proposed herein. All costs shown are in today's dollars.

8.1 PROPOSED RWPS RECOMMENDED PROJECTS

As described in Section 6 and Section 7, proposed facility improvements were recommended for every 5-years through Year 2035. Improvements were recommended based on the ability to meet the projected maximum day summer direct use demands, and delivery to the GWR basins assumed to be converted to receive the available recycled water supply for recharge.

Based on the sensitivity analysis performed and comparison of project costs and flows for each analysis scenario, the proposed RWPS projects recommended are those identified in Scenario B.

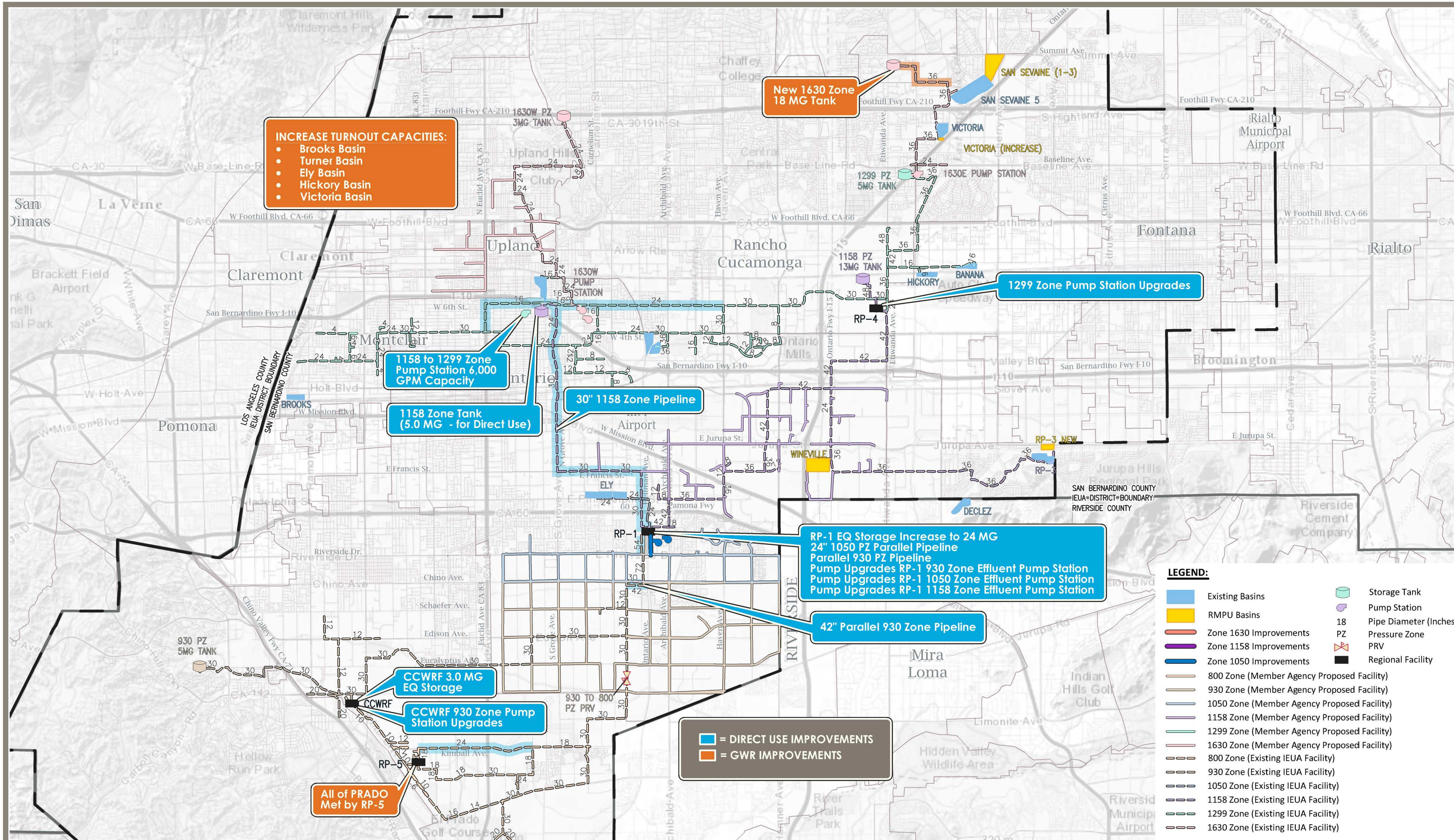
Table 8.1 is provided to show the comprehensive list of projects and project costs identified for each planning year. Since the proposed improvements recommended are required to either meet direct use demands or groundwater recharge purposes, the table includes a description of the demand condition that triggers the need for the project as well the type of deficiency the project is intended to mitigate.

Project costs and total CIP cost projects are based on 2015 dollars and do not include cost escalations.

The RWPS recommended facility improvements are shown in Figure 8-1.

Table 8.1 Recommended RWPS Projects

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	Unit Cost	Total Const. Cost	Cont. / Admin./ Eng.	Total Estimated Project Cost	Cumulative CIP Costs	GWR Program Improvement	Direct Use Improvement
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1 LS	$ 500,000	$ 500,000	$ 225,000	$ 730,000	$ 730,000	$ 730,000	$ -
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6715 lf	$ 495	$ 3,323,925	$ 1,495,766	$ 4,820,000	$ 5,550,000	$ 4,820,000	$ -
2020	GWR to basins in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1 LS	$ 900,000	$ 900,000	$ 405,000	$ 1,310,000	$ 6,860,000	$ 1,310,000	$ -
2020	Average Direct Use	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12620 lf	$ 340	$ 4,290,800	$ 1,930,860	$ 6,220,000	$ 13,080,000	$ -	$ 6,220,000
							Year 2020 Improvement Costs	**$13,080,000**	**$ 13,080,000**	**$ 6,860,000**	**$ 6,220,000**
2025	Max Summer DU & GWR	Insufficient supply capacity from RP-1	24 MG EQ Storage at RP-1	1 LS	$ -	$ -	$ -	$ -	$ 13,080,000	$ -	$ -
2025	Max Summer Direct Use	Deficient 1299 PZ transmission mains, to serve east & 7th/8th Street Basins	16-inch Parallel 1299 PZ Pipeline	15289 lf	$ 225	$ 3,440,025	$ 1,548,011	$ 4,990,000	$ 18,070,000	$ -	$ 4,990,000
2025	Max Summer Direct Use	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	24-inch Parallel 1299 PZ Pipeline	13600 lf	$ 340	$ 4,624,000	$ 2,080,800	$ 6,700,000	$ 24,770,000	$ -	$ 6,700,000
2025	Max Summer Direct Use	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	54-inch 930 PZ Parallel Pipeline	2300 lf	$ 860	$ 1,978,000	$ 890,100	$ 2,870,000	$ 27,640,000	$ -	$ 2,870,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-4 1158 PZ PS Capacity Upgrades	1 LS	$ 950,000	$ 950,000	$ 427,500	$ 1,380,000	$ 29,020,000	$ -	$ 1,380,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 930 PZ PSCapacity Upgrades	1 LS	$ 800,000	$ 800,000	$ 360,000	$ 1,160,000	$ 30,180,000	$ -	$ 1,160,000
2025	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	CCWRF PS Capacity Upgrades	1 LS	$ 600,000	$ 600,000	$ 270,000	$ 870,000	$ 31,050,000	$ -	$ 870,000
							Year 2025 Improvement Costs	**$ 17,970,000**	**$ 31,050,000**	**$ -**	**$ 17,970,000**
2030	Max Summer Direct Use	Capacity in the 930 PZ	42-inch Parallel Pipeline in Chino Ave.	1680 lf	$ 590	$ 991,200	$ 446,040	$ 1,440,000	$ 32,490,000	$ -	$ 1,440,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	30-inch 1158 PZ Pipeline	31800 lf	$ 420	$ 13,356,000	$ 6,010,200	$ 19,370,000	$ 51,860,000	$ -	$ 19,370,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	5.0 MG 1158 PZ Storage Tank	5 MG	$ 1.50	$ 7,500,000	$ 3,375,000	$ 10,880,000	$ 62,740,000	$ -	$ 10,880,000
2030	Max Summer Direct Use	Capacity in the 1158 PZ and 1299 PZ	New 1158 to 1299 Booster Pump Station	1 LS	$1,800,000	$ 1,800,000	$ 810,000	$ 2,610,000	$ 65,350,000	$ -	$ 2,610,000
							Year 2030 Improvement Costs	**$ 34,300,000**	**$ 65,350,000**	**$ -**	**$ 34,300,000**
2035	Max Summer Direct Use	Capacity in the 930 PZ, reduce supply constraint from RP-1	3 MG EQ Storage at CCWRF	3 MG	$ 1.75	$ 5,250,000	$ 2,362,500	$ 7,610,000	$ 72,960,000	$ -	$ 7,610,000
2035	Max Summer Direct Use	Increase capacity at the CCWRF 930 PZ Pump Station	CCWRF Pump Station Capacity Upgrades	1 LS	$ 1,000,000	$ 1,000,000	$ 450,000	$ 1,450,000	$ 74,410,000	$ -	$ 1,450,000
2035	Max Summer Direct Use	Pipeline undersized for demands condition	24-inch 1050 PZ Parallel Pipeline	2000 lf	$ 340	$ 680,000	$ 306,000	$ 990,000	$ 75,400,000	$ -	$ 990,000
2035	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 930 Pump Station Capacity Upgrades	1 LS	$ 1,000,000	$ 1,000,000	$ 450,000	$ 1,450,000	$ 76,850,000	$ -	$ 1,450,000
2035	Max Summer Direct Use	Pump capacity exceeded to serve peak direct use demand periods	RP-1 1050 Pump Station Capacity Upgrades	1 LS	$ 700,000	$ 700,000	$ 315,000	$ 1,020,000	$ 77,870,000	$ -	$ 1,020,000
							Year 2035 Improvement Costs	**$ 12,520,000**	**$ 77,870,000**	**$ -**	**$ 12,520,000**
							Total Program Improvement Costs	**$ 77,870,000**		**$ 6,860,000**	**$ 71,010,000**



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IEUA RWPS
Recommended Recycled Water System Improvements

FIGURE 8-1

8.2 RWPS COST OF WATER

Table 8.2 is provided to show the differences in the cost of water for the recommended GWR program. The cost of water is assumed to be the total capital improvement costs for every acre-foot of water used to meet the projected direct use demands and that recharged into the groundwater basin for the 5-year planning increment. It should be noted the annual recharge shown in Table 8.2 reflects a 9-month recharge program throughout the year.

Table 8.2 Summary of Recharge Water Costs

Planning Year	Total Annual Direct Use Demands (AFY)	Total Annual Recycled Water Supply Recharge (AFY)	Total Annual Recycled Water Use (AFY)	Estimated Cost of Water (per AFY)
Year 2020	30,757	13,977	44,734	$ 3,283
Year 2025	36,507	13,027	49,534	$ 6,469
Year 2030	40,320	13,707	54,027	$ 4,922
Year 2035	43,019	14,871	57,890	$ 4,543
			20-Yr Average Cost Water	**$ 4,804**

8.3 SUMMARY OF RECOMMENDED PROJECT COSTS

Table 8.3 is provided below to show the project costs estimated for of the planning year horizons for the recommended RWPS program facilities.

Table 8.3 Summary of Recommended Total Project Costs

Planning Year	Facility Construction Costs	Contingency/ Admin/Eng.	Total Planning Year Project Costs
Year 2020	$ 9,014,725	$ 4,056,626	$ 13,080,000
Year 2025	$ 12,392,025	$ 5,576,411	$ 17,970,000
Year 2030	$ 23,647,200	$ 10,641,240	$ 34,300,000
Year 2035	$ 8,630,000	$ 3,883,500	$ 12,520,000
Total Capital Improvements	**$ 71,010,000**		**$ 77,870,000**

9.0 OPERATIONAL CONTROL STRATEGY

This section provides a brief description of the general recycled water program operational control strategy regarding the general philosophy on how the recycled water system is to be operated for the various seasonal supply and demand needs. Descriptions are provided for each of the 5-year incremental planning year for the winter, spring/fall, and summer direct use demands and recharge conditions.

9.1 WINTER DEMAND CONDITIONS

The winter demand conditions are considered to be a three month duration including the months of December, January, and February for purposes of this study.

In general, for each of the planning years, during the winter demand months the recycled water system will be operated to meet only the direct use demands and the SARBF at Prado Obligation demands. No groundwater recharge during these months will occur.

To maximize the groundwater recharge during the other months of the year, as much of the surplus recycled water supply as possible will be used to meet as much of the SARBF at Prado Obligation demands as is feasible. For purposes of this study, a minimum of 40% of the annual SARBF at Prado Obligation assumed for this study will be met during the winter months.

Winter program operational strategy will be basically the same for each of the planning years, Year 2020, Year 2025, Year 2030, and Year 2035. The surplus supply from RP-5 will be used as the first priority to meet the SARBF at Prado Obligation during the winter months. The 930 PS demands will be met by RP-1 as the first priority. RP-4 will be the primary supply to the upper pressure zones.

Figures 9-1 through 9-4 are provided to illustrate the operational strategy for each of the planning years.

9.2 SPRING/FALL DEMAND CONDITIONS

The spring/fall demand conditions are considered to be a four month duration including the months of March, April, May, and November for purposes of this study.

In general for each of the planning years, the direct use demands will be met first and then the SARBF at Prado Obligation needs. Based on the mass balance analysis approximately 35% of the total annual SARBF at Prado Obligation will be met during the Spring/Fall months.

The surplus supply from the Southern Service Area from RP-5 and CCWRF is assumed to the first priority to meet the SARBF at Prado Obligation demands.

The surplus from the RP-1 and RP-4 facilities, after meeting the direct use demand needs, is used to supply groundwater recharge to the existing and proposed groundwater basins.

Due to the low flow periods during the night from the wastewater supply, and the peak direct use demands during this same period, the groundwater recharge flows to the basin are met during a 12-hour period during the day, during non-direct use irrigation periods.

Figures 9-1 through 9-4 are provided to illustrate the operational strategy for each of the planning years.

9.3 SUMMER DEMAND CONDITIONS

The summer demand conditions are considered to be a five month duration including the months between June and October for purposes of this study.

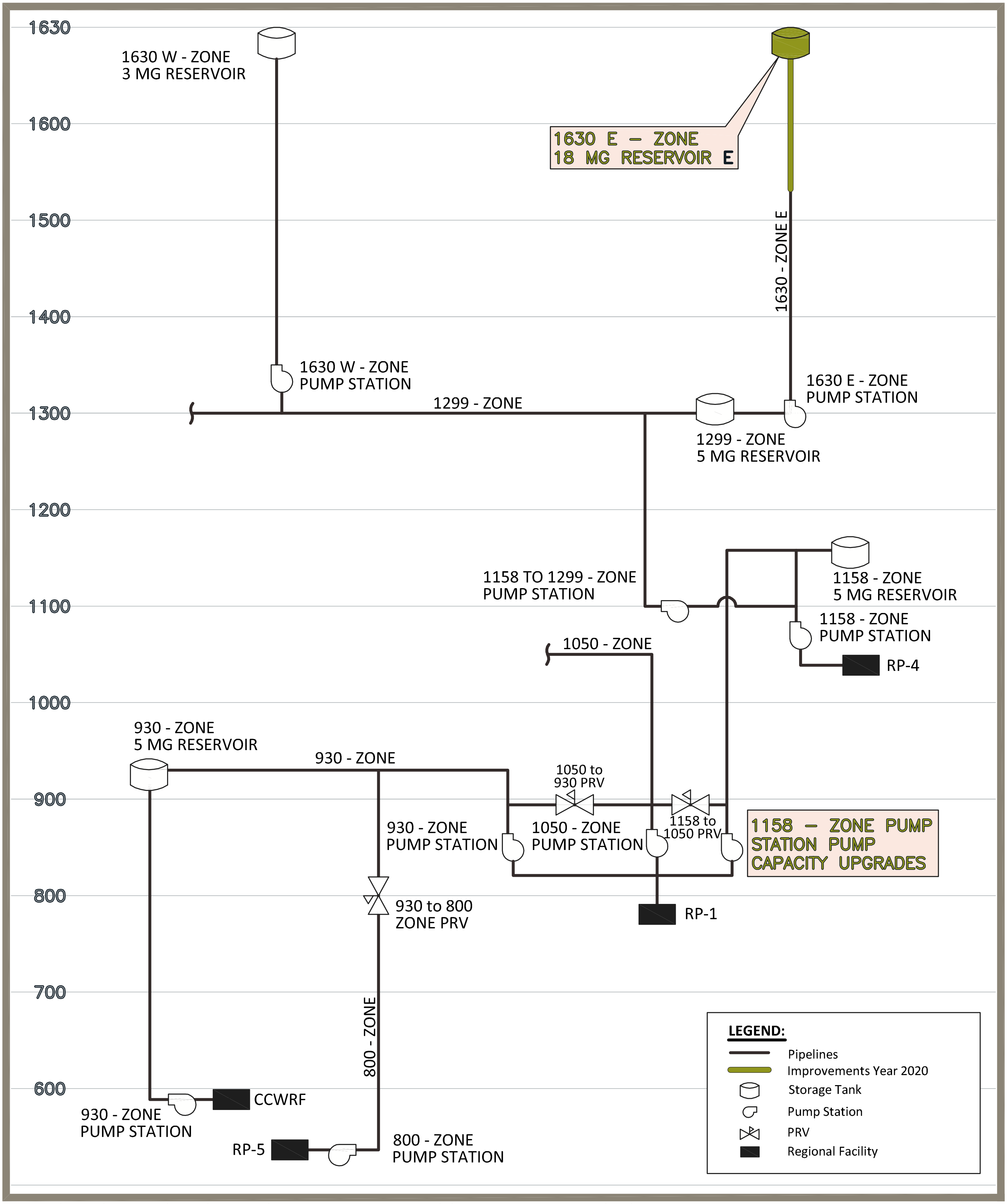
In general for each of the planning years, the direct use demands will be met first. For purposes of this study, approximately 24% of the total annual SARBF at Prado Obligation will be met during the summer months.

The surplus supply from the Southern Service Area from RP-5 and CCWRF is assumed to the first priority to meet the SARBF at Prado Obligation demands up to only 24%. The minimum flow to SARBF at Prado Obligation is 3.5 MGD.

The surplus from the RP-1 and RP-4 facilities, after meeting the direct use demand needs and supplementing the SARBF at Prado Obligation, is used to supply groundwater recharge to the existing and proposed groundwater basins. Due to the increase in direct use demands during the summer months, the groundwater recharge flows are reduced so the recycled water supply available from the treatment facilities is not exceeded.

Due to the low flow periods during the night from the wastewater supply, and that the direct use demands are peaked during this same period, the groundwater recharge flows to the basin are met during a 12-hour period during the day.

Figures 9-1 through 9-4 are provided to illustrate the operational strategy for each of the planning years.



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IEUA RWPS
Year 2020 System Profile

FIGURE 9-1

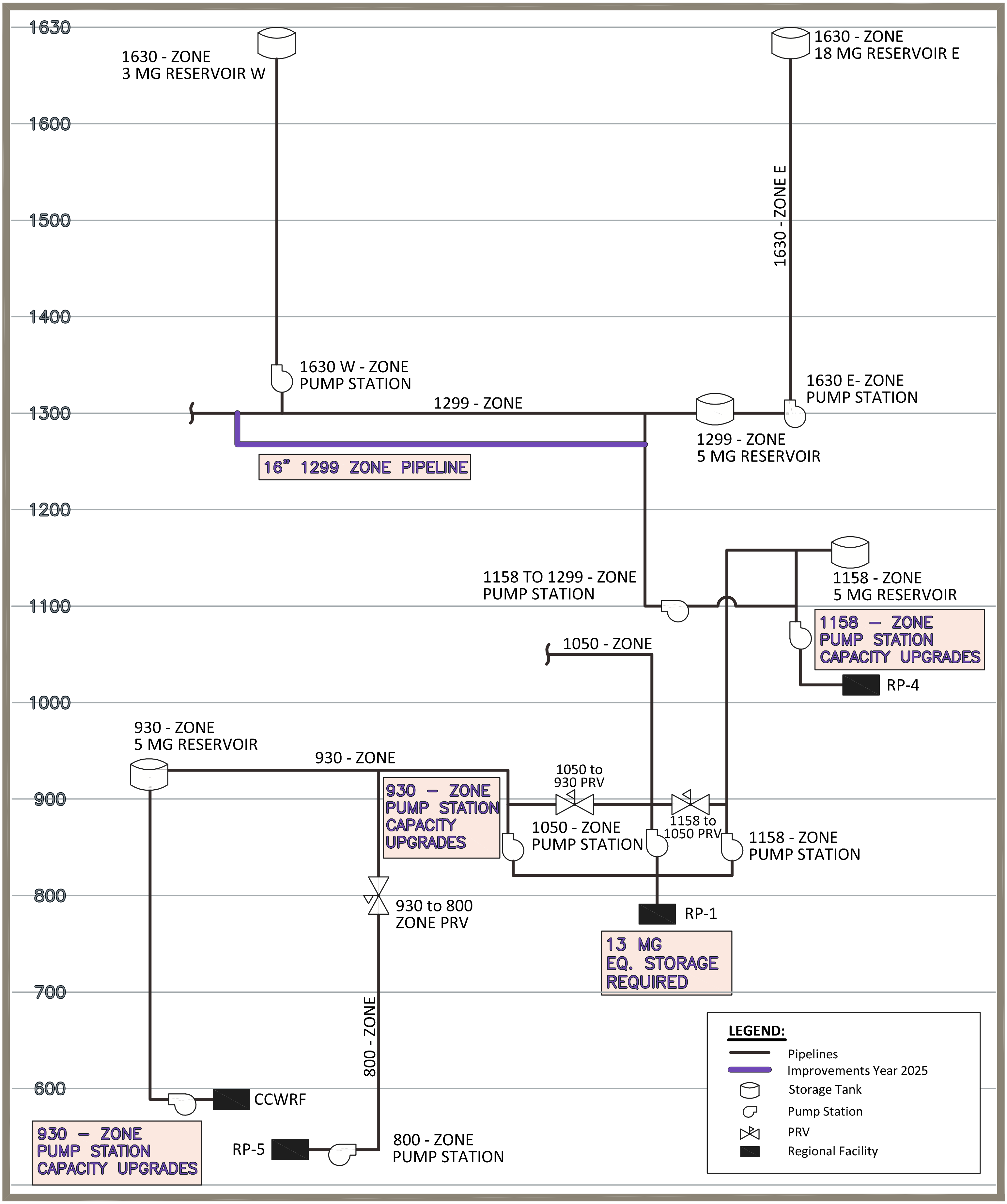

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FIGURE 9-2

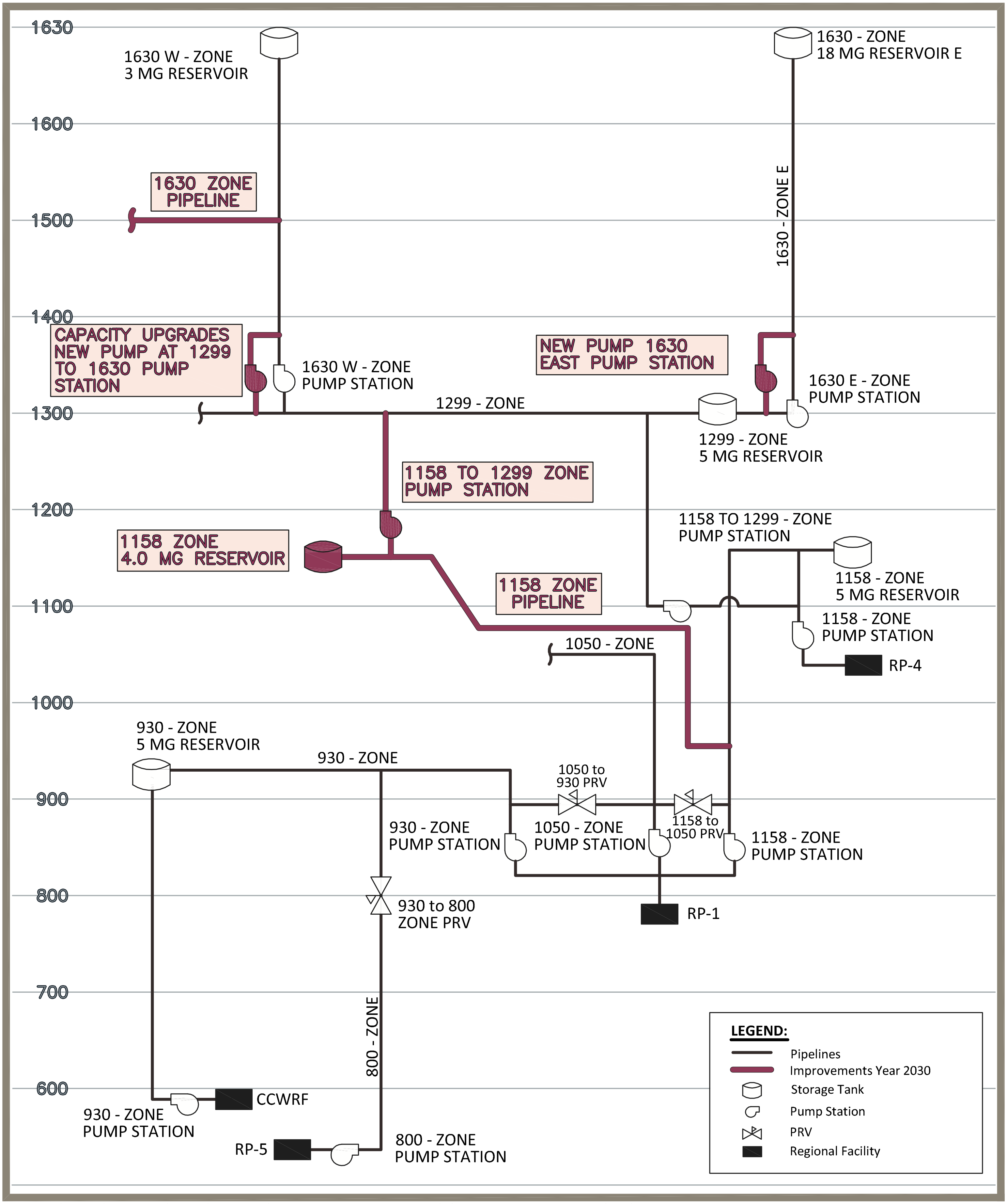

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FIGURE 9-3

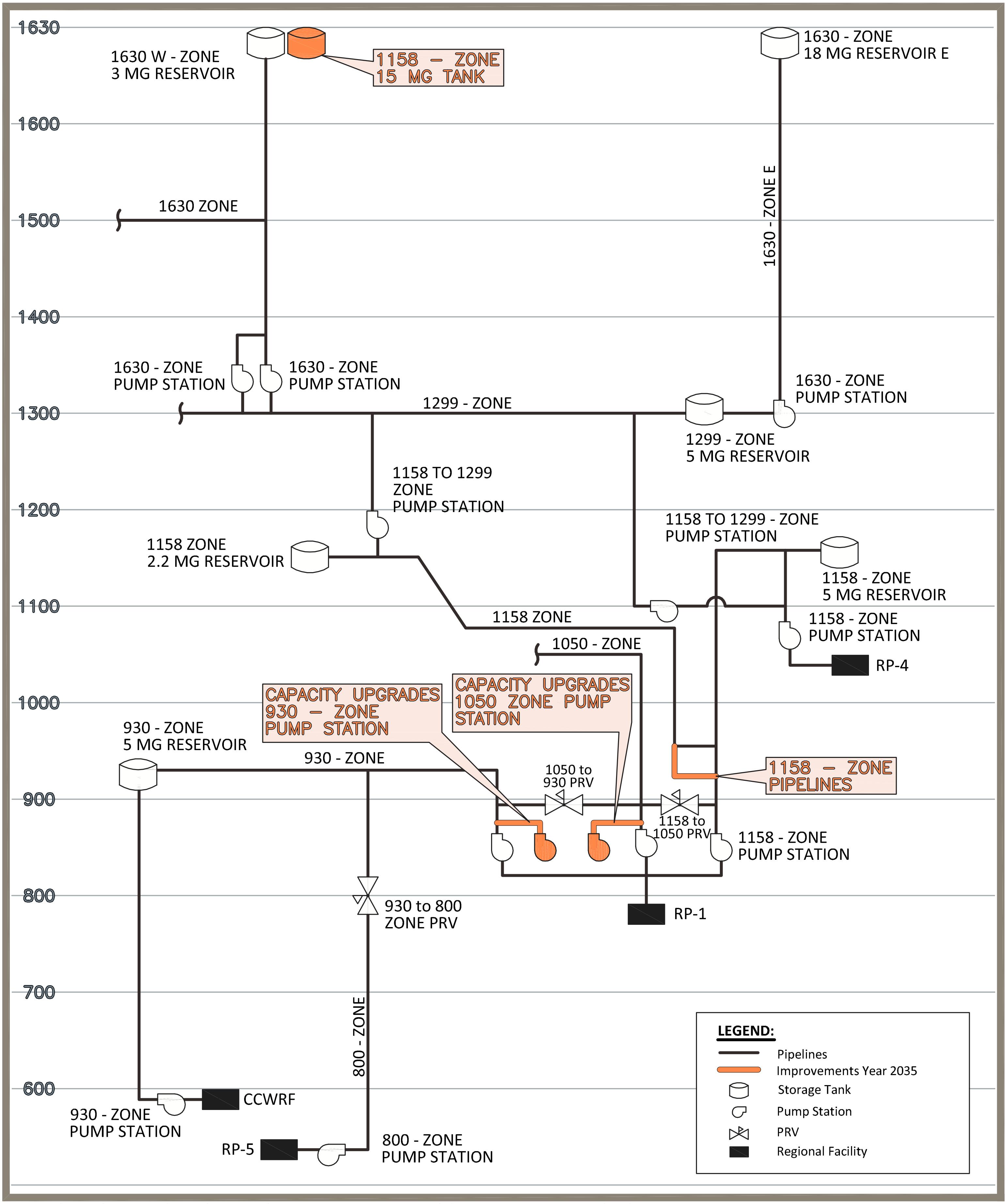

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FIGURE 9-4

Appendix A

Modeling Results are Bound Separately

Appendix B

"*Recycled Water System Hydraulic Analysis for the Enhanced GWR Program*", December 2013

APPENDIX H

IEUA 2014 Wastewater Facilities Master Plan

IEUA Wastewater Facilities Master Plan
TM 3 Regional Trunk Sewer Analysis

PREPARED FOR: Inland Empire Utilities Agency

PREPARED BY: Carollo Engineers, Inc.

REVIEWED BY: CH2M HILL

DATE: August 18, 2014

Executive Summary

In accordance with the goals of the master planning effort, the Consultant Team evaluated the capacity of IEUA's collection system and developed flow diversion alternatives to optimize the use of recycled water within the service area for groundwater recharge. To achieve this goal, four flow diversion alternatives were developed as part of the WFMP that would allow IEUA to optimize recharge groundwater opportunities in the north.

As part of this analysis, the Consultant Team updated the IEUA collection system hydraulic model. This updated model was used to conduct an evaluation of the regional trunk sewer system under existing and projected future flow conditions. Results of the analysis indicate that IEUA's collection system generally maintains adequate capacity to convey peak flows. However, capacity limitations were identified in the Montclair pipeline reach that conveys flow to RP-1 from the Montclair diversion structure.

Flow diversion alternatives were evaluated using both monetary and non-monetary evaluation criteria and a benefit-cost analysis to identify the most suitable alternative for meeting IEUA's objectives. Alternative 2, which utilizes the existing Whispering Lakes and Haven Pump Stations to divert flows from RP-5 to RP-1 was identified as IEUA's preferred flow diversion alternative because it has a lower capital cost, is easier to implement and provides a relatively high benefit related to diverting additional flows to RP-1 for groundwater recharge. Alternative 2 also provides flexibility in that flows could still be conveyed to RP-5 by gravity should the need arise.

1.0 Background and Objectives

The Inland Empire Utilities Agency (IEUA) contracted with CH2M HILL and Carollo Engineers (Consultant Team) to develop a Wastewater Facilities Master Plan (WFMP). The objective of the WFMP is to plan IEUA's wastewater treatment and conveyance improvements and develop a capital program. The capital program will guide IEUA in the development of major improvements to their treatment and conveyance facilities.

As part of the WFMP effort, the Consultant Team worked with IEUA to develop a series of flow diversion alternatives. The diversion alternatives were developed as a way to convey wastewater to Reclamation Plant (RP)-1 in an effort to maximize groundwater recharge opportunities in the northern portions of IEUA's service area. The flow diversion alternatives are described in Technical Memorandum (TM) No. 2. In conjunction with the analysis of the diversion alternatives, IEUA's existing conveyance system was evaluated to determine its ability to convey current and projected flows based on specified evaluation criteria. The purpose of this TM 3 is to summarize the analysis of IEUA's conveyance system and the results of the evaluation of the flow diversion alternatives presented in TM 2.

2.0 Evaluation and Planning Criteria

Evaluation criteria were established as a means to provide a framework for the analysis of the conveyance system and the evaluation of the flow diversion alternatives. The evaluation included the criteria to evaluate the collection system using the hydraulic model and the criteria used to evaluate the flow diversion alternatives. The evaluation of the flow diversion alternatives used a qualitative non-monetary approach called the Simple Multi-Attribute Rating Technique (SMART). The conveyance system criteria and the SMART system are summarized in this section of TM 3.

2.1 Collection System Evaluation Criteria

2.1.1 Gravity Conveyance System

Gravity sewer pipe capacities are dependent on many factors. The factors include roughness of the pipe, the chosen maximum allowable depth of flow downstream, and limiting velocity and slope. The following sections describe the factors that account for the determination of existing and future pipeline capacities in IEUA's collection system.

Manning Coefficient (n)

The manning coefficient 'n' is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For sewer pipes, the manning coefficient typically ranges between 0.011 and 0.017, with 0.013 being a representative value used for system planning purposes. For this study, a manning "n" factor of 0.013 was assigned to all existing sewer collection system lines in the hydraulic model, and then refined as necessary during model verification to accurately simulate field measured levels and velocities.

Peak Flow Criteria

The primary criteria used to identify capacity deficient sewers or to size new sewer improvements is the maximum flow depth to pipe diameter ratio (d/D). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). Based on the Consultant Team's experience, IEUA staff input, and industry standards, the following criteria were used and are summarized in Table 3-1 for existing and new sewers:

- **Flow Depth for Existing Sewers.** Peak flow criteria for existing sanitary sewers are established based on a number of factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative criterion for evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, a lenient criterion could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable peak flow criterion should be established to be as cost effective as possible while at the same time reducing the risk of SSOs to the greatest extent possible.

  For IEUA, it was decided that a maximum d/D ratio of 0.92 would be used to identify capacity deficient sewers.

- **Flow Depth for New Sewers.** When designing sewer pipelines, it is common practice to adopt variable flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. Since IEUA collects wastewater flow from multiple agencies, IEUA's collection system primarily consists of larger diameter interceptors (i.e., greater than 18 inches in diameter). Therefore, sewer interceptor projects will be sized to a d/D of 0.75.

TABLE 3-1
Maximum Flow Depth Criteria

	Maximum d/D
Existing Sewers	0.92
New Sewers	0.75[1]

Notes:
[1] For pipe diameters larger than 18 inches

2.1.2 Pump Stations and Forcemains

Industry standard practice is to require that sewage lift stations have sufficient capacity to pump the peak flow with the largest pump out of service (firm capacity).

Force main piping should be sized to provide a minimum velocity of 3 ft/s at the design flow rate of the lift station and no more than 8 ft/s. For the determination of head loss, the Hazen Williams Equation is used with a C-factor of 110. These factors are typical for sewer system master planning purposes.

2.2 Flow Diversion Evaluation Criteria

2.2.1 Non-Monetary Evaluation Criteria

The SMART method was used to evaluate alternatives. This approach includes development of a benefit score for each alternative based on non-monetary criteria and their assigned weighting factors. Once the benefit score is established for each alternative, a monetary evaluation is conducted to estimate life cycle costs for each alternative. A benefit-to-cost ratio is then determined for each alternative to establish the recommended alternative.

For the non-monetary evaluation, a multi-attribute analysis methodology was employed to develop clear and defensible benefit scores for identified alternatives. With multi-attribute analysis, a set of criteria is first developed for use in ranking the appropriateness of each alternative in satisfying the project objectives. Secondly, each criterion is assigned a weighting factor that reflects its relative importance. The weighting factors range from 1 (least important relative to other criteria) to 10 (most important relative to other criteria), allowing calculation of a weighted criterion score based on how important the criterion is for the project in the overall decision-making process.

The non-monetary evaluation criteria, definitions, and weighting factors for evaluating the flow diversion alternatives in TM 3 are presented in Table 3-2.

TABLE 3-2

Non-Monetary Evaluation Criteria, Definitions, and Assigned Weighting Factors

Criteria	Description	Weighting Factor
Optimize Groundwater Recharge	Evaluate each alternative relative to the volume of water available for recharge.	10
Operational Flexibility	Ability to divert flow to either RP-5 or RP-1.	10
Operational Risk and Reliability	Operational implications on system reliability and redundancy and the associated risk involved in the operation of the lift station(s) and other major facilities.	10
Ability to maximize use of existing assets	Ability to use existing infrastructure, lift stations, and other facilities.	8
Ease of operation and maintenance	Relative degree of ease and extent of time required to operate and maintain the facilities. Ability to operate one regional lift station versus operating multiple lift stations.	8
Recycled water pumping needs	Implications on pumping and conveying recycled water.	6
Impacts on liquid treatment facilities	Impacts on the required level of treatment at RP-5 or RP-1 (i.e., to achieve the corresponding TN limits for groundwater recharge).	6
Environmental considerations	Environmental considerations, impacts, permitting and documentation required for project implementation.	6
Construction impacts	Construction impacts on traffic, commuter schedules, ecosystems, etc.	5
Institutional feasibility	Extent of coordination required for rights-of-way and easement procurement, as well as major crossings across freeways, channels, etc.	5
Carbon footprint and sustainability	Potential impacts on the carbon footprint of each plant or conveyance system as a result of construction and operation of the facilities.	4
Footprint and space constraints	Overall footprint requirements and space constraints.	3

3.0 Evaluation of Existing Collection System

The hydraulic model developed for the WFMP was used to conduct an analysis of the capacity of IEUA's existing conveyance system. The analysis was conducted under the peak flow scenario.

In general, IEUA's collection system has adequate capacity to convey peak wastewater flows. The one facility that is currently lacking adequate capacity to convey existing flows is the 30-inch pipeline downstream of the Montclair diversion. The sections of pipeline that are currently deficient are illustrated on Figure 3-1.

The deficient reach of the Montclair pipeline includes approximately 24,000 linear feet of 36-inch diameter sewer. The hydraulic model was run under future system conditions as part of the analysis of the diversion alternatives discussed in the following sections of this memorandum. It was determined that in order to mitigate the capacity deficiencies the pipeline would need to be upsized to a 36-inch diameter sewer to convey peak buildout flows.

It is recommended that IEUA staff conduct further flow monitoring of this reach of pipeline to determine the extent of the deficiency. IEUA staff should conduct a focused flow monitoring effort on this reach to develop a clear picture of the flow conditions during peak flow periods to verify the modeling results and help size the pipeline during preliminary and final design of mitigation alternatives. While upsizing the pipeline is a viable alternative, other options may exist such as constructing parallel reaches of conveyance trunk lines.

4.0 Evaluation of Flow Diversion Alternatives

One of the goals of the WFMP is to plan the efficient use of IEUA's wastewater treatment plants and optimize the use of recycled water within IEUA's service area for groundwater recharge. One of the tasks in the project is to develop and evaluate flow diversion alternatives given an understanding of the constraints and goals of the treatment evaluations and plans for RWRP expansion. For instance, consideration of treatment plant expansions at RP-1 and RP-5 took into account nitrogen concentration limits at the groundwater recharge basin and the treatment plants.

Per the Waste Discharge Order No. R8-2009-0021 (NPDES No. CA8000409) and Water Recycling Order No. R8-2007-0039 (and subsequent amendments), the 12-month flow weighted running average Total Inorganic Nitrogen (TIN) concentration shall not exceed 8 mg/L. This limitation may be met on an agency-wide basis using flow weighted averages of discharges from RP-1, RP-4, RP-5, and CCWRF. Per the CDPH regulations for groundwater recharge and in accordance with Water Recycling Order No. R8-2007-0039, Total Nitrogen (TN) concentration of the recycled water used for recharge prior to reaching the regional groundwater table must not exceed 5 mg/L. The organic nitrogen content in plant effluent is typically in the range of 1.5 to 2.0 mg/L. Therefore, a plant effluent TIN of 8 mg/L corresponds to a TN of about 9.5 to 10 mg/L at the basins. In comparison, a plant effluent TIN of 5 mg/L corresponds to a TN of about 6.5 to 7 mg/L at the basins. To be conservative, this analysis assumes a plant effluent TIN of 5 mg/L for recharge. Therefore, RP-1 expansion needs are based on a plant effluent TIN of 5 mg/L. Similarly, for Alternatives 4A and 4B where flow from RP-5 is pumped to the north for groundwater recharge, the RP-5 expansion needs are based on a plant effluent TIN of 5 mg/L, reducing the overall plant capacity and causing expansions to occur sooner. For the capacity analysis of each RWRP in later TMs, capacities will be developed based on the permitted plant effluent TIN of 8 mg/L as confirmed by IEUA.

This section provides a summary of the proposed flow diversion alternatives, and details the results of the non-monetary evaluation of the flow diversion alternatives. The flow diversion alternatives are described in detail in Technical Memorandum TM 2 and are summarized below. The analysis is based on a planning horizon of 20 years (2035), which is then used to establish the infrastructure needs for each alternative. The flows diverted in each alternative are summarized in Table 3-3.

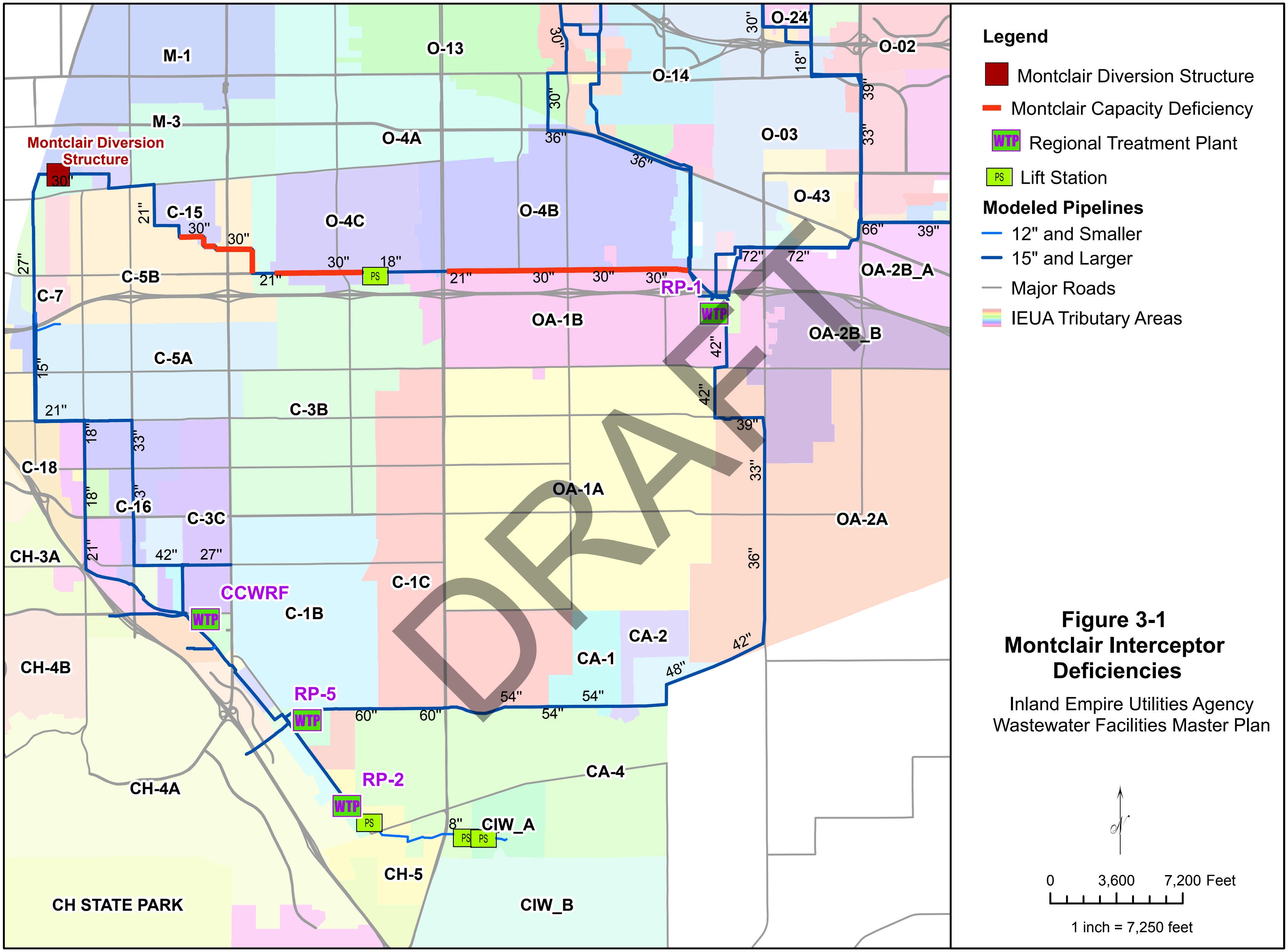

Figure 3-1
Montclair Interceptor Deficiencies

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

M:\IEUA_FNO\GIS\Alternatives_with_Upgrades\Montclair Pipeline Deficiencies.mxd 8/14/2014

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4.1 Summary of Flow Diversion Alternatives

Alternative 1

Alternative 1 is the “Do Nothing” alternative. This alternative makes use of the future flow projections for RP-1 and RP-5 and determines how keeping the existing methodologies for flow routing in place affects IEUA’s ability to meet its goals. The assumption is that all flows from the Whispering Lakes tributary area, as well as the flows from the Haven Pump Station tributary area, are conveyed by gravity to RP-5.

Alternative 2

Alternative 2 assumes that the flows from the Whispering Lakes pump station tributary area are pumped to RP-1 for treatment. Currently the Haven pump station conveys flow to RP-1 and this alternative assumes that the flows would continue to be conveyed to RP-1 in the future.

The Whispering Lakes pump station collects wastewater from agency tributary area OA-1B, while Haven pump station collects from tributary area OA-2B_A. This alternative provides flexibility where the wastewater is sent, since IEUA would still have the option to send the flows south to RP-5.

Alternatives 3A, 3B, and 3C

Alternative 3 assumes a new pump station would be installed south of the Archibald Ranch area to convey flows from the Whispering Lakes, Haven, and Archibald Ranch developments. The areas diverted to RP-1 include tributary areas OA-1B, OA-2B_A, OA-2B_B, OA-1A, and OA-2A. There would be three sub alternatives of this alternative. The sub alternatives compare different locations for the new pump station in order to maximize the collection of sewer flows from the New Model Colony in the City of Ontario and to optimize the amount of flow diverted to RP-1.

This Alternative includes additional flow diversions from the eastern portions of the New Model Colony. In comparison, Alternative 2 does not assume that any new flows outside the existing Whispering Lakes and Haven tributary areas would be conveyed to RP-1. This alternative maximizes the amount of flow going to RP-1 by taking flow from new growth. Potential locations for the new pump station are (a) south of Edison Avenue to intercept approximately 30 percent of the New Model Colony flows, (b) near the flood control channel and Hellman Avenue to intercept approximately 50 percent of the New Model Colony flows, and (c) near Euclid Avenue and Kimball Avenue to intercept all of the New Model Colony flows.

These locations have not been analyzed to determine the percentage of New Model Colony flows that could be captured. Rather, these locations are intended to serve as starting points for the analysis and the captured flow percentages will most likely be modified.

The other difference between Alternative 2 and Alternative 3 is that Alternative 3 includes the construction of a single regional pump station instead of utilizing the existing City of Ontario pump stations (Whispering Lakes and Haven). This alternative eliminates the operation and maintenance of multiple pump stations. There is still some flexibility with this alternative because the flows may be diverted to either RP-1 or RP-5.

Alternatives 4A and 4B

Alternative 4 assumes that instead of diverting flow to RP-1 for treatment, the flows are treated at RP-5 and pumped to RP-1 to be distributed in the recycled water distribution system in the northern portions of IEUA’s service area. It is assumed that a recycled water pump station would be installed at RP-5 to pump the recycled water up to the recycled water facility at RP-1. This alternative requires an expansion of RP-5 in order to handle the increase in flow to the plant. This alternative is the least flexible of the alternatives since it is not able to divert water away from RP-5.

Alternative 4 has two sub-alternatives. Alternative 4A assumes that all flows at the Montclair Diversion are diverted east to the Montclair pump station and ultimately RP-1. Alternative 4B assumes that flows at the Montclair Diversion are diverted west/south to RP-5.

TABLE 3-3
Projected Sewer Flows for Diversion Alternatives

	Facility	2013 Flow (mgd)	2020 Flow (mgd)	2030 Flow (mgd)	2035 Flow[3] (mgd)	2040 Flow (mgd)	2050 Flow (mgd)	2060 Flow (mgd)
Do Nothing								
	RP-1	27.5	28.7	30.4	**31.3**	32.1	34.2	34.4
	RP-5	8.2	11.9	17.7	**20.3**	22.8	26.7	27.2
Alternative 2								
	RP-1	29.2	30.4	32.2	**33.1**	34.0	36.1	36.3
	RP-5	6.4	10.2	15.9	**18.4**	20.9	24.8	25.3
Alternative 3[1]								
3A								
	RP-1	28.4	30.3	33.4	**34.9**	36.3	39.3	39.5
	RP-5	7.3	10.3	14.8	**16.7**	18.6	21.6	22.1
3B								
	RP-1	29.0	31.4	35.3	**37.2**	39.1	42.7	42.9
	RP-5	6.7	9.2	12.8	**14.3**	15.8	18.2	18.7
3C								
	RP-1	30.4	34.1	40.2	**43.2**	46.1	51.1	51.3
	RP-5	5.3	6.5	7.9	**8.4**	8.9	9.8	10.3
Alternative 4[2]								
4A								
	RP-1	28.6	29.9	31.7	**32.6**	33.4	35.5	35.7
	RP-5	7.1	10.7	16.4	**19.0**	21.5	25.4	25.9
4B								
	RP-1	26.4	27.5	29.1	**30.0**	30.8	32.9	33.1
	RP-5	9.3	13.1	19.0	**21.6**	24.1	28.0	28.5

Notes:
[1] Includes construction of a new regional lift station to convey flows to RP-1. Three sub alternatives were developed to evaluate diverting differing percentages of flows from City of Ontario's New Model Colony (NMC) growth area. Alternative 3A diverted 30 percent of NMC flow, Alternative 3B diverted 50 percent of NMC flow, and Alternative 3C diverted 100 percent of NMC flow.
[2] Alternative 4A evaluated the flows if 100 percent of flow at the Montclair diversion structure was diverted to RP-1, while Alternative 4B assumes 100 percent of the flows at the Montclair diversion were conveyed to CCWRF.
[3] Analysis based on 20-Year Planning Horizon.

4.2 Infrastructure Implications

Once the flow diversion alternatives were established, the facilities needed to operate under the specifics of each were developed. The facilities were established using the hydraulic model discussed in TM 2 and an understanding of the treatment requirements for RP-1 and RP-5. For the expansions of the Reclamation Plants, it was assumed that additional capacity would be added in modules based on the current configuration of the unit processes. As discussed in the evaluation section, RP-1 expansion modules will provide 5 mgd capacity for a TIN concentration of 5 mg/L. RP-5 can be expanded in 7.5 mgd modules for a TIN concentration of 8 mg/L. These same modules will provide 6.5 mgd of capacity each for a TIN of 5 mg/L. The infrastructure implications for each alternative are listed in Table 3-4. As stated previously, a planning horizon of 20 years (2035) is used to establish the infrastructure needs for each alternative.

TABLE 3-4
Alternative Infrastructure Implications

Facility	Type of Improvement	Existing Size/ Diameter	New Size/ Diameter
Alternative 1			
RP-1	Expand 5 mgd	29 mgd	34 mgd
RP-5	Expand 7.5 mgd	15 mgd	22.5 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 2			
Whispering Lakes PS	Pump Station	2.16 mgd	4.68 mgd
RP-1	Expand 5 mgd	29 mgd	34 mgd
RP-5	Expand 7.5 mgd	15 mgd	22.5 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 3A			
Proposed	Pump Station	-	17 mgd
	Force Main	-	24 in
RP-1	Expand 10 mgd	29 mgd	39 mgd
RP-5	Expand 7.5 mgd	15 mgd	22.5 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 3B			
Proposed	Pump Station	-	29 mgd
	Force Main	-	30 in
RP-1	Expand 10 mgd	29 mgd	39 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 3C			
Proposed	Pump Station	-	45.8 mgd
	Force Main	-	42 in
RP-1	Expand 15 mgd	29 mgd	44 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 4A[1]			
Proposed	Pump Station	-	22 mgd
	Storage Tank	-	6 MG
	Recycled Water Pipeline	-	24 in
RP-1	Expand 5 mgd	29 mgd	34 mgd
RP-5	Expand 6.5 mgd	13 mgd	19.5 mgd
Montclair Pipeline	Upsize	30 in	36 in
Alternative 4B[1]			
Proposed	Pump Station	-	22 mgd
	Storage Tank	-	6 MG
	Recycled Water Pipeline	-	24 in
RP-1	Expand 5 mgd	29 mgd	34 mgd
RP-5	Expand 13 mgd	13 mgd	26 mgd

Note:
[1] The RP-5 capacity and expansion needs for Alternatives 4A and 4B are based on a TIN of 5 mg/L. For all other alternatives, the RP-5 capacity and expansion needs are based on a TIN of 8 mg/L.

Alternative 1 – Facilities required include the expansions of RP-1 and RP-5 to accommodate the projected increases in wastewater flows. Currently RP-1 is rated at 29 mgd (5 mg/L TIN) and would need to be expanded to 34 mgd to accommodate the projected increase in flow. RP-5 is currently rated for 15 mgd (8 mg/L TIN) and would need to be expanded to 22.5 mgd. Alternative 1 would also include an upgrade of the Montclair pipeline downstream of the Montclair pump station from a 30-inch sewer to a 36-inch pipeline. The added facilities are shown on Figure 3-2 at the end of this section.

Alternative 2 – Alternative 2 proposes to utilize the Whispering Lakes Pump station to convey wastewater back to RP-1. This alternative would require the expansion of the Whispering Lakes Pump Station by approximately 2.2 mgd to 4.7 mgd. Similar to Alternative 1, RP-1 and RP-5 would require expansions of 5 and 7.5 mgd, respectively. The added facilities are shown on Figure 3-3 at the end of this section.

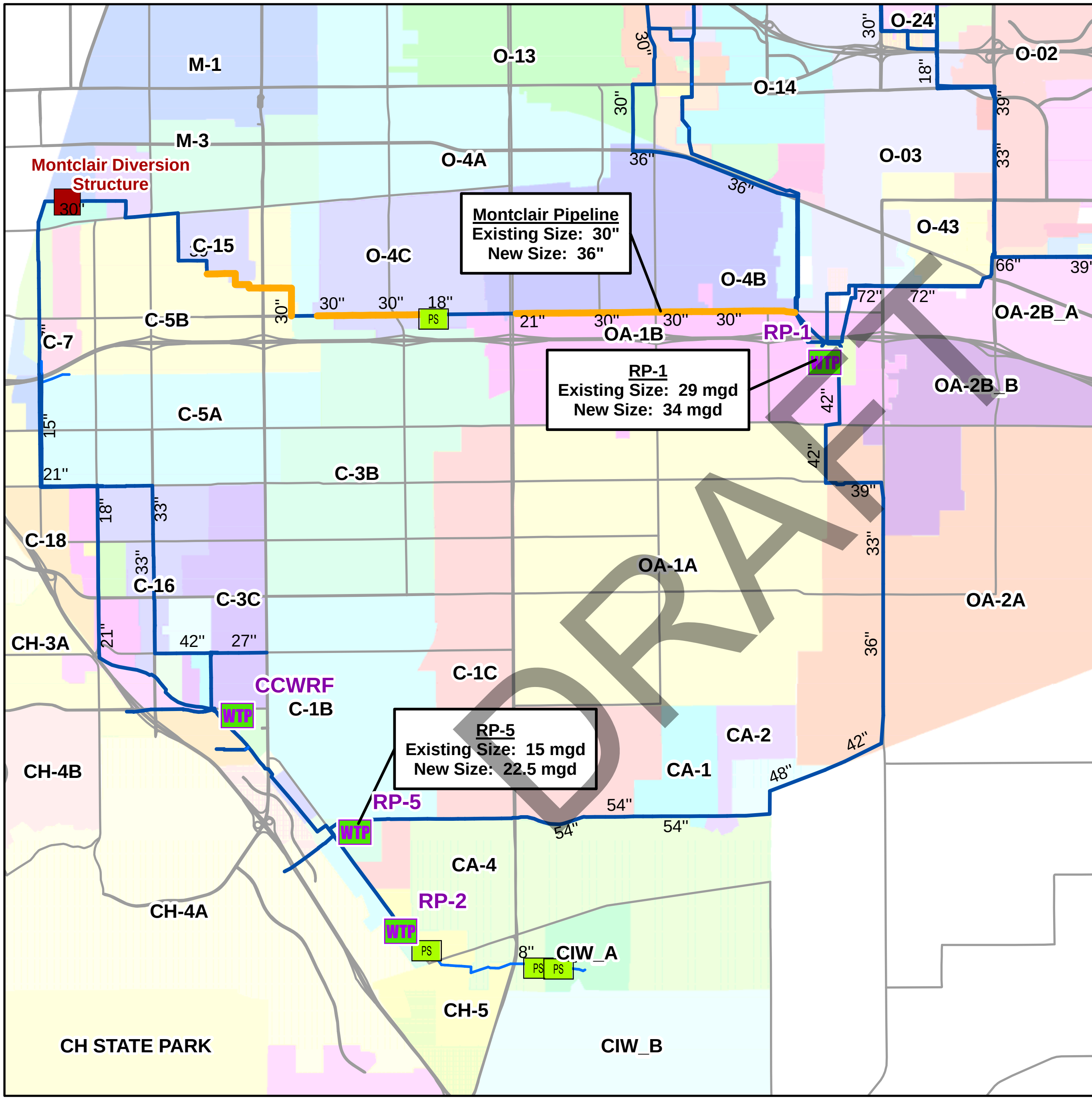
Alternative 3A – The infrastructure required for Alternative 3A includes a 17 mgd pump station located South of Edison Avenue and a 24-inch diameter forcemain to convey wastewater back to RP-1. RP-1 and RP-5 would require expansions of 10 mgd and 7.5 mgd, respectively. RP-1 would expand from 29 mgd to 39 mgd and RP-5 would expand from 15 mgd to 22.5 mgd. This alternative would also require upsizing the Montclair pipeline downstream of the Montclair pump station, from a 30-inch sewer to a 36-inch sewer. The added facilities are shown on Figure 3-4 at the end of this section.

Alternative 3B – Alternative 3B is similar to Alternative 3A in terms of the treatment plant expansions for RP-1 and the upsizing of the Montclair pipeline. However, this alternative would require a 29 mgd pump station, located near the flood control channel and Hellman Avenue, and a 30-inch diameter forcemain to convey flows to RP-1. This alternative would not require an expansion of RP-5. Alternative 3B would also include an upgrade of the Montclair pipeline downstream of the Montclair pump station from a 30-inch sewer to a 36-inch pipeline. The added facilities are shown on Figure 3-5 at the end of this section.

Alternative 3C – This Alternative would require an expansion of RP-1 by 15 mgd, from 29 mgd to 44 mgd, and installation of a 46 mgd wastewater pump station and 42-inch diameter forcemain. Alternative 3C would also include an upgrade of the Montclair pipeline downstream of the Montclair pump station, from a 30-inch sewer to a 36-inch pipeline. The added facilities are shown on Figure 3-6 at the end of this section.

Alternative 4A – This alternative assumes that 22 mgd of wastewater would be treated for groundwater recharge and pumped to RP-1 in a 24-inch diameter recycled water pipeline. There would also need to be a recycled water storage tank located at RP-5. RP-1 would need to be expanded by 5 mgd, from 29 to 34 mgd, and RP-5 would be expanded by 6.5 mgd, from 13 mgd to 19.5 mgd. The difference in the expansions for RP-5 in this alternative is the lower TIN limit of 5 mg/L for RP-5 discussed in the evaluation criteria section. Alternative 4A would also include an upgrade of the Montclair pipeline downstream of the Montclair pump station, from a 30-inch sewer to a 36-inch pipeline. The added facilities are shown on Figure 3-7 at the end of this section.

Alternative 4B – Similar to Alternative 4A, the infrastructure required for this alternative includes a 22 mgd recycled water pump station, and a 24-inch diameter recycled water pipeline and a recycled water storage tank. RP-1 would be expanded by 5 mgd from 29 mgd to 34 mgd, and RP-5 would increase by 13 mgd from 13 mgd to 26 mgd. This is the only alternative that does not require the expansion of the Montclair pipeline. The added facilities are shown on Figure 3-7.



Legend

- Montclair Capacity Deficiency
- Montclair Diversion Structure
- Regional Treatment Plant
- Lift Station

Modeled Pipelines

- 12" and Smaller
- 15" and Larger
- Major Roads
- IEUA Tributary Areas

Figure 3-2
Alternative 1
Infrastructure Implications

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

0 3,600 7,200 Feet

1 inch = 7,250 feet

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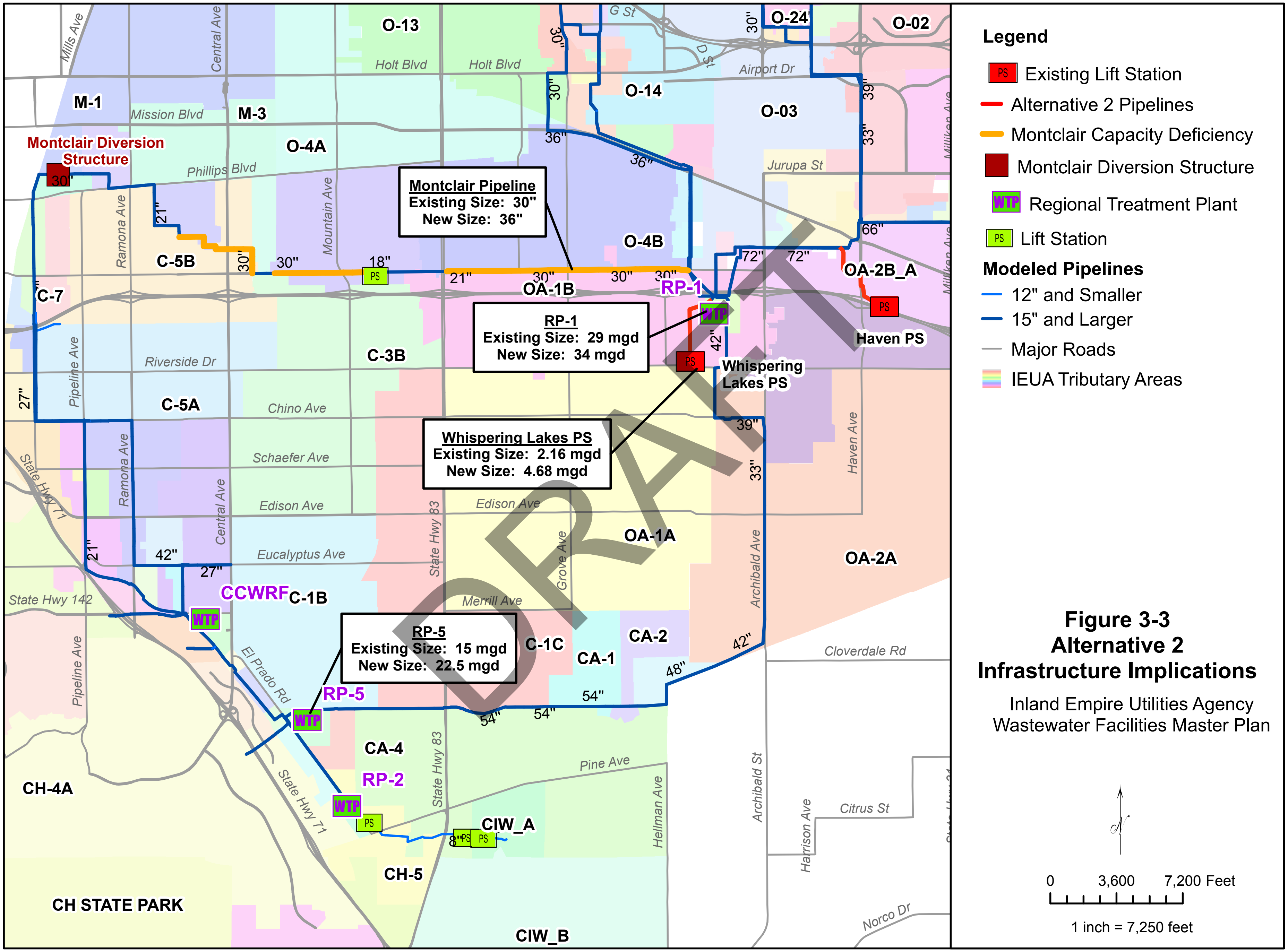

Figure 3-3
Alternative 2
Infrastructure Implications

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

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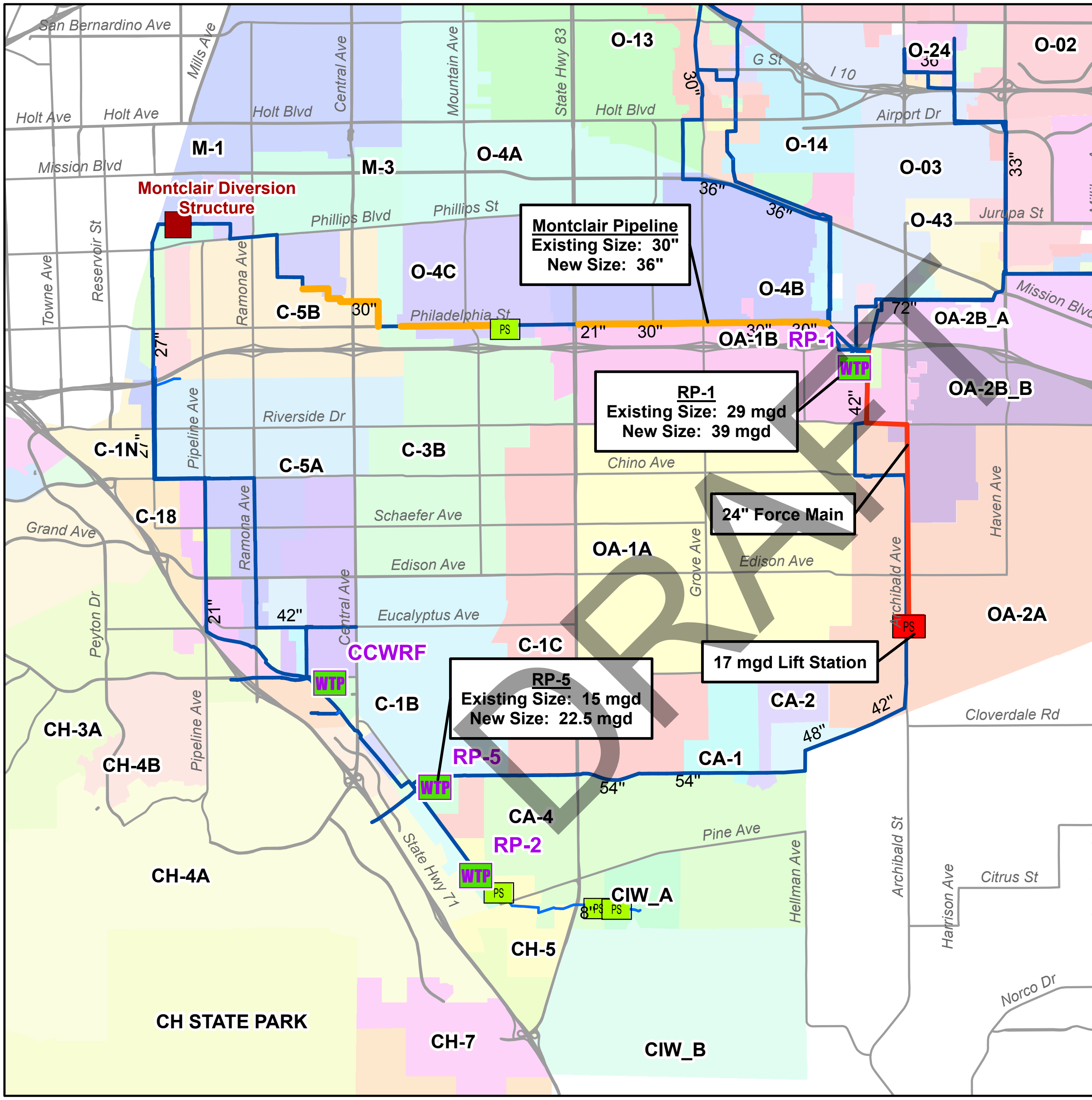

Legend

- Proposed Lift Station
- Alternative 3A Pipeline
- Montclair Capacity Deficiency
- Montclair Diversion Structure
- Regional Treatment Plant
- Lift Station

Modeled Pipelines

- 12" and Smaller
- 15" and Larger
- Major Roads
- IEUA Tributary Areas

Figure 3-4
Alternative 3A
Infrastructure Implications

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

0 3,000 6,000 Feet

1 inch = 8,123.13 feet

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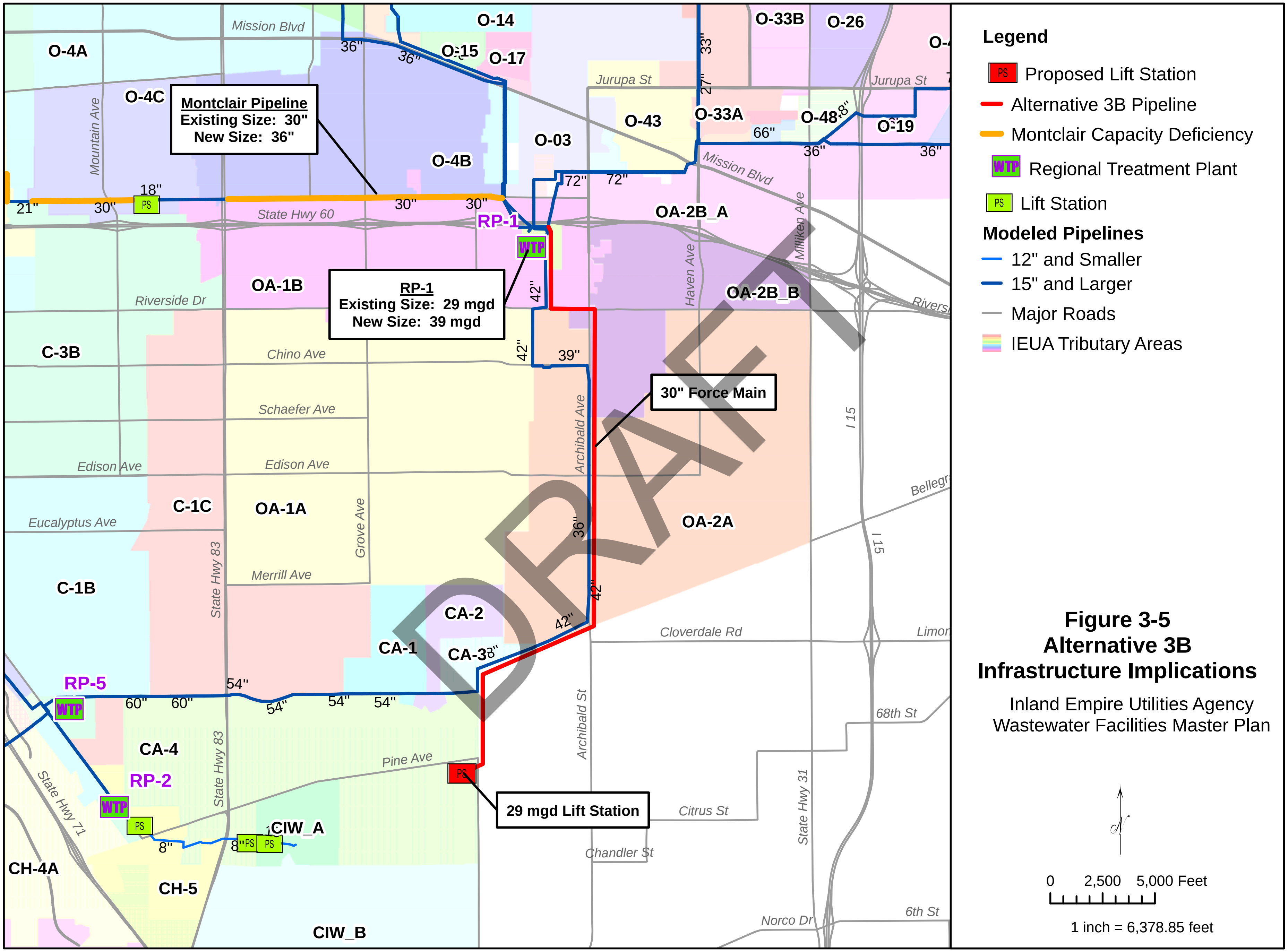

Figure 3-5
Alternative 3B
Infrastructure Implications

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

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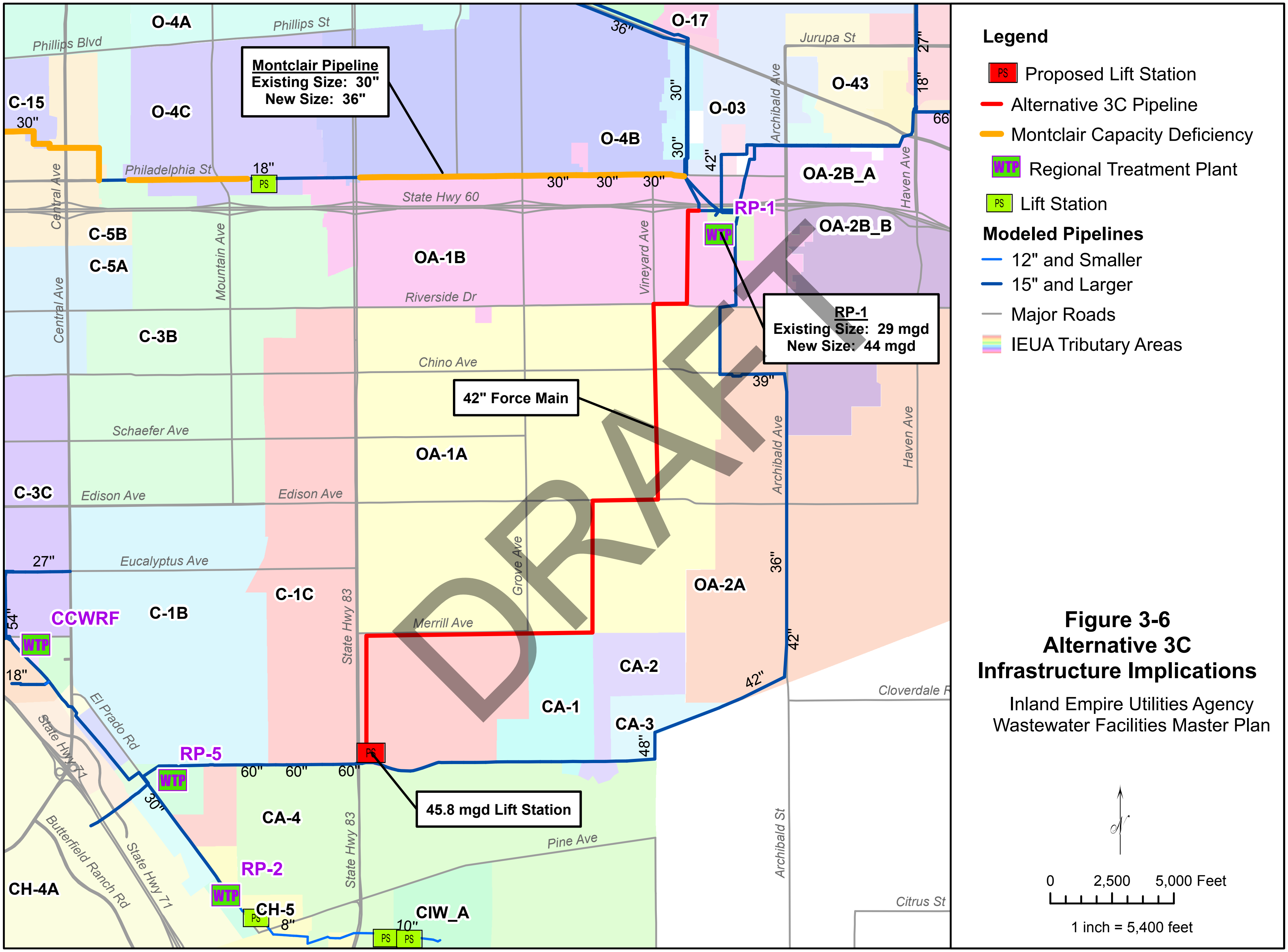

Figure 3-6
Alternative 3C
Infrastructure Implications
Inland Empire Utilities Agency
Wastewater Facilities Master Plan
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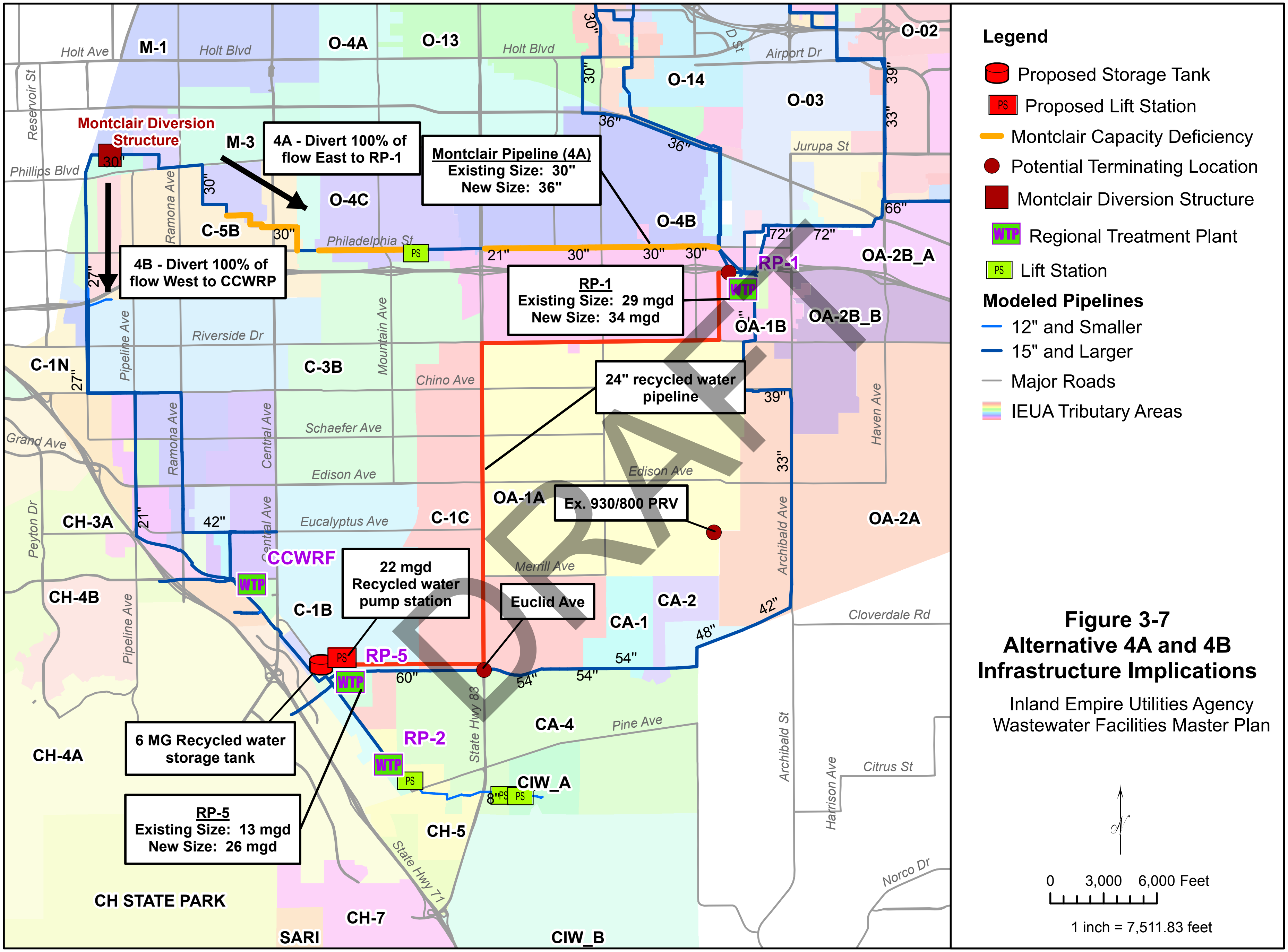

Figure 3-7
Alternative 4A and 4B
Infrastructure Implications

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

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4.3 Evaluation of Proposed Flow Diversion Alternatives

The Consultant Team used the SMART evaluation approach described above to conduct a non-monetary evaluation of the flow diversion alternatives. The non-monetary and monetary evaluations are summarized in this section of this technical memorandum. The non-monetary and monetary evaluations are ultimately combined as a means to develop a cost benefit analysis of the alternatives.

4.3.1 Non-monetary Evaluation

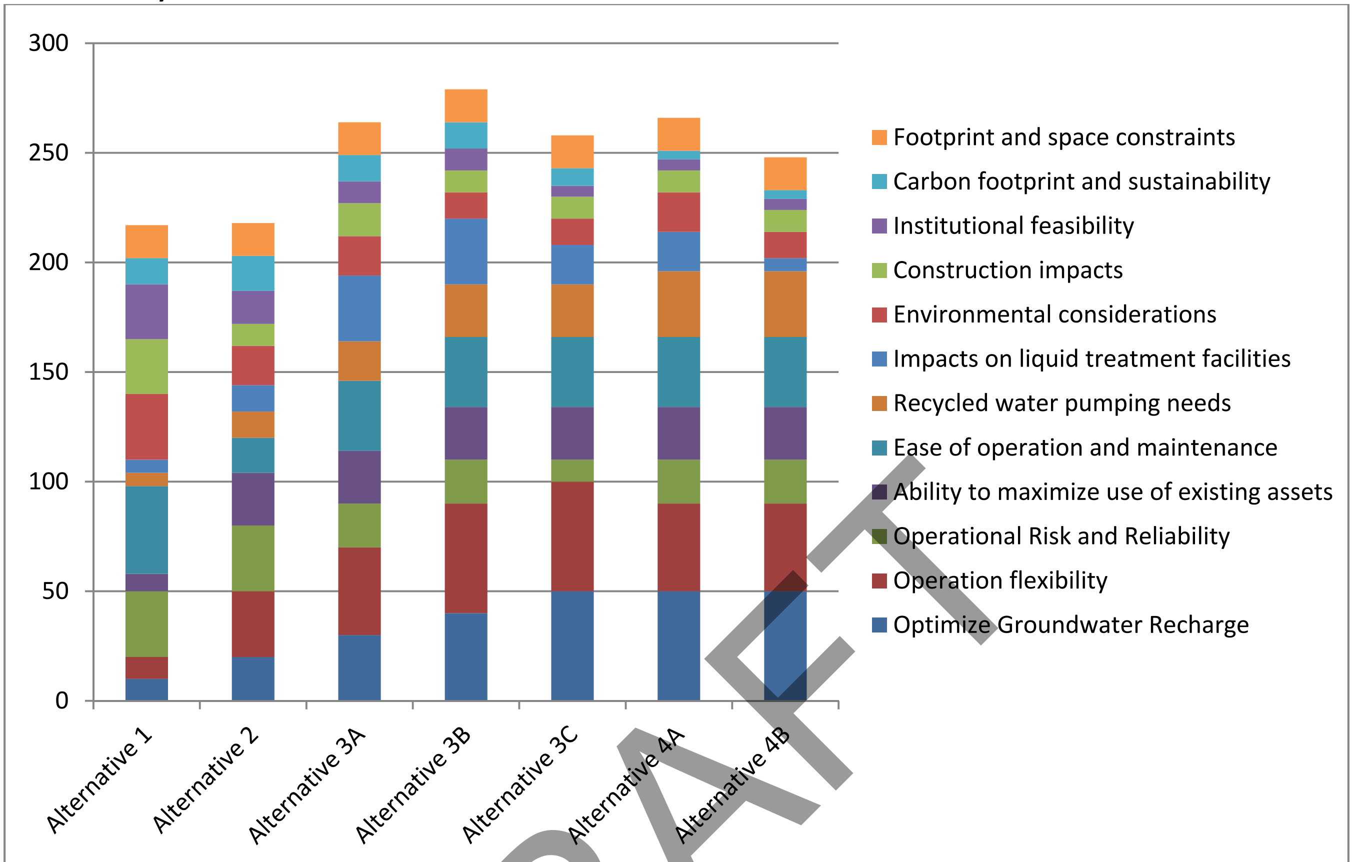
Each alternative was evaluated relative to one another using the SMART criteria described previously in this memorandum. Each evaluation criterion for each alternative was given a performance score between one (1) and five (5). The performance score was multiplied by the weighting factor for each criterion to develop a weighted score that criterion. The total weighted performance for each alternative was then determined by summing the weighted scores for each alternative. The results of the evaluations are summarized in Table 3-5.

As illustrated in Table 3-5, the scores ranged from a low for Alternative 1 of 217 to a high of 279 for Alternative 3B. Figure 3-8 depicts a summary of the relative weights of each criterion for each alternative. The bars show the contribution of each weighted score towards the total score for each alternative. As shown in the chart, Operational Flexibility, Optimizing Groundwater Recharge, and Ease of Operation and Maintenance had the biggest impact of the total performance scores for each alternative.

TABLE 3-5
Non-Monetary Evaluation Results

Criteria	Weighting Factor	Alternative 1		Alternative 2		Alternative 3A		Alternative 3B		Alternative 3C		Alternative 4A		Alternative 4B	
		Performance Score	Weighted Score	Performance Score	Weighted Score	Performance Score	Weighted Score	Performance Score	Weighted Score	Performance Score	Weighted Score	Performance Score	Weighted Score	Performance Score	Weighted Score
Optimize Groundwater Recharge	10	1	10	2	20	3	30	4	40	5	50	5	50	5	50
Operational Flexibility	10	1	10	3	30	4	40	5	50	5	50	4	40	4	40
Operational Risk and Reliability	10	3	30	3	30	2	20	2	20	1	10	2	20	2	20
Ability to maximize use of existing assets	8	1	8	3	24	3	24	3	24	3	24	3	24	3	24
Ease of operation and maintenance	8	5	40	2	16	4	32	4	32	4	32	4	32	4	32
Recycled water pumping needs	6	1	6	2	12	3	18	4	24	4	24	5	30	5	30
Impacts on liquid treatment facilities	6	1	6	2	12	5	30	5	30	3	18	3	18	1	6
Environmental considerations	6	5	30	3	18	3	18	2	12	2	12	3	18	2	12
Construction impacts	5	5	25	3	15	3	15	2	10	2	10	2	10	2	10
Institutional feasibility	5	5	25	3	15	2	10	2	10	1	5	1	5	1	5
Carbon footprint and sustainability	4	3	12	4	16	3	12	3	12	2	8	1	4	1	4
Footprint and space constraints	3	5	15	5	15	5	15	5	15	5	15	5	15	5	15
Total Weighted Performance			**217**		**223**		**264**		**279**		**258**		**266**		**248**

FIGURE 3-8
Non-Monetary Evaluation Results



4.3.2 Monetary Evaluation

The Monetary Evaluation included several assumptions that had an impact on the cost estimates. The assumptions included the following:

- The WFMP assumed a 20-year planning period
- 3% inflation rate
- 6% bond (interest) rate
- $10 per gallon for liquid treatment capacity costs
- Pump Station costs were based on a cost curve established from historical pump station projects
- Pipeline costs were developed based on the costs per linear foot for varying diameters
- Labor and Power costs were provided based on IEUA cost factors.
- 30% contingency for unknown conditions
- 30% contingency for Engineering, Construction Management, Environmental, and Legal costs

Based on the flow curves for each diversion alternative, the year in which each treatment plant expansion will be required was determined. For each alternative, the costs for expansion was escalated to the mid-point of construction using the inflation rate, and was brought back to present worth with the bond interest rate. Operations and maintenance and power costs were annualized and brought to a net present value in the same manner.

With this method, the total life cycle cost for each alternative was developed. The estimated cost for each alternative is summarized in Table 3-6. These cost estimates range from a high of $341 million for Alternative 3C to a low of $172 million for Alternative 1. Alternative 2 was the second lowest cost at $178 million. The unit costs and the detailed cost breakdown is provided in Appendix A of this TM. Benefit/cost ratios are explained in the next subsection.

TABLE 3-6
Life Cycle Cost and Benefit/Cost Ratio Summary

Alternative	Life Cycle Cost ($ Millions)	Benefit/Cost Ratio
1	$172	1.26
2	$178	1.25
3A	$261	1.01
3B	$219	1.28
3C	$341	0.76
4A	$265	1.00
4B	$335	0.74

4.3.3 Benefit/Cost Ratio

The non-monetary scores and monetary cost estimates were used to develop a benefit cost ratio as a means to determine the alternative with the highest overall benefit for IEUA. For each Alternative, the weighted performance score was divided by the estimated life cycle cost to determine the Benefit/Cost (B/C) Ratio. The calculated B/C ratio for each alternative is summarized in Table 3-6.

The alternative with the highest weighted score is Alternative 3B with a score of 1.28. Both Alternatives 1 and 2 also scored high, and close to Alternative 3B, with scores of 1.26 and 1.25 respectively.

5.0 Conclusions

The results of the flow diversion alternatives evaluation and the benefit cost analysis were presented to IEUA staff at the WFMP Workshop No. 2 on June 11, 2014. The benefit cost analysis scores for Alternatives 1, 2 and 3B are very similar and vary by only 0.03 points. IEUA discussed the alternatives and ultimately selected Alternative 2 as the preferred alternative. Alternative 2 provides IEUA with near term benefits in diverting flow from both the Whispering Lakes and Haven pump stations while prolonging the treatment expansion of RP-1 and RP-5. Alternative 2 also offers a lower capital cost than alternative 3B.

The preferred Alternative 2 includes the following improvements during the planning horizon:

- Expand RP-1 by 5.0 mgd
- Expand RP-5 by 7.5 mgd
- Upgrade the Whispering Lakes Pump Station to a firm capacity of 4.7 mgd
- Construct improvements to mitigate the deficiencies in the Montclair pipeline

In order to provide greater system reliability and redundancy, IEUA also requested that, for RP-5 facilities planning, the Consultant Team assume both the Whispering Lakes and Haven pump stations are offline, whereby the full flow is conveyed to RP-5 instead of RP-1. This flow condition is reflected in TM 4 Flow and Loading Forecast and forms the basis for establishing RP-5 facilities planning and expansion, hereinafter.

Appendix A
Cost Estimates

	Type of Improv.	Description / Limits	Ex. Size/ Diam.	New Size/ Diam.	Replace/ New	Length (ft)	2014 Cost	Potential Flows for GW Recharge AF
Proposed Alternatives								
Alternative 1								
	Expand	Expand RP-1 by 5 mgd	29 mgd	34.0 mgd	Rehab	-	$ 70,834,000.00	
	Expand	Expand RP-5 by 6.5 mgd	15 mgd	21.5 mgd	Rehab	-	$ 84,485,000.00	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 1 Total							**$ 172,449,000**	**None**
Alternative 2								
	Pump Station	Upgrade to 4.5mgd Firm Capacity	2.16 mgd	4.68 mgd	Rehab	-	$ 4,923,000	
	Maintanence	Pump Station Maintanence	-	-	-	-	$ 760,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 582,000	
	Expand	Expand RP-1 by 5 mgd	29 mgd	34.0 mgd	Rehab	-	$ 75,020,000	
	Expand	Expand RP-5 by 6.5 mgd	15 mgd	21.5 mgd	Rehab	-	$ 79,771,000	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 2 Total							**$ 178,186,000**	**42,559**
Alternative 3A								
	Force Main	South of Edision to RP-1	-	24 in	New	16,700	$ 10,118,000	
	Pump Station	13.8 mgd Firm Capacity	-	17.3 mgd	New	-	$ 7,258,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 3,981,000	
	Maintanence	Pump Station Maintanence	-	-	-	-	$ 1,120,000	
	Expand	Expand RP-1 by 10 mgd	29 mgd	39.0 mgd	Rehab	-	$ 150,041,000	
	Expand	Expand RP-5 by 6.5 mgd	15 mgd	21.5 mgd	Rehab	-	$ 71,116,000	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 3A Total							**$ 260,764,000**	**114,245**
Alternative 3B								
	Force Main	South of Pine Ave and Hellman Ave to RP-1	-	30 in	New	31,000	$ 28,069,000	
	Pump Station	22.9 mgd Firm Capacity	-	29 mgd	New	-	$ 12,033,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 9,622,208	
	Maintanence	Pump Station Maintanence				-	$ 1,857,000	
	Expand	Expand RP-1 by 10 mgd	29 mgd	39 mgd	Rehab	-	$ 150,040,758	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 3B Total							**$ 218,752,000**	**190,457**
Alternative 3C								
	Force main	Forcemain	-	42	New	35,000	$ 49,186,000	
	Pump Station	45.8 mgd Firm Capacity	-	57 mgd	New	-	$ 24,088,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 21,327,000	
	Maintanence	Pump Station Maintanence	-	-	-	-	$ 3,718,000	
	Expand	Expand RP-1 by 15 mgd	29 mgd	44 mgd	-	-	$ 225,061,000	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 3C Total							**$ 340,510,000**	**378,578**
Alternative 4A								
	Pump Station	24 mgd Recycled Water PS	-	22 mgd	New	-	$ 9,257,000	
	Eg. Basin	6 mgd Recycled Water Eq. basin	-	6 mgd	-	-	$ 10,100,000	
	Maintanence	Pump Station Maintanence	-	-	-	-	$ 1,429,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 23,316,000	
	Force main	Recycled Water Pipeline	-	30 in	New	43,500	$ 39,387,000	
	Expand	Expand RP-1 by 5 mgd	29 mgd	34.0 mgd	Rehab	-	$ 75,020,000	
	Expand	Expand RP-5 by 6.5 mgd	13	19.5 mgd	Rehab	-	$ 89,478,000	
	Upsize	Montclair Improvements	30 in	36 in	Replace	24,000	$ 17,130,000	
Alternative 4A Total							**$ 265,117,000**	**492,823**
Alternative 4B								
	Pump Station	24 mgd Recycled Water PS	-	22 mgd	New	-	$ 9,256,500	
	Eg. Basin	6 mgd Recycled Water Eq. basin	-	6 mgd	-	-	$ 10,100,000	
	Maintanence	Pump Station Maintanence	-	-	-	-	$ 1,429,000	
	Pump Station	Energy Consumption	-	-	-	-	$ 23,316,000	
	Expand	Expand RP-1 by 5 mgd	29 mgd	34.0 mgd	Rehab	-	$ 56,298,000	
	Expand	Expand RP-5 by 13 mgd	13 mgd	26.0 mgd	Rehab	-	$ 195,053,000	
	Force main	Recycled Water Pipeline		30 in	New	43,500	$ 39,387,000	
Alternative 4B Total							**$ 334,840,000**	**492,823**

IEUA Wastewater Facilities Master Plan
TM 4 Wastewater Flow and Loading Forecast

PREPARED FOR: Inland Empire Utilities Agency

PREPARED BY: CH2M HILL

DATE: August 21, 2014

Executive Summary

Analysis of the influent wastewater flow and quality data for each of the four treatment plants was conducted to establish average values and peaking factors. Results of the influent wastewater analysis presented in this Technical Memorandum (TM), as well as the results of the flow diversion alternatives analysis presented in TM 3 *Regional Trunk Sewer Analysis*, formed the basis of the treatment plant influent wastewater flow and loading forecast analysis presented herein. As discussed in TM 3, the Wastewater Facilities Master Plan (WFMP) planning effort will be based on the Inland Empire Utilities Agency (IEUA) preferred Flow Diversion Alternative 2, optimizing groundwater recharge by diverting flows from Whispering Lakes and Haven pump stations to Regional Water Recycling Plant (RWRP, or RP) RP-1. The corresponding influent wastewater flow and loading projections under this alternative for the planning year 2035, as well as for the 2060 ultimate buildout year, are presented in this TM and will form the basis of the master planning effort for each of the treatment plants.

The data analysis is based on two consecutive years of recent data provided by IEUA for influent flow and key wastewater quality constituents including biological oxygen demand (BOD), total organic carbon (TOC), total suspended solids (TSS), ammonia as nitrogen (NH3-N), and Total Kjehldahl Nitrogen (TKN). As discussed in TM 3, influent wastewater flows are projected to increase at the Carbon Canyon Water Recycling Facility (CCWRF) between 2020 and 2060 by about 15 percent, with more significant flow increases expected at RP-1, RP-4 and RP-5. The increase in flows to RP-4 by approximately 60 percent is largely attributable to the gradual incorporation of septic flows into the system beginning in 2020. RP-1 flows are projected to increase by 20 percent, and RP-5 flows are projected to more than double by year 2060 as a result of population growth in Chino and other areas served by RP-5.

1.0 Background and Objectives

IEUA owns and operates regional sewer pipelines and receives wastewater from the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills, and Cucamonga County Water District servicing the City of Rancho Cucamonga. Wastewater collected within these service areas is treated at one of the four regional water recycling plants. RP-1 and RP-4 serve the northern parts of the service area, while RP-5 and CCWRF serve the southern parts. Both RP-4 and CCWRF are designed to be scalping plants for RP-1 and RP-5, respectively.

The four RWRPs are interconnected in a regional network. IEUA staff routinely use the bypass and diversion facilities, such as the San Bernardino Lift Station, the Montclair Lift Station and Diversion Structure, and the Carbon Canyon bypass to optimize flow and capacity utilization within the system. For instance, RP-5 can receive bypassed flows from RP-1 (primary effluent) and CCWRF, in addition to receiving recycle flows from RP-2, the solids handling facility, and the RP-2 lift station flows. In general, flows are routed between RWRPs in order to optimize recycled water deliveries while minimizing overall pumping and treatment cost.

The objective of this TM is to summarize current influent wastewater flow and quality data for each of the four RWRPs, establish peaking factors, and develop flow and loading projections for the WFMP. The analysis is based on two consecutive years of recent data provided by IEUA for key wastewater quality constituents including

BOD, TOC, TSS, NH3-N, and TKN. Peaking factors are established for maximum month, maximum week, and maximum day conditions. Influent wastewater flow projections were developed by the IRP Consultant as part of the flow monitoring program, while the load projections are calculated based on these flow projections and analysis of the influent wastewater characteristics.

2.0 Overview of IEUA Wastewater System

Each of the four regional reclamation facilities is interconnected through an intricate network of diversion points within the member agency wastewater collection systems to enable plant influent flows to be shifted between the facilities in order to efficiently treat the wastewater and meet recycled water demands within the IEUA service area. A schematic of this network is depicted in Figure 4-1.

In order to effectively deliver recycled water to users in the north, IEUA uses both the San Bernardino Lift Station and the Montclair Lift Station to route additional wastewater to RP-1 and RP-4 where the groundwater recharge basins are located. A diversion structure located upstream of RP-1 allows IEUA to divert raw wastewater to RP-4 by way of the San Bernardino Lift Station. The RP-4 Influent Diversion Structure offers flexibility within the system to divert RP-4 influent flows downstream towards RP-1, thus enabling IEUA to control the volume of influent flow to RP-4.

The Montclair Lift Station intercepts raw wastewater from the cities of Montclair, Upland, and Chino and pumps them to RP-1 for treatment. A portion of the flows from Upland and Montclair can also be diverted to CCWRF by way of the Montclair Diversion Structure. Similar to RP-4, the CCWRF Influent Diversion Structure offers flexibility within the system to divert CCWRF influent flows to RP-5, thus enabling IEUA to control the influent flow to CCWRF. In addition, the Primary Effluent Diversion Structure at RP-1 offers IEUA flexibility to divert primary effluent from RP-1 to RP-5.

With bypassed and diverted flows ultimately reaching RP-5 from each of the upstream facilities as well as from the RP-2 Lift Station to the south, RP-5 is a critical treatment facility within the IEUA system. The flow diversion alternatives analysis presented in TM 3 evaluated options for diverting flow between the facilities to achieve greater reliability and redundancy within the system. The results of the flow diversion analysis, as well as the analysis of the current and projected influent wastewater flow and quality presented herein, will form the basis of the treatment plant capacity and expansion needs in subsequent TMs. A summary of the influent wastewater flow and quality for each RWRP and for the system as a whole is presented in the next section.

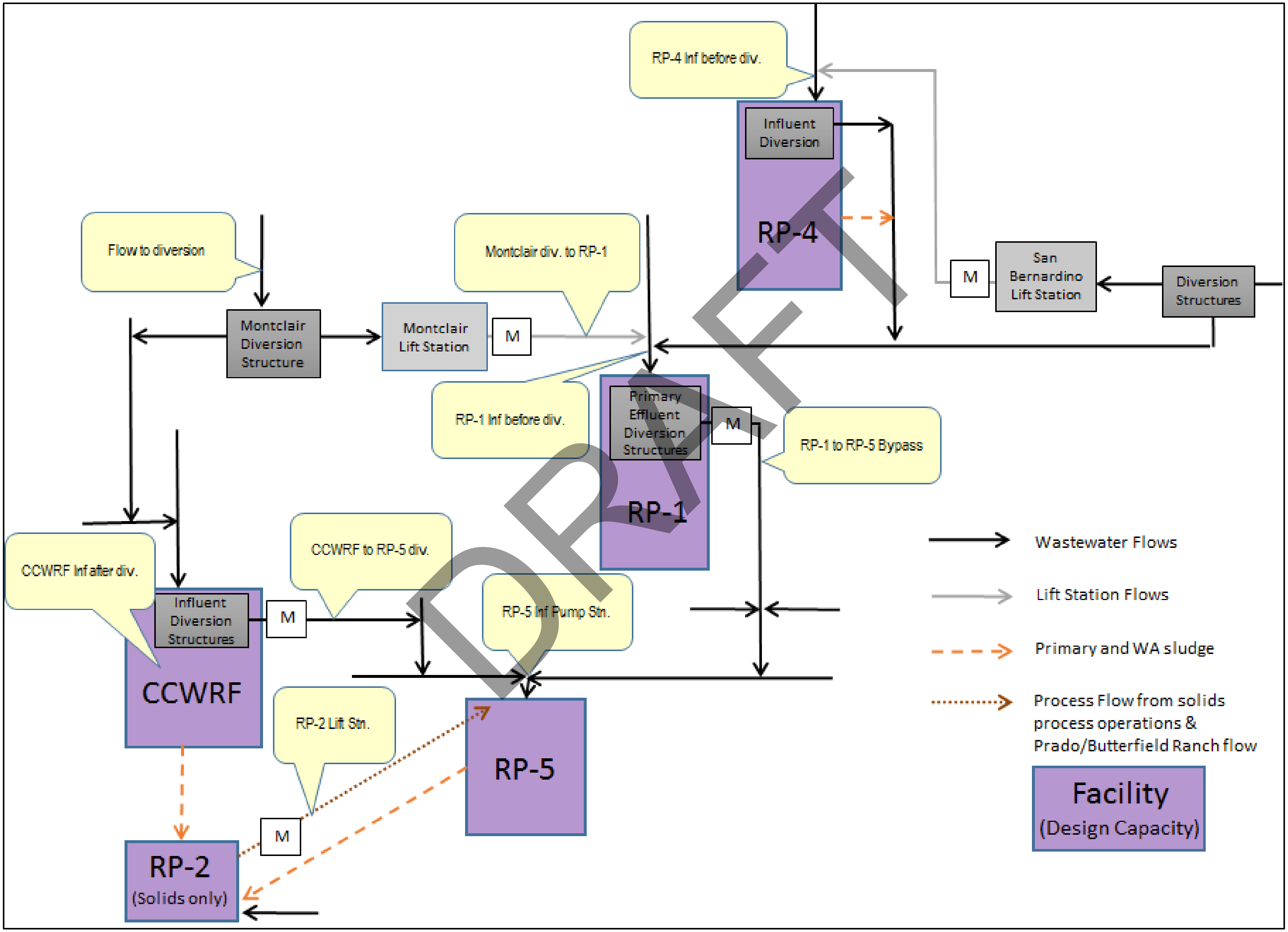
3.0 Influent Wastewater Flow and Quality

The Consultant Team reviewed the most recent two years of treatment plant flow and quality data to establish influent wastewater characteristics for each RWRP, which will form the basis of the treatment plant capacity evaluation conducted as part of the WFMP effort as well as the wastewater flow and loading projections presented in the next section. The recent data was analyzed to determine the annual average, maximum month, maximum week, and maximum day flows and corresponding peaking factors for each plant. Peaking factors are ratios of the particular flow or load event to the corresponding average values during the same time period. The same was done for the concentrations and loads for key constituents.

Plant influent flow data for the period of October 15, 2011 through October 15, 2013 was available on a daily basis for each of the RWRPs. Influent data for key parameters such as TOC, BOD, TSS, NH3-N, and TKN was also available for each plant. Constituent concentrations at each RWRP were measured using 24-hour composite samples collected and analyzed by plant personnel. The frequency at which these key parameters were measured during this time period varied from one time per week to three times per week depending on the plant and the constituent. Where BOD data was limited or unavailable, BOD concentrations were calculated using the measured influent TOC values and the parameter correlation currently employed by IEUA as provided in Equation 1. Review of the data indicated that this correlation is a good representation of influent BOD and was therefore used for this WFMP.

Influent BOD (mg/L) = 1.92 x TOC – 13.19 *Equation 1*

FIGURE 4-1
IEUA Existing Wastewater System Schematic



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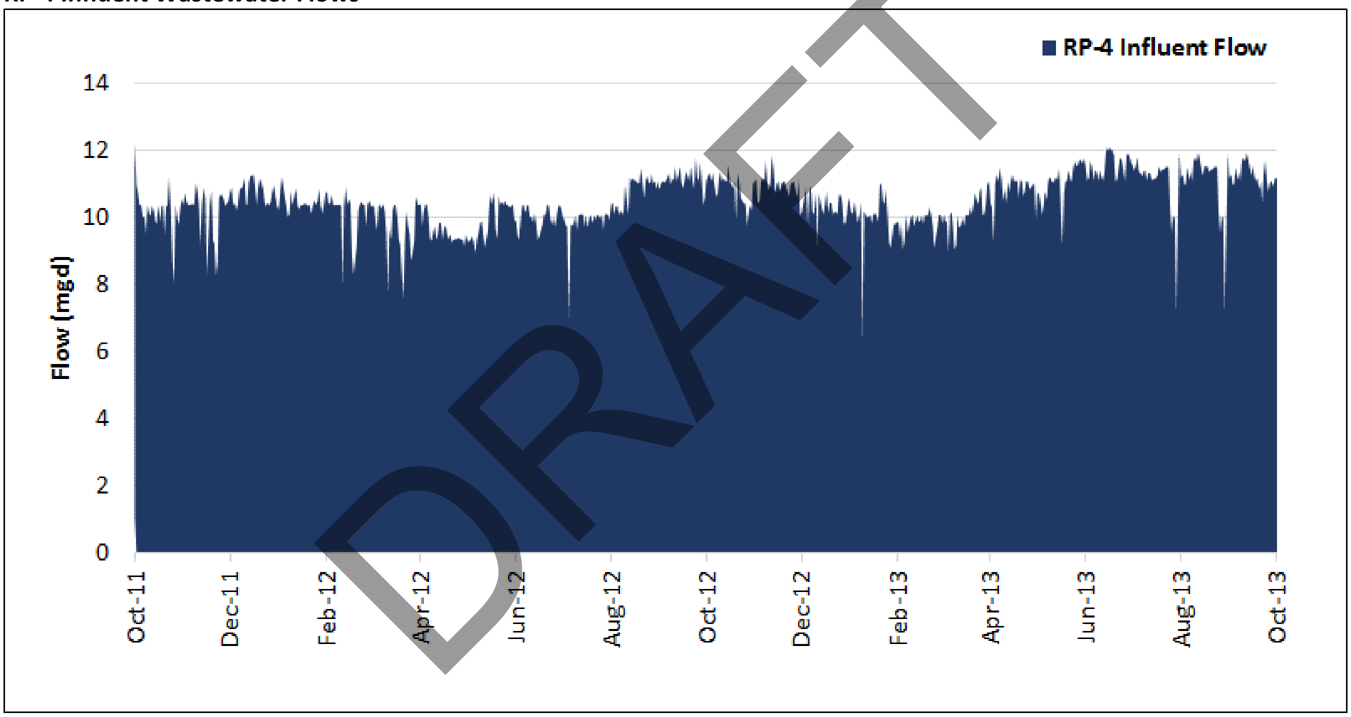
Observations for each plant are discussed below. In general, plant influent flows and constituent concentrations have remained relatively constant over the two year period. A discussion of these observations is presented herein for each RWRP, from upstream-most plant to downstream-most plant. A summary of the influent flows, concentrations, and loads in terms of annual average, maximum month, maximum week, maximum day, and corresponding peaking factors is presented in Tables 4-1, 4-2, and 4-3 for all RWRPs at the end of this section.

3.1 RP-4 Influent Wastewater Flow and Quality

With the ability to divert northern flows to either RP-1 or RP-4, and to bypass influent RP-4 flows to RP-1, IEUA is able to control the influent flow to RP-4. As shown in Figure 4-2, the daily average influent flow values reported at RP-4 have been fairly stable over the last two year period, generally ranging between 8 and 12 mgd with an annual average of 10.5 mgd. Because RP-4 serves as a scalping plant for RP-1, routine flow diversions occurred during the analysis period but are not depicted in the figure due to the fact that RP-4 influent flows are measured after flow diversion has taken place. A summary of the average and maximum influent flows is presented in Table 4-1 at the end of this section.

FIGURE 4-2
RP-4 Influent Wastewater Flows

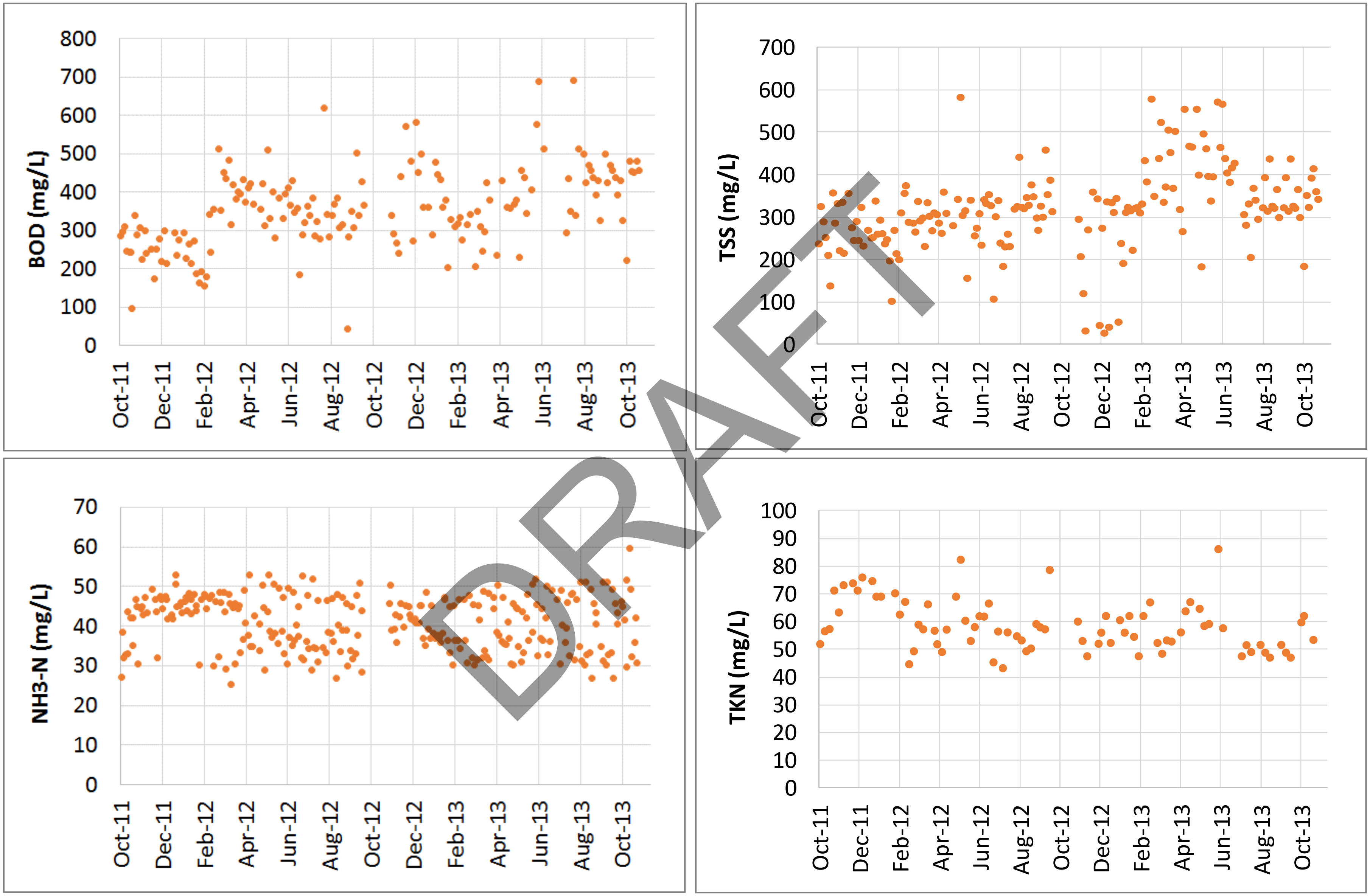


The RP-4 influent wastewater quality for BOD, TSS, NH3-N, and TKN concentrations over the recent two year period is presented in Figure 4-3. Concentrations for TKN, TSS, and NH3-N were reported once, twice, and three times per week, respectively. TOC data was also available twice per week, as well as limited BOD data. For those months where BOD was measured, BOD data was available twice per week. For dates when both TOC and BOD data were available, BOD measurements were used. For dates when only TOC data was available, BOD concentrations were calculated using IEUA's equation derived from the correlation between TOC and BOD.

As shown in the concentration plots, influent BOD, TSS, NH3-N, and TKN concentrations have remained fairly constant during the two year period. A summary of the average and maximum concentrations and calculated loads for each of these constituents is presented in Tables 4-2 and 4-3 at the end of this section.

FIGURE 4-3

RP-4 Influent Wastewater Quality



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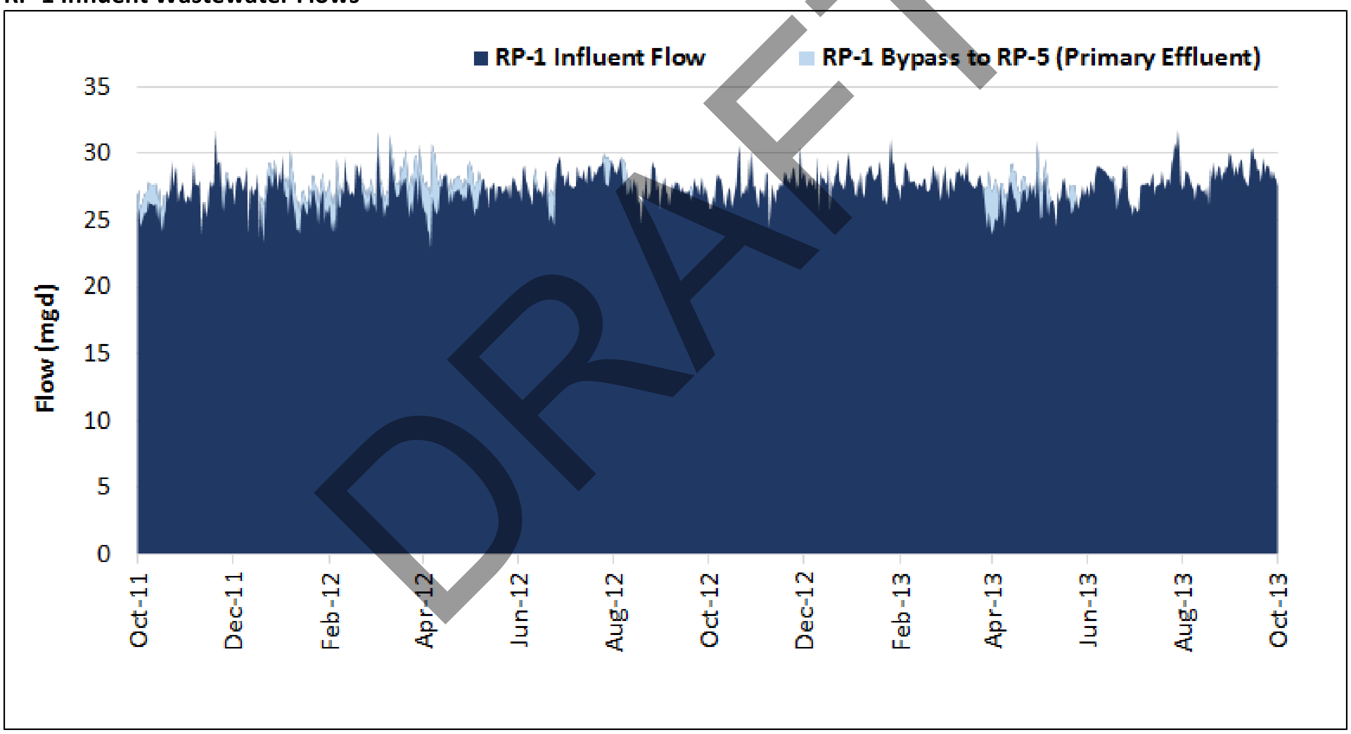
3.2 RP-1 Influent Wastewater Flow and Quality

As described previously, RP-1 has the ability to bypass primary effluent flows to RP-5 to provide relief at RP-1 and/or to perform maintenance activities. Northern flows can also be diverted upstream of RP-1. As shown in Figure 4-4, the daily average flow values reported at RP-1 have been fairly stable over the last two year period, generally ranging between 25 and 30 mgd with an average of 28 mgd.

Periodic bypasses of primary effluent from RP-1 to RP-5 were observed during this period, primarily due to maintenance activities at RP-1. In addition, there were two instances during April 2012 and April 2013 when non-routine bypasses of RP-1 primary effluent flow to RP-5 occurred to allow IEUA to conduct maintenance activities at RP-1. Each of these occurrences was captured in the data and is represented in the figure. The Consultant Team analyzed the data with and without these unique occurrences and determined they did not affect analysis results. Therefore, the analysis presented herein represents the entire two year data set including routine and non-routine bypasses from RP-1 to RP-5. A summary of the average and maximum influent flows is presented in Table 4-1 at the end of this section.

FIGURE 4-4
RP-1 Influent Wastewater Flows

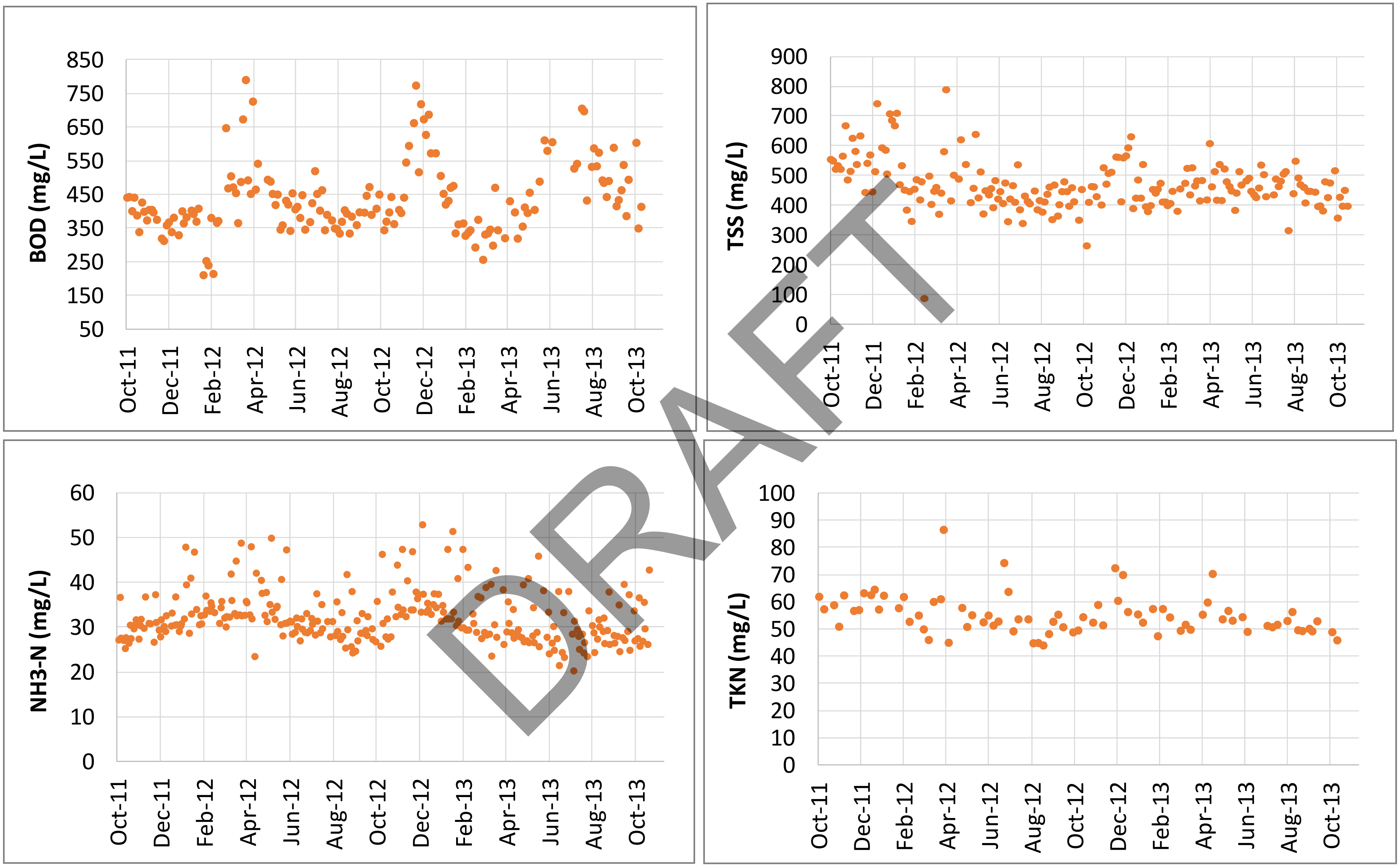


The RP-1 influent wastewater quality for BOD, TSS, NH3-N, and TKN concentrations over the recent two year period is presented in Figure 4-5. Concentrations for TKN, TSS, and NH3-N were reported once, twice, and three times per week, respectively. TOC data was also available twice a week, as well as limited BOD data. For those months where BOD was measured, BOD data was available twice a week. For dates when both TOC and BOD data were available, BOD measurements were used. For dates when only TOC data was available, BOD concentrations were calculated using IEUA's equation derived from the correlation between TOC and BOD.

As shown in the concentration plots, concentrations of BOD, TSS, NH3-N, and TKN have remained fairly constant over the two year period aside from a couple of peak events. A summary of the average and maximum concentrations and calculated loads for each of these constituents is presented in Tables 4-2 and 4-3 at the end of this section.

FIGURE 4-5

RP-1 Influent Wastewater Quality



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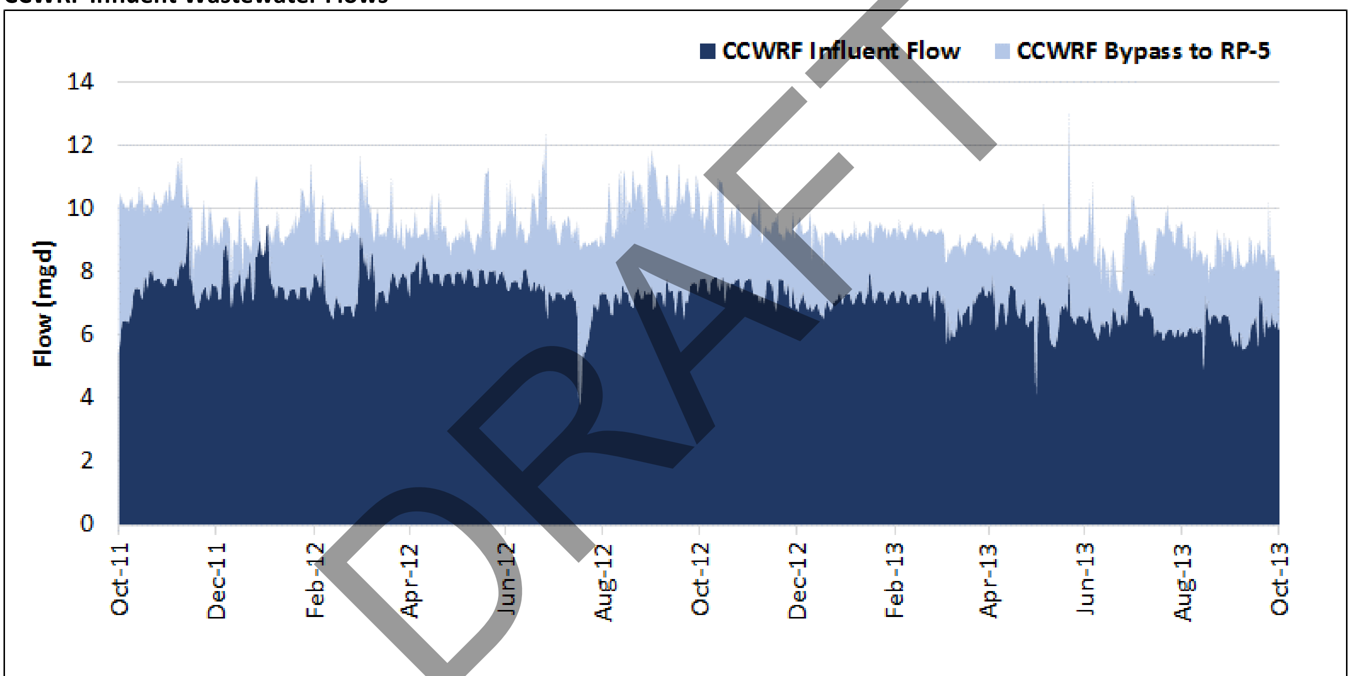
3.3 CCWRF Influent Wastewater Flow and Quality

The operational relationship between CCWRF and RP-5 in the south is similar to that between RP-4 and RP-1 in the north, with CCWRF and RP-4 operating as scalping plants for RP-5 and RP-1, respectively. As discussed previously, the Montclair Diversion Structure upstream of CCWRF allows IEUA to bypasses a portion of the northern flows south to CCWRF to provide relief capacity for the Montclair Lift Station and RP-1. The CCWRF Influent Diversion Structure at CCWRF also allows flows influent to CCWRF to be diverted south to RP-5, allowing IEUA to control the volume of influent flow to CCWRF.

As shown in Figure 4-6, the daily average flow values reported at CCWRF have been fairly stable over the last two year period, generally ranging between 6 and 8 mgd with an average of 7.2 mgd. Routine bypasses from CCWRF to RP-5 were observed during this two year period, averaging about 2.2 mgd. A summary of the average and maximum influent flows is presented in Table 4-1 at the end of this section.

FIGURE 4-6
CCWRF Influent Wastewater Flows

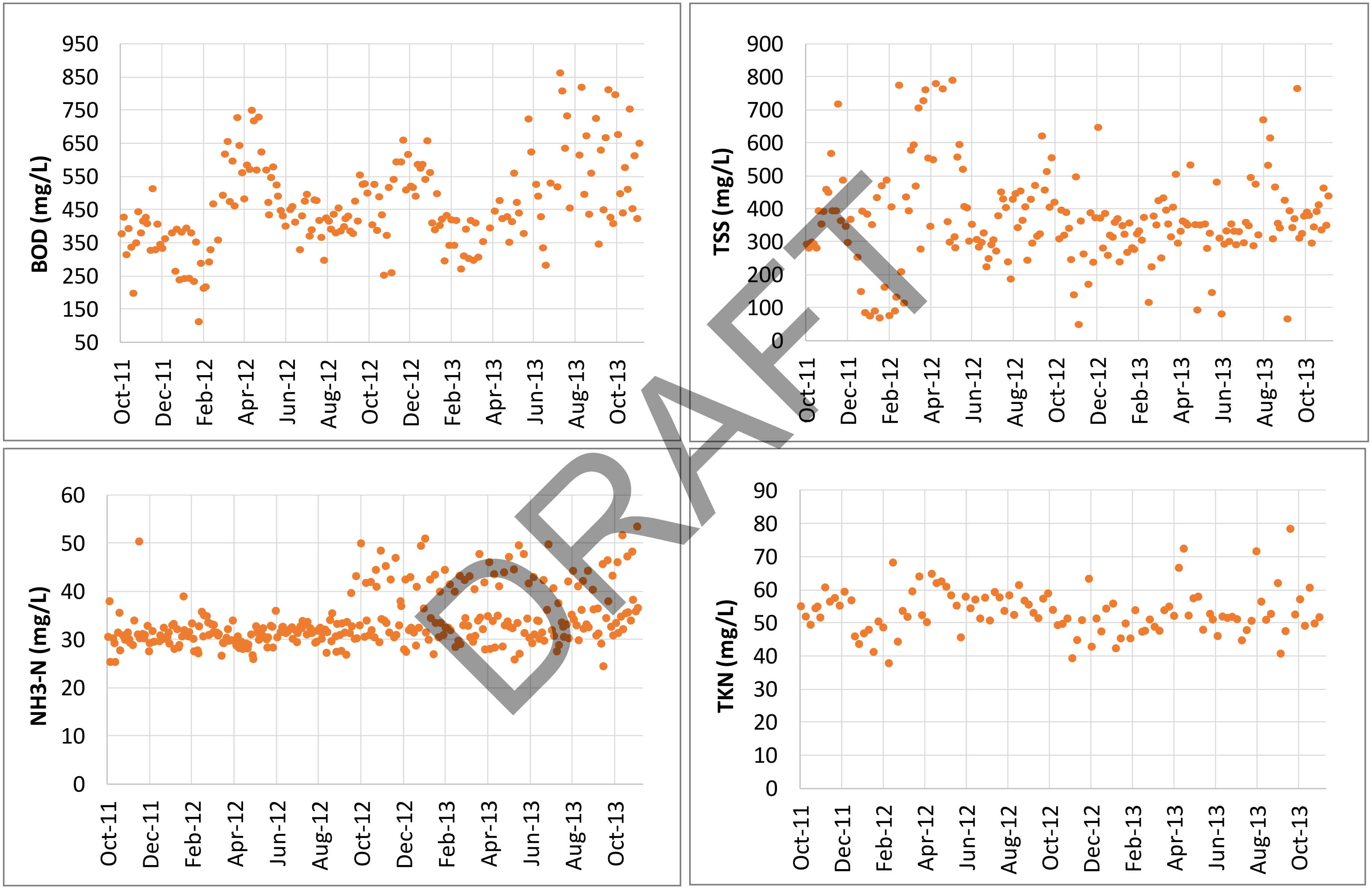


The CCWRF influent wastewater quality for BOD, TSS, NH3-N, and TKN concentrations over the recent two year period is presented in Figure 4-7. Concentrations for TSS and NH3-N were reported three times per week, while TKN was reported once per week. TOC data was also available three times per week, as well as limited BOD data. For those months where BOD was measured, BOD data was available three times per week. For dates when both TOC and BOD data were available, BOD measurements were used. For dates when only TOC data was available, BOD concentrations were calculated using IEUA's equation derived from the correlation between TOC and BOD.

Influent BOD, TSS, NH3-N, and TKN concentrations have remained fairly constant over the two year period. The high degree of variability in the CCWRF influent ammonia data is due to the sampling practices employed at the plant during this period. Beginning in October 2012, the reported ammonia concentrations were generally higher on Tuesdays because these represent grab samples rather than composite samples. A summary of the average and maximum concentrations and calculated loads for each of these constituents is presented in Tables 4-2 and 4-3 at the end of this section.

FIGURE 4-7

CCWRF Influent Wastewater Quality



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3.4 RP-5 Influent Wastewater Flow and Quality

With bypassed and diverted flows ultimately reaching RP-5 from each of the upstream facilities as well as from the RP-2 Lift Station to the south, RP-5 serves as the system sink with no ability to divert or bypass flows elsewhere within the system. RP-5 receives flows from its surrounding sewershed, as well as bypassed flows from CCWRF, RP-1, and the RP-2 Lift Station. Each of these sources is captured in the RP-5 data analysis and illustrated in Figure 4-8. The CCWRF bypass flows to RP-5 have been fairly constant over the two year period, except during October and November 2011 when greater flows from CCWRF and RP-1 were bypassed to RP-5 for maintenance related activities. RP-5 influent flows also spiked in April 2012 and April 2013 as a result of increased RP-1 bypass flows. However, the Consultant Team analyzed the data with and without these unique occurrences and determined they did not affect analysis results. Therefore, the analysis presented herein represents the entire two year data set including routine and non-routine bypasses to RP-5.

Routine flow diversions from CCWRF and the RP-2 Lift Station were observed during the two year period, with periodic bypasses from RP-1. For conservative planning purposes, the RP-5 influent flows presented in this analysis include raw wastewater contributions from the surrounding sewershed as well as bypassed flows from CCWRF and RP-1, in addition to RP-2 recycles and other flows from the RP-2 Lift Station. In general, RP-5 influent flows from all sources, as measured downstream of all diversions and bypasses, ranged between 8 and 12 mgd, with an average influent flow of 10 mgd. A summary of the average and maximum influent flows is presented in Table 4-1 at the end of this section.

The RP-5 influent wastewater quality for BOD, TSS, NH3-N, and TKN concentrations over the recent two year period is presented in Figure 4-9. Concentrations for TKN, TSS, and NH3-N were reported once, twice, and three times per week, respectively. TOC data was also available twice a week, as well as limited BOD data. For those months where BOD was measured, BOD data was available twice a week. For dates when both TOC and BOD data were available, BOD measurements were used. For dates when only TOC data was available, BOD concentrations were calculated using IEUA's equation derived from the correlation between TOC and BOD.

Influent concentrations of BOD, TSS, NH3-N, and TKN have remained fairly constant over the last two years. Higher TSS concentrations were observed in October and November of 2011 due to a temporary diversion of RP-1 flows and sludge to RP-5. A summary of the average and maximum concentrations and calculated loads for each of these constituents is presented in Tables 4-2 and 4-3 at the end of this section.

FIGURE 4-8
RP-5 Influent Wastewater Flows

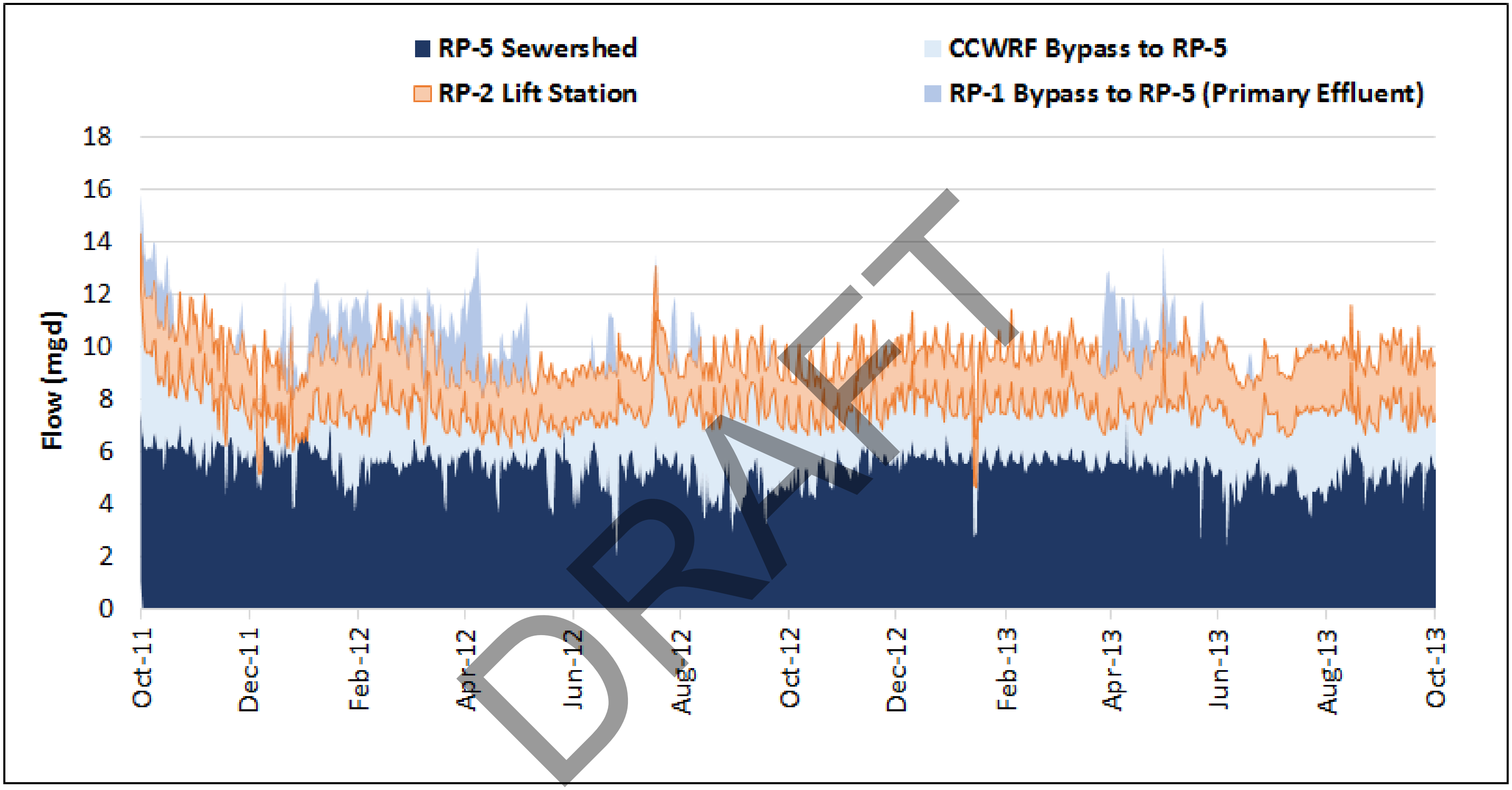
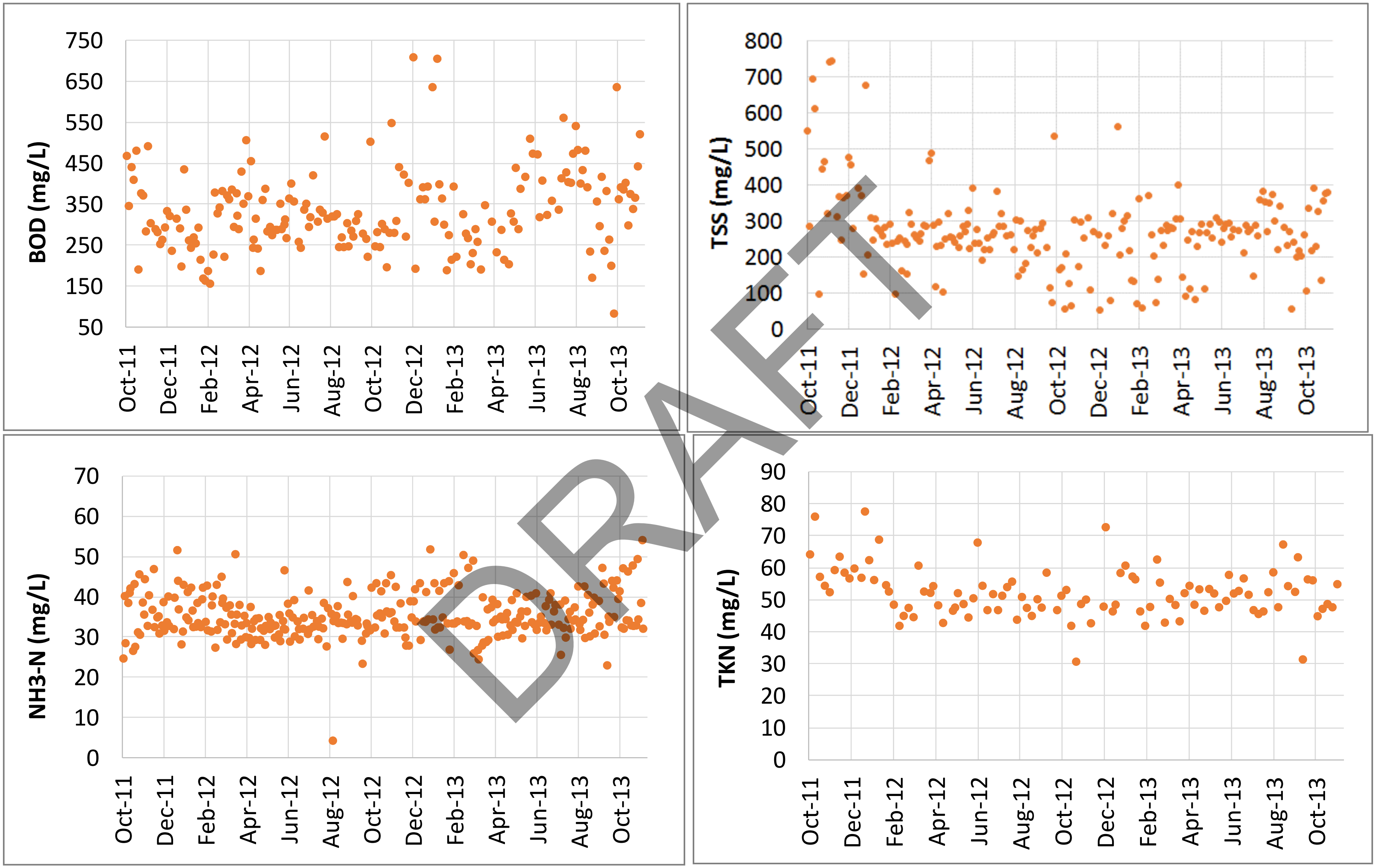


FIGURE 4-9

RP-5 Influent Wastewater Quality



3.5 Summary of Current Influent Wastewater Flows and Quality

In summary, each of the RWRPs exhibited fairly constant influent wastewater flows and constituent concentrations during the recent two year analysis period. A summary of the current influent wastewater flows is illustrated in Figure 4-10 for each plant and for the system as a whole. As depicted, the average influent flow for the entire system was about 56 mgd during the two year period, with most of the flows being treated at RP-1 and the least of the flows being treated at CCWRF. The average and maximum flows and peaking factors for each of the individual RWRPs are summarized in Table 4-1. Peaking factors were developed for maximum month, maximum week, and maximum day.

The average concentrations for key constituents including BOD, TSS, NH3-N, and TKN for each of the RWRPs are summarized in Table 4-2. For comparison, the concentrations established previously for the 2002 WFMP are also presented in Table 4-2. A comparison of the two analyses demonstrates a substantial increase in wastewater strength since the 2002 WFMP.

For analysis of the current wastewater loads, loads were calculated based on the reported influent flow and constituent concentration for each reporting day. Therefore, the average and maximum loads and peaking factors presented in Table 4-3 represent load characteristics as calculated from flow and concentration data. These load peaking factors formed the basis of the influent wastewater load projections discussed in the next section.

FIGURE 4-10
IEUA Current Influent Wastewater Flows

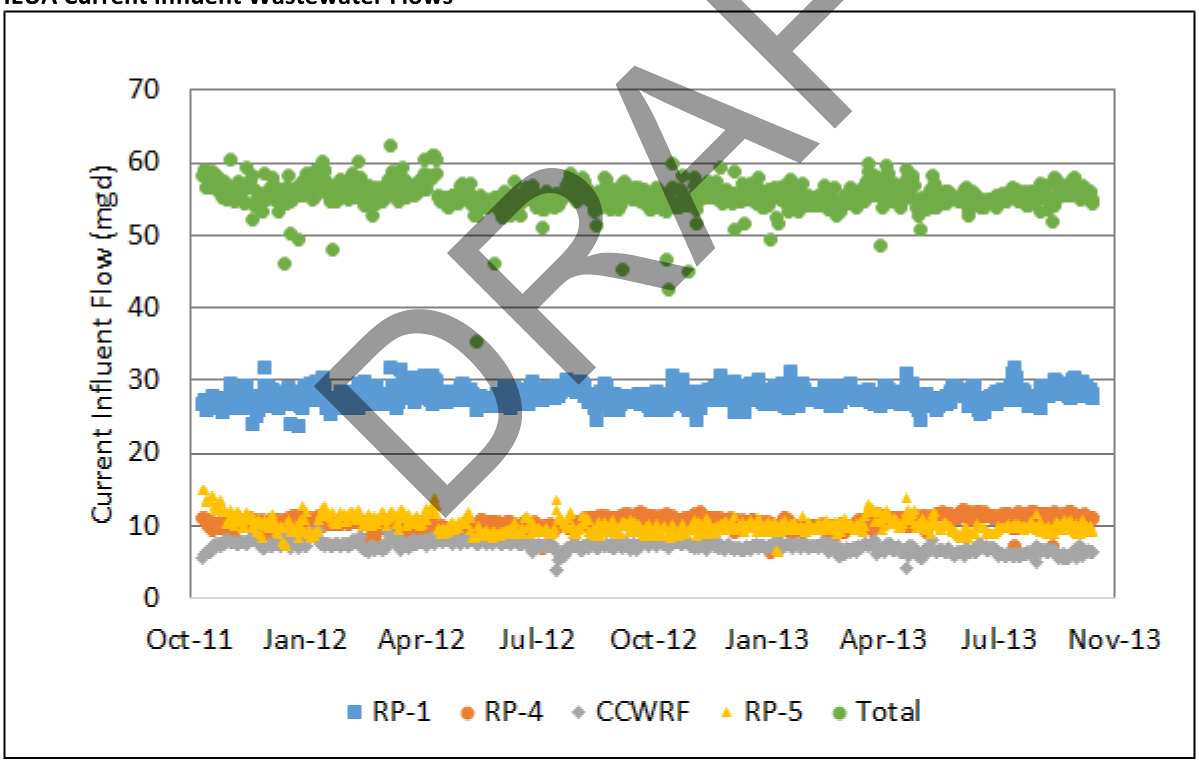


TABLE 4-1
Summary of Current Influent Wastewater Flows[1]

	RP-4		RP-1		CCWRF		RP-5	
	Peaking Factor	Influent Flow (mgd)	Peaking Factor	Influent Flow (mgd)	Peaking Factor	Influent Flow (mgd)	Peaking Factor	Influent Flow (mgd)
Annual Average	-	10.5	-	28	-	7.2	-	10.0
Max Month	1.10	11.6	1.04	29	1.13	8.1	1.27	12.8
Max Week	1.14	11.9	1.08	30	1.25	8.9	1.43	14.3
Max Day	1.15	12.1	1.14	32	1.34	9.6	1.47	14.8

Notes:
[1] Analysis based on plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.

TABLE 4-2
Summary of Influent Wastewater Concentrations[1,2]

	Average Influent Water Quality (mg/L)							
	RP-4		RP-1		CCWRF		RP-5	
	Current	**2002**	**Current**	**2002**	**Current**	**2002**	**Current**	**2002**
BOD	**352**	245	**434**	243	**455**	240	**321**	240
TSS	**318**	256	**472**	301	**367**	300	**267**	300
NH3-N	**41**	28	**32**	23	**34**	23	**35**	23
TKN	**59**	43	**55**	42	**53**	42	**52**	42

Notes:
[1] Current concentrations based on plant influent data provided by IEUA for the period between Oct 15, 2011 and Oct 15, 2013.
[2] 2002 wastewater characteristics as presented in the 2002 WFMP Volume II memoranda. RP-4 concentrations based on plant influent data between Aug 1999 and Jul 2001. RP-1 concentrations based on plant influent data between Jul 1999 and May 2001. CCWRF and RP-5 concentrations established under the assumption that raw wastewater received at most of IEUA's wastewater treatment plants shared the same characteristics.

TABLE 4-3
Summary of Current Influent Wastewater Loads[1,2]

	RP-4		RP-1		CCWRF		RP-5	
	Peaking Factor	Load (lb/day)	Peaking Factor	Load (lb/day)	Peaking Factor	Load (lb/day)	Peaking Factor	Load (lb/day)
BOD								
Annual Average	-	30,543	-	101,197	-	26,839	-	27,771
Max Month	1.85	56,393	1.53	155,195	1.58	42,479	1.79	49,636
Max Week	2.09	63,735	1.74	175,768	1.88	50,430	2.48	69,009
Max Day	2.12	64,696	1.90	191,964	1.99	53,289	2.31	64,209
TSS								
Annual Average	-	27,630	-	109,880	-	21,683	-	23,181
Max Month	1.59	43,963	1.38	151,459	1.88	40,837	2.47	57,295
Max Week	1.98	54,717	1.71	187,551	2.45	53,219	3.22	74,660
Max Day	1.98	54,717	1.71	187,551	2.45	53,219	3.48	80,742
NH3-N								
Annual Average	-	3,550	-	7,544	-	1,993	-	3,005
Max Month	1.24	4,393	1.20	9,045	1.21	2,413	1.35	4,043
Max Week	1.32	4,692	1.33	10,023	1.42	2,823	1.65	4,953
Max Day	1.57	5,566	1.63	12,276	1.64	3,262	1.70	5,112
TKN								
Annual Average	-	5,015	-	12,975	-	3,105	-	4,602
Max Month	1.46	7,322	1.24	16,027	1.28	3,963	1.60	7,349
Max Week	1.59	7,963	1.53	19,912	1.40	4,338	1.92	8,854
Max Day	1.59	7,963	1.53	19,912	1.40	4,338	1.92	8,854

Notes:
[1] Analysis based on plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013. Loads calculated from flow and concentration data.
[2] Maximum weekly and daily load values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.

4.0 Wastewater Flow and Loading Forecast

The Consultant Team developed flow and loading projections for each of the RWRPs based on the results of the flow diversion analysis presented in TM 3 as well as the influent wastewater analysis presented in the previous section. The results of the flow and loading forecast discussed in this section will form the basis of establishing the capacity and expansion needs for each of the four RWRPs as part of this WFMP effort.

Flow projections were developed by the IRP Consultant and are based on the average influent wastewater flows measured during the flow monitoring period in November 2013 and projected through the year 2060 using population, employment, and land use information. The year 2060 represents buildout or ultimate flows. A detailed discussion of the flow monitoring equipment, methodology, and data analysis is presented in the *IEUA IRP Temporary Flow Monitoring Report* (ADS, 2014). A discussion of the development of flow projections is presented in the *IEUA IRP Wastewater Flow Projections Technical Memorandum* (RMC 2013). These flow projections formed the basis of the flow diversion alternatives analysis presented in TM 3 *Regional Trunk Sewer Analysis* of the WFMP. Accordingly, several flow diversion alternatives were evaluated as part of this WFMP effort, each offering different means to divert flows to either RP-1 or RP-5 to optimize groundwater recharge and serve IEUA customers in each sewershed. As established in TM 3, IEUA's preferred flow diversion alternative is Alternative 2, whereby flows from the existing Whispering Lakes and Haven pump stations will be conveyed to RP-1, while maintaining flexibility in the system to convey flows south to RP-5 if needed.

Under Flow Diversion Alternative 2, the CCWRF influent wastewater flows are projected to increase between 2020 and 2060 by about 15 percent, with more significant flow increases expected at RP-1, RP-4 and RP-5. The increase in flows to RP-4 by approximately 60 percent is largely attributable to the gradual incorporation of septic flows into the system beginning in 2020. RP-1 flows are projected to increase by 20 percent, and RP-5 flows are projected to more than double by year 2060 as a result of population growth in Chino and other areas served by RP-5. The forecasted influent wastewater flows for Alternative 2 are summarized in Table 4-4 for each of the four RWRPs and for the overall system.

TABLE 4-4
Average Influent Wastewater Flow Projections for Preferred Flow Diversion Alternative 2[1]

Year	RP-1[2] (mgd)	RP-4[3] (mgd)	CCWRF (mgd)	RP-5 (mgd)	Total (mgd)
2020	30.4	11.7	6.9	10.2	**59.2**
2030	32.2	14.0	7.1	15.9	**69.2**
2035[4]	33.1	14.7	7.3	18.4	**73.5**
2040	34.0	15.4	7.4	20.9	**77.7**
2050	36.1	16.8	7.7	24.8	**85.4**
2060[4]	36.3	18.4	7.9	25.3	**87.9**

Notes:
[1] Analysis performed by IRP Consultant during November 2013 flow monitoring period. Values adjusted by IEUA to reflect normal bypass and diversion operations between plants.
[2] Assumes Whispering Lakes Pump Station and Montclair Pipeline infrastructure improvements discussed in TM 3 are complete and operational by 2020, with both pump stations online and conveying flow to RP-1.
[3] Includes septic flows tributary to RP-4, introduced in 2020 at 1 mgd and increasing by 0.5 mgd every 10 years through 2060.
[4] WFMP planning effort based on 2035 planning year. For site footprint planning considerations, the ultimate flows (i.e., 2060 flow values) constitute the basis of systems sizing and site space requirements.

At the request of IEUA, the Consultant Team evaluated as a subset of Alternative 2 the impact on RP-5 flow projections under the assumption that both the Whispering Lakes and Haven pump stations are offline. Under this scenario, the flows from each of these tributary areas would be conveyed to RP-5 rather than to RP-1. In order to provide greater system reliability and redundancy, RP-5 facilities planning will assume both pump stations are offline. These projected flows will form the basis for establishing RP-5 facilities planning and expansion needs in subsequent TMs, which will likely result in the need for RP-5 capacity enhancements to occur sooner. The RP-5 flow projections for the two scenarios (pump stations online and pump stations offline) are presented in Table 4-5.

TABLE 4-5
RP-5 Average Influent Wastewater Flow Projections for Preferred Flow Diversion Alternative 2

Year	RP-5 w/ Pump Stations Online (mgd)	RP-5 w/ Pump Stations Offline[1] (mgd)
2020	10.2	11.9
2030	15.9	17.7
2035[2]	18.4	20.2
2040	20.9	22.8
2050	24.8	26.7
2060[2]	25.3	27.2

Notes:
[1] Flow projections established for this scenario assumed both Whispering Lakes and Haven Pump Stations are offline.
[2] WFMP planning effort based on 2035 planning year. For site footprint planning considerations, the ultimate flows (i.e., 2060 flow values) constitute the basis of systems sizing and site space requirements.

The wastewater loading projections were developed for the four key wastewater parameters identified previously, for each of the four RWRPs for the 2035 planning year as well as the 2060 ultimate buildout year. These projections are based on the flow peaking factors presented in Table 4-1, the average influent wastewater constituent concentrations presented in Table 4-2, the load peaking factors presented in Table 4-3, and average influent wastewater flow projections established in Tables 4-4 and 4-5. The forecasted influent wastewater flow and loading values are summarized in Tables 4-6 through 4-10 for each of the four RWRPs and forms the basis of the master planning effort for each of these RWRPs in subsequent TMs. The results are presented below from upstream-most plant to downstream-most plant.

TABLE 4-6
RP-4 Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2

	Flows		Loads[1]							
			BOD		TSS		NH3-N		TKN	
	PF	mgd	PF	lb/day	PF	lb/day	PF	lb/day	PF	lb/day
Current (Based on 2011-2013 Data)										
Annual Average	-	10.5	-	30,543	-	27,630	-	3,550	-	5,015
Max Month	1.10	11.6	1.85	56,393	1.59	43,963	1.24	4,393	1.46	7,322
Max Week	1.14	11.9	2.09	63,735	1.98	54,717	1.32	4,692	1.59	7,963
Max Day	1.15	12.1	2.12	64,696	1.98	54,717	1.57	5,566	1.59	7,963
Projections (Planning Year: 2035)[2]										
Annual Average	-	14.7	-	43,207	-	38,948	-	5,010	-	7,186
Max Month	1.10	16.2	1.85	79,775	1.59	61,971	1.24	6,200	1.46	10,492
Max Week	1.14	16.7	2.09	90,161	1.98	77,132	1.32	6,621	1.59	11,410
Max Day	1.15	17.0	2.12	91,521	1.98	77,132	1.57	7,856	1.59	11,410
Projections (Planning Year: 2060)[3]										
Annual Average	-	18.4	-	54,082	-	48,752	-	6,271	-	8,994
Max Month	1.10	20.3	1.85	99,854	1.59	77,570	1.24	7,761	1.46	13,132
Max Week	1.14	20.9	2.09	112,855	1.98	96,546	1.32	8,288	1.59	14,282
Max Day	1.15	21.2	2.12	114,556	1.98	96,546	1.57	9,833	1.59	14,282

Notes:
[1] Maximum weekly and daily loading values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.
[2] Analysis based on average influent wastewater flow projections presented in Table 4-4 and the average concentrations and loading peaking factors established from plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.
[3] Site planning considerations will be based on the projections established for the 2060 ultimate planning year.

TABLE 4-7
RP-1 Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2

	Flows		Loads[1]							
			BOD		TSS		NH3-N		TKN	
	PF	mgd	PF	lb/day	PF	lb/day	PF	lb/day	PF	lb/day
Current (Based on 2011-2013 Data)										
Annual Average	-	27.8	-	101,197	-	109,880	-	7,544	-	12,975
Max Month	1.04	29.0	1.53	155,195	1.38	151,459	1.20	9,045	1.24	16,027
Max Week	1.08	30.0	1.74	175,768	1.71	187,551	1.33	10,023	1.53	19,912
Max Day	1.14	31.8	1.90	191,964	1.71	187,551	1.63	12,276	1.53	19,912
Projections (Planning Year: 2035)[2]										
Annual Average	-	33.1	-	119,771	-	130,296	-	8,937	-	15,249
Max Month	1.04	34.4	1.53	183,680	1.38	179,602	1.20	10,716	1.24	18,835
Max Week	1.08	35.7	1.74	208,029	1.71	222,400	1.33	11,875	1.53	23,401
Max Day	1.14	37.7	1.90	227,197	1.71	222,400	1.63	14,544	1.53	23,401
Projections (Planning Year: 2060)[3]										
Annual Average	-	36.3	-	131,350	-	142,893	-	9,801	-	16,723
Max Month	1.04	37.8	1.53	201,438	1.38	196,965	1.20	11,752	1.24	20,656
Max Week	1.08	39.1	1.74	228,141	1.71	243,900	1.33	13,023	1.53	25,663
Max Day	1.14	41.4	1.90	249,162	1.71	243,900	1.63	15,951	1.53	25,663

Notes:
[1] Maximum weekly and daily loading values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.
[2] Analysis based on average influent wastewater flow projections presented in Table 4-4 and the average concentrations and loading peaking factors established from plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.
[3] Site planning considerations will be based on the projections established for the 2060 ultimate planning year.

TABLE 4-8
CCWRF Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2

	Flows		Loads[1]							
			BOD		TSS		NH3-N		TKN	
	PF	mgd	PF	lb/day	PF	lb/day	PF	lb/day	PF	lb/day
Current (Based on 2011-2013 Data)										
Annual Average	-	7.2	-	26,839	-	21,683	-	1,993	-	3,105
Max Month	1.13	8.1	1.58	42,479	1.88	40,837	1.21	2,413	1.28	3,963
Max Week	1.25	8.9	1.88	50,430	2.45	53,219	1.42	2,823	1.40	4,338
Max Day	1.34	9.6	1.99	53,289	2.45	53,219	1.64	3,262	1.40	4,338
Projections (Planning Year: 2035)[2]										
Annual Average	-	7.3	-	27,708	-	22,353	-	2,048	-	3,257
Max Month	1.13	8.2	1.58	43,854	1.88	42,099	1.21	2,480	1.28	4,156
Max Week	1.25	9.1	1.88	52,063	2.45	54,863	1.42	2,901	1.40	4,550
Max Day	1.34	9.8	1.99	55,014	2.45	54,863	1.64	3,352	1.40	4,550
Projections (Planning Year: 2060)[3]										
Annual Average	-	7.9	-	29,985	-	24,190	-	2,217	-	3,524
Max Month	1.13	8.9	1.58	47,459	1.88	45,559	1.21	2,684	1.28	4,498
Max Week	1.25	9.8	1.88	56,342	2.45	59,373	1.42	3,139	1.40	4,924
Max Day	1.34	10.6	1.99	59,535	2.45	59,373	1.64	3,628	1.40	4,924

Notes:
[1] Maximum weekly and daily loading values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.
[2] Analysis based on average influent wastewater flow projections presented in Table 4-4 and the average concentrations and loading peaking factors established from plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.
[3] Site planning considerations will be based on the projections established for the 2060 ultimate planning year.

TABLE 4-9

RP-5 Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2 w/ Haven & WL PS Online

	Flows		Loads[1]							
			BOD		TSS		NH3-N		TKN	
	PF	mgd	PF	lb/day	PF	lb/day	PF	lb/day	PF	lb/day
Current (Based on 2011-2013 Data)										
Annual Average	-	10.0	-	27,771	-	23,181	-	3,005	-	4,602
Max Month	1.27	12.8	1.79	49,636	2.47	57,295	1.35	4,043	1.60	7,349
Max Week	1.43	14.3	2.48	69,009	3.22	74,660	1.65	4,953	1.92	8,854
Max Day	1.47	14.8	2.31	64,209	3.48	80,742	1.70	5,112	1.92	8,854
Projections (Planning Year: 2035)[2]										
Annual Average	-	18.4	-	49,290	-	40,964	-	5,422	-	8,036
Max Month	1.27	23.4	1.79	88,099	2.47	101,247	1.35	7,294	1.60	12,835
Max Week	1.43	26.3	2.48	122,483	3.22	131,932	1.65	8,937	1.92	15,463
Max Day	1.47	27.1	2.31	113,964	3.48	142,680	1.70	9,223	1.92	15,463
Projections (Planning Year: 2060)[3]										
Annual Average	-	25.3	-	67,774	-	56,326	-	7,456	-	11,050
Max Month	1.27	32.2	1.79	121,137	2.47	139,214	1.35	10,029	1.60	17,648
Max Week	1.43	36.1	2.48	168,415	3.22	181,406	1.65	12,288	1.92	21,261
Max Day	1.47	37.3	2.31	156,700	3.48	196,185	1.70	12,682	1.92	21,261

Notes:

[1] Maximum weekly and daily loading values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.

[2] Analysis based on average influent wastewater flow projections presented in Table 4-5 and the average concentrations and loading peaking factors established from plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.

[3] Site planning considerations will be based on the projections established for the 2060 ultimate planning year.

TABLE 4-10

RP-5 Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2 w/ Haven & WL PS Offline

	Flows		Loads[1]							
			BOD		TSS		NH3-N		TKN	
	PF	mgd	PF	lb/day	PF	lb/day	PF	lb/day	PF	lb/day
Current (Based on 2011-2013 Data)										
Annual Average	-	10.0	-	27,771	-	23,181	-	3,005	-	4,602
Max Month	1.27	12.8	1.79	49,636	2.47	57,295	1.35	4,043	1.60	7,349
Max Week	1.43	14.3	2.48	69,009	3.22	74,660	1.65	4,953	1.92	8,854
Max Day	1.47	14.8	2.31	64,209	3.48	80,742	1.70	5,112	1.92	8,854
Projections (Planning Year: 2035)[2]										
Annual Average	-	20.2	-	54,112	-	44,972	-	5,953	-	8,823
Max Month	1.27	25.7	1.79	96,718	2.47	111,151	1.35	8,007	1.60	14,090
Max Week	1.43	28.8	2.48	134,465	3.22	144,838	1.65	9,811	1.92	16,975
Max Day	1.47	29.8	2.31	125,113	3.48	156,638	1.70	10,125	1.92	16,975
Projections (Planning Year: 2060)[3]										
Annual Average	-	27.2	-	72,864	-	60,556	-	8,016	-	11,880
Max Month	1.27	34.7	1.79	130,234	2.47	149,669	1.35	10,782	1.60	18,973
Max Week	1.43	38.8	2.48	181,062	3.22	195,030	1.65	13,211	1.92	22,858
Max Day	1.47	40.1	2.31	168,468	3.48	210,918	1.70	13,634	1.92	22,858

Notes:

[1] Maximum weekly and daily loading values are based on limited data with sampling frequencies ranging between 1 and 3 times per week.

[2] Analysis based on average influent wastewater flow projections presented in Table 4-5 and the average concentrations and loading peaking factors established from plant influent data provided by IEUA for the period between October 15, 2011 and October 15, 2013.

[3] Site planning considerations will be based on the projections established for the 2060 ultimate planning year.

6.0 Conclusions

As discussed in TM 3, the WFMP planning effort will be based on IEUA's preferred Flow Diversion Alternative 2, optimizing groundwater recharge by diverting flows from Whispering Lakes and Haven pump stations to RP-1. The corresponding influent wastewater flow and loading projections under this alternative for the planning year 2035 are presented in this TM and will form the basis of the master planning effort for each of the RWRPs in subsequent TMs. Projections are also presented for the 2060 ultimate buildout year, which will be used for site planning considerations. In order to provide greater system reliability and redundancy, RP-5 facilities planning will assume both the Whispering Lakes and Haven pump stations are offline. These projected flows will form the basis for establishing RP-5 facilities planning and expansion needs conducted as part of this WFMP effort.

7.0 References

ADS Environmental Services (ADS). January 2014. *IEUA IRP Temporary Flow Monitoring Report.* Prepared for RMC Water and Environment and IEUA for the Flow Monitoring Period between October 25, 2013 and November 7, 2013.

RMC Water and Environment (RMC). December 2013. *Technical Memorandum: IEUA IRP Wastewater Flow Projections.* Prepared for IEUA.

IEUA Wastewater Facilities Master Plan
TM 5 RP-1 Future Plans

PREPARED FOR:	Inland Empire Utilities Agency
PREPARED BY:	CH2M HILL
DATE:	October 31, 2014

Executive Summary

Regional Water Recycling Plant No. 1 (RP-1) has undergone many expansions since its initial construction in 1948 to serve the needs of the Cities of Ontario, Rancho Cucamonga, Upland, Fontana, Montclair, and Chino. RP-1 includes both liquid treatment and solids handling facilities, receiving and treating wastewater flows from tributary communities and Regional Water Recycling Plant No. 4 (RP-4). RP-1 also includes primary and secondary flow equalization which currently exhibit odor and lagoon maintenance challenges. This technical memorandum (TM) evaluates alternatives for improving RP-1 flow equalization, identifies RP-1 plant expansion projects within the 20-year planning period, and provides preliminary capital cost estimates for the projects. Information from this TM will be incorporated into the updated 20-year Capital Improvements Program (CIP).

The current and future flows and loads for RP-1 were estimated in *TM 4 Wastewater Flow and Loading Forecast*. An analysis of the influent wastewater characteristics at RP-1 was conducted to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and the 2060 ultimate buildout year. The influent flow and loading projections and the effluent requirements detailed in the Santa Ana Regional Water Quality Control Board (RWQCB) Order No. R8-2009-0021 were used to evaluate the existing capacities of the RP-1 liquid treatment facilities. The estimated capacities were then compared to the projected flow and loads to determine the RP-1 facilities that require expansion within the 20-year planning period, and when those facilities would need to be online.

A nonmonetary evaluation of potential RP-1 flow equalization alternatives identified Alternative 3 (eliminating primary effluent equalization by adding secondary clarifiers, and converting the existing lagoons to secondary effluent equalization or recycled water storage) as being the most favorable alternative. This alternative offers a sustainable and cost-effective approach that significantly eliminates plant odors from primary effluent storage and pumping, and frees up the existing lagoons for other flow management needs such as secondary effluent or recycled water storage.

Three plant expansion projects were identified during the 20-year CIP: the RP-1 Primary Effluent Equalization Elimination Project, the RP-1 Liquid Treatment Expansion Project, and the RP-1 Solids Treatment Expansion Project. Together, these projects would include modifications to primary flow equalization piping and pumping systems to be able to use the lagoons for secondary effluent equalization, as well as construction of a new membrane bioreactor (MBR) facility, secondary clarifiers, and anaerobic digesters. The capital costs included in the 20-year CIP for these projects are summarized in Table 5-1.

The evaluation of RP-1 identified three main conclusions:

- Elimination of existing primary effluent flow equalization by adding secondary clarifiers and converting the existing lagoons to secondary effluent equalization or recycled water storage is the most favorable alternative.
- The RP-1 liquid treatment facilities will need to be expanded during the 20-year planning period with the construction of a new MBR facility (Train D).
- The RP-1 solids treatment facilities will need to be expanded during the 20-year planning period with the construction of new anaerobic digesters.

TABLE 5-1
RP-1 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-1 Primary Effluent Equalization Elimination Project	RP-1 Liquid Treatment Expansion Project	RP-1 Solids Treatment Expansion Project
Total Direct Cost[a]	$12,366,000	$28,890,000	$9,450,000
Total Estimated Construction Cost[b]	$20,739,000	$48,450,000	$15,848,000
Total Estimated Project Costs	$26,961,000	$62,985,000	$20,602,000

TABLE 5-1
RP-1 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-1 Primary Effluent Equalization Elimination Project	RP-1 Liquid Treatment Expansion Project	RP-1 Solids Treatment Expansion Project

[a] *Engineering-News Record* Construction Cost Index (ENR CCI) for Los Angeles (August 2014 - 10,737).

[b] Cost does not include escalation to midpoint of construction.

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

1.0 Background and Objectives

The Inland Empire Utilities Agency (IEUA) contracted with CH2M HILL and Carollo Engineers (Consultant Team) to develop a Wastewater Facilities Master Plan (WFMP). The objective of the WFMP is to plan IEUA's wastewater treatment and conveyance improvements and develop a capital program. The capital program will guide IEUA in the development of major improvements to their treatment and conveyance facilities. There are five specific goals for this TM:

- Summarize information from TMs 1 through 4 as it pertains to RP-1.
- Evaluate the current capacities and limitations of the existing facilities.
- Evaluate three alternatives for improving RP-1 flow equalization.
- Determine treatment facilities required to treat projected flows and loads through planning year 2035.
- Estimate timing and preliminary capital costs for plant expansion projects required during the 20-year planning period.

2.0 RP-1 Overview

RP-1 was originally constructed in 1948 and has undergone many expansions and improvements over the years to serve the needs of the Cities of Ontario, Rancho Cucamonga, Upland, Fontana, Montclair, and Chino. The treatment plant includes preliminary, primary, secondary, and tertiary liquid treatment facilities, and primary and secondary solids treatment facilities. The liquid facilities are designed to produce an effluent quality meeting Title 22 standards for spray irrigation, nonrestricted recreational and landscape impoundments, and groundwater recharge. The solids handling facilities are operated to achieve Class B biosolids, which are trucked to Inland Empire Regional Composting Facility (IERCF) for further treatment and composting. A schematic of the RP-1 facility process flow diagram is shown in Figure 5-1.

2.1 Liquid Treatment Facilities

Preliminary treatment at RP-1 involves flow measurement using two Parshall flumes, screening that consists of four mechanical and two manual bar screens, and grit removal consisting of an aerated grit chamber and a vortex-type grit basin. Foul air from the preliminary and primary treatment facilities is sent to a chemical scrubber or biofilter for treatment and discharge. Primary treatment consists of 10 rectangular primary clarifiers and 2 circular primary clarifiers. Ferric chloride and polymer are added upstream of the primary clarifiers to improve settling performance and reduce hydrogen sulfide and odors in digester gas in the solids handling facilities. Primary effluent flow can be equalized using two equalization basins.

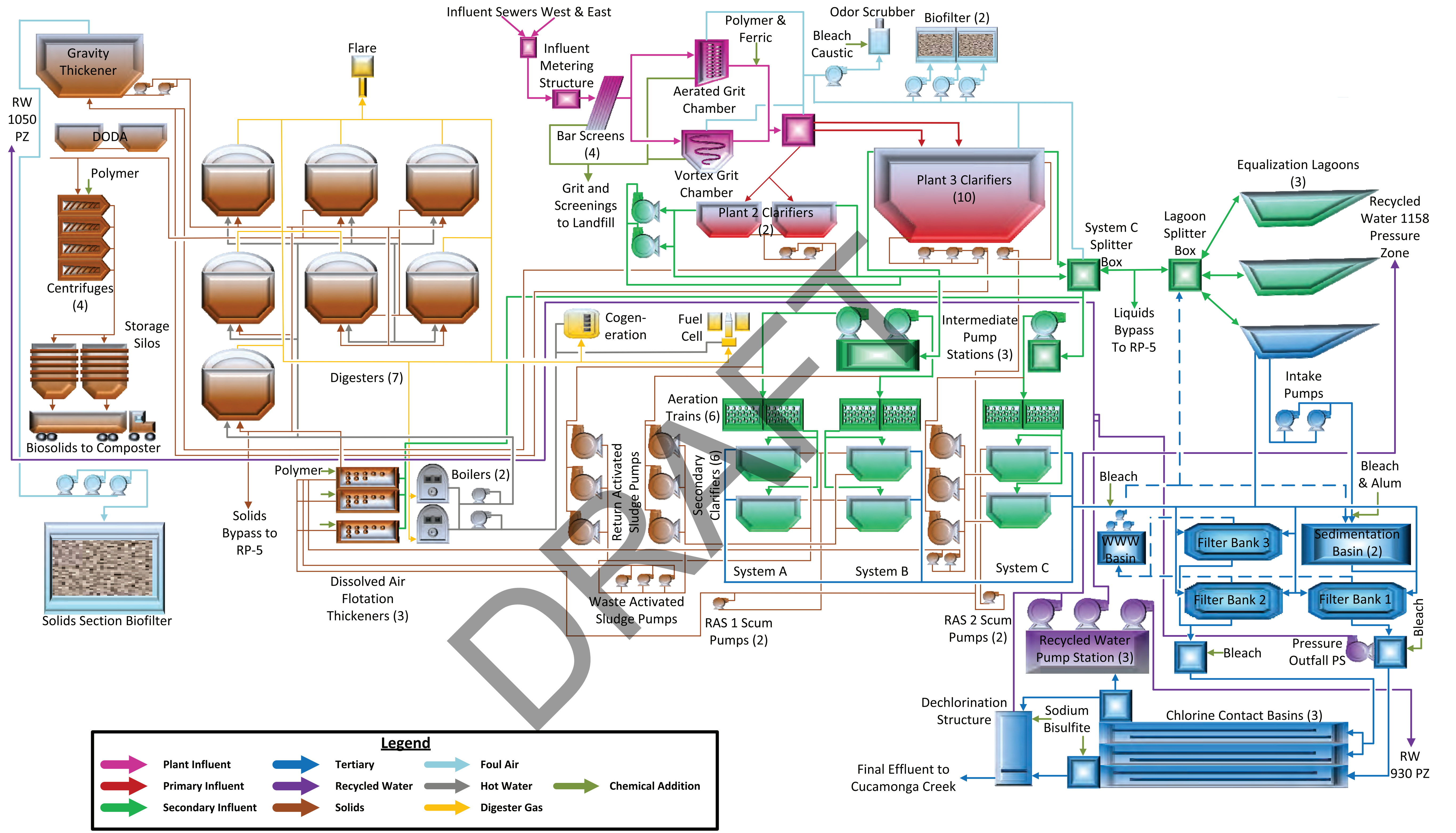


FIGURE 5-1

REGIONAL WATER RECYCLING PLANT NO. 1
PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-10-14F5-1-9370A00.AI

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The secondary treatment facilities consist of three parallel, suspended growth treatment systems, each made up of two aeration basins and two circular secondary clarifiers. Two are identical, while the third has slightly larger secondary clarifiers. Aeration basins use fine bubble diffused aeration panels supplied by four centrifugal blowers. Tertiary treatment consists of filtration, coagulation, and flocculation/sedimentation of filter backwash, disinfection, and distribution of the tertiary effluent. Filtration is achieved using 26 dual media gravity filters and alum is added in-line upstream. Although flocculation/clarification facilities are available upstream of filtration, the flocculation/clarification process is normally offline. Disinfection is achieved using sodium hypochlorite, and filter effluent is sent to three chlorine contact tanks. The disinfected recycled water can then be discharged directly to Cucamonga Creek or directed to the RP-1 Recycled Water Pump Station. Discharge to Cucamonga Creek or Prado Lake is dechlorinated using sodium bisulfite. Further details of the facilities are summarized in *TM 1 Existing Facilities*.

2.2 Solids Handling Facilities

Solids from RP-1 and RP-4 are processed at the RP-1 solids handling facilities. RP-4 solids are discharged into downstream sewers and flow to RP-1; solids are removed from RP-1 primary and secondary treatment processes. RP-1 solids handling facilities consist of thickening, stabilization, and dewatering processes. There are two thickening processes in operation at RP-1: gravity thickening for primary solids, and dissolved air flotation (DAF) thickening for secondary solids. Thickened biosolids from the primary and secondary processes are stabilized in a three-stage anaerobic digestion process. Digesters No. 1 and 2 can be operated as mesophilic-acid digesters. Digesters No. 2 through 7 can be operated as either thermophilic or mesophilic digesters. Methane gas that is produced is sent to the cogeneration facility. Digested biosolids are then dewatered using centrifuges and sent to IERCF for composting. Foul air is diverted to a biofilter for treatment. Further details of the facilities are summarized in *TM 1 Existing Facilities*.

3.0 Current and Future Flows and Loads

As presented in *TM 4 Wastewater Flow and Loading Forecast*, an analysis of the influent wastewater characteristics at RP-1 was conducted as part of this WFMP effort in order to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and 2060 ultimate buildout year. The data analysis is based on 2 consecutive years of recent data provided by IEUA for influent flow and key wastewater quality constituents including biological oxygen demand (BOD), total organic carbon (TOC), total suspended solids (TSS), ammonia as nitrogen (NH3-N), and total Kjeldahl nitrogen (TKN).

Flow projections were developed by the Integrated Water Resources Plan (IRP) Consultant and are based on the average influent wastewater flows measured during the flow monitoring period in November 2013 and projected through the year 2060 using population, employment, and land use information. As discussed in *TM 3 Regional Trunk Sewer Alternatives Analysis*, the WFMP planning effort is based on IEUA's preferred Flow Diversion Alternative 2, which includes diverting flows from Whispering Lakes and Haven Pump Stations to RP-1. The corresponding influent wastewater flow and loading projections under this alternative for the planning year 2035 form the basis of the master planning effort and treatment plant capacity evaluation presented herein. Projections are also presented for the 2060 ultimate buildout year; these projections are used for site planning considerations. Influent wastewater flows are projected to increase at RP-1 between 2020 and 2060 as a result of population growth in areas served by RP-1.

A summary of the current and projected average influent wastewater flows and loads for RP-1 are presented in Tables 5-2 and 5-3, respectively.

TABLE 5-2
RP-1 Current and Projected Average Influent Wastewater Flows

	Current	2035[a]	2060[a,b]
Average Influent Flow (mgd)[c]	27.8	33.1	36.3

[a] Projections developed by IRP Consultant and IEUA based on November 2013 flow monitoring period. Reflects projected flows for IEUA preferred Flow Diversion Alternative 2.
[b] Site planning considerations are based on the projections established for the 2060 ultimate buildout planning year.
[c] Assumes Whispering Lakes Pump Station and Montclair Pipeline infrastructure improvements discussed in *TM 3 Regional Trunk Sewer Alternatives Analysis* are complete and operational by 2020, with both pump stations online and conveying flow to RP-1.

TABLE 5-3
RP-1 Current and Projected Average Influent Wastewater Characteristics

	Current Concentration (mg/L)	Current Load (lb/day)	2035 Load[a] (lb/day)	2060 Load[a] (lb/day)
BOD	434	101,197	119,771	131,350
TSS	472	109,880	130,296	142,893
NH3-N	32	7,544	8,937	9,801
TKN	55	12,975	15,249	16,723

[a] Load projections based on projected flows, concentrations, and load peaking factors presented in *TM 4 Wastewater Flow and Loading Forecast.*

4.0 Treatment Requirements

IEUA operates under an umbrella permit and must meet water quality requirements for discharge and recycled water.

4.1 Discharge Requirements

The tertiary effluent from RP-1 is discharged at two discharge points (DPs) – Prado Park Lake (DP 001) and Cucamonga Creek (DP 002), both regulated by RWQCB Order No. R8-2009-0021, which replaced Order No. 01-1 and Order No. 95-43, National Pollutant Discharge Elimination System (NPDES) No. CA 0105279. This permit is an umbrella permit governing all of IEUA's wastewater treatment plants (RP-1, RP-4, RP-5, and Carbon Canyon Water Recycling Facility). It includes a stormwater discharge permit and the enforcement of an industrial pretreatment program. Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water, due to the use of receiving waters for water contact recreation. A summary of the main effluent quality limits is provided in Table 5-4.

4.2 Recycled Water Requirements

As mentioned previously, effluent from RP-1 and RP-4 is used as recycled water for irrigation and groundwater recharge via spreading in seven Phase I recharge basin sites and six Phase II recharge basin sites. Specifically, recycled water from RP-1 is discharged to a use area overlying Chino North "Max Benefit" Groundwater Management Zone (DP 005). Recycled water quality requirements for groundwater recharge are governed under RWQCB Order No. R8-2007-0039. Table I, Table II, and Table III in the permit provide concentration limits for many constituents of concern, such as inorganic chemicals, volatile organic chemicals, radionuclides, metals, and disinfection byproducts. Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described in Table 5-4.

TABLE 5-4
Summary of Effluent Quality Limits[a]

Parameter	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Notes
BOD	30 mg/L[b]	20 mg/L[b]	-	-	45 mg/L weekly average and 30 mg/L monthly average with 20:1 dilution.
TSS	30 mg/L[b]	20 mg/L[b]	-	-	
NH_4-N	-	4.5 mg/L	-	-	
Chlorine Residual	-	-	-	0.1	Instantaneous maximum ceiling 2 mg/L
TIN	-	-	8 mg/L	-	
TDS	-	-	550 mg/L	-	Shall not exceed 12-month running average TDS concentration in water supply by more than 250 mg/L
Turbidity	-	-	-	-	1. Daily average – 2 NTU 2. 5% maximum in 24 hr – 5 NTU 3. Instantaneous maximum – 10 NTU
Coliform	< 2.2 MPN	-	-	-	Maximum 23 MPN, once per month
pH	-	-	-	6.5 – 8.5	99% compliance
Free Cyanide	-	4.2 µg/L	-	8.5 µg/L	
Bis(2-ethylhexyl) Phthalate	-	5.9 µg/L	-	11.9 µg/L	
Selenium	-	4.1 µg/L	-	8.2 µg/L	

[a] RWQCB Order No. R8-2009-0021
[b] Without 20:1 dilution and for recycled water.
TIN – total inorganic nitrogen
TDS – total dissolved solids
NH_4-N – ammonia as nitrogen
NTU – nephelometric turbidity unit(s)
MPN – most probable number
mg/L – milligrams per liter
µg/L – micrograms per liter

5.0 Existing Plant Capacity and Limitations

Existing facilities and the current performance of RP-1 were used as the basis for process model development. A whole plant model was developed using PRO2D and calibrated based on plant influent data and plant operations data for the period between October 15, 2011, and October 15, 2013. This period was selected as the basis after a review of the influent and plant data to reflect a 2-year-long complete data set. Existing plant operation and the findings of the capacity evaluation through the use of process modeling is presented below for the liquid and solids treatment facilities at RP-1.

5.1 Existing Plant Operation

A summary of RP-1 plant operations is provided in Table 5-5 for the liquid treatment and solids handling facilities. Unit process performance values were averaged over the evaluation period, with operating ranges noted. These values were used in development and calibration of the process models. Detailed data summaries for the evaluation period are provided in Appendix 5-A.

TABLE 5-5
RP-1 Average Plant Operations Summary

Parameter	Value
Primary Treatment	
TSS Removal Rate (%)	73
TOC Removal Rate (%)	47
Primary Sludge (mgd)	1.01
Secondary Treatment (Average of System A, B, C)	
MLSS (mg/L)	4,400
MLVSS (%)	77
RAS SS (mg/L)	7,900
Solids Inventory (Basins Only) (lb)	141
Solids Inventory (Basins, Clarifiers, RAS) (lb)	194
Secondary Clarifier Loading (gpd/ft^2)	500
Secondary Clarifier Loading (lb/d/ft^2)	40
SVI (mL/g)	150-190
SRT (Basins Only) (d)	18
Residual Alkalinity (mg as $CaCO_3$/L)	138
Solids Handling	
Gravity Thickened Solids (% TS)	4-5
DAF Thickened Solids (%TS)	4.5-6.5
Acid Phase (Digester 1) HRT (day)	3
Gas / Second Phase Digestion HRT (day)	12
Gas / Third Phase Digestion HRT (day)	6
Centrifuge Cake Solids (%TS)	14-20

gpd – gallons per day
MLSS – mixed liquor suspended solids
MLVSS – mixed liquor volatile suspended solids
RAS SS – return activated sludge suspended solids
lb – pound(s)
mL/g – milliliters per gram
gpd/ft^2 – gallons per day per square foot
lb/d/ft^2 – pounds per day per square foot
SVI – sludge volume index
SRT – solids retention time
$CaCO_3$/L – calcium carbonate per liter
TS – thickened solids
HRT – hydraulic retention time

A performance summary for the major treatment processes is presented in Table 5-6. These values, which represent the average over the evaluation period, were used in the subsequent plant process modeling and capacity evaluations for the major treatment units. Detailed data summaries for the evaluation period are provided in Appendix 5-A.

TABLE 5-6
RP-1 Average Plant Performance Summary

Parameter	Primary Effluent	Secondary Effluent System A	System B	System C
TOC (mg/L)	125	6.1	5.8	5.1
BOD (mg/L)	224	1.7	1.6	1.4
TSS (mg/L)	126	6.3	3.9	4.4
NH3-N (mg/L)	29	0.17	0.12	0.22
NO3-N (mg/L)	N/A	6.9	7.1	6.2
NO2-N (mg/L)	N/A	0.20	0.07	0.19
TIN (mg/L)	N/A	7.3	7.3	6.6
Alkalinity (mg as $CaCO_3$/L)	N/A	138	N/A	139

N/A – Not applicable
NO3-N – nitrate as nitrogen
NO2-N – nitrite as nitrogen

The values above are for the current operation, which includes secondary treatment operation without internal mixed liquor recycling, configured in an anoxic-oxic-anoxic-oxic biological nutrient removal (BNR) configuration with step feed capability. IEUA is currently planning to add internal mixed liquor pumping capability to the bioreactors, converting them to be closer to a Modified Ludzack-Ettinger (MLE) configuration with step feed capability, which is expected to improve the nitrogen removal capability of the secondary treatment system.

5.2 Existing Plant Capacity

5.2.1 Process Modeling

The capacity of the existing system was evaluated through process modeling using CH2M HILL's whole plant simulator, PRO2D. PRO2D is a process simulation model that takes into account the mass balances through an entire facility for particulate and soluble components and, similar to other commercially available process models, is based on the International Water Association (IWA) ASM2D biological process kinetics. The base model was constructed to reflect the actual facility setup, including flow splits and backwash. The process model facility setup flow diagram is presented in Figure 5-2. The model was constructed with the operations and performance criteria reflective of the evaluation period, and then calibrated to reflect the actual performance, solids yields, and water quality data.

As shown in Figure 5-2, the model was constructed to represent the actual plant operation for all the major process units. The model also allows establishing sizing and design considerations for each major unit process tankage and equipment. Similar to the actual operations, the plant model was built with the filter backwash and solids thickening recycles being returned to the main plant for further treatment, with the dewatering recycles being diverted offsite. The liquid and solids mass balances calculated for the current conditions allow calibration of the model against the actual field data. The calibrated model is then used to evaluate current capacity as well as establish expansion needs and process bottlenecks.

The process model was constructed and calibrated using the current influent and operating data available for the facility. The purpose of the model calibration step is to establish a baseline condition that closely resembles current operations and provides a means to reliably predict operations and system limitations under different scenarios or alternatives. Key model calibration results are presented in Table 5-7. As the listed values show, the model was calibrated such that the simulation results are within a value range that is 5 percent or smaller relative to the actual data. This level of accuracy will allow reliable capacity estimations to be made for the various capacity scenarios and future operation needs.

TABLE 5-7
RP-1 Average Plant Performance Summary

Parameter	Actual Data Average Values	Model Results
Effluent BOD (mg/L)	1.43	2.6
Effluent TSS (mg/L)	4.9	5.2
Effluent TIN (mg/L)	7.3	7.2
Effluent Alkalinity (mg as $CaCO_3$/L)	139	144
Total MLSS Inventory (lb)	424,000	408,000
Sludge VS Content	77%	76%
Biosolids (Dry Solids lb/day)	44,400	47,400

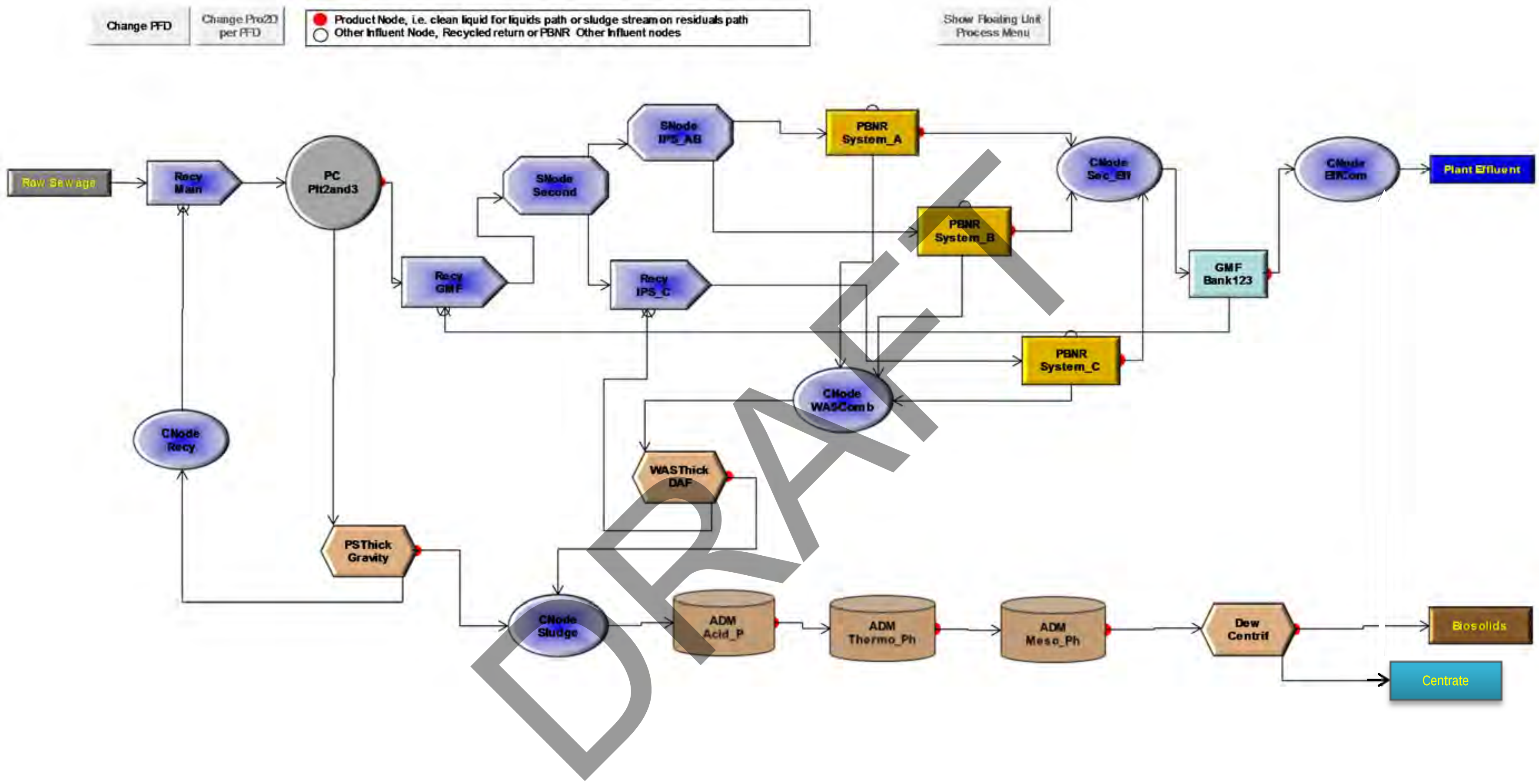
Subsequent process modeling using the calibrated model as the base model was conducted to evaluate the following scenarios:

- Current plant capacity
  - Liquid treatment capacity to meet 8-mg/L effluent TIN level under average and maximum month flow and load conditions
  - Liquid treatment capacity to meet 5-mg/L effluent TIN level under average and maximum month flow and load conditions
  - Solids handling capacity under average and maximum month flow and load conditions
- Flow equalization options and future capacity implications for the planning year 2035
- Future facility footprint implications for the planning years 2035 and 2060

Findings of the current plant capacity evaluation are presented next in this section. Flow equalization and future capacity needs are presented in Sections 6.0 and 7.0, respectively.

FIGURE 5-2

RP-1 Process Model Facility Setup



5.2.2 Liquid Treatment Capacity

An evaluation of the liquid treatment capacity was conducted using the whole plant process model under both the average and maximum month conditions. The capacity evaluation was conducted based on achieving a plant effluent TIN concentration of 8 mg/L and 5 mg/L. As established at the onset of the project, the facility reliability and redundancy considerations are based on the IEUA's overall wastewater treatment system, with RP-5 being the end-of-the-line facility receiving all flow diversions, if needed, from other Regional Water Recycling Plants. Additional reliability and redundancy considerations driven by the regulatory requirements, such as Title 22 requirements, were taken into account. Dewatering recycles were considered to be handled separately or treated separately onsite.

Process modeling showed that the primary treatment system is not capacity limiting, because the liquid treatment capacity is limited by the secondary treatment system. One of the limitations was found to be the aeration and the ability to control dissolved oxygen (DO) in the anoxic and oxic zones in the aeration basins. The implications of DO are TIN fluctuations in the effluent and SVI values that are greater than 150 mL/g, which indicates sludge settleability could be impaired at times.

Another limitation of the secondary treatment system was found to be the secondary clarification solids loading resulting from the current operations and the influent wastewater solids loading rates. Maintaining the SVI values at or below 150 mL/g is important for this reason also.

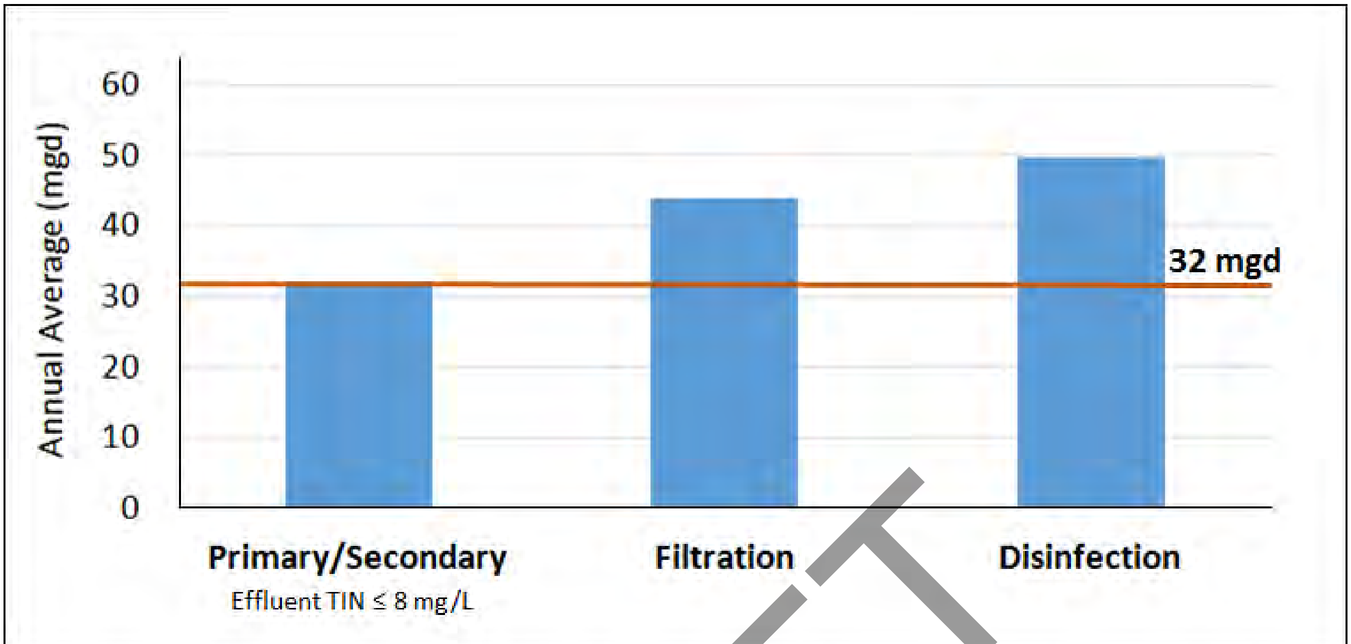
The capacity of the RP-1 tertiary processes also were evaluated; the methodologies employed are consistent with those presented in the Title 22 Engineering Report (DDB Engineering, Inc. [DDB], 2010). The filters were designed based on a California Department of Public Health (CDPH) maximum filter loading rate of 5 gallons per minute per square foot (gpm/ft^2) for dual-media gravity filters, with one filter in backwash and one filter offline. In order not to exceed the maximum approved filter loading rate, the maximum flow the filtration system can handle is 51.7 mgd. Applying a peak hourly dry weather peaking factor of 1.18, the resulting average filtration capacity is 43.8 mgd.

The disinfection system was designed based on the Title 22 concentration and time (CT) and modal contact requirements of 450 milligrams per minute per liter (mg-min/L), and 90 minutes during the peak hourly dry weather flow, respectively. Tracer testing completed in 2002 showed that Tanks 1 and 2 can handle a peak flow of 41.3 mgd while maintaining a modal contact time of 90 minutes (DDB, 2010). Applying a peak hourly dry weather peaking factor of 1.18, the resulting average disinfection capacity of Tanks 1 and 2 is 35 mgd. Tank 3 was designed based on 90 minutes modal contact time resulting in a peak dry weather capacity of 17.5 mgd. Applying a peak hourly dry weather peaking factor of 1.18, the resulting average disinfection capacity of Tank 3 is 14.8 mgd. Thus, the overall average disinfection capacity is approximately 49.8 mgd.

The overall liquid treatment capacity is determined by its most limiting process capacity. For RP-1, the secondary treatment is limited to 32 mgd with all units in service, with primary flow equalization, for an effluent TIN of 8 mg/L, assuming that the mixed liquor return system is installed and dewatering recycles go to the Non-Reclaimable Wastewater (NRW) system or are treated separately. Therefore, the RP-1 liquid treatment capacity is 32 mgd. As discussed previously, this is less than the rated capacity of 44 mgd. However, the rated capacity was based on completion of Train D, which has not been constructed.

The liquid treatment capacity of the plant to achieve an effluent TIN value of 8 mg/L is illustrated in Figure 5-3. As shown, the current plant influent represents 88 percent of the plant liquid treatment capacity. To achieve 5 mg/L effluent TIN, the plant can only treat 28 mgd and will be at capacity.

FIGURE 5-3
RP-1 Existing Liquid Treatment Capacity



5.2.3 Solids Handling Capacity

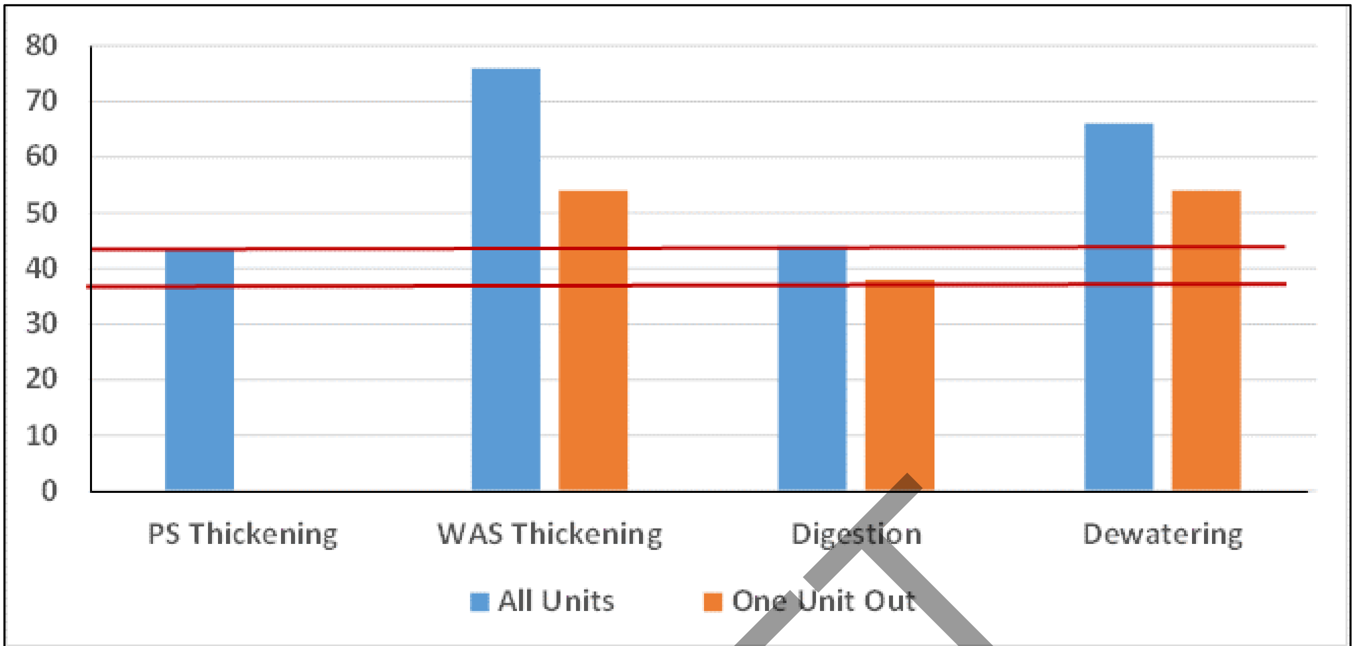
In evaluating the solids handling system capacity, operational considerations as well as Part 503 Rule requirements were taken into account when considering the average and maximum month loading. The system capacity with and without one unit out of service was evaluated using the industry standard loading rates and operational criteria. The capacity values calculated are considered to represent equivalent plant influent flow values at the current wastewater characteristics. The plant influent includes the RP-4 solids diverted to RP-1 via the sewer system for further treatment.

Primary sludge (PS) thickening is currently achieved using one gravity thickener; having a single thickener was not considered a key concern, based on the input from the IEUA staff. Thickening can be achieved in the primary clarifiers if the gravity thickener is taken out of service. WAS thickening is achieved in dissolved air floatation thickeners (DAFTs). Capacity was evaluated by maintaining a solids loading rate of 45 $lb/d/ft^2$ or less for the DAFTs.

Waste solids digestion, achieved in the phased digestion system, was evaluated based on the current operating conditions as well as Part 503 Rule requirements. Digester loading rates of 0.1 to 0.2 pounds per day per cubic foot ($lb/d/ft^3$) and a digester SRT of 15 days with one large unit out of service were used to establish digestion capacity, using an active digester volume of 90 percent of the total digester volume including the cone space. The dewatering capacity of the centrifuges was calculated considering the hydraulic loading rate to be maintained at or below 340 gallons per minute (gpm) under the current solids loading conditions.

The solids handling capacity of the plant to meet the Part 503 Rule requirements for Class B biosolids is illustrated in Figure 5-4. As shown, the digestion is the limiting unit process of the solids handling system. The current equivalent RP-1/RP-4 plant influent flows (28 + 10 = 38 mgd) represent 100 percent of the anaerobic digestion capacity with one large unit out of service at the current influent wastewater characteristics and RP-4 solids loading diversion.

FIGURE 5-4
RP-1 Existing Solids Handling Capacity



5.3 RP-1 Capacity Summary

The current RP-1 plant capacity is summarized in Table 5-8. These values constitute the basis of the future capacity requirements assessment presented later in this TM.

TABLE 5-8
RP-1 Existing Process Capacity Summary

	All Units in Service	**One Unit Out of Service**
Secondary Treatment		
Plant Effluent TIN ≤ 8 mg/L[b]	32 mgd	28 mgd[a]
Plant Effluent TIN ≤ 5 mg/L[b,c]	29 mgd	26 mgd
Solids Handling[d]		
PS Thickening	43.3 mgd	0 mgd[e]
WAS Thickening	76 mgd	54 mgd[e]
Digestion	44 mgd	38 mgd[e]
Dewatering	66 mgd	54 mgd[e]
Tertiary Treatment		
Filtration	47.4	43.8[f]
Disinfection	49.8	N/A

[a] One secondary clarifier and one aeration basin out of service.
[b] Assumes internal mixed liquor return (IMLR) is in place and SVI is 150 mL/g or better.
[c] Assumes IMLR is in place, DO control is added, and DO management is practiced.
[d] Values represent equivalent plant influent capacity and include RP-4 solids diverted to RP-1. Dewatering recycles were considered to be handled separately or treated onsite, not adding to the main plant nutrient loads.
[e] One large unit out of service.
[f] Two filter cells out of service, one in backwash one for maintenance.

6.0 Flow Equalization Alternatives Evaluation

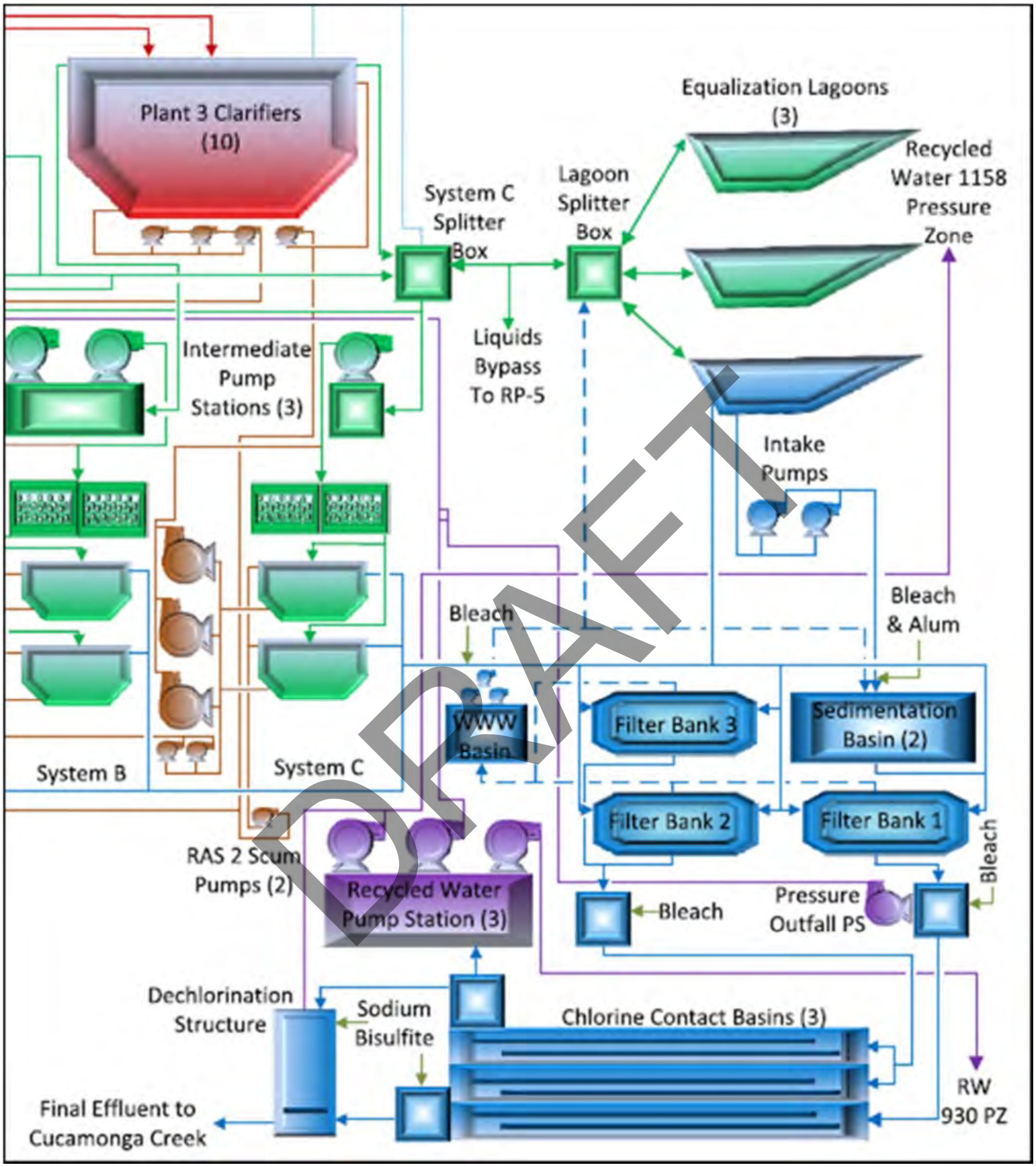
As part of the capacity and site planning for RP-1, primary flow equalization was evaluated for the projected RP-1 influent flows of 33.1 mgd in 2035 and 36.3 mgd in 2060 (ultimate capacity). The facility currently has three flow management lagoons as shown in Figures 5-5 and 5-6. These lagoons are used for flow management for primary effluent and secondary effluent. While all three lagoons were constructed to receive primary effluent, Lagoon 3 primarily receives secondary effluent. The primary effluent is diverted to remaining lagoons on an as needed basis to manage flow peaks at the facility. IEUA strives to minimize odors that are sometimes experienced with the storage of primary effluent in these lagoons that are not covered and are in close proximity to the neighboring community and businesses.

The following flow equalization alternatives were considered for detailed review of the monetary and nonmonetary considerations:

1. Keep the existing system, continuing the current operations as long as possible.
2. Replace with a modern covered tank system with the capability to mix, drain, and clean the contents of the equalization tanks, as well as provide continuous odor control for the tank headspace.
3. Eliminate primary effluent equalization by adding planned aeration basin improvements and secondary clarifiers, and converting the lagoons to secondary effluent equalization or recycled water storage.

A nonmonetary evaluation was completed considering the advantages and disadvantages of these flow equalization alternatives. The evaluation criteria included factors that are of varying levels of importance for IEUA. For example, operational flexibility, operational risk and reliability, and impacts on plant odors were of greatest importance, while footprint and space considerations had the lowest importance. The criteria, definitions, and weighting factors are listed in Table 5-9. As illustrated in Table 5-10 and Figure 5-7, the benefit scores were calculated for each alternative through independent evaluation of each criterion. Resultant total benefit scores show that Alternative 3 (eliminating the primary effluent equalization by adding secondary clarifiers, and converting the existing lagoons to secondary effluent equalization or recycled water storage) has the highest nonmonetary benefit for IEUA. This is in larger part due to the fact that this alternative significantly eliminates the plant odors from primary effluent storage and pumping, improves the overall plant aesthetics, does not have any constructability or space constraints, and provides ease of operation and maintenance because it eliminates primary effluent storage and associated pond/ mechanical equipment maintenance.

FIGURE 5-5
RP-1 Existing Flow Management Schematic



Aerial image © Google Earth, 2014. Annotation by CH2M HILL, 2014.

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Figure 5-6
RP-1 Existing Flow Management Infrastructure

Inland Empire Utilities Agency
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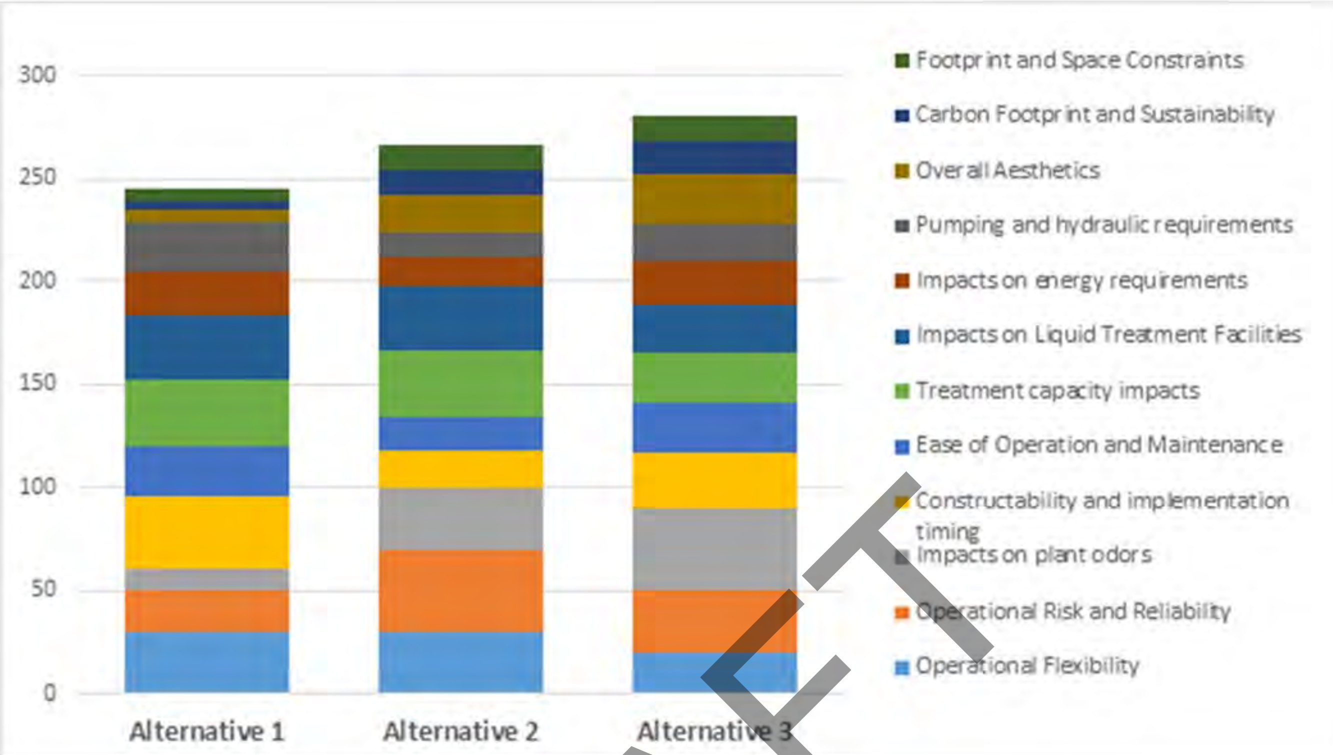
TABLE 5-9
Nonmonetary Evaluation Criteria, Definitions, and Assigned Weighting Factors

Criteria	Description	Weighting Factor
Operational flexibility	Ability of the system to respond to potential internal or external changes affecting delivery of equalized flow or treated solids without any impact on system performance.	10
Operational risk and reliability	Operational implications on system reliability and redundancy and the associated risk involved in operating major facilities. Use of proven systems and technologies, with similar installations currently in operation.	10
Impacts on plant odors	Impacts of new processes on plant odors, and the need for additional odor control facilities to minimize plant odors.	10
Constructability and implementation timing	Construction implications, ease of construction, and integration with the existing systems, and the ability to implement the proposed alternative in phases.	9
Treatment capacity impacts	Impacts of the new facilities on treatment plant capacity.	8
Impacts on existing facilities	Impacts on existing facilities and the ability to use existing infrastructure. Implications of site planning and the need to demolish or relocate existing facilities.	8
Ease of operation and maintenance	Relative degree of ease and extent of time required to operate and maintain the facilities.	8
Impacts on energy requirements	Additional energy required to construct and maintain new facilities, as well as the impact of the new facilities on the overall plant energy balance and power demand (for example, pumping, mixing, etc.).	7
Pumping and hydraulic requirements	Implications of pumping and conveying to new facilities, and complexity of pumping and yard piping requirements.	6
Overall aesthetics	Aesthetic and visual considerations as a result of the new facilities.	6
Carbon footprint and sustainability	Potential impacts on the carbon footprint of each plant and added sustainability features as a result of construction and operation of the facilities.	4
Footprint and space constraints	Overall footprint requirements and space constraints, and impacts on site planning for future facilities.	3

TABLE 5-10
RP-1 Flow Equalization Non-Monetary Evaluation Results

Criteria	Weighting Factor	Alternative 1 Keep Existing		Alternative 2 Build New Tanks		Alternative 3 Eliminate PE EQ	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Operational Flexibility	10	3	30	3	30	2	20
Operational Risk and Reliability	10	2	20	4	40	3	30
Impacts on Plant Odors	10	1	10	3	30	4	40
Constructability and Implementation Timing	9	4	36	2	18	3	27
Treatment Capacity Impacts	8	4	32	4	32	3	24
Impacts on Existing Facilities	8	4	32	4	32	3	24
Ease of Operation and Maintenance	8	3	24	2	16	3	24
Impacts on Energy Requirements	7	3	21	2	14	3	21
Pumping and Hydraulic Requirements	6	4	24	2	12	3	18
Overall Aesthetics	6	1	6	3	18	4	24
Carbon Footprint and Sustainability	4	1	4	3	12	4	16
Footprint and Space Constraints	3	2	6	4	12	4	12
Final Score			**245**		**266**		**280**

FIGURE 5-7
RP-1 Flow Equalization Non-Monetary Evaluation Summary



Monetary evaluation of these three flow equalization alternatives was completed to further assess the options. The monetary evaluation was conducted by developing life-cycle costs (LCC) for the three alternatives. The cost basis was the same for the overall master plan cost criteria:

- 20-year planning period
- 3 percent inflation
- 6 percent bond (interest) rate
- 30 percent contingency
- 30 percent engineering, construction management, environmental, legal, etc.

The monetary evaluation findings are listed in Table 5-11. Accordingly, Alternative 1 will have the lowest LCC because it is the baseline alternative with no addition of new infrastructure. Alternative 2 has the highest LCC because of the addition of new infrastructure including two 180-foot covered concrete primary effluent equalization tanks, associated recirculation and flow transfer pumps, mixing, cleaning and odor control components, and elimination of some of the existing lagoon volume to provide space to construct the new tanks. New infrastructure needed for Alternative 3 includes one new secondary clarifier for each secondary treatment train (two 120-foot units and one 130-foot unit) to accommodate the unequalized loads to the secondary treatment system and associated piping and flow splitting features. As a result, it has the second highest LCC value.

TABLE 5-11
RP-1 Flow Equalization Monetary Evaluation Results

	Alternative 1 Keep Existing	Alternative 2 Build New Tanks	Alternative 3 Eliminate PE EQ
Capital Cost	$ -	$ 50,661,000	$ 23,481,000
O&M Cost	$ 50,000	$ 468,000	$ 130,000
20-yr LCC	$ 750,000	$ 57,681,000	$ 27,079,000

IEUA has decided that Alternative 1 is not a sustainable approach because this alternative does not eliminate the currently experienced odor problems or provide a resolution to the lagoon maintenance challenges (for example, the need to clean the open lagoons properly and promptly, etc.). Alternative 2 was not preferred due to its high cost and the operational complexity. IEUA desires to eventually move toward elimination of the current primary effluent flow equalization as in Alternative 3. This will free up the existing lagoons for other flow management needs such as secondary effluent or recycled water storage.

7.0 Plant Expansion Needs

The flow projections for the planning years 2035 and 2060 were established as described under Section 3.0 of this TM. Accordingly, 2035 flow projections will be the basis of the facility expansion and CIP planning effort, while the facilities needed for the 2060 flow conditions will constitute the basis of site planning. The corresponding planning flows are listed in Table 5-12.

TABLE 5-12
RP-1 Expansion Flow Scenarios

Planning Year	RP-1 Influent	RP-4 Influent (Equivalent Waste Solids)
2035	33.1 mgd	14.7 mgd
2060	36.3 mgd	18.4 mgd

IEUA has decided to base the capacity expansion and footprint requirements on using the MBR technology for RP-1. The benefits of the MBR technology for long-term IEUA planning include small footprint requirements, elimination of secondary clarifiers and tertiary filters for recycled water production, superior water quality, and ability to produce thicker waste sludge compared to conventional technologies. The modular design capability of MBR technology also allows stepwise expansion of the treatment facility to meet both load capacity and different effluent TIN requirements. Also, the superior quality effluent can be directly fed to a reverse osmosis (RO) system if IEUA needs to produce higher-quality effluent or reduce final effluent TDS.

7.1 Facility Expansion Requirements

For the 2035 capacity expansion requirements that will constitute the basis of the CIP planning, facility sizing was determined using the whole plant PRO2D process model developed and calibrated for the current operation and wastewater quality. The PRO2D model simulations for average and maximum month flow and load conditions were completed to establish the facility requirements as well as liquid and mass balances for the facility. New facility sizing was based on the current IEUA operations as well as industry standards that apply to each unit process. RP-1 facility expansion requirements are summarized in Table 5-13.

TABLE 5-13
RP-1 Facility Expansion Requirements for Planning Year 2035

Parameter	Size of New Units	Comments
Primary Clarifiers	-	No new units are needed.
Train D Secondary Treatment (MBR)	1 module (8 mg/L TIN) 2 modules (5 mg/L TIN)	MBR system requirements include fine screening for the MBR system feed, MBR equipment includes permeate blowers and pumps. For site planning purposes, a 60-foot x 45-foot concrete equipment pad is reserved for this purpose.
Train D MBR Bioreactor Dimensions (Length x Width x Depth)	1 module 130-foot x 60-foot x 18-foot	Two trains per module.
Train D Membrane Tank Dimensions (Length x Width x Depth)	1 module 30-foot x 60-foot x 10-foot	Three trains per module.
Trains A, B, C New Secondary Clarifiers (PE EQ Elimination)	2 x 120-foot (Trains A and B) 1 x 130-foot (Train C)	Flow-splitting structure for each of the trains, as well as considerations for new RAS/WAS piping and pumping requirements, were included.
Anaerobic Digesters	2 digesters 110-foot diameter 30-foot sidewater depth	New digesters with complete sludge transfer and recirculation, mixing and heating, and pumping equipment.
Flow Management Lagoons	-	Modifications only to piping and pumping systems to be able to use the lagoons for secondary effluent equalization.

The facility expansion configured in Table 5-13 was used as the basis of the capital and site planning under this master plan because it allows independent implementation of various facilities listed in the table. For example, elimination of primary effluent equalization impacts on secondary treatment needs to be balanced with the addition of secondary clarifiers, as noted previously. Because the clarifier addition and the MBR system addition are independent projects, they can be implemented separately.

There is an alternative that combines the elimination of primary flow equalization and addition of an MBR system; this alternative needs to be further evaluated as a part of the preliminary design effort. It involves dedicating the existing six secondary clarifiers to Trains A and B, while converting Train C to MBR technology. Under this alternative, Trains A and B will have adequate capacity to handle diurnal peaks. After conversion to MBR through the addition of membrane tanks and bioreactors, as needed, Train C can provide additional capacity for treatment of RP-1 flows. Train D can be constructed in the future, if needed. This way, no new secondary clarifiers would be built, and more flows could be treated through MBR as compared to constructing Train D only. The constructability and sizing details for the conversion of existing infrastructure for this alternative need to be further evaluated during preliminary design.

7.2 Ultimate Facilities Site Plan

For ultimate site planning purposes, the facilities for the ultimate capacity increase and other site planning considerations were established. In addition to the liquid treatment and solids handling facilities expansion requirements, the following site space needs were reserved for the listed future uses:

1. **Secondary Treatment**: Ultimate site space planning was completed using the expansion scheme listed in Table 5-13. To achieve 5-mg/L effluent TIN, both MBR modules of Train D needs to be implemented. However, an alternative ultimate site plan by converting Train C to MBR technology and adding Train D also could be implemented. As indicated above, Train C conversion requirements and related site planning requirements need to be further explored during preliminary design. The secondary treatment footprint, as shown in Figure 5-8, represents the worst-case scenario.

2. **Dewatering Recycles Treatment**: Currently, IEUA diverts the dewatering recycles to the NRW line through an interagency agreement. The NRW delivers non-reclaimable wastewater flows from the inland areas to the Los Angeles County Sanitation Districts (Sanitation Districts) Joint Water Pollution Control Facility (JWPCF) located in Carson, California. IEUA is planning to eliminate this discharge and manage the dewatering recycle flows onsite in the future. Dewatering recycles represent significant nutrient load (especially ammonia as nitrogen) that need to be treated. The flow can either be recycled back to the head of the plant, or be treated separately. Current advancements in treatment technologies, such as the Demon process, will allow IEUA to cost-effectively treat the ammonia load separately in a biological treatment system that uses the specialty microorganisms to achieve short-cut nitrogen removal. To reserve space to implement dewatering recycle treatment, a 20,000-ft^2 site space was reserved as shown in Figure 5-8.

3. **Advanced Water Treatment (AWT)**: Currently IEUA does not need to implement AWT to further treat the tertiary effluent. However, to manage the needs for higher-quality effluent or increasing TDS in the tertiary effluent, IEUA would like to reserve space for future implementation of an AWT system that could treat up to 5,000 acre feet per year (AFY) using a microfiltration (MF)/RO system and its appurtenances. If the MBR technology is implemented for the main plant expansion, the MF facility could be eliminated, depending on the AWT flow requirements. For this purpose, a 60,000-ft^2 site space was reserved as shown in Figure 5-8.

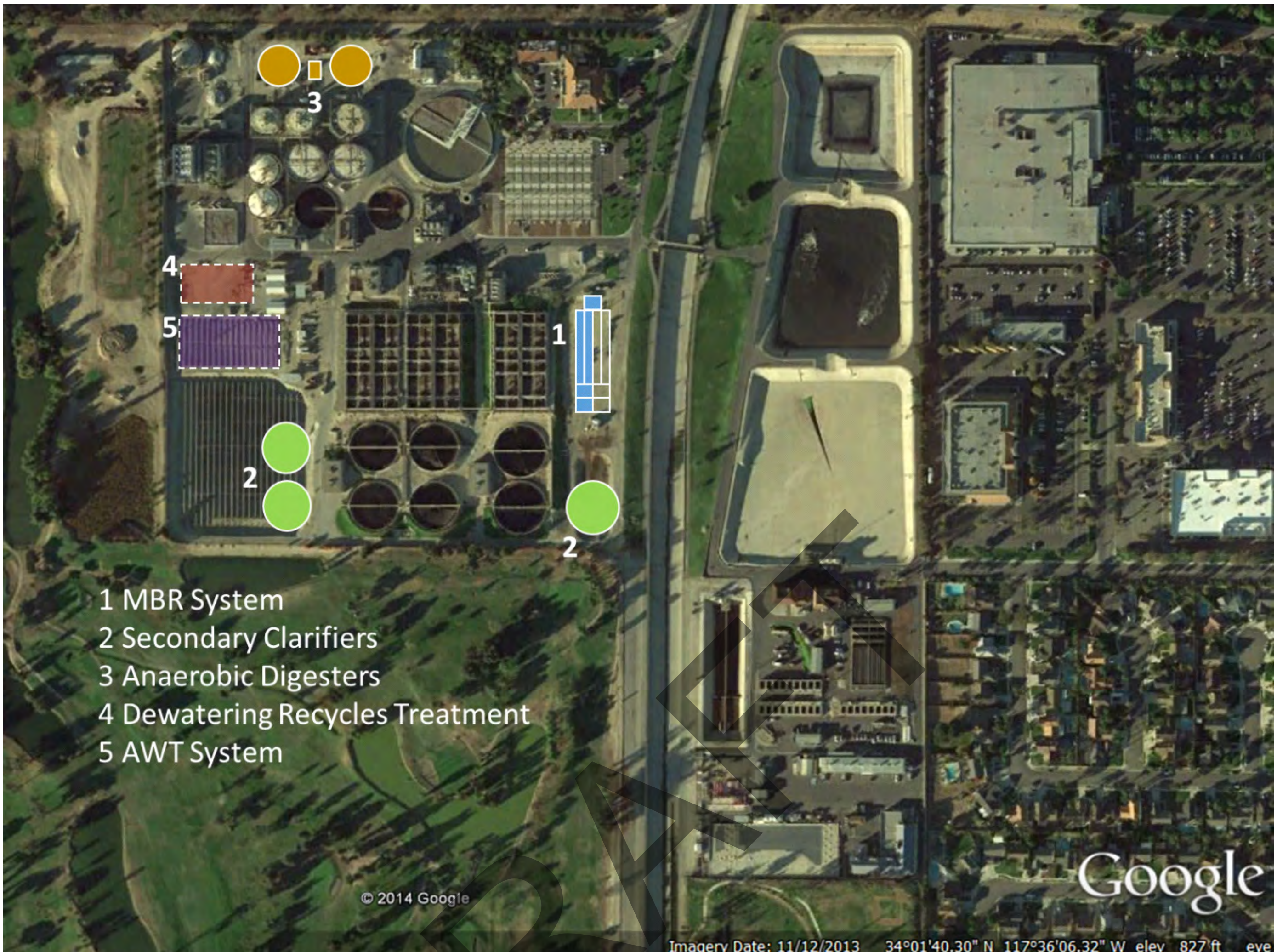


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Figure 5-8
RP-1 Ultimate Facilities Site Plan

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8.0 20-Year CIP Plant Expansion Projects and Capital Cost

Three plant expansion projects were identified during the 20-year CIP: the RP-1 Primary Effluent Equalization Elimination Project, the RP-1 Liquid Treatment Expansion Project, and the RP-1 Solids Treatment Expansion Project. Capital costs were estimated for each project and those costs were placed into the 20-year CIP. The planning-level capital costs for each facility identified were developed based on cost curves established from previous projects and known direct costs for similar-sized projects. Additionally, several assumptions were made to estimate the total construction cost and total project costs for each expansion project. The assumptions include the following:

- The WFMP assumed a 20-year planning period.
- 10 percent of facilities subtotal for civil/site work.
- 0 to 5 percent of facilities subtotal for demolition depending on existing site conditions.
- 20 percent of facilities subtotal for electrical and instrumentation.
- 10 percent of total direct cost for contractor general conditions.
- 15 percent of total direct cost for contractor overhead and profit.
- 8 percent sales tax was applied to 50 percent of the total direct cost.
- 30 percent for construction contingency.
- 30 percent for engineering, construction management, environmental, and legal costs was applied to the total construction cost to estimate the total project cost.

The total construction cost and total project cost for each expansion project are summarized in Table 5-14.

9.0 Conclusion

The following conclusions can be made from the evaluation of RP-1:

- Elimination of existing primary effluent flow equalization by adding secondary clarifiers and converting the existing lagoons to secondary effluent equalization or recycled water storage is the most favorable alternative.
- The RP-1 liquid treatment facilities will need to be expanded during the 20-year planning period with the construction of a new MBR facility (Train D).
- The RP-1 solids treatment facilities will need to be expanded during the 20-year planning period with the construction of new anaerobic digesters.

10.0 References

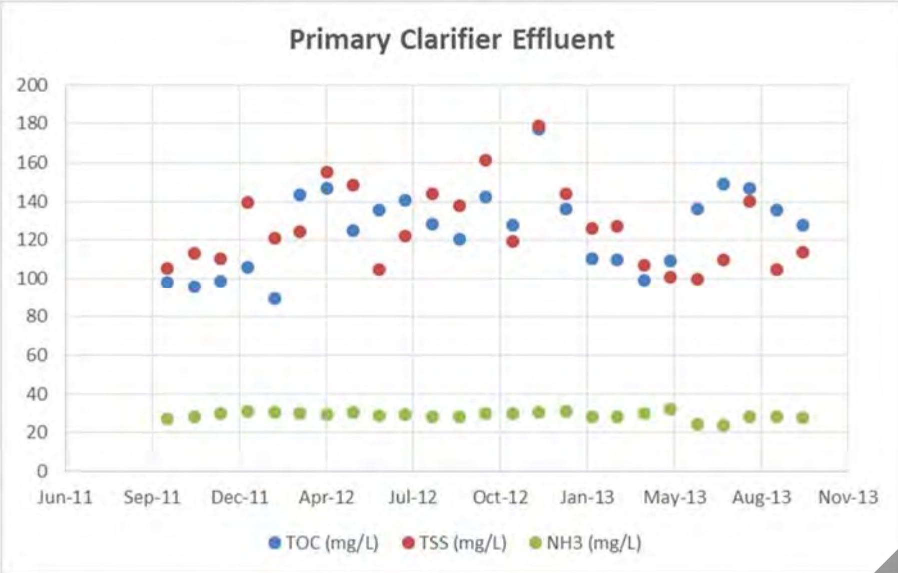
DDB Engineering, Inc. (DDB). 2010. *Inland Empire Utilities Agency Regional Plant No. 1 Title 22 Engineering Report.* January.

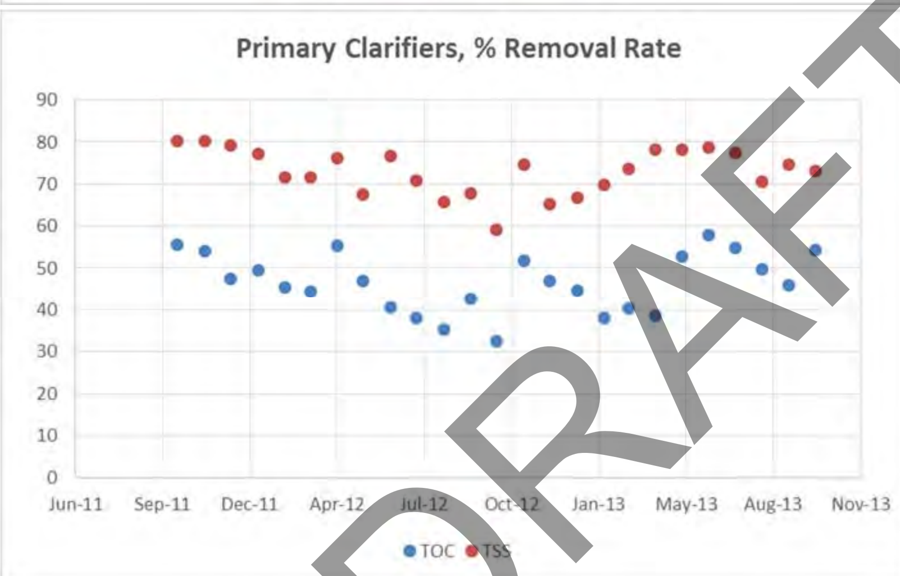
TABLE 5-14
RP-1 Expansion Projects Capital Cost Estimate

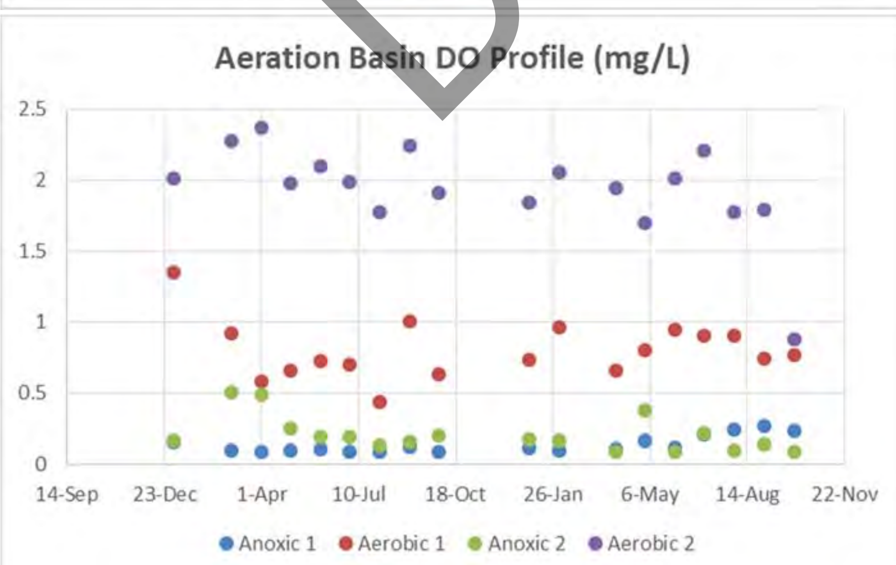
Component Description	RP-1 Primary Effluent Equalization Elimination Project	RP-1 Liquid Treatment Expansion Project	RP-1 Solids Treatment Expansion Project
Secondary Treatment (MBR) – 5 mgd	-	$21,400,000	
Secondary Clarifiers	$7,200,000	-	
Aeration Basin Distribution Box Modifications	$360,000	-	
RAS/WAS Pump Station Modifications	$1,100,000	-	
Equalization Pond Piping Modifications	$500,000	-	
Methane-Phase Digestion	-		$7,000,000
Facilities Subtotal	**$9,160,000**	**$21,400,000**	**$7,000,000**
Civil/Site Work (10%)	$916,000	$2,140,000	$700,000
Demolition (5%)	$458,000	$1,070,000	$350,000
Electrical and Instrumentation (20%)	$1,832,000	$4,280,000	$1,400,000
Total Direct Cost[a]	**$12,366,000**	**$28,890,000**	**$9,450,000**
General Conditions (10%)	$1,237,000	$2,889,000	$945,000
General Contractor Overhead and Profit (15%)	$1,855,000	$4,334,000	$1,418,000
Sales Tax (8%)[b]	$495,000	$1,156,000	$378,000
Subtotal	**$15,953,000**	**$37,269,000**	**$12,191,000**
Construction Contingency (30%)	$4,786,000	$11,181,000	$3,657,000
Total Estimated Construction Cost[c]	**$20,739,000**	**$48,450,000**	**$15,848,000**
Engineering, Construction Management, Environmental, and Legal Costs (30%)	$6,222,000	$14,535,000	$4,754,000
Total Estimated Project Costs	**$26,961,000**	**$62,985,000**	**$20,602,000**

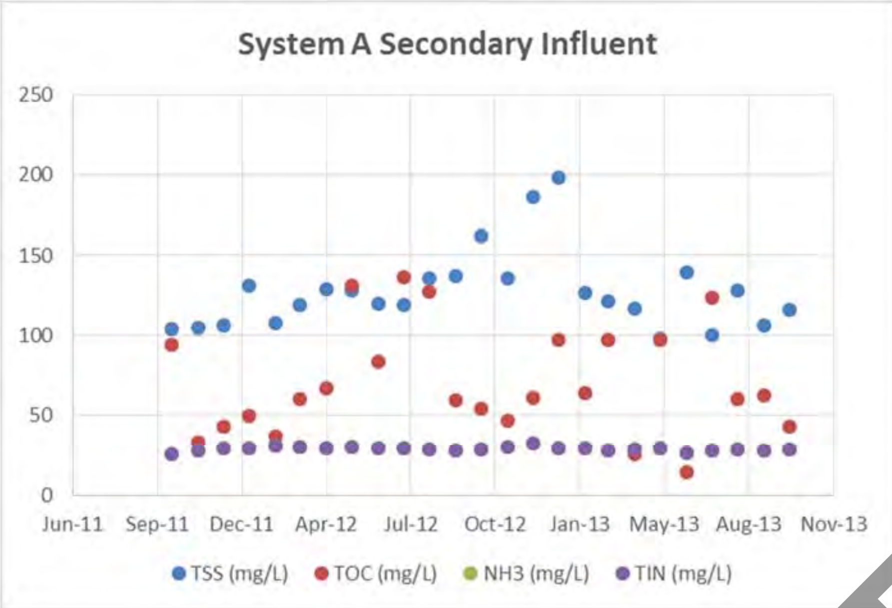
[a] ENR CCI Index for Los Angeles (August 2014 - 10,737).
[b] Calculated assuming 50% of direct costs are taxable.
[c] Cost does not include escalation to midpoint of construction.
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

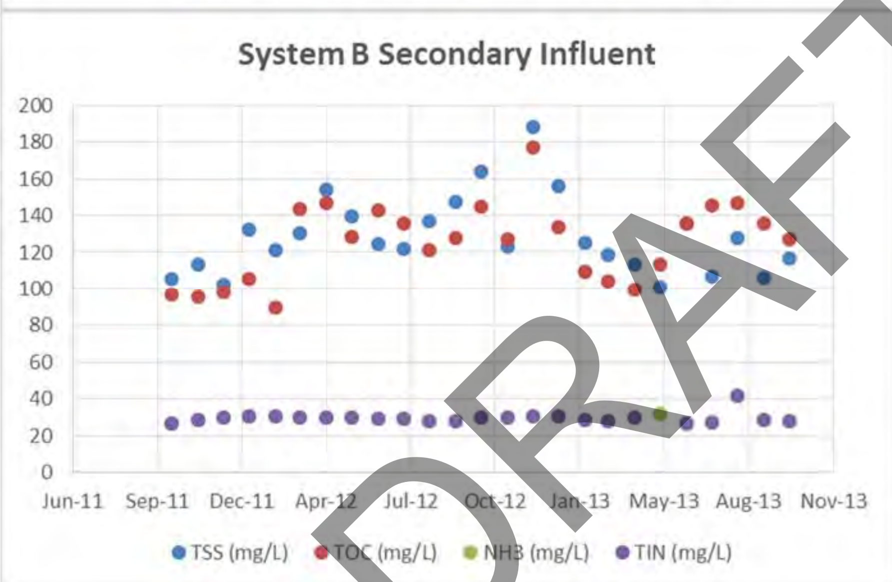
Appendix 5-A
RP-1 Plant Operations Summary (2011-2013)

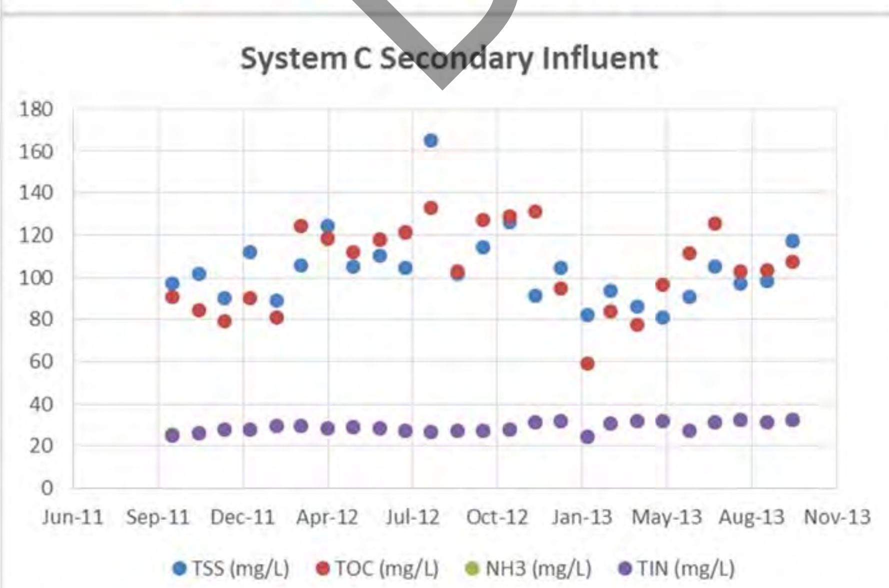

Primary Clarifier Effluent
200
180
160
140
120
100
80
60
40
20
0
Jun-11 Sep-11 Dec-11 Apr-12 Jul-12 Oct-12 Jan-13 May-13 Aug-13 Nov-13
TOC (mg/L) TSS (mg/L) NH3 (mg/L)

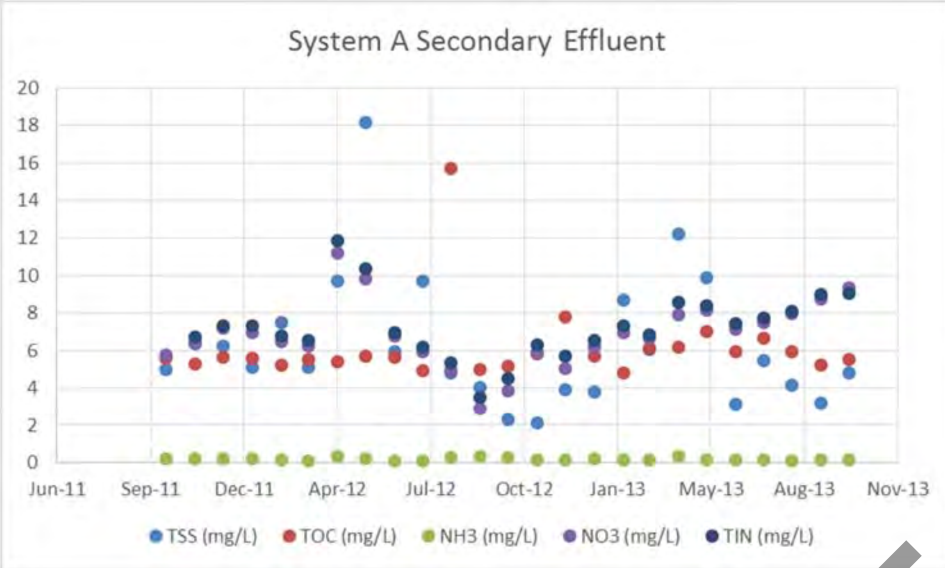

Primary Clarifiers, % Removal Rate
90
80
70
60
50
40
30
20
10
0
Jun-11 Sep-11 Dec-11 Apr-12 Jul-12 Oct-12 Jan-13 May-13 Aug-13 Nov-13
TOC TSS

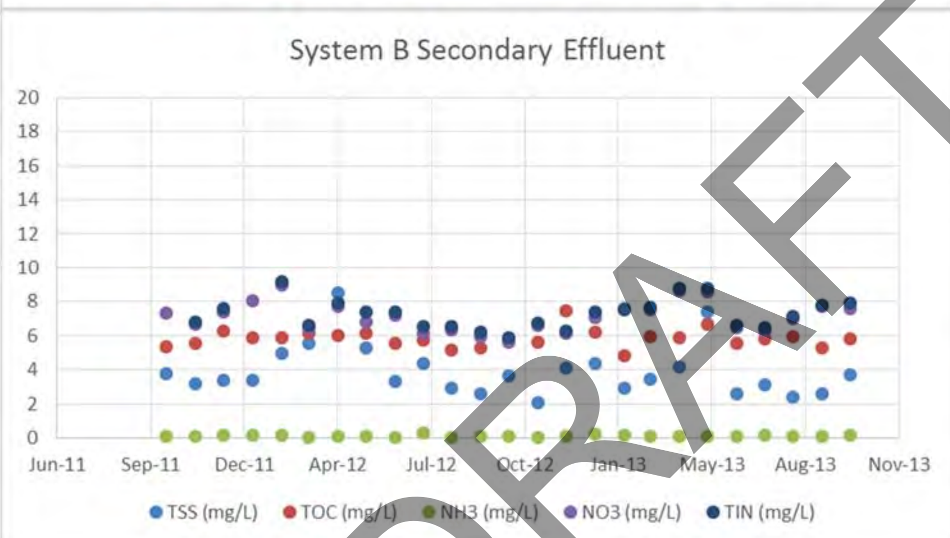

Aeration Basin DO Profile (mg/L)
2.5
2
1.5
1
0.5
0
14-Sep 23-Dec 1-Apr 10-Jul 18-Oct 26-Jan 6-May 14-Aug 22-Nov
Anoxic 1 Aerobic 1 Anoxic 2 Aerobic 2

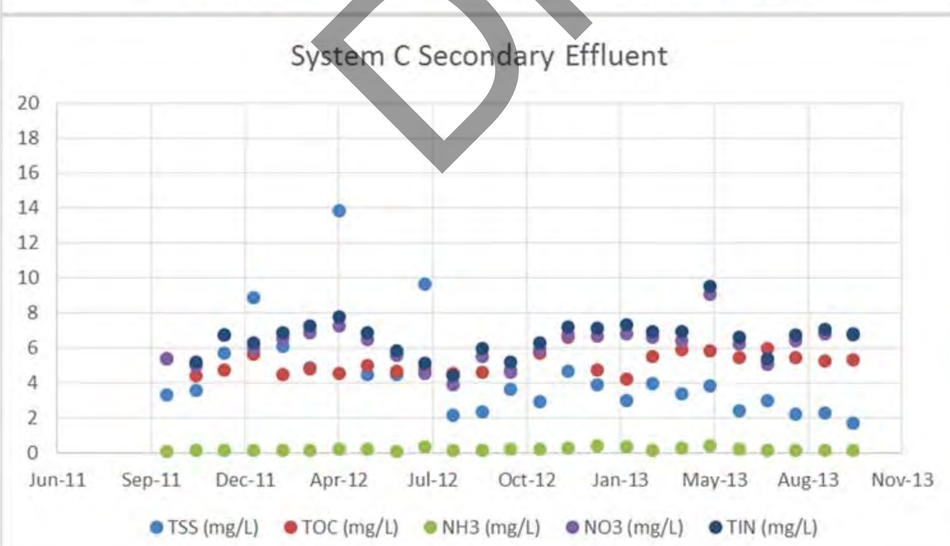

System A Secondary Influent
250
200
150
100
50
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
TIN (mg/L)

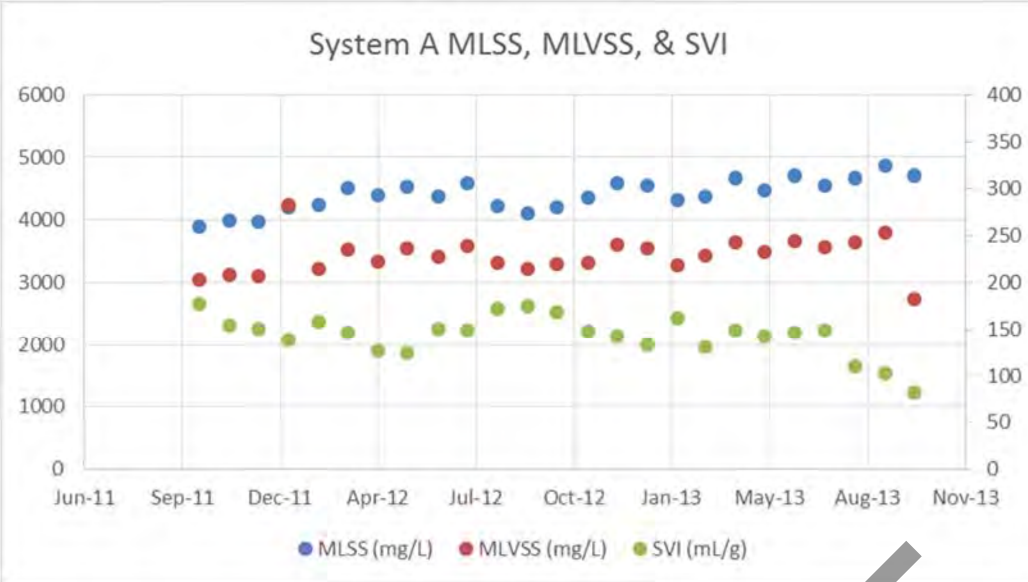

System B Secondary Influent
200
180
160
140
120
100
80
60
40
20
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
TIN (mg/L)

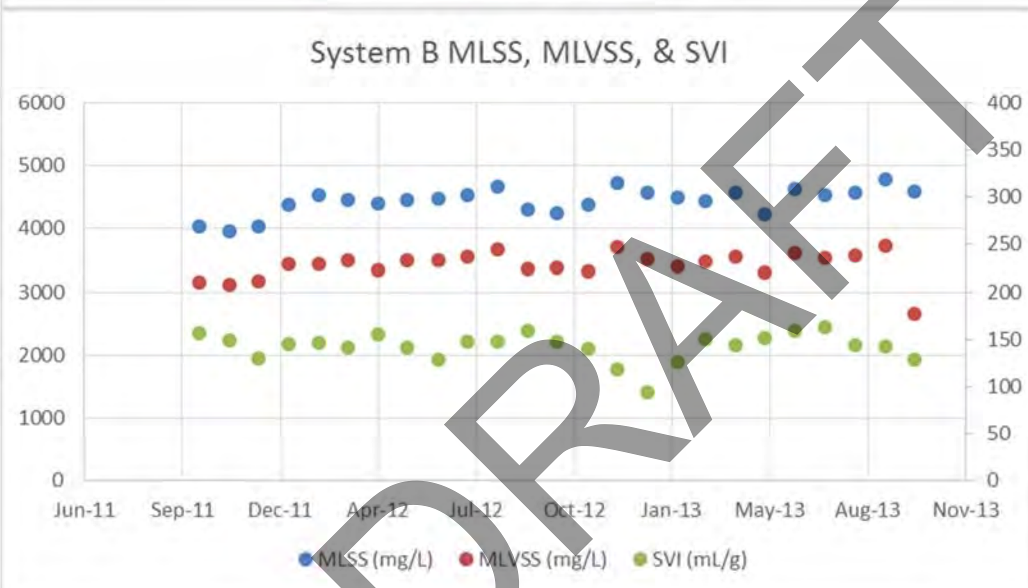

System C Secondary Influent
180
160
140
120
100
80
60
40
20
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
TIN (mg/L)

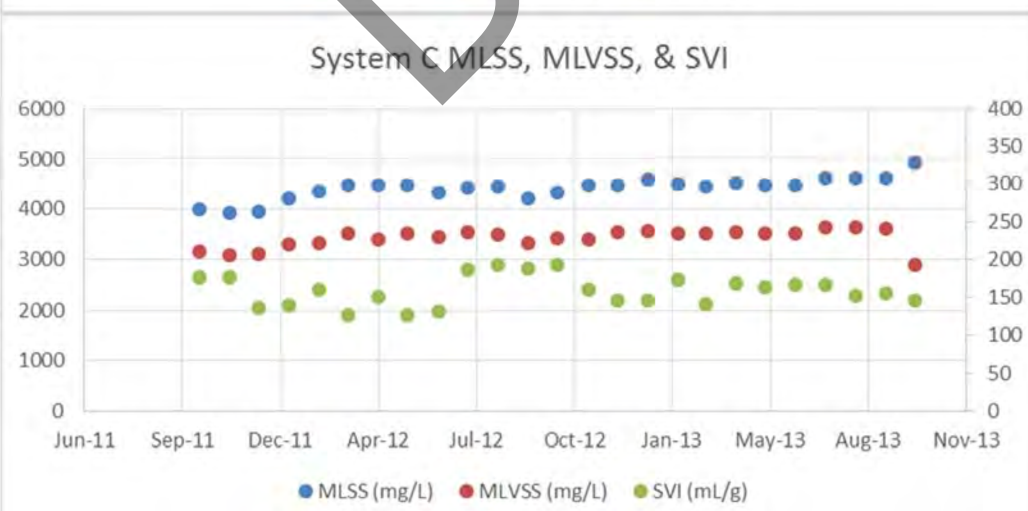

System A Secondary Effluent
0
2
4
6
8
10
12
14
16
18
20
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
NO3 (mg/L)
TIN (mg/L)

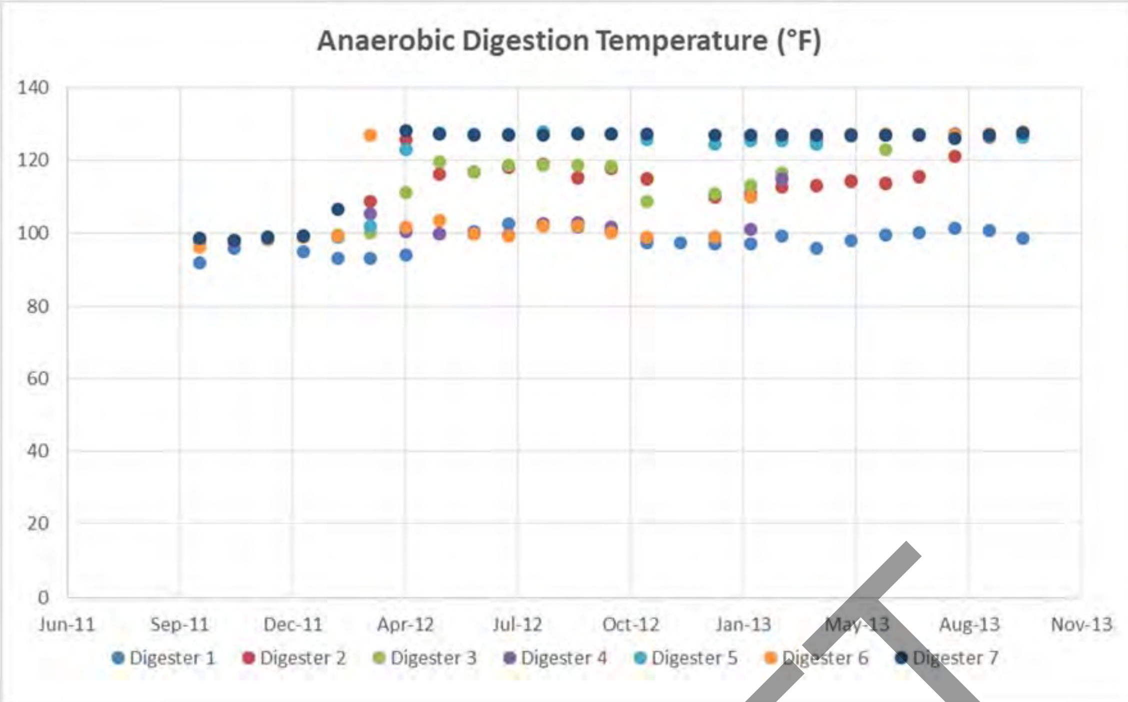

System B Secondary Effluent
0
2
4
6
8
10
12
14
16
18
20
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
NO3 (mg/L)
TIN (mg/L)

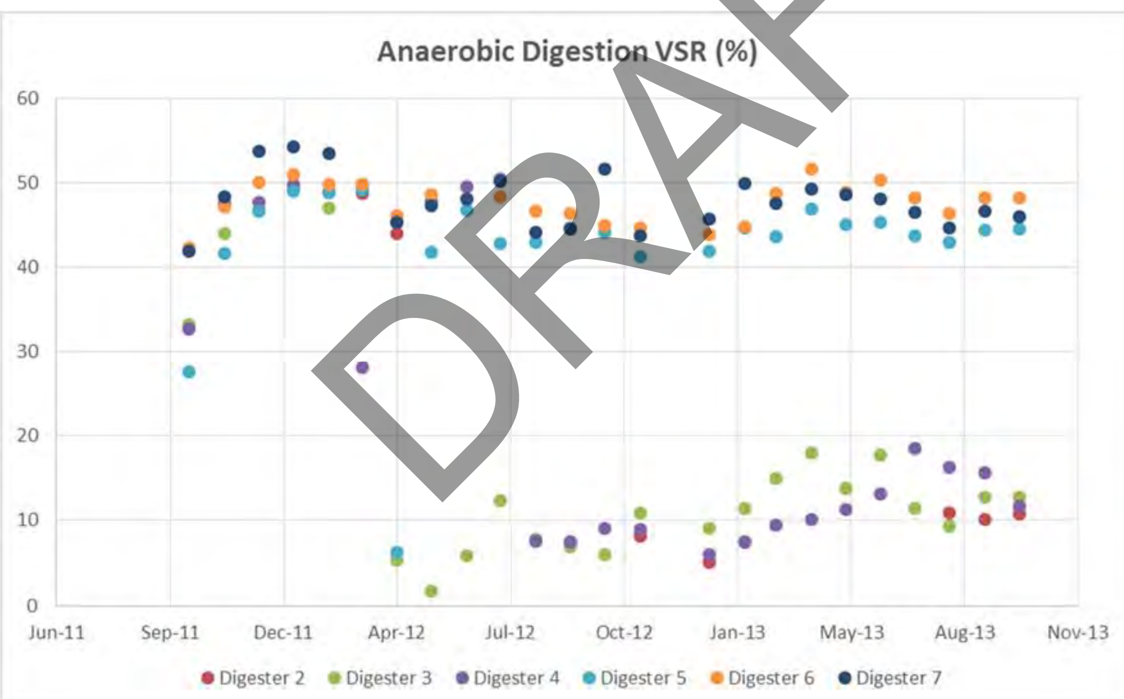

System C Secondary Effluent
0
2
4
6
8
10
12
14
16
18
20
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
NO3 (mg/L)
TIN (mg/L)

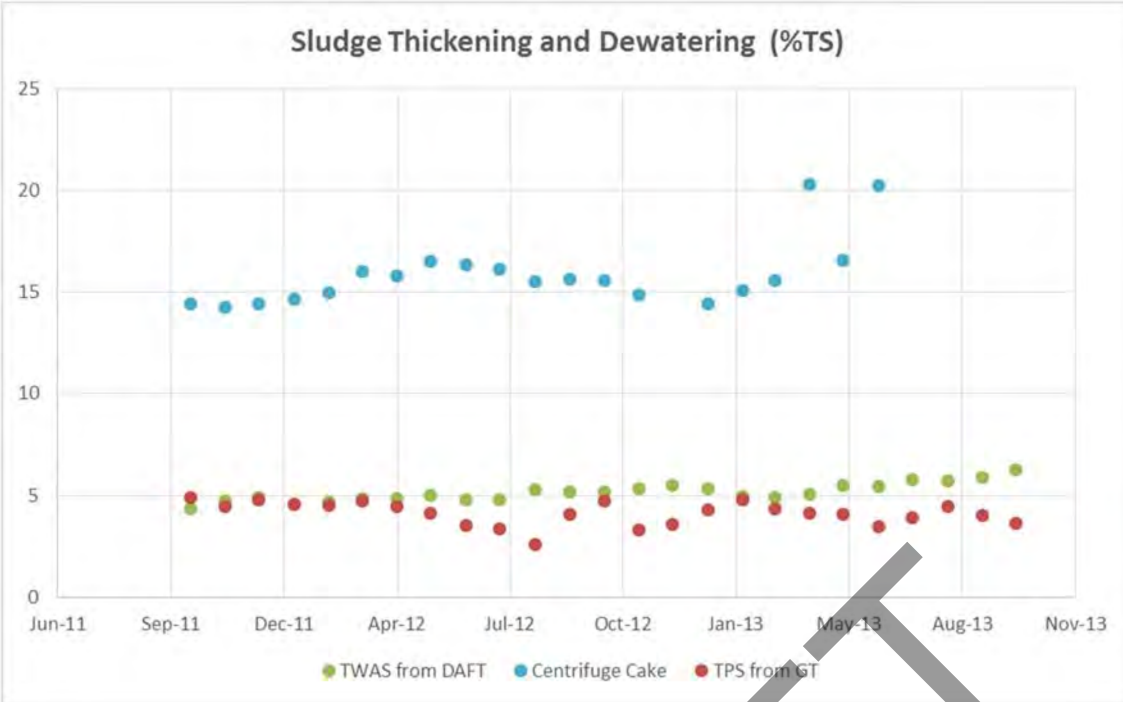

System A MLSS, MLVSS, & SVI
6000
5000
4000
3000
2000
1000
0
400
350
300
250
200
150
100
50
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
MLSS (mg/L)
MLVSS (mg/L)
SVI (mL/g)


System B MLSS, MLVSS, & SVI
6000
5000
4000
3000
2000
1000
0
400
350
300
250
200
150
100
50
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
MLSS (mg/L)
MLVSS (mg/L)
SVI (mL/g)


System C MLSS, MLVSS, & SVI
6000
5000
4000
3000
2000
1000
0
400
350
300
250
200
150
100
50
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
MLSS (mg/L)
MLVSS (mg/L)
SVI (mL/g)


Anaerobic Digestion Temperature (°F)
140
120
100
80
60
40
20
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
Digester 1
Digester 2
Digester 3
Digester 4
Digester 5
Digester 6
Digester 7


Anaerobic Digestion VSR (%)
60
50
40
30
20
10
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
Digester 2
Digester 3
Digester 4
Digester 5
Digester 6
Digester 7



Sludge Thickening and Dewatering (%TS)
25
20
15
10
5
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TWAS from DAFT
Centrifuge Cake
TPS from GT

IEUA Wastewater Facilities Master Plan
TM 6 RP-4 Future Plans

PREPARED FOR:	Inland Empire Utilities Agency
PREPARED BY:	CH2M HILL
DATE:	October 29, 2014

Executive Summary

Regional Water Recycling Plant No. 4 (RP-4) began operation in 1997 and treats wastewater from the Cities of Rancho Cucamonga and Fontana, as well as unincorporated areas of San Bernardino County. RP-4 consists of liquid treatment facilities and sends solids to Regional Water Recycling Plant No. 1 (RP-1) for treatment.

The current and future flows and loads for RP-4 were estimated in *Technical Memorandum (TM) 4 Wastewater Flow and Loading Forecast*. An analysis of the influent wastewater characteristics at RP-4 was conducted to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and the 2060 ultimate buildout year. These projections and the effluent requirements detailed in the Santa Ana Regional Water Quality Control Board (RWQCB) Order No. R8-2009-0021 were used to evaluate the existing capacities of the RP-4 liquid treatment facilities. The estimated capacities were then compared to the projected flow and loads to determine the RP-4 processes that require expansion within the 20-year planning period, and when those facilities would need to be online.

Due to the incorporation of septic flows into the Inland Empire Utilities Agency (IEUA) sewer system, RP-4 plant influent flows and loads are projected to increase substantially by 2035. Although the existing primary and secondary treatment processes at RP-4 have sufficient capacity to treat projected flows and loads through planning year 2035, the tertiary processes will need to be expanded. Additional filtration and disinfection units will be needed by 2035 to handle the increased flows and loads. The RP-4 Tertiary Expansion Project would expand the RP-4 tertiary treatment capacity beyond 14 mgd to match that of the primary and secondary treatment processes. The capital costs included in the 20-year CIP for this project are summarized in Table 6-1.

TABLE 6-1
RP-4 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-4 Tertiary Expansion Project
Total Direct Cost[a]	$2,160,000
Total Estimated Construction Cost[b]	$3,622,000
Total Estimated Project Costs	$4,709,000

[a] *Engineering-News Record* Construction Cost Index (ENR CCI) for Los Angeles (August 2014 - 10,737).
[b] Cost does not include escalation to midpoint of construction.
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

1.0 Background and Objectives

IEUA contracted with CH2M HILL and Carollo Engineers (Consultant Team) to develop a Wastewater Facilities Master Plan (WFMP). The objective of the WFMP is to plan IEUA's wastewater treatment and conveyance improvements and develop a Capital Improvement Program (CIP). The capital program will guide IEUA in the development of major improvements to treatment and conveyance facilities. There are five goals for this TM:

- Summarize information from TMs 1 through 4 as it pertains to RP-4.
- Evaluate the current capacities and limitations of the existing facilities.
- Determine treatment facilities required to treat projected flows and loads through planning year 2035.
- Estimate timing and preliminary capital costs for plant expansion projects required during the 20-year planning period.

2.0 RP-4 Overview

RP-4 has been in operation since 1997 and serves the Cities of Rancho Cucamonga and Fontana, as well as unincorporated areas of San Bernardino County. It acts as an upstream satellite facility to RP-1 by scalping flow from the Etiwanda sewer, which is tributary to RP-1. RP-4 includes preliminary, primary, secondary, and tertiary liquid treatment facilities. The liquid facilities are permitted to treat an annual average flow of 14 million gallons per day (mgd) and produce an effluent quality meeting Title 22 standards for spray irrigation, nonrestricted recreational and landscape impoundments, and groundwater recharge. Solids produced at RP-4 are returned to the collection system and conveyed to RP-1 for treatment. A schematic of the RP-4 facility is shown in Figure 6-1.

Preliminary treatment at RP-4 includes screening that consists of two mechanical bar screens, influent pumping, flow measurement by magnetic flowmeter, and grit removal by two vortex-type grit chambers. As flow enters RP-4, it passes through the screening process and is pumped to the headworks splitter box, where it is split between two vortex grit basins. Foul air from the preliminary and primary treatment facilities is sent to a biofilter for treatment and discharge. Primary treatment consists of two circular primary clarifiers. Ferric chloride and polymer are added upstream to improve settling performance and reduce odors in the solids handling facilities.

Secondary treatment includes three parallel, multistage Bardenpho activated sludge treatment systems and three circular clarifiers. Each system consists of an anoxic basin and an aeration basin. Each aeration basin is divided into two trains; each train is further subdivided into four zones: an extended anoxic zone, oxic zone, anoxic zone, and oxic zone. Aerobic zones are equipped with fine bubble diffused air strips that are supplied with air by three centrifugal blowers. Tertiary treatment consists of coagulation/flocculation, filtration, and disinfection. Secondary effluent is split between two tertiary trains. In the first train, coagulation/flocculation and filtration processes are achieved using US Filter's "Trident" process. Alum is added upstream of an upflow "contra-clarifier" followed by dual media filtration. Effluent is sent to two chlorine contact basins operated in series. In the second train, alum is added upstream of three flocculation basins operated in series and followed by cloth disc filtration. Effluent is directed to a chlorine contact basin. Disinfection is achieved using sodium hypochlorite, and recycled water is pumped to the distribution system for reuse. Excess recycled water from RP-4 is conveyed to RP-1 where it is combined with effluent from RP-1, dechlorinated, and discharged. Further details of the facilities are summarized in *TM 1 Existing Facilities*.

3.0 Current and Future Flows and Loads

As presented in *TM 4 Wastewater Flow and Loading Forecast*, an analysis of the influent wastewater characteristics at RP-4 was conducted as part of this WFMP effort to establish current average and peak influent flows, concentrations, and loads at the plant and to develop flow and load projections for the 2035 planning year and 2060 ultimate buildout year. The data analysis is based on 2 consecutive years of recent data provided by IEUA for influent flow and key wastewater quality constituents including biological oxygen demand (BOD), total organic carbon (TOC), total suspended solids (TSS), ammonia (NH_3-N), and total Kjeldahl nitrogen (TKN).

Flow projections were developed by the Integrated Water Resources Plan (IRP) Consultant and are based on the average influent wastewater flows measured during the flow monitoring period in November 2013 and projected through the year 2060 using population, employment, and land use information. As discussed in *TM 3 Regional Trunk Sewer Alternatives Analysis*, the WFMP planning effort is based on IEUA's preferred Flow Diversion Alternative 2, which includes diverting flows from Whispering Lakes and Haven Pump Stations to RP-1. The corresponding influent wastewater flow and loading projections under this alternative for the planning year 2035 form the basis of the master planning effort and treatment plant capacity evaluation presented herein. Projections are also presented for the 2060 ultimate buildout year; these projections are used for site planning considerations. Influent wastewater flows are projected to increase significantly at RP-4, largely due to the gradual incorporation of septic flows into the system between 2020 and 2060.

A summary of the current and projected average influent wastewater flows and loads for RP-4 are presented in Tables 6-2 and 6-3.

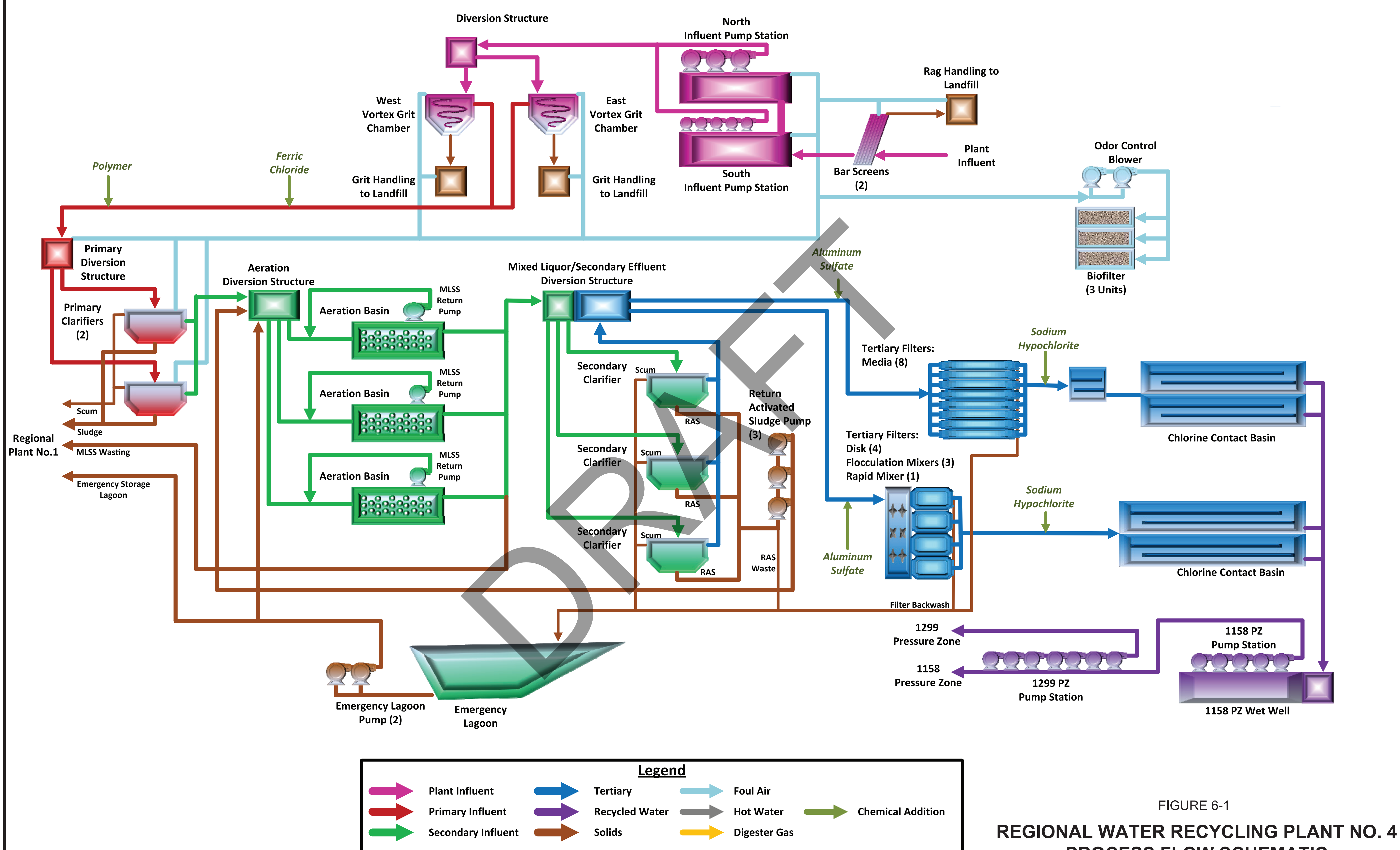


FIGURE 6-1

REGIONAL WATER RECYCLING PLANT NO. 4
PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-10-14F6-1-9370A00.AI

CH2MHILL® carollo Engineers...Working Wonders With Water®

TABLE 6-2
RP-4 Current and Projected Average Influent Wastewater Flows

	Current	2035[a]	2060[a,b]
Average Influent Flow (mgd)	10.5	14.7	18.4

[a] Projections developed by IRP Consultant and IEUA based on November 2013 flow monitoring period. Reflects projected flows for IEUA preferred Flow Diversion Alternative 2 and includes septic flows tributary to RP-4.
[b] Site planning considerations are based on the projections established for the 2060 ultimate buildout planning year.

TABLE 6-3
RP-4 Current and Projected Average Influent Wastewater Characteristics

	Current Concentration (mg/L)	Current Load (lb/day)	2035 Load[a] (lb/day)	2060 Load[a] (lb/day)
BOD	352	30,543	43,207	54,082
TSS	318	27,630	38,948	48,752
NH3-N	41	3,550	5,010	6,271
TKN	59	5,015	7,186	8,994

[a] Load projections based on projected flows, concentrations, and load peaking factors presented in *TM 4 Wastewater Flow and Loading Forecast.*
mg/L – milligrams per liter
lb/day – pounds per day

4.0 Treatment Requirements

IEUA operates under an umbrella permit and must meet water quality requirements for discharge and recycled water.

4.1 Discharge Requirements

The tertiary effluent from RP-4 is discharged at Reach 1 of Cucamonga Creek (Discharge Point [DP] 002), regulated by RWQCB Order No. R8-2009-0021, which replaced Order No. 01-1 and Order No. 95-43, National Pollutant Discharge Elimination System (NPDES) No. CA 0105279. This permit is an umbrella permit governing all of IEUA's wastewater treatment plants (RP-1, RP-4, RP-5, and Carbon Canyon Water Recycling Facility [CCWRF]). It includes a stormwater discharge permit and the enforcement of an industrial pretreatment program. Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water, due to the use of receiving waters for water contact recreation. A summary of the key effluent quality limits is provided in Table 6-4.

TABLE 6-4
Summary of Effluent Quality Limits[a]

Parameter	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Notes
BOD	30 mg/L[b]	20 mg/L[b]	-	-	45 mg/L weekly average and 30 mg/L monthly average with 20:1 dilution.
TSS	30 mg/L/[b]	20 mg/[b]	-	-	
NH_4-N	-	4.5 mg/L	-	-	
Chlorine Residual	-	-	-	0.1	Instantaneous maximum ceiling 2 mg/L
TIN	-	-	8 mg/L	-	
TDS	-	-	550 mg/L	-	Shall not exceed 12-month running average TDS concentration in water supply by more than 250 mg/L
Turbidity	-	-	-	-	1. Daily average – 2 NTU 2. 5% maximum in 24 hr – 5 NTU 3. Instantaneous maximum – 10 NTU
Coliform	< 2.2 MPN	-	-	-	Maximum 23 MPN, once per month
pH	-	-	-	6.5 – 8.5	99% compliance
Free Cyanide	-	4.2 µg/L	-	8.5 µg/L	
Bis(2-ethylhexyl) Phthalate	-	5.9 µg/L	-	11.9 µg/L	
Selenium	-	4.1 µg/L	-	8.2 µg/L	

[a] RWQCB Order No. R8-2009-0021.
[b] Without 20:1 dilution and for recycled water.
NTU – nephelometric turbidity unit(s)
MPN – most probable number
µg/L – micrograms per liter

4.2 Recycled Water Requirements

As mentioned previously, effluent from RP-1 and RP-4 is used as recycled water for irrigation and groundwater recharge via spreading in seven Phase I recharge basin sites and six Phase II recharge basin sites. Specifically, recycled water from RP-1 is discharged to a use area overlying Chino North “Max Benefit” Groundwater Management Zone (DP 005). Recycled water quality requirements for groundwater recharge are governed under RWQCB Order No. R8-2007-0039. Table I, Table II, and Table III in the permit provide concentration limits for many constituents of concern, such as inorganic chemicals, volatile organic chemicals, radionuclides, metals, and disinfection byproducts. Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described in Table 6-4.

5.0 Existing Plant Capacity and Limitations

Existing facilities and the current plant performance were used as the basis for RP-4 process model development. A whole plant model was developed using PRO2D and calibrated based on plant influent data and plant operations data for the period between October 15, 2011, and October 15, 2013. This period was selected as the basis after a review of the influent and plant data to reflect a 2-year-long complete data set. Existing plant operation and the findings of the capacity evaluation through the use of process modeling are presented below for the liquid treatment facilities at RP-4.

5.1 Existing Plant Operation

A summary of RP-4 plant operations is provided in Table 6-5 for the liquid treatment and solids handling facilities. Unit process performance values were averaged over the evaluation period, with operating ranges noted. These values were used in development and calibration of the process models. Detailed data summaries for the evaluation period are provided in Appendix 6-A.

TABLE 6-5
RP-4 Average Plant Operations Summary

Parameter	Value
Primary Treatment	
TSS Removal Rate (%)	69
TOC Removal Rate (%)	38
Primary Sludge (gpd)	174,000
Secondary Treatment	
MLSS (mg/L)	4,600
MLVSS (%)	81
RAS SS (mg/L)	7,430
Solids Inventory (klb)	350 – 385
Basins DO (mg/L)	0.8 – 1.5
WAS (mgd)	0.050 – 0.194
SVI (ml/g)	193
SRT (Basins Only) (day)	46 – 190[a]
Residual Alkalinity (mg as $CaCO_3$/L)	135

[a] Wide range of SRT values experienced due to solids wasting practices.
gpd – gallons per day
MLSS – mixed liquor suspended solids
MLVSS – mixed liquor volatile suspended solids
RAS – return activated sludge
SS – suspended solids
klb – kilopounds
DO – dissolved oxygen
WAS – waste activated sludge
mL/g – milliliters per gram
SVI – sludge volume index
SRT – solids retention time
$CaCO_3$/L – calcium carbonate per liter

A performance summary for the major treatment processes is presented in Table 6-6. These values, which represent the average over the evaluation period, were used in the subsequent plant process modeling and the capacity evaluations for the major treatment units. Detailed data summaries for the evaluation period are provided in Appendix 6-A.

TABLE 6-6
RP-4 Average Plant Performance Summary

Parameter	Primary Effluent	Secondary Effluent
TOC (mg/L)	120	4.2
BOD (mg/L)	217	1.2
TSS (mg/L)	91	3.5
NH3-N (mg/L)	30	0.2
NO3-N (mg/L)	N/A	4.2
NO2-N (mg/L)	N/A	0.1
TIN (mg/L)	N/A	4.5
Alkalinity (mg as $CaCO_3$/L)	N/A	135

NO3-N – nitrate as nitrogen
NO2-N – nitrite as nitrogen
TIN – total inorganic nitrogen

The values in Table 6-6 are for the current operation, which includes secondary treatment with internal mixed liquor recycling, configured in an anoxic-oxic-anoxic-oxic biological nutrient removal (BNR) configuration with step feed capability, consisting of pre-anoxic tanks followed by plug flow reactors.

5.2 Existing Plant Capacity

5.2.1 Process Modeling

The capacity of the existing system was evaluated through process modeling using CH2M HILL's whole plant simulator, PRO2D. PRO2D is a process simulation model that takes into account the mass balances through an entire facility for particulate and soluble components and, similar to other commercially available process models, is based on the International Water Association (IWA) ASM2D biological process kinetics. The base model was constructed to reflect the actual facility setup, including flow splits and backwash. The process model facility setup flow diagram is presented in Figure 6-2. The model was constructed with the operations and performance criteria reflective of the evaluation period, and then calibrated to reflect the actual performance, solids yields, and water quality data.

As shown in Figure 6-2, the model was constructed to represent the actual plant operation for all the major process units. The model also allows establishing sizing and design considerations for each major unit process tankage and equipment. Similar to the actual operations, the plant model was built with the filter backwash and solids thickening recycles being returned to the main plant for further treatment, with the dewatering recycles being diverted offsite. The liquid and solids mass balances calculated for the current conditions allow calibration of the model against the actual field data. The calibrated model is then used to evaluate current capacity as well as establish expansion needs and process bottlenecks.

The process model was constructed and calibrated using the current influent and operating data available for the facility. The purpose of the model calibration step is to establish a baseline condition that closely resembles current operations and provides a means to reliably predict operations and system limitations under different scenarios or alternatives. Key model calibration results are presented in Table 6-7. As the listed values show, the model was calibrated such that the simulation results are within a value range that is 5 percent or smaller as compared to the actual data. This level of accuracy will allow reliable capacity estimations to be made for the various capacity scenarios and future operation needs.

TABLE 6-7
RP-4 Average Plant Performance Summary

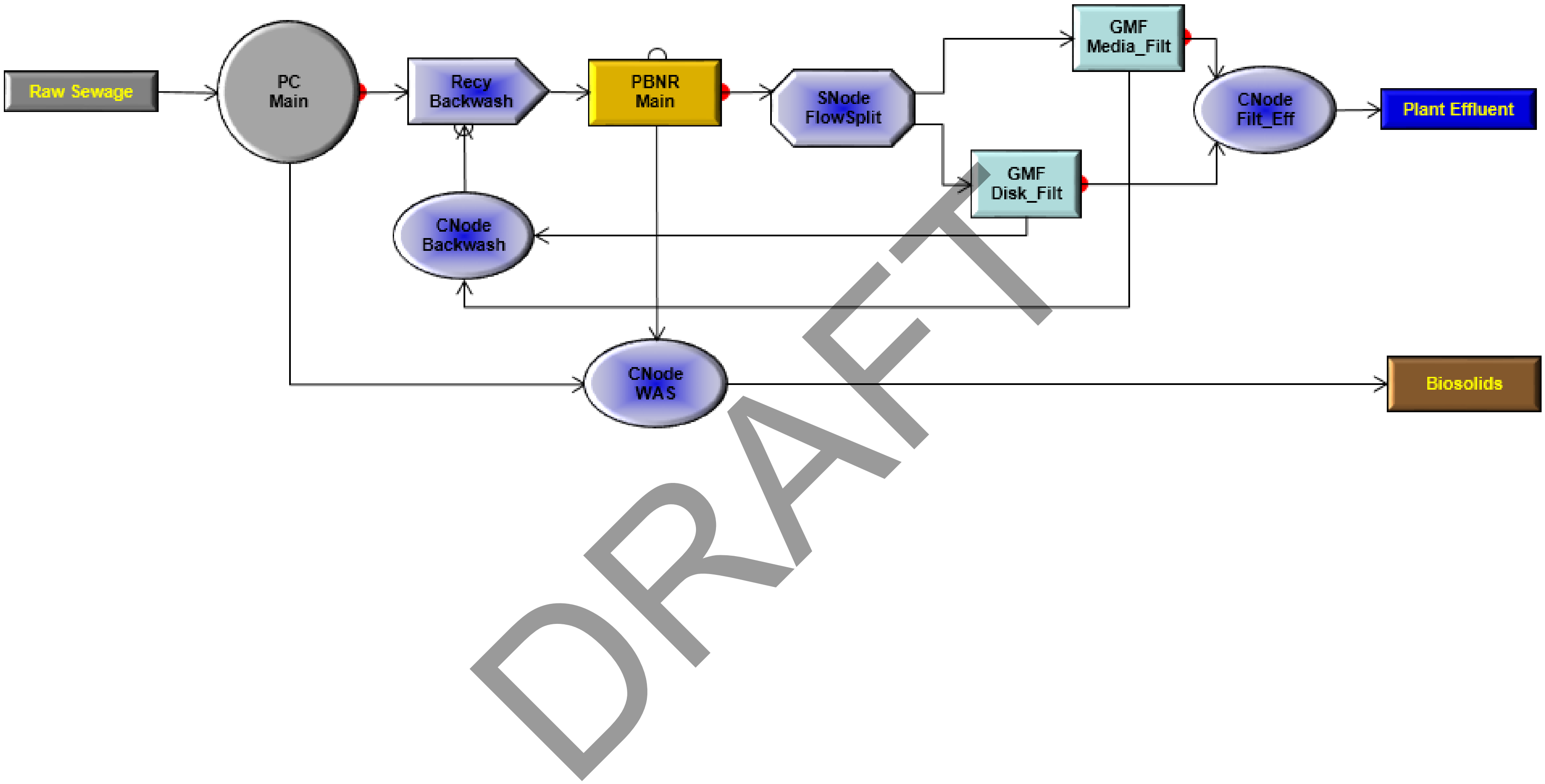
Parameter	Actual Data Average Values	Model Results
Effluent BOD (mg/L)	1.2	0.1
Effluent TSS (mg/L)	<5	<5
Effluent TIN (mg/L)	4.5	4.3
Effluent Alkalinity (mg as $CaCO_3$/L)	135	140
MLSS Inventory (lb)	367,500	364,300
Sludge Volatile Solids Content (%)	81	80
Total Waste Solids (Dry Solids lb/day)	30,500	31,400

Subsequent process modeling using the calibrated model as the base model was conducted to evaluate the following scenarios:

- Current Plant Capacity
  - Liquid treatment capacity to meet 8-mg/L effluent TIN level under average and maximum month flow and load conditions
  - Liquid treatment capacity to meet 5-mg/L effluent TIN level under average and maximum month flow and load conditions
  - Solids generation rates under average and maximum month flow and load conditions
- Future capacity implications for the planning year 2035
- Future facility footprint implications for the planning years 2035 and 2060

Findings of the current plant capacity evaluation are presented next in this section. Future capacity needs are presented in Section 6.0.

FIGURE 6-2
RP-4 Process Model Facility Setup



5.2.2 Liquid Treatment Capacity

An evaluation of the liquid treatment capacity was conducted using the whole plant process model under both the average and maximum month conditions. The capacity evaluation was conducted based on achieving a plant effluent TIN concentration of 5 mg/L and 8 mg/L. As established at the onset of the project, the facility reliability and redundancy considerations are based on the IEUA's overall wastewater treatment system, with RP-5 being the end-of-the-line facility receiving all flow diversions if needed from other Regional Water Recycling Plants. Since redundancy is provided by taking the largest unit out of service for each process at RP-5, the RP-4 plant capacity is based on all RP-4 units in service.

The facility has two primary clarifiers in service. The average hydraulic loading rates with two units in service are around 800 gallons per day per square foot (gpd/ft^2). If one unit needs to be taken out of service, especially under peak flow conditions, the primary clarifiers will be hydraulically loaded at 1,600 gpd/ft^2 or greater. Considering that flow diversion to RP-5 is available for times if a primary clarifier needs to be taken out of service, chemically enhanced primary treatment (CEPT) could be implemented under these conditions to avoid overloading the downstream secondary treatment system. The facility already has a ferric chloride system in place and injecting 16 mg/L ferric on average.

Process modeling showed that the liquid treatment capacity can be limited by the secondary treatment system. SVI values are reportedly greater than 190 mL/g, which indicates sludge settleability could be impaired at times. One limitation of the secondary treatment system was found to be the secondary clarification solids loading resulting from the current operations and the influent wastewater solids loading rates. Maintaining the SVI values at or below 150 mL/g is important for this reason also.

Waste solids (primary sludge and WAS) generated at RP-4 are diverted to RP-1 via the sewer system. For this reason, there are no solids handling recycles processed at this facility. RP-4 waste solids will continue to be diverted offsite. The solids are not continuously discharged, but maintained in the system; wasting is achieved intermittently.

Primary and secondary treatment capacity is presented in Table 6-8.

TABLE 6-8
RP-4 Existing Primary/Secondary Process Capacity

	All Units in Service	One Unit Out of Service[a]
Plant Effluent TIN $\leq$ 8 mg/L	16 mgd	14 mgd
Plant Effluent TIN $\leq$ 5 mg/L	14 mgd	12 mgd

[a] One secondary clarifier out of service.

The capacity of the RP-4 tertiary processes also were evaluated; the methodologies employed are consistent with those presented in the Title 22 Engineering Report (DDB Engineering, Inc. [DDB], 2009). The filters were designed based on a California Department of Public Health (CDPH) maximum filter loading rate of 5 gallons per minute per square foot (gpm/ft^2) for dual-media filters and 6 gpm/ ft^2 for cloth filters, with one dual-media filter cell in backwash and one cloth filter out of service. In order not to exceed the maximum approved filter loading rates, the maximum flow the filtration system can handle is 32.5 mgd. Applying a peak hourly wet weather peaking factor of 2.3, based on current plant data, the resulting average filtration capacity is 14.1 mgd.

As described in Section 2.0, the disinfection system consists of the original Chlorine Contact Basins No. 1A and 1B and the expanded Chlorine Contact Basin No. 2. Basins 1A and 1B were designed based on Title 22 requirements with a minimum concentration and time (CT) value of 450 milligrams per minute per liter (mg-min/L) and a minimum modal contact time of 90 minutes during the peak hourly dry weather flow. Tracer testing conducted by IEUA at RP-4 in 2005 showed that Basins 1A and 1B can handle a peak flow of 14.3 mgd while maintaining a modal contact time of 90 minutes (DDB, 2009). Applying a peak hourly dry weather peaking factor of 2.0, the resulting average disinfection capacity of Basins 1A and 1B is 7.2 mgd.

Basin 2 was designed based on an annual average capacity of 7 mgd and estimated peak dry weather capacity of 14 mgd while providing 90 minutes modal contact time (DDB, 2009). The Title 22 Engineering Report indicated the actual modal contact time and capacity of Basin 2 needs to be confirmed by tracer testing. Thus, the overall average disinfection capacity of Basins 1A, 1B, and 2 is approximately 14.2 mgd. The results of the tertiary treatment capacity evaluation are summarized in Table 6-9.

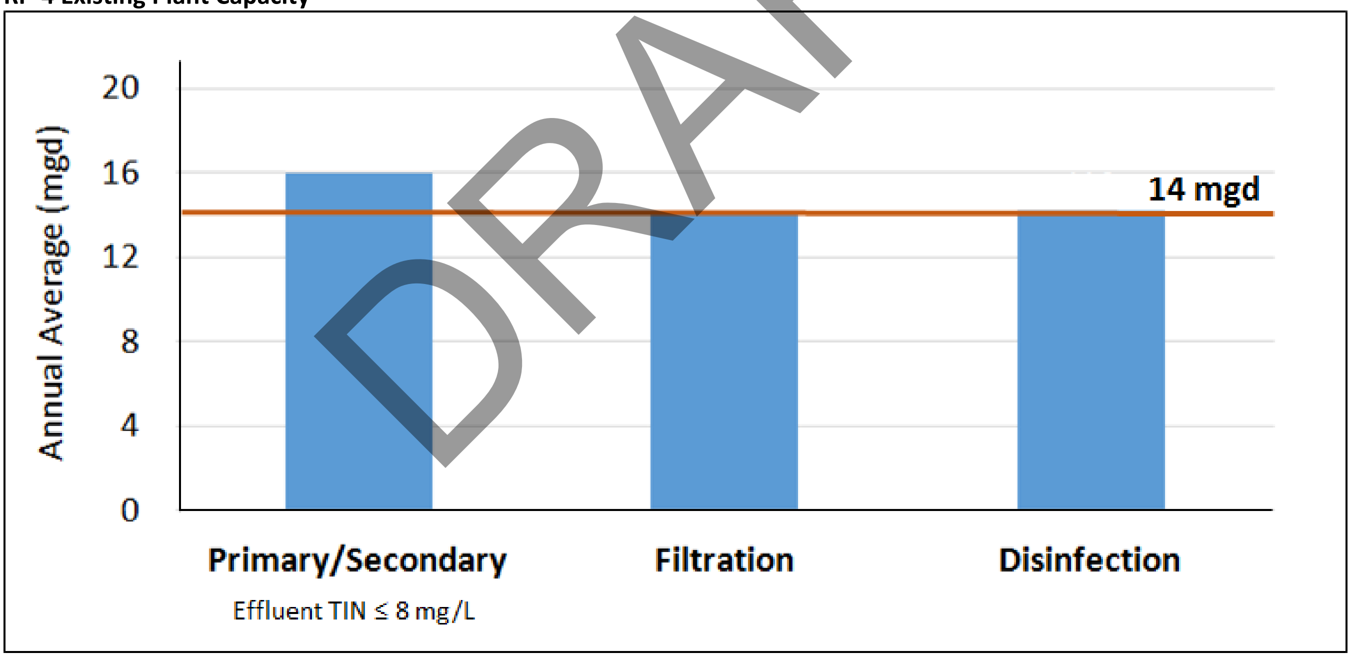
TABLE 6-9
RP-4 Existing Tertiary Process Capacity

	All Units in Service	Two Filters Out of Service[a]
Average Filtration Capacity	17.5 mgd	14.1 mgd
Average Disinfection Capacity	14.2 mgd	N/A

[a] One dual-media filter cell in backwash and one cloth filter out of service.

The overall plant capacity is determined by its most limiting process capacity. For RP-4, the tertiary processes are limited to approximately 14 mgd. Therefore, the RP-4 plant capacity is approximately 14 mgd under the assumptions presented in this section including the system reliability and redundancy being provided at RP-5. The primary and secondary process capacity will be 14 mgd if one unit of service is considered to meet 8-mg/L effluent TIN. A summary of the individual process capacities in comparison to the overall plant capacity is depicted in Figure 6-3.

FIGURE 6-3
RP-4 Existing Plant Capacity



6.0 Plant Expansion Needs

The flow projections for the planning years 2035 and 2060 were established as described under Section 3.0 of this TM. Accordingly, 2035 flow projections will be the basis of facility expansion and the CIP planning effort, while the facilities needed for the 2060 flow conditions will constitute the basis of site planning. The corresponding planning flows are listed in Table 6-2.

6.1 Facility Expansion Requirements

For the 2035 capacity expansion requirements that will constitute the basis of the CIP planning, facility sizing was determined using the whole plant PRO2D process model developed and calibrated for the current operation and wastewater quality, and for future average and maximum month flow and load conditions. Accordingly, the capacity requirement at RP-4 is in the tertiary treatment facilities for the 2035 flow projections, considering the facility could meet 5-mg/L or 8-mg/L effluent TIN with all primary and secondary process units in service. The expansion requirements are summarized in Table 6-10.

TABLE 6-10
RP-4 Facility Expansion Requirements for Planning Year 2035

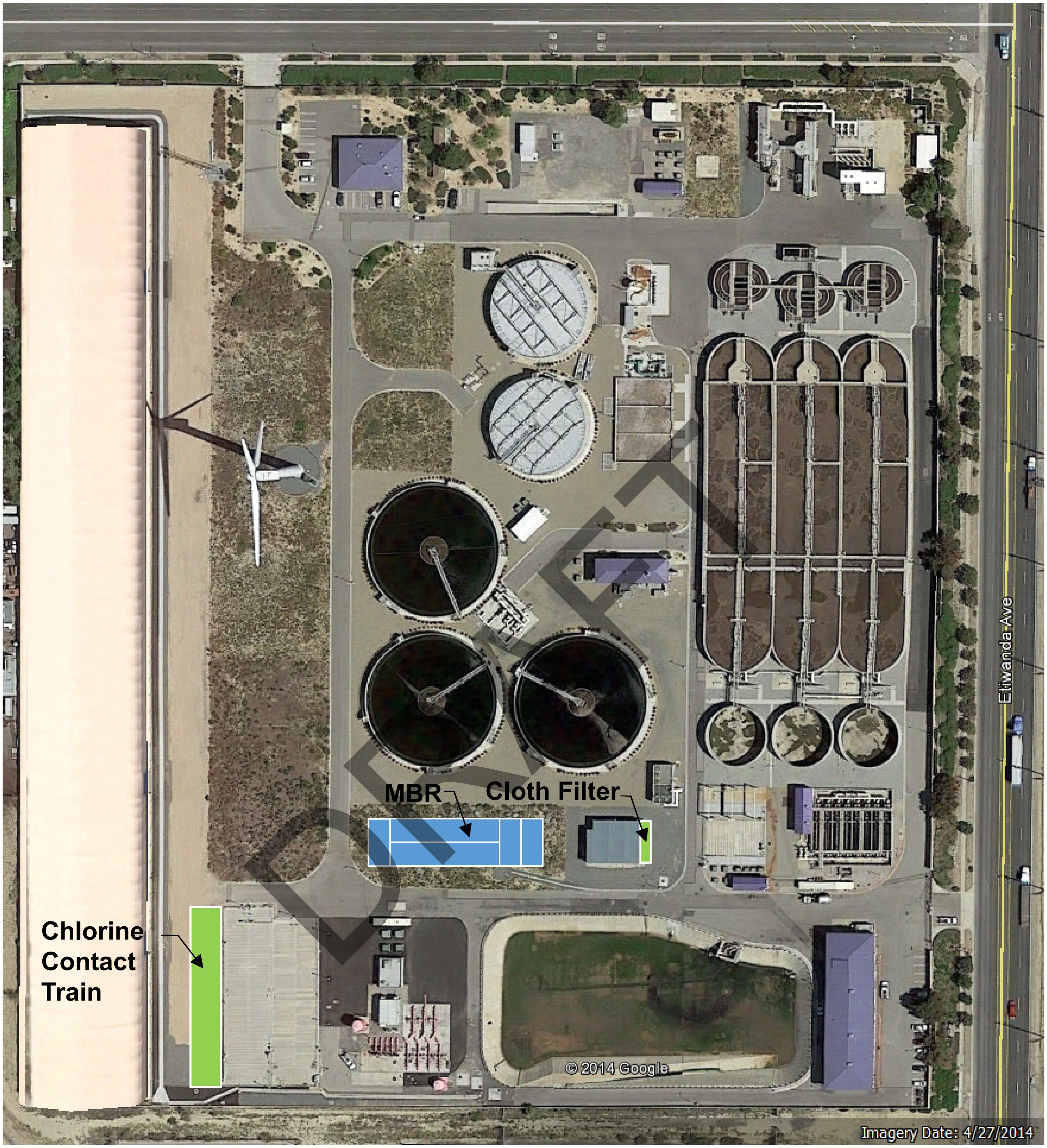
Parameter	Size of New Units	Comments
Primary Clarifiers	-	No new units are needed.
Secondary Treatment	-	No new units are needed.
Tertiary Filters	1 Cloth Filter	Same size as existing cloth filters, with 12 discs per filter.
Disinfection	1 Train	Same size as existing Chlorine Contact Tank No. 2 train, with 3 passes or channels per train.

6.2 Ultimate Facilities Site Plan

For ultimate site planning purposes, the facilities for the ultimate capacity increase were established and are presented in Figure 6-4. Facility sizing was determined using the whole plant PRO2D process model developed and calibrated for the current operation and wastewater quality, and for future average and maximum month flow and load conditions. Accordingly, the ultimate capacity needs include secondary treatment capacity expansion as well as tertiary treatment expansion, with RP-5 serving to provide reliability and redundancy for the system.

IEUA has decided to base the capacity expansion and footprint requirements on the membrane bioreactor (MBR) technology for RP-4. The benefits of the MBR technology for long term IEUA planning include small footprint requirements, elimination of secondary clarifiers as well as tertiary filters for recycled water production, superior water quality, and ability to produce thicker waste sludge compared to conventional technologies. Modular design capability of the MBR technology also allows stepwise expansion of the treatment facility to meet both load capacity and different effluent TIN requirements. Furthermore, the superior-quality effluent can be directly fed to a reverse osmosis (RO) system if IEUA needs to produce higher-quality effluent or reduce final effluent TDS. Therefore, a 4.5-mgd average capacity MBR train was included in site planning. This eliminates the need to implement filter expansion beyond planning year 2035.

No other site planning considerations were identified by the project team.



Aerial image © Google Earth, 2014. Annotation by CH2M HILL, 2014.

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Figure 6-4
RP-4 Ultimate Facilities Site Plan

Inland Empire Utilities Agency
Wastewater Facilities Master Plan

CH2MHILL carollo Engineers...Working Wonders With Water™

7.0 20-Year CIP Plant Expansion Projects and Capital Cost

One plant expansion project was identified during the 20-year CIP, the RP-4 Tertiary Expansion Project. Capital costs were estimated for the project and placed into the 20-year CIP. The planning-level capital costs for each process identified were developed based on cost curves established from previous projects and known direct costs for similar-size projects. Additionally, several assumptions were made to estimate the total construction cost and total project costs for the expansion project. The assumptions included the following:

- The WFMP assumed a 20-year planning period.
- 10 percent of facilities subtotal for civil/site work.
- 0 to 5 percent of facilities subtotal for demolition depending on existing site conditions.
- 20 percent of facilities subtotal for electrical and instrumentation.
- 10 percent of total direct cost for contractor general conditions.
- 15 percent of total direct cost for contractor overhead and profit.
- 8 percent sales tax was applied to 50 percent of the total direct cost.
- 30 percent for construction contingency.
- 30 percent for engineering, construction management, environmental, and legal costs was applied to the total construction cost to estimate the total project cost.

The total construction cost and total project cost for the expansion project are summarized in Table 6-11.

8.0 Conclusion

The following conclusions can be made from the evaluation of RP-4:

- RP-4 influent flows and loads are projected to increase substantially due to incorporation of septic flows tributary to RP-4.
- Primary and secondary treatment processes have sufficient capacity to treat projected liquid flows through the 20-year planning period.
- Additional filtration and disinfection capacity will be needed by 2035.

9.0 References

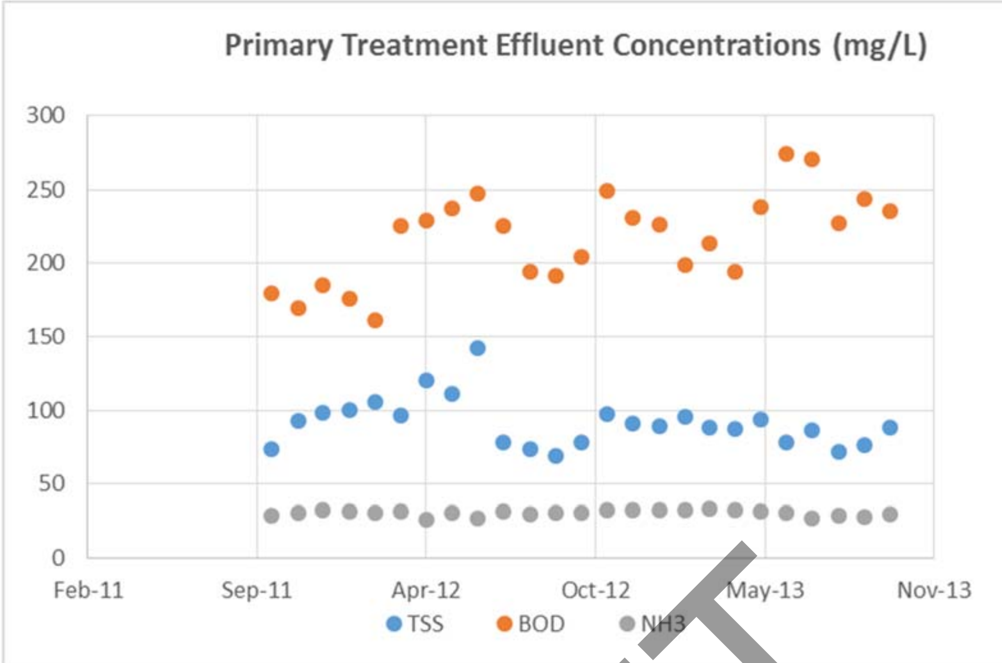
DDB Engineering, Inc. (DDB). 2009. *Inland Empire Utilities Agency Regional Plant No. 4 Title 22 Engineering Report.* September.

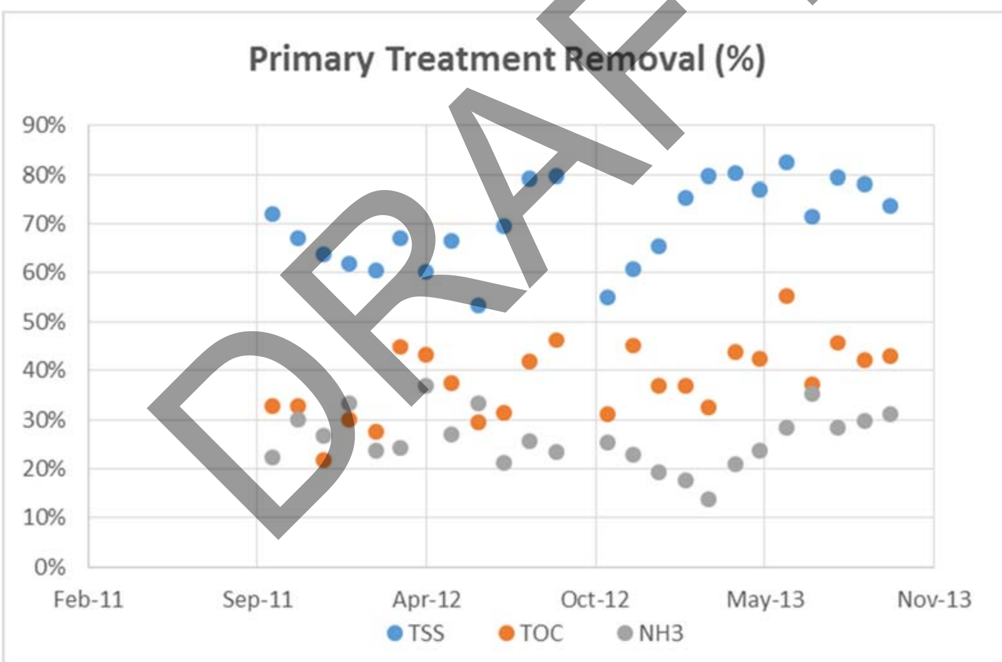
TABLE 6-11
RP-4 Expansion Projects Capital Cost Estimate

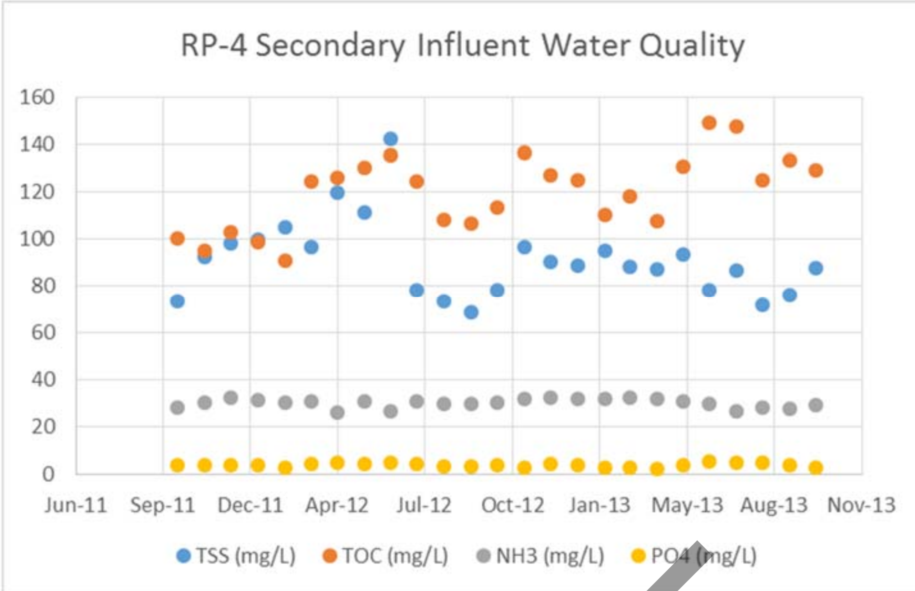
Component Description		RP-4 Tertiary Expansion Project
Filtration		$700,000
Chlorine Contact Basin		$900,000
	Facilities Subtotal	**$1,600,000**
Civil/Site Work (10%)		$160,000
Demolition (5%)		$80,000
Electrical and Instrumentation (20%)		$320,000
	Total Direct Cost[a]	**$2,160,000**
General Conditions (10%)		$216,000
General Contractor Overhead and Profit (15%)		$324,000
Sales Tax (8%)[b]		$86,000
	Subtotal	**$2,786,000**
Construction Contingency (30%)		$836,000
	Total Estimated Construction Cost[c]	**$3,622,000**
Engineering, Construction Management, Environmental, and Legal Costs (30%)		$1,087,000
	Total Estimated Project Costs	**$4,709,000**

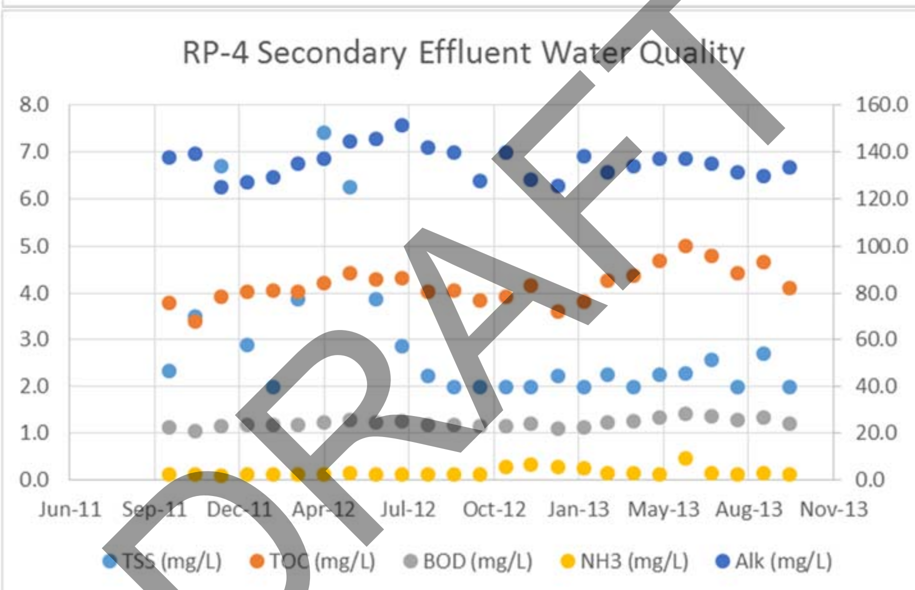
[a] *Engineering-News Record* Construction Cost Index (ENR CCI) for Los Angeles (August 2014 - 10,737).
[b] Calculated assuming 50% of direct costs are taxable.
[c] Cost does not include escalation to midpoint of construction.
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

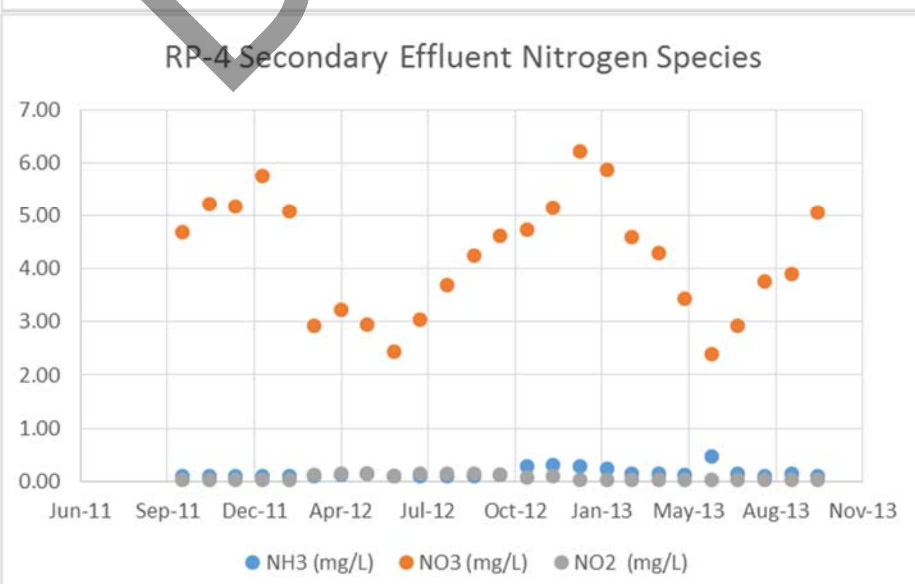
Appendix 6-A
RP-4 Plant Operations Summary (2011-2013)

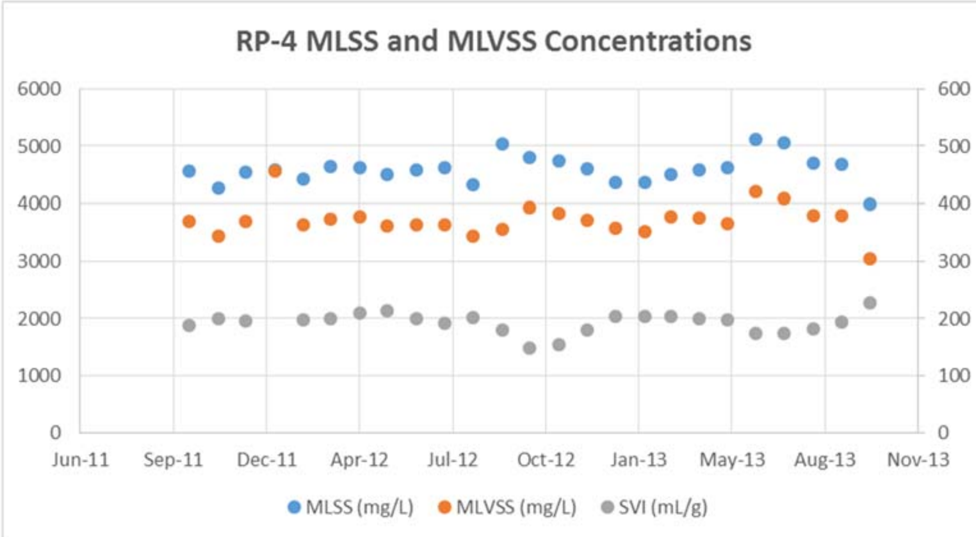

Primary Treatment Effluent Concentrations (mg/L)
300
250
200
150
100
50
0
Feb-11
Sep-11
Apr-12
Oct-12
May-13
Nov-13
TSS
BOD
NH3

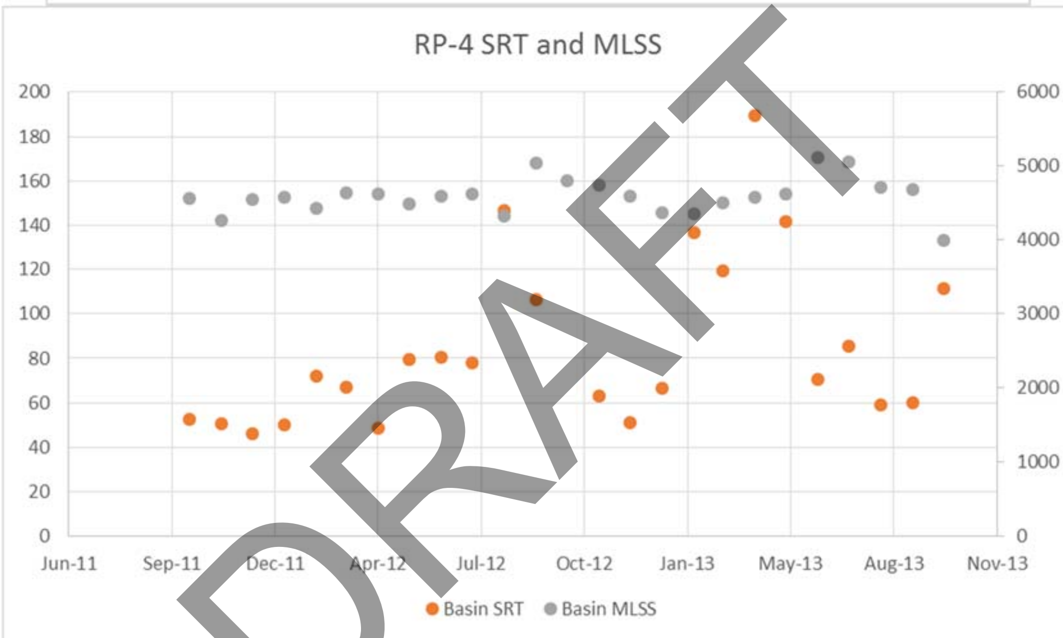

Primary Treatment Removal (%)
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Feb-11
Sep-11
Apr-12
Oct-12
May-13
Nov-13
TSS
TOC
NH3


RP-4 Secondary Influent Water Quality
160
140
120
100
80
60
40
20
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
NH3 (mg/L)
PO4 (mg/L)


RP-4 Secondary Effluent Water Quality
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
TSS (mg/L)
TOC (mg/L)
BOD (mg/L)
NH3 (mg/L)
Alk (mg/L)


RP-4 Secondary Effluent Nitrogen Species
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
NH3 (mg/L)
NO3 (mg/L)
NO2 (mg/L)


RP-4 MLSS and MLVSS Concentrations
6000
5000
4000
3000
2000
1000
0
600
500
400
300
200
100
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
MLSS (mg/L)
MLVSS (mg/L)
SVI (mL/g)


RP-4 SRT and MLSS
200
180
160
140
120
100
80
60
40
20
0
6000
5000
4000
3000
2000
1000
0
Jun-11
Sep-11
Dec-11
Apr-12
Jul-12
Oct-12
Jan-13
May-13
Aug-13
Nov-13
Basin SRT
Basin MLSS

IEUA Wastewater Facilities Master Plan
TM 7 RP-5 and RP-2 Complex Future Plans

PREPARED FOR: Inland Empire Utilities Agency

PREPARED BY: Carollo Engineers, Inc.

REVIEWED BY: CH2M HILL

DATE: November 6, 2014

Executive Summary

Regional Water Recycling Plant No. 2 (RP-2) and Regional Water Recycling Plant No. 5 (RP-5) are located approximately 1 mile from each other. RP-5 treats wastewater from the Cities of Chino, Chino Hills, Ontario, Montclair, and Upland. RP-2 treats solids from RP-5 and Carbon Canyon Water Recycling Facility (CCWRF). Due to the United States Army Corps of Engineers (USACE) decision to raise the elevation of the Prado Dam, all facilities at RP-2 need to be abandoned and moved to RP-5. The liquid treatment capacity was relocated in March 2004; the solids facilities will be relocated during the 20-year planning period. This technical memorandum (TM) evaluates potential locations for the RP-2 solids facilities at RP-5, identifies RP-5 plant expansion projects within the 20-year planning period, and provides preliminary capital cost estimates for the projects. Information from this TM will be incorporated into the updated 20-year Capital Improvements Program (CIP).

The current and future flows and loads for RP-5 were estimated in *TM 4 Wastewater Flow and Loading Forecast*. An analysis of the influent wastewater characteristics at RP-5 was conducted to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and the 2060 ultimate buildout year. The influent flow and loading projections and the effluent requirements detailed in the Santa Ana Regional Water Quality Control Board (RWQCB) Order No. R8-2009-0021 were used to evaluate the existing capacities of the RP-5 liquid treatment facilities. The estimated capacities were then compared to the projected flow and loads to determine the RP-5 facilities that require expansion within the 20-year planning period, and when those facilities would need to be online.

Two plant expansion projects were identified during the 20-year CIP: the RP-5 Solids Handling Facilities Project and the RP-5 Expansion Project. The RP-5 Solids Handling Facilities Project would relocate solids handling facilities from RP-2 to RP-5. This project would include the construction of thickening, digestion, dewatering, and ancillary facilities at RP-5. A nonmonetary evaluation of potential sites for the solids handling facilities identified the eastern side of the RP-5 site as the most favorable location for the solids handling facilities. The RP-5 Expansion Project would expand the RP-5 liquid treatment capacity from 15 million gallons per day (mgd) to 22.5 mgd, and would include the construction of primary treatment, a membrane bioreactor (MBR), disinfection, and ancillary facilities. The capital costs included in the 20-year CIP for these projects are summarized in Table 7-1.

The evaluation of RP-2 and RP-5 identified four main conclusions:

- Solids handling facilities will need to be relocated from RP-2 to RP-5 within the 20-year planning period.
- The location along the east side of the RP-5 site (Alternative 2) is the most favorable due to its location near the liquid treatment facilities and minimal impacts on the existing solar facilities.
- The RP-5 liquid treatment facilities will need to be expanded during the 20-year planning period.

TABLE 7-1
RP-5 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-5 Solids Handling Facilities Project[a]	RP-5 Expansion Project
Total Direct Cost[b]	$51,805,000	$47,580,000
Total Estimated Construction Cost[c]	$86,878,000	$79,791,000
Total Estimated Project Costs	$112,941,000	$103,728,000

[a] Costs do not include the demolition of the RP-2 facility.
[b] *Engineering-News Record* Construction Cost Index (ENR CCI) for Los Angeles (August 2014 - 10,737).
[c] Cost does not include escalation to midpoint of construction.

The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

1.0 Background and Objectives

Currently, RP-5 consists of liquid treatment facilities and sends primary and secondary solids to RP-2 for treatment. RP-2 only operates the solids handling facilities and accepts primary and secondary solids from CCWRF and RP-5. RP-2 was constructed in the 1960s and was purchased from the City of Chino at the onset of the regional wastewater program. Due to the USACE decision to raise the elevation of the Prado Dam, the RP-2 liquid treatment capacity was relocated to RP-5, which began operation in March 2004. The Inland Empire Utilities Agency (IEUA) decided to continue to use the RP-2 solids handling facilities until the end of their useful lives because they were constructed in 1990 and were above the 100-year flood plain at the time. Since that decision was made, USACE has decided to raise the Prado Dam. When the Prado Dam elevation change is complete, the RP-2 solids handling facilities will then be at risk of being inundated by a flood because they will be below the new 100-year flood elevation.

IEUA contracted with CH2M HILL and Carollo Engineers (Consultant Team) to develop a Wastewater Facilities Master Plan (WFMP). The objective of the WFMP is to plan IEUA's wastewater treatment and conveyance improvements and develop a capital program. The capital program will guide IEUA in the development of major improvements to their treatment and conveyance facilities. There are five specific goals for this TM:

- Summarize information from TMs 1 through 4 as it pertains to RP-2 and RP-5.
- Evaluate the current capacities and limitations of the existing facilities.
- Evaluate three location alternatives for the relocation of RP-2 solids handling facilities to RP-5.
- Determine treatment facilities required to treat predicted flows and loads through the planning year 2035.
- Estimate timing and preliminary capital costs for plant expansion projects required during the 20-year planning period.

2.0 RP-5/RP-2 Overview

2.1 RP-2

Solids from RP-5 and CCWRF are processed in the RP-2 solids handling facilities. Facilities include thickening, stabilization, and dewatering processes. A schematic of the RP-2 facility is shown in Figure 7-1 There are two thickening processes in operation at RP-2: gravity thickening for primary solids, and dissolved air flotation (DAF) thickening for secondary solids. Thickened biosolids are stabilized in a two-stage anaerobic digestion process, consisting of mesophilic-acid and mesophilic stages. Methane gas produced is sent to the cogeneration facility, while biosolids are dewatered using belt filter presses or centrifuges and loaded onto trucks for delivery to the Inland Empire Regional Composting Facility for composting. Further details on the facilities are summarized in *TM 1 Existing Facilities*.

2.2 RP-5

Liquid treatment facilities at RP-5 include influent pumping, and preliminary, primary, secondary, and tertiary treatment; these facilities are designed to treat an annual average flow of 15 mgd plus 1.3 mgd of return flows from the RP-2 Lift Station. Recycled water is discharged to IEUA's recycled water distribution system for landscape irrigation and other approved recycled water uses. Recycled water in excess of demand is dechlorinated and discharged to Chino Creek. A schematic of the RP-5 facility is shown in Figure 7-2.

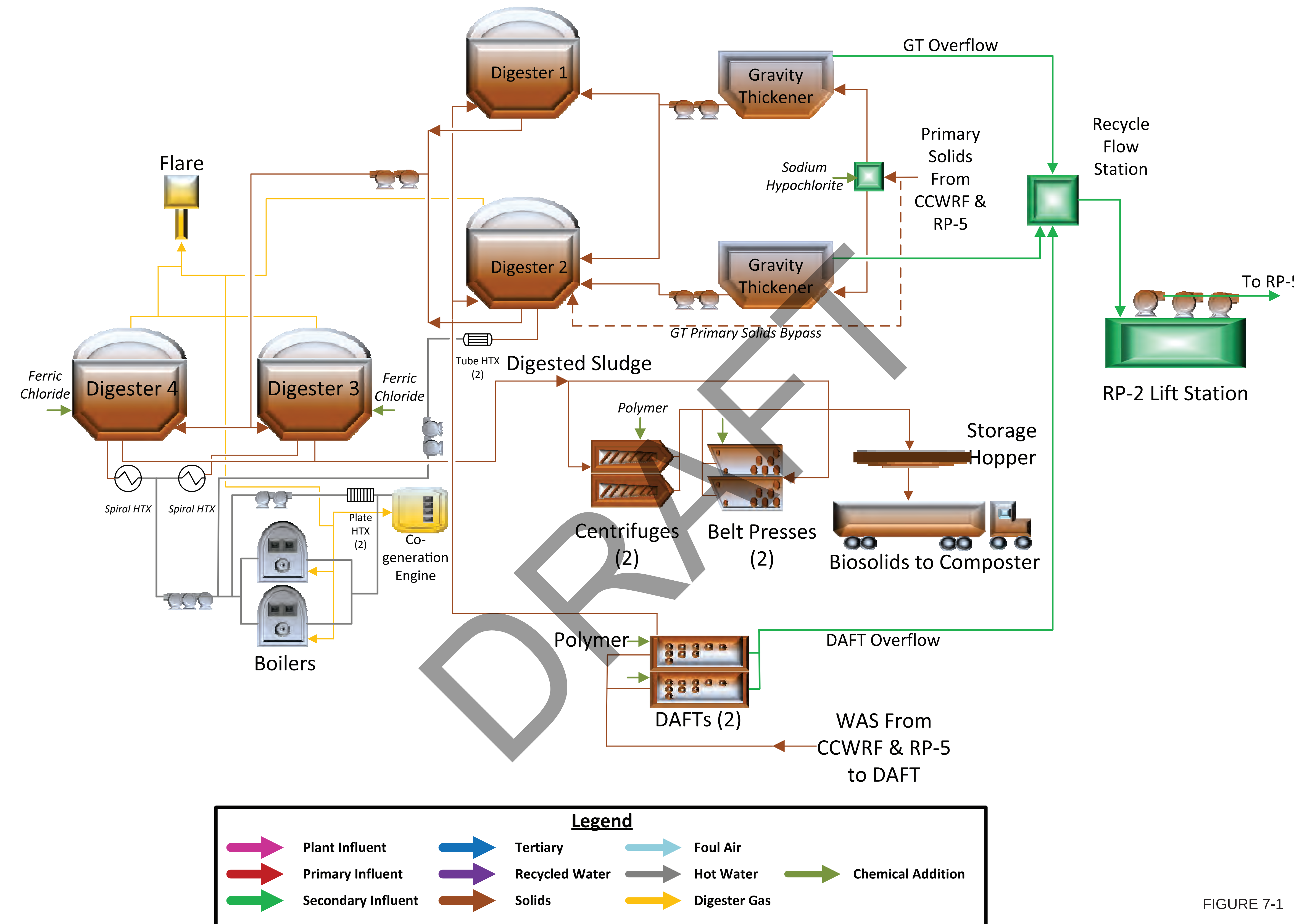


FIGURE 7-1

REGIONAL WATER RECYCLING PLANT NO. 2 PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY

WASTEWATER FACILITIES MASTER PLAN

CH2MHILL® carollo Engineers...Working Wonders With Water®

20-IEUA-10-14F7-1-9370A00.AI

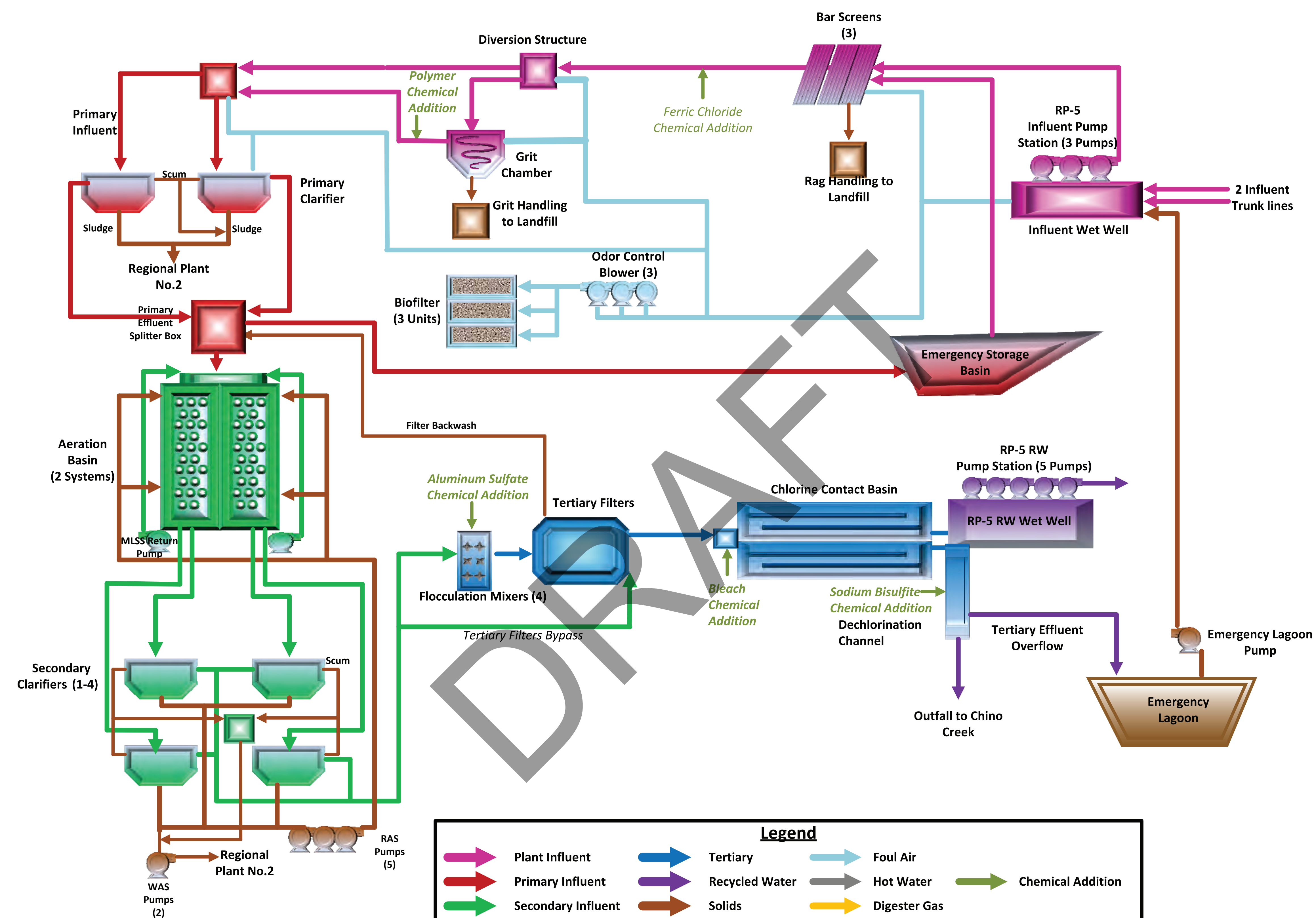


FIGURE 7-2

REGIONAL WATER RECYCLING PLANT NO. 5
PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-10-14F7-2-9370A00.AI

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Preliminary treatment includes screening and grit removal. Wastewater passes through the screening process, which consists of one manual and two mechanical bar screens. The screened influent is conveyed to one vortex grit basin. Foul air from preliminary and primary treatment facilities is sent to a biofilter for treatment and discharge. Primary treatment consists of two, 100-foot-diameter, circular primary clarifiers and a primary effluent emergency storage basin. The clarifiers are center-feed, peripheral-draw-off with sludge hoppers and scum removal. They have a common sludge and scum pump station, which pumps solids to RP-2 for processing.

Secondary treatment includes two parallel two-stage biological nutrient removal (BNR) activated sludge treatment trains and four circular secondary clarifiers. Aerobic zones are equipped with fine bubble diffused aeration panels supplied by two centrifugal blowers. Tertiary treatment consists of coagulation/flocculation, filtration, and disinfection. Secondary effluent is fed to a rapid mix basin, where alum is added upstream of four flocculation basins operated in series, and followed by 12 upflow, continuous backwash filters. Effluent is sent to a chlorine contact basin and then conveyed to the Recycled Water Pump Station. Disinfection is achieved using sodium hypochlorite; recycled water is pumped to the distribution system for reuse, or dechlorinated and discharged to Chino Creek. Further details of the facilities are summarized in *TM 1 Existing Facilities*.

3.0 Current and Future Flows and Loads

As presented in *TM 4 Wastewater Flow and Loading Forecast*, an analysis of the influent wastewater characteristics at RP-5 was conducted as part of this WFMP effort in order to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and 2060 ultimate buildout year. The data analysis is based on two consecutive years of recent data provided by IEUA for influent flow, and key wastewater quality constituents including biological oxygen demand (BOD), total organic carbon (TOC), total suspended solids (TSS), ammonia as nitrogen (NH_3-N), and total Kjeldahl nitrogen (TKN).

Flow projections were developed by the Integrated Resources Plan (IRP) Consultant and are based on the average influent wastewater flows measured during the flow monitoring period in November 2013 and projected through the year 2060 using population, employment, and land use information. As discussed in *TM 3 Regional Trunk Sewer Alternatives Analysis*, the WFMP planning effort is based on IEUA's preferred Flow Diversion Alternative 2, which includes diverting flows from Whispering Lakes and Haven Pump Stations to RP-1. At the request of IEUA and as a subset of Alternative 2, the Consultant Team evaluated what the impact would be on RP-5 flow projections if both the Whispering Lakes and Haven Pump Stations were offline. Under this scenario, the flows from each of these tributary areas would be conveyed to RP-5 rather than to RP-1. In order to provide greater system reliability and redundancy, RP-5 facilities planning assumes that both pump stations are offline. The influent wastewater flow and loading projections under this scenario for the planning year 2035 form the basis of the master planning effort and treatment plant capacity evaluation presented herein. Projections are also presented for the 2060 ultimate buildout year; these projections are used for site planning considerations. Influent wastewater flows are projected to more than double by the year 2060 at RP-5 as a result of population growth in Chino and other areas served by RP-5.

Summaries of the current and projected average influent wastewater flows and loads for RP-5 are presented in Tables 7-2 and 7-3. The RP-5 flow and load projections for the two scenarios (pump stations online and pump stations offline) are also presented.

TABLE 7-2
RP-5 Current and Projected Average Influent Wastewater Flows

	Current	2035[a]	2060[a,b]
Flow w/ Pump Stations Online (mgd)[c]	10.0	18.4	25.3
Flow w/ Pump Stations Offline (mgd)	10.0	20.2	27.2

[a] Projections developed by IRP Consultant and IEUA based on November 2013 flow monitoring period. Reflects projected flows for IEUA preferred Flow Diversion Alternative 2.
[b] Site planning considerations are based on the projections established for the 2060 ultimate buildout planning year.
[c] Assumes Whispering Lakes Pump Station and Haven Pump Station are online and conveying flow to RP-1.The projected flow for each lift station in 2035 is 1.6 mgd (Whispering Lakes Pump Station) and 0.2 mgd (Haven Pump Station).

TABLE 7-3
RP-5 Current and Projected Average Influent Wastewater Characteristics

			Pump Stations Online[a,b]		Pump Stations Offline[a,c]	
	Current Concentration (mg/L)	Current Load (lb/day)	2035 Load (lb/day)	2060 Load (lb/day)	2035 Load (lb/day)	2060 Load (lb/day)
BOD	321	27,771	49,290	67,774	54,112	72,864
TSS	267	23,181	40,964	56,326	44,972	60,556
NH3-N	35	3,005	5,422	7,456	5,953	8,016
TKN	52	4,602	8,036	11,050	8,823	11,880

[a] Load projections based on projected flows, concentrations, and load peaking factors presented in TM 4.
[b] Assumes Whispering Lakes Pump Station and Haven Pump Station are online and conveying flow to RP-1.
[c] Assumes Whispering Lakes Pump Station and Haven Pump Station are offline with flow conveyed by gravity to RP-5.
mg/L – milligrams per liter
lb/day – pounds per day

4.0 Treatment Requirements

IEUA operates under an umbrella permit and must meet water quality requirements for discharge and recycled water.

4.1 Discharge Requirements

The tertiary effluent from RP-5 is discharged at Reach 1B of Chino Creek (Discharge Point [DP] 003), regulated by RWQCB Order No. R8-2009-0021, which replaced Order No. 01-1 and Order No. 95-43, National Pollutant Discharge Elimination System (NPDES) No. CA 0105279. This permit is an umbrella permit, governing all of IEUA's wastewater treatment plants (RP-1, RP-4, RP-5, and CCWRF). It includes a stormwater discharge permit and the enforcement of an industrial pretreatment program. Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water, due to the use of receiving waters for water contact recreation. A summary of main effluent quality limits is provided in Table 7-4.

4.2 Recycled Water Requirements

Recycled water from RP-5 is used for irrigation in the area overlying Chino North "Max Benefit" Groundwater Management Zone (DP 007). Recycled water quality requirements are governed under RWQCB Order No. R8-2009-0021 and must meet the discharge requirements set forth in Table 7-4.

TABLE 7-4
Summary of Effluent Quality Limits for RP-5[a]

Parameter	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Notes
BOD	30 mg/L[b]	20 mg/L[b]	-	-	45 mg/L weekly average and 30 mg/L monthly average with 20:1 dilution.
TSS	30 mg/L[b]	20 mg/L[b]	-	-	
NH_4-N	-	4.5 mg/L	-	-	
Chlorine Residual	-	-	-	0.1	Instantaneous maximum ceiling 2 mg/L
TIN	-	-	8 mg/L	-	
TDS	-	-	550 mg/L	-	Shall not exceed 12-month running average TDS concentration in water supply by more than 250 mg/L
Turbidity	-	-	-	-	1. Daily average – 2 NTU 2. 5% maximum in 24 hours – 5 NTU 3. Instantaneous maximum – 10 NTU
Coliform	< 2.2 MPN	-	-	-	Max 23 MPN, once per month
pH	-	-	-	6.5 – 8.5	99% compliance
Free Cyanide	-	4.6 µg/L	-	7.3 µg/L	
Bromodichloro-methane	-	46 µg/L	-	92 µg/L	

[a] RWQCB Order No. R8-2009-0021.
[b] Without 20:1 dilution and for recycled water.
TIN – total inorganic nitrogen
TDS – total dissolved solids
NH_4-N – ammonia as nitrogen
NTU – nephelometric turbidity unit(s)
MPN – most probable number
µg/L – micrograms per liter

5.0 Existing Plant Capacity and Limitations

Existing facilities and current plant performance were used as the basis for RP-5/RP-2 process model development. A whole plant model was developed using PRO2D and calibrated based on plant influent data and plant operations data for the period between October 15, 2011, and October 15, 2013. This period was selected as the basis after a review of the influent and plant data to reflect a 2-year-long complete data set. Existing plant operation and the findings of the capacity evaluation through the use of process modeling are presented below for the liquid and the solids treatment facilities at RP-5/RP-2, respectively.

5.1 Existing Plant Operation

A summary of RP-5/RP-2 plant operations is provided in Table 7-5 for the liquid treatment and solids handling facilities. Unit process performance values were averaged over the evaluation period, with operating ranges noted. These values were used in development and calibration of the process models. Detailed data summaries for the evaluation period are provided in Appendix 7-A.

TABLE 7-5
RP-5/ RP-2 Average Plant Operations Summary

Parameter	Value
Primary Treatment	
TSS Removal Rate (%)	70
TOC Removal Rate (%)	41
Primary Sludge (mgd)	0.180
Secondary Treatment	
MLSS (mg/L)	3,920
MLVSS (%)	83
RAS SS (mg/L)	5,990
Solids Inventory (Basins, Clarifiers, RAS) (lb)	337,000
Secondary Clarifier Loading (gpd/ft^2)	200 (4 Clarifiers)
SVI (mL/g)	210
SRT (day)	>50
Residual Alkalinity (mg as $CaCO_3$/L)	145
Solids Handling	
Gravity Thickened Solids (%TS)	4.2
DAF Thickened Solids (%TS)	4.9
Acid Phase (Digester 1) HRT (day)	3.4
Gas / Second Phase Digestion HRT (day)	14.1
Dewatered Solids (%TS)	N/A

gpd – gallons per day
MLSS – mixed liquor suspended solids
MLVSS – mixed liquor volatile suspended solids
RAS – return activated sludge
SS – suspended solids
gpd/ft^2 – gallons per day per square foot
mL/g – milliliters per gram
SVI – sludge volume index
SRT – solids retention time
$CaCO_3$/L – calcium carbonate per liter
TS – thickened solids
HRT – hydraulic retention time

A performance summary for the major treatment processes is presented in Table 7-6. These values, which represent the average over the evaluation period, were used in the subsequent plant process modeling and the capacity evaluations for the major treatment units. Detailed data summaries for the evaluation period are provided in Appendix 7-A.

TABLE 7-6
RP-5/ RP-2 Average Plant Performance Summary

Parameter	Primary Effluent	Secondary Effluent
TOC (mg/L)	102	4.5
BOD (mg/L)	180	1.5
TSS (mg/L)	72	<5
NH3-N (mg/L)	32	0.15
NO3-N (mg/L)	N/A	6.60
NO2-N (mg/L)	N/A	0.06
TIN (mg/L)	N/A	6.81
Alkalinity (mg as $CaCO_3$/L)	N/A	145

N/A – Not applicable
NO3-N – nitrate as nitrogen
NO2-N – nitrite as nitrogen

The values in Table 7-6 represent the current operation including secondary treatment operation configured in an anoxic-oxic-anoxic-oxic BNR configuration with step feed capability. Both basins and all basin zones, as well as both primary clarifiers and three out of four secondary clarifiers, were in service throughout the evaluation period.

5.2 Existing Plant Capacity

5.2.1 Process Modeling

The capacity of the existing RP-5/RP-2 system was evaluated through process modeling using CH2M HILL's whole plant simulator, PRO2D. PRO2D is a process simulation model that takes into account the mass balances through an entire facility for particulate and soluble components, and similar to other commercially available process models, is based on the International Water Association (IWA) ASM2D biological process kinetics. The base model was constructed to reflect the actual facility setup, including flow splits and backwash. The process model facility setup flow diagram depicting the integrated RP-5/RP-2 operation is presented in Figure 7-3. The model was constructed with the operations and performance criteria reflective of the evaluation period, and then calibrated to reflect the actual performance, solids yields, and water quality data.

As shown in Figure 7-3, the model was constructed to represent the actual plant operation for all the major process units. The model also allows establishing sizing and design considerations for each major unit process tankage and equipment. Similar to the actual operations, the plant model was built with the filter backwash and solids thickening/dewatering recycles being returned to the main plant for further treatment, with the CCWRF sludge diverted to RP-2 for solids handling. The liquid and solids mass balances calculated for the whole system under the current conditions allow calibration of the model against the actual field data. The calibrated model is then used to evaluate current capacity as well as establish expansion needs and process bottlenecks.

The process model was constructed and calibrated using the current influent and operating data available for the facility. The purpose of the model calibration step is to establish a baseline condition that closely resembles current operations and provides a means to reliably predict operations and system limitations under different scenarios or alternatives. Key model calibration results are presented in Table 7-7. As the listed values show, the model was calibrated such that the simulation results are within a value range that is 5 percent or smaller relative to the actual data. This level of accuracy will allow reliable capacity estimations to be made for the various capacity scenarios and future operation needs.

TABLE 7-7
RP-5/ RP-2 Average Plant Performance Summary

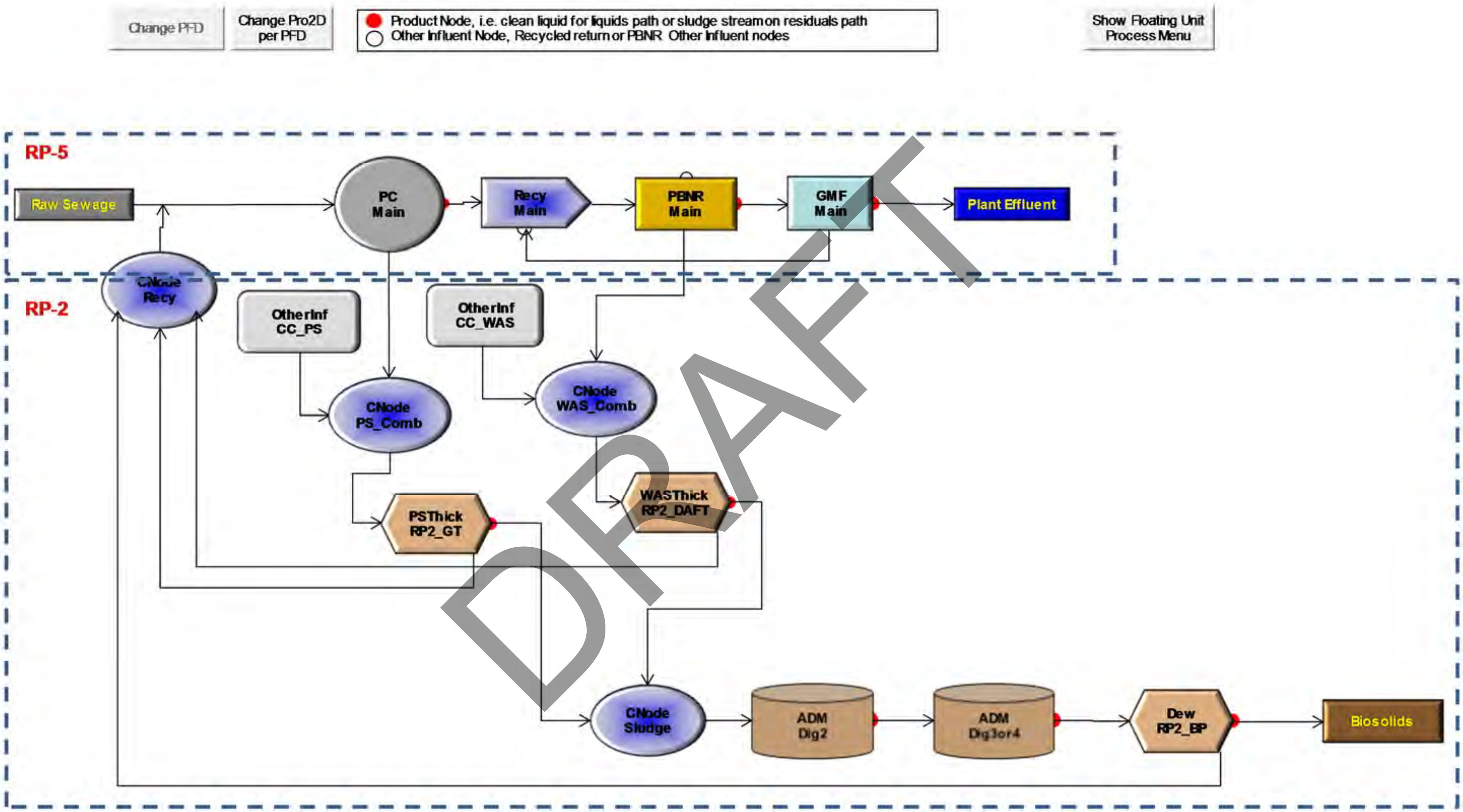
Parameter	Actual Data Average Values	Model Results
Effluent BOD (mg/L)	1.5	1.6
Effluent TSS (mg/L)	<5	<5
Effluent TIN (mg/L)	6.81	7.1
Effluent Alkalinity (mg as $CaCO_3$/L)	145	139
MLSS (mg/L)	3,922	3,910
Total MLSS Inventory (lb)	337,000	336,800
Sludge Volatile Solids Content	83	83
RP-5/CCWRF Primary Sludge, Thickener Feed (gpd)	378,800	382,400
RP-5/CCWRF Waste Activated Sludge, Thickener Feed (gpd)	246,100	247,200
Biosolids (Dry Solids lb/day)	25,800	25,500

Subsequent process modeling using the calibrated model as the base model was conducted to evaluate the following scenarios:

- Current plant capacity
  - Liquid treatment capacity to meet 8-mg/L effluent TIN level under average and maximum month flow and load conditions with solids handling recycles
  - Liquid treatment capacity to meet 5-mg/L effluent TIN level under average and maximum month flow and load conditions without solids handling recycles
  - Solids handling capacity under average and maximum month flow and load conditions
- RP-2 (solids handling) facility relocation options and future capacity implications for the planning year 2035
- Future facility footprint implications for the planning years 2035 and 2060

Findings of the current plant capacity evaluation are presented next in this section. Flow equalization and future capacity needs are presented in Sections 6.0 and 7.0, respectively.

FIGURE 7-3
RP-5/RP-2 Process Model Facility Setup



5.2.2 Liquid Treatment Capacity

An evaluation of the liquid treatment capacity was conducted using the whole plant process model under both the average and maximum month conditions. The capacity evaluation was conducted based on achieving a plant effluent TIN concentration of 8 mg/L. As established at the onset of the project, the facility reliability and redundancy considerations are based on IEUA's overall wastewater treatment system, with RP-5 being the end-of-the-line facility receiving all flow diversions, if needed, from other Regional Water Recycling Plants (RWRPs). Additional reliability and redundancy considerations driven by the regulatory requirements, such as Title 22 requirements, were taken into account. Dewatering recycles were considered to be handled at RP-5 along with other plant recycles and filter backwash.

The facility has two primary clarifiers in service. The average hydraulic loading rates with two units in service are around 1,070 gallons per day per square foot (gpd/ft^2). Under peak day flow conditions, and especially if one unit needs to be taken out of service, the primary clarifiers will be hydraulically overloaded. Considering that flow diversions to RP-5 are available for all other RWRPs and RP-5 needs to have robust reliability to handle the diversions, this needs to be considered as part of future capacity evaluations. Chemically enhanced primary treatment is available and could be implemented under high primary clarifier loading conditions to avoid overloading the downstream secondary treatment system.

Process modeling showed that both the primary clarifiers and the secondary treatment system are the capacity limiting factors for liquid treatment. One of the key parameters was found to be the aeration and the ability to control dissolved oxygen (DO) in the anoxic and oxic zones in the aeration basins, especially under peak flows with one large aeration zone out of service. The implications of DO are TIN fluctuations in the effluent and SVI values that are greater than 200 mL/g, which indicates sludge settleability is impaired most of the time. Another limitation of the secondary treatment system was found to be the secondary clarification solids loading resulting from the current operations and the influent wastewater solids loading rates. Maintaining the SVI values at or below 150 mL/g is important for this reason as well. Also, the system is reportedly operated at SRT values greater than 50 days. Although the current lower flows could allow this practice, much lower SRT values will need to be maintained to be able to treat flows greater than currently experienced.

Primary and secondary treatment capacity values established through modeling are presented in Table 7-8.

TABLE 7-8
RP-5 Existing Primary/Secondary Treatment Capacity

	All Units in Service	One Unit Out of Service[a]
Capacity with effluent TIN $\leq$ 8 mg/L and with dewatering recycles (1.3 mgd)	17 mgd	15 mgd
Capacity with effluent TIN $\leq$ 8 mg/L and without dewatering recycles	20 mgd	18 mgd

[a] One large aeration zone and one secondary clarifier out of service.

The capacities of the RP-5 tertiary processes also were evaluated; the methodologies employed are consistent with those presented in the Title 22 Engineering Report (DDB Engineering, Inc. [DDB], 2010). The filters were designed based on a California Department of Public Health (CDPH) maximum filter loading rate of 5 gallons per minute per square foot (gpm/ft^2) for continuous backwash upflow sand filters, with one filter out of service. In order not to exceed the maximum approved filter loading rate, the maximum flow that the filtration system can handle is 23.8 mgd. Applying a tertiary system peaking factor of 1.44, based on the availability of short-term storage for primary effluent flow equalization, the resulting average filtration capacity is 16.5 mgd.

The chlorine contact basins were designed based on Title 22 requirements with a minimum concentration and time (CT) value of 450 milligrams per minute per liter (mg-min/L) and a minimum modal contact time of 90 minutes during the peak hourly dry weather flow. Tracer testing conducted by IEUA in 2004 showed that the disinfection system could handle a peak flow of 23.5 mgd while maintaining a modal contact time of 90 minutes

(DDB, 2010). Applying a tertiary system peaking factor of 1.44, the resulting average disinfection capacity is 16.3 mgd.

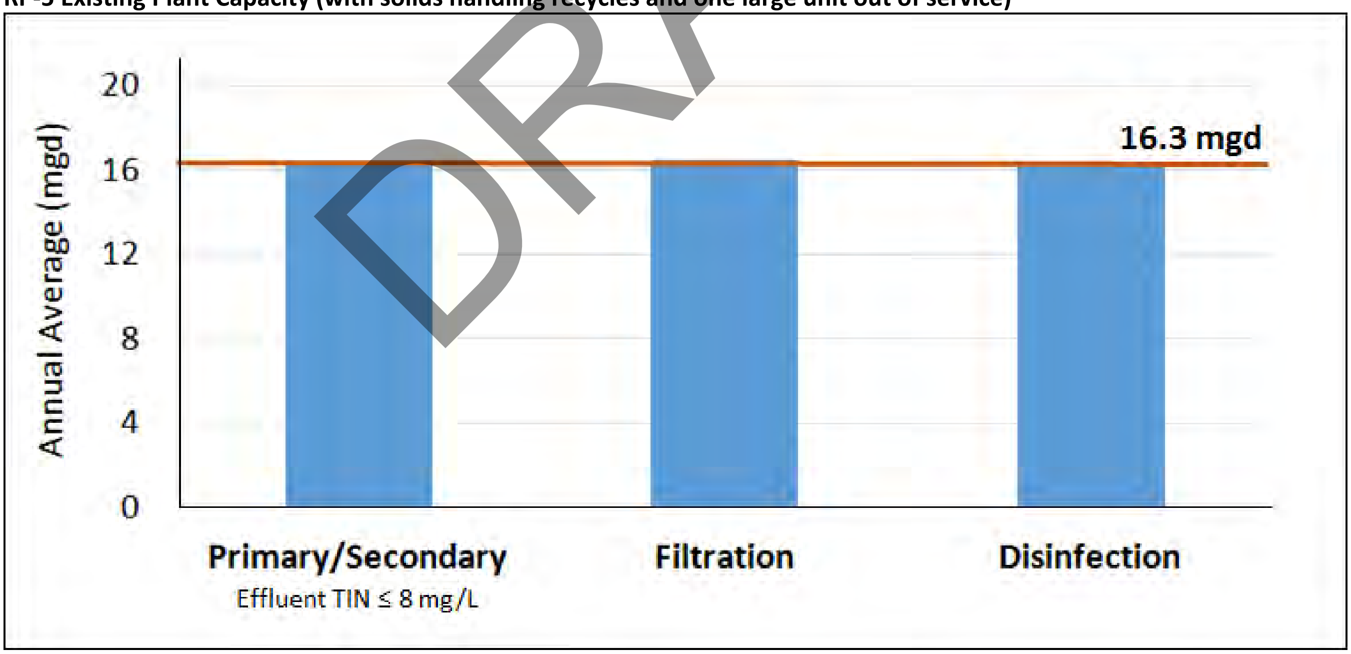
It is important to note that the primary effluent weir gate elevation is set to allow up to only 23.4 mgd to the downstream processes, with excess flow diverted to the Emergency Storage Pond. Thus, the tertiary processes do not receive more than 23.4 mgd of flow. The results of the tertiary capacity evaluation are summarized in Table 7-9.

TABLE 7-9
RP-5 Existing Tertiary Process Capacity

	All Units in Service	One Filter Out of Service
Average Filtration Capacity	18.0 mgd	16.5 mgd
Average Disinfection Capacity	16.3 mgd	N/A

The overall plant capacity is determined by its most limiting process capacity. However, the RP-5 primary, secondary, and tertiary process capacities are all equally limited to about 16.3 mgd. The primary/secondary treatment capacity of 15 mgd with one unit out of service plus 1.3 mgd of return flow from the RP-2 Lift Station, results in a 16.3 mgd primary/secondary treatment capacity. Therefore, the RP-5 plant capacity is approximately 16.3 mgd under the assumptions presented in this section and the current wastewater characteristics. Flows considered in this evaluation include approximately 1.3 mgd of recycle flows and other flows diverted from the RP-2 Lift Station. Thus, the evaluated capacity is consistent with the permitted capacity of 15 mgd previously established for RP-5 during design. A summary of the individual process capacities in comparison to the overall plant capacity is depicted in Figure 7-4.

FIGURE 7-4
RP-5 Existing Plant Capacity (with solids handling recycles and one large unit out of service)



5.2.3 Solids Handling Capacity

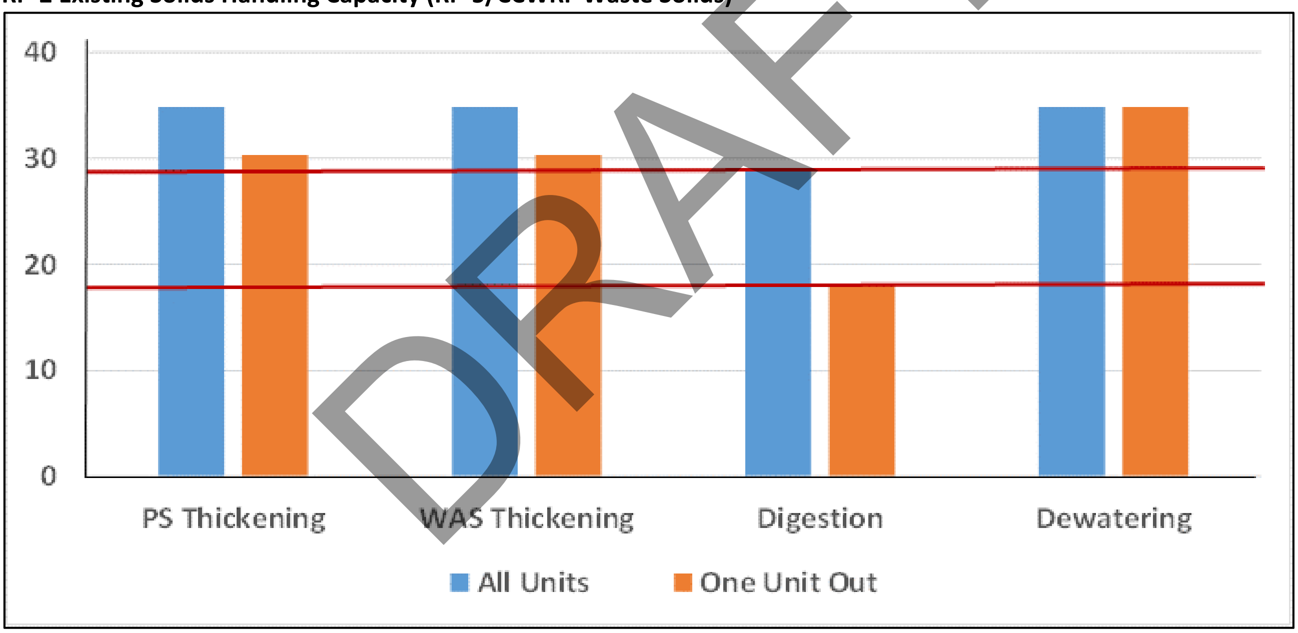
In evaluating the solids handling system capacity, operational considerations and Rule 503 requirements were taken into account considering the average and maximum month loading. The system capacity with and without one unit out of service was evaluated using the industry standard loading rates and operational criteria. The capacity values calculated are considered to represent equivalent plant influent flow values at the current wastewater characteristics.

Primary sludge (PS) thickening is currently achieved using gravity thickening. Thickening cannot be achieved in the primary clarifiers, because the sludge needs to be diverted to RP-2 at a solids content of about 1 to 1.5 percent solids. WAS thickening is achieved in dissolved air floatation thickeners (DAFT). Capacity was evaluated by maintaining a solids loading rate of 45 pounds per day per square foot ($lb/d/ft^2$) or less for the DAFTs.

Waste solids digestion, achieved in the phased digestion system, was evaluated based on the current operating conditions as well as Part 503 Rule requirements. A digester SRT of 15 day with one large unit out service was used to establish digestion capacity, using an active digester volume of 90 percent of the total digester volume including the cone space. Dewatering capacity of the belt filter presses was calculated considering the hydraulic loading rate to be maintained at or below 75 gallons per minute per meter (gpm/m) and the solids loading rate to be maintained at or below 1,000 pounds per hour per meter (lb/hr/m) under the current solids loading conditions.

The solids handling capacity of the plant to meet the Part 503 Rule requirements for Class B biosolids is illustrated in Figure 7-5. As shown, the digestion is the limiting unit process of the solids handling system. The current equivalent RP-5/CCWRF plant influent flows (10 + 7.2 = 17.2 mgd) represent almost 96 percent of the anaerobic digestion capacity with one large unit out of service at the current influent wastewater characteristics and CCWRF solids loading diversion.

FIGURE 7-5
RP-2 Existing Solids Handling Capacity (RP-5/CCWRF Waste Solids)



5.3 RP-5/RP-2 Capacity Summary

Current RP-5/RP-2 liquid treatment and solids handling facility capacity values are summarized in Table 7-10. These values constitute the basis of the future capacity requirements assessment presented later in this TM.

TABLE 7-10
RP-5/RP-2 Existing Process Capacity Summary

	All Units in Service	One Unit Out of Service
Secondary Treatment		
Plant Effluent TIN $\leq$ 8 mg/L [b]	17 mgd	15 mgd[a]
Plant Effluent TIN $\leq$ 8 mg/L [c]	20 mgd	18 mgd[a]
Solids Handling[d]		
PS Thickening	34.8 mgd	30.3 mgd[d]
WAS Thickening	34.8 mgd	30.3 mgd[d]
Digestion	29 mgd	18 mgd[d]
Dewatering	34.8 mgd	34.8 mgd[d]
Tertiary Treatment		
Filtration	18	16.5[e]
Disinfection	16.3	N/A

[a] One secondary clarifier and one aeration basin out of service.
[b] With solids handling recycles.
[c] Without solids handling recycles.
[d] One large unit out of service.
[e] One filter out of service.

6.0 Solids Handling Alternatives Evaluation

As previously mentioned, solids handling facilities at RP-2 will be below the 100-year flood plain with the rise of the Prado Dam elevation. Thus, the solids handling capacity of the RP-2 facility will be relocated to RP-5. Three solids facilities location alternatives were considered:

1. Southwest corner of the RP-5 site
2. East side of the RP-5 site
3. Solids Handling Site (SHS) at the corner of Flowers Street and Mountain Avenue

Figure 7-6 shows the three proposed site layouts for the RP-5 solids handling facilities. The RP-5 solids facilities were preliminarily sized based on flow and loading projections for RP-5 described in *TM 4 Wastewater Flow and Loading Forecast* and summarized in Section 3.0 of this TM, Current and Future Flows and Loads. Table 7-11 presents the various facilities, the number of units, and their corresponding size for expansion through 2060.

TABLE 7-11
RP-5 Proposed Solids Handling Facilities (Ultimate)

Facility	Number of Units	Size
Gravity Thickener	4	45-foot Diameter
Dissolved Air Flotation Thickening (DAFT)	3	40-foot Diameter
Anaerobic Digestion		
Acid-Phase	10 Cells	20-ft^2 30-foot sidewater depth per cell
Methane-Phase	5	90-foot diameter 35-foot sidewater depth
Sludge Holding	1	90-foot diameter 35-foot sidewater depth
High Pressure Gas Storage	1	35-foot diameter w/ 30- ft^2 equipment pad
Dewatering	1	100-foot x 150-foot
Biofilter	1	60-foot x 80-foot per cell (3 total cells)

Using the facility sizes described in Table 7-11, site layouts were developed for each of the three alternatives. Figures 7-7 through 7-9 present the preliminary site layouts for Alternatives 1 through 3, respectively.

The three alternatives were evaluated based on both economic and nonmonetary criteria. The economic difference between the three alternatives was assumed to be negligible. Each alternative requires the same facilities and equipment and the site work during construction would also be similar. The difference between the alternatives is identified in the nonmonetary evaluation.

The three alternatives were evaluated based on 12 specific nonmonetary criteria. Each alternative was assigned a ranking of 1 through 5, with 1 being the least favorable and 5 being optimal, for each of the nonmonetary criteria. The assigned rankings were then multiplied by the weighting factor selected for each criterion and summed to determine the overall score for each alternative. Table 7-12 presents the nonmonetary evaluation criteria and the corresponding weighting factor that was utilized in the decision analysis matrix. The results of the evaluation are summarized in Table 7-13.

FIGURE 7-6

RP-5 SOLIDS HANDLING ALTERNATIVES

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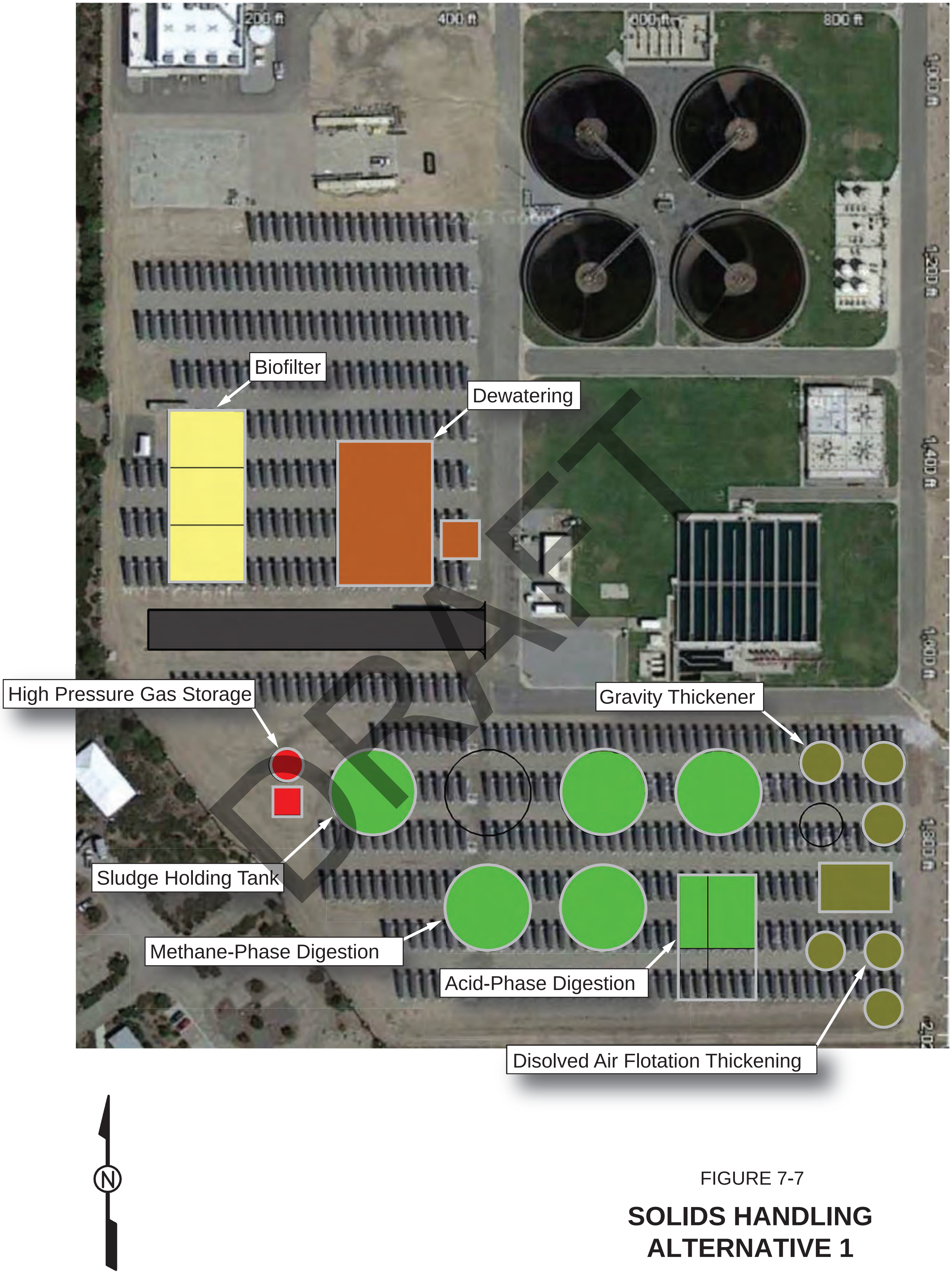

FIGURE 7-7

SOLIDS HANDLING ALTERNATIVE 1

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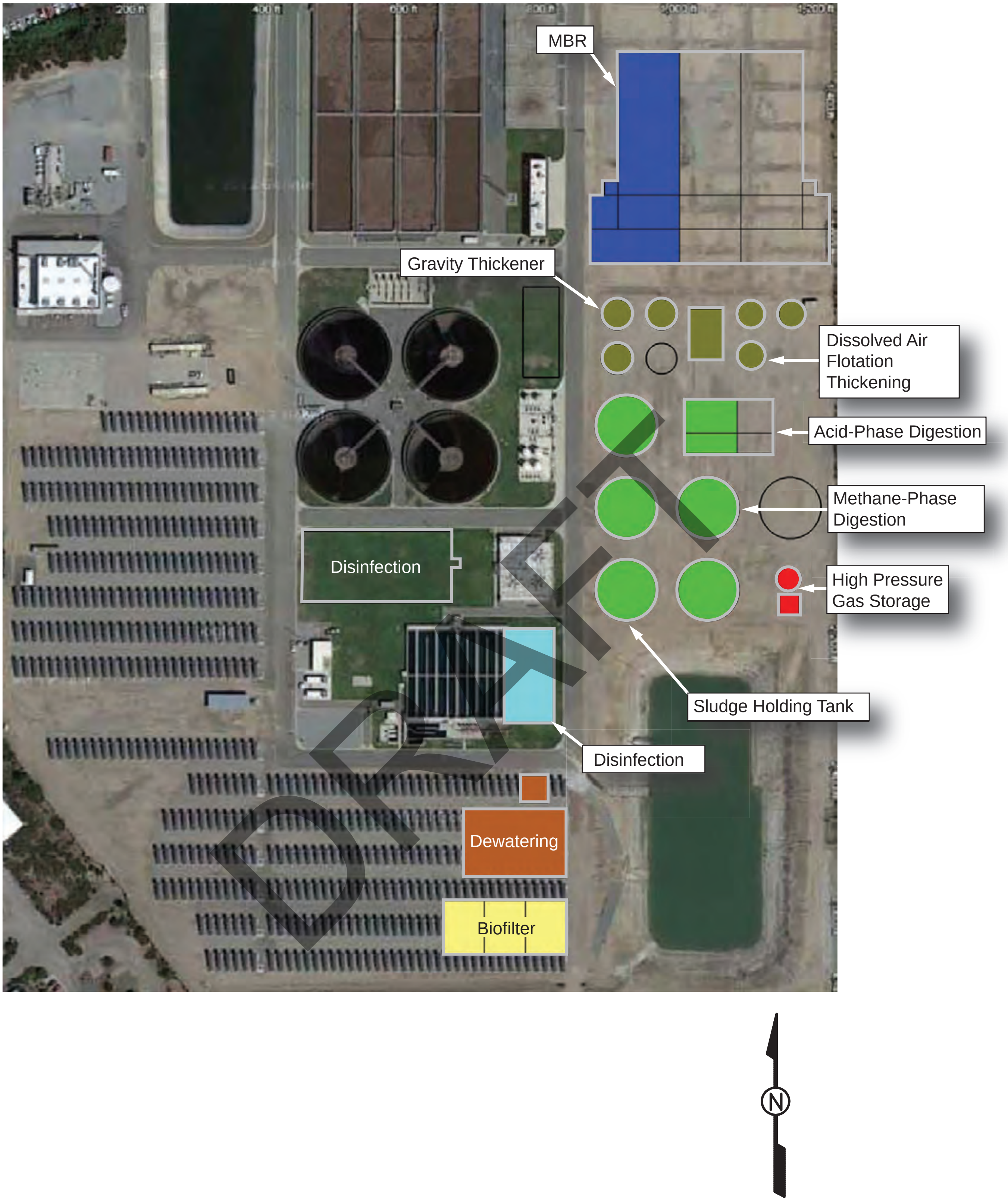

FIGURE 7-8

SOLIDS HANDLING ALTERNATIVE 2

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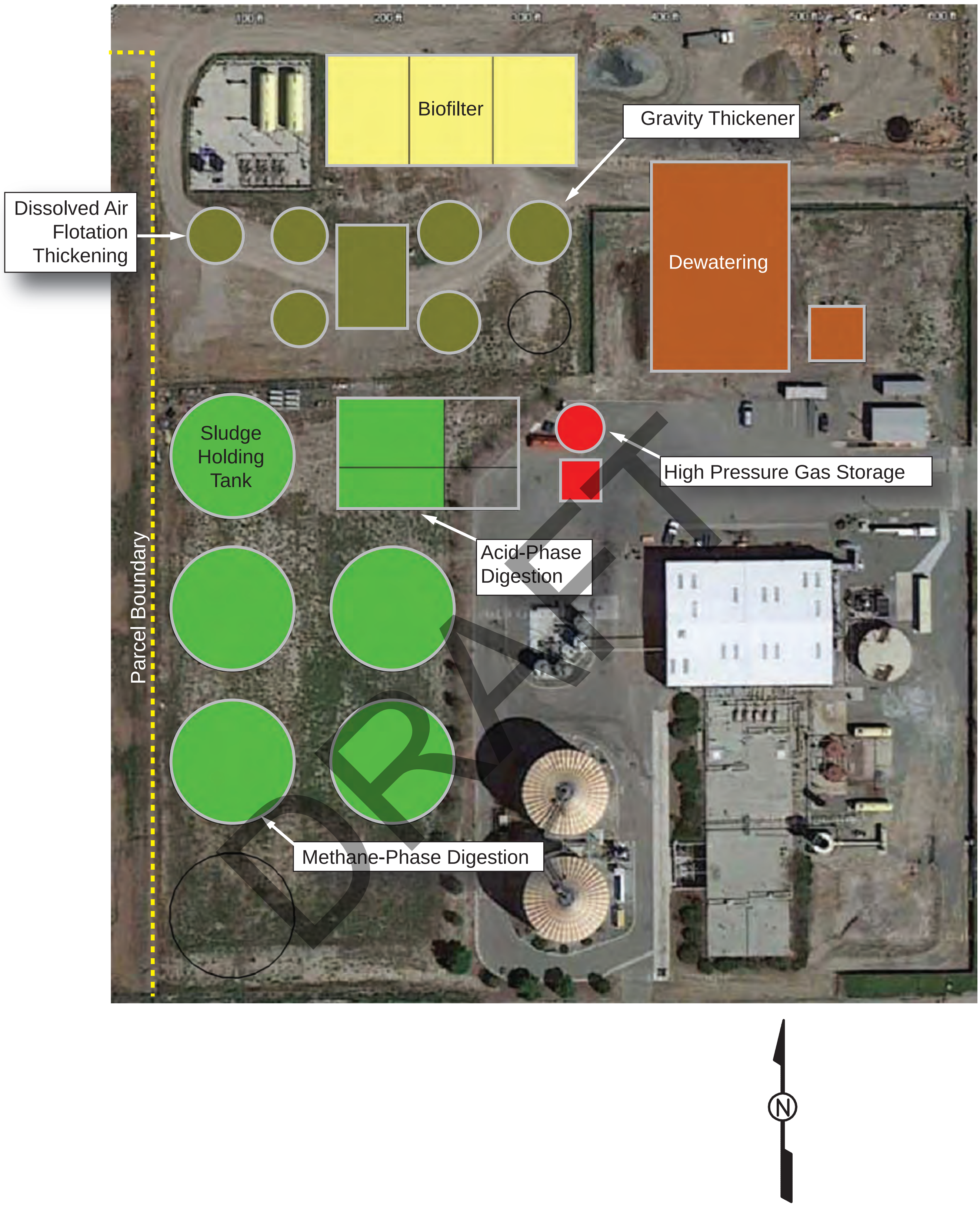

FIGURE 7-9

SOLIDS HANDLING ALTERNATIVE 3

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TABLE 7-12
Non-Monetary Evaluation Criteria, Definitions, and Assigned Weighting Factors

Criteria	Description	Weighting Factor
Operational flexibility	Ability of the system to respond to potential internal or external changes affecting delivery of equalized flow or treated solids without any impact on system performance.	10
Operational risk and reliability	Operational implications on system reliability and redundancy and the associated risk involved in operating major facilities. Use of proven systems and technologies, with similar installations currently in operation.	10
Impacts on plant odors	Impacts of new processes on plant odors, and the need for additional odor control facilities to minimize plant odors.	10
Constructability and implementation timing	Construction implications, ease of construction, and integration with the existing systems, and the ability to implement the proposed alternative in phases.	9
Treatment capacity impacts	Impacts of the new facilities on treatment plant capacity.	8
Impacts on existing facilities	Impacts on existing facilities and the ability to use existing infrastructure. Implications of site planning and the need to demolish or relocate existing facilities.	8
Ease of operation and maintenance	Relative degree of ease and extent of time required to operate and maintain the facilities.	8
Impacts on energy requirements	Additional energy required to construct and maintain new facilities, as well as the impact of the new facilities on the overall plant energy balance and power demand (for example, pumping, mixing, etc.).	7
Pumping and hydraulic requirements	Implications of pumping and conveying to new facilities, and complexity of pumping and yard piping requirements.	6
Overall aesthetics	Aesthetic and visual considerations as a result of the new facilities.	6
Carbon footprint and sustainability	Potential impacts on the carbon footprint of each plant and added sustainability features as a result of construction and operation of the facilities.	4
Footprint and space constraints	Overall footprint requirements and space constraints, and impacts on site planning for future facilities.	3

TABLE 7-13
RP-5 Solids Handling Non-Monetary Evaluation Results

Criteria	Weighting Factor	Alternative 1 RP-5 Southwest Corner		Alternative 2 RP-5 East Side		Alternative 3 SHS	
		Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
Operational Flexibility	10	4	40	4	40	1	10
Operational Risk and Reliability	10	3	30	3	30	3	30
Impacts on Plant Odors	10	3	30	3	30	3	30
Constructability and Implementation Timing	9	3	27	3	27	3	27
Treatment Capacity Impacts	8	3	24	3	24	3	24
Impacts on Existing Facilities	8	2	16	3	24	3	24
Ease of Operation and Maintenance	8	3	24	3	24	1	8
Impacts on Energy Requirements	7	4	28	4	28	1	7
Pumping and Hydraulic Requirements	6	4	24	4	24	1	6
Overall Aesthetics	6	3	18	3	18	3	18
Carbon Footprint and Sustainability	4	3	12	4	16	2	8
Footprint and Space Constraints	3	3	9	4	12	2	6
Final Score			**282**		**297**		**198**

From Table 7-13, the recommended alternative is shown as the one with the greatest score. Using these nonmonetary criteria, Alternative 2 was selected as the proposed alternative and Alternative 3 (SHS) was the least favorable option using the evaluation matrix. Alternative 3 was ranked lower in several categories due to the location being further away from the RP-5 liquid treatment facilities, being closer to neighbors, and having space constraints compared to the other alternatives. As shown in Table 7-13, the scores for Alternatives 1 and 2 are close. The main difference between these two alternatives is their impact to the existing solar facility. Alternative 1 would require the demolition or relocation of a significant portion of the solar facility, while Alternative 2 would have much less impact.

7.0 Plant Expansion Needs

Using the flow and loading projections for RP-5 described in *TM 4 Wastewater Flow and Loading Forecast* and summarized in Section 3.0 of this TM, the RP-5 expansion needs were determined for the 20-year planning period and the estimated ultimate flow. Preliminary sizing of the solids and liquid facilities associated with expanding RP-5 are shown in Tables 7-11 and 7-14, respectively. The facility sizes shown in Tables 7-11 and 7-14 were used to determine the number of units required for planning years 2035 and 2060. Site layouts were then developed for each planning year.

TABLE 7-14
RP-5 Proposed Liquid Treatment Facilities (Ultimate)

Facility	Number of Units	Size
Primary Clarifiers	2	100-foot diameter
Secondary Treatment (MBR)	2	7.5 mgd per module, includes fine screens, bioreactor, membrane tank, blowers, and RAS/WAS pump station
Chlorine Contact Tank	2	0.8 million gallons (MG) per module

7.1 Facility Expansion Requirements

7.1.1 Planning Year 2035

Flows at RP-5 were projected for planning year 2035, and are summarized below:

- 20.2-mgd RP-5 plant influent (represents influent flow with Whispering Lakes and Haven Pump Stations offline)
- 7.3-mgd CCWRF waste solids equivalent

The facilities required to treat the planning year 2035 flows and loads are described in Table 7-15 and shown in Figure 7-10. It is assumed that the RP-2 solids handling facilities will be relocated during the 20-year planning period.

TABLE 7-15
RP-5 Facility Expansion Requirements for Planning Year 2035

Facility	Number of Units	Size of Unit
Liquid Treatment		
Primary Clarifier	2	100-foot diameter
Membrane Bioreactor	1[a]	7.5 mgd
Chlorine Contact Tank	1	0.8 MG
Solids Treatment		
Gravity Thickener	3	45-foot diameter
DAFT	3	40-foot diameter
Anaerobic Digestion		
Acid-Phase	6 Cells	20-ft^2 30-foot SWD per cell
Methane-Phase	4	90-foot diameter 35-foot SWD
Sludge Holding Tank	1	90-foot diameter 35-foot SWD
High-Pressure Gas Storage	1	35-foot diameter w/ 30- ft^2 equipment pad
Dewatering	1	100-foot x 150-foot Building
Biofilter	3 Cells	60-foot x 80-foot per cell

[a] Includes fine screens, bioreactor, blowers, membrane tanks, RAS/WAS pump station, and associated equipment.

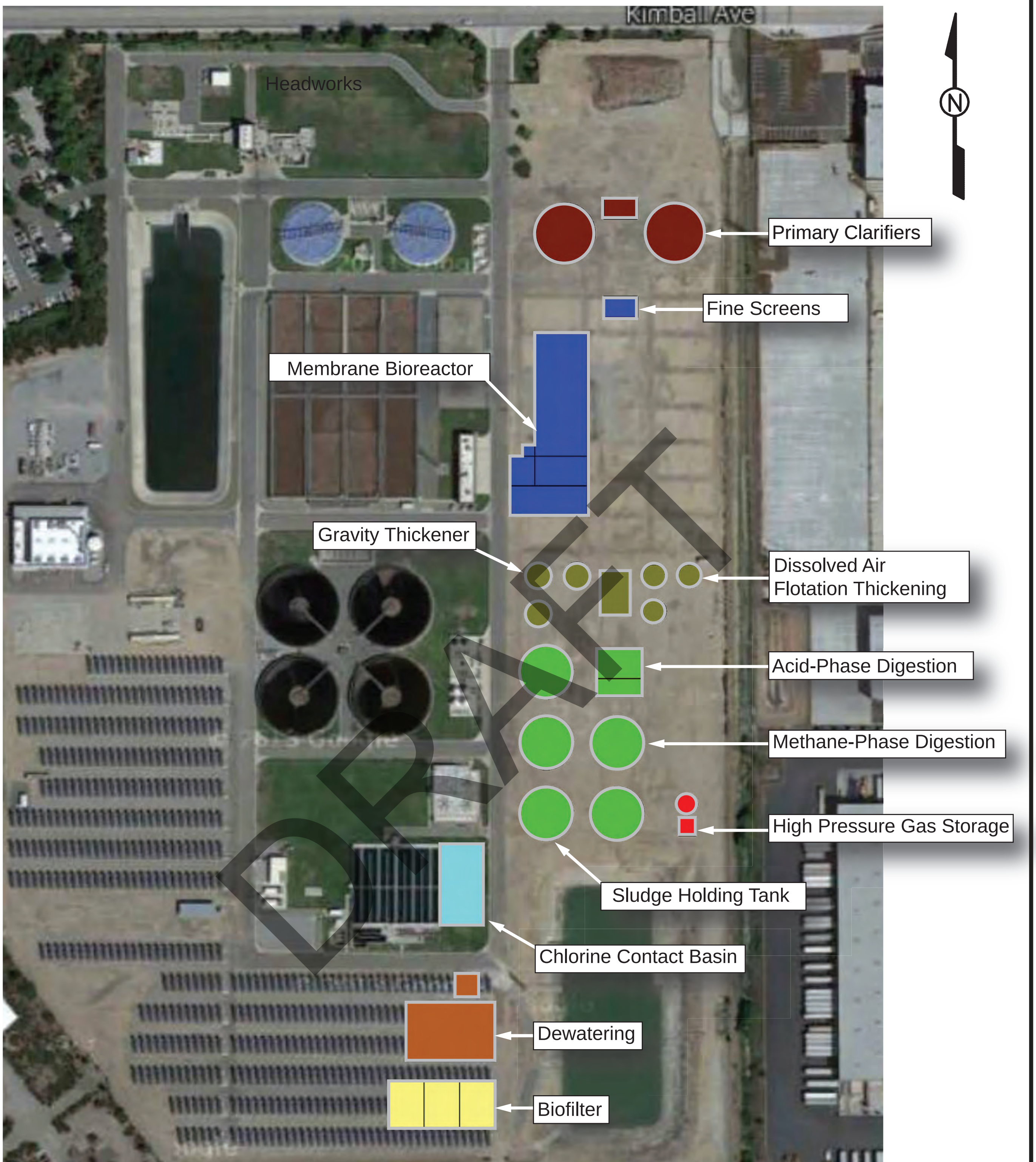

FIGURE 7-10

RP-5 FACILITIES -
PLANNING YEAR 2035

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7.1.2 Ultimate Buildout Year 2060

Flows at RP-5 were projected for planning year 2060, and are summarized below:

- 27.2 mgd RP-5 plant influent (represents influent flow with Whispering Lakes and Haven Pump Stations offline)
- 7.9 mgd CCWRF waste solids equivalent

The facilities required to treat the planning year 2060 flows and loads are described in Table 7-16 and shown in Figure 7-11.

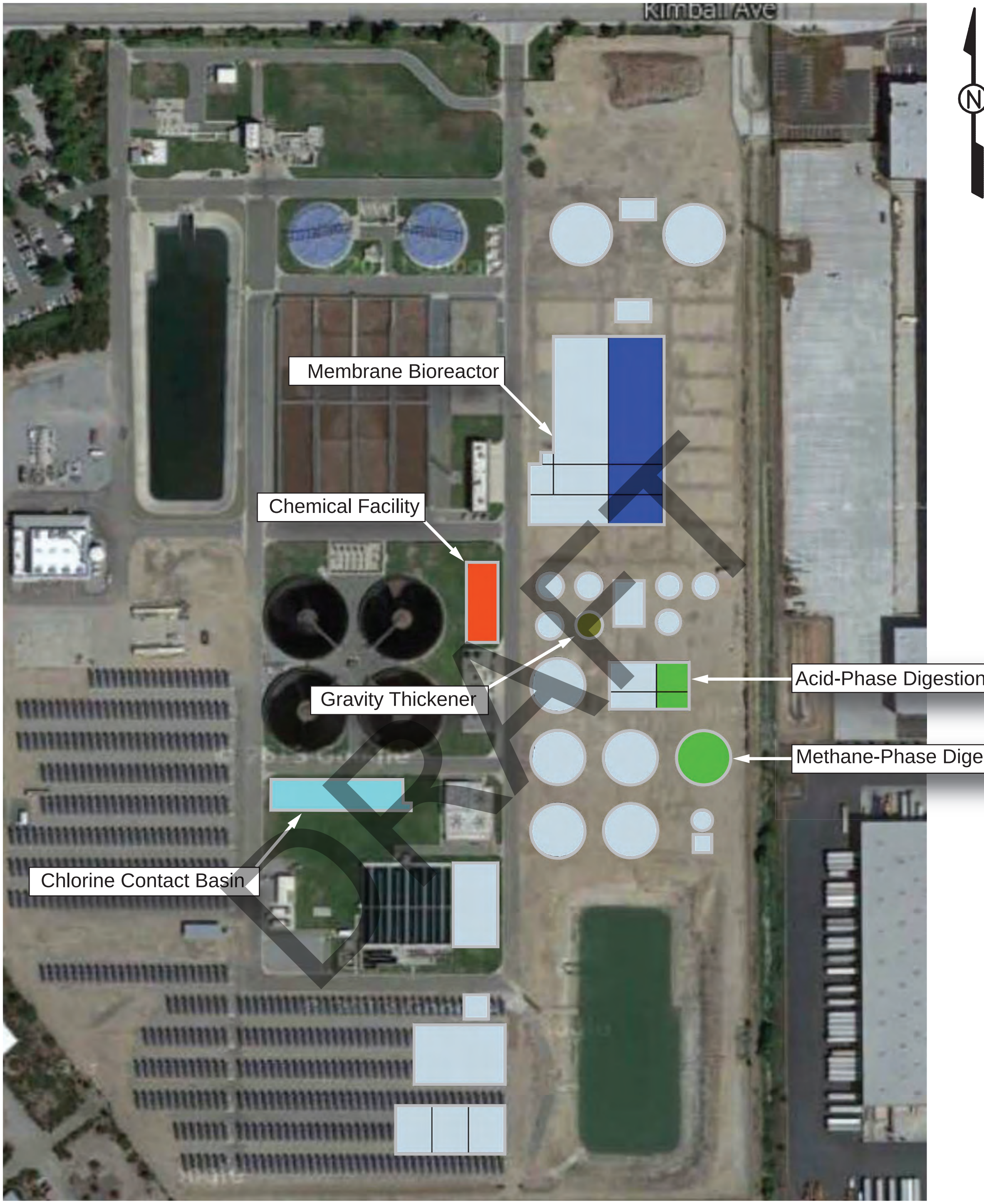
TABLE 7-16
RP-5 Facility Expansion Requirements for Ultimate Buildout Year 2060

Facility	Number of Units	Size of Unit
Liquid Treatment		
Membrane Bioreactor	1[a]	7.5 mgd
Chlorine Contact Tank	1	0.8 MG
Chemical Facilities	1	
Solids Treatment		
Gravity Thickener	1	45-foot diameter
Anaerobic Digestion		
Acid-Phase	4 Cells	20- ft^2 30-foot SWD per cell
Methane-Phase	1	90-foot diameter 35-foot SWD

[a] Includes fine screens, bioreactor, blowers, membrane tanks, RAS/WAS pump station, and associated equipment.

7.2 Ultimate Facilities Site Plan

The ultimate facilities site plan is presented in Figure 7-11. All proposed solid and liquid facilities expansions are shown.



Legend:

Planning year 2035.

FIGURE 7-11

RP-5 FACILITIES - PLANNING YEAR 2060

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8.0 20-Year CIP Plant Expansion Projects and Capital Cost

Two plant expansion projects were identified during the 20-year CIP: the RP-5 Solids Handling Facilities Project and the RP-5 Expansion Project. Capital costs were estimated for each project and those costs were placed into the 20-year CIP. The planning level capital costs for each process identified were developed based on cost curves established from previous projects and known direct costs for similar-sized projects. Additionally, several assumptions were made to estimate the total construction cost and total project costs for each expansion project. The assumptions include the following:

- The WFMP assumed a 20-year planning period.
- 10 percent of facilities subtotal for civil/site work.
- 0 to 5 percent of facilities subtotal for demolition depending on existing site conditions.
- 20 percent of facilities subtotal for electrical and instrumentation.
- 10 percent of total direct cost for contractor general conditions.
- 15 percent of total direct cost for contractor overhead and profit.
- 8 percent sales tax was applied to 50 percent of the total direct cost.
- 30 percent for construction contingency.
- 30 percent for engineering, construction management, environmental, and legal costs was applied to the total construction cost to estimate the total project cost.

The total construction cost and total project cost for each expansion project are summarized in Table 7-17.

9.0 Conclusion

The following conclusions can be made from the evaluation of RP-2 and RP-5:

- Solids handling facilities will need to be relocated from RP-2 to RP-5 within the 20-year planning period.
- The most favorable location for the relocated RP-2 solids handling facilities is along the east side of the RP-5 site (Alternative 2) near the existing liquid treatment facilities. This alternative has a minimal impact on the existing solar facility.
- The RP-5 liquid treatment facilities will need to be expanded during the 20-year planning period.

10.0 References

DDB Engineering, Inc. (DDB). December 2010. *Inland Empire Utilities Agency Regional Plant No. 5 Title 22 Engineering Report.*

TABLE 7-17
RP-5 Expansion Projects Capital Cost Estimate

Component Description		RP-5 Solids Handling Facilities Project[a]	RP-5 Expansion Project
Primary Clarifiers			$3,600,000
Primary Sludge Pump Station			$1,600,000
Secondary Treatment (MBR) – 7.5 mgd			$30,200,000
Chlorine Contact Basin			$1,200,000
Gravity Thickener		$2,400,000	
Dissolved Air Flotation Thickening		$4,200,000	
Acid-Phase Digestion		$4,900,000	
Methane-Phase Digestion[b]		$14,000,000	
High-Pressure Gas Storage		$3,000,000	
Dewatering		$10,250,000	
Biofilter		$1,100,000	
	Facilities Subtotal	**$39,850,000**	**$36,600,000**
Civil/Site Work (10%)		$3,985,000	$3,660,000
Demolition (0%)		$-	$-
Electrical and Instrumentation (20%)		$7,970,000	$7,320,000
	Total Direct Cost[c]	**$51,805,000**	**$47,580,000**
General Conditions (10%)		$5,181,000	$4,758,000
General Contractor Overhead and Profit (15%)		$7,771,000	$7,137,000
Sales Tax (8%)[d]		$2,072,000	$1,903,000
	Subtotal	**$66,829,000**	**$61,378,000**
Construction Contingency (30%)		$20,049,000	$18,413,000
	Total Estimated Construction Cost[e]	**$86,878,000**	**$79,791,000**
Engineering, Construction Management, Environmental, and Legal Costs (30%)		$26,063,000	$23,937,000
	Total Estimated Project Costs	**$112,941,000**	**$103,728,000**

[a] Costs do not include the demolition of the RP-2 facility.
[b] Includes cost of sludge holding tank.
[c] ENR CCI Index for Los Angeles (August 2014 - 10,737).
[d] Calculated assuming 50% of direct costs are taxable.
[e] Cost does not include escalation to midpoint of construction.
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. The Consultant Team has no control over variances in the cost of labor, materials, equipment; nor services provided by others, contractor's means and methods of executing the work or of determining prices, competitive bidding or market conditions, practices, or bidding strategies. The Consultant Team cannot and does not warrant or guarantee that proposals, bids, or actual construction costs will not vary from the costs presented as shown.

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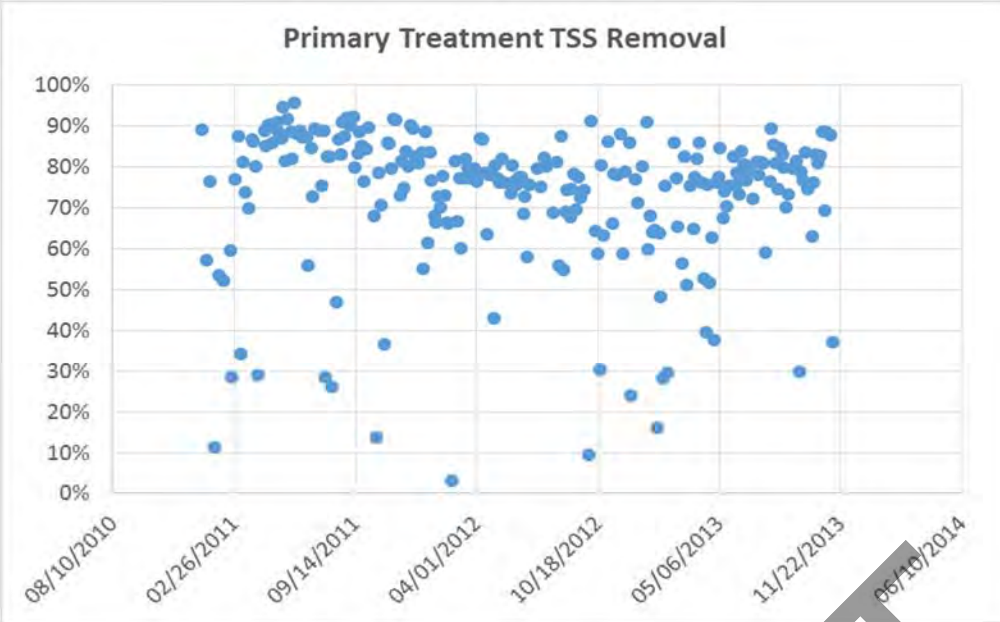
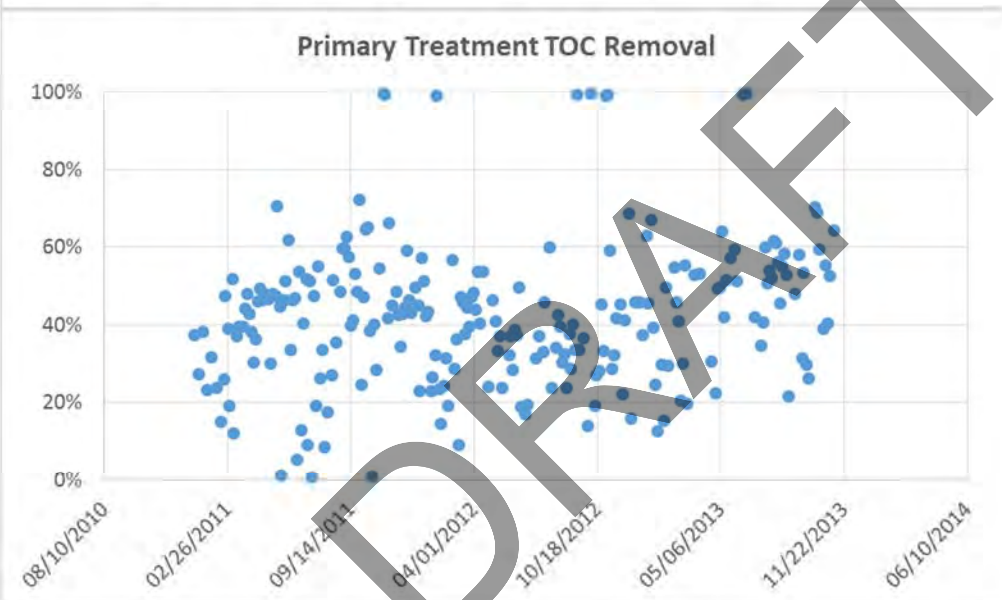
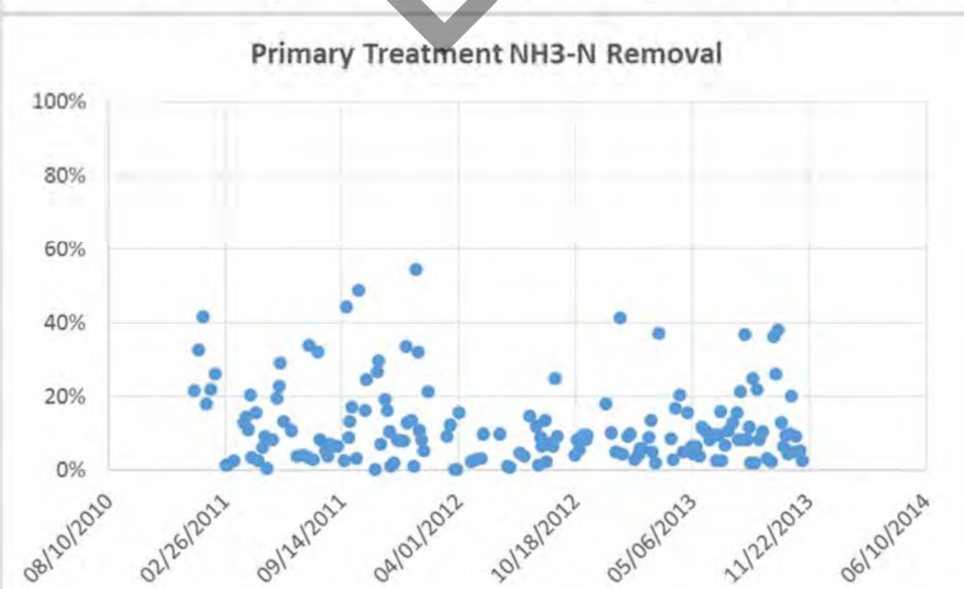
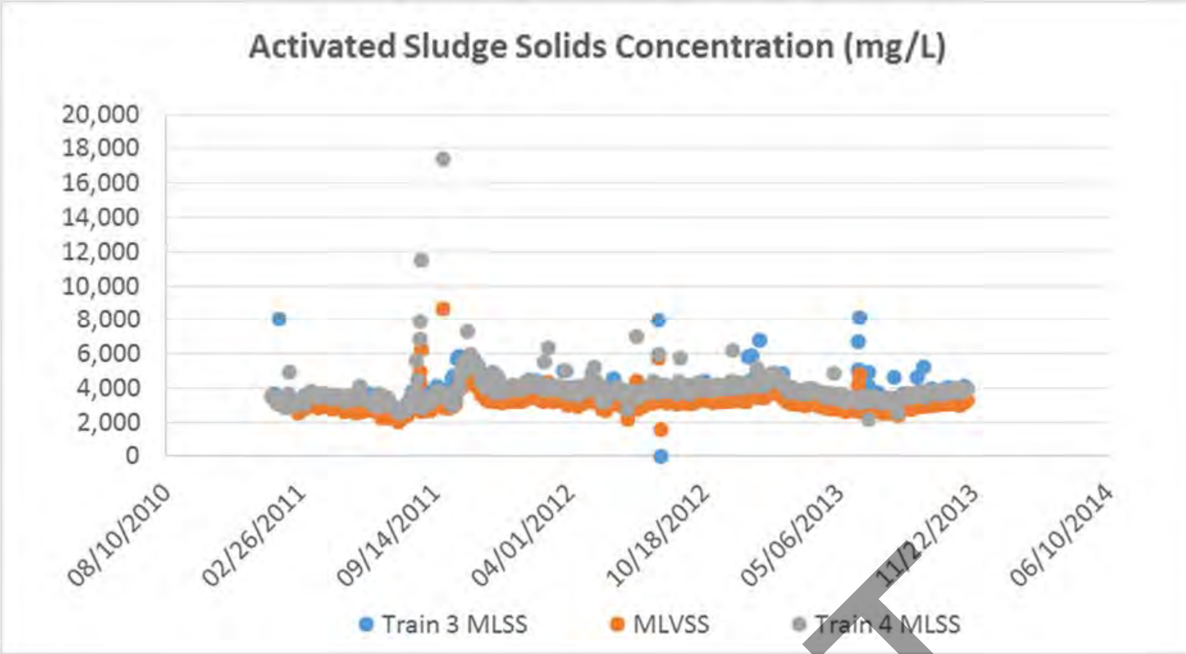
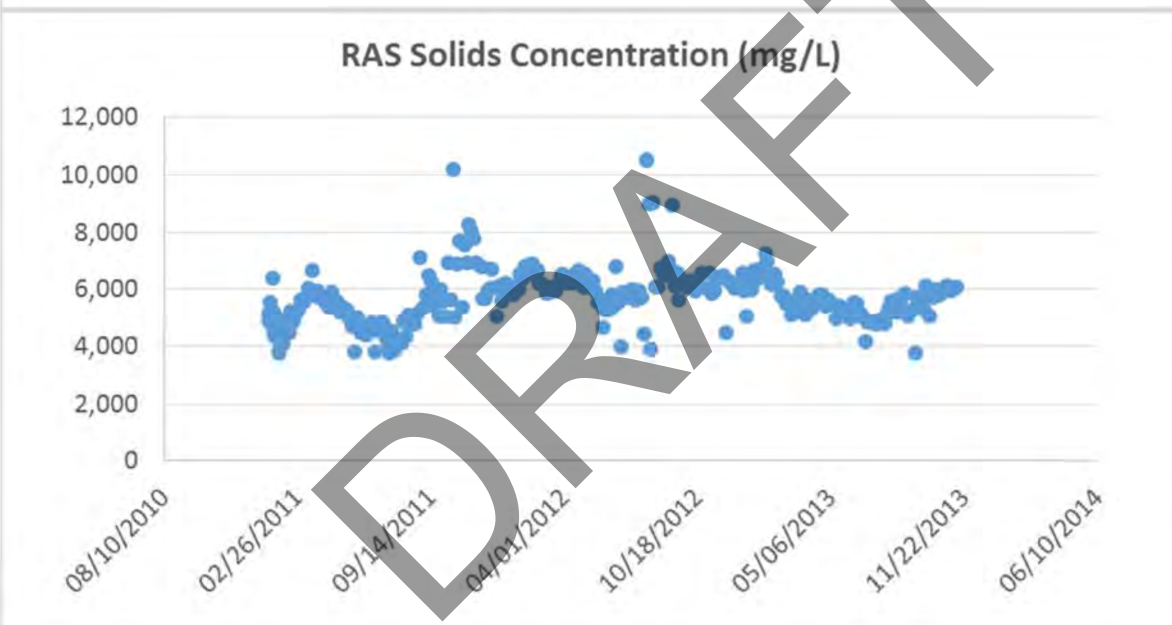
Appendix 7-A
RP-5 / RP-2 Plant Operation Summary (2011-2013)

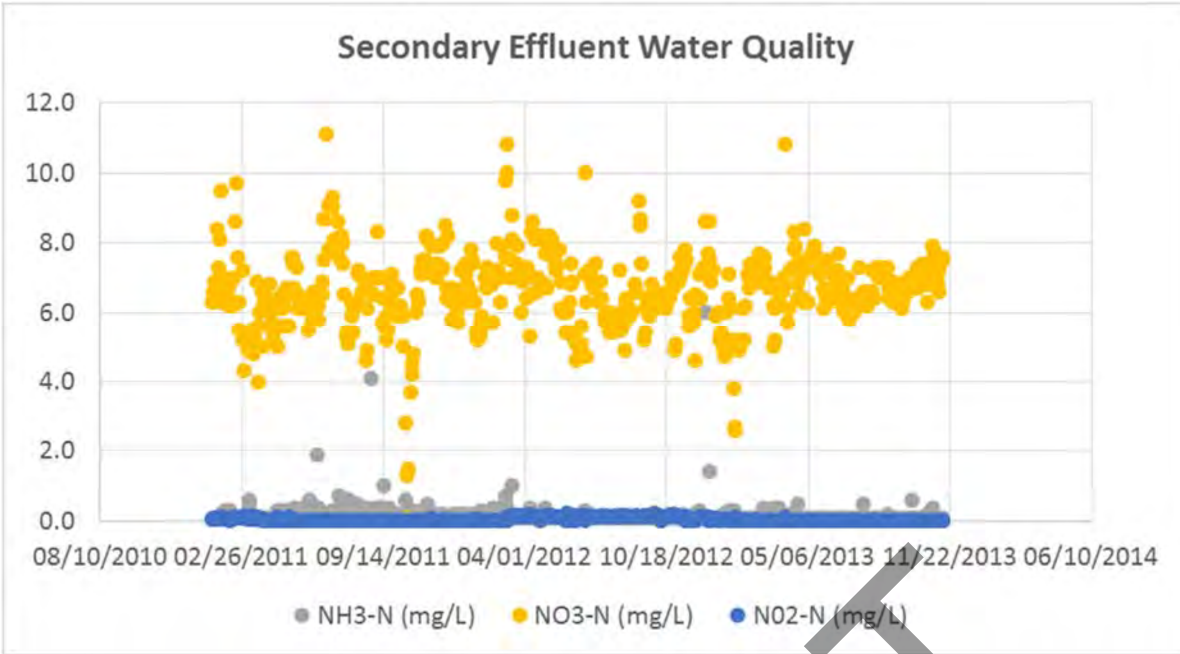

Primary Treatment TSS Removal
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014

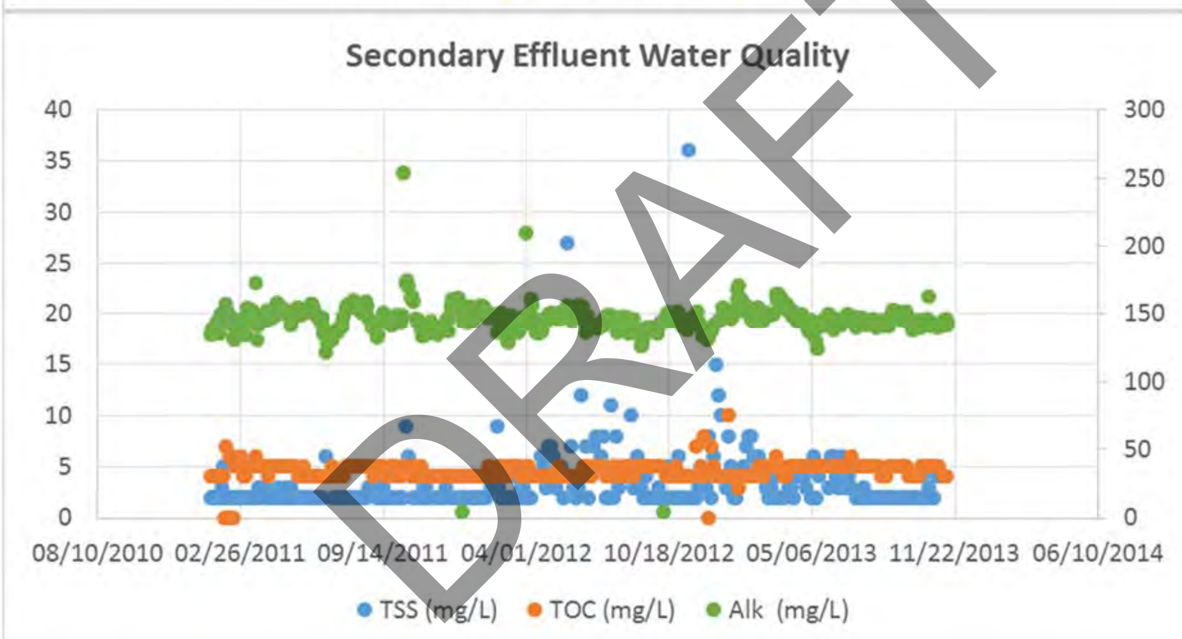

Primary Treatment TOC Removal
100%
80%
60%
40%
20%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014


Primary Treatment NH3-N Removal
100%
80%
60%
40%
20%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014


Activated Sludge Solids Concentration (mg/L)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014
Train 3 MLSS
MLVSS
Train 4 MLSS


RAS Solids Concentration (mg/L)
12,000
10,000
8,000
6,000
4,000
2,000
0
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014


Secondary Effluent Water Quality
12.0
10.0
8.0
6.0
4.0
2.0
0.0
08/10/2010 02/26/2011 09/14/2011 04/01/2012 10/18/2012 05/06/2013 11/22/2013 06/10/2014
NH3-N (mg/L)
NO3-N (mg/L)
N02-N (mg/L)


Secondary Effluent Water Quality
40
35
30
25
20
15
10
5
0
300
250
200
150
100
50
0
08/10/2010 02/26/2011 09/14/2011 04/01/2012 10/18/2012 05/06/2013 11/22/2013 06/10/2014
TSS (mg/L)
TOC (mg/L)
Alk (mg/L)

IEUA Wastewater Facilities Master Plan
TM 8 CCWRF Future Plans

PREPARED FOR: Inland Empire Utilities Agency

PREPARED BY: Carollo Engineers, Inc.

REVIEWED BY: CH2M HILL

DATE: October 28, 2014

Executive Summary

Carbon Canyon Water Recycling Facility (CCWRF) began operation in 1992 and treats wastewater from the Cities of Chino, Chino Hills, Ontario, Montclair, and Upland. CCWRF consists of liquid treatment facilities and sends primary and secondary solids to RP-2 for treatment.

The current and future flows and loads for CCWRF were estimated in *TM 4 Wastewater Flow and Loading Forecast*. An analysis of the influent wastewater characteristics at CCWRF was conducted to establish current average and peak influent flows, concentrations, and loads at the plant, and to develop flow and load projections for the 2035 planning year and the 2060 ultimate buildout year. The influent flow and loading projections and the effluent requirements detailed in the Santa Ana Regional Water Quality Control Board (RWQCB) Order No. R8-2009-0021 were used to evaluate the existing capacities of the CCWRF liquid treatment facilities. The estimated capacities were then compared to the projected flow and loads to determine the CCWRF processes that require expansion within the 20-year planning period and when those facilities would need to be online.

This evaluation indicated that the existing capacity of CCWRF was sufficient to treat predicted flows and loads through planning years 2035 and 2060. No expansion projects are planned during the 20-year planning period.

1.0 Background and Objectives

The Inland Empire Utilities Agency (IEUA) contracted with CH2M HILL and Carollo Engineers (Consultant Team) to develop a Wastewater Facilities Master Plan (WFMP). The objective of the WFMP is to plan IEUA's wastewater treatment and conveyance improvements and develop a capital improvement program (CIP). The capital program will guide IEUA in the development of major improvements to their treatment and conveyance facilities. There are five specific goals for this technical memorandum (TM):

- Summarize information from TMs 1 through 4 as it pertains to CCWRF.
- Evaluate the current capacities and limitations of the existing facilities.
- Determine treatment facilities required to treat predicted flows and loads through planning year 2035.
- Estimate timing and preliminary capital costs for plant expansion projects required during the 20-year planning period.

2.0 CCWRF Overview

Liquid facilities include influent pumping, and preliminary, primary, secondary, and tertiary treatment. The facilities are designed to treat an annual average flow of 11.4 million gallons per day (mgd). A schematic of the CCWRF is shown in Figure 8-1.

Preliminary treatment at CCWRF includes influent diversion, flow measurement, screening, and grit removal. Raw wastewater enters the plant through the influent diversion structure and then is directed to the headworks where it is split between two mechanical bar screens. Following screening, flow enters a vortex grit chamber and is then metered by a Parshall flume. Foul air from the preliminary and primary treatment facilities is sent to a chemical scrubber for treatment and discharge. Primary treatment at CCWRF consists of two 95-foot-diameter, circular primary clarifiers. Ferric chloride is added upstream of the headworks to enhance settling performance. The two clarifiers have a common sludge and scum pump station, which pumps solids to RP-2 for processing.

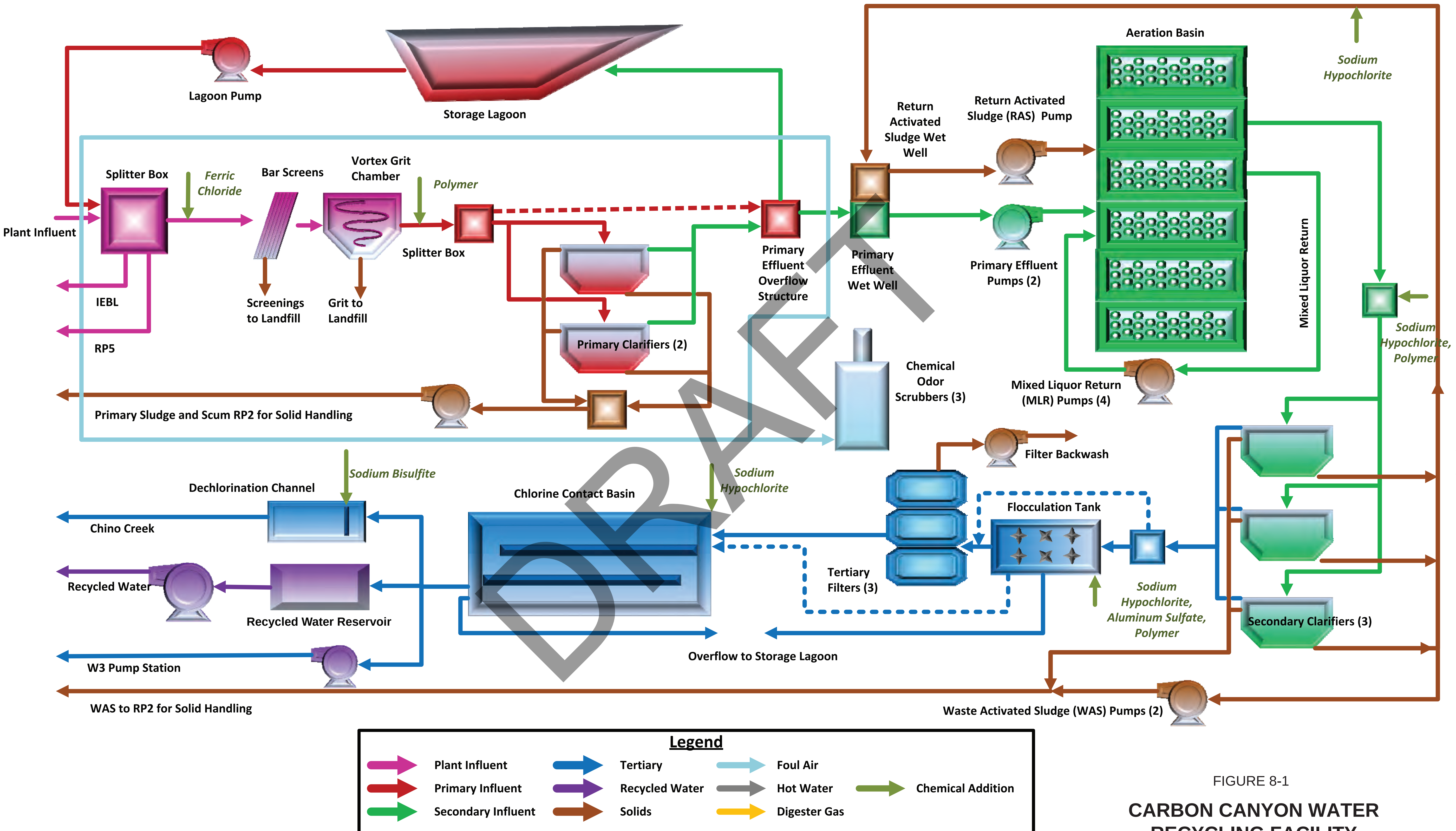


FIGURE 8-1

CARBON CANYON WATER RECYCLING FACILITY PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-10-14F8-1-9370A00.AI

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Secondary treatment at CCWRF includes six parallel, two-stage biological nutrient removal activated sludge treatment trains and three circular secondary clarifiers. The aerobic zones are equipped with fine bubble tube diffusers supplied by three centrifugal blowers. Tertiary treatment at CCWRF consists of coagulation/flocculation (not typically used), filtration, and disinfection. Secondary effluent is fed to a rapid mix basin upstream of a baffled, serpentine flocculation basin. After the flocculation basin, secondary effluent is fed to one of three continuous backwash, shallow bed, traveling bridge filters. Following the filter, filter effluent is directed to a chlorine contact basin and finally conveyed to the Recycled Water Pump Station. Disinfection is achieved using sodium hypochlorite, which is added to either the filter influent or effluent and fed to the contact tank. Recycled water is sent to a water storage reservoir prior to being pumped to the distribution system for reuse; excess recycled water is dechlorinated using sodium bisulfite and discharged to Chino Creek. Further details of the facilities are summarized in *TM 1 Existing Facilities*.

3.0 Current and Future Flows and Loads

As presented in *TM 4 Wastewater Flow and Loading Forecast*, an analysis of the influent wastewater characteristics at CCWRF was conducted as part of this WFMP effort in order to establish current average and peak influent flows, concentrations, and loads at the plant and to develop flow and load projections for the 2035 planning year and 2060 ultimate buildout year. The data analysis is based on two consecutive years of recent data provided by IEUA for influent flow and key wastewater quality constituents including biological oxygen demand (BOD), total organic carbon (TOC), total suspended solids (TSS), ammonia as nitrogen (NH3-N), and total Kjeldahl nitrogen (TKN).

Flow projections were developed by the Integrated Resources Plan (IRP) Consultant and are based on the average influent wastewater flows measured during the flow monitoring period in November 2013 and projected through the year 2060 using population, employment, and land use information. As discussed in *TM 3 Regional Trunk Sewer Alternatives Analysis*, the WFMP planning effort is based on IEUA's preferred Flow Diversion Alternative 2, which includes diverting flows from Whispering Lakes and Haven Pump Stations to RP-1. The corresponding influent wastewater flow and loading projections under this alternative for the planning year 2035 form the basis of the master planning effort and treatment plant capacity evaluation presented herein. Projections are also presented for the 2060 ultimate buildout year and are used for site planning considerations. Influent wastewater flows are projected to increase slightly at CCWRF between 2020 and 2060 as a result of population growth in areas served by CCWRF.

A summary of the current and projected average influent wastewater flows and loads for CCWRF are presented in Tables 8-1 and 8-2.

TABLE 8-1
CCWRF Current and Projected Average Influent Wastewater Flows

	Current	2035[a]	2060[a,b]
Average Influent Flow (mgd)	7.2	7.3	7.9

[a] Projections developed by IRP Consultant and IEUA based on November 2013 flow monitoring period. Reflects projected flows for IEUA preferred Flow Diversion Alternative 2.
[b] Site planning considerations are based on the projections established for the 2060 ultimate buildout planning year.

TABLE 8-2
CCWRF Current and Projected Average Influent Wastewater Characteristics

	Current Concentration (mg/L)	Current Load (lb/day)	2035 Load[a] (lb/day)	2060 Load[a] (lb/day)
BOD	455	26,839	27,708	29,985
TSS	367	21,683	22,353	24,190
NH3-N	34	1,993	2,048	2,217
TKN	53	3,105	3,257	3,524

[a] Load projections based on projected flows, concentrations, and load peaking factors presented in TM 4.
mg/L – milligrams per liter
lb/day – pounds per day

4.0 Treatment Requirements

IEUA operates under an umbrella permit and must meet water quality requirements for discharge and recycled water.

4.1 Discharge Requirements

The tertiary effluent from CCWRF is discharged at Reach 2 of Chino Creek (Discharge Point [DP] 004), regulated by RWQCB Order No. R8-2009-0021, which replaced Order No. 01-1 and Order No. 95-43, National Pollutant Discharge Elimination System (NPDES) No. CA 0105279. This permit is an umbrella permit, governing over all of IEUA's water recycling plants (RP-1, RP-4, RP-5, and CCWRF). It includes a stormwater discharge permit and the enforcement of an industrial pretreatment program. Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water, due to the use of receiving waters for water-contact recreation. A summary of the main effluent quality limits is provided in Table 8-3.

TABLE 8-3
Summary of Effluent Quality Limits for RP-5[a]

Parameter	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Notes
BOD	30 mg/L[b]	20 mg/L[b]	-	-	45 mg/L weekly average and 30 mg/L monthly average with 20:1 dilution.
TSS	30 mg/L[b]	20 mg/L[b]	-	-	
NH_4-N	-	4.5 mg/L	-	-	
Chlorine Residual	-	-	-	0.1	Instantaneous maximum ceiling 2 mg/L
TIN	-	-	8 mg/L	-	
TDS	-	-	550 mg/L	-	Shall not exceed 12-month running average TDS concentration in water supply by more than 250 mg/L
Turbidity	-	-	-	-	1. Daily average – 2 NTU 2. 5% maximum in 24 hour – 5 NTU 3. Instantaneous maximum – 10 NTU
Coliform	< 2.2 MPN	-	-	-	Maximum 23 MPN, once per month
pH	-	-	-	6.5 – 8.5	99% compliance

TABLE 8-3
Summary of Effluent Quality Limits for RP-5[a]

Parameter	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Notes
Free Cyanide	-	4.3 µg/L	-	8.5 µg/L	
Bis(2-ethylhexyl) Phthalate	-	5.9 µg/L	-	11.9 µg/L	

[a] RWQCB Order No. R8-2009-0021
[b] Without 20:1 Dilution and for recycled water
TIN – total inorganic nitrogen
NTU – nephelometric turbidity unit(s)
MPN – most probable number
µg/L – micrograms per liter

4.2 Recycled Water Requirements

Recycled water from CCWRF is used for irrigation in the area overlying Chino North "Max Benefit" Groundwater Management Zone (DP 008). Recycled water quality requirements are governed under RWQCB Order No. R8-2009-0021 and must meet the discharge requirements set forth in Table 8-3.

5.0 Existing Plant Capacity and Limitations

Existing facilities and current plant performance were used as the basis for CCWRF process model development. A whole plant model was developed using PRO2D and calibrated based on plant influent data and plant operations data for the period between October 15, 2011, and October 15, 2013. This period was selected as the basis after a review of influent and plant data to reflect a 2-year-long complete data set. Existing plant operation and the findings of the capacity evaluation through the use of process modeling is presented below for the liquid treatment facilities at CCWRF.

5.1 Existing Plant Operation

A summary of CCWRF plant operations is provided in Table 8-4 for the liquid treatment and solids handling facilities. Unit process performance values were averaged over the evaluation period, with operating ranges noted. These values were used in development and calibration of the process models. Detailed data summaries for the evaluation period are provided in Appendix 8-A.

A performance summary for the major treatment processes is presented in Table 8-5. These values, which represent the average over the evaluation period, were used in the subsequent plant process modeling and the capacity evaluations for major treatment units. Detailed data summaries for the evaluation period are provided in Appendix 8-A.

TABLE 8-4
CCWRF Average Plant Operations Summary

Parameter	Value
Primary Treatment	
TSS Removal Rate (%)	73
TOC Removal Rate (%)	38
Primary Sludge (gpd)	80,500
Secondary Treatment	
MLSS (mg/L)	3,500

TABLE 8-4
CCWRF Average Plant Operations Summary

Parameter	Value
MLVSS (%)	84
RAS SS (mg/L)	7,300
Solids Inventory (Basins Only) (lb)	260,000
Solids Inventory (Basins, Clarifiers, RAS) (lb)	281,000
Secondary Clarifier Loading (gpd/ft^2)	550
Secondary Clarifier Loading (lb/d/ ft^2)	16
Basins DO (mg/L)	1.75
Waste Activated Sludge (WAS) (mgd)	0.116
SVI (mL/g)	189
SRT (Basins Only) (day)	36
Residual Alkalinity (mg as $CaCO_3$/L)	142

Notes:
gpd – gallons per day
lb – pound(s)
RAS – return activated sludge
gpd/ ft^2 – gallons per day per square foot
lb/d/ ft^2 – pounds per day per square foot
SVI – sludge volume index
SRT – solids retention time
$CaCO_3$/L – calcium carbonate per liter

TABLE 8-5
CCWRF Average Plant Performance Summary

Parameter	Primary Effluent	Secondary Effluent	Final Effluent
TOC (mg/L)	138	5	4.8
BOD (mg/L)	249	1.5	1.2
TSS (mg/L)	83	5	2
NH3-N (mg/L)	30	0.15	0.10
NO3-N (mg/L)	N/A	4.60	4.71
NO2-N (mg/L)	N/A	0.07	0.06
TIN (mg/L)	N/A	5.0	4.87
Alkalinity (mg as $CaCO_3$/L)	N/A	142	138

The values above are for the current operation, which includes secondary treatment operation with internal mixed liquor recycling, representing a Modified Ludzack-Ettinger biological nutrient removal (BNR) configuration.

5.2 Existing Plant Capacity

5.2.1 Process Modeling

The capacity of the existing system was evaluated through process modeling using CH2M HILL's whole plant simulator, PRO2D. PRO2D is a process simulation model that takes into account the mass balances through an entire facility for particulate and soluble components. Similar to other commercially available process models, PRO2D is based on the International Water Association (IWA) ASM2D biological process kinetics. The base model was constructed to reflect the actual facility setup, including flow splits and backwash. The process model facility setup flow diagram is presented in Figure 8-2. The model was constructed with operations and performance criteria reflective of the evaluation period; it was then calibrated to reflect the actual performance, solids yields and water quality data.

As shown in Figure 8-2, the model was constructed to represent the actual plant operation for all the major process units. The model also allows establishing sizing and design considerations for each major unit process tankage and equipment. Similar to the actual operations, the plant model was built with the filter backwash and solids thickening recycles being returned to the main plant for further treatment, with the dewatering recycles being diverted offsite. The liquid and solids mass balances calculated for the current conditions allow calibration of the model against the actual field data. The calibrated model is then used to evaluate current capacity as well as establish expansion needs and process bottlenecks.

The process model was constructed and calibrated using the current influent and operating data available for the facility. The purpose of the model calibration step is to establish a baseline condition that closely resembles current operations and provides a means to reliably predict operations and system limitations under different scenarios or alternatives. Key model calibration results are presented in Table 8-6. As the listed values show, the model was calibrated such that the simulation results and actual plant data are within a value range that is 5 percent or smaller relative to the actual data. This level of accuracy will allow reliable capacity estimations to be made for the various capacity scenarios and future operation needs.

TABLE 8-6
CCWRF Average Plant Performance Summary

Parameter	Actual Data Average Values	Model Results
Effluent BOD (mg/L)	1.5	1.5
Effluent TSS (mg/L)	<5	<5
Effluent TIN (mg/L)	4.71	4.86
Effluent Alkalinity (mg as $CaCO_3$/L)	138	141
Train 2-6 MLSS Inventory (lb)	215,600	217,320
Train 1 MLSS Inventory (lb)	44,200	43,960
Sludge VS Content	84	84
Total Waste Solids (Dry Solids lb/d)	7,000	6,720
Total Primary Sludge (gpd)	80,500	80,720
Filter Backwash (gpd)	90,200	91,200

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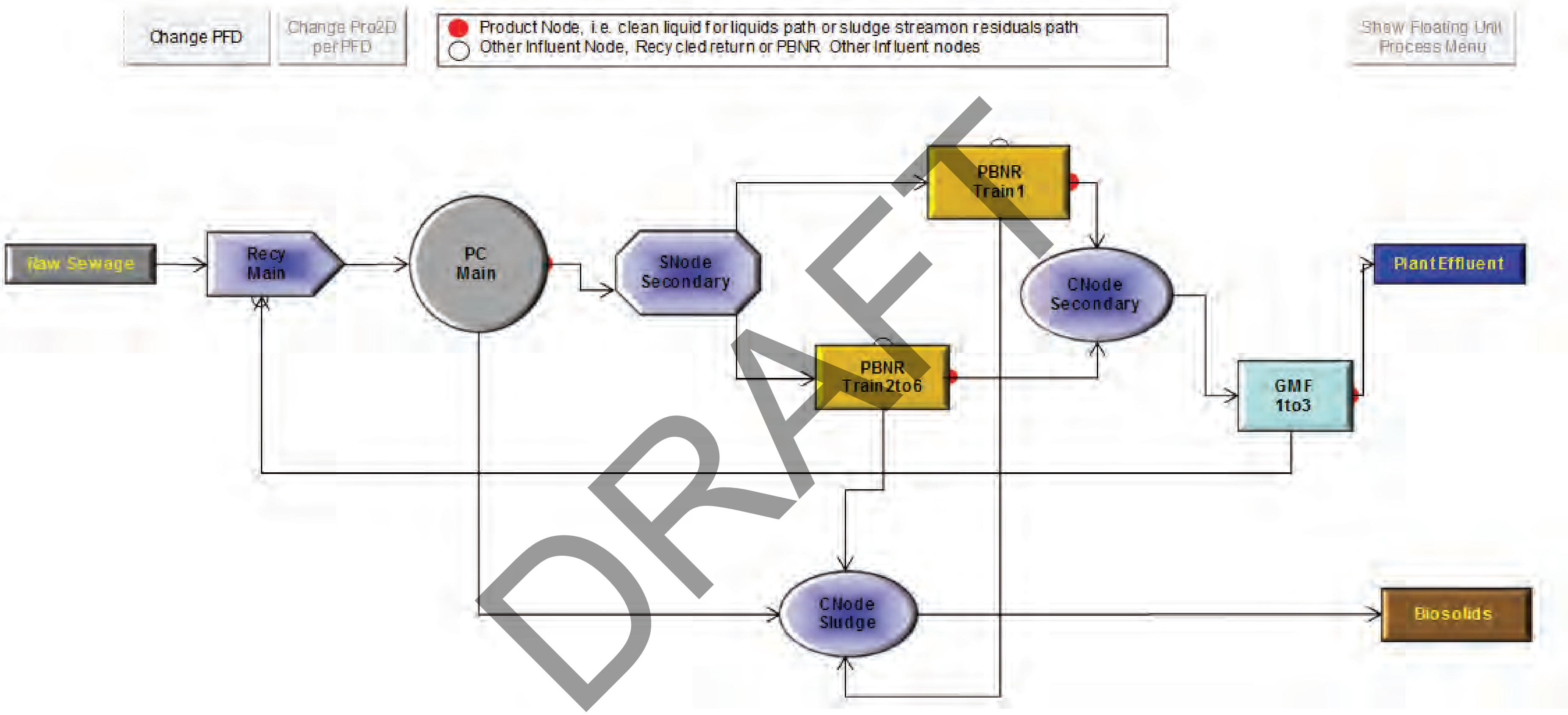

FIGURE 8-2

CCWRF PROCESS MODEL FACILITY SETUP

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WASTEWATER FACILITIES MASTER PLAN

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Subsequent process modeling using the calibrated model as the base model was conducted to evaluate the following scenarios:

- Current Plant Capacity
  - Liquid treatment capacity to meet 8-mg/L effluent TIN level under flow and load conditions
  - Liquid treatment capacity to meet 8-mg/L effluent TIN level under maximum month flow and load conditions
  - Solids generation rates under average and maximum month flow and load conditions
- Future capacity implications for the planning year 2035
- Future facility footprint implications for the planning years 2035 and 2060

Findings of the current plant capacity evaluation are presented next in this section. Future capacity needs are presented in Section 6.0.

5.2.2 Liquid Treatment Capacity

An evaluation of the liquid treatment capacity was conducted using the whole plant process model under both the average and maximum month conditions. The capacity evaluation was conducted based on achieving a plant effluent TIN concentration of 8 mg/L. As established at the onset of the project, the facility reliability and redundancy considerations are based on the IEUA's overall wastewater treatment system, with RP-5 being the end of the line facility receiving all flow diversions if needed from other Regional Water Recycling Plants. Since redundancy is provided by taking the largest unit out of service for each process at RP-5, the CCWRF plant capacity is based on all CCWRF units in service.

The facility has two primary clarifiers in service. The average hydraulic loading rates with two units in service are around 1,100 gpd/ ft^2. Under peak day, and especially if one unit needs to be taken out of service, the primary clarifiers will be hydraulically overloaded. Considering that flow diversion to RP-5 is available for times if a primary clarifier needs to be taken out of service, the facility will need to operate at a lower treatment capacity under these temporary conditions. Alternatively, chemically enhanced primary treatment (CEPT) could be implemented under these conditions to avoid overloading the downstream secondary treatment system.

Waste solids (primary sludge and WAS) generated at CCWRF are diverted to RP-2 currently. CCWRF waste solids will continue to be diverted offsite, either to RP-2 or to the new solids handling facility that will be located at the RP-5 site. Therefore, there are no solids handling recycles processed at this facility.

Process modeling showed that the liquid treatment capacity is also limited by the secondary treatment system. One of the limitations was found to be the aeration and the ability to control dissolved oxygen (DO) in the anoxic and oxic zones in the aeration basins. The implications of DO are TIN fluctuations in the effluent and SVI values that are greater than 180 milliliters per gram (mL/g), which indicates sludge settleability could be impaired at times. Another limitation of the secondary treatment system was found to be the secondary clarification solids loading resulting from the current operations and the influent wastewater solids loading rates. Maintaining the SVI values at or below 150 mL/g is important for this reason also. Primary and secondary treatment capacity is presented in Table 8-7.

TABLE 8-7
CCWRF Existing Primary/Secondary Treatment Capacity

	All Units in Service	One Unit Out of Service[a]
Capacity with Effluent TIN $\leq$ 8 mg/L	14 mgd	12 mgd

[a] One secondary clarifier out of service.

The CCWRF tertiary filters were designed based on a California Department of Public Health (CDPH) maximum filter loading rate of 4.0 gpm/ft^2 for shallow bed sand filters (RWQCB, 2010). As indicated in the Title 22 Engineering Report (DDB Engineering, Inc. [DDB], 2014) and confirmed by IEUA, the filters are rated based on all three filters in service, with average capacity equal to maximum capacity, on the premise that reliability and redundancy are provided by the ability to discharge peak flows to RP-5, the availability of short-term onsite storage, the availability of standby equipment, and the use of automatic flow controls. In order not to exceed the maximum approved filter loading rate, the maximum flow that the filtration system can handle is 27.6 mgd. Given the flexibilities discussed above, the Title 22 Engineering Report equates the average flow for the plant to the peak flow. As such, the CCWRF average filtration capacity is reported as 27.6 mgd in the current Title 22 report.

The disinfection system was designed based on the Title 22 concentration-time (CT) and modal contact requirements of 450 milligrams per minute per liter (mg-min/L) and 90 minutes during the peak hourly dry weather flow, respectively. Tracer testing conducted at CCWRF in 2004 showed that the disinfection system can handle a peak flow of 15.4 mgd while maintaining a modal contact time of 90 minutes (DDB, 2014). The resulting average disinfection capacity is therefore also 15.4 mgd for the reasons discussed above. The results of the tertiary capacity evaluation are summarized in Table 8-8.

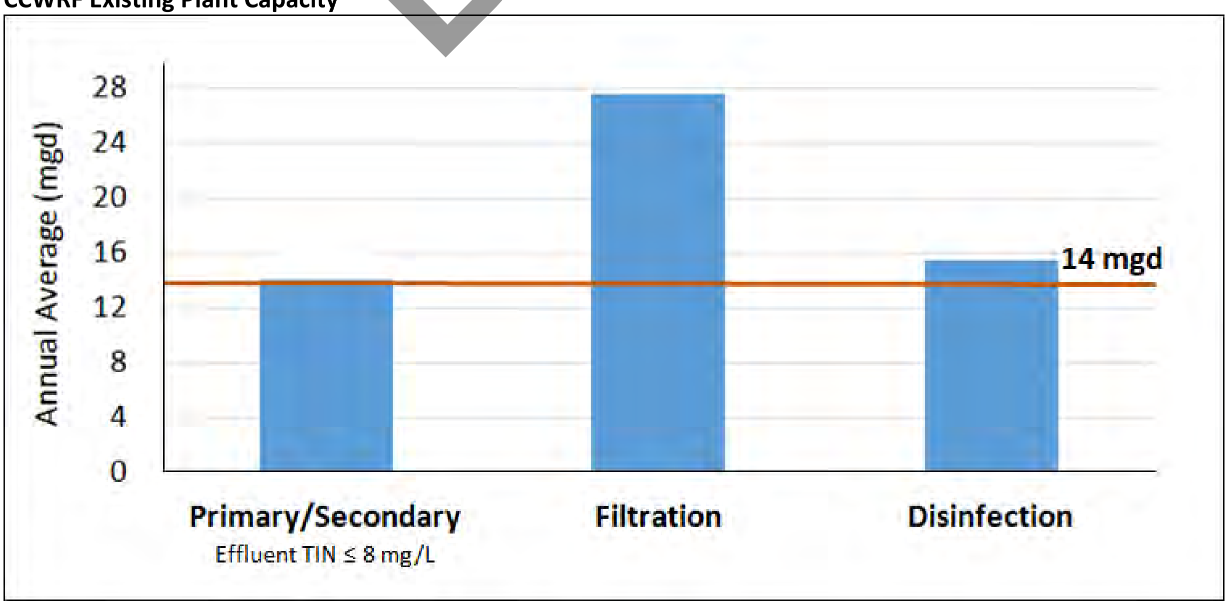
TABLE 8-8
CCWRF Existing Tertiary Treatment Capacity

	All Units in Service	One Filter Out of Service
Average Filtration Capacity[a]	27.6 mgd	18.4 mgd
Average Disinfection Capacity[a]	15.4 mgd	N/A

[a] Per Title 22 Engineering Report, the reliable annual average capacity is equal to peak capacity due to the ability to discharge to RP-5, availability of short-term onsite storage, standby equipment, and use of automatic flow controls to provide reliability and redundancy.

The overall plant capacity is determined by its most limiting process capacity. As shown in Figure 8-3, the limiting treatment process is the secondary treatment system. Therefore, the average CCWRF plant capacity is 14 mgd under the current wastewater flow and loads, as well as the reliability and redundancy considerations outlined previously.

FIGURE 8-3
CCWRF Existing Plant Capacity



6.0 Plant Expansion Needs

CCWRF has sufficient capacity to treat estimated flows and loads presented in Section 3.0 for planning years 2035 and 2060. There are no expansion projects planned for CCWRF during the 20-year planning period.

6.1 Facility Expansion Requirements

There are no projects planned for CCWRF in planning years 2035 or 2060.

6.2 Ultimate Facilities Site Plan

As there are no projects planned for the expansion of CCWRF, the plant will remain as currently operated. Figure 8-4 presents the current site layout, which is estimated to be the ultimate facilities site plan.

7.0 20-Year CIP Plant Expansion Projects and Capital Cost

CCWRF has sufficient capacity to treat estimated flows and loads projected for planning years 2035 and 2060. No expansion projects are planned during the 20-year planning period.

8.0 Conclusion

The following conclusions can be made from the evaluation of CCWRF:

- CCWRF has sufficient capacity to treat predicted liquid flows through the 20-year planning period.

9.0 References

DDB Engineering, Inc. (DDB). 2014. *Inland Empire Utilities Agency Carbon Canyon Water Recycling Facility Title 22 Engineering Report.* March.

Regional Water Quality Control Board (RWQCB). 2010. *Effluent Monitoring Point and Filter Loading Rate Approval – Waste Discharge and Producer/User Reclamation Requirements Order No. R8-2009-0021 for the Inland Empire Utilities Agency.* July 30.

FIGURE 8-4

CCWRF ULTIMATE FACILITIES SITE PLAN

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-10-14F8.4-9370A00.AI

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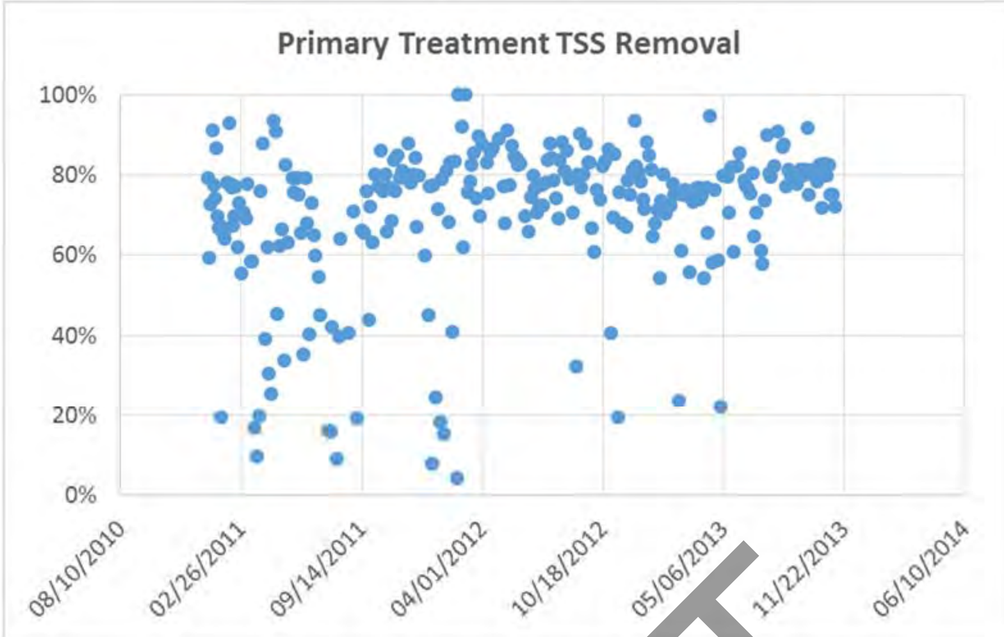
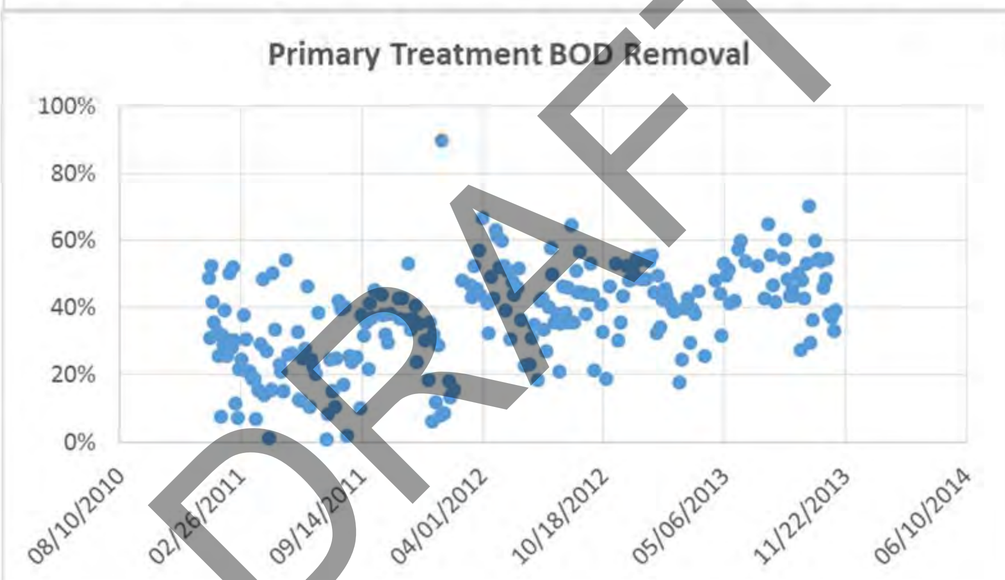
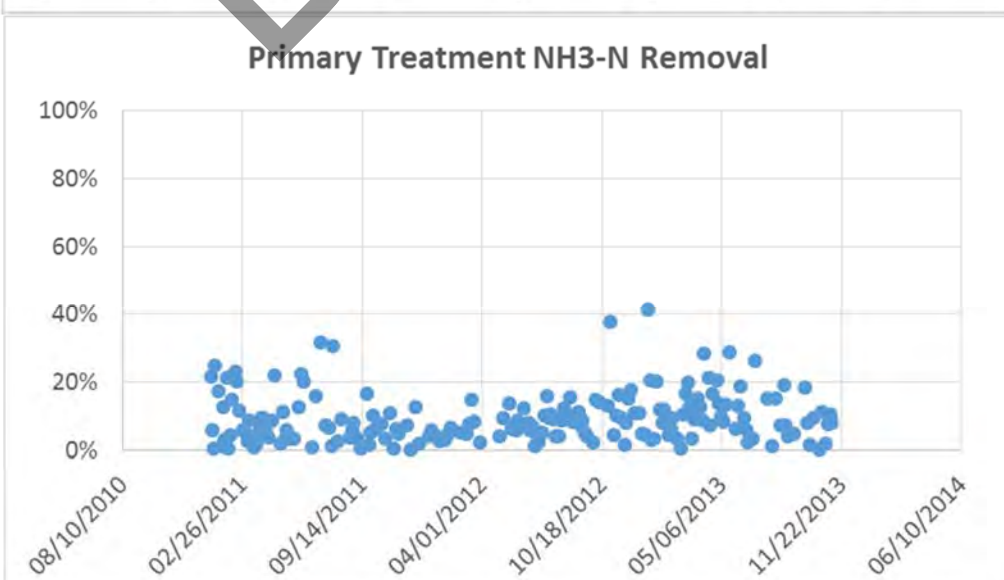
Appendix 8-A
CCWRF Plant Operations Summary (2011-2013)


Primary Treatment TSS Removal
100%
80%
60%
40%
20%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014


Primary Treatment BOD Removal
100%
80%
60%
40%
20%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014


Primary Treatment NH3-N Removal
100%
80%
60%
40%
20%
0%
08/10/2010
02/26/2011
09/14/2011
04/01/2012
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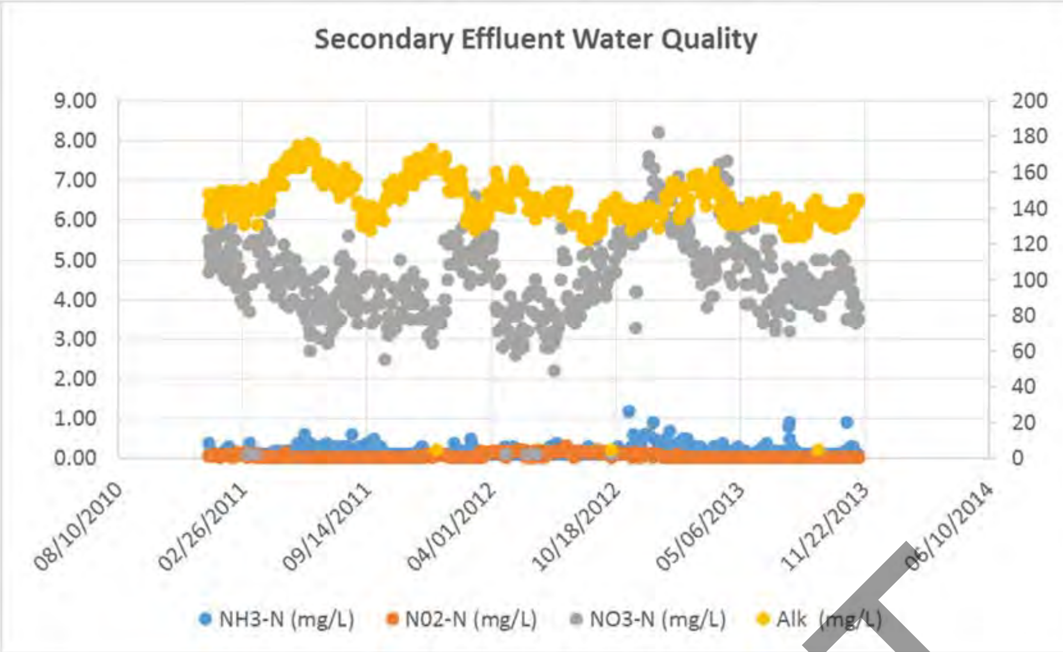
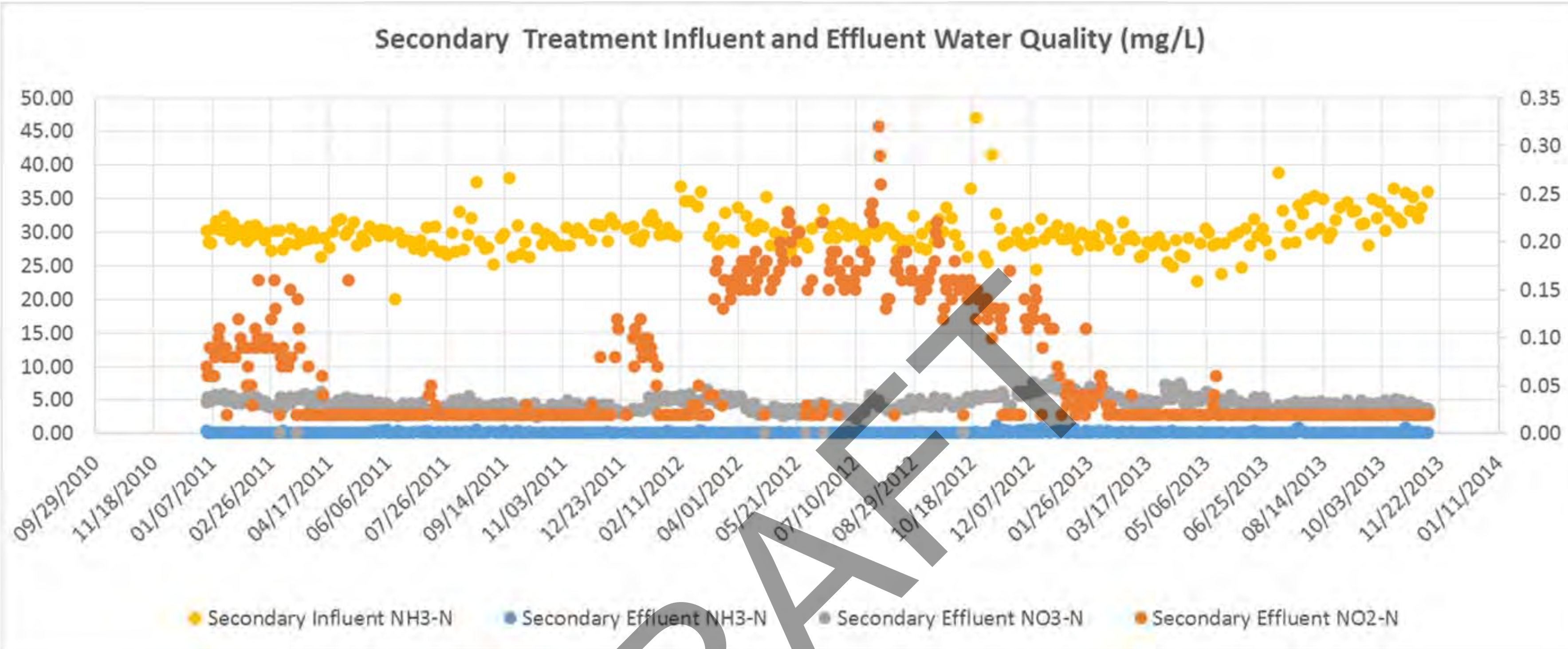
05/06/2013
11/22/2013
06/10/2014



Secondary Effluent Water Quality
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
200
180
160
140
120
100
80
60
40
20
0
08/10/2010
02/26/2011
09/14/2011
04/01/2012
10/18/2012
05/06/2013
11/22/2013
06/10/2014
NH3-N (mg/L)
N02-N (mg/L)
NO3-N (mg/L)
Alk (mg/L)



Secondary Treatment Influent and Effluent Water Quality (mg/L)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
09/29/2010
11/18/2010
01/07/2011
02/26/2011
04/17/2011
06/06/2011
07/26/2011
09/14/2011
11/03/2011
12/23/2011
02/11/2012
04/01/2012
05/21/2012
07/10/2012
08/29/2012
10/18/2012
12/07/2012
01/26/2013
03/17/2013
05/06/2013
06/25/2013
08/14/2013
10/03/2013
11/22/2013
01/11/2014
Secondary Influent NH3-N
Secondary Effluent NH3-N
Secondary Effluent NO3-N
Secondary Effluent NO2-N

IEUA Wastewater Facilities Master Plan
TM 9 Organics Management Plan

PREPARED FOR: Inland Empire Utilities Agency

PREPARED BY: CH2M HILL

DATE: October 30, 2014

Executive Summary

The purpose of the Inland Empire Utilities Agency (IEUA) Organics Management Plan is to assess the existing solids handling and composting capacities within the northern and southern service areas and determine the facilities expansion needs through the ultimate buildout year 2060 based on the projected plant influent flows and loads, and the corresponding projected biosolids quantities. Based on the influent flow and load projections presented in *Technical Memorandum (TM) 4 Wastewater Flow and Loading Forecast*, the solids handling facilities at RP-1 and RP-5/RP-2 will need to be expanded beyond their existing solids handling capacities of 38 million gallons per day (mgd) and 18 mgd, respectively, to meet future demands in the northern and southern service areas, respectively. RP-1 solids handling will require the addition of anaerobic digesters, while RP-5/RP-2 solids handling facilities need to be relocated to RP-5. The RP-2 solids handling facilities will need to be decommissioned and relocated to the RP-5 site by 2023 in anticipation of the United States Army Corps of Engineers (USACE) raising the Prado Spillway. New RP-5 solids handling facilities to be completed by 2035 include thickening, anaerobic digestion, dewatering, digester gas storage and utilization, and odor control. Additional thickening and digestion capacity would be needed at RP-5 by 2060 to meet the projected demands in the southern service area.

As a result of the anticipated increased flows and loads to each plant, the estimated biosolids quantities from the northern and southern service areas are projected to reach up to 198 wet tons per day by 2035 and 241 wet tons per day by 2060. Based on recent discussions with the Inland Empire Regional Composting Facility (IERCF) Manager of Operations and Organics, the facility currently has a throughput capacity of 209,625 annual wet tons of biosolids and amendment permitted by the Air Quality Management District (AQMD). Based on the joint powers agreement, IEUA may contribute up to half of this amount, which equates to 200 wet tons of biosolids per day. Thus, IERCF has adequate capacity to receive and process IEUA biosolids over the next 20 years. However, the projected ultimate biosolids are expected to surpass the current permitted capacity of IERCF by 2060, at which time IEUA needs to explore additional biosolids management options. Options may include implementing technologies such as heat drying, improved dewatering technologies to reduce the amount of wet tons produced, or diversifying biosolids management by contracting with private companies for land application, composting, energy production, and other biosolids product markets.

1.0 Background and Objectives

As part of the Wastewater Facilities Master Plan (WFMP) effort, CH2M HILL and Carollo Engineers (the Consultant Team) have prepared this Organics Management Plan TM to summarize existing solids handling and composting facility capacities, establish biosolids projections through the ultimate buildout year 2060, and determine expansion needs for solids handling and composting facilities within the service area.

The expected solids generation in wet and dry tons per day from now until ultimate buildout was calculated based on the current wastewater characteristics and projected influent wastewater flows to each of the four Regional Water Recycling Plants (RWRPs) established in *TM 4 Wastewater Flow and Loading Forecast* as the basis of all capacity and planning considerations. Projected biosolids quantities were then compared to the existing capacity of the solids handling and composting facilities to assess the biosolids handling capacity requirements for the biosolids generated in the northern and southern portions of the IEUA service area, and determine what options are available for expansion, if expansion is deemed necessary.

As discussed in *TM 7 RP-5 and RP-2 Complex Future Plans*, the RP-2 solids handling facilities will need to be decommissioned and relocated to the RP-5 site by 2023 in anticipation of the USACE raising the Prado Spillway. For the northern part of the service area, the Consultant Team will determine the timing needed for developing a management strategy for handling the biosolids based on how long it may take to develop a strategy and when the current capacity will be exceeded.

2.0 Organics Management Plan Overview

The existing solids handling and composting facilities are described in *TM 1 Existing Facilities*. As presented in TM 1, biosolids are produced at each of the four RWRPs and require stabilization and beneficial use. Currently, IEUA operates two solids handling facilities located at RP-1 and RP-2. RP-1 solids handling processes treat biosolids produced at RP-1 and RP-4, while RP-2 solids handling processes treat biosolids produced at RP-5 and Carbon Canyon Water Recycling Facility (CCWRF). Biosolids are thickened, stabilized, and dewatered at RP-1 and RP-2 and then trucked to IERCF for composting. IERCF is operated by the Inland Empire Regional Composting Authority (IERCA), which was created by a joint powers agreement between IEUA and the Sanitation Districts of Los Angeles County (Sanitation Districts). IERCF accepts biosolids from both IEUA and the Sanitation Districts treatment facilities and produces a high-quality soil amendment.

3.0 Projections of Biosolids Quantities

In the northern service area, IEUA currently produces approximately 100 wet tons of biosolids per day at 24 percent solids content on average. In the southern service area, IEUA produces approximately 45 wet tons per day at 24 percent solids content on average. The resulting total biosolids production is currently about 145 wet tons per day.

With influent wastewater flows projected to increase through the ultimate buildout year 2060 as a result of increased population growth and incorporation of septic flows into the IEUA system, biosolids production is similarly expected to increase. Biosolids projections are calculated based on the projected influent flows to each RWRP and the wastewater characteristics established for each RWRP. A detailed discussion of the influent flow and load projections is presented in *TM 4 Wastewater Flow and Loading Forecast*. The projected average biosolids quantities for the northern and southern service areas for the 2035 and 2060 planning years are presented in Table 9-1.

TABLE 9-1
Estimated Current and Projected Average Biosolids Quantities

	Current			**Planning Year 2035[a]**			**Planning Year 2060[a,b]**		
	Influent Flow (mgd)	**Biosolids (WT/d)**	**Biosolids (DT/d)**	**Influent Flow (mgd)**	**Biosolids (WT/d)**	**Biosolids (DT/d)**	**Influent Flow (mgd)**	**Biosolids (WT/d)**	**Biosolids (DT/d)**
RP-1 / RP-4	38.5	100	24	47.8	130	31	54.7	139	33
RP-5 / CCWRF	17.2	45	11	25.7	68	16	33.2	102	25
Total	55.7	145	35	73.5	198	47	87.9	241	58

[a] Reflects projected flows for IEUA preferred Flow Diversion Alternative 2, with Whispering Lakes and Haven Pump Stations online, and a biosolids cake solids content of 24 percent.
[b] Site planning considerations are based on the projections established for the 2060 ultimate planning year.
WT/d = wet tons per day
DT/d = dry tons per day
TS = total solids

As listed in Table 9-1, the northern service area biosolids production is projected to increase by 30 percent from 100 to 130 wet tons per day by 2035, to as much as 139 wet tons per day by 2060. In comparison, the southern service area biosolids production is projected to increase by 51 percent from 45 to 68 wet tons per day by 2035, to as much as 102 wet tons per day by 2060, which is aligned with the projected increase in plant flows and loads. Overall, the total biosolids production is projected to increase by 37 percent from 145 to 198 wet tons per day by 2035, and up to 241 wet tons per day by 2060.

4.0 Summary of Existing Solids Handling Facilities Capacities

The existing capacity of the solids handling facilities and the composting facility are summarized briefly in this section. A description of each facility is presented in *TM 1 Existing Facilities*, and a detailed discussion of the capacity evaluation of each solids handling facility is presented in *TM 5 RP-1 Future Plans* and *TM 7 RP-5 and RP-2 Complex Future Plans.*

4.1 RP-1 Solids Handling Facilities

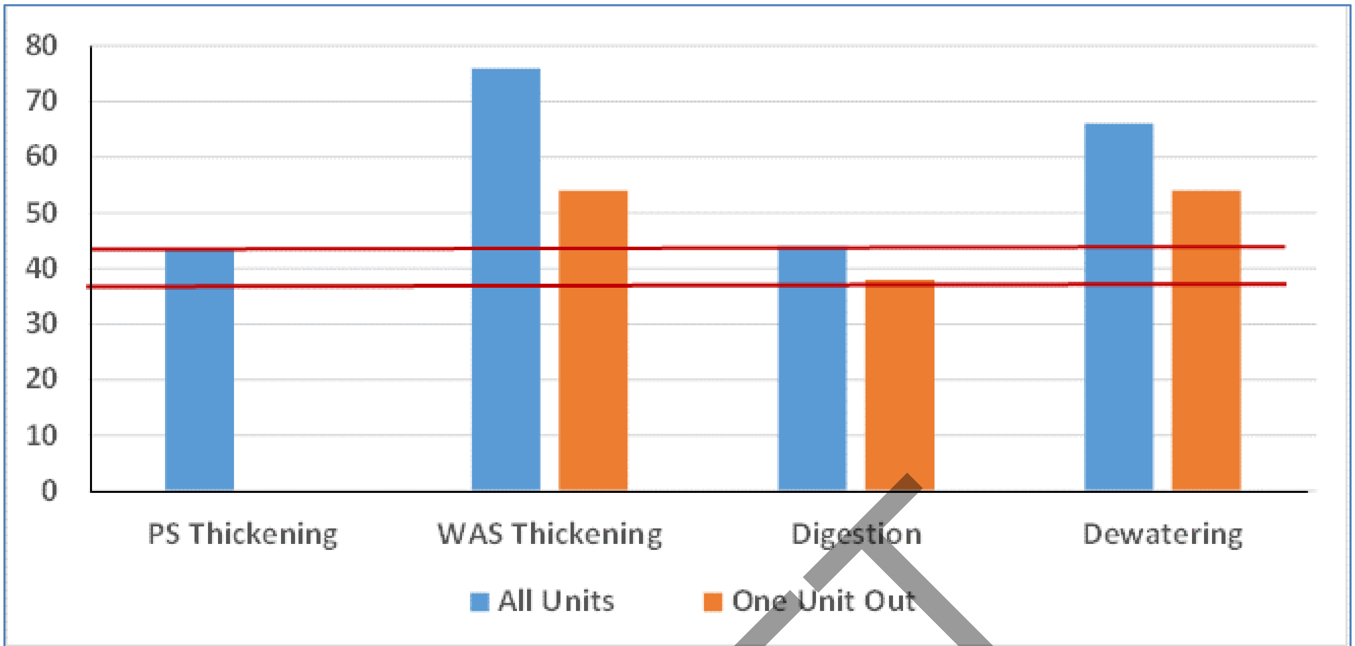
Solids removed from RP-1 and RP-4 liquid streams are processed in the RP-1 solids handling facilities. The RP-1 solids handling facilities consist of thickening, stabilization, and dewatering processes. Two thickening processes are in operation at RP-1: gravity thickening for primary solids, and dissolved air flotation (DAF) thickening for secondary solids. Thickened waste solids from the primary and secondary processes are stabilized in a three-stage anaerobic digestion process, which consists of acid and gas (thermophilic and mesophilic) digestion stages. Digested solids are then dewatered using centrifuges. Dewatered biosolids are loaded onto trucks and delivered to IERCF for composting.

As presented in *TM 5 RP-1 Future Plans*, the existing RP-1 solids handling capacity is limited to 38 mgd due to digestion capacity limitations with one digester out of service. The plant influent includes the RP-4 solids diverted to RP-1 via the sewer system for further treatment. Primary sludge thickening is currently achieved using one gravity thickener. Having a single thickener was not considered a key concern by IEUA staff since thickening can be achieved in the primary clarifiers if the gravity thickener is taken out of service. The capacity of the DAF thickeners was evaluated using a maximum solids loading rate of 45 pounds per day per square foot. Waste solids digestion, achieved in the phased digestion system, was evaluated based on the current operating conditions as well as Part 503 Rule requirements for Class B biosolids. Digester loading rates and a digester solids retention time (SRT) of 15 days with one large unit out of service were used to establish digestion capacity, using an active digester volume of 90 percent of the total digester volume including the cone space. Dewatering capacities of the centrifuges were calculated considering the hydraulic loading rate to be maintained at or below 340 gallons per minute (gpm) under the current solids loading conditions. The existing RP-1 solids handling process capacities are summarized in Table 9-2 and illustrated in Figure 9-1.

TABLE 9-2
RP-1 Existing Solids Handling Capacity

	All Units in Service	One Unit Out of Service
Primary Sludge Thickening	43.3 mgd	0 mgd
Waste Activated Sludge Thickening	76 mgd	54 mgd
Digestion	44 mgd	38 mgd
Dewatering	66 mgd	54 mgd

FIGURE 9-1
RP-1 Existing Solids Handling Capacity



4.2 RP-5/RP-2 Solids Handling Facilities

4.2.1 RP-2 Solids Handling Facilities

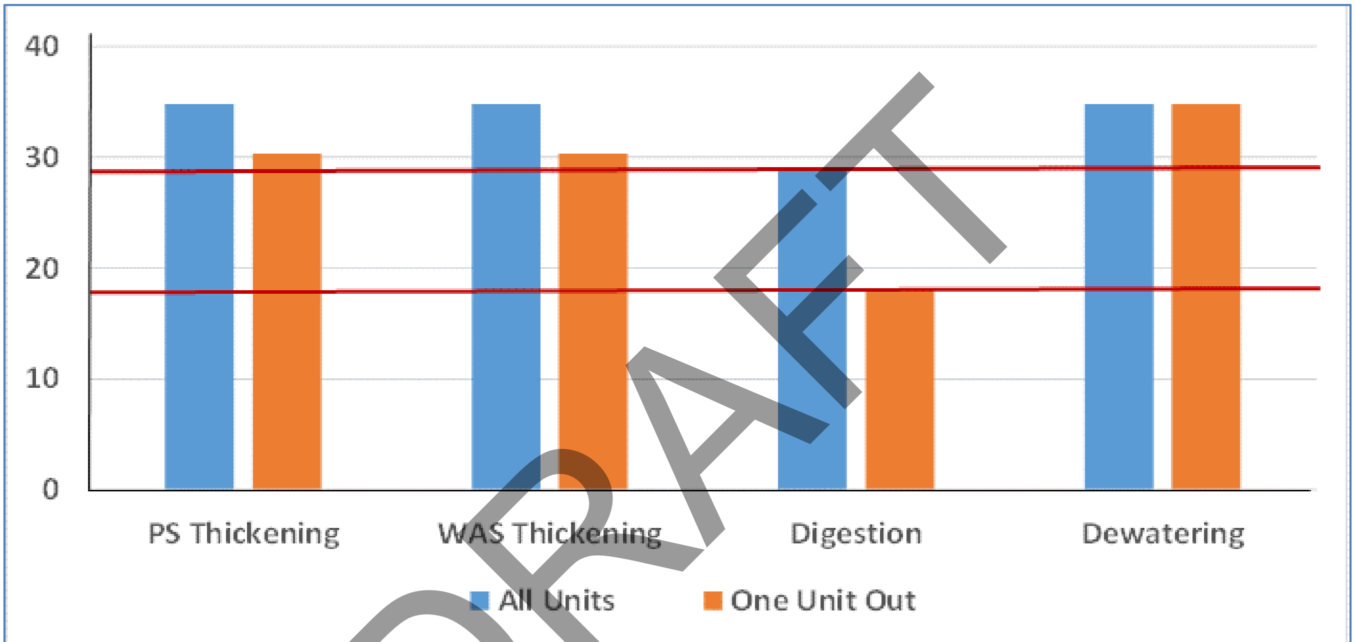
Solids removed from the RP-5 and CCWRF liquid streams are processed in the RP-2 solids handling facilities. RP-5 and CCWRF primary and secondary solids are individually conveyed to RP-2 for treatment. The RP-2 solids handling facilities consist of thickening, stabilization, and dewatering processes. There are two thickening processes in operation at RP-2: gravity thickening for primary solids, and DAF thickening for secondary solids. Thickened solids from the primary and secondary processes are stabilized in a two-stage anaerobic digestion process, which consists of mesophilic-acid and mesophilic gas digestion stages. Digested biosolids are then dewatered using belt filter presses or centrifuges. Currently, the belt filter presses are in operation with the centrifuges on standby. Dewatered biosolids are loaded onto trucks and delivered to IERCF for composting.

As presented in *TM 7 RP-5 and RP-2 Complex Future Plans*, the existing RP-2 solids handling capacity is limited to 18 mgd due to digestion capacity limitations with one digester out of service. Primary sludge thickening is currently achieved using gravity thickening. Thickening cannot be achieved in the primary clarifiers because the sludge needs to be diverted to RP-2 at a solids content of about 1 to 1.5 percent solids. WAS thickening is achieved in DAF thickeners. Waste solids digestion, achieved in the phased digestion system, was evaluated based on the current operating conditions as well as Part 503 Rule requirements. A digester SRT of 15 days with one large unit out of service was used to establish digestion capacity, using an active digester volume of 90 percent of the total digester volume including the cone space. The dewatering capacity of the belt filter presses was calculated considering the hydraulic loading rate to be maintained at or below 75 gallons per minute per meter, and the solids loading rate to be maintained at or below 1000 pounds per hour per meter under the current solids loading conditions. The existing RP-2 solids handling process capacities are summarized in Table 9-3 and illustrated in Figure 9-2.

TABLE 9-3
RP-2 Existing Solids Handling Capacity

	All Units in Service	One Unit Out of Service
Primary Sludge Thickening	34.8 mgd	30.3 mgd
Waste Activated Sludge Thickening	34.8 mgd	30.3 mgd
Digestion	29 mgd	18 mgd
Dewatering	34.8 mgd	34.8 mgd

FIGURE 9-2
RP-2 Existing Solids Handling Capacity



4.2.2 RP-5 Solids Handling Site

To help reduce the impacts of manure from dairy farms on local groundwater and produce energy, IEUA built a 5-million gallon (MG) plug flow digester at the RP-5 complex. This facility began accepting manure in 2001. In 2005, two aboveground vertical stirred digesters were added to allow food-waste processing in addition to the dairy manure. In 2009, IEUA shut down the food-waste processing unit and began looking for a third-party operator. In 2010, IEUA signed a 10-year lease agreement with Environ Strategy Consultants, Inc. (ESCI). ESCI operates the food-waste processing facility and sells power to IEUA. A capacity evaluation of this food-waste processing facility was therefore not conducted as part of this WFMP effort.

4.3 Inland Empire Regional Composting Facility

IERCF is North America's largest indoor biosolids composting facility, encompassing 24 acres with 445,275 square feet dedicated specifically to the compost process building. The facility is operated by the IERCA, a joint powers authority created by IEUA and the Sanitation Districts in 2002 to construct, operate, and maintain a regional composting facility. Both IEUA and the Sanitation Districts send biosolids to the facility for processing and reuse as a high-quality soil amendment. IERCF produces high-quality compost that is marketed under the name of SoilPro Premium Products and sold to landscapers, farmers, and gardeners around the region.

Biosolids and amendments are trucked to IERCF and deposited into solids hoppers prior to conveying the biosolids and amendment material to the pug mills via belt conveyors for mixing. After mixing in the pug mills, the material flows via belt conveyors to the active compost area and is piled using front-end loaders for approximately 21 days of active composting. Compost materials are then transferred via front-end loader to the curing area for approximately 30 days of curing. The cured materials are then transported to the screening belt conveyor using front-end loaders. After screening, the product flows via belt conveyors to the product load-out area, where it is loaded onto trucks and hauled to customers. A process flow schematic of IERCF is provided in Figure 9-3.

Based on recent discussions with the IERCF Manager of Operations and Organics, Mr. Jeff Ziegenbein, the facility currently processes up to approximately 205,000 wet tons of biosolids and amendment annually, or 98 percent of the maximum throughput permitted by the AQMD. The AQMD permits a total of 209,625 wet tons per year of biosolids and amendment throughput, excluding recycled material (AQMD, 2010) based on the air emissions control system capacity and emission limits. This includes approximately 150,000 tons of biosolids and 60,000 tons of amendment materials such as green waste, wood waste, and stable bedding. Thus, IERCF processes approximately 400 wet tons of biosolids on average per day. Based on the joint powers agreement, IEUA and the Sanitation Districts contribute equal shares of biosolids. Thus, IEUA may contribute up to approximately 200 wet tons of biosolids per day to IERCF.

5.0 Expansion Considerations

Expansion needs for the RP-1 solids handling facilities, RP-5/RP-2 solids handling facilities, and IERCF were determined based on the flow and load projections discussed in *TM 4 Wastewater Flow and Loading Forecast* and the biosolids projections presented above in Section 3.0 of this TM. Expansion needs for RP-1 and RP-5/RP-2 are discussed in detail in *TM 5 RP-1 Future Plans* and *TM 7 RP-5 and RP-2 Complex Future Plans*, respectively. Expansion needs for the solids handling and composting facilities for the planning year 2035 and ultimate buildout year 2060 are summarized below.

5.1 RP-1 Solids Handling Facilities

As discussed in Section 4.1, the existing RP-1 solids handling capacity is limited to 38 mgd due to digestion capacity limitations with one digester out of service. As presented in Table 9-1, the projected influent flow to RP-1 and RP-4 is approximately 47.8 mgd by 2035 and 54.7 mgd by 2060. Therefore, the existing solids handling facilities at RP-1 do not have adequate capacity to accommodate either the 2035 or ultimate projected influent flows in the northern service area. Two new anaerobic digesters with complete sludge transfer and recirculation, mixing and heating, and pumping equipment are recommended by 2035. No additional solids handling facilities are needed beyond this since the new digesters would provide adequate capacity for the planning year 2035 and ultimate buildout year 2060.

The RP-1 solids handling facilities expansion needs are summarized in Table 9-4. The ultimate site layout and estimated costs for the recommended improvements are presented in *TM 5 RP-1 Future Plans.*

TABLE 9-4
RP-1 Solids Handling Facilities Expansion Needs for Planning Year 2035

Facility	Number of Units	Size of Unit
Anaerobic Digesters	2	110 ft diameter 30 ft sidewater depth

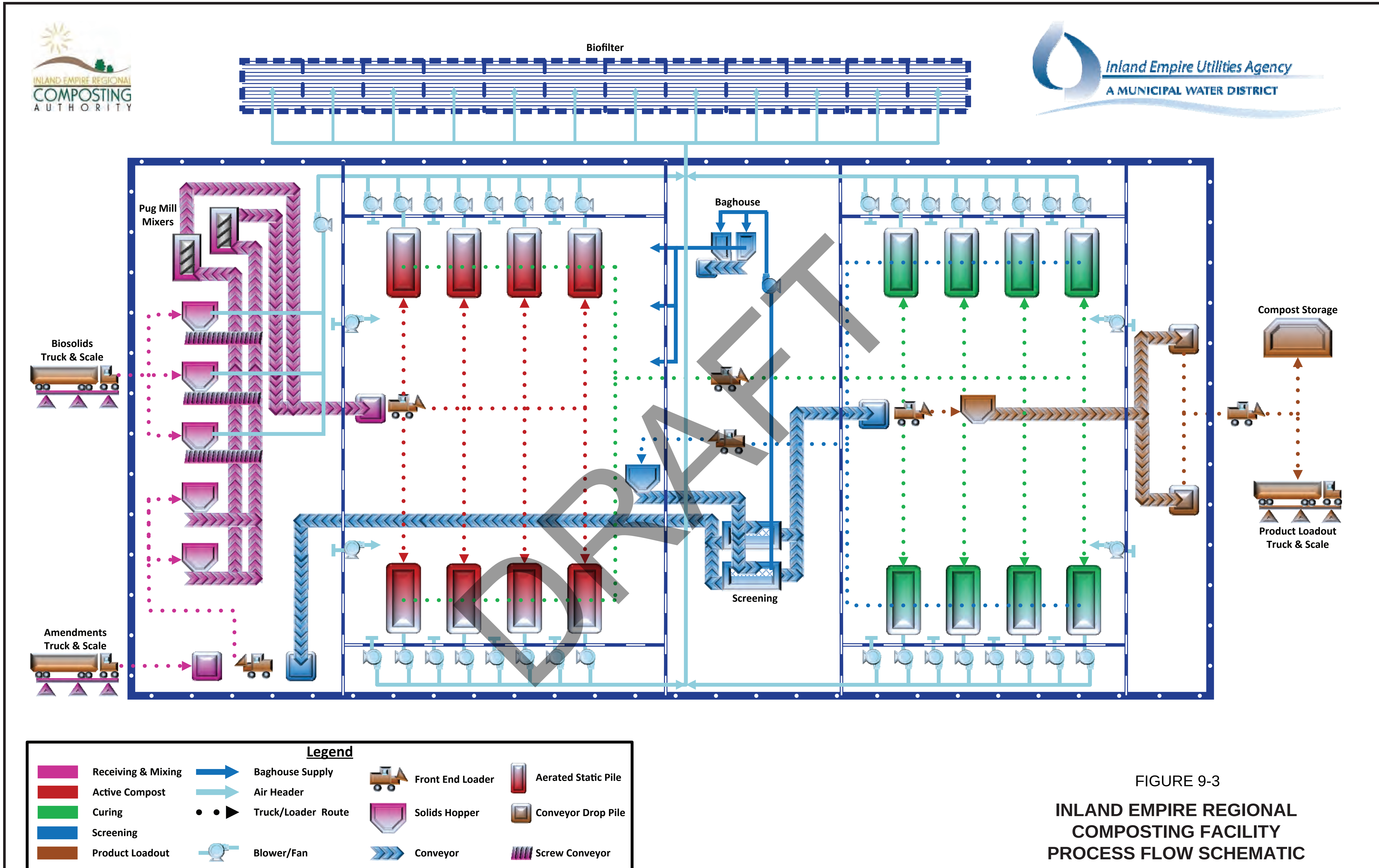


FIGURE 9-3

INLAND EMPIRE REGIONAL COMPOSTING FACILITY PROCESS FLOW SCHEMATIC

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-1-14F1-8-9370A00.AI

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5.2 RP-5/RP-2 Solids Handling Facilities

The RP-2 solids handling facilities will be relocated to the RP-5 site by 2035 to meet biosolids management needs for the southern part of the service area. As discussed in Section 4.2, the existing RP-2 solids handling capacity is limited to 18 mgd due to digestion capacity limitations with one digester out of service. As presented in Table 9-1, the projected influent flow to RP-5 and CCWRF is approximately 25.7 mgd by 2035 and 33.2 mgd by 2060. Thus, the solids handling facilities do not have adequate capacity to accommodate either the 2035 or 2060 projected influent flows in the southern service area. RP-5 solids handling facilities expansion needs by 2035 include new thickening, anaerobic digestion, dewatering, digester gas storage and utilization, and odor control. Additional thickening and digestion capacity would be needed by 2060 to meet the projected demands.

The RP-5 solids handling facilities expansion needs for planning year 2035 and ultimate buildout year 2060 are summarized in Table 9-5 and Table 9-6, respectively. The ultimate site layout and estimated costs for the recommended improvements are presented in *TM 7 RP-5 and RP-2 Complex Future Plans.*

TABLE 9-5
RP-5 Solids Handling Facilities Expansion Needs for Planning Year 2035

Facility	Number of Units	Size of Unit
Gravity Thickener	3	45 ft diameter
DAF Thickener	3	40 ft diameter
Anaerobic Digestion		
Acid-Phase	6 Cells	20 ft^2, 30 ft sidewater depth per cell
Methane-Phase	4	90 ft diameter 35 ft sidewater depth
Sludge Holding Tank	1	90 ft diameter 35 ft sidewater depth
High-Pressure Gas Storage	1	35 ft diameter w/ 30 ft^2 equipment pad
Dewatering	1	100 ft x 150 ft building
Biofilter	3 Cells	60 ft x 80 ft per cell

TABLE 9-6
RP-5 Solids Handling Facilities Expansion Needs for Planning Year 2060

Facility	Number of Units	Size of Unit
Gravity Thickener	1	45 ft diameter
Anaerobic Digestion		
Acid-Phase	4 Cells	20 ft^2 30 ft sidewater depth per cell
Methane-Phase	1	90 ft diameter 35 ft sidewater depth

5.3 Inland Empire Regional Composting Facility

As shown in Table 9-1, the total projected biosolids quantities produced from the northern and southern service areas is approximately 198 wet tons per day by planning year 2035 and 241 wet tons per day by ultimate buildout year 2060. As described in Section 4.3, IEUA can contribute approximately 200 wet tons of biosolids per day to IERCF, based on the joint powers agreement between IEUA and the Sanitation Districts. Therefore, IERCF has adequate capacity to receive and process IEUA biosolids over the next 20 years.

The projected ultimate biosolids quantities in 2060 exceed the current permitted capacity of IERCF by approximately 40 wet tons per day, or 20 percent of the total IEUA daily biosolids production. The projection of biosolids quantities is based on a biosolids cake solids content of 24 percent. The biosolids quantities could be reduced if a higher solids content can be achieved. Additionally, the biosolids product markets in Southern California and its vicinity are still evolving and are subject to change. These product markets, in addition to composting, could include land application, heat drying to produce pellets, and pyrolysis or heat drying to generate energy. Given the changing nature of biosolids regulations and product markets, IEUA should consider these options at the time capacity expansion is needed.

IEUA may consider implementing different technologies such as heat drying for pellet production, similar to those installed at the City of Corona Plant 1 and Encina Water Pollution Control Facility in Carlsbad, both of which have been operational for over a decade. Irvine Ranch Water District is also currently constructing a heat drying facility at the Michelson Water Recycling Plant in Irvine. The new IEUA heat drying facility can be located either at RP-1 or RP-5 to reduce hauling costs.

IEUA may also consider diversifying biosolids management by contracting with private biosolids management companies who can utilize the excess 40 wet tons per day of biosolids for land application, composting, energy production, and other applications. With the biosolids management market changing rapidly, the Consultant Team recommends that IEUA explore these and other options to manage the 2060 projected biosolids quantities closer to this date.

6.0 Conclusion

Based on the projected plant influent flows and loads through 2060, the solids handling facilities at RP-1 and RP-5/RP-2 will need to be expanded to meet future demands in the northern and southern service areas, respectively. RP-1 solids handling will require the addition of anaerobic digesters by 2035, while the RP-2 solids handling facilities will need to be decommissioned and relocated to the RP-5 site by 2023 in anticipation of the USACE raising the Prado Spillway. RP-5 solids handling facilities expansion needs by 2035 include new thickening, anaerobic digestion, dewatering, digester gas storage and utilization, and odor control. Additional thickening and digestion capacity would be needed at RP-5 by 2060 to meet the projected demands in the southern service area.

As a result of the anticipated increased flows and loads to each plant, the estimated biosolids quantities from the northern and southern service areas are projected to reach up to 198 wet tons per day by 2035 and 241 wet tons per day by 2060. Since IEUA's capacity at IERCF is 200 wet tons of biosolids per day, IERCF has adequate capacity to receive and process IEUA biosolids over the next 20 years. However, the projected ultimate biosolids are expected to surpass the current permitted capacity of IERCF by 2060, at which time IEUA needs to explore additional biosolids management options. Options may include implementing technologies such as heat drying or improved dewatering technologies to produce dryer cake, or diversifying biosolids management by contracting with private companies for land application, composting, energy production, and other biosolids product markets.

7.0 References

Air Quality Management District (AQMD). 2010. *Facility Permit to Operate, Inland Empire Regional Composting Authority, Section H.* September.

APPENDIX I

Regional Alliance SB X7-7 Calculations

Deduct Recycled Water Use for Indirect Potable Reuse				
FYE	Total Groundwater Recharge	(1) 5-Year Average Recharge (Acre-Feet)	(2) Loss Factor for Recharge & Recovery	(1) x (2) = (3) Volume Entering Distribution System (Acre-Feet)
1995	0	0	0	0
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	0	0
1999	0	0	0	0
2000	0	0	0	0
2001	500.3	500.3	90%	450.27
2002	504.6	502.5	90%	452.21
2003	184.5	396.5	90%	356.82
2004	48.5	309.5	90%	278.53
2005	158.3	279.3	90%	251.33
2006	1,303.0	439.8	90%	395.81
2007	2,981.0	935.1	90%	841.56
2008	2,340.0	1,366.2	90%	1,229.55
2009	2,684.0	1,893.3	90%	1,703.94
2010	7,208.0	3,303.2	90%	2,972.88
2011	8,028.0	4,648.2	90%	4,183.38
2012	8,634.0	5,778.8	90%	5,200.92
2013	10,479.0	7,406.6	90%	6,665.94
2014	13,593.0	9,588.4	90%	8,629.56
2015	10,840.0	10,314.8	90%	9,283.32

Indirect Recycled Water (AFY)								
FYE	Chino	Chino Hills	Ontario	Upland	Fontana	SBC	CVWD	Montclair /MVWD
1995	0	0	0	0	0	0	0	0
1996	0	0	0	0	0	0	0	0
1997	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	0	0	0
2001	21.7	0	0	0	0	0	0	29.3
2002	16.8	0	94.2	0.007	0	0	0	36.4
2003	13.0	0	75.3	0	0	0	0	28.9
2004	9.6	0	44.1	0	0	0	0	20.0
2005	8.9	0	42.0	0	0	0	0	15.7
2006	14.6	0	73.1	0	0	0	0	21.0
2007	43.5	7.8	136.7	0	0	0	0	57.0
2008	68.1	20.3	233.9	0	0	0	59.5	127.5
2009	119.4	28.4	447.5	0	0	0	37.3	218.6
2010	202.7	37.3	662.3	80.3	849.4	0	500.2	409.6
2011	268.8	74.1	725.0	27.1	966.4	0	747.8	443.0
2012	379.3	172.2	925.2	25.4	1388.0	0	721.7	508.8
2013	379.0	169.2	1122.8	127.3	1812.4	0	1011.5	557.3
2014	415.4	132.1	1341.8	174.3	949.8	0	995.8	773.4
2015	445.1	199.0	1193.8	234.0	914.2	0	992.6	576.0

City of Chino Hills

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	20,782	Acre Feet
	2008 total volume of delivered recycled water	1,479	Acre Feet
	2008 recycled water as a percent of total deliveries	7.12%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1995	
	Year ending baseline period range[2]	2004	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2005	
	Year ending baseline period range[3]	2009	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☑	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1995	50,527
Year 2	1996	53,063
Year 3	1997	56,083
Year 4	1998	59,546
Year 5	1999	63,399
Year 6	2000	66,787
Year 7	2001	68,124
Year 8	2002	70,488
Year 9	2003	71,854
Year 10	2004	74,809
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2005	71,854
Year 2	2006	74,809
Year 3	2007	75,414
Year 4	2008	74,943
Year 5	2009	75,168
2015 Compliance Year Population		
2015		77,596
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
	Baseline Year *Fm SB X7-7 Table 3*	Volume Into Distribution System *Fm SB X7-7 Table(s) 4-A*	Deductions					Annual Gross Water Use
			Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	13000			0		0	13,000
Year 2	1996	14151			0		0	14,151
Year 3	1997	14649			0		0	14,649
Year 4	1998	13178			0		0	13,178
Year 5	1999	15246			0		0	15,246
Year 6	2000	17241			0		0	17,241
Year 7	2001	15911			0		0	15,911
Year 8	2002	16707			0		0	16,707
Year 9	2003	15795			0		0	15,795
Year 10	2004	17339			0		0	17,339
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**15,322**
5 Year Baseline - Gross Water Use								
Year 1	2005	15,795			0		0	15,795
Year 2	2006	17,339			0		0	17,339
Year 3	2007	15,953			8		0	15,945
Year 4	2008	16,398			20		0	16,378
Year 5	2009	18,700			28		0	18,672
5 year baseline average gross water use								**16,826**
2015 Compliance Year - Gross Water Use								
2015		14,260			199		0	14,061
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	Chino Hills Wells

This water source is:

- [x] The supplier's own water source
- [ ] A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	3437		3,437
Year 2	1996	4075		4,075
Year 3	1997	1941		1,941
Year 4	1998	2909		2,909
Year 5	1999	4404		4,404
Year 6	2000	4257		4,257
Year 7	2001	4239		4,239
Year 8	2002	3605		3,605
Year 9	2003	2027		2,027
Year 10	2004	2416		2,416
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	2027		2,027
Year 2	2006	2416		2,416
Year 3	2007	2477		2,477
Year 4	2008	852		852
Year 5	2009	2010		2,010
2015 Compliance Year - Water into Distribution System				
2015		2904		2,904

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		CDA&MVWD&WFA		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	9563		9,563
Year 2	1996	10076		10,076
Year 3	1997	12708		12,708
Year 4	1998	10269		10,269
Year 5	1999	10842		10,842
Year 6	2000	12984		12,984
Year 7	2001	11672		11,672
Year 8	2002	13102		13,102
Year 9	2003	13768		13,768
Year 10	2004	14923		14,923
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	13768		13,768
Year 2	2006	14923		14,923
Year 3	2007	13476		13,476
Year 4	2008	15546		15,546
Year 5	2009	16690		16,690
2015 Compliance Year - Water into Distribution System				
2015		11,356		11,356
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
Baseline Year *Fm SB X7-7 Table 3*		Surface Reservoir Augmentation					Groundwater Recharge			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1995			0		0	0		0	0
Year 2	1996			0		0	0		0	0
Year 3	1997			0		0	0		0	0
Year 4	1998			0		0	0		0	0
Year 5	1999			0		0	0		0	0
Year 6	2000			0		0	0		0	0
Year 7	2001			0		0	0		0	0
Year 8	2002			0		0	0		0	0
Year 9	2003			0		0	0		0	0
Year 10	2004			0		0	0		0	0
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2005			0		0	0		0	0
Year 2	2006			0		0	0		0	0
Year 3	2007			0		0	7.751145		8	8
Year 4	2008			0		0	20.309346		20	20
Year 5	2009			0		0	28.36353		28	28
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	198.95118		199	199
**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*										
NOTES:										

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility					
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use					
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	13,000		0%	NO
Year 2	1996	14,151		0%	NO
Year 3	1997	14,649		0%	NO
Year 4	1998	13,178		0%	NO
Year 5	1999	15,246		0%	NO
Year 6	2000	17,241		0%	NO
Year 7	2001	15,911		0%	NO
Year 8	2002	16,707		0%	NO
Year 9	2003	15,795		0%	NO
Year 10	2004	17,339		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2005	15,795		0%	NO
Year 2	2006	17,339		0%	NO
Year 3	2007	15,945		0%	NO
Year 4	2008	16,378		0%	NO
Year 5	2009	18,672		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		14,061		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility

Criteria 2

Industrial water use is equal to or greater than 15 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995		50,527	0	NO
Year 2	1996		53,063	0	NO
Year 3	1997		56,083	0	NO
Year 4	1998		59,546	0	NO
Year 5	1999		63,399	0	NO
Year 6	2000		66,787	0	NO
Year 7	2001		68,124	0	NO
Year 8	2002		70,488	0	NO
Year 9	2003		71,854	0	NO
Year 10	2004		74,809	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2005		71,854	0	NO
Year 2	2006		74,809	0	NO
Year 3	2007		75,414	0	NO
Year 4	2008		74,943	0	NO
Year 5	2009		75,168	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			77,596	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility

Criteria 3

Non-industrial use is equal to or less than 120 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	13,000		13,000	50,527	230	NO
Year 2	1996	14,151		14,151	53,063	238	NO
Year 3	1997	14,649		14,649	56,083	233	NO
Year 4	1998	13,178		13,178	59,546	198	NO
Year 5	1999	15,246		15,246	63,399	215	NO
Year 6	2000	17,241		17,241	66,787	230	NO
Year 7	2001	15,911		15,911	68,124	209	NO
Year 8	2002	16,707		16,707	70,488	212	NO
Year 9	2003	15,795		15,795	71,854	196	NO
Year 10	2004	17,339		17,339	74,809	207	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2005	15,795		15,795	71,854	196	NO
Year 2	2006	17,339		17,339	74,809	207	NO
Year 3	2007	15,945		15,945	75,414	189	NO
Year 4	2008	16,378		16,378	74,943	195	NO
Year 5	2009	18,672		18,672	75,168	222	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		14,061		14,061	77,596	162	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility				
Criteria 4 Disadvantaged Community *Use IRWM DAC Mapping tool* http://www.water.ca.gov/irwm/grants/resources_dac.cfm				
California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046	$93,322	176%	NO
A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.				
NOTES:				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	50,527	13,000	230
Year 2	1996	53,063	14,151	238
Year 3	1997	56,083	14,649	233
Year 4	1998	59,546	13,178	198
Year 5	1999	63,399	15,246	215
Year 6	2000	66,787	17,241	230
Year 7	2001	68,124	15,911	209
Year 8	2002	70,488	16,707	212
Year 9	2003	71,854	15,795	196
Year 10	2004	74,809	17,339	207
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**217**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2005	71,854	15,795	196
Year 2	2006	74,809	17,339	207
Year 3	2007	75,414	15,945	189
Year 4	2008	74,943	16,378	195
Year 5	2009	75,168	18,672	222
5 Year Average Baseline GPCD				**202**
2015 Compliance Year GPCD				
2015		77,596	14,061	162
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	217
5 Year Baseline GPCD	202
2015 Compliance Year GPCD	162
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
217	173
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Water Use	Target Landscape

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
202	192	173	173
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
173	217	195
NOTES:		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
162	195	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	161.7724547	161.7724547	YES
NOTES:								

City of Chino

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	21,963	Acre Feet
	2008 total volume of delivered recycled water	4,574	Acre Feet
	2008 recycled water as a percent of total deliveries	20.82%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1995	
	Year ending baseline period range[2]	2004	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2004	
	Year ending baseline period range[3]	2008	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☑	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1995	52,082
Year 2	1996	52,833
Year 3	1997	53,584
Year 4	1998	54,335
Year 5	1999	55,086
Year 6	2000	55,837
Year 7	2001	56,927
Year 8	2002	58,018
Year 9	2003	59,108
Year 10	2004	60,199
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2004	60,199
Year 2	2005	61,290
Year 3	2006	62,380
Year 4	2007	63,471
Year 5	2008	64,561
2015 Compliance Year Population		
2015		73,966
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
	Baseline Year *Fm SB X7-7 Table 3*	**Volume Into Distribution System** *Fm SB X7-7 Table(s) 4-A*	**Deductions**					**Annual Gross Water Use**
			Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	13109.15			0		0	13,109
Year 2	1996	14847.84			0		0	14,848
Year 3	1997	14938.3			0		0	14,938
Year 4	1998	13077.37			0		0	13,077
Year 5	1999	14687.03			0		0	14,687
Year 6	2000	15144.97			0		0	15,145
Year 7	2001	14569.69			22		0	14,548
Year 8	2002	15574.03			17		0	15,557
Year 9	2003	15220.38			13		0	15,207
Year 10	2004	15630.3			10		0	15,621
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**14,674**
5 Year Baseline - Gross Water Use								
Year 1	2004	15,630			10		0	15,621
Year 2	2005	15,644			9		0	15,635
Year 3	2006	16,306			15		0	16,291
Year 4	2007	17,963			43		0	17,919
Year 5	2008	17,390			68		0	17,322
5 year baseline average gross water use								**16,558**
2015 Compliance Year - Gross Water Use								
2015		13,433			445		0	12,988

* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	City Wells
This water source is:	
☑	The supplier's own water source
☐	A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	8728.2		8,728
Year 2	1996	10163.88		10,164
Year 3	1997	10230.29		10,230
Year 4	1998	9508.74		9,509
Year 5	1999	10124.16		10,124
Year 6	2000	9693.85		9,694
Year 7	2001	6118.47		6,118
Year 8	2002	6552.03		6,552
Year 9	2003	5867.05		5,867
Year 10	2004	6316.8		6,317
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	6316.8		6,317
Year 2	2005	5749.56		5,750
Year 3	2006	7159.06		7,159
Year 4	2007	8479.44		8,479
Year 5	2008	8315.93		8,316
2015 Compliance Year - Water into Distribution System				
2015		5873.13		5,873

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		WFA (+ Desalter after 2000)		
This water source is:				
☐	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	4380.95		4,381
Year 2	1996	4683.96		4,684
Year 3	1997	4708.01		4,708
Year 4	1998	3568.63		3,569
Year 5	1999	4562.87		4,563
Year 6	2000	5451.12		5,451
Year 7	2001	8451.22		8,451
Year 8	2002	9022		9,022
Year 9	2003	9353.33		9,353
Year 10	2004	9313.5		9,314
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	9313.5		9,314
Year 2	2005	9894.43		9,894
Year 3	2006	9146.7		9,147
Year 4	2007	9483.41		9,483
Year 5	2008	9073.94		9,074
2015 Compliance Year - Water into Distribution System				
2015		7,560		7,560
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
		Surface Reservoir Augmentation					Groundwater Recharge			
Baseline Year *Fm SB X7-7 Table 3*		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1995			0		0	0		0	0
Year 2	1996			0		0	0		0	0
Year 3	1997			0		0	0		0	0
Year 4	1998			0		0	0		0	0
Year 5	1999			0		0	0		0	0
Year 6	2000			0		0	0		0	0
Year 7	2001			0		0	21.681055		22	22
Year 8	2002			0		0	16.805562		17	17
Year 9	2003			0		0	13.040127		13	13
Year 10	2004			0		0	9.628067		10	10
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2004			0		0	9.628067		10	10
Year 2	2005			0		0	8.8520515		9	9
Year 3	2006			0		0	14.560783		15	15
Year 4	2007			0		0	43.485567		43	43
Year 5	2008			0		0	68.070581		68	68
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	445.12218		445	445

**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility

Criteria 1
Industrial water use is equal to or greater than 12% of gross water use

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	13,109		0%	NO
Year 2	1996	14,848		0%	NO
Year 3	1997	14,938		0%	NO
Year 4	1998	13,077		0%	NO
Year 5	1999	14,687		0%	NO
Year 6	2000	15,145		0%	NO
Year 7	2001	14,548		0%	NO
Year 8	2002	15,557		0%	NO
Year 9	2003	15,207		0%	NO
Year 10	2004	15,621		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	15,621		0%	NO
Year 2	2005	15,635		0%	NO
Year 3	2006	16,291		0%	NO
Year 4	2007	17,919		0%	NO
Year 5	2008	17,322		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		12,988		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility

Criteria 2

Industrial water use is equal to or greater than 15 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995		52,082	0	NO
Year 2	1996		52,833	0	NO
Year 3	1997		53,584	0	NO
Year 4	1998		54,335	0	NO
Year 5	1999		55,086	0	NO
Year 6	2000		55,837	0	NO
Year 7	2001		56,927	0	NO
Year 8	2002		58,018	0	NO
Year 9	2003		59,108	0	NO
Year 10	2004		60,199	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004		60,199	0	NO
Year 2	2005		61,290	0	NO
Year 3	2006		62,380	0	NO
Year 4	2007		63,471	0	NO
Year 5	2008		64,561	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			73,966	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility

Criteria 3

Non-industrial use is equal to or less than 120 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	13,109		13,109	52,082	225	NO
Year 2	1996	14,848		14,848	52,833	251	NO
Year 3	1997	14,938		14,938	53,584	249	NO
Year 4	1998	13,077		13,077	54,335	215	NO
Year 5	1999	14,687		14,687	55,086	238	NO
Year 6	2000	15,145		15,145	55,837	242	NO
Year 7	2001	14,548		14,548	56,927	228	NO
Year 8	2002	15,557		15,557	58,018	239	NO
Year 9	2003	15,207		15,207	59,108	230	NO
Year 10	2004	15,621		15,621	60,199	232	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2004	15,621		15,621	60,199	232	NO
Year 2	2005	15,635		15,635	61,290	228	NO
Year 3	2006	16,291		16,291	62,380	233	NO
Year 4	2007	17,919		17,919	63,471	252	NO
Year 5	2008	17,322		17,322	64,561	240	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		12,988		12,988	73,966	157	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility				
Criteria 4 Disadvantaged Community *Use IRWM DAC Mapping tool* http://www.water.ca.gov/irwm/grants/resources_dac.cfm				
California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES
A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.				
NOTES:				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	52,082	13,109	225
Year 2	1996	52,833	14,848	251
Year 3	1997	53,584	14,938	249
Year 4	1998	54,335	13,077	215
Year 5	1999	55,086	14,687	238
Year 6	2000	55,837	15,145	242
Year 7	2001	56,927	14,548	228
Year 8	2002	58,018	15,557	239
Year 9	2003	59,108	15,207	230
Year 10	2004	60,199	15,621	232
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**235**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2004	60,199	15,621	232
Year 2	2005	61,290	15,635	228
Year 3	2006	62,380	16,291	233
Year 4	2007	63,471	17,919	252
Year 5	2008	64,561	17,322	240
5 Year Average Baseline GPCD				**237**
2015 Compliance Year GPCD				
2015		73,966	12,988	157
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	235
5 Year Baseline GPCD	237
2015 Compliance Year GPCD	157
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
235	188
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Target Landscape Water Use

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
237	225	188	188
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
188	235	211
NOTES:		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
157	211	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	156.7550549	156.7550549	YES
NOTES:								

Cucamonga Valley Water District

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	58,131	Acre Feet
	2008 total volume of delivered recycled water	635	Acre Feet
	2008 recycled water as a percent of total deliveries	1.09%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1995	
	Year ending baseline period range[2]	2004	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2004	
	Year ending baseline period range[3]	2008	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☑	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population

Year		Population
10 to 15 Year Baseline Population		
Year 1	1995	132,882
Year 2	1996	135,001
Year 3	1997	136,874
Year 4	1998	139,556
Year 5	1999	143,175
Year 6	2000	148,159
Year 7	2001	152,221
Year 8	2002	161,267
Year 9	2003	166,359
Year 10	2004	170,784
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2004	170,784
Year 2	2005	179,523
Year 3	2006	182,035
Year 4	2007	184,369
Year 5	2008	184,669
2015 Compliance Year Population		
2015		200,466
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
			Deductions					
	Baseline Year *Fm SB X7-7 Table 3*	**Volume Into Distribution System** *Fm SB X7-7 Table(s) 4-A*	Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	**Annual Gross Water Use**
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	42131.565			0	0	0	42,132
Year 2	1996	45476.188			0	0	0	45,476
Year 3	1997	47218.695			0	0	0	47,219
Year 4	1998	41864.75			0	0	0	41,865
Year 5	1999	49409.59			0	0	0	49,410
Year 6	2000	50716.806			0	0	0	50,717
Year 7	2001	48062.783			0	0	0	48,063
Year 8	2002	52409.177			0	0	0	52,409
Year 9	2003	51899.242			0	0	0	51,899
Year 10	2004	54825.81			0	0	0	54,826
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**48,401**
5 Year Baseline - Gross Water Use								
Year 1	2004	54,826			0	0	0	54,826
Year 2	2005	55,933			0	0	0	55,933
Year 3	2006	57,977			0	0	0	57,977
Year 4	2007	61,035			0	0	0	61,035
Year 5	2008	57,496			60	0	0	57,436
5 year baseline average gross water use								**57,441**
2015 Compliance Year - Gross Water Use								
2015		41,443			993	0	0	40,451
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	Chino Basin Groundwater			
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	6297.41		6,297
Year 2	1996	7311.11		7,311
Year 3	1997	7764.41		7,764
Year 4	1998	5101.37		5,101
Year 5	1999	7737.49		7,737
Year 6	2000	6194.88		6,195
Year 7	2001	6899		6,899
Year 8	2002	10579.92		10,580
Year 9	2003	10020.304		10,020
Year 10	2004	12581.751		12,582
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	12581.751		12,582
Year 2	2005	13328.276		13,328
Year 3	2006	16814.099		16,814
Year 4	2007	16781.12		16,781
Year 5	2008	19231.97		19,232
2015 Compliance Year - Water into Distribution System				
2015		18759.78		18,760

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		Cucamonga Basin Groundwater		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	14199.855		14,200
Year 2	1996	15319.183		15,319
Year 3	1997	14179.856		14,180
Year 4	1998	9764.375		9,764
Year 5	1999	13660.961		13,661
Year 6	2000	10641.854		10,642
Year 7	2001	6604.26		6,604
Year 8	2002	6718.98		6,719
Year 9	2003	5051.103		5,051
Year 10	2004	6714.296		6,714
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	6714.296		6,714
Year 2	2005	7518.004		7,518
Year 3	2006	6497.16		6,497
Year 4	2007	5019.25		5,019
Year 5	2008	4450.11		4,450
2015 Compliance Year - Water into Distribution System				
2015		8,439		8,439
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		Imported Water (State Project Water)		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	12412.209		12,412
Year 2	1996	16932.2		16,932
Year 3	1997	18586.51		18,587
Year 4	1998	17419.051		17,419
Year 5	1999	21853.883		21,854
Year 6	2000	29459.588		29,460
Year 7	2001	28904.505		28,905
Year 8	2002	32635.129		32,635
Year 9	2003	33328.97		33,329
Year 10	2004	33638.094		33,638
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	33638.094		33,638
Year 2	2005	28108.628		28,109
Year 3	2006	29318.496		29,318
Year 4	2007	36040.672		36,041
Year 5	2008	28550.894		28,551
2015 Compliance Year - Water into Distribution System				
2015		13,195		13,195

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		Cucamonga Canyon Water		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	0		0
Year 2	1996	0		0
Year 3	1997	586.091		586
Year 4	1998	1612.307		1,612
Year 5	1999	1664.435		1,664
Year 6	2000	1053.084		1,053
Year 7	2001	1648.199		1,648
Year 8	2002	491.737		492
Year 9	2003	958.017		958
Year 10	2004	410.182		410
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	410.182		410
Year 2	2005	0		0
Year 3	2006	0		0
Year 4	2007	141.439		141
Year 5	2008	1700.365		1,700
2015 Compliance Year - Water into Distribution System				
2015		363		363

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		Deer Canyon Water		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	2355.313		2,355
Year 2	1996	1090.817		1,091
Year 3	1997	1033.13		1,033
Year 4	1998	2027.55		2,028
Year 5	1999	640.11		640
Year 6	2000	503.8		504
Year 7	2001	578.9		579
Year 8	2002	208.5		209
Year 9	2003	453.01		453
Year 10	2004	248.79		249
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	248.79		249
Year 2	2005	603.33		603
Year 3	2006	186.89		187
Year 4	2007	73.37		73
Year 5	2008	77.66		78
2015 Compliance Year - Water into Distribution System				
2015		189		189

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		Day/East Canyon Water		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	6866.778		6,867
Year 2	1996	4822.878		4,823
Year 3	1997	5068.698		5,069
Year 4	1998	5940.097		5,940
Year 5	1999	3852.711		3,853
Year 6	2000	2863.6		2,864
Year 7	2001	3427.919		3,428
Year 8	2002	1774.911		1,775
Year 9	2003	2087.838		2,088
Year 10	2004	1232.697		1,233
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	1232.697		1,233
Year 2	2005	6374.311		6,374
Year 3	2006	5160.607		5,161
Year 4	2007	2979.49		2,979
Year 5	2008	3484.717		3,485
2015 Compliance Year - Water into Distribution System				
2015		498		498
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
Baseline Year *Fm SB X7-7 Table 3*		Surface Reservoir Augmentation					Groundwater Recharge			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1995			0		0	0		0	0
Year 2	1996			0		0	0		0	0
Year 3	1997			0		0	0		0	0
Year 4	1998			0		0	0		0	0
Year 5	1999			0		0	0		0	0
Year 6	2000			0		0	0		0	0
Year 7	2001			0		0	0		0	0
Year 8	2002			0		0	0		0	0
Year 9	2003			0		0	0		0	0
Year 10	2004			0		0	0		0	0
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2004			0		0	0		0	0
Year 2	2005			0		0	0		0	0
Year 3	2006			0		0	0		0	0
Year 4	2007			0		0	0		0	0
Year 5	2008			0		0	59.538843		60	60
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	992.64589		993	993

**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility

Criteria 1
Industrial water use is equal to or greater than 12% of gross water use

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	42,132		0%	NO
Year 2	1996	45,476		0%	NO
Year 3	1997	47,219		0%	NO
Year 4	1998	41,865		0%	NO
Year 5	1999	49,410		0%	NO
Year 6	2000	50,717		0%	NO
Year 7	2001	48,063		0%	NO
Year 8	2002	52,409		0%	NO
Year 9	2003	51,899		0%	NO
Year 10	2004	54,826		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	54,826		0%	NO
Year 2	2005	55,933		0%	NO
Year 3	2006	57,977		0%	NO
Year 4	2007	61,035		0%	NO
Year 5	2008	57,436		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		40,451		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility					
Criteria 2 Industrial water use is equal to or greater than 15 GPCD					
Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995		132,882	0	NO
Year 2	1996		135,001	0	NO
Year 3	1997		136,874	0	NO
Year 4	1998		139,556	0	NO
Year 5	1999		143,175	0	NO
Year 6	2000		148,159	0	NO
Year 7	2001		152,221	0	NO
Year 8	2002		161,267	0	NO
Year 9	2003		166,359	0	NO
Year 10	2004		170,784	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004		170,784	0	NO
Year 2	2005		179,523	0	NO
Year 3	2006		182,035	0	NO
Year 4	2007		184,369	0	NO
Year 5	2008		184,669	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			200,466	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	42,132		42,132	132,882	283	NO
Year 2	1996	45,476		45,476	135,001	301	NO
Year 3	1997	47,219		47,219	136,874	308	NO
Year 4	1998	41,865		41,865	139,556	268	NO
Year 5	1999	49,410		49,410	143,175	308	NO
Year 6	2000	50,717		50,717	148,159	306	NO
Year 7	2001	48,063		48,063	152,221	282	NO
Year 8	2002	52,409		52,409	161,267	290	NO
Year 9	2003	51,899		51,899	166,359	279	NO
Year 10	2004	54,826		54,826	170,784	287	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2004	54,826		54,826	170,784	287	NO
Year 2	2005	55,933		55,933	179,523	278	NO
Year 3	2006	57,977		57,977	182,035	284	NO
Year 4	2007	61,035		61,035	184,369	296	NO
Year 5	2008	57,436		57,436	184,669	278	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		40,451		40,451	200,466	180	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility					
Criteria 4 Disadvantaged Community *Use IRWM DAC Mapping tool* http://www.water.ca.gov/irwm/grants/resources_dac.cfm					
California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES
A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.				
NOTES:				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	132,882	42,132	283
Year 2	1996	135,001	45,476	301
Year 3	1997	136,874	47,219	308
Year 4	1998	139,556	41,865	268
Year 5	1999	143,175	49,410	308
Year 6	2000	148,159	50,717	306
Year 7	2001	152,221	48,063	282
Year 8	2002	161,267	52,409	290
Year 9	2003	166,359	51,899	279
Year 10	2004	170,784	54,826	287
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**291**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2004	170,784	54,826	287
Year 2	2005	179,523	55,933	278
Year 3	2006	182,035	57,977	284
Year 4	2007	184,369	61,035	296
Year 5	2008	184,669	57,436	278
5 Year Average Baseline GPCD				**284**
2015 Compliance Year GPCD				
2015		200,466	40,451	180
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	291
5 Year Baseline GPCD	284
2015 Compliance Year GPCD	180
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
291	233
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Water Use	Target Landscape

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
284	270	233	233
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
233	291	262
NOTES:		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
180	262	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	180.1412025	180.1412025	YES
NOTES:								

City of Fontana

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	47,525	Acre Feet
	2008 total volume of delivered recycled water	0	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1999	
	Year ending baseline period range[2]	2008	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2004	
	Year ending baseline period range[3]	2008	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		Population
10 to 15 Year Baseline Population		
Year 1	1999	153,528
Year 2	2000	160,195
Year 3	2001	166,092
Year 4	2002	172,765
Year 5	2003	182,178
Year 6	2004	187,554
Year 7	2005	194,082
Year 8	2006	199,419
Year 9	2007	200,401
Year 10	2008	200,517
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2004	187,554
Year 2	2005	194,082
Year 3	2006	199,419
Year 4	2007	200,401
Year 5	2008	200,517
2015 Compliance Year Population		
2015		215,520
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
			Deductions					
	Baseline Year *Fm SB X7-7 Table 3*	Volume Into Distribution System *Fm SB X7-7 Table(s) 4-A*	Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	Annual Gross Water Use
10 to 15 Year Baseline - Gross Water Use								
Year 1	1999	40984.07			0	0	0	40,984
Year 2	2000	39979.44			0	0	0	39,979
Year 3	2001	43001.41			0	0	0	43,001
Year 4	2002	42229.29			0	0	0	42,229
Year 5	2003	46608.59			0	0	0	46,609
Year 6	2004	43219.86			0	0	0	43,220
Year 7	2005	45081.9			0	0	0	45,082
Year 8	2006	48396.07			0	0	0	48,396
Year 9	2007	44771.52			0	0	0	44,772
Year 10	2008	42731.71			0	0	0	42,732
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**43,700**
5 Year Baseline - Gross Water Use								
Year 1	2004	43,220			0	0	0	43,220
Year 2	2005	45,082			0	0	0	45,082
Year 3	2006	48,396			0	0	0	48,396
Year 4	2007	44,772			0	0	0	44,772
Year 5	2008	42,732			0	0	0	42,732
5 year baseline average gross water use								**44,840**
2015 Compliance Year - Gross Water Use								
2015		34,241			914	0	0	33,326
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source		Source 1- Wells + Surface		
This water source is:				
☐	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1999	40982.12		40,982
Year 2	2000	39908.71		39,909
Year 3	2001	42885.7		42,886
Year 4	2002	41779.7		41,780
Year 5	2003	46228.56		46,229
Year 6	2004	42822.76		42,823
Year 7	2005	44626.07		44,626
Year 8	2006	48282.57		48,283
Year 9	2007	44625.72		44,626
Year 10	2008	37090.5		37,091
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	42822.76		42,823
Year 2	2005	44626.07		44,626
Year 3	2006	48282.57		48,283
Year 4	2007	44625.72		44,626
Year 5	2008	37090.5		37,091
2015 Compliance Year - Water into Distribution System				
2015		26405.362		26,405

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		Source 2 - Imported		
This water source is:				
☐	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1999	1.95		2
Year 2	2000	70.73		71
Year 3	2001	115.71		116
Year 4	2002	449.59		450
Year 5	2003	380.03		380
Year 6	2004	397.1		397
Year 7	2005	455.83		456
Year 8	2006	113.5		114
Year 9	2007	145.8		146
Year 10	2008	5641.21		5,641
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	397.1		397
Year 2	2005	455.83		456
Year 3	2006	113.5		114
Year 4	2007	145.8		146
Year 5	2008	5641.21		5,641
2015 Compliance Year - Water into Distribution System				
2015		7,835		7,835
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
Baseline Year *Fm SB X7-7 Table 3*		Surface Reservoir Augmentation					Groundwater Recharge			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1999			0		0	0		0	0
Year 2	2000			0		0	0		0	0
Year 3	2001			0		0	0		0	0
Year 4	2002			0		0	0		0	0
Year 5	2003			0		0	0		0	0
Year 6	2004			0		0	0		0	0
Year 7	2005			0		0	0		0	0
Year 8	2006			0		0	0		0	0
Year 9	2007			0		0	0		0	0
Year 10	2008			0		0	0		0	0
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2004			0		0	0		0	0
Year 2	2005			0		0	0		0	0
Year 3	2006			0		0	0		0	0
Year 4	2007			0		0	0		0	0
Year 5	2008			0		0	0		0	0
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	914.17455		914	914
**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*										
NOTES:										

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility					
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use					
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1999	40,984		0%	NO
Year 2	2000	39,979		0%	NO
Year 3	2001	43,001		0%	NO
Year 4	2002	42,229		0%	NO
Year 5	2003	46,609		0%	NO
Year 6	2004	43,220		0%	NO
Year 7	2005	45,082		0%	NO
Year 8	2006	48,396		0%	NO
Year 9	2007	44,772		0%	NO
Year 10	2008	42,732		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	43,220		0%	NO
Year 2	2005	45,082		0%	NO
Year 3	2006	48,396		0%	NO
Year 4	2007	44,772		0%	NO
Year 5	2008	42,732		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		33,326		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1999		153,528	0	NO
Year 2	2000		160,195	0	NO
Year 3	2001		166,092	0	NO
Year 4	2002		172,765	0	NO
Year 5	2003		182,178	0	NO
Year 6	2004		187,554	0	NO
Year 7	2005		194,082	0	NO
Year 8	2006		199,419	0	NO
Year 9	2007		200,401	0	NO
Year 10	2008		200,517	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004		187,554	0	NO
Year 2	2005		194,082	0	NO
Year 3	2006		199,419	0	NO
Year 4	2007		200,401	0	NO
Year 5	2008		200,517	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			215,520	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1999	40,984		40,984	153,528	238	NO
Year 2	2000	39,979		39,979	160,195	223	NO
Year 3	2001	43,001		43,001	166,092	231	NO
Year 4	2002	42,229		42,229	172,765	218	NO
Year 5	2003	46,609		46,609	182,178	228	NO
Year 6	2004	43,220		43,220	187,554	206	NO
Year 7	2005	45,082		45,082	194,082	207	NO
Year 8	2006	48,396		48,396	199,419	217	NO
Year 9	2007	44,772		44,772	200,401	199	NO
Year 10	2008	42,732		42,732	200,517	190	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2004	43,220		43,220	187,554	206	NO
Year 2	2005	45,082		45,082	194,082	207	NO
Year 3	2006	48,396		48,396	199,419	217	NO
Year 4	2007	44,772		44,772	200,401	199	NO
Year 5	2008	42,732		42,732	200,517	190	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		33,326		33,326	215,520	138	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility				
Criteria 4 Disadvantaged Community *Use IRWM DAC Mapping tool* http://www.water.ca.gov/irwm/grants/resources_dac.cfm				
California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES
A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.				
NOTES:				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1999	153,528	40,984	238
Year 2	2000	160,195	39,979	223
Year 3	2001	166,092	43,001	231
Year 4	2002	172,765	42,229	218
Year 5	2003	182,178	46,609	228
Year 6	2004	187,554	43,220	206
Year 7	2005	194,082	45,082	207
Year 8	2006	199,419	48,396	217
Year 9	2007	200,401	44,772	199
Year 10	2008	200,517	42,732	190
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**216**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2004	187,554	43,220	206
Year 2	2005	194,082	45,082	207
Year 3	2006	199,419	48,396	217
Year 4	2007	200,401	44,772	199
Year 5	2008	200,517	42,732	190
5 Year Average Baseline GPCD				**204**
2015 Compliance Year GPCD				
2015		215,520	33,326	138
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	216
5 Year Baseline GPCD	204
2015 Compliance Year GPCD	138
NOTES:	

SB X7-7 Table 7: 2020 Target Method
Select Only One

Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
216	173
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Water Use	Target Landscape

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
204	194	173	173

** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*

NOTES: Method 1

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
173	216	194
NOTES:		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
138	194	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	138.046896	138.046896	YES
NOTES:								

Monte Vista Water District

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	12,247	Acre Feet
	2008 total volume of delivered recycled water	0	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1996	
	Year ending baseline period range[2]	2005	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2004	
	Year ending baseline period range[3]	2008	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	1996	47,150
Year 2	1997	47,225
Year 3	1998	47,300
Year 4	1999	48,900
Year 5	2000	48,934
Year 6	2001	49,200
Year 7	2002	50,020
Year 8	2003	50,520
Year 9	2004	50,520
Year 10	2005	51,230
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2004	50,520
Year 2	2005	51,230
Year 3	2006	53,690
Year 4	2007	53,943
Year 5	2008	54,593
2015 Compliance Year Population		
2015		56,039
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
	Baseline Year *Fm SB X7-7 Table 3*	**Volume Into Distribution System** *Fm SB X7-7 Table(s) 4-A*	**Deductions**					**Annual Gross Water Use**
			Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1996	10708	0		0	0	0	10,708
Year 2	1997	11831.94	0		0	0	0	11,832
Year 3	1998	10146.31	0		0	0	0	10,146
Year 4	1999	11007	396		0	0	0	10,611
Year 5	2000	24547	12,624		0	0	0	11,923
Year 6	2001	21509.7278	9,775		29	0	0	11,705
Year 7	2002	23385.873	11,360		36	0	0	11,990
Year 8	2003	23783.3027	11,831		29	0	0	11,923
Year 9	2004	25468.5689	13,008		20	0	0	12,441
Year 10	2005	22926.5727	12,040		16	0	0	10,871
Year 11	0	0			0		0	
Year 12	0	0			0		0	
Year 13	0	0			0		0	
Year 14	0	0			0		0	
Year 15	0	0			0		0	
10 - 15 year baseline average gross water use								**11,415**
5 Year Baseline - Gross Water Use								
Year 1	2004	25,469	13,008		20	0	0	12,441
Year 2	2005	22,927	12,040		16	0	0	10,871
Year 3	2006	25,434	13,930		21	0	0	11,484
Year 4	2007	25,804	13,428	107	57	0	0	12,211
Year 5	2008	26,078	12,614	1,217	128	0	0	12,119
5 year baseline average gross water use								**11,825**
2015 Compliance Year - Gross Water Use								
2015		17,160	8,050		576	0	0	8,534
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source		Chino Basin Groundwater		
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	6902		6,902
Year 2	1997	9117.01		9,117
Year 3	1998	6828.21		6,828
Year 4	1999	8647		8,647
Year 5	2000	9312		9,312
Year 6	2001	10508.54		10,509
Year 7	2002	13418.44		13,418
Year 8	2003	13283.27		13,283
Year 9	2004	13049.62		13,050
Year 10	2005	10298.94		10,299
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	13049.62		13,050
Year 2	2005	10298.94		10,299
Year 3	2006	8535.22		8,535
Year 4	2007	11619.91		11,620
Year 5	2008	14250.45		14,250
2015 Compliance Year - Water into Distribution System				
2015		8405.58508		8,406

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source	Water Facilities Authority		
This water source is:			
☐	The supplier's own water source		
☑	A purchased or imported source		

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	3806		3,806
Year 2	1997	2714.93		2,715
Year 3	1998	3318.1		3,318
Year 4	1999	2360		2,360
Year 5	2000	15235		15,235
Year 6	2001	11001.1878		11,001
Year 7	2002	9967.433		9,967
Year 8	2003	10500.0327		10,500
Year 9	2004	12418.9489		12,419
Year 10	2005	12627.6327		12,628
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	12418.9489		12,419
Year 2	2005	12627.6327		12,628
Year 3	2006	16898.8515		16,899
Year 4	2007	14183.698		14,184
Year 5	2008	11827.2141		11,827
2015 Compliance Year - Water into Distribution System				
2015		8,144		8,144

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		San Antonio Water Company		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	0		0
Year 2	1997	0		0
Year 3	1998	0		0
Year 4	1999	0		0
Year 5	2000	0		0
Year 6	2001	0		0
Year 7	2002	0		0
Year 8	2003	0		0
Year 9	2004	0		0
Year 10	2005	0		0
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2004	0		0
Year 2	2005	0		0
Year 3	2006	0		0
Year 4	2007	0		0
Year 5	2008	0		0
2015 Compliance Year - Water into Distribution System				
2015		611		611

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
Baseline Year *Fm SB X7-7 Table 3*		Surface Reservoir Augmentation					Groundwater Recharge			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1996			0		0	0		0	0
Year 2	1997			0		0	0		0	0
Year 3	1998			0		0	0		0	0
Year 4	1999			0		0	0		0	0
Year 5	2000			0		0	0		0	0
Year 6	2001			0		0	29.298572		29	29
Year 7	2002			0		0	36.438494		36	36
Year 8	2003			0		0	28.922761		29	29
Year 9	2004			0		0	19.997229		20	20
Year 10	2005			0		0	15.726631		16	16
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2004			0		0	19.997229		20	20
Year 2	2005			0		0	15.726631		16	16
Year 3	2006			0		0	20.951633		21	21
Year 4	2007			0		0	57.023301		57	57
Year 5	2008			0		0	127.51217		128	128
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	575.95069		576	576
**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*										
NOTES:										

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility

Criteria 1

Industrial water use is equal to or greater than 12% of gross water use

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1996	10,708		0%	NO
Year 2	1997	11,832		0%	NO
Year 3	1998	10,146		0%	NO
Year 4	1999	10,611		0%	NO
Year 5	2000	11,923		0%	NO
Year 6	2001	11,705		0%	NO
Year 7	2002	11,990		0%	NO
Year 8	2003	11,923		0%	NO
Year 9	2004	12,441		0%	NO
Year 10	2005	10,871		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004	12,441		0%	NO
Year 2	2005	10,871		0%	NO
Year 3	2006	11,484		0%	NO
Year 4	2007	12,211		0%	NO
Year 5	2008	12,119		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		8,534		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility					
Criteria 2 Industrial water use is equal to or greater than 15 GPCD					
Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1996		47,150	0	NO
Year 2	1997		47,225	0	NO
Year 3	1998		47,300	0	NO
Year 4	1999		48,900	0	NO
Year 5	2000		48,934	0	NO
Year 6	2001		49,200	0	NO
Year 7	2002		50,020	0	NO
Year 8	2003		50,520	0	NO
Year 9	2004		50,520	0	NO
Year 10	2005		51,230	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2004		50,520	0	NO
Year 2	2005		51,230	0	NO
Year 3	2006		53,690	0	NO
Year 4	2007		53,943	0	NO
Year 5	2008		54,593	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			56,039	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1996	10,708		10,708	47,150	203	NO
Year 2	1997	11,832		11,832	47,225	224	NO
Year 3	1998	10,146		10,146	47,300	192	NO
Year 4	1999	10,611		10,611	48,900	194	NO
Year 5	2000	11,923		11,923	48,934	218	NO
Year 6	2001	11,705		11,705	49,200	212	NO
Year 7	2002	11,990		11,990	50,020	214	NO
Year 8	2003	11,923		11,923	50,520	211	NO
Year 9	2004	12,441		12,441	50,520	220	NO
Year 10	2005	10,871		10,871	51,230	189	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2004	12,441		12,441	50,520	220	NO
Year 2	2005	10,871		10,871	51,230	189	NO
Year 3	2006	11,484		11,484	53,690	191	NO
Year 4	2007	12,211		12,211	53,943	202	NO
Year 5	2008	12,119		12,119	54,593	198	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		8,534		8,534	56,039	136	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility

Criteria 4

Disadvantaged Community

Use IRWM DAC Mapping tool http://www.water.ca.gov/irwm/grants/resources_dac.cfm

California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES

A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.

NOTES:

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1996	47,150	10,708	203
Year 2	1997	47,225	11,832	224
Year 3	1998	47,300	10,146	192
Year 4	1999	48,900	10,611	194
Year 5	2000	48,934	11,923	218
Year 6	2001	49,200	11,705	212
Year 7	2002	50,020	11,990	214
Year 8	2003	50,520	11,923	211
Year 9	2004	50,520	12,441	220
Year 10	2005	51,230	10,871	189
Year 11	0	0		
Year 12	0	0		
Year 13	0	0		
Year 14	0	0		
Year 15	0	0		
10-15 Year Average Baseline GPCD				**208**

5 Year Baseline GPCD

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2004	50,520	12,441	220
Year 2	2005	51,230	10,871	189
Year 3	2006	53,690	11,484	191
Year 4	2007	53,943	12,211	202
Year 5	2008	54,593	12,119	198
5 Year Average Baseline GPCD				**200**
2015 Compliance Year GPCD				
2015		56,039	8,534	136

NOTES:

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	208
5 Year Baseline GPCD	200
2015 Compliance Year GPCD	136
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
208	166
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Water Use	Target Landscape

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3

Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**

NOTES:

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
200	190	166	166
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
166	208	187
NOTES:		

SB X7-7 Table 9: 2015 Compliance

Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
136	187	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	135.958895	135.958895	YES

NOTES:

City of Ontario

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges

Baseline	Parameter	Value	Units
10- to 15-year baseline period	2008 total water deliveries	42,072	Acre Feet
	2008 total volume of delivered recycled water	2,637	Acre Feet
	2008 recycled water as a percent of total deliveries	6.27%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1995	
	Year ending baseline period range[2]	2004	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2003	
	Year ending baseline period range[3]	2007	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☑	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population

Year		Population
10 to 15 Year Baseline Population		
Year 1	1995	138,976
Year 2	1996	140,276
Year 3	1997	142,064
Year 4	1998	144,688
Year 5	1999	147,005
Year 6	2000	152,524
Year 7	2001	153,951
Year 8	2002	157,752
Year 9	2003	160,641
Year 10	2004	162,528
Year 11	*2005*	164,308
Year 12	*2006*	164,763
Year 13	*2007*	166,058
Year 14	*2008*	164,951
Year 15	*2009*	163,719
5 Year Baseline Population		
Year 1	2003	164,515
Year 2	2004	164,836
Year 3	2005	165,790
Year 4	2006	166,866
Year 5	2007	167,240
2015 Compliance Year Population		
2015		168,777
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
			Deductions					
	Baseline Year *Fm SB X7-7 Table 3*	**Volume Into Distribution System** *Fm SB X7-7 Table(s) 4-A*	Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	**Annual Gross Water Use**
10 to 15 Year Baseline - Gross Water Use								
Year 1	1995	12262			0	0	0	12,262
Year 2	1996	40764.7			0	0	0	40,765
Year 3	1997	40115.4			0	0	0	40,115
Year 4	1998	40066.1			0	0	0	40,066
Year 5	1999	45144.16			0	0	0	45,144
Year 6	2000	46100			0	0	0	46,100
Year 7	2001	43951.48			0	0	0	43,951
Year 8	2002	44708.9			94	0	0	44,615
Year 9	2003	43447.24			75	0	0	43,372
Year 10	2004	42967.19			44	0	0	42,923
Year 11	2005	42204.57			42		0	42,163
Year 12	2006	43901.41			73		0	43,828
Year 13	2007	44805.9			137		0	44,669
Year 14	2008	43301			234		0	43,067
Year 15	2009	39538			448		0	39,090
10 - 15 year baseline average gross water use								**40,809**
5 Year Baseline - Gross Water Use								
Year 1	2003	34,990			75	0	0	34,915
Year 2	2004	34,488			44	0	0	34,444
Year 3	2005	35,297			42	0	0	35,255
Year 4	2006	35,921			73	0	0	35,848
Year 5	2007	35,670			137	0	0	35,533
5 year baseline average gross water use								**35,199**
2015 Compliance Year - Gross Water Use								
2015		29,943			1,194	0	0	28,749
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	Groundwater

This water source is:

- ☑ The supplier's own water source
- ☐ A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	10100		10,100
Year 2	1996	32005.8		32,006
Year 3	1997	32525.8		32,526
Year 4	1998	35484.1		35,484
Year 5	1999	37028.62		37,029
Year 6	2000	36842		36,842
Year 7	2001	35104.53		35,105
Year 8	2002	35383.5		35,384
Year 9	2003	30240.34		30,240
Year 10	2004	27824.25		27,824
Year 11	2005	28799		28,799
Year 12	2006	28793.18		28,793
Year 13	2007	26946.41		26,946
Year 14	2008	29061		29,061
Year 15	2009	28996		28,996
5 Year Baseline - Water into Distribution System				
Year 1	2003	21997.07		21,997
Year 2	2004	20442		20,442
Year 3	2005	20226.06		20,226
Year 4	2006	19966.97		19,967
Year 5	2007	20274		20,274
2015 Compliance Year - Water into Distribution System				
2015		19544		19,544

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		Purchased		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1995	2162		2,162
Year 2	1996	8758.9		8,759
Year 3	1997	7589.6		7,590
Year 4	1998	4582		4,582
Year 5	1999	8115.54		8,116
Year 6	2000	9258		9,258
Year 7	2001	8846.95		8,847
Year 8	2002	9325.4		9,325
Year 9	2003	13206.9		13,207
Year 10	2004	15142.94		15,143
Year 11	2005	13405.57		13,406
Year 12	2006	15108.23		15,108
Year 13	2007	17859.49		17,859
Year 14	2008	14240		14,240
Year 15	2009	10542		10,542
5 Year Baseline - Water into Distribution System				
Year 1	2003	12992.93		12,993
Year 2	2004	14046		14,046
Year 3	2005	15071.15		15,071
Year 4	2006	15953.79		15,954
Year 5	2007	15396		15,396
2015 Compliance Year - Water into Distribution System				
2015		10,399		10,399

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*

		Surface Reservoir Augmentation					Groundwater Recharge			
Baseline Year *Fm SB X7-7 Table 3*		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1995			0		0	0		0	0
Year 2	1996			0		0	0		0	0
Year 3	1997			0		0	0		0	0
Year 4	1998			0		0	0		0	0
Year 5	1999			0		0	0		0	0
Year 6	2000			0		0	0		0	0
Year 7	2001			0		0	0		0	0
Year 8	2002			0		0	94.232488		94	94
Year 9	2003			0		0	75.262967		75	75
Year 10	2004			0		0	44.106833		44	44
Year 11	2005			0		0	42.029974		42	42
Year 12	2006			0		0	73.12223		73	73
Year 13	2007			0		0	136.71479		137	137
Year 14	2008			0		0	233.90843		234	234
Year 15	2009			0		0	447.53827		448	448
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2003			0		0	75.262967		75	75
Year 2	2004			0		0	44.106833		44	44
Year 3	2005			0		0	42.029974		42	42
Year 4	2006			0		0	73.12223		73	73
Year 5	2007			0		0	136.71479		137	137
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	1193.7756		1,194	1,194

**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES:

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility					
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use					
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995	12,262		0%	NO
Year 2	1996	40,765		0%	NO
Year 3	1997	40,115		0%	NO
Year 4	1998	40,066		0%	NO
Year 5	1999	45,144		0%	NO
Year 6	2000	46,100		0%	NO
Year 7	2001	43,951		0%	NO
Year 8	2002	44,615		0%	NO
Year 9	2003	43,372		0%	NO
Year 10	2004	42,923		0%	NO
Year 11	2005	42,163		0%	NO
Year 12	2006	43,828		0%	NO
Year 13	2007	44,669		0%	NO
Year 14	2008	43,067		0%	NO
Year 15	2009	39,090		0%	NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2003	34,915		0%	NO
Year 2	2004	34,444		0%	NO
Year 3	2005	35,255		0%	NO
Year 4	2006	35,848		0%	NO
Year 5	2007	35,533		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		28,749		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility					
Criteria 2 Industrial water use is equal to or greater than 15 GPCD					
Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1995		138,976	0	NO
Year 2	1996		140,276	0	NO
Year 3	1997		142,064	0	NO
Year 4	1998		144,688	0	NO
Year 5	1999		147,005	0	NO
Year 6	2000		152,524	0	NO
Year 7	2001		153,951	0	NO
Year 8	2002		157,752	0	NO
Year 9	2003		160,641	0	NO
Year 10	2004		162,528	0	NO
Year 11	2005		164,308	0	NO
Year 12	2006		164,763	0	NO
Year 13	2007		166,058	0	NO
Year 14	2008		164,951	0	NO
Year 15	2009		163,719	0	NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2003		164,515	0	NO
Year 2	2004		164,836	0	NO
Year 3	2005		165,790	0	NO
Year 4	2006		166,866	0	NO
Year 5	2007		167,240	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			168,777	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1995	12,262		12,262	138,976	79	YES
Year 2	1996	40,765		40,765	140,276	259	NO
Year 3	1997	40,115		40,115	142,064	252	NO
Year 4	1998	40,066		40,066	144,688	247	NO
Year 5	1999	45,144		45,144	147,005	274	NO
Year 6	2000	46,100		46,100	152,524	270	NO
Year 7	2001	43,951		43,951	153,951	255	NO
Year 8	2002	44,615		44,615	157,752	252	NO
Year 9	2003	43,372		43,372	160,641	241	NO
Year 10	2004	42,923		42,923	162,528	236	NO
Year 11	2005	42,163		42,163	164,308	229	NO
Year 12	2006	43,828		43,828	164,763	237	NO
Year 13	2007	44,669		44,669	166,058	240	NO
Year 14	2008	43,067		43,067	164,951	233	NO
Year 15	2009	39,090		39,090	163,719	213	NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2003	34,915		34,915	164,515	189	NO
Year 2	2004	34,444		34,444	164,836	187	NO
Year 3	2005	35,255		35,255	165,790	190	NO
Year 4	2006	35,848		35,848	166,866	192	NO
Year 5	2007	35,533		35,533	167,240	190	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		28,749		28,749	168,777	152	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility

Criteria 4

Disadvantaged Community

Use IRWM DAC Mapping tool http://www.water.ca.gov/irwm/grants/resources_dac.cfm

California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES

A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.

NOTES:

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1995	138,976	12,262	79
Year 2	1996	140,276	40,765	259
Year 3	1997	142,064	40,115	252
Year 4	1998	144,688	40,066	247
Year 5	1999	147,005	45,144	274
Year 6	2000	152,524	46,100	270
Year 7	2001	153,951	43,951	255
Year 8	2002	157,752	44,615	252
Year 9	2003	160,641	43,372	241
Year 10	2004	162,528	42,923	236
Year 11	2005	164,308	42,163	229
Year 12	2006	164,763	43,828	237
Year 13	2007	166,058	44,669	240
Year 14	2008	164,951	43,067	233
Year 15	2009	163,719	39,090	213
10-15 Year Average Baseline GPCD				**235**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2003	164,515	34,915	189
Year 2	2004	164,836	34,444	187
Year 3	2005	165,790	35,255	190
Year 4	2006	166,866	35,848	192
Year 5	2007	167,240	35,533	190
5 Year Average Baseline GPCD				**189**
2015 Compliance Year GPCD				
2015		168,777	28,749	152
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	235
5 Year Baseline GPCD	189
2015 Compliance Year GPCD	152
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
235	188
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Water Use	Target Landscape

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
189	180	188	180
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
180	235	207
NOTES:		

SB X7-7 Table 9: 2015 Compliance

Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
152	207	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	152.0684304	152.0684304	YES

NOTES:

City of Upland

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	21,505	Acre Feet
	2008 total volume of delivered recycled water	0	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1]	10	Years
	Year beginning baseline period range	1996	
	Year ending baseline period range[2]	2005	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2005	
	Year ending baseline period range[3]	2009	

[1] *If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period.*

[2] *The ending year must be between December 31, 2004 and December 31, 2010.*

[3] *The ending year must be between December 31, 2007 and December 31, 2010.*

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☑	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☐	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		Population
10 to 15 Year Baseline Population		
Year 1	1996	65,566
Year 2	1997	65,961
Year 3	1998	66,676
Year 4	1999	67,289
Year 5	2000	68,393
Year 6	2001	69,058
Year 7	2002	70,357
Year 8	2003	71,200
Year 9	2004	71,831
Year 10	2005	72,216
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2005	72,216
Year 2	2006	72,197
Year 3	2007	72,981
Year 4	2008	72,654
Year 5	2009	72,715
2015 Compliance Year Population		
2015		75,787
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
	Baseline Year *Fm SB X7-7 Table 3*	Volume Into Distribution System *Fm SB X7-7 Table(s) 4-A*	Deductions					Annual Gross Water Use
			Exported Water	Change in Dist. System Storage (+/-)	Indirect Recycled Water *Fm SB X7-7 Table 4-B*	Water Delivered for Agricultural Use	Process Water *Fm SB X7-7 Table(s) 4-D*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	1996	21460.774			0	0	0	21,461
Year 2	1997	21666.224			0	0	0	21,666
Year 3	1998	18400.76			0	0	0	18,401
Year 4	1999	20735.129			0	0	0	20,735
Year 5	2000	23061.602			0	0	0	23,062
Year 6	2001	21979.24			0	0	0	21,979
Year 7	2002	22495.287			0	0	0	22,495
Year 8	2003	20255.227			0	0	0	20,255
Year 9	2004	20984.134			0	0	0	20,984
Year 10	2005	17986.959			0	0	0	17,987
Year 11	0	0			0		0	0
Year 12	0	0			0		0	0
Year 13	0	0			0		0	0
Year 14	0	0			0		0	0
Year 15	0	0			0		0	0
10 - 15 year baseline average gross water use								**20,903**
5 Year Baseline - Gross Water Use								
Year 1	2005	17,987			0	0	0	17,987
Year 2	2006	20,247			0	0	0	20,247
Year 3	2007	22,847			0	0	0	22,847
Year 4	2008	23,651			0	0	0	23,651
Year 5	2009	21,931			0	0	0	21,931
5 year baseline average gross water use								**21,333**
2015 Compliance Year - Gross Water Use								
2015		19,992			234	0	0	19,757
* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3								
NOTES:								

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	City Wells			
This water source is:				
☑	The supplier's own water source			
☐	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	11084.188		11,084
Year 2	1997	10090.542		10,091
Year 3	1998	8281.407		8,281
Year 4	1999	11099.058		11,099
Year 5	2000	7410.202		7,410
Year 6	2001	7545.283		7,545
Year 7	2002	6236.759		6,237
Year 8	2003	5962.61		5,963
Year 9	2004	5151.374		5,151
Year 10	2005	5132.058		5,132
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	5132.058		5,132
Year 2	2006	7037.733		7,038
Year 3	2007	7471.704		7,472
Year 4	2008	7868.693		7,869
Year 5	2009	8919.82		8,920
2015 Compliance Year - Water into Distribution System				
2015		6846.46		6,846

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution

Name of Source		SAWCO Groundwater		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	4468.007		4,468
Year 2	1997	6667.908		6,668
Year 3	1998	5049.89		5,050
Year 4	1999	5242.082		5,242
Year 5	2000	11587.49		11,587
Year 6	2001	7394.429		7,394
Year 7	2002	6760.942		6,761
Year 8	2003	6125.555		6,126
Year 9	2004	6937.346		6,937
Year 10	2005	5760.622		5,761
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	5760.622		5,761
Year 2	2006	7007.085		7,007
Year 3	2007	8112.855		8,113
Year 4	2008	9050.996		9,051
Year 5	2009	7765.412		7,765
2015 Compliance Year - Water into Distribution System				
2015		4,695		4,695

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		SAWCO Surface Water		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	3454.591		3,455
Year 2	1997	2353.997		2,354
Year 3	1998	1257.461		1,257
Year 4	1999	4115.653		4,116
Year 5	2000	346.436		346
Year 6	2001	1999.176		1,999
Year 7	2002	1499.275		1,499
Year 8	2003	1155.159		1,155
Year 9	2004	718.359		718
Year 10	2005	467.328		467
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	467.328		467
Year 2	2006	1134.669		1,135
Year 3	2007	2529.721		2,530
Year 4	2008	2133.085		2,133
Year 5	2009	1589.19		1,589
2015 Compliance Year - Water into Distribution System				
2015		1,403		1,403
** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*				
NOTES:				

SB X7-7 Table 4-A: Volume Entering the Distribution				
Name of Source		Water Facility Authority		
This water source is:				
☐	The supplier's own water source			
☑	A purchased or imported source			
Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional* *(+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	1996	2453.988		2,454
Year 2	1997	2553.777		2,554
Year 3	1998	3812.002		3,812
Year 4	1999	278.336		278
Year 5	2000	3717.474		3,717
Year 6	2001	5040.352		5,040
Year 7	2002	7998.311		7,998
Year 8	2003	7011.903		7,012
Year 9	2004	8177.055		8,177
Year 10	2005	6626.951		6,627
Year 11	0			0
Year 12	0			0
Year 13	0			0
Year 14	0			0
Year 15	0			0
5 Year Baseline - Water into Distribution System				
Year 1	2005	6626.951		6,627
Year 2	2006	5067.201		5,067
Year 3	2007	4732.552		4,733
Year 4	2008	4598.25		4,598
Year 5	2009	3656.798		3,657
2015 Compliance Year - Water into Distribution System				
2015		7,048		7,048

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-B: Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*										
Baseline Year *Fm SB X7-7 Table 3*		Surface Reservoir Augmentation					Groundwater Recharge			**Total Deductible Volume of Indirect Recycled Water Entering the Distribution System**
		Volume Discharged from Reservoir for Distribution System Delivery	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility*	Transmission/ Treatment Losses	Recycled Volume Entering Distribution System from Groundwater Recharge	
10-15 Year Baseline - Indirect Recycled Water Use										
Year 1	1996			0		0	0		0	0
Year 2	1997			0		0	0		0	0
Year 3	1998			0		0	0		0	0
Year 4	1999			0		0	0		0	0
Year 5	2000			0		0	0		0	0
Year 6	2001			0		0	0		0	0
Year 7	2002			0		0	0.0073317		0	0
Year 8	2003			0		0	0		0	0
Year 9	2004			0		0	0		0	0
Year 10	2005			0		0	0		0	0
Year 11	0			0		0			0	0
Year 12	0			0		0			0	0
Year 13	0			0		0			0	0
Year 14	0			0		0			0	0
Year 15	0			0		0			0	0
5 Year Baseline - Indirect Recycled Water Use										
Year 1	2005			0		0	0		0	0
Year 2	2006			0		0	0		0	0
Year 3	2007			0		0	0		0	0
Year 4	2008			0		0	0		0	0
Year 5	2009			0		0	0		0	0
2015 Compliance - Indirect Recycled Water Use										
2015				0		0	234.04937		234	234
**Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*										
NOTES:										

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility					
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use					
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1996	21,461		0%	NO
Year 2	1997	21,666		0%	NO
Year 3	1998	18,401		0%	NO
Year 4	1999	20,735		0%	NO
Year 5	2000	23,062		0%	NO
Year 6	2001	21,979		0%	NO
Year 7	2002	22,495		0%	NO
Year 8	2003	20,255		0%	NO
Year 9	2004	20,984		0%	NO
Year 10	2005	17,987		0%	NO
Year 11	0	0			NO
Year 12	0	0			NO
Year 13	0	0			NO
Year 14	0	0			NO
Year 15	0	0			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2005	17,987		0%	NO
Year 2	2006	20,247		0%	NO
Year 3	2007	22,847		0%	NO
Year 4	2008	23,651		0%	NO
Year 5	2009	21,931		0%	NO
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		19,757		0%	NO
NOTES:					

SB X7-7 Table 4-C.2: Process Water Deduction Eligibility

Criteria 2
Industrial water use is equal to or greater than 15 GPCD

Baseline Year *Fm SB X7-7 Table 3*		Industrial Water Use	Population	Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	1996		65,566	0	NO
Year 2	1997		65,961	0	NO
Year 3	1998		66,676	0	NO
Year 4	1999		67,289	0	NO
Year 5	2000		68,393	0	NO
Year 6	2001		69,058	0	NO
Year 7	2002		70,357	0	NO
Year 8	2003		71,200	0	NO
Year 9	2004		71,831	0	NO
Year 10	2005		72,216	0	NO
Year 11	0		0		NO
Year 12	0		0		NO
Year 13	0		0		NO
Year 14	0		0		NO
Year 15	0		0		NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2005		72,216	0	NO
Year 2	2006		72,197	0	NO
Year 3	2007		72,981	0	NO
Year 4	2008		72,654	0	NO
Year 5	2009		72,715	0	NO
2015 Compliance Year - Process Water Deduction Eligibility					
2015			75,787	0	NO
NOTES:					

SB X7-7 Table 4-C.3: Process Water Deduction Eligibility							
Criteria 3 Non-industrial use is equal to or less than 120 GPCD							
Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	Industrial Water Use	Non-industrial Water Use	Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility							
Year 1	1996	21,461		21,461	65,566	292	NO
Year 2	1997	21,666		21,666	65,961	293	NO
Year 3	1998	18,401		18,401	66,676	246	NO
Year 4	1999	20,735		20,735	67,289	275	NO
Year 5	2000	23,062		23,062	68,393	301	NO
Year 6	2001	21,979		21,979	69,058	284	NO
Year 7	2002	22,495		22,495	70,357	285	NO
Year 8	2003	20,255		20,255	71,200	254	NO
Year 9	2004	20,984		20,984	71,831	261	NO
Year 10	2005	17,987		17,987	72,216	222	NO
Year 11	0	0		0	0		NO
Year 12	0	0		0	0		NO
Year 13	0	0		0	0		NO
Year 14	0	0		0	0		NO
Year 15	0	0		0	0		NO
5 Year Baseline - Process Water Deduction Eligibility							
Year 1	2005	17,987		17,987	72,216	222	NO
Year 2	2006	20,247		20,247	72,197	250	NO
Year 3	2007	22,847		22,847	72,981	279	NO
Year 4	2008	23,651		23,651	72,654	291	NO
Year 5	2009	21,931		21,931	72,715	269	NO
2015 Compliance Year - Process Water Deduction Eligiblity							
2015		19,757		19,757	75,787	233	NO
NOTES:							

SB X7-7 Table 4-C.4: Process Water Deduction Eligibility				
Criteria 4 Disadvantaged Community *Use IRWM DAC Mapping tool* http://www.water.ca.gov/irwm/grants/resources_dac.cfm				
California Median Household Income		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2015 Compliance Year - Process Water Deduction Eligibility				
2010	$53,046		0%	YES
A "Disadvantaged Community" is a community with a median household income less than 80 percent of the statewide average.				
NOTES:				

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)

Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	1996	65,566	21,461	292
Year 2	1997	65,961	21,666	293
Year 3	1998	66,676	18,401	246
Year 4	1999	67,289	20,735	275
Year 5	2000	68,393	23,062	301
Year 6	2001	69,058	21,979	284
Year 7	2002	70,357	22,495	285
Year 8	2003	71,200	20,255	254
Year 9	2004	71,831	20,984	261
Year 10	2005	72,216	17,987	222
Year 11	0	0	0	
Year 12	0	0	0	
Year 13	0	0	0	
Year 14	0	0	0	
Year 15	0	0	0	
10-15 Year Average Baseline GPCD				**271**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2005	72,216	17,987	222
Year 2	2006	72,197	20,247	250
Year 3	2007	72,981	22,847	279
Year 4	2008	72,654	23,651	291
Year 5	2009	72,715	21,931	269
5 Year Average Baseline GPCD				**262**
2015 Compliance Year GPCD				
2015		75,787	19,757	233
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	271
5 Year Baseline GPCD	262
2015 Compliance Year GPCD	233
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
271	217
NOTES:	

SB X7-7 Table 7-B: Target Method 2 Target Landscape Water Use

Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-C: Target Method 2 Target CII Water Use
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-D: Target Method 2 Summary
Tables for Target Method 2 (SB X7-7 Tables 7-B, 7-C, and 7-D) are not included in the SB X7-7 Verification Form, but are still required for water suppliers using Target Method 2. These water suppliers should contact Gwen Huff at (916) 651-9672 or gwen.huff@water.ca.gov

SB X7-7 Table 7-E: Target Method 3				
Agency May Select More Than One as Applicable	Percentage of Service Area in This Hydrological Region	Hydrologic Region	"2020 Plan" Regional Targets	Method 3 Regional Targets (95%)
☐		North Coast	137	130
☐		North Lahontan	173	164
☐		Sacramento River	176	167
☐		San Francisco Bay	131	124
☐		San Joaquin River	174	165
☐		Central Coast	123	117
☐		Tulare Lake	188	179
☐		South Lahontan	170	162
☑	100%	South Coast	149	142
☐		Colorado River	211	200
Target *(If more than one region is selected, this value is calculated.)*				**142**
NOTES:				

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
262	249	217	217
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES: Method 1			

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	2015 Interim Target GPCD
217	271	244
NOTES:		

SB X7-7 Table 9: 2015 Compliance

Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
233	244	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	232.733446	232.733446	YES

NOTES:

APPENDIX J

Metropolitan Demand Model Projections

Draft

(November 13, 2015)

Inland Empire Utilities Agency

Average Year

(Average of 1922-2004 Hydrology)

Demographics[1]	**2020**	**2025**	**2030**	**2035**	**2040**
Population	888,858	947,352	1,000,595	1,058,666	1,102,569
Occupied Housing Units	261,554	277,701	293,893	310,049	325,275
Single Family	195,111	204,247	213,674	224,921	234,414
Multi-Family	66,443	73,454	80,219	85,128	90,861
Persons Per Household	3.34	3.35	3.35	3.36	3.33
Urban Employment	366,679	413,438	453,145	476,893	492,200

Conservation	**2020**	**2025**	**2030**	**2035**	**2040**
Conservation[2]	34,632	40,253	46,281	50,992	56,506
Installed Active Device Through 2015	6,064	4,598	2,905	1,854	1,738
Code-Based and Price-Effect Savings	28,568	35,656	43,376	49,137	54,768

Total Demands After Conservation	**2020**	**2025**	**2030**	**2035**	**2040**
Total Demand	299,141	316,090	327,333	339,339	347,560
Retail Municipal and Industrial[3]	273,448	288,754	301,993	313,999	322,220
Retail Agricultural	5,344	6,986	4,990	4,990	4,990
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	20,350	20,350	20,350	20,350	20,350

Local Supplies	**2020**	**2025**	**2030**	**2035**	**2040**
Total Local Supplies	239,778	246,362	248,712	250,283	251,853
Groundwater Production	149,544	149,600	149,600	149,600	149,600
Surface Production	32,480	32,480	32,480	32,480	32,480
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	0	0	0	0	0
Groundwater Recovery	13,706	16,720	17,500	17,500	17,500
Recycling	44,048	47,562	49,132	50,703	52,273
M&I and Agricultural	30,198	33,712	35,282	36,853	38,423
Groundwater Replenishment	13,850	13,850	13,850	13,850	13,850
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	**2020**	**2025**	**2030**	**2035**	**2040**
Total Metropolitan Demands	59,364	69,728	78,620	89,056	95,707
Consumptive Use	52,864	63,228	72,120	82,556	89,207
Seawater Barrier	0	0	0	0	0
Replenishment Water[4]	6,500	6,500	6,500	6,500	6,500

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2012 Regional Transportation Plan and SANDAG Series 13 Forecast.
2. Includes code-based, price-effect and existing active savings through FY2014; does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.
3. Retail M&I projections include conservation.
4. Replenishment Water include direct and in-lieu replenishment.

Draft

(November 13, 2015)

Inland Empire Utilities Agency

Single Dry-Year

(Repeat of 1977 Hydrology)

Demographics[1]	**2020**	**2025**	**2030**	**2035**	**2040**
Population	888,858	947,352	1,000,595	1,058,666	1,102,569
Occupied Housing Units	261,554	277,701	293,893	310,049	325,275
Single Family	195,111	204,247	213,674	224,921	234,414
Multi-Family	66,443	73,454	80,219	85,128	90,861
Persons Per Household	3.34	3.35	3.35	3.36	3.33
Urban Employment	366,679	413,438	453,145	476,893	492,200

Conservation	**2020**	**2025**	**2030**	**2035**	**2040**
Conservation[2]	34,632	40,253	46,281	50,992	56,506
Installed Active Device Through 2015	6,064	4,598	2,905	1,854	1,738
Code-Based and Price-Effect Savings	28,568	35,656	43,376	49,137	54,768

Total Demands After Conservation	**2020**	**2025**	**2030**	**2035**	**2040**
Total Demand	300,828	317,879	329,189	341,268	349,539
Retail Municipal and Industrial[3]	275,102	290,501	303,819	315,898	324,169
Retail Agricultural	5,376	7,028	5,020	5,020	5,020
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	20,350	20,350	20,350	20,350	20,350

Local Supplies	**2020**	**2025**	**2030**	**2035**	**2040**
Total Local Supplies	240,154	246,682	249,032	250,603	252,173
Groundwater Production	149,600	149,600	149,600	149,600	149,600
Surface Production	32,800	32,800	32,800	32,800	32,800
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	0	0	0	0	0
Groundwater Recovery	13,706	16,720	17,500	17,500	17,500
Recycling	44,048	47,562	49,132	50,703	52,273
M&I and Agricultural	30,198	33,712	35,282	36,853	38,423
Groundwater Replenishment	13,850	13,850	13,850	13,850	13,850
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	**2020**	**2025**	**2030**	**2035**	**2040**
Total Metropolitan Demands	60,674	71,197	80,157	90,665	97,367
Consumptive Use	54,174	64,697	73,657	84,165	90,867
Seawater Barrier	0	0	0	0	0
Replenishment Water[4]	6,500	6,500	6,500	6,500	6,500

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2012 Regional Transportation Plan and SANDAG Series 13 Forecast.
2. Includes code-based, price-effect and existing active savings through FY2014; does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.
3. Retail M&I projections include conservation.
4. Replenishment Water include direct and in-lieu replenishment.

Draft

(November 13, 2015)

Inland Empire Utilities Agency

Multi Dry-Year

(Repeat of 1990-1992 Hydrology)

Demographics[1]	2020	2025	2030	2035	2040
Population	888,858	947,352	1,000,595	1,058,666	1,102,569
Occupied Housing Units	261,554	277,701	293,893	310,049	325,275
Single Family	195,111	204,247	213,674	224,921	234,414
Multi-Family	66,443	73,454	80,219	85,128	90,861
Persons Per Household	3.34	3.35	3.35	3.36	3.33
Urban Employment	366,679	413,438	453,145	476,893	492,200

Conservation	2020	2025	2030	2035	2040
Conservation[2]	34,632	40,253	46,281	50,992	56,506
Installed Active Device Through 2015	6,064	4,598	2,905	1,854	1,738
Code-Based and Price-Effect Savings	28,568	35,656	43,376	49,137	54,768

Total Demands After Conservation	2020	2025	2030	2035	2040
Total Demand	297,065	321,039	333,812	346,003	355,259
Retail Municipal and Industrial[3]	270,419	293,851	307,907	320,519	329,775
Retail Agricultural	6,361	6,838	5,555	5,134	5,134
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	20,285	20,350	20,350	20,350	20,350

Local Supplies	2020	2025	2030	2035	2040
Total Local Supplies	240,906	247,069	250,151	251,722	253,292
Groundwater Production	149,600	149,600	149,600	149,600	149,600
Surface Production	34,233	34,233	34,233	34,233	34,233
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	0	0	0	0	0
Groundwater Recovery	13,923	16,117	17,500	17,500	17,500
Recycling	43,150	47,119	48,818	50,389	51,959
M&I and Agricultural	29,365	33,269	34,968	36,539	38,109
Groundwater Replenishment	13,785	13,850	13,850	13,850	13,850
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2020	2025	2030	2035	2040
Total Metropolitan Demands	56,158	73,969	83,660	94,281	101,967
Consumptive Use	49,658	67,469	77,160	87,781	95,467
Seawater Barrier	0	0	0	0	0
Replenishment Water[4]	6,500	6,500	6,500	6,500	6,500

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2012 Regional Transportation Plan and SANDAG Series 13 Forecast.
2. Includes code-based, price-effect and existing active savings through FY2014; does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.
3. Retail M&I projections include conservation.
4. Replenishment Water include direct and in-lieu replenishment.

APPENDIX K

IEUA Drought Plan

Inland Empire Utilities Agency

Drought Plan

April 15, 2009

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SECTION 1 – INTRODUCTION

The State of California and the Southern California Region is in the midst of a third consecutive year of drought and water levels in all of the state's major reservoirs are below normal. On February 27, 2009, Governor Schwarzenegger proclaimed a statewide drought emergency and directed state agencies to take immediate action to address the drought conditions and water delivery reductions.

Critically dry conditions are affecting all of the Metropolitan Water District of Southern California (MWD) water supply sources. In addition, recent court rulings and regulatory actions have further impacted State Water Project water and supplies. These legal and regulatory developments, along with the impacts of dry conditions, have raised the possibility that MWD may not have access to the supplies necessary to meet total firm demands and will have to allocate shortages in supplies to MWD Member Agencies.

In February 2008, in anticipation of possible water supply shortages, the MWD Board of Directors adopted the Water Supply Allocation Plan (MWD WSAP). The MWD WSAP provides guidance for allocating limited water supplies to Member Agencies should the need arise. MWD is closely monitoring water supply conditions. If it is determined the MWD WSAP needs to be implemented, this decision will be made by the MWD Board of Directors on April 14, 2009 and the plan would go into effect July 1st, 2009.

The Inland Empire Utilities Agency (IEUA) Drought Plan was developed for the purpose of implementing the MWD WSAP, within the IEUA's service area in a manner that is fair and equitable to IEUA's Member Agencies. The IEUA Drought Plan is consistent with and supplements the MWD WSAP for specific IEUA service area drought planning issues. All MWD WSAP definitions, policies, principals and program provisions are incorporated here by reference and are considered to be a part of the IEUA Drought Plan. For example, if IEUA is not imposed a penalty from MWD then IEUA would not impose a penalty on a member agency within IEUA's service area. In addition, MWD does not allow resale or "marketing" of MWD WSAP allocation credits and IEUA will not allow IEUA Drought Plan credits to be sold internally within IEUA's service area or externally without IEUA's approval. A complete copy of the adopted MWD WSAP is provided as Appendix A.

IEUA's Drought Plan is consistent with and contributes to the existing IEUA imported water policies and programs. For example, the IEUA's Drought Plan principles encourage development and full utilization of local water resources, such as recycled water and conservation measures. The IEUA Drought Plan also addresses MWD's Chino Basin Groundwater Storage Dry Year Yield (DYY) program and the need for best management of DYY program “shift” obligations concurrent with MWD WSAP reductions of imported water supplies to IEUA.

SECTION 2 – IEUA Drought Plan Preparation

2.1 IEUA and Retail Agency Coordination

The process to prepare the IEUA Drought Plan has been in full consultation with all the retail agencies, cities, Chino Basin Water Conservation District and Chino Basin Watermaster. This has been a consensus based process which has included monthly meetings to discuss the development of the IEUA Drought Plan as well as numerous presentations and workshops at MWD, IEUA, IEUA Member Agency offices and the offices of the Chino Basin Watermaster. Throughout this process the IEUA Board of Directors was provided with regular progress reports on the status of the plan and the technical workgroup discussions. Since July 2007, there have been more than 55 public presentations, workshops and meetings. See Appendix B for a summary of these activities.

2.2 IEUA Drought Allocation Plan Principles

The following principles are intended to describe the development and implementation of the IEUA Drought Plan.

Overall Plan

- The IEUA Drought Plan was developed in cooperation with the Member Agencies and includes all aspects of drought planning such as actions to avoid rationing, drought response stages, allocation, methodology, pricing and communications strategy.

Drought Supply Enhancement

- IEUA and its Member Agencies worked cooperatively to avoid or minimize rationing during droughts through supply enhancement, such as the implementation of the Three Year Recycled Water Business Plan and voluntary demand reduction measures.

Drought Response Stages

- The drought response stages are consistent with MWD’s adopted MWD WSAP. MWD, IEUA and IEUA’s Member Agencies will coordinate the administration of MWD WSAP and DYY Program accounting and performance targets to minimize impacts to IEUA Member Agencies.

Allocation Methodology

- The allocation methodology was developed to be equitable, easy to administer, contain financial and pricing signals to ensure Member Agencies and the public are informed and understand the need to conserve. In order to protect the economic health of the entire region, it is important that the allocation methodology avoid large, uneven retail impacts across the region.

- A Member Agency that has developed local projects and instituted conservation measures should not be penalized in the computation of the shortage allocation. To help balance the financial costs and risks associated with the development of local resources, the shortage allocation methodology should provide an incentive to those Member Agencies that can develop additional local supplies.

Metropolitan Water District Consistency

- IEUA will administer the IEUA Drought Plan to be consistent with MWD policies and procedures.

Communication Strategy

- A regional communication strategy is included as a part the IEUA Drought Plan. IEUA and Member Agencies have agreed that a coordinated regional strategy be prepared, including development of a unified message and press activities to strengthen communication with the public about the serious nature of the drought and the actions that are needed to manage water demands and ensure a safe and reliable water supply during drought conditions.
- The development of an ongoing, coordinated and regional public outreach program has been initiated and provides a clear and consistent message to the public regarding support Member Agencies communication efforts that address specific retail level allocations. An Ad hoc committee comprised of IEUA and its Member Agencies has been established to develop and coordinate the information to be provided to the media, public officials and the general public. The communication message will include clear solutions – easy and inexpensive ways to conserve. It is essential that local print and news media are fully committed to covering the situation.
- The drought communication strategy will include the following:
    - Regular meetings with Member Agencies and Conservation Partners Ad hoc committee to develop and coordinate a regional conservation message starting in February, 2009.
    - Regular briefings to the Inland Valley Daily Bulletin and other editorial boards.
    - Joint press conferences with Member Agencies, Three Valley's MWD, Western MWD, and MWD to provide updates on the water supply status and actions that need to be taken to address the drought.

- A speaker's bureau which will provide timely presentations and updates to City Councils, Chambers of Commerce, and Service Organizations.
- Inland Valley Daily Bulletin feature advertising on conservation and monthly conservation tips and rebates.
- An advertising campaign using donated billboard space and Public Service Announcements.
- Distribution of information to the public about the drought and conservation tips and rebates through school programs, libraries and senior organizations.

2.3 IEUA Drought Allocation Plan Goals

- Ensure equity and fairness throughout IEUA's service area
- Avoid payment of MWD WSAP or DYY penalties to MWD
- Recognize IEUA/MWD investments in local supplies to "drought proof" the IEUA service area
- Encourage additional local investments to further drought proof the economy
    - Enhanced Conservation
    - Recycled Water – Connect parks, schools and other landscapes
    - Interconnections to promote flexibility (Azusa Pipeline)
    - Increased Chino Desalter production
    - Groundwater Recharge (recycled water and capture of storm water when available)
- Coordinate IEUA's service area communication strategy
- Implement IEUA's Drought Plan in a manner that is consistent with MWD's WSAP and DYY policies and contracts

Section 3 – IEUA DROUGHT PLAN AND ALLOCATION SCENARIOS

3.1 Overview

IEUA is a MWD member agency, and is obligated to follow the MWD Board adopted MWD WSAP. The allocation methodology is based on the guiding principles and considerations described in MWD's WSDM Plan and updated through its nine-month planning process which culminated in the adoption of the MWD WSAP.

3.2 IEUA Baseline under MWD Water Supply Allocation Plan

MWD uses a three year 2004-2006 average from actual water demand data as the baseline for its calculation of the water supply allocation for its Member Agencies. Only potable water supplies are counted in the baseline (recycled water is not included). The baseline data addresses imported water, groundwater, surface water, and desalter water supplies. In-lieu water is designated as a local groundwater supply.

Table 1 provides a summary of IEUA's baseline data. Total imported and local supplies are 261,343 acre-feet. IEUA's purchase of imported water (Tier1/Tier2) during the 2004-2006 period averaged 51,992 acre-feet.

Table 1. Summary of IEUA's Baseline Data (2004-2006 Average)

Water Source	Baseline (2004-2006) AF
Imported (MWD) Tier 1/Tier2 Purchases	**51,992**
Local Supplies	
Groundwater	166,815
Surface Water	18,361
Chino Desalters	6,228
Recycled[1]	--
In-Lieu	17,947
Local Supply SUB-TOTAL	**209,351**
TOTAL (Imported and Local Supplies)	**261,343**

IEUA's 2009 Imported Water Baseline Allocation was developed by MWD according to the methodology defined in the MWD WSAP (see Appendix A). This methodology begins with the baseline demand of 261,343 AF and then adds a growth adjustment percentage based on the actual growth rate in IEUA's service area. For IEUA's service area, the growth adjustment percentages are as follows: for 2007 (1.89%), for 2008 (2.4%) and for 2009 (2.4%). These growth adjustment percentages are based upon the California Department of Finance most recent growth report. In addition, a water conservation adjustment factor is added. This adjustment recognizes previous investments in water conservation in the IEUA service area and the use of tiered-rate structures, where applicable.

As shown in Table 2, IEUA's imported water allocation increases from 51,992 AF (2004-2006 three-year average "Baseline") to 69,386 AF (2009 Imported Water Baseline Allocation).

[1] Recycled water is not included in IEUA's baseline data because the MWD WSAP does not take into account non-potable water supplies; however, during the base period (2004-2006) on average IEUA produced 11,468 AFY.

Table 2. Comparison of IEUA's Baseline Imported Water Purchases and IEUA's 2009 Baseline Allocation under the MWD Water Supply Allocation Plan

Water Source	IEUA's Imported Water Baseline (2004-2006) AF	IEUA's 2009 Imported Water Baseline Allocation AF
Imported Deliveries (MWD)	**51,992**	**69,386**

IEUA's 2009 Imported Water Baseline Allocation of 69,386 AF is allocated as summarized here. First, the imported water baseline amount of 51,992 AF is allocated based on the amount of imported water purchased during the base period. The Water Facilities Authority (WFA) on average purchased 21,671 AFY (42%) and Cucamonga Valley Water District (CVWD) on average purchased 30,321 AF (58%). Fontana Water Company (FWC) did not purchase imported water during the base period. Second, IEUA's additional imported water allocation (attributable to growth and water conservation adjustments) of 17,394 AF is allocated based on 2008 population. Therefore of this 17,394 AF amount, the WFA is allocated 9,045 AF or 52% and CVWD is allocated 8,349 or 48% (see appendix C). Table 3 summarizes IEUA's 2009 Imported Water Baseline Allocation to the WFA and CVWD. As previously noted, FWC did not purchase imported water during the base period and for this reason does not receive an allocation. This table is the foundation for the IEUA Drought Plan allocation scenarios in the following sections.

In April, 2009 the MWD Board of Directors is scheduled to consider whether or not to implement the MWD WSAP. If implemented, the MWD WSAP will take effect July 1, 2009 and continue for a twelve month period through June 30, 2010.

Table 3. IEUA and Member Agencies 2009 Imported Water Baseline Allocation

Agency	IEUA & Member Agencies Baseline Allocation
IEUA	**69,386**
Water Facilities Authority	**30,716**
Cucamonga Valley W.D.	**38,670**
Fontana Water Company	**0**
TOTAL	**69,386**

3.3 Level 2 (10%) Shortage Allocation Scenario

The MWD WSAP establishes twenty levels of water shortage with corresponding percentage reductions in imported water allocations. In the event an MWD Member Agency exceeds its imported water supply allocation, then a penalty will be assessed to that agency. Such penalties will be assessed by MWD at the end of the twelve month period.

For the purpose of developing a shortage allocation scenario, a MWD WSAP Level 2 (10%) shortage allocation is provided here as an example. Table 4 compares IEUA and its Member Agencies baseline allocations with a Level 2 (10%) shortage allocation. IEUA's allocation, under a Level 2 (10%) shortage is reduced from 69,386 AF to 59,601 AF. [2]

Table 4. IEUA and Member Agencies Level 2 (10%) Allocation

Agency	IEUA & Member Agencies Baseline Allocation	Level 2 (10%) Allocation
IEUA	**69,386**	**59,601**
Water Facilities Authority	**30,716**	**26,224**
Cucamonga Valley W.D.	**38,670**	**33,377**
Fontana Water Company	**0**	**0**
TOTAL	**69,386**	**59,601**

3.4 IEUA's Drought Plan and DYY Performance Scenario

As noted above, the MWD WSAP may be implemented during the period July 1, 2009 through June 30, 2010. In addition to the MWD WSAP, MWD has notified IEUA that it will implement the second year of the Dry Year Yield (DYY) Program for the period May 1, 2009 through April 30, 2010 and will "call" for 31,000 AF of DYY Program groundwater in storage. One impact resulting from the implementation of both programs would be a greater reduction in the amount of imported water deliveries to the DYY Program participating agencies. Table 5 shows the impact that the DYY Program shift obligation has on the amount of imported water deliveries IEUA and its Member Agencies will receive. The last column in Table 5 shows the annual imported water deliveries that IEUA and its Member Agencies will receive after complying with their respective DYY Program shift obligation.

[2] Current MWD estimate for the IEUA Level 2 allocation is 59,601 AF but this may be adjusted in response to the final MWD calculation of conservation credits and potentially other amendments to the baseline.

Table 5. IEUA and Member Agencies 2009 Imported Water Baseline Allocation With DYY Shift Obligation

Agency	IEUA & Member Agencies 2009 Baseline Allocation	DYY Shift Obligation	MWD Allocation after 2009 DYY Shift Obligation
IEUA	69,386	31,000	38,386
Water Facilities Authority	30,716	19,647	11,069
Cucamonga Valley W.D.	38,670	11,353	27,317
Fontana Water Company	0	0	0
TOTAL	69,386	31,000	38,386

The impact of the implementation of the two programs (MWD WSAP and DYY) during a Level 2 (10%) shortage allocation is a further decrease in MWD imported water deliveries to IEUA. Table 6 summarizes this impact.

Table 6. IEUA and Member Agencies Level 2 (10%) Allocation with DYY Shift Obligation

Agency	Level 2 (10%) Allocation	DYY Shift Obligation	MWD Allocation after 2009 DYY Shift Obligation
IEUA	59,601	31,000	28,601
Water Facilities Authority	26,224	19,647	6,577
Cucamonga Valley W.D.	33,377	11,353	22,024
Fontana Water Company	0	0	0
TOTAL	59,601	31,000	28,601

MWD has officially approved the DYY Shift Obligation Period to be May 1, 2009 to April 30, 2010. Therefore, depending on the amount of the DYY shift that can occur during this two month period (May and June 2009), IEUA Member Agencies will be able to reduce the impact of the DYY Program during the MWD WSAP period (July 2009 to June 2010) and maximize their imported water allocation for surface deliveries at CB12 and CB16.

3.5 Maximize Local Water Supplies Scenario

One of the core principles of the IEUA Drought Plan is to maximize the development and use of local water supplies, including recycled water, desalter water, groundwater and increased water efficiency. Current water demands in the IEUA service area are significantly less than IEUA's projected water supplies for 2009, which include MWD's 69,386 AF baseline allocation to IEUA. This suggests that increased local supplies will greatly enhance the service area's ability to cope with MWD's imported water allocations.

Table 7 provides a comparison of the projected demands and supplies for the baseline period (2004-2006), the actual IEUA water use in 2007/2008 and the projected water supplies under a MWD WSAP Baseline Allocation. Table 8 is similar to Table 7, but includes an added column that summarizes how local water supplies will help to address the reduction in MWD imported deliveries under a MWD level 2 (10%) shortage allocation.

Table 7. IEUA and Member Agencies Projected Water Supplies Table

Water Source	IEUA's Baseline (2004-2006) AF	IEUA 2007/08 Water Use AF	IEUA's 2009/10 Projected Supply AF
Imported (MWD)	51,992	69,000	69,386
3-Year Average (2004-06)			51,992
Local Supplies			
Groundwater	166,815	132,000	160,000
Surface Water	18,361	18,000	18,000
Chino Desalters	**6,228**	**15,000**	**15,000**
Recycled	**--**	**8,000**	**20,000**
In-Lieu	17,947	--	--
SUB-TOTAL	***209,351***	***190,000***	***213,000***
TOTAL Imported and Local Supplies	**261,343**	**242,000**	**282,000**
IEUA Projected Demand		**242,000**	**242,000**

Table 8. IEUA and Member Agencies Projected Water Supplies At a Level 2 (10%) Shortage Allocation

Water Source	IEUA's Baseline (2004-2006) AF	IEUA FY 07/08 Water Use AF	IEUA's FY 09/10 Projected Supply AF	FY 09/10 Level 2 Shortage (10%) AF
Imported (MWD)	51,992	69,000	69,386	59,601
3-Year Average (2004-06)			51,992	51,992
Local Supplies				
Groundwater	166,815	132,000	160,000	160,000
Surface Water	18,361	18,000	18,000	18,000
Chino Desalters	**6,228**	**15,000**	**15,000**	15,000
Recycled	**--**	**8,000**	**20,000**	20,000
In-Lieu	17,947	--	--	--
SUB-TOTAL	***209,351***	***190,000***	***213,000***	***213,000***
TOTAL Import/Local Supplies	**261,343**	**242,000**	**282,000**	**272,000**
IEUA Projected Demand		**242,000**	**242,000**	**242,000**

3.6 IEUA Penalties

MWD enforces Member Agency allocations through a penalty rate structure. The applicable rates are based on MWD's established tiered pricing structure. Penalty rates and charges will only be assessed to the extent that an agency's total annual usage exceeds its total annual allocation.

Funds collected by MWD (through penalty rates) will be applied towards investments in conservation and local resources development within the service area of the Member Agency that incurs the penalties. MWD will assess penalties at the end of the twelve-month allocation period and currently proposes to provide Member Agencies with three months to pay any penalties that are incurred.

If the MWD WSAP is implemented by MWD and IEUA is assessed penalties, IEUA will enact penalty rates consistent with the MWD WSAP and the IEUA Drought Plan pursuant to IEUA Ordinance 70, Division II, Part II, Section 201. IEUA will not assess penalties if the whole IEUA service area is in compliance with its MWD WSAP allocation after the July 2009 – June 2010 period, even though WFA, CVWD or possibly FWC may exceed its IEUA Drought Plan allocation. This is consistent with IEUA's historic Tier 1 and Tier 2 billing procedures.

Table 9. MWD Penalty Rates under MWD Water Supply Allocation Plan

Standard MWD Penalty Rates			
Water Use	Base Water Rate	Penalty Rate	Total Rate
100% of Allocation	Tier 1	0	Tier 1
Between 100% and 115%	Tier 1	2 x Tier 2	Tier 1 + (2 x Tier 2)
Greater Than 115%	Tier 1	4 x Tier 2	Tier 1 + (4 x Tier 2)

3.7 IEUA Billing Under an MWD Allocation

If the MWD WSAP is implemented by MWD, IEUA's monthly billing process will remain the same. At the end of the twelve-month allocation period, IEUA will receive from MWD an invoice that includes an assessment of penalties if IEUA's 2009 MWD WSAP allocation has been exceeded. IEUA will summarize WFA, CVWD and FWC total imported water purchases based upon the monthly MWD invoices to IEUA and determine whether either agency exceeded its individual allocation. Based on this determination, IEUA will assess penalties in accordance with IEUA's adopted Ordinance 70, but only if IEUA is assessed a penalty from MWD. If penalties are incurred, IEUA will allow payment of these penalties, consistent with the MWD WSAP, to be spread over three monthly billing periods. IEUA will work as needed with each member agency to develop an appropriate payment schedule.

MWD has an administrative procedure for reviewing and making changes to the MWD WSAP allocation based upon loss of local supplies and other extraordinary conditions. IEUA will work with the Member Agencies and MWD to ensure that any changes to the MWD WSAP allocation are appropriately considered before penalties are assessed to any agency within the IEUA service area.

3.8 IEUA Tracking and Reporting

Consistent with current IEUA practice and the requirements of the MWD WSAP and the DYY Program, Member Agency imported water purchases and local water use will be summarized and reported on a monthly basis. This information will help IEUA and its Member Agencies to monitor and evaluate water use demands, project annual usage and avoid any over usage that would result in MWD WSAP and DYY Program penalties. IEUA will rely on the full cooperation of Member Agencies to collect monthly water demand and supply information in a timely manner.

3.9 Revisiting the IEUA Drought Plan

Principal objectives in the development of the IEUA Drought Plan are to ensure equity and fairness throughout IEUA's service area. However, due to the complexity of these issues and the possibility that unforeseen circumstances may occur, IEUA offers the opportunity to review and refine components of this plan as appropriate.

IEUA and the Member Agencies will continue to meet regularly during the next year to monitor DYY Program and MWD WSAP performance and will have the opportunity to revisit the plan and offer any recommendations to the IEUA Board that will improve the method, calculation, and approach of this plan.

Metropolitan has a similar process which will allow opportunity to review the MWD WSAP as approved.

Section 4 – Summary

In February 2008, in anticipation of possible water supply shortages, the MWD Board of Directors adopted the Water Supply Allocation Plan (MWD WSAP). The MWD WSAP provides guidance for allocating limited water supplies to Member Agencies should the need arise. MWD is closely monitoring water supply conditions. If it is determined the MWD WSAP needs to be implemented, this decision will be made by the MWD Board of Directors on April 14, 2009, and the plan would go into effect July 1st, 2009.

The Inland Empire Utilities Agency (IEUA) Drought Plan was developed for the purpose of implementing the MWD WSAP within the IEUA's service area in a manner that is fair and equitable to IEUA's Member Agencies. The IEUA Drought Plan is an extension of the MWD WSAP. All MWD WSAP definitions, policies, principals and program provisions are incorporated here by reference and are considered to be a part of the IEUA Drought Plan. A complete copy of the adopted MWD WSAP is provided as Appendix A.

IEUA's Drought Plan is consistent with and contributes to the existing IEUA policies and programs. For example, the plan's principles encourage development and full utilization of local water resources, such as recycled water, and extraordinary conservation measures. The plan also addresses MWD's DYY Program and the need for best management of the DYY Program "shift" obligations in concurrence with the MWD WSAP reductions of imported water supplies to IEUA.

APPENDIX L

Retail Agency Drought Plans

ORDINANCE NO. 286

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CHINO HILLS, CALIFORNIA, REPEALING CHAPTER 13.08 WATER CONSERVATION AND ORDINANCE NO. 214 OF THE CHINO HILLS MUNICIPAL CODE IN ITS ENTIRETY, AND ESTABLISHING A NEW CHAPTER 13.08 WATER CONSERVATION OF THE CHINO HILLS MUNICIPAL CODE AND FINDING THAT THIS PROJECT IS EXEMPT FROM REVIEW UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF CHINO HILLS DOES HEREBY ORDAIN AS FOLLOWS:

SECTION 1. The City Council does hereby make the following findings of fact:

a. It is necessary to repeal the exisiting Chapter 13.08 Water Conservation and Ordinance No. 214 as both no longer comply with State of California regulations and current water enacted requirements.

b. It is necessary to establish a new Chapter 13.08 Water Conservation in its stead so as to comply with California State Water Resources Control Board Regulations as adopted on May 5, 2015.

c. It is necessary to minimize the potential for water shortage through the practice of water conservation pursuant to California Water Code § 375 et seq., based upon the need to conserve water supplies and to avoid or minimize the effects of any future shortage.

d. It is further necessary to reduce the potential effect of a water shortage on the residents, businesses and visitors of Chino Hills and to adopt provisions that will significantly reduce the inefficient consumption of water, thereby extending the available water resources necessary for the domestic, sanitation, and fire protection of the community to the greatest extent possible.

e. On January 17, 2014, the Governor issued a proclamation of a state of emergency under the California Emergency Services Act based on drought conditions.

f. On April 25, 2014, the Governor issued a proclamation of a continued state of emergency under the California Emergency Services Act based on continued drought conditions.

g. On April 1, 2015, the Governor issued an Executive Order that, in part, directs the Califonia State Water Resources Control Board to impose restrictions on water suppliers (including the City of Chino Hills) to achieve a statewide 25 percent reduction to potable urban usage through February 28, 2016.

h. The drought conditions that formed the basis of the Governor's emergency proclamations continue to exist.

i. The present year is critically dry and has been immediately preceded by two or more consecutive below normal, dry, or critically dry years.

j. The drought conditions will likely continue for the foreseeable future and additional action by both the California State Water Resources Control Board and local water suppliers will likely be necessary to prevent waste and unreasonable use of water and to further promote conservation.

k. On May 5, 2015, the California State Water Resources Control Board adopted California Code of Regulations, title 23, section 866 and re-adopted sections 863, 864, and 865 that requires, among other things, that, beginning June 1, 2015, the City of Chino Hills reduce its total potable water production by 28 percent for each month as compared to the amount used in the same month in 2013.

l. California Water Code section 375 et seq. empower any public entity which supplies water at retail or wholesale to adopt and enforce a water conservation program to reduce the quantity of water used by those within its service area after holding a public hearing and making appropriate findings of necessity for the adoption of a water conservation program.

m. Pursuant to California Water Code Section 375, on May 16, 2015, the City published notice in the Chino Champion, a regularly published newspaper, providing notice of the time and place of the May 26, 2015 public hearing on the proposed ordinance. A duly noticed public hearing before the City Council was conducted on May 26, 2015, at which time all interested persons were given an opportunity to testify.

n. Based on the facts noted above, and all other facts presented to the City Council, this ordinance is adopted for the immediate preservation of the public peace, health or safety and is passed by no less than a four-fifths vote of the City Council.

SECTION 2. The City Council finds that this ordinance is exempt from review under the California Environmental Quality Act (California Public Resources Code §§ 21000, et seq., "CEQA") and CEQA regulations (Title 14 California Code of Regulations §§ 15000, et seq.) because it consists of the operation of existing facilities involving no expansion of use and consists of actions taken to assure the maintenance, protection and enhancement of natural resources and the environment. Consequently, it is categorically exempt from further CEQA review under California Code of Regulations Title 14, §§ 15301, 15307 and 15308.

SECTION 3. That Chapter 13.08 Water Conservation of the Chino Hills Municipal Code and Ordinance No. 214 are hereby repealed in their entirety.

SECTION 4. That Chapter 13.08 Water Conservation of the Chino Hills Municipal Code is hereby adopted and shall read as follows:

Chapter 13.08
WATER CONSERVATION

Sections:

13.08.010 - Findings of Necessity.

It is necessary to minimize the potential for water shortage through the practice of water conservation pursuant to California Water Code § 375 et seq., based upon the need to conserve water supplies and to avoid or minimize the effects of any future shortage. It is further necessary to reduce the potential effect of a water shortage on the residents, businesses and visitors of Chino Hills and to adopt provisions that will significantly reduce the inefficient consumption of water, thereby extending the available water resources necessary for the domestic, sanitation, and fire protection of the community to the greatest extent possible. Nothing in this chapter shall prevent the City from also declaring a water emergency pursuant to Water Code Section 350.

13.08.020 - Water Customer.

Water customer, for the purposes of this chapter, shall mean any person, partnership, business, corporation, or association or legal entity to whom the City of Chino Hills (City) supplies water or user of water supplied by the City.

13.08.030 - Application.

This chapter shall be applicable to all water customers.

13.08.040 - Exceptions and Exemptions.

A. **Exceptions**. The City Manager or his/her designee shall grant an exception from the requirements of this chapter for any of the following reasons:
   1. Water use is necessary for public health and safety; or
   2. Recycled water is being used; or
   3. Water use is necessary due to the medical needs of the water customer.

B. **Exemptions**. The Public Works Commission may grant an exemption to the requirements of this chapter, with or without conditions, if it determines that a water customer would otherwise experience extreme financial hardship that cannot be mitigated. The Public Works Commission shall review any requests for an exemption from compliance with this chapter. A written request for an exemption must be submitted to the Public Works Department a minimum of two weeks prior to the Commission meeting at which the exemption is to be considered. If appropriate, the Public Works Commission may require the customer granted an exemption to reduce water use by other appropriate alternative methods. A decision of the Public Works Commission may be appealed to the City Council in accordance with Chino Hills Municipal Code Section 1.20.010. The City Council may establish by resolution an "exemption processing fee."

13.08.050 - Authorization.

The City Council may declare the conservation stage based on any of the following circumstances:

- Issuance of a water emergency executive order by the Governor of California; or
- Adoption of certain regulations by the California State Water Resources Control Board; or
- Major interruptions in water supply from Metropolitan Water District, the Inland Empire Utilities Agency or any other major water supplier to the City; or
- Occurrence of a major water emergency emanating from a natural or man-caused disaster.

As declared, the City Council shall see to the enforcement of all prohibitions and restrictions as outlined in the following four stages:

Stage 1 - Voluntary Water Conservation Alert;
Stage 2 - Moderate Water Conservation Alert;
Stage 3 - High Water Conservation Alert; and
Stage 4 - Severe Water Conservation Alert

13.08.060 - Stage I Voluntary Water Conservation Alert.

Chino Hills water customers are requested to voluntarily limit the amount of water used from March 1st through October 31st of each year to the amount absolutely necessary for health, safety, business, and irrigation. During Stage 1, all elements of the prohibitions and restrictions for moderate, high and severe conservation alerts shall apply on a voluntary basis.

13.08.070 - Stage II Prohibitions and Restrictions — Moderate Water Conservation Alert.

The following restrictions and exceptions shall be applicable during a Moderate Water Conservation Alert as declared by the City Council, whenever the City's water supply is anticipated to be reduced by up to ten (10) percent, and voluntary conservation does not achieve the desired reduction, or whenever any of the conditions noted under Section 13.08.050 are met requiring conservation measures noted in this stage:

A. Sprinkling or irrigating any shrubbery, trees, lawns, grass, groundcovers, plants, vines, gardens, vegetables, flowers, or any other landscaped or vegetated areas between the hours of 9:00 a.m. and 6:00 p.m. This provision shall not apply to equestrian and livestock businesses, dairies, nurseries, golf courses, or other water dependent industries;
B. Applying potable water to outdoor landscapes in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures;
C. Applying potable water to any hard surface, including but not limited to driveways, sidewalks, parking areas, asphalt, patios, porches, verandas;
D. Permitting water to leak on any premises. Such leak shall be repaired in a timely manner after notification by the City, but in no case in excess of forty-eight (48) hours after notification;
E. Serving of drinking water other than upon request in eating or drinking establishments, including but not limited to restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served and/or purchased;
F. Using potable water in a non-residential fountain or other decorative water feature, except where the water is part of a recirculating system;
G. Using water from fire hydrants shall be limited to fire fighting and related activities necessary to maintain the public health, safety, and welfare. An exception may be made for construction use through a proper City-designated meter where recycled water is not available;
H. Permitting noncommercial washing of privately owned livestock, vehicles, trailers, buses or boats, except from a bucket and/or a hand-held hose equipped with a shut-off nozzle used for a quick rinse; and
I. Using a hand held hose that dispenses potable water without a shut-off valve. Such use shall not be in conflict with any provision within this code.

13.08.080 - Stage III Prohibitions and Restrictions — High Water Conservation Alert.

The following restrictions and exceptions shall be applicable during a High Water Conservation Alert as declared by the City Council whenever the City's water supply is anticipated to be reduced by more than ten (10%) percent and up to twenty-five (25%) percent or whenever any of the conditions noted under Section 13.08.050 are met requiring conservation measures noted in this Stage:

A. All prohibitions and restrictions in Section 13.08.070 shall be in effect;
B. All residential customers shall be limited in the outdoor use of water for sprinkling, watering, or irrigating any shrubbery, trees, lawns, grass, groundcovers, plants, vines, gardens, vegetables, flowers, or any other landscaped or vegetated areas to a two days per week schedule based on street address. Designated days of irrigation: Residential addresses ending in an even number may use water on Wednesdays and Saturdays and

residential addresses ending in an odd number may use water on Thursdays and Sundays. All such irrigation may only occur between 12:01 a.m. and 9:00 a.m. or between 6:00 p.m. and 12:00 a.m. and shall not exceed fifteen (15) minutes per watering-station, except for drip or micro-spray irrigation systems which shall not exceed 30 minutes per station. No irrigation shall occur between the hours of 9:00 a.m. and 6:00 p.m.;

C. Non-residential customers, including commercial nurseries, golf courses, institutions and other water dependent industries shall be prohibited from watering lawns, landscapes, or other turf areas more than twice per week. Such irrigation may only occur on Tuesdays and Fridays between 12:01 a.m. and 9:00 a.m. or between 6:00 p.m. and 12:00 a.m. and shall not exceed fifteen (15) minutes per watering-station during assigned days, except for drip or micro-spray irrigation systems which shall not exceed 30 minutes per station. No irrigation shall occur between the hours of 9:00 a.m. and 6:00 p.m. Entities using recycled water are exempted from this prohibition for their recycled water use. However, such entities are not exempted for their potable water use. Alternatively, non-residential customers may be exempted from this prohibition by reducing their potable water usage by 28 percent from their usage in 2013;

D. The outside irrigation of landscapes with City-supplied potable water for new construction of homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission;

E. The application of potable water to outdoor landscapes during and within 48 hours after measurable rainfall is prohibited. Measureable rainfall is defined as rainfall of one tenth of an inch (1/10") or more falling within a forty eight (48) hour period;

F. To promote water conservation, operators of hotels and motels shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language;

G. Swimming pool refilling or new-construction swimming pool filling shall be limited to the same days as set forth in subsection B for outdoor use of water;

H. Washing of vehicles or boats is prohibited except:
   1. When using a hose that is equipped with a shut-off valve; or
   2. When washed in either an automatic or manual commercial car wash. Notwithstanding the above, temporary car washes held for fundraising purposes are prohibited;

I. Use of misting systems, commonly used in business establishments for cooling purposes, are prohibited;

J. Use of potable water for dust control is prohibited where recycled water is readily available for connection by the property owner.

13.08.090 - Stage IV Prohibitions and Restrictions—Severe Water Conservation Alert.

In the event of a major earthquake, large-scale fire, or other so called "Act of Nature" which could have serious impacts on the City's total available water storage capacity, whether storage capacities have been reduced or not, or in the case of a reduction in City water supply anticipated to be more than twenty-five (25%) percent or whenever any of the conditions noted under Section 13.08.050 are met requiring conservation measures noted in this Stage, a Severe Water Conservation Alert shall be declared by the City Council. The following conservation measures shall apply:

A. All previous restrictions noted in Sections 13.08.070 and 13.08.080 shall be in effect;
B. There shall be no outdoor use of water at any time, including the use of a hand-held hose with shut-off valve;
C. All decorative fountains, decorative (i.e., non-swimming) pools shall be drained and made dry. Such fountains and pools shall not be refilled until the City has returned to a Stage III water conservation stage. Fountains, ponds or pools that are filled with recycled water are not subject to this provision. Decorative ponds that contain fish as a feature shall be exempt from this restriction as long as the system is maintained in good working order with measures taken to reduce the volume of makeup water required for evaporative losses; and
D. No commitments shall be made to provide water service as part of any new land use entitlement (general plan, specific plan or amendments requesting new water allocations) until the City has returned to a stage three drought restriction. Currently approved specific plans with accompanying development agreements and projects or properties that have received water allocations in advance of full entitlements may be issued building permits so long as they comply with the remainder of this chapter.

13.08.100 - Penalties.

A. No water customer of the City shall knowingly use, or permit the use of, water in a manner contrary to any provision of this chapter, or in an amount in excess of that use permitted by the provisions of this chapter;
B. Unless otherwise provided, any water customer violating any provision of this chapter shall be guilty of an infraction or misdemeanor as specified in this section, and each day or portion thereof such violation, which is in existence, shall be a new and separate offense;
C. Any violation of this chapter is deemed an infraction, punishable as provided in Section 1.36.020 of this code. Subsequent violations shall also be punished as provided in Section 1.36.020 of this code;
D. Notwithstanding the above, the City Attorney or Deputy District Attorney may charge and prosecute second and subsequent offenses as misdemeanors at the City's sole discretion pursuant to California Water Code § 377. In addition to the above penalties, the City may file an action

for civil abatement and, at the discretion of the court, be entitled to reimbursement for all necessary costs and attorney's fees incurred through investigation, discovery, analysis, inspection, abatement and other actual costs incurred by the City or its agents pertaining to the violation;

E. The court shall fix the amount of any such reimbursements upon submission of proof of such costs by the City. Payment of any penalty provided in this section shall not relieve a person, firm or corporation, or other entity from the responsibility of correcting the condition resulting from the violation; and

F. In addition to the above remedies, the City Manager or his/ her designee is empowered, to enforce any or all of the following penalties:
   1. Place a flow restricting device upon the water service;
   2. Lock off a water meter;
   3. Remove a water meter; and
   4. Shut off the service connection.

All costs or expenses incurred by the City for enforcement of this section shall be borne by the water customer. No water service shall be limited or discontinued until the City Manager or his/her designee provides a written notice of intent to so limit or discontinue such service and the reasons for such decision, and further, provides such water customer notice of the right to request an administrative review and hearing pursuant to the procedures set forth in Section 1.18.090 of this code, except that any reference to "citation" in that section shall instead be deemed a reference to a "notice of intent" as described in this section. A written notice of intent shall be provided either by first class mail, by personal service to the water customer, or by posting said notice in a conspicuous place on the property wherein the violation occurred. Notwithstanding any other provision of this code, there shall be no right to further administrative review or appeal.

13.08.110 - Compliance.

Any City Code Enforcement Officer, Utility Conservation Coordinator and any other employee designated by the City Manager shall enforce the provisions of this chapter.

13.08.120 – Implementing policies.

The City Manager is authorized to promulgate policies and procedures to implement this chapter.

SECTION 4. If any section, subsection, subdivision, sentence, clause, phrase, or portion of this Ordinance is, for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of this Ordinance. The City Council hereby declares that it would have adopted this Ordinance, and each section, subsection, subdivision, sentence, clause, phrase, or portion thereof, irrespective of the fact that any one or more sections, subsections, subdivisions, sentences, clauses, phrases, or portion thereof be declared invalid or unconstitutional.

SECTION 5. Upon the effective date of this Ordinance, the provisions hereof shall supersede any inconsistent or conflicting provisions of the San Bernardino County Code as the same were adopted by reference by City Ordinance Nos. 91-01 and 92-02.

SECTION 6. This Ordinance must be broadly construed in order to achieve the purposes stated in this Ordinance. It is the City Council's intent that the provisions of this Ordinance be interpreted or implemented by the City and others in a manner that facilitates the purposes set forth in this Ordinance.

SECTION 7. Repeal of any provision of the Chino Hills Municipal Code does not affect any penalty, forefeiture, or liability incurred before, or preclude prosecution and imposition of penalties for any violation occurring before, this Ordinance's effective date. Any such repealed part will remain in full force and effect for sustaining action or prosecuting violations occurring before the effective date of this ordinance.

SECTION 8. The City Clerk shall certify as to the adoption of this Ordinance and shall cause a summary thereof to be published within ten (10) days of the adoption and shall post a certified copy of this Ordinance, including the vote for and against the same, in the Office of the City Clerk, in accordance with Government Code Section 36933 and Water Code Section 376.

SECTION 9. This ordinance will become effective upon its passage and adoption as provided in Water Code Section 376, subdivision (a).

PASSED, APPROVED AND ADOPTED this 9th day of June, 2015.

CYNTHIA MORAN, MAYOR

ATTEST:

CHERYL BALZ, CITY CLERK

APPROVED AS TO FORM:

MARK D. HENSLEY, CITY ATTORNEY

STATE OF CALIFORNIA)
COUNTY OF SAN BERNARDINO) ss
CITY OF CHINO HILLS)

I, CHERYL BALZ, City Clerk of the City of Chino Hills, DO HEREBY CERTIFY that Ordinance No. 286 was duly introduced at a regular meeting held May 26, 2015; and adopted at a regular meeting of the City Council held on the 9th day of June, 2015 by the following roll call vote, to wit:

AYES:	COUNCIL MEMBERS:	MORAN, BENNETT, GRAHAM, MARQUEZ, AND ROGERS.
NOES:	COUNCIL MEMBERS:	NONE
ABSENT:	COUNCIL MEMBERS:	NONE

CHERYL BALZ, CITY CLERK

(SEAL)

I hereby certify that the foregoing is the original of Ordinance No. 286 duly passed and adopted by the Chino Hills City Council at their regular meeting held on June 9, 2015, and that Summaries of the Ordinance were published on May 30, 2015 and June 13, 2015 in the Chino Hills Champion newspaper.

CHERYL BALZ, CITY CLERK

(SEAL)

AFFIDAVIT OF POSTING

STATE OF CALIFORNIA)
CITY OF CHINO HILLS) §.
COUNTY OF SAN BERNARDINO)

Cheryl Balz, being first duly sworn, deposes and says:

That she is the duly appointed and qualified City Clerk of the City of Chino Hills;

That in compliance with the State laws of the State of California, a certified copy of the full text of proposed Ordinance No. 286, being:

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CHINO HILLS, CALIFORNIA, REPEALING CHAPTER 13.08 WATER CONSERVATION AND ORDINANCE NO. 214 OF THE CHINO HILLS MUNICIPAL CODE IN ITS ENTIRETY, AND ESTABLISHING A NEW CHAPTER 13.08 WATER CONSERVATION OF THE CHINO HILLS MUNICIPAL CODE AND FINDING THAT THIS PROJECT IS EXEMPT FROM REVIEW UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

attached hereto and made a part hereof, was caused to be posted in the Office of the City Clerk.

Dated this 9th day of June, 2015.

CHERYL BALZ, CITY CLERK

(SEAL)

ORIG: Vault   XC: H.Miller(PW); City Attorney

ORDINANCE NO 2009-04

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CHINO, CALIFORNIA, AMENDING CHAPTER 13 05 (ORDINANCE NO 91-21) OF THE CHINO MUNICIPAL CODE

The City Council of the City of Chino hereby does ordain as follows:

Section 1. Chapter 13.05 of the Chino Municipal Code hereby is amended in full and it shall read as follows:

Chapter 13.05

WATER CONSERVATION

Sections:

13.05.010 Purpose and Policy

It is declared that because of the water conditions prevailing in the State of California, the statewide drought and the declared policy of the state, it is necessary and appropriate for the City to adopt and implement a water conservation program to reduce the quantity of water used by persons in the city Furthermore, the general welfare requires the reasonable and efficient use of the City's water resources, the waste or unreasonable use of water to be prevented, and the implementation of water conservation measures that will reduce water consumption within the City's service area.

13.05.020 City Council Authority

A. The City Council shall authorize and direct implementation of the applicable provisions of this chapter upon determination that such implementation is necessary to protect the public health, welfare and safety, or when the demand for water consumption threatens to exceed the City's available supply of potable water to the customer

B. When any water shortage stage of this chapter is declared by resolution of the City Council, the specific level called for shall be made by public announcement and shall be published at least twice in a newspaper of general circulation and shall become effective immediately on the date specified in the newspaper publications. When any other water shortage stage is declared or the drought conditions no longer exist, then publication of the applicable portion of this chapter, or a statement stating that the drought conditions no longer exist, shall be published an additional two times.

13.05.030 Definitions

Unless the context specifically indicates otherwise, the following terms and phrases, as used in this chapter, shall have the meanings hereinafter designated:

A. "City Council" means the Council of the City of Chino

B. "Conservation Offset" means the implementation of proven conservation techniques which, when installed, will result in no additional demand on water supplies.

C "Customer" means any person, persons, association, corporation, or governmental agency supplied and/or billed for water service by the City

D "Graywater" means untreated household wastewater which has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and clothes washing machines.

E. "Potable Water" means water which is suitable for drinking.

F "Recycled Water" means treated domestic water (effluent) from a wastewater treatment plant that is suitable for a direct beneficial use or a controlled use that would not otherwise occur

G. "Single Pass Cooling Systems" means equipment where water is circulated only once to cool equipment before being disposed.

H. "Water Shortage" means a determination by the City in consideration of the existing conditions of water production and/or an announcement by any state water agency, the Metropolitan Water District of Southern California, or any of its water suppliers.

13.05.040 Applicability

The provisions of this chapter shall apply to all persons, customers, or property, wherever situated, utilizing water provided by the City

13.05.050 Party Responsible for Compliance

A. For purposes of this chapter, it shall be presumed that a person, corporation or association in whose name the water service account with the City is or was last billed or who is receiving the economic benefit of said water supply will be responsible for complying with this chapter

B. For the purpose of this chapter, a use of water by a tenant or by an employee, agent, contractor or other acting on behalf of a customer, whether with real or ostensible authority, shall be imputed to the customer

13.05.060 Adequate Water Supply Conditions – Permanent Measures

The following activities are hereby prohibited at all times:

A. Allowing irrigation water to run off into a gutter, ditch, drain, driveway, sidewalk, street or onto pavement or other hard surface.

B. Outdoor irrigation of landscape for more than fifteen (15) minutes of watering per day per station. This restriction does not apply to landscapes that utilize drip irrigation systems.

C. Automated irrigation of landscape during the hours of six a.m. to eight p.m. Customers are encouraged to avoid the use of sprinklers on windy days. Irrigation by hand held hoses with automatic shutoff nozzles, drip irrigation, or hand held buckets is permitted anytime.

D Outdoor irrigation of landscape on rainy days.

E. Washing down hard or paved surfaces, including but not limited to sidewalks, walkways, driveways, parking areas, patios, and alleys, except when necessary to alleviate safety or sanitary hazards.

F Excess use, loss or escape of water through breaks, leaks, or other malfunctions in the plumbing system or distribution system for any period of time after such escape of water should have reasonably been discovered and corrected.

G. Washing of automobiles, trucks, trailers, boats, airplanes, and other types of mobile equipment, unless done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses.

H. Restaurants serving water to their customers, except when specifically requested by their customers.

I Operating a decorative water fountain or feature, built or installed after the adoption of this ordinance, that does not include re-circulated water

J. Operating a commercial car wash or laundry, built or installed after the adoption of this ordinance, that does not use re-circulated water

K. Operating a single-pass cooling system built or installed after the adoption of this ordinance.

13.05.070 Stage 1 Water Shortage – Restrictions to Take Effect

The following additional measures shall take effect upon a declaration by the City Council that needed supplies are anticipated to be reduced approximately ten percent or less. Upon this declaration, the following restrictions shall apply to all customers or persons who use the water utility of the City·

A. Restaurants shall not use non-conserving dish spray valves.

B. Ornamental lakes or ponds shall not be filled or refilled with potable water, except to the extent needed to sustain aquatic life.

C Outdoor irrigation of landscape with potable water will only be allowed every other day from May 1st through September 30th.

13.05.080 Stage 2 Water Shortage – Restrictions to Take Effect

In the event the City Council determines that the measures outlined in Sections 13 05.060 and 13.05.070 do not produce a sufficient reduction in demand, or if the estimated needed supplies are reduced approximately ten percent to twenty percent, then the following additional restrictions shall be implemented:

A. Outdoor irrigation of landscape with potable water will only be allowed every other day

B Hotels, motels, and other commercial lodging establishments shall not launder towels and linen daily, except when specifically requested by their customer

13.05.090 Stage 3 Water Shortage – Restrictions to Take Effect

In the event the City Council determines that the measures outlined in Sections 13.05.060, 13.05.070 and 13.05.080 do not produce a sufficient reduction in demand or if the estimated needed supplies are reduced approximately twenty percent or more, then the following additional restriction shall be implemented:

A. Potable water service will not be provided to new land development projects except under the following circumstances:

1 A valid building permit has been issued for the project, or

2. The project is necessary to protect public health, safety, and welfare, or

3. The applicant provides evidence that the project will include conservation offsets prior to the provision of new water service.

13.05.095 General Provisions

A. Recycled water shall be used instead of potable water for landscape irrigation, construction, dust control, and other approved uses to the extent feasible where recycled water is available to supply all or some of the water demand.

B. All measures and restrictions outlined in this chapter shall apply to recycled water use except for Subsections 13.05.070(B), 13.05.070(C), 13.05.08(A), and 13.05.090(A).

C All restrictions resulting from any water shortage stage shall remain in effect with each successive and more severe water shortage stage until such time that the City Council changes a particular restriction or declares that drought conditions no longer exist.

D Additional restrictions may be implemented as determined by the City, after notice to customers.

13.05.100 Exceptions to Provisions

None of the restrictions outlined in this chapter shall apply to the following:

A. The routine and necessary use of water by a governmental entity in pursuit of its functions for protecting the public health, safety and welfare. This exception does not apply to landscape irrigation by a governmental agency

B. The necessary use of water for the routine maintenance and/or repair of water distribution facilities, residential and commercial plumbing, and existing landscape irrigation systems.

C The prohibited uses set forth in this subsection do not apply to Graywater This provision shall not be construed to authorize the use of Graywater if such use is otherwise prohibited by law

13.05.105 Exemptions from Provisions

Nothing contained in Sections 13.05.070 through 13.05.090 shall require any single-family residential customer to reduce the customer's consumption of water to any amount less than nine billing units per month (two hundred twenty-four gallons per day) during any billing period.

13.05.110 Hardship and Special Cases – Implementation/Review Board

A. A Review Board is established to review hardship and special cases which cannot follow the letter of this chapter The Review Board shall consist of any two of the following or their respective designees: Director of Community Development, Director of Finance, or Director of Public Works. Appeal of any Board decision shall be made to the City Manager

B. It is the purpose of the Review Board to review hardship or special cases and to determine whether or not said case warrants an exemption. The decision of the Review Board shall be prepared in writing, include terms and conditions, if any, set forth findings in support of the decision, and are promptly sent to the applicant. The Board shall consider the facts of each case and decide whether to grant an exemption within five working days of the receipt of a properly completed "Application for Exemption from Mandatory Water Restrictions" form. The application must include pertinent information and a written statement from the applicant. An exemption shall be granted for reasons of economic hardship which is defined as, but not limited to, a threat to an individual business's primary source of income (but under no circumstances shall inconvenience or the potential for damage of landscaping be considered an economic hardship which justifies an exemption.) An exemption may also be granted in instances where the water use restrictions cannot be met without threatening public health or safety, or there has been a significant change in the customer's circumstances. No exemption will be granted to any customer for any reason in the absence of a demonstration that the customer has achieved the maximum practical reduction in water consumption. The Board shall authorize only the implementation of equitable water use restrictions which further the purpose and intent of the emergency water conservation plan. The special water use restrictions authorized by the Board in each special or hardship case shall be set forth on the face of the exemption.

C An exemption to any element of this ordinance granted under any adequate water supply condition or water shortage condition shall not be valid upon implementation of any more severe water supply condition of this chapter An exemption expires under its own terms and conditions and/or when the next higher stage of the emergency water conservation ordinance takes effect. A separate application for exemption must be submitted at each higher stage of the water conservation ordinance unless the exemption conditions specifically do not require such separate application.

D Any person, corporation or association who is granted an exemption and makes use of the water utility of the City pursuant to said exemption shall provide proof of said exemption upon demand by any peace officer or person authorized by the City to enforce this chapter Upon conviction of any person, corporation or association for violating any provision of this part, the Review Board shall revoke any exemption previously granted. However, the Board shall notify applicant of the proposed revocation in writing no less than five working days before taking such action, and applicant shall be given the opportunity to be heard by the Review Board prior to its taking such action.

E. Persons wishing to appeal the decision of the Board shall have the right of appeal to the City Manager Appeal shall be made in writing within ten working days of the Board decision. The decision of the City Manager shall be final.

13.05.120 Failure to Comply – Violation /Penalty

A. Penalties. It is unlawful for any water customer to fail to comply with any of the provisions of this chapter Notwithstanding any other provision of the City Code, the penalties set forth herein shall be exclusive and not cumulative with any other provisions of this code. Furthermore, any and all violations that occur on any one day shall be treated as one violation for the purposes of determining a penalty under Subsection B. The penalties for failure to comply with the provisions of this chapter shall be as set out in subsection B of this section.

B. Range of Penalties

1 For the first violation by any customer of any of the provisions of sections 13.05.060, 13.05.070, 13.05.080, or 13.05 090, the City shall issue a written notice of the fact of such violation to the customer

2. For a second violation by any customer of any of the provisions of sections 13.05.060, 13.05.070, 13.05.080, or 13.05.090 within the same twelve month period beginning with the first violation, the City shall issue a final written notice of the fact of such violation to the customer

3. For a third violation by any customer of any of the provisions of sections 13.05.060, 13.05.070, 13.05.080, or 13.05.090 within the same twelve month period beginning with the first violation, a surcharge in the amount of fifty dollars shall be added to the customer's water bill.

4 For a fourth violation by any customer of any of the provisions of sections 13.05.060, 13.05.070, 13.05.080, or 13.05.090 within the same twelve month period beginning with the first violation, a surcharge in the amount of one hundred dollars shall be added to the customer's water bill that follows the customer's water bill containing the fifty dollar surcharge for the third violation.

5 For a fifth and any subsequent violation by any customer of any of the provisions of sections 13.05.060, 13.05.070, 13 05 080, or 13.05.090 within the same twelve month period beginning with the first violation, a surcharge in the amount of one hundred and fifty dollars shall be added to the customer's water bill that follows the customer's water bill containing the one hundred dollar surcharge for the fourth violation.

6. After a fifth violation of sections 13.05 060, 13.05.070, 13.05.080 or 13.05.090 within the same twelve month period beginning with the first violation, the City may install a flow restricting device of one gallon per minute (1 GPM) capacity for services up to one and one-half inch size and comparatively sized restrictors for larger services. Such action shall be taken only after a hearing

held by the Review Board where the customer has an opportunity to respond to the City's information or evidence that the customer has repeatedly violated this chapter's rules regarding the conservation of water and that such action is reasonably necessary to assure compliance with this chapter regarding the conservation of water Appeal of Board decisions shall be made in writing to the City Manager within ten working days of the Board hearing. The decision of the City Manager shall be final. Any such restricted service may be restored upon application of the customer made not less than forty-eight hours after the implementation of the action restricting service and only upon a showing by the customer that the customer is ready, willing and able to comply with the provisions of this chapter's rules regarding the conservation of water Prior to any restoration of service, the customer shall pay all City charges for any restriction of service and its restoration as provided for in a separate ordinance.

Section 2. Severability If any section, subsection, sentence, clause, phrase or portion of this Ordinance is held invalid or unconstitutional by any court of competent jurisdiction, such determination shall not affect the validity of the remaining portions of this Ordinance. The City Council declares that it would have enacted this Ordinance and each section, subsection, sentence, clause and phrase hereof irrespective of any determination of invalidity

Section 3. The City Clerk of the City of Chino shall certify to the passage and adoption of this Ordinance and shall cause the same to be published in a newspaper of general circulation, printed and published within said City in accordance with the provisions of the Government Code.

APPROVED AND ADOPTED THIS 5th DAY OF MAY 2009

DENNIS R. YATES, MAYOR

ATTEST

LENNA J. TANNER, CITY CLERK

State of California)
County of San Bernardino) §
City of Chino)

I, Lenna J. Tanner, City Clerk of the City of Chino, do hereby certify the foregoing Ordinance was duly adopted by the Chino City Council at a regular meeting held on the 5th day of May 2009, by the following votes:

AYES: COUNCIL MEMBERS: YATES, DUNCAN, ELROD, HAUGHEY, ULLOA

NOES: COUNCIL MEMBERS: NONE

ABSENT COUNCIL MEMBERS: NONE

LENNA J. TANNER, CITY CLERK

CHAPTER 8A: EMERGENCY WATER CONSERVATION

Sec. 6-8.20. Scope and title.

This Chapter shall be known as "The Water Conservation Plan of the City of Ontario."

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.21. Statement of policy and declaration of purpose.

(a) Because of the water supply conditions prevailing in the City and/or the area from which the City obtains a portion of its supply, the general welfare requires that the water resources available to the City of Ontario be put to the maximum beneficial use to the extent to which they are capable, and that the waste or unreasonable use, or unreasonable method of use of water be prevented and that the conservation of such water be practiced with a view to that reasonable and beneficial use thereof in the interest of the people of the City.

(b) The purpose of this chapter is to minimize the potential for water shortage through the practice of water conservation, and to minimize the effect of a shortage of water supplies on the water customers of the City. It is furthermore the intent of this chapter to adopt provisions that will significantly reduce the inefficient consumption of water, thereby extending the available water resources necessary for the domestic, sanitation, and fire protection of the community to the greatest extent possible.

(c) This chapter shall be applicable to all water customers. For the purposes of this chapter, any person, business, corporation, or association to whom the city supplies water shall be considered a water customer.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.22. Authorization.

(a) The City Council may declare a water shortage based on a determination by Metropolitan Water District or the Inland Empire Utilities Agency, or based upon any interruption in water supply or delivery that the City Council determines in its sole discretion necessitates water conservation pursuant to this chapter.

(b) In the event of an unplanned interruption of water supply causing a water shortage, the City Manager or his/her designee is authorized to restrict water use and apportion the available supply of water among its customers in the most equitable manner possible to continue service fairly and without discrimination, except that preference shall be given to such service as is essential to the public interest and to the preservation of life and health.

(c) A notice of a water shortage shall be published in a daily newspaper of general circulation within the City. Any restrictions on the use of water shall become effective immediately upon such publication.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.23. General prohibitions.

(a) The following are prohibited in new connections:

(1) Non-recycling decorative fountains;

(2) Single-pass cooling systems; and

(3) Conveyor and in-bay vehicle wash and commercial laundry systems which do not reuse water.

(b) No water customer of the City shall make, cause, use, or permit the use of water from the City in a manner contrary to any provision of this chapter or in an amount in excess of the use permitted by any restriction provisions then in effect pursuant to the provisions of this chapter.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.24. Exceptions.

(a) The prohibited uses of water and water use restrictions provided within this chapter are not applicable for the use of recycled water or the use of potable water necessary to public health and safety or for essential government services such as police, fire and other similar services.

(b) Nothing contained within this chapter shall be construed to require the city to curtail the supply of water necessary for the health, safety, and welfare of any customer.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.25. Voluntary conservation.

Water customers are encouraged to voluntarily limit the amount of water used to the amount absolutely necessary for health, business, and irrigation. The following elements of conservation apply at all times on a voluntary basis:

(a) Avoid hose washing of sidewalks, walkways, driveways, parking areas or other paved surfaces, except as required for sanitary purposes.

(b) Wash motor vehicles, trailers, boats and other types of mobile equipment using a hand held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, or at the immediate premises of a commercial car wash or with recycled wastewater for approved uses.

(c) Avoid using water to clean, fill or maintain levels in decorative fountains, ponds, lakes or other

similar aesthetic structures unless such water is part of a recycling system.

(d) Encourage restaurants, hotels, cafés, cafeterias or other public places where food is sold, served or offered for sale, to serve drinking water only to those customers expressly requesting water.

(e) Promptly repair all leaks from indoor and outdoor plumbing fixtures.

(f) Avoid watering lawn, landscape or other turf area more often than every other day and during the hours between 6:00 a.m. and 6:00 p.m.

(g) Avoid causing or allowing the water to run off landscape areas into adjoining streets, sidewalks or other paved areas due to incorrectly directed or maintained sprinklers or excessive watering.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.26. Stage 1 water shortage-water supply reduced by up to ten percent (10%).

(a) The following restrictions on the use of potable water shall be applicable when the City Council determines that the City's water conservation goals are not being met by voluntary water conservation measures, or that the City's water supplies are likely to be reduced by up to ten percent (10%).

(1) There shall be no hose washing of sidewalks, walkways, driveways, parking areas or other paved surfaces, except as required for sanitary purposes.

(2) Washing of motor vehicles, trailers, boats and other types of mobile equipment shall be done only with a hand-held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, except that washing may be done at the immediate premises of a commercial car wash or with reclaimed wastewater.

(3) No water shall be used to clean, fill or maintain levels in decorative fountains, ponds, lakes or other similar aesthetic structures unless such water is part of a recycling system.

(4) No restaurant, hotel, café, cafeteria or other public place where food is sold, served or offered for sale, shall serve drinking water to any customer unless expressly requested.

(5) All water customers of the City shall promptly repair all leaks from indoor and outdoor plumbing fixtures. Such leak shall be repaired in a timely manner after notification by the city, but in no case after notification in excess of seventy-two (72) hours for the first violation and then every seventy-two (72) hours thereafter for the second and third violations.

(6) No person shall sprinkle, water, or irrigate any shrubbery, trees, lawns, grass, groundcovers, plants, vines, gardens, vegetables, flowers, or any other landscaped or vegetated areas between the hours of 9:00 a.m. and 4:00 p.m. In any event, such watering shall not be in excess of needs nor be of a manner that allows water to flow onto streets. The above mentioned plants may be watered by a hand-held hose equipped with a shut-off nozzle at any time of the day. This provision shall not apply to commercial nurseries, golf courses and other water-dependent industries.

(7) No water customer of the City shall cause or allow the water to run off landscape areas into adjoining streets, sidewalks or other paved areas due to incorrectly directed or maintained sprinkler or excessive watering.

(8) The use of water from fire hydrants shall be limited to fire fighting and related activities necessary to maintain the public health, safety, and welfare. An exception may be made for construction use through a proper city-designated meter. The use of potable water for construction activities shall be restricted in areas where recycled water is available for such use.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.27. Stage 2 water shortage-water supply reduced by ten percent (10%) to twenty percent (20%).

(a) The following restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than ten percent (10%) but less than twenty percent (20%) in its water supplies.

(1) All prohibitions and restrictions in § 6-8.26 shall be in effect provided that more restrictive measures noted in this section shall take precedence.

(2) Commercial nurseries, golf courses, and other water dependent industries shall be prohibited from watering lawn, landscape, or other turf areas more than every other day. Irrigation shall occur between the hours of 6:00 p.m. and 6:00 a.m. only.

(3) All water customers other than commercial nurseries, golf courses, and other water dependent industries shall be limited in the use of outdoor watering for sprinkling, watering, or irrigating any shrubbery, trees, lawns, grass, groundcovers, plants, vines, gardens, vegetables, flowers, or any other landscaped or vegetated areas to a two (2) day per week schedule between the hours of 4:00 p.m. and 9:00 a.m. based on street address.

(i) All locations ending in an odd number shall have outdoor water scheduled on Mondays and Thursdays.

(ii) All locations ending in an even number shall have outdoor water scheduled on Wednesdays and Saturdays.

(iii) There shall be no outdoor watering on Tuesdays, Fridays, or Sundays.

(iv) The use of a hand-held hose with shut-off valve shall be permitted at any time.

(v) The replenishment of swimming pools shall be limited to the same days as other outdoor watering.

(4) Filling or refilling empty swimming pools shall not occur without permission from the City Manager or his/her designee.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.28. Stage 3 water shortage-water supply reduced by more than twenty percent (20%).

(a) The following restrictions on the use of potable water shall be applicable when the City Council determines that it is likely that the City will suffer a reduction of more than twenty percent (20%) in its water supplies.

(b) All the prohibitions and restrictions in § 6-8.27 shall be in effect provided that the more restrictive measures noted in this section shall take precedence.

(c) Commercial nurseries, golf courses and other water dependent industries shall be prohibited from watering lawn, landscaping and other turf areas more often than every third day. Irrigation shall occur between the hours of 6:00 p.m. and 6:00 a.m. only. There shall be no restriction on watering utilizing recycled water.

(d) The use of water from fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety and welfare. The use of potable water for construction activities shall be prohibited.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.29. Stage 4 water shortage-emergency interruption in water supply.

(a) The following restrictions on the use of potable water shall be applicable during an emergency water shortage which may be declared in the event of a major earthquake, large-scale fire, or other so called "Act of God" which could have serious impacts on the city's total available water supply.

(1) All the prohibitions and restrictions in § 6-8.28 shall be in effect provided that the more restrictive measures noted in this section shall take precedence.

(2) There shall be no use of outdoor water at any time except the minimal amount by hand-held hose equipped with a shut-off nozzle.

(3) Commercial nurseries, golf courses, and other water dependent industries shall be prohibited from the use of outside water except by a hand-held hose equipped with a shut-off nozzle.

(4) All nonessential uses of water shall be prohibited including the filling, cycling, filtering, or refilling swimming pools, spas, Jacuzzis, fountains or other like devices.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.30. Relief from compliance.

(a) A water customer of the City may file a written application for relief in whole or in part, from the water use restriction provisions of this chapter. The City Manager or his/her designee shall review the request for a variance and take such steps as he or she deems reasonable to resolve the application for relief. The decision of the City Manager shall be final.

(b) A relief may be granted if the water customer shows that he or she has achieved the maximum practical reduction in water consumption other than in the specific areas in which relief is being sought. No relief shall be granted to any water customer who, when requested by the City Manager, fails to provide any information necessary for resolution of the customer's application for relief.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.31. Failure to comply.

(a) Violations of the provisions of this chapter:

(1) First violation. For a first violation, the City shall issue a written warning to the water customer.

(2) Second violation. For a second violation, the City shall impose a surcharge in an amount of One Hundred Dollars ($100.00) added to the water customer's water bill.

(3) Third violation. For a third violation, the City shall impose a surcharge in an amount of Two Hundred Dollars ($200.00) added to the water customer's water bill.

(4) Subsequent Violations. For the fourth and any subsequent violation during, the City shall impose a surcharge in an amount of Five Hundred Dollars ($500.00) added to the water customer's water bill. In addition to the surcharge, the City may also install a flow restricting device on the service of the customer at the premises at which the violation occurred for a period of not less than forty-eight (48) hours. The City shall charge the water customer the reasonable costs incurred for installing and for removing the flow-restricting devices and for restoration of normal service. The charge shall be paid before normal service can be restored.

(b) The City shall give notice of violation to the water customer committing the violation as follows:

(1) First notice of violation shall be given in writing by regular mail to the address at which the water customer is normally billed.

(2) Notice of second or subsequent violations shall be given in writing by certified mail to the address at which the water customer is normally billed.

(§ 2, Ord. 2907, eff. June 16, 2009)

Sec. 6-8.32. Hearing regarding violations.

(a) Any water customer receiving notice of a violation of §§ 6 8.23, 6-8.26, 6-8.27, 6-8.28, or 6-8.29, which includes the imposition of a surcharge, shall have a right to a hearing by the City Manager or his/her designee within fifteen (15) days of mailing or other delivery of the notice of violation.

(b) The water customer’s timely written request for a hearing shall automatically stay installation of flow-restricting device on the customer’s premises until after the City Manager or his/her designee renders his or her decision.

(c) The water customer’s timely written request for a hearing shall not stay the imposition of a surcharge unless within the time period to request a hearing, the water customer deposits with the City money in the amount of any unpaid surcharge due. If it is determined that the surcharge was wrongly assessed, the City will refund any money deposited to the water customer.

(d) The decision of the City Manager or his/her designee shall be final except for judicial review.

(§ 2, Ord. 2907, eff. June 16, 2009)

Chapter 13.16 WATER CONSERVATION

13.16.010 Generally

A. Declaration of Policy. It is declared that because of the water conditions prevailing in the city, the general welfare requires that the water resources available to the city, region and state be put to the maximum beneficial use, that the waste or unreasonable use of water be prevented, and that the conservation of water is to be encouraged at all times.

B. Authorization.

1. The city manager shall request the city council to declare that demand for water is anticipated to be in excess of supply, immediately after it appears that such a situation exists or is threatened, if the city council is in session. If the council is not in session, the city manager shall immediately cause a request for a special meeting of the city council to be delivered to each council person who can be located.

2. The city council shall have the power to declare the necessity to implement the applicable provisions of this chapter when in its opinion the demand for water consumption exceeds the city's available supply (allowing for a safe reserve), or threatens to do so, provided there are no immediate resources available to remedy the situation. Such declaration shall be made by public announcement and shall be published in a newspaper of general circulation and shall become effective immediately upon such publication.

C. Application. The provisions of this chapter shall apply to all persons, customers within the city, or property utilizing city water wherever situated.

D. Presumption. For purposes of this title, it shall be presumed that a person, corporation or association in whose name the water utility of the city is or was last billed or who is receiving the economic benefit of the water supply has knowingly made, caused, used or permitted the use of water received from the city for a purpose in a manner contrary to any provision of this title. (Ord. 1786 § 1 (part), 2005: prior code § 7730.0)

13.16.020 Penalties

A. Compliance—Guidelines.

1. No customer of the city or person who uses water within the city shall knowingly use, or permit the use of water in a manner contrary to any provision of this chapter, or in an amount in excess of that use permitted by the provisions of this title or that is reasonably necessary to satisfy the water usage need.

2. Unless otherwise provided, any person, firm or corporation violating any provision of this title as adopted by reference above, other than the provisions of Sections 13.20.010 through 13.20.040 of this code, shall be guilty of an infraction or misdemeanor as hereinafter specified at the city's discretion, and each day or portion thereof such violation is in existence shall be a new and separate offense.

B. Any person so convicted shall be:

1. Guilty of an infraction offense and punished by a fine of not less than $25.00 but not exceeding $100.00 for a first violation during any calendar year or declared conservation stage, whichever time period is shorter in duration;

2. Guilty of an infraction offense and punished by a fine not less than $50.00 and not exceeding $200.00 for a second violation during any calendar year or declared conservation stage, whichever time period is shorter in duration;

3. On conviction of a third violation, guilty of a misdemeanor offense and shall be punished by a fine not less than $500.00 nor more than $1,000.00 during any calendar year or declared conservation stage, whichever time period is shorter in duration.

C. 1. Notwithstanding the above, a first or second offense may be charged and prosecuted as a misdemeanor at the city's sole discretion. In addition to the above penalties, such convicted person, firm, corporation or other entity may, in the discretion of the court, be ordered to reimburse the city for all necessary costs incurred through investigation, discovery, analysis, inspection, abatement and other actual costs incurred by the city or its agents pertaining to the violation.

2. The court shall fix the amount of any such reimbursements upon submission of proof of such costs by the city. Payment of any penalty herein provided shall not relieve a person, firm or corporation, or other entity from the responsibility of correcting the condition resulting from the violation.

D. In addition to the above, the water utility director is empowered to enact other penalties and restrictive measures that are intended to abate the conductor circumstances comprising the violation, including but not limited to the following: placement of a flow restricting device upon the water service, locking off of water meter, removal of water meter, and shutting off of the service line valve. (Ord. 1812 § 1 (part), 2006: prior code § 7731.00)

13.16.030 Conservation program—Year-round stage.

A. The following activities are prohibited:

1. The washing of sidewalks, walkways, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety;

2. Excessive or unreasonable runoff of water or unreasonable spray of the areas being watered. Every customer is deemed to have his or her water system under control at all times, to know the manner and extent of this water use and any runoff, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;

3. Allowing, permitting or causing the escape of water through breaks or leaks within the customer's plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 72 hours after the customer discovers such a break or leak or receives notice from the city of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak;

4. Outdoor irrigation of landscape by sprinklers during the hours of 10:00 a.m. to 6:00 p.m. Citizens are encouraged to avoid the use of sprinklers on windy days. Irrigation by handheld hose,

drip irrigation, hand-held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains;

5. Washing of automobiles, trucks, trailers, boats, airplanes, and other types of equipment (mobile or otherwise) unless done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff. However, this section does not apply to the washing of the above-listed vehicles or mobile equipment when conducted on the immediate premises of a commercial carwash;

6. All eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall not provide drinking water to any person unless it is expressly requested.

B. Exceptions. None of these restrictions shall apply to the following:

1. The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2. The necessary use of water for the routine maintenance and/or repair of water distribution facilities, residential and commercial plumbing and permanently installed landscaped irrigation systems. (Ord. 1786 § 1 (part), 2005: prior code § 7732.00)

13.16.040 Conservation program—Moderate shortage stage.

A. In the event the city council determines that the measures outlined in Section 13.16.030 fail to produce a sufficient reduction in demand so as to produce a sufficient supply, the use of water within the city shall be additionally restricted and the following provisions shall become effective upon a declaration by the city council and publication of same as follows:

1. The washing of sidewalks, walkways, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety.

2. Excessive or unreasonable runoff of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his or her water system under control at all times, to know the manner and extent of this water use and any runoff, and to employ available alternatives to apply irrigation water in a reasonably efficient manner.

3. Allowing, permitting or causing the escape of water through breaks or leaks within the customer's plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 72 hours after the customer discovers such a break or leak or receives notice from the city of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak.

4. Outdoor irrigation of landscape by sprinklers is permitted only on even days of the month for those locations having a street address with an even last digit. Outdoor irrigation by sprinklers is

permitted only on odd days of the month for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on even days of the month if located west of San Antonio Avenue or only on odd days of the month if located east of San Antonio Avenue. No outdoor irrigation shall take place between the hours of 10:00 a.m. and 6:00 p.m. Irrigation by hand-held hose, drip irrigation, hand-held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains.

5. Washing of Vehicles, Trailers, Boats, Airplanes and Mobile Equipment.

a. The washing of automobiles, trucks, trailers, boats, airplanes and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days pursuant to subsection (A)(4) of this section between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff.

b. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin-operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved city standards with equipment to recycle water for use within their facility.

c. Washing trucks, trailers and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables), when such washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to noon. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use.

d. Nonprofit and community based organizations' fundraising car washes shall be allowed, provided they are otherwise in accordance with all other provisions of the Upland Municipal Code and this section, and have obtained a permit to operate a nonprofit carwash from the finance department, the cost of same to be $5.00, which sum is found to cover the city's costs to issue the permit. Such activities shall be limited to no more than two times in one month. Permit shall become void upon the effective date of the declaration of severe shortage.

6. All eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall not provide drinking water to any person unless it is expressly requested.

7. The refilling or adding of water to swimming pools is prohibited except on designated outdoor water use days, which shall be the same days as outdoor watering is permitted pursuant to subsection (A)(4) of this section.

8. Any non-business, operation-related pond, ornamental fountain or other structure making similar use of water is prohibited.

9. The irrigation of golf course fairways is prohibited. This section shall not apply to the irrigation of any golf course solely with reclaimed wastewater.

10. The use of water from fire hydrants shall be limited to firefighting and emergency-related activities and/or other activities necessary to maintain the health, safety, and welfare of the citizens of Upland. This restriction shall not apply to businesses which require the use of water for land development and building construction processes, pursuant to prior written approval by the review board as defined in Section 13.16.070.

B. Exceptions. None of the moderate shortage restrictions shall apply to the following uses of water:

1. The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2. The routine and necessary use of water, other than for landscape irrigation, for land development (e.g., roadway base preparation, flushing of utility lines, dust control, concrete and asphalt work) and for building construction processes;

3. The necessary use of water for the routine maintenance and/or repair of water distribution facilities, residential and commercial plumbing and permanently installed landscape irrigation systems;

4. The use of water necessary to irrigate large, landscaped areas in commercial and institutional establishments as authorized by the terms and conditions of an approved compliance agreement issued by the review board, as defined in Section 13.16.070;

5. The use of water pursuant to the approved terms and conditions of a variance granted by the review board as defined in Section 13.16.070. (Ord. 1786 § 1 (part), 2005: prior code § 7733.00)

13.16.050 Conservation program—High shortage stage.

A. In the event the city council determines that the measures outlined in Section 13.16.040 fail to produce a sufficient reduction in demand so as to produce a sufficient supply, the use of water within the city shall be additionally restricted and the following provisions shall become effective upon a declaration by the city council and publication of same as follows:

1. The washing of sidewalks, walkways, driveways, public and private parking areas and other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety is prohibited.

2. Excessive runoff of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his or her water system under control at all times, to know the manner and extent of this water use and any runoff, and to employ available alternatives to apply irrigation water in a reasonably efficient manner.

3. Allowing, permitting or causing the escape of water through breaks or leaks within the customer's plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 72 hours after the customer discovers such a break or leak or receives notice from the city of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak.

4. Outdoor irrigation of landscape by sprinklers is permitted only on Wednesday and Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Tuesday and Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Wednesday and Sunday if located west of San Antonio Avenue or only on Tuesday and Saturday if located east of San Antonio Avenue. No outdoor irrigation shall take place between 6:00 a.m. until one hour before

sundown. Irrigation by hand-held hose, drip irrigation, or handheld bucket or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains.

5. Washing of Vehicles, Trailers, Boats, Airplanes and Mobile Equipment.

a. The washing of automobiles, trucks, trailers, boats, airplanes and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days pursuant to subsection (A)(4) of this section between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff.

b. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin-operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved city standards with equipment to recycle water for use within their facility.

c. Washing trucks, trailers and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables), when such washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to noon. Such washing, when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use.

d. Nonprofit and community-based organizations' fundraising car washes shall be allowed, provided they are otherwise in accordance with all other provisions of the Upland Municipal Code and this section, and have obtained a permit to operate a nonprofit carwash from the finance department, the cost of same to be $5.00, which sum is found to cover the city's costs to issue the permit. Such activities shall be limited to no more than two times in one month. Permit shall become void upon the effective date of the declaration of severe shortage.

6. All eating and drinking establishments of any kind whatsoever including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall not provide drinking water to any person unless it is expressly requested.

7. The refilling or adding of water to existing swimming pools is prohibited except on designated outdoor water use days which shall be the same days as outdoor water is permitted pursuant to subsection (A)(4) of this section. New pool construction filling shall be by permit only.

8. Any non-business, operation-related pond, ornamental fountain or other structure making similar use of water is prohibited.

9. The watering of golf course tee areas and fairways is prohibited unless done with reclaimed wastewater.

10. The use of water from fire hydrants shall be limited to firefighting and emergency-related activities and/or other activities necessary to maintain the health, safety, and welfare of the citizens of Upland. This restriction shall not apply to businesses which require the use of water for land development and building construction processes, pursuant to prior written approval by the review board as defined in Section 13.16.070.

B. Exceptions. None of the high shortage restrictions shall apply to the following uses of water, provided there is prior written approval by the review board as defined in Section 13.16.070:

1. The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2. The routine and necessary use of water, other than for landscape irrigation, for land development (e.g., roadway base preparation, flushing of utility lines, dust control, concrete and asphalt work) and for building construction processes;

3. The necessary use of water for the routine maintenance and/or repair of water distribution facilities, residential and commercial plumbing and permanently installed landscape irrigation systems;

4. The use of water necessary to irrigate large landscaped areas in commercial and institutional establishments as authorized by the terms and conditions of an approved compliance agreement issued by the review board, as defined in Section 13.16.070. (Ord. 1786 § 1 (part), 2005: prior code § 7734.00)

13.16.060 Conservation program—Severe shortage stage.

In the event the city council determines that the measures outlined in Section 13.16.050 fail to produce a sufficient reduction in demand so as to produce a sufficient supply, then the use of water within the city shall be additionally restricted and the following provisions shall become effective upon a declaration by the city council and publication of same as follows:

A. The washing of sidewalks, walkways, driveways, public and private parking areas and other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety is prohibited.

B. Excessive runoff of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his or her water system under control at all times, to know the manner and extent of this water use and any runoff, and to employ available alternatives to apply irrigation water in a reasonably efficient manner.

C. Allowing, permitting or causing the escape of water through breaks or leaks within the customer’s plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of 72 hours after the customer discovers such a break or leak or receives notice from the city of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak.

D. Outdoor irrigation of landscape by sprinklers is permitted only on Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Sunday if located west of San Antonio Avenue or only on Tuesday and Saturday if located east of San Antonio Avenue. No outdoor irrigation shall take place between 6:00 a.m. until one hour before sundown. Irrigation by hand-held hose, drip irrigation, or hand-held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains.

E. Washing of Vehicles, Trailers, Boats, Airplanes and Mobile Equipment.

1. The washing of automobiles, trucks, trailers, boats, airplanes, and other types of equipment (mobile or otherwise) is prohibited except as provided elsewhere in this section.

2. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin-operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved city standards with equipment to recycle water for use within their facility. Washing of vehicles in such facilities shall occur only between the hours of 6:00 a.m. and 12:00 noon.

3. Washing trucks, trailers, and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables), when such washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to 12:00 noon. Such washing when allowed, shall be done with a hand-held bucket or hand-held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use.

F. All eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall not provide drinking water to any person unless it is expressly requested.

G. Washing sidewalks, driveways, public and private parking areas, tennis courts, patios, or other paved areas, except to alleviate an immediate health hazard, is prohibited.

H. The refilling or adding of water to existing swimming pools is prohibited except on designated outdoor water use days which shall be the same days as outdoor water is permitted pursuant to subsection D of this section. New pool construction filling shall be by permit only.

I. Any non-business, operation-related pond, ornamental fountain or other structure making similar use of water is prohibited.

J. The watering of golf course tee areas and fairways is prohibited unless done with reclaimed wastewater. (Ord. 1786 § 1 (part), 2005: prior code § 7735.00)

13.16.070 Implementation.

A. Review Board—Variances, Permits and Compliance Agreements. A review board is established to review special cases which cannot follow the letter of this chapter. The review board shall consist of the water utility director, the city engineer, the fire chief, the city planning director and the city attorney, or their appointed representative.

B. Appeal of review board decisions shall be made to the city council. It is the purpose of the review board to review special cases and to determine whether or not such cases warrant a variance, permit or compliance agreement including conditions of approval. The board shall consider the facts of each case and decide whether to grant a variance or a permit or to enter into a compliance agreement within five working days of the receipt of a properly completed application for variance/permit/compliance agreement form.

C. A variance shall be granted only for reasons of economic hardship, which is defined as a threat to an individual business's primary source of income. (Under no circumstances shall inconvenience or the potential for damage of landscaping be considered an economic hardship, which justifies a variance.) The board shall authorize only the implementation of equitable water use restrictions which further the purpose and intent of the water conservation plan. The special water use restrictions authorized by the board in each case shall be set forth on the face of the variance, permit or compliance agreement. A nonrefundable fee of $50.00 per permit application for all requests shall be assessed to reimburse the city for administrative costs.

D. 1. A variance or permit issued under moderate shortage shall not be valid upon implementation of high or severe shortage stages unless the permit specifically addresses either or both of those stages upon initial issuance. The multistage permit would have to reflect significant additional savings of water, or nonuse of water, under progressively more critical shortage stages. A variance or permit shall expire under its own terms and conditions and/or when another water conservation stage is in effect.

2. Exception. If, within the period of the permit, the conservation stage for which the permit was originally issued is reinstated, the permit will be considered valid until the original expiration date, as long as that conservation stage is in effect.

E. Any person, corporation or association who is issued a variance or permit and makes use of water pursuant to the variance, permit or compliance agreement shall provide proof of the variance, permit or compliance agreement upon demand by any peace officer or person authorized by the city to enforce this title.

F. Upon conviction of a person, corporation or association of violating any provision of this chapter, the review board shall revoke any permit, variance, or compliance agreement previously granted. However, the board shall notify applicant of the proposed revocation five working days before taking such action, and applicant shall be given the opportunity to be heard by the review board prior to its taking such action.

G. Persons wishing to appeal the decision of the review board shall have the right of appeal to the city council. Appeal shall be made in writing within 10 working days of the review board decision. The decision of the city council shall be final. (Ord. 1786 § 1 (part), 2005: prior code § 7736.00)

ORDINANCE NO. 47

AN ORDINANCE OF THE CUCAMONGA VALLEY WATER DISTRICT OF SAN BERNARDINO COUNTY, CALIFORNIA, RESCINDING ORDINANCE 41 AND ENCOURAGING WATER USE EFFICIENCY

WHEREAS, the State of California and western United States has limited supplies of drinking water, and;

WHEREAS, Cucamonga Valley Water District practices diligent stewardship of this valuable resource, and;

WHEREAS, the District's Board of Directors encourages the efficient use of all water supplies.

WHEREAS, it is hereby declared that the conditions prevailing in areas served by Cucamonga Valley Water District, the areas of the State of California and elsewhere from which the District obtains its water supplies require that the water resources available to the District be put to the maximum beneficial use to the extent to which they are capable, and that waste or unreasonable method of use of water be prevented, and the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interests of the people of the District and for the public welfare.

WHEREAS, Water Code Section 31026 authorizes the District to restrict the use of water during any emergency caused by drought, or other threatened or existing water shortage, and to prohibit the waste of District water or the use of District water during such periods, for any purpose other than household use. Other restricted uses may be determined to be necessary by the District.

WHEREAS, Water Code Section 350 et seq. and Section 375 et seq. authorize the District to declare a water shortage emergency condition whenever it finds and determines that the ordinary demands and requirements of water consumers will not be satisfied without depleting the water supply of the District to the extent that there will be insufficient water for human consumption, sanitation and fire protection. The District has the power and authority to enact a water conservation measures pursuant to Water Code Section 350 et seq. and 375 et seq.

NOW, THEREFORE, THE BOARD OF DIRECTORS OF THE CUCAMONGA VALLEY WATER DISTRICT OF SAN BERNARDINO COUNTY, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

SECTION 1: As of the effective date of this Ordinance No. 47, Ordinance No. 47 shall supersede, and otherwise control, over Ordinance 41 and Ordinance 41 shall be of no further force or effect.

SECTION 2: DEFINITIONS

2.1 "DISTRICT": Cucamonga Valley Water District

2.2 "AREA OF SERVICE": For the purposes of this Ordinance, the area of service shall be defined as all of the Cucamonga Valley Water District

2.3 "CUSTOMER/PERSON": Any natural person, firm, or corporation.

2.4 "GENERAL MANAGER/CEO": The person designated by the District to supervise the operation of the public water system and who is charged with certain duties and responsibilities by this Ordinance, or his/her duly authorized representative.

SECTION 3: AUTHORITY

This Ordinance is adopted pursuant to Water Code Sections 31026, 31027, 350 et seq., and 375 et seq. Pursuant to the Water Code Sections 31027, 350 et seq., and 375 et seq., a notice of public hearing was published at least seven (7) days prior to the date of the public hearing which was conducted on March 24, 2009 at 6:00 p.m., or as soon thereafter as practicable at 10440 Ashford Street, Rancho Cucamonga, CA 91730-2799 as part of the Regular Meeting of the Board of Directors. A certified copy of the proposed Ordinance was also posted at the District offices at least five (5) days before the hearing. Notice of the time and place of the public hearing was published in a newspaper of general circulation within the District. The Public Hearing was continued to the May 12, 2009 Regular Meeting of the Board of Directors and a subsequent notice of the continuation was published in the newspaper of general circulation, on the District's website and on the bulletin board at the District office.

SECTION 4: WATER USE EFFICIENCY PRACTICES

Customers are required to practice the following activities:

(1) Hosing paved areas for health and safety purposes only with the use of a waterbroom or water-efficient pressure washer using not more than 5 gallons per minute.

(2) Wash vehicles using a hose equipped with a shutoff nozzle so that water does not flow to waste.

(3) All decorative fountains shall be equipped with recirculating systems.

(4) Upon notification by the District, repair all leaks.

(5) Adjust sprinklers so there is no run-off, over-spray or excessive irrigation from the property.

(6) Restaurants will only serve water on request.

(7) Hotels will offer guests the option to not launder linen daily.

(8) Industrial customers will review their water-using processes to evaluate ways to increase water conservation

No water customer of the District shall make, cause, use, or permit the use of water in a manner contrary to any provision of this Ordinance.

SECTION 5: FAILURE TO COMPLY

Financial penalties will be assessed when a customer who, in the reasonable discretion of the General Manager/CEO, or his/her representative, violates this Ordinance. Exhibit A, attached hereto and incorporated herein by reference, outlines those penalties and the method of notifying a customer that he/she is violating District's Ordinance. If the General Manager/CEO, or his/her representative deems it appropriate, water service will be terminated at the location where the violation occurred due to a failure to comply with this Ordinance or a failure to pay financial penalties. Any such service termination shall be implemented under the District's authority and procedures including, but not limited to, the District's rules and regulations for water service. The regulatory purpose of imposing the requirements and financial penalties, as set forth in this Ordinance and Exhibit "A," are to conserve water, deter waste and unreasonable use of water, encourage efficiency, and to cover the costs incident to the investigation, inspection, and administration of the enforcement of this Ordinance and Exhibit "A." Such costs of this regulatory program include, but are not necessarily limited to, the cost of District personnel for administration of this program, notices, publications, implementation of conservation measures/programs and the monitoring and enforcement of penalties.

SECTION 6: SEVERABILITY

If any provision, paragraph, word, section, or article of this Ordinance is invalidated by any court of competent jurisdiction, the remaining provision, paragraphs, words, sections, and articles shall not be affected and shall continue in full force and effect.

SECTION 7: EFFECTIVE DATE OF ORDINANCE

This Ordinance is effective immediately upon its adoption. Within ten (10) days after adoption of this Ordinance, this full Ordinance with the names of those Directors voting for and against the Ordinance shall be published in a newspaper of general circulation and a certified copy of this Ordinance, along with the names of those Directors voting for and against the Ordinance, will be posted in the District offices.

ADOPTED May 12, 2009

Randall J. Reed
President

ATTEST:

Robert A. DeLoach
Secretary

ORDINANCE NO. 47

EXHIBIT "A"

Financial penalties will be assessed when a customer violates the requirements outlined in Section 4 of Ordinance 47. The penalties are as follows:

(a) First violation. The District shall issue a written notice of a first violation to the water customer.

(b) Second violation. For a second violation, the District shall impose a penalty in the amount of Fifty Dollars ($50.00) which will be added to the water customer's water bill.

(c) Third violation. For a third violation, the District shall impose a penalty in the amount of One Hundred Dollars ($100.00) which will be added to the water customer's water bill.

(d) Fourth violation. After a fourth and any subsequent violation, the District shall impose a penalty in the amount of One Hundred Fifty Dollars ($150.00) which will be added to the water customer's water bill.

The regulatory purposes of imposing the requirements and financial penalties, as set forth in this Ordinance and Exhibit "A," are to conserve water, deter waste and unreasonable use of water, encourage efficiency, and to cover the costs incident to the investigation, inspection, and administration of the enforcement of this Ordinance and Exhibit "A." Such costs of this regulatory program include, but are not necessarily limited to, the cost of District personnel for administration of this program, notices, publications, implementation of conservation measures/programs and the monitoring and enforcement of penalties.

NOTICING

The District shall give notice of violation of Ordinance No. 47 to the water customer as follows:

(a) The first notice of violation shall be a warning given to the customer by using a door hanger.

(b) The second violation shall be in writing by regular mail to the address at which the water customer is normally billed.

(c) Notice of subsequent violations shall be given in writing in the following manner:

(i) By giving the notice to the customer at the property where the violation occurred; or

(ii) If the water customer is absent from or unavailable at the premises at which the violation occurred, by leaving a copy with some person of suitable age and discretion at the premises and sending a copy through the regular mail to the address at which the water customer is normally billed; or

(iii) If a person of suitable age or discretion cannot be found, then by affixing a copy in a conspicuous place at the premises at which the violation occurred, and also sending a copy through the regular mail to the address at which the customer is normally billed.

The notice shall contain a description of the facts of the violation and a statement of the penalties for each violation.

APPEAL PROCESS

(1) The application of this Ordinance is not intended to have a disproportionate impact on customers who have implemented conservation methods or installed water saving devices.

(2) A water customer may appeal to the District in writing if he/she feels that this Ordinance causes an undue hardship. The written request shall provide a justification for a reduction of a restricted use violation. Documentation must be provided to support the request and reasons outlining the hardship must be included.

(3) The request shall be reviewed by the General Manager or designee(s) and the customer will receive a written response from the District.

(4) A customer may appeal the District's decision by requesting a review by a committee designated by the Board of Directors. The decision of this committee will be final.

DRAFT OF A

RESOLUTION IMPLEMENTING THE WATER SHORTAGE CONTINGENCY PLAN
(Ready for adoption should the need the arise)

SAN GABRIEL VALLEY WATER COMPANY

RESOLUTION ADOPTED BY THE BOARD OF DIRECTORS

____

DATE

WHEREAS, the California Legislature enacted Assembly Bill 11X during the 1991 Extraordinary Session of the California Legislature (an act to amend California Water Code Sections 10620, 10631, and 10652, and to add Section 10656 to the California Water Code, relating to water); and

WHEREAS, AB11X requires that every urban water supplier providing potable water directly to more than 3,000 customers or supplying more than 3,000 acre feet of water to develop a Water Shortage Contingency Plan; and

WHEREAS, AB 11X mandates that said Water Shortage Contingency Plan be filed with the California Department of Water Resources by January 31, 1992; and

WHEREAS, San Gabriel Valley Water Company is an urban water supplier providing water to more than 3,000 customers, and therefore, has prepared and filed a Water Shortage Contingency Plan, in compliance with requirements of AB 11X.

WHEREAS, public hearings have been conducted regarding the implementation of the Company's Water Shortage Contingency Plan;

NOW, THEREFORE, BE IT RESOLVED that:

1. The Water Shortage Contingency Plan is hereby implemented;

2. The Company is hereby authorized (should the need arise) to declare a Water Shortage Emergency and implement the Water Shortage Contingency Plan;

3. The Company shall implement additional procedures regarding rules and regulations to carry out effective and equitable allocation of water during a declared water shortage, as approved and adopted by the California Public Utilities Commission.

5. The Company take necessary actions to mitigate the effects on customers of the water shortage while continuing to fulfill its duties as a public utility water company.

SAN GABRIEL VALLEY WATER COMPANY

11142 GARVEY AVENUE • P.O. BOX 6010 • EL MONTE, CALIFORNIA 91734 • (818) 448-6183

IMPORTANT NOTICE

10% Voluntary Water Use Reduction Requested

Dear Customer:

Because of the severe 5-year drought we are experiencing, San Gabriel Valley Water Company is requesting that effective immediately all water customers reduce their water use, on a **voluntary basis**, by at least 10% compared to the same period last year.

As you may be aware, the Metropolitan Water District of Southern California (MWD) has adopted stringent water conservation measures to greatly reduce water usage because of the severe drought in California. Effective March 1, 1991, MWD has declared a Stage V water shortage. Fortunately, MWD supplies only a small portion of the water provided by San Gabriel Valley Water Company. Nevertheless, because of the drought, we also must request your cooperation in conserving water.

We believe that you and our other customers can achieve the requested 10% reduction on a voluntary basis and that it will not be necessary to implement strict water rationing and penalty rates. **Obviously, if our customers are unable to achieve the conservation goals on a voluntary basis, we would be forced to consider mandatory cutbacks and higher water costs.**

To assist you in meeting the conservation goal, your current water use and your use during the corresponding period last year is shown on your water bill. On future water bills we will be showing your conservation goal for the coming month. In addition, the water conservation measures shown on the back of this letter can help save water. Thank you for your cooperation.

Very truly yours,

SAN GABRIEL VALLEY WATER COMPANY

SAN GABRIEL VALLEY WATER COMPANY
WATER CONSERVATION MEASURES

1. Lawn watering and landscape irrigation should be done only between the hours of 4 p.m. and 8 a.m. every other day. Public and recreational facilities such as parks. school grounds. golf courses. and recreational fields can be irrigated on any day. Agricultural users and commercial nurseries and landscape contractors can continue to irrigate as necessary but should curtail all non-essential water uses.

2. Other watering can be done at any time if a handheld hose equipped with a positive shutoff nozzle is used. a handheld faucet-filled bucket of five gallons or less is used, or a drip irrigation system is used.

3. Do not allow water to run off landscaped areas into adjoining streets, sidewalks, or other paved areas because of excessive watering or incorrectly directed or maintained sprinklers.

4. Washing of cars, trucks, trailers, boats, airplanes, or buildings should only be done with a handheld bucket or with a handheld hose equipped with a positive shutoff nozzle for quick rinses.

5. Do not use water to wash down sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas except to alleviate immediate fire, sanitation, or health hazards.

6. There should be no filling or refilling of ponds, fountains, or artificial lakes. Pools and spas should be filled or refilled only between 4 p.m. and 8 a.m.

7. Restaurants should not serve water to their customers unless specifically requested.

8. Leaks from indoor and outdoor plumbing fixtures should be repaired as soon as discovered and should not be allowed to continue for more than 48 hours.

9. Do not leave water running while brushing your teeth, shaving, soaping in the shower, or washing dishes in the sink.

Also, to further assist customers in conserving water, the company has water conservation kits available and water-saving information literature available free of charge at each of the company's commercial offices. You may call or stop by one of the company's commercial offices to avail yourself of these materials. The commercial offices are located at:

11142 Garvey Avenue, El Monte, CA
14404 East Valley Boulevard, Industry, CA
11579 Hadley Street, Whittier, CA

FONTANA WATER COMPANY

A DIVISION OF SAN GABRIEL VALLEY WATER COMPANY

8440 NUEVO AVENUE • P.O. BOX 987, FONTANA, CALIFORNIA 92334 • (714) 822-2201

IMPORTANT NOTICE

10% Voluntary Water Use Reduction Requested

Dear Customer:

Because of the severe 5-year drought we are experiencing, Fontana Water Company is requesting that effective immediately all water customers reduce their water use, on a **voluntary basis**, by at least 10% compared to the same period last year.

As you may be aware, the Metropolitan Water District of Southern California (MWD) has adopted stringent water conservation measures to greatly reduce water usage because of the severe drought in California. Effective March 1, 1991, MWD has declared a Stage V water shortage. Fortunately, Fontana Water Company does not rely on water deliveries from MWD to supply its customers. Nevertheless, because of the drought, we also must request your cooperation in conserving water.

We believe that you and our other customers can achieve the requested 10% reduction on a voluntary basis and that it will not be necessary to implement strict water rationing and penalty rates. **Obviously, if our customers are unable to achieve the conservation goals on a voluntary basis, we would be forced to consider mandatory cutbacks and higher water costs.**

To assist you in meeting the conservation goal, your current water use and your use during the corresponding period last year is shown on your water bill. On future water bills we will be showing your conservation goal for the coming month. In addition, the water conservation measures shown on the back of this letter can help save water. Thank you for your cooperation.

Very truly yours,

FONTANA WATER COMPANY

FONTANA WATER COMPANY
WATER CONSERVATION MEASURES

1. Lawn watering and landscape irrigation should be done only between the hours of 4 p.m. and 8 a.m. every other day. Public and recreational facilities such as parks, school grounds, golf courses, and recreational fields can be irrigated on any day. Agricultural users and commercial nurseries and landscape contractors can continue to irrigate as necessary but should curtail all non-essential water uses.

2. Other watering can be done at any time if a handheld hose equipped with a positive shutoff nozzle is used, a handheld faucet-filled bucket of five gallons or less is used, or a drip irrigation system is used.

3. Do not allow water to run off landscaped areas into adjoining streets, sidewalks, or other paved areas because of excessive watering or incorrectly directed or maintained sprinklers.

4. Washing of cars, trucks, trailers, boats, airplanes, or buildings should only be done with a handheld bucket or with a handheld hose equipped with a positive shutoff nozzle for quick rinses.

5. Do not use water to wash down sidewalks, driveways, parking areas, tennis courts, patios, or other paved areas except to alleviate immediate fire, sanitation, or health hazards.

6. There should be no filling or refilling of ponds, fountains, or artificial lakes. Pools and spas should be filled or refilled only between 4 p.m. and 8 a.m.

7. Restaurants should not serve water to their customers unless specifically requested.

8. Leaks from indoor and outdoor plumbing fixtures should be repaired as soon as discovered and should not be allowed to continue for more than 48 hours.

9. Do not leave water running while brushing your teeth, shaving, soaping in the shower, or washing dishes in the sink.

Also, to further assist customers in conserving water, the company has water conservation kits available and water-saving information literature available free of charge at the company's commercial office. You may call or stop by the company's commercial office to avail yourself of these materials. The commercial office is located at:

8440 Nuevo Avenue, Fontana, CA

RULE NO. 14.1

MANDATORY WATER CONSERVATION AND RATIONING PLAN

GENERAL INFORMATION

If water supplies are projected to be insufficient to meet normal customer demand, the utility may elect to implement voluntary conservation using the portion of this plan set forth in Section A of this Rule after notifying the Commission's Water Utilities Branch of its intent. If in the opinion of the utility more stringent water conservation measures are required, the utility shall request Commission authorization to implement the mandatory conservation and rationing measures set forth in Section B.

The Commission shall authorize mandatory conservation and rationing by approving Tariff SCHEDULE NO. 14.1, MANDATORY WATER CONSERVATION AND RATIONING. When Tariff Schedule No. 14.1 has expired or is not in effect, mandatory conservation and rationing measures will not be in force. Tariff Schedule No. 14.1 will set forth water use allocations, excess water use penalties, charges for removal of flow restrictors, and the period during which mandatory conservation and rationing measures will be in effect.

When Tariff Schedule No. 14.1 is in effect and the utility determines that water supplies are again sufficient to meet normal demands and mandatory conservation and rationing measures are no longer necessary, the utility shall seek Commission approval to rescind Tariff Schedule No. 14.1 to discontinue rationing.

In the event of a water supply shortage requiring a voluntary or mandatory program, the utility shall make available to its customers water conservation kits as required by Rule No. 20. The utility shall notify all customers of the availability of conservation kits.

(continued)

JUL 90

Cal. P.U.C. Sheet No.

Canceling Cal. P.U.C. Sheet No.

RULE NO. 14.1
(continued)

A. CONSERVATION - NONESSENTIAL OR UNAUTHORIZED WATER USE

No customer shall use utility-supplied water for nonessential or unauthorized uses as defined below:

1. Use of water through any connection when the utility has notified the customer in writing to repair a broken or defective plumbing, sprinkler, watering or irrigation system and the customer has failed to make such repairs within 5 days after receipt of such notice.

2. Use of water which results in flooding or run-off in gutters, waterways, patios, driveways, or streets.

3. Use of water for washing aircraft, cars, buses, boats, trailers or other vehicles without a positive shutoff nozzle on the outlet end of the hose, except for the washing of vehicles at commercial or fleet vehicle washing facilities operated at fixed locations where equipment using water is properly maintained to avoid wasteful use.

4. Use of water through a hose for washing buildings, structures, sidewalks, walkways, driveways, patios, parking lots, tennis courts, or other hard-surfaced areas in a manner which results in excessive run-off or waste.

5. Use of water for watering streets with trucks, except for initial wash-down for construction purposes (if street sweeping is not feasible), or to protect the health and safety of the public.

6. Use of water for construction purposes, such as consolidation of backfill, dust control, or other uses unless no other source of water or other method can be used.

7. Use of water for more than minimal landscaping in connection with any new construction.

(continued)

JUL 90

(To be inserted by utility) *Issued by* (To be inserted by Cal. P.U.C.

Advice Letter No. NAME Date Filed

Decision No. Effective

Cal. P.U.C. Sheet No.

Canceling Cal. P.U.C. Sheet No.

RULE NO. 14.1
(continued)

A. 8. Use of water for outside plants, lawn, landscape and turf areas more often than every other day, with even numbered addresses watering on even numbered days of the month and odd numbered addresses watering on the odd numbered days of the month, except that this provision shall not apply to commercial nurseries, golf courses and other water-dependent industries.

9. Use of water for outside plants, lawn, landscape and turf areas during certain hours if and when specified in Tariff Schedule No. 14.1 when the schedule is in effect.

10. Use of water for watering outside plants and turf areas using a hand held hose without a positive shut-off valve.

11. Use of water for decorative fountains or the filling or topping off of decorative lakes or ponds. Exceptions are made for those decorative fountains, lakes, or ponds which utilize recycled water.

12. Use of water for the filling or refilling of swimming pools.

13. Service of water by any restaurant except upon the request of a patron.

B. RATIONING OF WATER USAGE

In the event the conservation measures required by Section A are insufficient to control the water shortage, the utility shall, upon Commission approval, impose mandatory conservation and rationing. The water allocated for each customer, the time period during which rationing shall be in effect, and any additional conditions, will be set forth in Tariff Schedule No. 14.1, which shall be filed for this purpose at the time such rationing is approved by the Commission.

Before rationing is authorized by the Commission the utility shall hold public meetings and take all other applicable steps required by Sections 350 through 358 of the California Water Code.

JUL 90

(continued)

(To be inserted by utility) Issued by (To be inserted by Cal. P.U.C.)

Advice Letter No. ______ NAME Date Filed ______

Decision No. Effective ______

RULE NO. 14.1
(continued)

C. ENFORCEMENT OF MANDATORY CONSERVATION AND RATIONING

1. The water use restrictions of the conservation program in Section A of this rule become mandatory when the rationing program goes into effect. These restrictions are applicable whether or not the customer exceeds the monthly water allocation.

2. Upon inception of the mandatory provisions of this Rule the utility may, after one verbal and two written warnings, install a flow-restricting device on the service line of any premises where utility personnel observe water being used for any nonessential or unauthorized use as defined in Section A.

3. A flow restrictor shall not restrict water delivery by greater than 50% of normal flow and shall provide the premises with a minimum of 6 Ccf/month. The restrictor may be removed only by the utility, after a three-day period has elapsed, and upon payment of the appropriate removal charge as set forth in Tariff Schedule No. 14.1.

4. After the removal of a restricting device, if any nonessential or unauthorized use of water continues, the utility may install another flow-restricting device. This device shall remain in place until rationing is no longer in effect and until the appropriate charge for removal has been paid to the utility.

5. Each customer's water allocation shall be shown on the water bill. Water allocations may be appealed in writing as provided in Section D of this Rule. If a customer uses water in excess of the allocated amount, the utility may charge the excess usage penalty shown in Tariff Schedule No. 14.1.

6. Any monies collected by the utility through excess usage penalties shall not be accounted for as income, but shall be accumulated by the utility in a separate account for disposition as directed or authorized from time to time by the Commission.

7. The charge for removal of a flow-restricting device shall be in accordance with Tariff Schedule No. 14.1.

JUL 90

(continued)

RULE NO. 14.1
(continued)

D. APPEAL PROCEDURE

Any customer who seeks a variance from any of the provisions of this mandatory water conservation and rationing plan or a change in water allocation shall notify the utility in writing, explaining in detail the reasons for such a variation. The utility shall respond to each such request.

Any customer not satisfied with the utility's response may file an appeal with the staff of the Commission. The customer and the utility will be notified of the disposition of such appeal by letter from the Executive Director of the Commission.

If the customer disagrees with such disposition, the customer shall have the right to file a formal complaint with the Commission. Except as set forth in this Section, no person shall have any right or claim in law or in equity, against the utility because of, or as a result of, any matter or thing done or threatened to be done pursuant to the provisions of this mandatory water conservation and rationing plan.

E. PUBLICITY

In the event the utility finds it necessary to implement this plan, it shall notify customers and hold public hearings concerning the water supply situation, in accordance with Chapter 3, Water Shortage Emergencies, Sections 350 through 358, of the California Water Code. The utility shall also provide each customer with a copy of this plan by means of billing inserts or special mailings; notifications shall take place prior to imposing any fines associated with this plan. In addition, the utility shall provide customers with periodic updates regarding its water supply status and the results of customers' conservation efforts. Updates may be by bill insert, special mailing, poster, flyer, newspaper, television or radio spot/ advertisement, community bulletin board, or other appropriate method(s).

JUL 90

Sections of the California Water Code
Chapter 3 - Water Shortage Emergencies

Section 350. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, may declare a water shortage emergency condition to prevail within the area served by such distributor whenever it fin and determines that the ordinary demands and requirements of water consumers canno be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

Section 351. Excepting in event of a breakage or failure of a dam, pump, pipe line or conduit causing an immediate emergency, the declaration shall be made only after a public hearing at which consumers of such water supply shall have an opportunity to be heard protest against the declaration and to present their respective needs to said governing board.

Section 352. Notice of the time and place of hearing shall be published pursuant to Section 60 of the Government Code at least seven days prior to the date of hearing in a newspaper printed, published, and circulated within the area in which the water supply is distribute or if there is no such newspaper, in any newspaper printed, published, and circulated in the county in which the area is located.

Section 353. When the governing body has so determined and declared the existence of an emergency condition of water shortage within its service area, it shall thereupon adopt such regulations and restrictions on the delivery of water and the consumption within sa area of water supplied for public use as will in the sound discretion of such governing bod conserve the water supply for the greatest public benefit with particular regard to domest use, sanitation, and fire protection.

Section 354. After allocating and setting aside the amount of water which in the opinion of th governing body will be necessary to supply water needed for domestic use, sanitation, and fire protection, the regulations may establish priorities in the use of water for other purposes and provide for the allocation, distribution, and delivery of water for such other purposes, without discrimination between consumers using water for the same purpose purposes.

Section 355. The regulations and restrictions shall thereafter be and remain in full force and effect during the period of the emergency and until the supply of water available for distribution within such area has been replenished or augmented.

Section 356. The regulations and restrictions may include the right to deny such applications for new or additional service connections, and provision for their enforcement by discontinuing service to consumers willfully violating the regulations and restrictions.

Section 357. If the regulations and restrictions on delivery and consumption of water adopted pursuant to this chapter conflicts with any law establishing the rights of individual consumers to receive either specific or proportionate amounts of the water supply available for distribution within such service area, the regulations and restrictions adopted pursuant to this chapter shall prevail over the provisions of such laws relating to water rights for the duration of the period of emergency; provided, however, that any distributor of water which is subject to regulation by the State Public Utilities Commission shall before making such regulations and restrictions effective secure the approval thereof of the Public Utilities Commission.

Section 358. Nothing in this chapter shall be construed to prohibit or prevent review by any court of competent jurisdiction of any finding or determination by a governing board of the existence of an emergency or of regulations or restrictions adopted by such board, pursuant to this chapter, on the ground that any such action is fraudulent, arbitrary, or capricious.

ORDINANCE 33

AN ORDINANCE OF THE BOARD OF DIRECTORS OF THE MONTE VISTA WATER DISTRICT, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, TO ESTABLISH WATER USE EFFICIENCY BEST PRACTICES AND STAGED WATER SUPPLY SHORTAGE MEASURES

The Board of Directors of the Monte Vista Water District (District) of San Bernardino County, California, does hereby ordain the following:

Section 1: Purpose

Monte Vista Water District is responsible for providing reliable water supply for the beneficial use, health, safety and welfare of its customers. The District has worked diligently to educate its customers about the value of water use efficiency and available water supplies to the District. In the unlikely event of a water shortage, the District shall request that its customers make reasonable and necessary reductions in their water use, according to the provisions of this Ordinance.

Section 2: Policy

1. The waste or unreasonable use of water by District customers shall be prevented to the greatest extent possible, and the efficient use of water shall be encouraged.

2. The District shall meet its urban water efficiency targets as set forth in California Water Code Sections 10608-10608.60, requiring the District to achieve a 20% reduction in per capita water use or a comparable water use reduction goal by December 31, 2020.

3. The District shall declare respective water supply shortage stages only if the District determines one or more of the following situations has occurred or may occur in the foreseeable future:

   a. The District may be unable to acquire or produce adequate water supplies to meet projected customer demands; or,

   b. The cost to acquire or produce adequate water supplies to meet projected customer demands may rise above the projected revenues generated by currently adopted water rates.

   Such circumstances would most likely occur due to one or more of the following events: imported water supply cutbacks by Metropolitan Water District of Southern California, extended drought, equipment failure, act of terrorism, and/or natural disaster.

4. During a declared water supply shortage, the District shall reduce water deliveries to wholesale water customers equal to the percentage of water demand reduction requested from the District's retail customers. The wholesale customer shall be responsible for managing water demand within its service area to comply with reduced deliveries during the declared water supply shortage.

5. The District shall offer to local agencies within whose boundaries the District provides retail and wholesale water service, upon their request, reasonable levels of assistance in complying with California Government Code Sections 65591-65599 (Water Conservation in Landscaping Act), enacted by Assembly Bill No. 1881 (2006).

Section 3: Authority and Implementation

1. The Board of Directors has the statutory power to declare that water supply shortage conditions exist and to implement the various staged provisions of this Ordinance as required to maintain reliable and safe water service to District customers.

2. The General Manager shall request the Board of Directors to declare a water supply shortage at a regular or special meeting of the Board of Directors. The Board shall receive evidence of water supply conditions at a public hearing and shall make findings concerning the adequacy of water supplies for the District and the necessity, if any, of declaring a water supply shortage.

3. The declaration of the Board that a water supply shortage exists or is threatened to exist shall be made by Resolution and public announcement, and shall be published in a newspaper of general circulation within ten (10) calendar days of adoption. The declaration shall become effective immediately upon adoption. The Resolution shall set a time schedule for expiration after review of water supply shortage conditions as reported by the General Manager.

Section 4: Compliance Responsibility

The District customer whose name is on the account shall be responsible for compliance with the provisions of this Ordinance.

Section 5: Water Use Efficiency Best Practices

1. District customers are required to implement the following water use efficiency best practices at all times:

   a. Set automatic irrigation controllers to water outdoor landscaped areas only between the hours of 8 p.m. and 8 a.m. and for no more than fifteen (15) minutes per day per valve-controlled station. Exempt from this requirement:

      i. Watering by hand.

      ii. Drip irrigation.

      iii. Irrigation systems equipped with weather-based or soil moisture-based irrigation controllers.

   b. Adjust irrigation system so there is no run-off, over-spray or excessive irrigation causing irrigation water to flow off of the customer's property.

   c. Turn off outdoor irrigation during rain.

   d. Repair all plumbing and irrigation system leaks within seven (7) days of discovery.

e. Wash motor vehicles, trailers, boats and other types of mobile equipment with a hand-held bucket or a hand-held hose equipped with a shutoff nozzle, or use a commercial vehicle wash equipped with a water recycling system.

f. Wash paved areas for health and safety purposes only with the use of a waterbroom or water-efficient pressure washer.

g. Restaurants serve water only upon request.

h. Hotels offer guests the option to not launder linen daily.

2. The following technologies shall be equipped with water recycling, recirculation or reuse systems prior to the establishment of new water service:

   a. Cooling towers and evaporative cooling systems.

   b. Decorative water fountains.

   c. Conveyer vehicle washes and in-bay automatic vehicle washes.

3. The District shall offer local agencies and retail and wholesale customers reasonable assistance in complying with State and local water use efficiency guidelines and requirements.

Section 6: Significant Water Supply Shortage

If the Board of Directors finds that current or near-term water supply shortage conditions require a 10 to 25 percent demand reduction, the Board may pass a Significant Water Supply Shortage Resolution, enacting the following water use requirements in addition to those described in Section 5 above:

1. Landscaping and Landscape Irrigation.

   a. All lawns, landscape or turf areas shall be irrigated only on Tuesday, Thursday and Saturday of each week. Exempt from this requirement:

      i. Commercial nurseries, golf courses and other water-dependent industries.

      ii. Watering by hand.

      iii. Drip irrigation.

      iv. Irrigation systems equipped with weather-based or soil moisture-based irrigation controllers.

   b. Water consumption through water meters designed for landscape irrigation shall not exceed 75 percent of the amount of water used during the same billing period in the last calendar year during which no water shortage was declared.

2. Potable water used on a one-time basis for construction and dust control shall be limited to that quantity identified in the plan submitted by the user which describes water use requirements. The plan shall be submitted to and approved by the General Manager. Upon availability, non-potable recycled water will be made available for these uses.

3. The use of water from fire hydrants shall be limited to fire fighting and related activities, or for municipal activities necessary to maintain the public health, safety and welfare, or for construction use and dust control as approved by the General Manager.

4. The District shall reduce wholesale water deliveries in the same amount applicable to its retail customers, by 10 to 25 percent, effective upon the date of its public announcement of a Significant Water Supply Shortage. The General Manager shall consult with District wholesale customers prior to the announcement to coordinate and implement periods of reduction in water delivery.

Section 7: Critical Water Supply Shortage

If the Board of Directors finds that current or near-term water supply shortage conditions require a 25 to 40 percent demand reduction, the Board may pass a Critical Water Supply Shortage Resolution, enacting the following water use requirements in addition to those described in Sections 5 and 6 above:

1. Landscaping and Landscape Irrigation.

    a. All lawns, landscape or turf areas shall be watered only on Tuesday and Saturday of each week.

    b. Water consumption through water meters designed for landscape irrigation shall not exceed 50 percent of the amount of water used during the same billing period in the last calendar year during which no water shortage was declared.

    c. No person or entity shall implement any landscaping requirements of any homeowners association, developer or governing agency if it will result in an increase in water consumption from the prior calendar year.

2. No washing of motor vehicles, trailers, boats and other types of mobile equipment shall be permitted, unless done on the premises of a commercial car wash.

3. No one shall empty or refill swimming pools, spas or ponds for cleaning purposes. Water levels may be maintained.

4. The District shall reduce wholesale water deliveries in the same amount applicable to its retail customers, by 25 to 40 percent, effective upon the date of its public announcement of a Critical Water Supply Shortage. The General Manager shall consult with the District wholesale customers prior to the announcement to coordinate and implement periods of reduction in water delivery.

Section 8: Emergency Water Supply Shortage

If the Board of Directors finds that, due to emergency circumstances, current or near-term water supply shortage conditions require a 40 percent or higher demand reduction, the Board may pass an Emergency Water Supply Shortage Resolution, enacting the following water use requirements in addition to those described in Sections 5, 6 and 7 above:

1. Landscaping and Landscape Irrigation.

    a. All lawns, landscape or turf areas shall be watered only on Saturday of each week.

    b. Water consumption through water meters designed for landscape irrigation shall not exceed 33 percent of the amount of water used during the same billing period in the last calendar year during which no water shortage was declared.

    c. No installation of new landscaping shall be permitted.

2. No potable water for construction and dust control shall be permitted. Upon availability, non-potable recycled water will be made available for these uses.

3. No water shall be used to fill or maintain swimming pools, spas or ponds.

4. The District shall reduce wholesale water deliveries in the same amount applicable to its retail customers, by at least 40 percent, effective upon the date of its public announcement of an Emergency Water Supply Shortage. The General Manager shall consult with District wholesale customers prior to the announcement to coordinate and implement periods of reduction in water delivery.

Section 9: Exceptions

No water use requirements described in Sections 5, 6, 7 and 8 above shall apply to the following water uses:

1. The use of recycled water distributed through the District's recycled water distribution system and used for landscape irrigation, construction, dust control or other approved uses, or the use of recycled water produced for direct reuse by commercial car washes, commercial laundries and various industries utilizing industrial water reuse systems.

2. The routine and necessary use of water by a governmental entity in pursuit of its functions for protecting the public health, safety and welfare of its citizens. This exception does not apply to the use of potable water for landscape irrigation by a governmental agency.

3. The necessary use of water for the routine maintenance, testing and/or repair of water distribution facilities, residential and commercial plumbing and permanently installed landscape irrigation systems.

4. The use of "gray water". For the purposes of this Ordinance, "gray water" is defined as non-septic domestic wastewater collected from clothes washers, bathtubs, showers, and sinks. This provision shall not be construed to authorize the use of "gray water" if such use is otherwise prohibited by law.

Section 10: Immediate Water Shortage Response

In the event that an immediate shortage of water supply occurs due to disaster, the General Manager shall declare the extent of the water supply shortage and shall implement the appropriate water supply shortage stage as defined herein. The General Manager shall report such water supply shortage condition and level of response to the Board of Directors at a time which is reasonable and practicable.

Section 11: Failure to Comply

1. Any District customer violating the provisions set forth in this Ordinance shall be subject to the procedures and/or penalties described in this Section.

2. The following table outlines the procedures and penalties for violating the provisions set forth in this Ordinance, and each subsequent violation which occurs at least seven (7) days subsequent to the previous violation:

	First Violation	**Second Violation**	**Third Violation**	**Fourth Violation**	**Fifth Violation**
Best Practices	Written Notice	Final Written Notice	$50 Fine	$100 Fine	$150 Fine; Flow Restrictor
Significant Water Supply Shortage	Written Notice	$50 Fine	$100 Fine	$150 Fine	$200 Fine; Flow Restrictor
Critical Water Supply Shortage	Written Notice	$100 Fine	$200 Fine	$300 Fine; Flow Restrictor	---
Emergency Water Supply Shortage	Written Notice	$150 Fine	$300 Fine; Flow Restrictor	---	---

3. Written Notice

   a. Notice of a violation of Ordinance provisions, as outlined in Subsection 2 above, shall be given in writing by regular mail or personal delivery to the customer at the address on file with the District. If notice is given by mail, the person depositing the notice by mail shall complete a Proof of Service by Mail form indicating the time, date and place the notice was deposited in the U.S. Mail.

   b. If personal delivery is used, any notice of violation of the water use requirements shall be made in the following manner:

i. By handing the notice to the customer personally. The person serving the notice shall complete a Proof of Service form indicating the time, date and place of service.

ii. If the customer is absent from or unavailable at the premises at which the violation occurred, by leaving a copy with some person of suitable age and discretion at the premises and sending a copy through the regular mail to the customer at the address at which the customer is normally billed.

iii. If a person of suitable age or discretion cannot be found, by affixing a copy in a conspicuous place at the premises at which the violation occurred and also sending a copy through the regular mail to the customer at the address at which the customer is normally billed.

c. The notice shall contain a description of the facts of the violation, a statement of the possible penalties for each violation and a statement informing the customer of his or her right to request a waiver due to hardship or special circumstances.

4. After multiple violations of Ordinance provisions, as outlined under Subsection 2 above, the District may install a flow restricting device on a customer's water meter. The District may terminate a customer's landscape meter service upon a prior determination that the customer has repeatedly violated this Ordinance. Such action will only be taken after a hearing held by the Review Board where the customer will have the opportunity to respond to the District's evidence of repeated violation.

5. Any restricted or terminated service may be restored upon request of the customer made not less than forty-eight (48) hours after the implementation of the action restricting or terminating service and only upon a showing by the customer that the customer is ready, willing and able to comply with the provision of this Ordinance. Prior to any restoration of the service, the customer shall pay all District charges for any restriction or termination of service and its restoration.

Section 12: Review Board

1. A District customer may request a waiver from any provisions of this Ordinance due to hardship or special circumstances. A Review Board comprised of members of the District staff shall be designated by the General Manager to review such requests. The Review Board shall respond to a waiver request within ten (10) working days of receipt of request.

2. The Review Board shall review customer written requests for a waiver from Ordinance provisions due to hardship or special circumstances, and determine whether or not the case warrants a waiver. No waiver shall be granted unless the water customer shows that he or she has achieved the maximum practical reduction in water consumption other than in the specific area(s) in which a waiver is being sought. No waiver shall be granted to any water customer who, when requested by the District, fails to provide any information necessary for resolution of the customer's request for a waiver.

3. Any customer who is granted a waiver shall provide proof of compliance with said waiver upon demand by any person authorized by the District. If the customer is found to violate any provision of the waiver, the Review Board shall revoke the waiver. The Review Board shall notify the customer in writing of the proposed revocation five (5) working days before taking such action, and the customer shall be given the opportunity to be heard by the Review Board prior to its taking such action.

4. A waiver issued under a particular water supply shortage stage shall not be valid upon passage of a higher water supply shortage stage. A new waiver must be granted by the Review Board for each enacted water supply shortage stage.

5. Appeal of Review Board decisions shall be made in writing to the Board of Directors, whose decision shall be final. The Board of Directors shall consider the appeal within thirty (30) days from the date the appeal was filed. The appealing customer shall be given the opportunity to address the Board of Directors and submit evidence orally and in writing.

Section 13: Validity

If any section, sub-section, clause, phrase or portion of this Ordinance is for any reason held to be invalid or unconstitutional by any court of competent jurisdiction, such decision shall not affect the validity of remaining portions of this Ordinance.

Section 14: Consistency

1. This Ordinance is consistent with the provision of California Water Code Sections 375-378, inclusive, and Sections 31020-31035.1, inclusive.

2. This Ordinance fulfills the District's water supply shortage planning obligation as required by California Water Code Sections 10610-10656, inclusive (Urban Water Management Planning Act). Subsequent District Urban Water Management Plan updates shall comply with this Ordinance.

Section 15: Effective Date

This Ordinance shall be effective immediately upon adoption and shall be published in any newspaper of general circulation and distributed within the District as required by law.

The President of the Board of Directors shall sign this Ordinance and the Secretary shall attest to the same. The Secretary shall cause this Ordinance to be published within ten (10) days after its adoption, at least once in a newspaper of general circulation which is distributed within the boundaries of the Monte Vista Water District.

Section 16: Repeal and Rescind

Upon adoption of this Ordinance, Ordinance 32 shall be repealed and rescinded effective on the date of adoption of this Ordinance.

ADOPTED THIS 12th day of May 2010.

Sandra S. Rose
President of the Board of Directors
MONTE VISTA WATER DISTRICT

ATTEST:

Mark N. Kinsey
Secretary to the Board of Directors
MONTE VISTA WATER DISTRICT

RESOLUTION No. 2006–06-03
A RESOLUTION OF THE BOARD OF DIRECTORS OF THE
SAN ANTONIO WATER COMPANY ESTABLISHING PROCEDURES IN THE CASE OF A
WATER SHORTAGE

Entitled

"WATER SHORTAGE CONTINGENCY PLAN"

WHEREAS, the Board of Directors at its regular meeting of September 19, 2006, did discuss and establish the protocols and procedures attendant to the conduct of meetings of the Board of Directors.

NOW THEREFORE, BE IT RESOLVED that the San Antonio Water Company establish a plan to respond to water shortages,

WHEREAS, the Board is concerned that our precious water resources are protected so shareholders can expect to receive a reliable supply of quality water on demand; and

WHEREAS, the Board has a responsibility to provide water to its shareholders through the creation and maintenance of the infrastructure necessary to pump, store and distribute water; and

WHEREAS, the Board acknowledges the City of Upland Water Conservation Ordinance No. 1786 and shares the City of Upland's City Council's concern regarding the proper management of our precious water resources to ensure a reliable supply of quality water; and

WHEREAS, the San Antonio Water Company periodically needs supplemental water supply service from the City of Upland, which in accordance with City of Upland Ordinance No. 1786, as a prerequisite for receiving water supply service from the City of Upland, requires the implementation of water conservation measures; and

WHEREAS, the Board has adopted a resolution to water conservation,

NOW, THEREFORE, THE SAN ANTONIO WATER BOARD, CALIFORNIA, DOES RESOLVE, DECLARE, DETERMINE AND ORDER AS FOLLOWS:

I. GENERALLY

A. Declaration of policy. It is hereby declared that because of the water conditions prevailing in the Water Company service area, the general welfare requires that the water resources available to the Water Company, Region and State be put to the maximum beneficial use, that the waste or unreasonable use of water be prevented, and that the conservation of water is to be encouraged at all times.

B. Authorization. The General Manager shall request the Board to declare that demand for water is anticipated to be in excess of supply, immediately after it appears that such a situation exists or is threatened, if the Board is in session. If the Board is not in session, the General Manager immediately cause a request for a special meeting of the Board to be delivered to each Board Member who can be located. The Board shall have the power to declare the necessity to implement the applicable provisions of this part when in their opinion the demand for water consumption exceeds the Water Company's available supply (allowing for a safe reserve), or threatens to do so, provided there are no immediate resources available to remedy the situation. Said declaration shall be made by public announcement and shall be published in a newspaper of general circulation and shall become effective immediately upon such publication.

C. Application. The provisions of this chapter shall apply to all shareholders, customers within the Water Company's service area, or property serviced by the Water Company wherever situated.

II. CONSERVATION PROGRAM-YEAR ROUND STAGE

A. The following activities are hereby prohibited:

1.0 The washing of sidewalks, walkways, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety;

a. Excessive or unreasonable run off of water or unreasonable spray of the areas being watered. Every shareholder is deemed to have his/her water system under control at all times, to know the manner and extent of this water use and any run off, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;

2.0 Allowing, permitting or causing the escape of water through breaks or leaks within the customers plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy-two (72) hours after the customer discovers such a break or leak or receives notice from the Water Company of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak;

3.0 Outdoor irrigation of landscape by sprinklers during the hours of 10:00 a.m. to 6:00 p.m. Shareholders are encouraged to avoid the use of sprinklers on windy days. Irrigation by hand held hose, drip irrigation, hand held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, and alleys or storm drains;

4.0 Washing of automobiles, trucks, trailers, boats, and other types of equipment (mobile or otherwise) unless done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff. However, this section does not apply to the washing of the above-listed vehicles or mobile equipment when conducted on the immediate premises of a commercial carwash;

5.0 With respect to eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, that benefits from the supply of water by the Water Company shall not provide drinking water to any person unless expressly requested.

B. Exceptions: None of these restrictions shall apply to the following:

1.0 The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2.0 The necessary use of water for the routine maintenance, repair or construction of distribution and water supply facilities, residential and commercial plumbing and permanently installed landscaped irrigation systems.

3.0 Available non-potable water which is only delivered for irrigation purposes and/or not available for distribution by current Water Company production and conveyance facilities.

III. MODERATE SHORTAGE STAGE

A. In the event the Board determines that the measures outlined above fail to produce a sufficient reduction in demand so as to produce a sufficient supply, the use of water within the Water Company's service area shall be additionally restricted and the following provisions shall become effective upon a declaration by the Board and publication of same as follows:

1.0 The washing of sidewalks, walkways, driveways, public and private parking areas and all other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety;

a. Excessive or unreasonable run off of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his/her water system under control at all times, to know the manner and extent of this water use and any run off, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;

2.0 Allowing, permitting or causing the escape of water through breaks or leaks within the customers plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy-two (72) hours after the customer discovers such a break or leak or receives notice from the Water Company of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak;

3.0 Outdoor irrigation of landscape by sprinklers is permitted only on even days of the month for those locations having a street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on odd days of the month for those locations having a street address with an odd last digit. No outdoor irrigation shall take, place between the hours of 10:00 a.m. and 6:00 p.m. Irrigation by hand held hose, drip irrigation, hand held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains;

4.0 Washing of vehicles, trailers, boats, and mobile equipment:

a. The washing of automobiles, trucks, trailers, boats, and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff;

b. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved county standards with equipment to recycle water for use within their facility;

c. Nonprofit and community based organizations' fundraising car washes shall be allowed, provided they are otherwise in accordance with all other provisions of a permit to operate a nonprofit carwash.

5.0 With respect to eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, that benefits from the supply of water by the Water Company shall not provide drinking water to any person unless expressly requested.

6.0 The refilling or adding of water to swimming pools is prohibited except on designated outdoor water use days, which is restricted between the hours of 10am and 6 pm.

7.0 Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited.

8.0 The irrigation of golf course fairways is prohibited. This section shall not apply to the irrigation of any golf course solely with available non-potable or reclaimed wastewater.

9.0 The use of water from fire hydrants shall be limited to firefighting and emergency related activities and/or other activities necessary to maintain the health, safety, and welfare of the citizens of the San Antonio Water Company's service area. This restriction shall not apply to businesses, which require the use of water for land development and building construction processes with prior written approval by the Water Company.

B. Exceptions: None of the moderate shortage restrictions shall apply to the following uses of water:

1.0 The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2.0 The routine and necessary use of water, other than for landscape irrigation, for land development (e.g., roadway base preparation, flushing of utility lines, dust control, concrete and asphalt work) and for building construction processes;

3.0 The necessary use of water for the routine maintenance and/or repair or construction of water distribution facilities, residential and commercial plumbing and permanently installed landscape irrigation systems;

IV. CONSERVATION PROGRAM-HIGH SHORTAGE STAGE

A. In the event the Board determines that the measures fail to produce a sufficient reduction in demand so as to produce a sufficient supply, the use of water within the Water Company's service area shall be additionally restricted and the following provisions shall become effective upon a declaration by the Board and publication of same as follows:

1.0 The washing of sidewalks, walkways, driveways, public and private parking areas and other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety is prohibited;

a. Excessive run off of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his/her water system under control at all times, to know the manner and extent of this water use and any run off, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;

2.0 Allowing, permitting or causing the escape of water through breaks or leaks within the customers plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy-two (72) hours after the customer discovers such a break or leak or receives notice from the Water Company of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak;

3.0 Outdoor irrigation of landscape by sprinklers is permitted only on Wednesday and Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Tuesday and Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Wednesday and Sunday if located west of San Antonio Avenue or only on Tuesday and Saturday if located east of San Antonio Avenue. No outdoor irrigation shall take place between 6:00 a.m. until one (1) hour before sundown. Irrigation by hand held hose, drip irrigation, or hand held bucket or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains;

4.0 Washing of vehicles, trailers, boats and mobile equipment:

a. The washing of automobiles, trucks, trailers, boats, airplanes and other types of equipment (mobile or otherwise) is prohibited except on the designated outdoor water use days between the hours of 12:00 midnight to 12:00 noon and sundown to 12:00 midnight. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use to ensure the water supply is shutoff;

b. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved county standards with equipment to recycle water for use within their facility;

c. Trucks, trailers and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables) when said washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to noon. Such washing, when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use;

d. Nonprofit and community based organizations' fundraising car washes shall be allowed, provided they are otherwise in accordance with all other provisions of the appropriate agency with that jurisdiction and this section, and have obtained the necessary permits to operate a nonprofit carwash. Such activities shall be limited to no more than two (2) times in one (1) month. Permit shall become void upon the effective date of the declaration of severe shortage.

5.0 All eating and drinking establishments of any kind whatsoever including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall only provide drinking water to any person unless expressly requested.

6.0 The refilling or adding of water to existing swimming pools is prohibited except on designated outdoor water use days. New pool construction filling shall be by permit only.

7.0 Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited.

8.0 The waters of golf course tee areas and fairways are prohibited unless done with reclaimed wastewater or non-potable water.

9.0 The use of water from fire hydrants shall be limited to firefighting and emergency related activities and/or other activities necessary to maintain the health, safety, and welfare of the citizens of the San Antonio Heights. This restriction shall not apply to businesses, which require the use of water for land development and building construction processes, pursuant to prior written approval by the Water Company.

B. Exceptions: None of the high shortage restrictions shall apply to the following uses of water provided there is prior written approval by the Board:

1.0 The routine and necessary use of water, other than for landscape irrigation, by a governmental entity in pursuit of its governmental functions for the benefit of the public, such as construction projects and for the cleaning of streets to prevent debris and harmful substances from entering water systems via storm drains;

2.0 The routine and necessary use of water, other than for landscape irrigation, for land development (e.g., roadway base preparation, flushing of utility lines, dust control, concrete and asphalt work) and for building construction processes;

3.0 The necessary use of water for the routine maintenance and/or repair or construction of water distribution facilities, residential and commercial plumbing and permanently installed landscape irrigation systems;

V. CONSERVATION PROGRAM – SEVERE SHORTAGE STAGE

A. In the event the Board of Directors determines that the measures fail to produce a sufficient reduction in demand so as to produce a sufficient supply, then the use of water within the Company's service area shall be additionally restricted and the following provisions shall become effective upon a declaration by the Board of Directors and publication of same as follows:

1.0 The washing of sidewalks, walkways, driveways, public and private parking areas and other impervious hard surfaced areas by direct hosing when runoff water directly flows to a gutter or storm drain, except as may be necessary to properly dispose of flammable or other dangerous liquids or substances, wash away spills that present a trip and fall hazard, or to prevent or eliminate materials dangerous to the public health and safety is prohibited;

a. Excessive run off of water or unreasonable spray of the areas being watered is prohibited. Every customer is deemed to have his/her water system under control at all times, to know the manner and extent of this water use and any run off, and to employ available alternatives to apply irrigation water in a reasonably efficient manner;

2.0 Allowing, permitting or causing the escape of water through breaks or leaks within the customers plumbing or private water distribution system for any substantial period of time within which such break or leak should reasonably have been discovered and corrected. It shall be presumed that a period of seventy-two (72) hours after the customer discovers such a break or leak or receives notice from the Water Company of a break or leak, is a reasonable time within which to correct such break or leak, or, at a minimum, to stop the flow of water from such break or leak;

3.0 Outdoor irrigation of landscape by sprinklers is permitted only on Sunday for those locations having street address with an even last digit. Outdoor irrigation by sprinklers is permitted only on Saturday for those locations having a street address with an odd last digit. Outdoor irrigation for locations not having a street address shall occur on Sunday if located west of San Antonio Avenue or only on Saturdays if located east of San Antonio Avenue. No outdoor irrigation shall take place between 6:00 a.m. until one (1) hour before sundown. Irrigation by hand held hoses, drip irrigation, or hand held bucket, or similar container or by use of a cleaning machine equipped to recycle any water used are permitted anytime. In no event shall any water so used be permitted to run off into adjacent property, streets, alleys or storm drains;

4.0 Washing of vehicles, trailers, boats, and mobile equipment.

a. The washing of automobiles, trucks, trailers, boats, and other types of equipment (mobile or otherwise) is prohibited except as provided elsewhere in this section;

b. No individual, firm or business that regularly washes vehicles for remuneration or provides facilities for customers to do so through coin operated machinery shall be permitted to operate such a business unless their place of business is equipped and operating to approved county standards with equipment to recycle water for use within their facility. Washing of vehicles in such facilities shall occur only between the hours of 6:00 a.m. and 12:00 noon;

c. Trucks, trailers, and other types of mobile equipment (such as garbage trucks and vehicles used to transport food and other perishables) when said washing is necessary in order to protect the health, safety and welfare of the public, shall be restricted to the hours of sundown to 12:00 noon. Such washing when allowed, shall be done with a hand held bucket or hand held hose equipped with a positive shutoff nozzle for quick rinses. The nozzle shall be removed when the hose is not in use.

5.0 All eating and drinking establishments of any kind including, but not limited to, any restaurant, hotel, cafe, cafeteria, bar or club, whether public or private, shall only provide drinking water to any person unless expressly requested.

6.0 The refilling or adding of water to existing swimming pools is prohibited except on designated outdoor water use days. New pool construction filling shall be by permit only.

7.0 Any non-business, operation related pond, ornamental fountain or other structure making similar use of water is prohibited.

8.0 The watering of golf course tee areas and fairways is prohibited unless done with reclaimed wastewater.

VI. IMPLEMENTATION

A. In case of severe water shortage, which could occur due to a catastrophic failure of any of the Water Company's key water supply sources (i.e. SAWCo Tunnel) would result in an emergency meeting with the Board to set the appropriate reduction of entitlement per share effective upon a declaration by the Board of Directors and publication of same.

B. The Board shall review special cases, which cannot follow the letter of this part for recommendation to the Board who may grant variances.

1.0 A variance shall be granted only for reasons of economic hardship, which is defined as a threat to an individual business's primary source of income. (Under no circumstances shall inconvenience or the potential for damage of landscaping be considered an economic hardship, which justifies a variance.) The Board shall recommend only the implementation of equitable water use restrictions, which further the purpose and intent of the water conservation plan. The special water use restrictions recommended by the Board of Directors in each case shall be set forth on the face of the variance, permit or compliance agreement. A nonrefundable fee of fifty dollars ($50.00) per permit application for all requests shall be assessed to reimburse the Water Company for administrative costs.

2.0 A variance or permit issued under moderate shortage shall not be valid upon implementation of high or severe shortage stages unless the permit specifically addresses either or both of those stages upon initial issuance. Said multi-stage permit would have to reflect significant additional savings of water, or nonuse of water, under progressively more critical shortage stages. A variance or permit shall expire under its own terms and conditions and/or when another water conservation stage is in effect.

a. Exception: If, within the period of the permit, the conservation stage for which the permit was originally issued is reinstated, the permit will be considered valid until the original expiration date, as long as that conservation stage is in effect.

3.0 Any person, corporation or association who is issued a variance or permit and makes use of water pursuant to said variance, permit or compliance agreement shall provide proof of said variance, permit or compliance agreement upon demand by any person authorized by the Water Company.

4.0 Upon findings of non-compliance of a shareholder of any provision of this part, will cause revocation of any permit, variance, or compliance agreement previously granted. However, the applicant shall be notified of the proposed revocation five (5) working days before taking such action, and applicant shall be given the opportunity to be heard by the Board.

VI. ADDITIONAL ASSESSMENT FOR VIOLATION OF THIS RESOLUTION

A. Guidelines.

1.0 Any shareholder who uses water provided by the Water Company knowingly use, or permit the use of water in a manner contrary to any provision of this part, or in an amount in excess of that use permitted by the provisions of this resolution or that is reasonably necessary to satisfy the water usage need shall be found in non-compliance with this resolution and assessed the following:

a. If found in non-compliance of this resolution for a first occurrence during any calendar year or declared conservation stage, whichever time period is shorter in duration shall be assessed $50;

b. If found in non-compliance of this resolution for a second occurrence during any calendar year or declared conservation stage, whichever time period is shorter in duration shall be assessed $100;

c. If found in non-compliance of this resolution for a third occurrence or more during any calendar year or declared conservation stage, whichever time period is shorter in duration shall be assessed $500.

2.0 In addition to the above, the General Manager is hereby empowered to enact other restrictive measures that are intended to abate the conductor circumstances comprising the occurrence, including but not limited to the following: placement of a flow restricting device upon the water service, locking off of water meter, removal of water meter, and shutting off of the service line valve.

VII. If any section, subsection, sentence, clause, phrase, or portion of this Resolution is for any reason held to be invalid or unenforceable by a court of competent jurisdiction, the remaining portions of this Resolution shall nonetheless remain in full force and effect. The shareholders of the Water Company hereby declare that they would have adopted each section, subsection, sentence, clause, phrase, or portion of this Resolution, irrespective of the fact that anyone or more sections, subsections, sentences, clauses, phrases, or portions of this Resolution be declared invalid or unenforceable.

The foregoing ordinance was PASSED, APPROVED AND ADOPTED by the Board of Directors of the San Antonio Water Company on the ~~17~~ 19 th day of ~~October~~ September, 2006.

Tom Thomas

Tom Thomas, President

ATTEST:

Ken Willis

Ken Willis, Secretary

I, Ken Willis, Secretary of the San Antonio Water Company Board of Directors, Upland, California, do hereby certify that the foregoing Resolution was introduced at a regular meeting of the Board of Directors of the San Antonio Water Company held on the ~~17~~ 19 th day of ~~October~~ September, 2006, and was adopted at a regular meeting of the Water Company Board of the San Antonio Water Company on the ~~17~~ 19 th day of ~~October~~ September, 2006, by the following roll call vote:

AYES: 6

NOES: 0

ABSENT: 1

ABSTAINED: 0

APPENDIX M

WFA Contingency Operations Plan

CONTINGENCY OPERATIONS PLAN
UNDER EXTREME/EXCEPTIONAL DROUGHT MANAGEMENT CONDITIONS

Prepared by:

Terry Catlin
General Manager

Jake Stepp
Operations Superintendent

Water Facilities Authority, JPA
Agua de Lejos Treatment Plant
1775 North Benson Avenue
Upland, CA 91784

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1.0 INTRODUCTION

The Water Facilities Authority (Authority) owns and operates the Agua de Lejos Water Treatment Plant (WTP), a conventional surface water treatment facility that treats and disinfects imported water supplies, primarily State Water Project (SWP) water that is purchased from the Metropolitan Water District (MWD) through the Inland Empire Utilities Agency (IEUA). The WTP is located on sixteen acres in Upland. It began operations in 1988 and has the capacity to treat 81 million gallons per day (mgd). Recent historical flows through the treatment plant is normally in the range of 55-60 mgd during the peak summer months and can be as low as 8 mgd during the lower demand winter months. (With an administrative minimum flow penalty waiver from Metropolitan Water District, the deliveries can be as low as 4 mgd.)

The three-year period from 2012 through 2014 was the driest three-year period on record in California, and 2015 opened with the driest January in the state's weather record history. The Sierra Nevada snowpack typically peaks by April 1; this year, the snowpack was measured at five percent of historic average, the lowest measurement in recorded history. Governor Brown declared a drought State of Emergency on January 17, 2014 and directed state officials to take all necessary actions to prepare for water shortages. The State Water Resources Control Board on March 17, 2015 announced new restrictions on water use, including limiting outdoor watering to two days per week and prohibiting lawn watering during rainfall and during the next two days. Earlier this month, the governor directed the State Water Resources Control Board to implement mandatory water reductions in cities and towns across California to reduce water usage by 25 percent.

MWD amended its Water Supply Allocation Plan at its Board of Directors meeting held on December 9, 2014, with the following adjustments:

- Update to base period to Fiscal Years ending 2013 and 2014;
- Update to Conservation Demand Hardening credit based on member agency per capita water use reductions with considerations of early enforcement of mandatory conservation requirements;
- Includes a separate allocation for drought-impacted groundwater basins; and
- Replaces current penalty rate with an Allocation Surcharge based on marginal water conservation program costs.

On April 14, 2015, the Board of Directors took action to declare a Condition 3 – Water Supply Allocation and implement the Water Supply Allocation at a Level 3 Regional Shortage Level (approximately 15%), effective July 1, 2015 through June 30, 2016.

In order to manage the limited imported water supply deliveries through the treatment plant, staff collaborated with the Technical Advisory Committee (TAC) to develop the current Contingency Operations Plan (COP) to provide a guide outlining monthly delivery allocations to each of the members.

2.0 DRY YEAR YIELD PROGRAM

In June 2003, a Conjunctive Use Program Agreement (Number 49960) was executed between MWD, Three Valleys MWD (TVMWD), Chino Basin Watermaster (CBWM) and IEUA to establish a 100,000 AF conjunctive use and storage program for MWD, called the Dry Year Yield Program.

The Agreement provides for storage of up to 25,000 AFY unless CBWM allows for more, and extraction, at MWD's call, during dry years of up to 33,000 AFY not to exceed the amount of water in the MWD storage account.

The Agreement was amended in September 2014 to improve and clarify measurement of storage and extraction from the MWD storage account, define baseline conditions for calculations in performance targets, define procedures for variances for performance targets, revise administrative milestones, and make miscellaneous updates. Exhibit G was revised providing for a safety-net condition of imported water delivery of a minimum 40,000 AFY during Call Years, establishing minimum needs for direct deliveries from MWD.

MWD's storage account has not been replenished since it was emptied in the last set of calls during the last drought condition (2008-2011). Therefore, performance by the DYY Program participants is not required at this time.

3.0 WATER SUPPLY ALLOCATION PLAN

IEUA, along with other MWD members, worked with MWD staff in developing the Water Supply Allocation Plan (WSAP) that outlines measures to be taken to further reduce demand on the MWD system, if required. Previously, the WSAP was implemented at a Regional Shortage Level 2 (10%) from July 1, 2009 through June 30, 2010 and again from July 1, 2010 through June 30, 2011. Due to vastly improved water supply conditions, the allocation was rescinded in April 2011.

Since June 2014, MWD convened a number of working group meetings to revisit the WSAP in preparation for mandatory supply allocations in 2015. The recent discussions focused on three areas of the WSAP: (1) the Base Period, (2) the Allocation Formula, and (3) the Allocation enforcement mechanism.

In December 2014, the MWD Board of Directors approved adjustments to the WSAP. The adjustments included the following:

1. **Base Period**. The previous base period of CY 2004-2006 is replaced with FY ending 2013 and FY 2014.

2. **Conservation Demand Hardening Credits**. The current calculation intensive method is replaced with observed reductions in GPCD, compared to the baseline GPCD. The Conservation Demand hardening credit will be based on an initial ten percent of the GPCD-based Conservation savings plus an additional five percent for each level of Regional shortage set by the MWD Board during implementation of the WSAP. The credit will also be adjusted for the overall percentage reduction in retail water demand and the member agency’s dependence upon MWD.

3. **Drought-Impacted Groundwater Basins**. A limited allocation made for drought impacted groundwater basins based on overdraft conditions, water quality restrictions, and verified need for replenishment, with final amounts and allocations determined following consultation with groundwater basin managers and member agencies.

4. **WSAP Penalty Rates**. The current Penalty Rate is based on a multiple of the fully encumbered Tier 2 Untreated Rate, over and above the water rates for the use of the water. The Penalty Rate is replaced with an Allocation Surcharge, based on the current cost of the turf removal program.

Inland Empire Utilities Agency (IEUA) reports that a Level 3 (~15%) allocation was adopted by MWD. Estimated IEUA Member Agency WSAP Allocation based on % IW purchased during WSAP baseline FY13-FY14, is presented as follows:

Agency	2012-13	2013-14	% IW Delivery	Baseline	Level 3	Level 4
CVWD	25,845	28,825	43%	28,069	26,640	25,602
WFA	27,954	28,438	45%	28,953	**27,479**	26,408
FWC	5,215	9,792	12%	7,705	7,313	7,028
TOTAL	**59,014**	**67,055**	**100%**	**64,726**	**61,431**	**59,038**

(1) Baseline values as calculated by MWDs WSAP formula, FY12/13 and FY13/14 were the initial years used to forecast FY15/16 needs. The Baseline value includes growth and other various credits as defined by the approved WSAP. Each IEUA member agency will receive their % share of IEUAs total allocation based upon the percent's provided in "%IW Delivery" column.

(2) Values are estimates and are subject to change. Final allocations expected from MWD by end April or early May 2015.

3.1 ALLOCATION SURCHARGE

The Allocation Surcharge is based on the costs that MWD and its Member Agencies are incurring to implement outdoor waster use reductions through turf removal programs. The Allocation Surcharge would provide a price signal based on the marginal conservation costs incurred to reduce water use in dry and shortage years. Any revenues collected from the Allocation Surcharge would be used to fund the implementation of the Turf Removal Program or other similar programs designed to conserve water and reduce future demands.

The Allocation Surcharge is based on MWD's current cost of the Turf Removal Program. MWD is currently paying $2 per square foot of turf removed. The estimated water savings is 44 gallons per year for each square foot of turf removed for a period of ten years. Based on this savings rate, the estimated cost of the program is $1,480 per acre-foot.

Table 3. MWD Surcharge (per AF)

Water Use	Base Rate	Surcharge	Total Cost
100% of Allocation	Tier 1	0	Tier 1
Between 100% & 115%	Tier 1	$1,480	Tier 1 + $1,480
Greater than 115%	Tier 1	$2,960	Tier 1 + $2,960

4.0 CONTINGENCY OPERATIONS PLAN DEVELOPMENT

The Authority's Operations' staff recognizes that the projected imported water supply reductions mandated by the WSAP requires collaboration and coordination with it Member Agencies for the day-to-day operations. Further, the approximate level of reduced imported water deliveries available to the Authority under projected scenarios of program implementation are estimated for planning purposes.

Planning worksheets identifying possible delivery scenarios have been developed and discussed at length through the Technical Advisory Committee. It is important to note that any COP requires adaptability as conditions and circumstances change and as water supply updates are provided. Therefore, the content of the COP will be revisited as much as necessary to address changing conditions. While an expressed numerical analysis is presented, a number of assumptions were considered as they were known at the time of development to formulate these results and only serve to guide the Authority's staff in operating the WTP in a coordinated manner integrating the interests of the individual members and their demand for imported water supplies.

Further, the individual members are required to monitor and perform in accordance with any mandatory reductions required by the WSAP, certifying compliance accordingly to the appropriate administering agency.

4.1 BASELINE DETERMINATION

The revised WSAP relies upon an historical two-year period, being identified as FYE 2013 through FYE 2014 including a growth adjustment and other credits applied.

4.1.1 WSAP BASELINE (RAW DELIVERY DATA)

Table 4 WSAP Baseline Determination (Historical Deliveries FYE 2013-2014) in AF

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2013	3,168	3,261	3,053	2,333	1,763	1,141	1,110	1,128	1,610	2,856	3,113	3,419	**27,954**
2014	3,782	3,678	3,341	2,199	1,507	1,049	1,643	1,290	1,625	2,052	2,993	3,296	**28,455**
2 Yr Average	3,475	3,469	3,197	2,266	1,635	1,095	1,377	1,209	1,617	2,454	3,053	3,358	**28,204**

4.2 MEMBER ALLOCATION METHODOLOGY

Previously, the Authority utilized a formula for distributing the available imported water allocation amongst the members. This formula was the Ten Year Rolling Average (Fiscal Years 2004-2014 Basis with a one-year lag) of historical deliveries percentages (Table 5).

Table 5 Allocation Methodology	
Agency	**Allocation Formula (FY 10 YRA)**
Chino	12.6%
MVWD/Chino Hills	26.4%
Ontario	43.2%
Upland	17.8%
Total =	100.0%

4.2.1 MEMBERS WATER SUPPLY ALLOCATION

The FY 10 year rolling average of historical deliveries percentages in Table 6 was applied to the projected WSAP allocation (Level 3) identified in Table 6 below.

Table 6 Determination of Available Deliveries			
Agency	**Allocation Formula (FY 10 YRA)**		**Available Deliveries**
Chino	3,575	**12.6%**	3,462
MVWD/Chino Hills[(1)]	7,509	**26.4%**	7,255
Ontario	12,286	**43.2%**	11,871
Upland	5,066	**17.8%**	4,891
Total =	28,436	100.0%	**27,479**

[(1)]Per Joint water supply agreement between Monte Vista WD and City of Chino Hills

4.3 CONTINGENCY OPERATIONS

After much discussion during the development of the COP through the Technical Advisory Committee, the majority opinion was to design the COP wherein most of the projected available imported water supply would be delivered primarily during peak demand in the summer months, with emphasis given to July through October, while attempting to maintain minimum deliveries in the remainder or some portion of the year.

Since the construction of the Low Flow Modification Project, the WTP has the flexibility to operate at a minimum 4-mgd flow, as presented in the following tables, during the off-peak months so that most of the available supplies would be directed to the higher demand peak months. Further, a prolonged shutdown can be avoided with the lower minimum flow capability. Therefore, the plan is to operate the WTP throughout the year, unless a brief shutdown is required by MWD for maintenance on the Rialto Pipeline or for special maintenance at the WTP.

It should be noted that MWD has previously granted the Authority a waiver of their Administrative Code 4504(b) during WSAP implementation to allow minimum raw water supply deliveries less than the required minimum 10% of influent valve capacity (8 mgd) or to avoid minimum 8 mgd purchase payments for deliveries at less than the minimum.

In the following planning scenarios, the projected annual volume of water available for deliveries is distributed or allocated to the Authority's members according to the FY 10 YRA methodology previously used and considered the members' preferences in accordance to their individual systems' demands.

4.3.1 MONTHLY WATER SUPPLY ALLOCATION SCENARIO

In this scenario, Table 7 and Table 8 illustrate the allocation of projected water deliveries in acre-feet and million gallons per day, respectively. The allocation is distributed to the members in accordance with the FY 10 YRA methodology based on the historical delivery pattern. Scenarios in Tables 9-10 provide a distribution based on a winter minimum flow pattern. Scenarios in Tables 11-12 provide a distribution based on a winter no flow pattern.

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Distribution Based on **Historical Delivery Pattern**:

Table 7. Estimated Projected Available Deliveries (AF) July 2015 - June 2016

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Chino	441	456	378	295	202	183	214	118	234	284	299	358	3,462
MVWD/Chino Hills [(1)]	924	956	792	619	423	383	448	247	491	594	628	751	7,255
Ontario	1,511	1,565	1,295	1,013	692	627	734	404	804	972	1,027	1,229	11,871
Upland	623	645	534	417	285	258	302	166	331	401	423	506	4,891
Total	3,498	3,622	2,998	2,344	1602	1,451	1,698	934	1,860	2,251	2,377	2,844	27,479

Table 8. Estimated Projected Available Deliveries (MGD) July 2015 - June 2016

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Chino	4.6	4.8	4.1	3.1	2.2	1.9	2.2	1.4	2.5	3.1	3.1	3.9
MVWD/Chino Hills [(1)]	9.7	10.1	8.8	6.5	4.6	4.0	4.7	2.9	5.2	6.5	6.6	8.2
Ontario	15.9	16.4	14.1	10.6	7.5	6.6	7.7	4.7	8.4	10.6	10.8	13.3
Upland	6.5	6.8	5.8	4.4	3.1	2.7	3.2	1.9	3.5	4.4	4.4	5.5
Total	36.8	38.1	32.6	24.6	17.4	15.3	17.9	10.9	19.6	24.4	25.0	30.9

[(1)] Per Joint water supply agreement between Monte Vista WD and City of Chino Hills

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Distribution Based on **Winter Minimum Flow Pattern** (Assumes Waiver of MWD Administrative Code 4504(b) is Granted):

Table 9. Estimated Projected Available Deliveries (AF) July 2015 - June 2016

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Chino	578	583	512	277	208	48	48	45	242	277	298	346	**3462**
MVWD/Chino Hills [1]	1,212	1,222	1,072	580	435	101	101	93	508	580	625	726	**5,980**
Ontario	1,983	1,999	1,755	950	712	165	165	153	831	950	1,022	1,187	**11,871**
Upland	817	824	723	391	293	68	68	63	342	391	421	489	**4,891**
Total	**4,591**	**4,627**	**4,061**	**2,198**	**1,649**	**381**	**381**	**354**	**1,924**	**2,198**	**2,366**	**2,748**	**27,479**

Table 10. Estimated Projected Available Deliveries (MGD) July 2015 - June 2016

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Chino	6.1	6.1	5.6	2.9	2.3	0.5	0.5	0.5	2.5	3.0	3.1	3.8
MVWD/Chino Hills [1]	12.7	12.8	11.6	6.1	4.7	1.1	1.1	1.1	5.3	6.3	6.6	7.9
Ontario	20.8	21.0	19.1	10.0	7.7	1.7	1.7	1.7	8.7	10.3	10.7	12.9
Upland	8.6	8.7	7.9	4.1	3.2	0.7	0.7	0.7	3.6	4.2	4.4	5.3
Total	**48.3**	**48.6**	**44.1**	**23.1**	**17.9**	**4.0**	**4.0**	**4.0**	**20.2**	**23.9**	**24.9**	**29.8**

[1] Per Joint water supply agreement between Monte Vista WD and City of Chino Hills

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Distribution Based on **One Month No Flow Pattern**:

Table 11. Estimated Projected Available Deliveries (AF) July 2015 - June 2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Chino	459	555	378	295	202	183	214	0.0	234	284	299	358	**3462**
MVWD/Chino Hills[(1)]	965	1,162	792	619	423	383	448	0.0	491	594	628	751	**7,255**
Ontario	1,578	1,902	1,295	1,013	692	627	734	0.0	804	972	1,027	1,229	**11,871**
Upland	651	783	534	417	285	258	302	0.0	331	401	423	506	**4,891**
Total	**3,653**	**4,402**	**2,998**	**2,344**	**1,602**	**1,451**	**1,698**	**0.0**	**1,860**	**2,251**	**2,377**	**2,844**	**27,479**

Table 12. Estimated Projected Available Deliveries (MGD) July 2015 - June 2016	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Chino	4.8	5.8	4.1	3.1	2.2	1.9	2.2	0.0	2.5	3.1	3.1	3.9
MVWD/Chino Hills[(1)]	10.1	12.2	8.6	6.5	4.6	4.0	4.7	0.0	5.2	6.5	6.6	8.2
Ontario	16.6	20.0	14.1	10.6	7.5	6.6	7.7	0.0	8.4	10.6	10.8	13.3
Upland	6.8	8.2	5.8	4.4	3.1	2.7	3.2	0.0	3.5	4.4	4.4	5.5
Total	**38.4**	**46.3**	**32.6**	**24.6**	**17.4**	**15.3**	**17.9**	**0.0**	**19.6**	**24.4**	**25.0**	**30.9**

[(1)] Per Joint water supply agreement between Monte Vista WD and City of Chino Hills

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5.0 APPENDIX (Available upon Request)

5.1 METROPOLITAN WATER DISTRICT BOARD LETTER ON WATER SUPPLY ALLOCATION PLAN IMPLEMENTATION, APRIL 2015

5.2 METROPOLITAN WATER DISTRICT BOARD LETTER ON WATER SUPPLY ALLOCATION PLAN AMENDMENT, DECEMBER 2014

5.3 HISTORICAL TEN YEAR ROLLING AVERAGE (FY 2004-14 PLUS ONE YEAR LAG BASIS)

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APPENDIX 5.1

METROPOLITAN WATER DISTRICT BOARD LETTER ON WATER SUPPLY ALLOCATION PLAN IMPLEMENTATION, APRIL 2015

- Board of Directors
  Water Planning and Stewardship

4/14/2015 Board Meeting

8-3

Subject

Express support for Governor's Executive Order B-29-15; declare Water Supply Condition for 2015; approve implementation of Water Supply Allocation Plan; adopt supporting resolution; and conduct public hearing

Executive Summary

Based on the continuing drought conditions in California, Governor Brown's Executive Order calling for 25 percent reductions in water use, and a poor outlook for the final State Water Project Table A allocation, staff recommends the following actions:

1. Express support for the Governor's call for a 25 percent reduction in consumer water use and Executive Order B-29-15.
2. Declare a Condition 3 – Water Supply Allocation.
3. Implement Metropolitan's Water Supply Allocation Plan (WSAP) at a Level 3 Regional Shortage Level, effective July 1, 2015 through June 30, 2016.
4. Adopt the WSAP Level 3 allocation as a water conservation program pursuant to Water Code Section 375 et seq.
5. Adopt a resolution implementing the actions listed above.

Details

Background

On April 1, 2015, Governor Brown issued an Executive Order (Order) calling for a 25 percent reduction in consumer water use in response to the historically dry conditions throughout the state of California (**Attachment 1**). The Governor's Order also includes mandatory actions aimed at reducing water demands, with a particular focus on outdoor water use. In addition to the broad call for mandatory use reductions, the Order announces initiatives to:

- Remove and replace turf with drought tolerant landscape options
- Support rebate programs for water efficient devices
- Restrict water use on commercial, industrial, and institutional properties in order to achieve 25 percent reductions in potable water use
- Prohibit irrigation of ornamental turf on street medians with potable water supplies
- Prohibit irrigation of new construction with potable water unless drip or microspray systems are used
- Direct water suppliers to develop rate structures and pricing mechanisms to maximize water conservation consistent with statewide water restrictions

Metropolitan supports these efforts to respond to the historic drought conditions while taking actions that can have lasting benefits for the State of California in future years. Southern California has a proven track-record of aggressively implementing water conservation. Potable per capita water use in the region has declined by about 24 percent since 1990. These water use reductions have allowed the region to add an additional 5 million people while actually reducing reliance on imported supplies. Over the last 25 years, Metropolitan has invested more than $750 million in water use efficiency matched by significant local and consumer funding. The Governor's Executive Order recognizes the significant effort made by certain regions and directs the State Water Resources Control Board (SWRCB) to take that into account in setting specific reduction goals. Clearly Southern California's actions merit consideration by the SWRCB and staff will work with the SWRCB to ensure final actions are appropriate.

Hydrologic Conditions

2014 was an historically dry year in the State of California. According to the U.S. Drought Monitor, an estimated 58 percent of California was in "Exceptional Drought Conditions," the worst category possible, with over 80 percent of California in "Extreme Drought Conditions."

Immediately following the Governor's Emergency Drought Declaration in January 2014, Metropolitan took a series of actions to address drought conditions. In February 2014, Metropolitan declared a "Condition 2 – Water Supply Alert" to provide public messaging and to urge local water agencies within the Metropolitan service area to adopt and enact water saving ordinances. Metropolitan followed with the creation of the Water Management Fund (Fund) which set aside $232 million for financing drought-related projects and actions. Recognizing the importance of indoor and outdoor conservation in managing the ongoing drought and in establishing water efficiency for a sustainable future, the Board approved the addition of $40 million from the Water Management Fund to the conservation budget, increasing Metropolitan's total conservation budget to $100 million. Metropolitan also authorized additional expenditures from the Fund to improve storage withdrawal capabilities and acquire additional dry-year supplies through transfers and exchanges. In addition, Metropolitan conducted an enhanced public outreach program including an extensive radio and television advertising campaign that has greatly increased the public awareness of the water supply situation and has encouraged significant conservation savings.

The record dry and hot conditions of 2014 significantly impacted the water resources of both the State of California and Metropolitan. The California Department of Water Resources (DWR) limited supplies from the State Water Project (SWP) to only 5 percent of the contractors' SWP Table A amounts in 2014. This allocation was the lowest ever in the history of the SWP. Metropolitan was able to meet demands in 2014 by relying heavily on storage reserves to make up for the historically low allocation on the SWP. Metropolitan's dry-year storage reserves ended 2014 at approximately 1.2 million acre-feet (MAF).

Hydrologic conditions in 2015 have continued this severe dry trend. 2015 is the fourth consecutive drought year and the seventh dry year out of the last eight in California. The water year started with improved conditions, but the latter half of the winter has produced little additional snowpack. In fact, for the year to date, statewide snowpack is currently at its lowest level in recorded history. DWR announced an initial 2015 SWP allocation of 10 percent in December. Since then, the 2015 SWP allocation has only increased to 20 percent. DWR's recent SWP analysis indicates that an additional increase in the 2015 SWP allocation is possible, but the final allocation is unlikely to be more than 25 percent. Additionally, any increase in the 2015 SWP allocation is likely to occur later in the year, after DWR is able to assess the results of spring and summer SWP operations. Under these conditions, further withdrawals from Metropolitan's dry-year storage reserves will be necessary in order to meet demands. Although water demands in Southern California have reduced somewhat through ongoing conservation efforts and outreach, implementation of the WSAP to support the Governor's call for additional demand reductions and reduce withdrawals from Metropolitan's dry-year storage reserves is now necessary.

Potential Shortage Allocation Scenarios

By implementing the WSAP, Metropolitan places limits on the amount of water member agencies can purchase without facing a surcharge. Surcharges are from $1,480 per acre-foot up to $2,960 per acre-foot for water use in excess of a given member agency's allocation limit. Any revenues collected from these surcharges would be used to fund the implementation of Metropolitan's turf removal program or other similar programs designed to conserve water and reduce future demands. Once implemented, the WSAP would be in place from July 1, 2015 through June 30, 2016. Metropolitan estimates that the baseline deliveries plus losses under the WSAP would be approximately 2.2 MAF. However, current deliveries in Metropolitan's system are trending to be 2.1 MAF with losses. These lower deliveries reflect the positive response consumers have already shown to help manage with the drought conditions. Deliveries are expected to drop approximately 100 thousand acre-feet (TAF) with each level of allocation that is declared, unless member agencies exceed their allocations. While the numbers will vary among agencies based on their local supply conditions, each level of allocation is roughly a 5 percent reduction in wholesale water use on a regional level.

Staff considered the following objectives in developing the recommendation to implement the WSAP:

Set WSAP Level in 2015/16 while:

a. Supporting the Governor's April 1, 2015 Executive Order
b. Avoiding use of Emergency storage
c. Managing storage for the following years
d. Allowing for supply uncertainties
e. Avoiding steep increases in WSAP levels in future years, if dry conditions persist

The following table shows the balances of water supply and demand and the estimated impacts on regional storage through June 30, 2016, under two possible scenarios. A more detailed description of the supplies available to Metropolitan in calendar year 2015 is available in the April 2015 Water Surplus and Drought Management Report. Staff projects that approximately 128 TAF will be withdrawn from dry-year storage reserves in the first six months of 2015, leaving 1.057 MAF in dry-year storage reserves as of July 1. In Scenario A, a SWP Table A allocation of 25 percent is assumed. In Scenario B, a SWP Table A allocation of 20 percent is assumed. Both scenarios assume approximately 165 TAF of transfer/exchange supplies. Under Scenario A, staff estimates that a maximum of 459 TAF of dry-year storage could be withdrawn during the allocation period given projected capacity constraints. Under Scenario B, approximately 442 TAF of dry-year storage can be accessed due to the lower SWP allocation, which reduces the amount of storage that can be accessed via exchange.

SUPPLY DEMAND BALANCE	**SCENARIO A** (25% SWP Allocation)	**SCENARIO B** (20% SWP Allocation)
SWP Supply	478,000	382,000
CRA Supply	925,000	925,000
Transfers/Exchanges	165,000	165,000
Total Supply	1,568,000	1,472,000
WSAP Level 2 Option:		
Deliveries* (July 1, 2015 – June 30, 2016)	1,900,000	1,900,000
Dry-Year Storage (Take)	(332,000)	(428,000)
Dry-Year Storage Remaining For 2016/17	725,000	629,000

WSAP level 3 Option:

Deliveries* (July 1, 2015 – June 30, 2016)	1,800,000	1,800,000
Dry-Year Storage (Take)	(232,000)	(328,000)
Dry-Year Storage Remaining for 2016/17	825,000	729,000

WSAP level 4 Option:

Deliveries* (July 1, 2015 – June 30, 2016)	1,700,000	1,700,000
Dry-Year Storage (Take)	(132,000)	(228,000)
Dry-Year Storage Remaining for 2016/17	925,000	829,000

*Includes aggregate deliveries to member agencies available without an Allocation Surcharge, including losses.

Assuming a WSAP Level 2 is implemented with supplies shown in Scenarios A or B above, it is possible that a sizable amount of Metropolitan's dry-year storage reserves could be required to meet demands; however, no use of emergency storage would be required. Staff also analyzed the potential WSAP levels that might be necessary to avoid any draws on emergency storage in 2016/17 should Scenario A or Scenario B be repeated. Under these conditions, if a WSAP Level 2 is implemented in 2015/16, then a Level 2 might be necessary in 2016/17 under Scenario A and an allocation as deep as a Level 5 might be necessary under Scenario B.

Assuming a WSAP Level 3 is implemented with supplies shown in Scenarios A or B above, a lesser amount of Metropolitan's dry-year storage reserves would be required to meet demands. Should Scenario A occur again in 2016/17, then a WSAP Level 3 could be implemented again without any draw on emergency storage. Under a repeat of Scenario B, the WSAP Level would need to drop from Level 3 in 2015/16 to Level 4 in 2016/17 in order to eliminate any draw on emergency storage.

Implementing a WSAP Level 4 under the same scenarios would reduce the need for withdrawals from storage and allow Metropolitan to maintain or even reduce the allocation level in the subsequent year, should the same conditions repeat. Of the three options, WSAP Level 4 is the most protective of regional storage.

Supply Uncertainties

Scenario A and B both make assumptions about the supplies that will be available to Metropolitan. If dry conditions persist, some risks to these assumptions are possible. Base supplies available to Metropolitan on the Colorado River Aqueduct could be reduced if higher priority users have high Colorado River water use this year. It is also possible that the Lower Basin of the Colorado River could be in shortage conditions as early as 2016, which could limit Metropolitan's ability to access Intentionally Created Surplus reserves currently stored in Lake Mead. Under certain conditions, the 2015 SWP allocation may not increase from 20 to 25 percent. It is also possible that some member agencies would actually exceed their allocation limits, which would result in higher deliveries than shown in Scenario A and B. On the other hand, consumer reductions could exceed the requirements of the allocation resulting in lesser draws from dry-year storage. Both scenarios assume the benefits of transfers and exchanges. While it is likely that some transfer supplies may be affected by curtailments to water districts in Northern California, staff is pursuing transfer supplies on both the SWP and Colorado River to achieve approximately165 TAF in total supplies across both systems. Actual supply availability may end up being higher or lower than this assumption.

In general, a deeper WSAP Level provides more protection against supply risks as compared to a lower WSAP Level.

Recommendation on WSAP Implementation

Staff recommends that the Board express support for the Governor's call for a 25 percent reduction in consumer water use and declare a water supply "Condition 3 – Water Supply Allocation". Metropolitan would implement surcharges on agencies should their deliveries exceed limits at a WSAP Level 3 Regional Shortage Level. A WSAP Level 3 will implement surcharges on member agencies that don't reduce their deliveries in order to achieve a roughly 15 percent reduction in regional deliveries. In addition to this action, Metropolitan staff will bring to the Board additional tools that can be used to help retail agencies reduce water use further, in support of the Governor's call for greater reductions. These tools will include:

- A focused expanded outreach and media strategy geared at achieving greater consumer awareness and knowledge on how to reduce water use
- Additional budget approval to continue regional conservation incentives through FY 2015/16
- Partnering with the State on funding of rebate and outreach programs
- Modifications to the turf removal program to maintain and encourage broad participation while focusing on a long-term transition toward drought tolerant landscapes
- Monthly tracking and reporting of member agency water use and enforcement actions to achieve greater reductions in consumer water use
- Working with the State on accelerating funding from Proposition 1 for local projects
- Recommendations on key elements of local water use landscape ordinances, and tiered rate structures that can help achieve long-term changes in water use throughout the region

Based on the analysis provided in the previous section, a WSAP Level 3 meets the objectives outlined in this letter. Staff believes that implementing a WSAP Level 3 along with the additional actions listed above will help Southern California meet the Governor's outlined goals. However, a WSAP Level 4 is certainly more protective of regional water storage levels. While a WSAP Level 2 could be adequate to meet regional demands in combination with draws from storage, it is less supportive of the Governor's call for broad water use reductions.

Staff recommends a WSAP Level 3 based on current supply conditions, the recent DWR assessment of SWP allocations for 2015, and the Governor's Executive Order. Given the unprecedented drought occurring statewide, it is recognized that local and regional supply conditions still remain dynamic over the next several months. As a result, these conditions and response to the WSAP will be closely monitored and reported to the Board. If any significant changes in supply and demand conditions occur, staff will provide options on water use efficiencies and supply management for board consideration, if necessary.

Staff also recommends the Board adopt the WSAP allocation as a water conservation program pursuant to Water Code section 375 et set (**Attachment 2**). In addition to the general authorities provided under the MWD Act, Water Code section 375 specifically authorizes public agencies to adopt and enforce programs and rate structures aimed at encouraging water conservation. Adopting the WSAP allocation as a water conservation program is consistent with actions taken by our member agencies and retail agencies and will assist in public outreach efforts to communicate the severity of the current drought and the need for conservation in managing through the drought.

A resolution (**Attachment 3**) describing the water supply conditions in California and Metropolitan's service area and implementing the actions recommended above is attached.

Key Implementation Items and Timelines

Staff has been coordinating directly with member agencies to reconcile local supply and consumptive use estimates. Initial Member Agency WSAP allocations of supply will be provided to the member agencies for their use in implementing their local actions. Final member agency allocation limits are dependent on certified local supply production during the Allocation Year. There are several key implementation items to note following the Board's action to implement the WSAP.

- WSAP Effective Date – July 1, 2015, through June 30, 2016
- Member Agency Initial Allocations – May 15, 2015
- Water Use Tracking and reporting – May 2015 through June 2016

- Local Supply Certification – July 2016
- Allocation Surcharge assessment and billing – August 2016 through September 2016
- Member Agency Appeals – Process available throughout Allocation Year

Staff will report on a monthly basis the tracking of member agency deliveries during the allocation period and key updates to member agency data that affect the allocation limits.

Policy

By Minute Item 47393, dated February 12, 2008, the Board adopted the Water Supply Allocation Plan

By Minute Item 48376, dated August 17, 2010, the Board approved adjustments to the Water Supply Allocation Plan

By Minute Item 48803, dated September 12, 2011, the Board approved adjustments to the Water Supply Allocation Plan

By Minute Item 74526, dated February 11, 2014, the Board adopted the Water Supply Alert Resolution

By Minute Item 49979, dated December 9, 2014, the Board approved adjustments to the Water Supply Allocation Plan

California Environmental Quality Act (CEQA)

CEQA determination for Options #1 and #2:

Adoption of the WSAP previously was determined to be categorically and statutorily exempt under the provisions of CEQA and State CEQA Guidelines. Specifically, the WSAP was found to be exempt under Sections 15301 (Class 1), 15307 (Class 7), 15308 (Class 8) and 15378(b)(4) of the State CEQA Guidelines. In addition, the WSAP was found to be exempt pursuant to Water Code Section 10652, to the extent this plan serves as the basis for the urban water shortage contingency analysis required under Water Code Section 10632 and is incorporated into Metropolitan's RUWMP.

Similarly, the proposed actions are exempt from or otherwise not covered by CEQA. Specifically, implementation of the WSAP is statutorily exempt from CEQA under Water Code section 10652, which expressly exempts actions listed in and taken pursuant to a RUWMP's urban water shortage contingency analysis. Likewise, implementation of a WSAP allocation and its adoption as a water conservation program under Water Code section 375 are intended to promote conservation of scarce water supplies during a period of extreme drought. As such, these actions are categorically exempt from CEQA under Sections 15307 (Class 7) and 15308 (Class 8) of the State CEQA Guidelines. In addition, implementation of a WSAP allocation merely involves the potential application of a surcharge to those member agencies whose deliveries of water from Metropolitan exceed their allocations, but it does not otherwise prohibit or restrict such deliveries. As such, the proposed action is not defined as project under Section 15378(b)(4) of the State CEQA Guidelines, because it involves government fiscal activities that do not involve a commitment to any specific project that may result in a potentially significant impact. Finally, where it can be seen with certainty that there is no possibility that the proposed actions may have a significant impact on the environment, those actions are not subject to CEQA pursuant to Section 15061(b)(3) of the State CEQA Guidelines.

The CEQA determination is: Determine that the proposed actions are statutorily and categorically exempt, are not defined as a project and are not subject to CEQA, pursuant to Water Code section 10652 and Sections 15307, 15308, 15378(b)(4) and 15061(b)(3) of the State CEQA Guidelines.

CEQA determination for Option #3:

None required

Board Options

Option #1

Adopt the CEQA determination that the proposed actions are statutorily and categorically exempt, are not defined as a project, and are not subject to CEQA, and

a. Express support for the Governor's call for a 25 percent reduction in consumer water use and Executive Order B-29-15;
b. Declare a "Water Supply Condition 3 – Water Supply Allocation";
c. Implement the Water Supply Allocation Plan at a Level 3 Regional Shortage Level, effective July 1, 2015, through June 30, 2016;
d. Adopt the WSAP Level 3 allocation as a water conservation program pursuant to Water Code Section 375 et seq.; and
e. Adopt the resolution shown in **Attachment 3** implementing the actions listed above.

Fiscal Impact: None directly related to the declaration of a water supply condition or to the implementation of the WSAP. Future water sales may be impacted due to any regional reductions in water use as a result of the implementation of the WSAP.

Business Analysis: Implementing a WSAP Level 3 would result in the delivery of supplies at a level that likely avoids the use of emergency storage, allows for some supply uncertainties during the allocation year, and helps avoid steep increases in the WSAP Level in future years, should dry conditions persist.

Option #2

Adopt the CEQA determination that the proposed actions are statutorily and categorically exempt, are not defined as a project, and are not subject to CEQA, and

a. Express support for the Governor's call for a 25 percent reduction in consumer water use and Executive Order B-29-15;
b. Declare a "Water supply Condition 3 – Water Supply Allocation";
c. Implement the Water Supply Allocation Plan at a Regional Shortage Level to be determined by the Board, effective July 1, 2015 through June 30, 2016;
d. Adopt the WSAP Level as a water conservation program pursuant to Water Code Section 375 et seq.; and
e. Adopt the resolution shown in **Attachment 3,** revised to implement the actions listed above.

Fiscal Impact: None directly related to the declaration of a water supply condition or to the implementation of the WSAP. Future water sales may be impacted due to any regional reductions in water use as a result of the implementation of the WSAP.

Business Analysis: Implementing a WSAP Level will help Metropolitan manage regional storage levels given current drought conditions. It may be more difficult for member and local water agencies to reduce water use in order to avoid surcharges under deeper WSAP Levels. However, a deeper WSAP Level in 2015/16 could be more protective of regional storage levels and could reduce the need for potential deeper allocations in a future year, if drought conditions persist. A lower WSAP level could be less supportive of the Governor's call for broad water use reductions.

Option #3

Direct staff to return to the Board at a later date to revisit WSAP implementation.

Fiscal Impact: None

Business Analysis: Delaying the decision to implement the WSAP would allow for more certain information on water supply conditions to be entered into the decision on the appropriate level for the WSAP. However, a later decision date would also delay communication and coordination needed to make an implementation of the WSAP effective region-wide and potentially impact storage resources.

Staff Recommendation

Option #1

4/7/2015

Deven N. Upadhyay *Date*
Manager, Water Resources Management

4/7/2015

Jeffrey Kightlinger *Date*
General Manager

Attachment 1 – Governor Brown's Executive Order B-29-15

Attachment 2 – California Water Code Section 375

Attachment 3 – Resolution of the Board of Directors of the Metropolitan Water District of Southern California supporting the Governor's Executive Order B-29-15, implementing its Water Supply Allocation Plan for 2015, establishing the Regional Shortage Level, and implementing a water conservation plan pursuant to California Water Code Section 375

Ref# wrm12636036

Executive Department
State of California

EXECUTIVE ORDER B-29-15

WHEREAS on January 17, 2014, I proclaimed a State of Emergency to exist throughout the State of California due to severe drought conditions; and

WHEREAS on April 25, 2014, I proclaimed a Continued State of Emergency to exist throughout the State of California due to the ongoing drought; and

WHEREAS California's water supplies continue to be severely depleted despite a limited amount of rain and snowfall this winter, with record low snowpack in the Sierra Nevada mountains, decreased water levels in most of California's reservoirs, reduced flows in the state's rivers and shrinking supplies in underground water basins; and

WHEREAS the severe drought conditions continue to present urgent challenges including: drinking water shortages in communities across the state, diminished water for agricultural production, degraded habitat for many fish and wildlife species, increased wildfire risk, and the threat of saltwater contamination to fresh water supplies in the Sacramento-San Joaquin Bay Delta; and

WHEREAS a distinct possibility exists that the current drought will stretch into a fifth straight year in 2016 and beyond; and

WHEREAS new expedited actions are needed to reduce the harmful impacts from water shortages and other impacts of the drought; and

WHEREAS the magnitude of the severe drought conditions continues to present threats beyond the control of the services, personnel, equipment, and facilities of any single local government and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the Government Code, I find that conditions of extreme peril to the safety of persons and property continue to exist in California due to water shortage and drought conditions with which local authority is unable to cope; and

WHEREAS under the provisions of section 8571 of the California Government Code, I find that strict compliance with various statutes and regulations specified in this order would prevent, hinder, or delay the mitigation of the effects of the drought.

NOW, THEREFORE, I, EDMUND G. BROWN JR., Governor of the State of California, in accordance with the authority vested in me by the Constitution and statutes of the State of California, in particular Government Code sections 8567 and 8571 of the California Government Code, do hereby issue this Executive Order, effective immediately.

IT IS HEREBY ORDERED THAT:

1. The orders and provisions contained in my January 17, 2014 Proclamation, my April 25, 2014 Proclamation, and Executive Orders B-26-14 and B-28-14 remain in full force and effect except as modified herein.

SAVE WATER

2. The State Water Resources Control Board (Water Board) shall impose restrictions to achieve a statewide 25% reduction in potable urban water usage through February 28, 2016. These restrictions will require water suppliers to California's cities and towns to reduce usage as compared to the amount used in 2013. These restrictions should consider the relative per capita water usage of each water suppliers' service area, and require that those areas with high per capita use achieve proportionally greater reductions than those with low use. The California Public Utilities Commission is requested to take similar action with respect to investor-owned utilities providing water services.

3. The Department of Water Resources (the Department) shall lead a statewide initiative, in partnership with local agencies, to collectively replace 50 million square feet of lawns and ornamental turf with drought tolerant landscapes. The Department shall provide funding to allow for lawn replacement programs in underserved communities, which will complement local programs already underway across the state.

4. The California Energy Commission, jointly with the Department and the Water Board, shall implement a time-limited statewide appliance rebate program to provide monetary incentives for the replacement of inefficient household devices.

5. The Water Board shall impose restrictions to require that commercial, industrial, and institutional properties, such as campuses, golf courses, and cemeteries, immediately implement water efficiency measures to reduce potable water usage in an amount consistent with the reduction targets mandated by Directive 2 of this Executive Order.

6. The Water Board shall prohibit irrigation with potable water of ornamental turf on public street medians.

7. The Water Board shall prohibit irrigation with potable water outside of newly constructed homes and buildings that is not delivered by drip or microspray systems.

8. The Water Board shall direct urban water suppliers to develop rate structures and other pricing mechanisms, including but not limited to surcharges, fees, and penalties, to maximize water conservation consistent with statewide water restrictions. The Water Board is directed to adopt emergency regulations, as it deems necessary, pursuant to Water Code section 1058.5 to implement this directive. The Water Board is further directed to work with state agencies and water suppliers to identify mechanisms that would encourage and facilitate the adoption of rate structures and other pricing mechanisms that promote water conservation. The California Public Utilities Commission is requested to take similar action with respect to investor-owned utilities providing water services.

INCREASE ENFORCEMENT AGAINST WATER WASTE

9. The Water Board shall require urban water suppliers to provide monthly information on water usage, conservation, and enforcement on a permanent basis.

10. The Water Board shall require frequent reporting of water diversion and use by water right holders, conduct inspections to determine whether illegal diversions or wasteful and unreasonable use of water are occurring, and bring enforcement actions against illegal diverters and those engaging in the wasteful and unreasonable use of water. Pursuant to Government Code sections 8570 and 8627, the Water Board is granted authority to inspect property or diversion facilities to ascertain compliance with water rights laws and regulations where there is cause to believe such laws and regulations have been violated. When access is not granted by a property owner, the Water Board may obtain an inspection warrant pursuant to the procedures set forth in Title 13 (commencing with section 1822.50) of Part 3 of the Code of Civil Procedure for the purposes of conducting an inspection pursuant to this directive.

11. The Department shall update the State Model Water Efficient Landscape Ordinance through expedited regulation. This updated Ordinance shall increase water efficiency standards for new and existing landscapes through more efficient irrigation systems, greywater usage, onsite storm water capture, and by limiting the portion of landscapes that can be covered in turf. It will also require reporting on the implementation and enforcement of local ordinances, with required reports due by December 31, 2015. The Department shall provide information on local compliance to the Water Board, which shall consider adopting regulations or taking appropriate enforcement actions to promote compliance. The Department shall provide technical assistance and give priority in grant funding to public agencies for actions necessary to comply with local ordinances.

12. Agricultural water suppliers that supply water to more than 25,000 acres shall include in their required 2015 Agricultural Water Management Plans a detailed drought management plan that describes the actions and measures the supplier will take to manage water demand during drought. The Department shall require those plans to include quantification of water supplies and demands for 2013, 2014, and 2015 to the extent data is available. The Department will provide technical assistance to water suppliers in preparing the plans.

13. Agricultural water suppliers that supply water to 10,000 to 25,000 acres of irrigated lands shall develop Agricultural Water Management Plans and submit the plans to the Department by July 1, 2016. These plans shall include a detailed drought management plan and quantification of water supplies and demands in 2013, 2014, and 2015, to the extent that data is available. The Department shall give priority in grant funding to agricultural water suppliers that supply water to 10,000 to 25,000 acres of land for development and implementation of Agricultural Water Management Plans.

14. The Department shall report to Water Board on the status of the Agricultural Water Management Plan submittals within one month of receipt of those reports.

15. Local water agencies in high and medium priority groundwater basins shall immediately implement all requirements of the California Statewide Groundwater Elevation Monitoring Program pursuant to Water Code section 10933. The Department shall refer noncompliant local water agencies within high and medium priority groundwater basins to the Water Board by December 31, 2015, which shall consider adopting regulations or taking appropriate enforcement to promote compliance.

16. The California Energy Commission shall adopt emergency regulations establishing standards that improve the efficiency of water appliances, including toilets, urinals, and faucets available for sale and installation in new and existing buildings.

INVEST IN NEW TECHNOLOGIES

17. The California Energy Commission, jointly with the Department and the Water Board, shall implement a Water Energy Technology (WET) program to deploy innovative water management technologies for businesses, residents, industries, and agriculture. This program will achieve water and energy savings and greenhouse gas reductions by accelerating use of cutting-edge technologies such as renewable energy-powered desalination, integrated on-site reuse systems, water-use monitoring software, irrigation system timing and precision technology, and on-farm precision technology.

STREAMLINE GOVERNMENT RESPONSE

18. The Office of Emergency Services and the Department of Housing and Community Development shall work jointly with counties to provide temporary assistance for persons moving from housing units due to a lack of potable water who are served by a private well or water utility with less than 15 connections, and where all reasonable attempts to find a potable water source have been exhausted.

19. State permitting agencies shall prioritize review and approval of water infrastructure projects and programs that increase local water supplies, including water recycling facilities, reservoir improvement projects, surface water treatment plants, desalination plants, stormwater capture, and greywater systems. Agencies shall report to the Governor's Office on applications that have been pending for longer than 90 days.

20. The Department shall take actions required to plan and, if necessary, implement Emergency Drought Salinity Barriers in coordination and consultation with the Water Board and the Department of Fish and Wildlife at locations within the Sacramento - San Joaquin delta estuary. These barriers will be designed to conserve water for use later in the year to meet state and federal Endangered Species Act requirements, preserve to the extent possible water quality in the Delta, and retain water supply for essential human health and safety uses in 2015 and in the future.

21. The Water Board and the Department of Fish and Wildlife shall immediately consider any necessary regulatory approvals for the purpose of installation of the Emergency Drought Salinity Barriers.

22. The Department shall immediately consider voluntary crop idling water transfer and water exchange proposals of one year or less in duration that are initiated by local public agencies and approved in 2015 by the Department subject to the criteria set forth in Water Code section 1810.

23. The Water Board will prioritize new and amended safe drinking water permits that enhance water supply and reliability for community water systems facing water shortages or that expand service connections to include existing residences facing water shortages. As the Department of Public Health's drinking water program was transferred to the Water Board, any reference to the Department of Public Health in any prior Proclamation or Executive Order listed in Paragraph 1 is deemed to refer to the Water Board.

24. The California Department of Forestry and Fire Protection shall launch a public information campaign to educate the public on actions they can take to help to prevent wildfires including the proper treatment of dead and dying trees. Pursuant to Government Code section 8645, $1.2 million from the State Responsibility Area Fire Prevention Fund (Fund 3063) shall be allocated to the California Department of Forestry and Fire Protection to carry out this directive.

25. The Energy Commission shall expedite the processing of all applications or petitions for amendments to power plant certifications issued by the Energy Commission for the purpose of securing alternate water supply necessary for continued power plant operation. Title 20, section 1769 of the California Code of Regulations is hereby waived for any such petition, and the Energy Commission is authorized to create and implement an alternative process to consider such petitions. This process may delegate amendment approval authority, as appropriate, to the Energy Commission Executive Director. The Energy Commission shall give timely notice to all relevant local, regional, and state agencies of any petition subject to this directive, and shall post on its website any such petition.

26. For purposes of carrying out directives 2–9, 11, 16–17, 20–23, and 25, Division 13 (commencing with section 21000) of the Public Resources Code and regulations adopted pursuant to that Division are hereby suspended. This suspension applies to any actions taken by state agencies, and for actions taken by local agencies where the state agency with primary responsibility for implementing the directive concurs that local action is required, as well as for any necessary permits or approvals required to complete these actions. This suspension, and those specified in paragraph 9 of the January 17, 2014 Proclamation, paragraph 19 of the April 25, 2014 proclamation, and paragraph 4 of Executive Order B-26-14, shall remain in effect until May 31, 2016. Drought relief actions taken pursuant to these paragraphs that are started prior to May 31, 2016, but not completed, shall not be subject to Division 13 (commencing with section 21000) of the Public Resources Code for the time required to complete them.

27. For purposes of carrying out directives 20 and 21, section 13247 and Chapter 3 of Part 3 (commencing with section 85225) of the Water Code are suspended.

28. For actions called for in this proclamation in directive 20, the Department shall exercise any authority vested in the Central Valley Flood Protection Board, as codified in Water Code section 8521, et seq., that is necessary to enable these urgent actions to be taken more quickly than otherwise possible. The Director of the Department of Water Resources is specifically authorized, on behalf of the State of California, to request that the Secretary of the Army, on the recommendation of the Chief of Engineers of the Army Corps of Engineers, grant any permission required pursuant to section 14 of the Rivers and Harbors Act of 1899 and codified in section 48 of title 33 of the United States Code.

29. The Department is directed to enter into agreements with landowners for the purposes of planning and installation of the Emergency Drought Barriers in 2015 to the extent necessary to accommodate access to barrier locations, land-side and water-side construction, and materials staging in proximity to barrier locations. Where the Department is unable to reach an agreement with landowners, the Department may exercise the full authority of Government Code section 8572.

30. For purposes of this Executive Order, chapter 3.5 (commencing with section 11340) of part 1 of division 3 of the Government Code and chapter 5 (commencing with section 25400) of division 15 of the Public Resources Code are suspended for the development and adoption of regulations or guidelines needed to carry out the provisions in this Order. Any entity issuing regulations or guidelines pursuant to this directive shall conduct a public meeting on the regulations and guidelines prior to adopting them.

31. In order to ensure that equipment and services necessary for drought response can be procured quickly, the provisions of the Government Code and the Public Contract Code applicable to state contracts, including, but not limited to, advertising and competitive bidding requirements, are hereby suspended for directives 17, 20, and 24. Approval by the Department of Finance is required prior to the execution of any contract entered into pursuant to these directives.

This Executive Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given to this Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 1st day of April 2015.

EDMUND G. BROWN JR.
Governor of California

ATTEST:

ALEX PADILLA
Secretary of State

WATER CONSERVATION PROGRAMS
WATER CODE SECTIONS 375-378

Section 375

(a) Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity.

(b) With regard to water delivered for other than agricultural uses, the ordinance or resolution may specifically require the installation of water-saving devices which are designed to reduce water consumption. The ordinance or resolution may also encourage water conservation through rate structure design.

(c) For the purposes of this section, "public entity" means a city, whether general law or chartered, county, city and county, special district, agency, authority, any other municipal public corporation or district, or any other political subdivision of the state.

Section 375.5

a) A public entity, as defined by Section 375, may undertake water conservation and public education programs in conjunction with school districts, public libraries, or any other public entity.

(b) (1) A public entity may undertake water conservation and public education programs using an information booklet or materials for use in connection with the use or transfer of real estate containing up to four residential units. For the purposes of this subdivision, the public entity may use water conservation materials prepared by the department.

(2) It is the intent of the Legislature that on or before December 31, 2007, a review of the program be conducted to obtain information on both of the following matters:

(A) The extent to which public entities have undertaken water conservation and public education programs referred to in paragraph (1).

(B) The extent to which water conservation may be attributable to the implementation of water conservation and public education programs referred to in paragraph (1).

(c) A public entity may take into account any programs undertaken pursuant to this section in a rate structure design implemented pursuant to Section 375.

(d) The Legislature finds and declares that a program undertaken pursuant to this section is in the public interest, serves a public purpose, and will promote the health, welfare, and safety of the people of the state.

Section 376

(a) Any ordinance or resolution adopted pursuant to Section 375 is effective upon adoption. Within 10days after its adoption, the ordinance or resolution shall be published pursuant to Section 6061 of the Government Code in full in a newspaper of general circulation that is printed, published, and circulated in the public entity. If there is no such newspaper, the ordinance or resolution shall be posted within 10 days after its adoption in three public places within the public entity.

(b) The publication of ordinances or resolutions, as required by subdivision (a), may be satisfied by either of the following actions:

(1) The public entity may publish a summary of a proposed ordinance, resolution, or proposed amendment to an existing ordinance or resolution. The summary shall be prepared by an official designated by the governing body. A summary shall be published and a certified copy of the full text of the proposed ordinance, resolution, or amendment shall be posted in the office of the governing body at least five days prior to the governing body's meeting at which the proposed ordinance, resolution, or amendment is to be adopted. Within 15 days after adoption of the ordinance, resolution, or amendment, the governing body shall publish a summary of the ordinance, resolution, or amendment with the names of those members voting for and against the ordinance, resolution, or amendment and the official shall post in the office of the governing body a certified copy of the full text of the adopted ordinance, resolution, or amendment along with the names of those members voting for and against the ordinance, resolution, or amendment.

(2) If the official designated by the governing body determines that it is not feasible to prepare a fair and adequate summary of the proposed or adopted ordinance, resolution, or amendment, and if the governing body so orders, a display advertisement of at least one-quarter of a page in a newspaper of general circulation in the county shall be published at least five days prior to the governing body meeting at which the proposed ordinance, resolution, or amendment is to be adopted. Within 15 days after adoption of the ordinance, resolution, or amendment, a display advertisement of at least one-quarter of a page shall be published. The advertisement shall indicate the general nature of, and provide information about, the proposed or adopted ordinance, resolution, or amendment, including information sufficient to enable the public to obtain copies of the complete text of the ordinance, resolution, or amendment, and the names of those members voting for and against the ordinance, resolution, or amendment.

Section 377

From and after the publication or posting of any ordinance or resolution pursuant to Section 376, violation of a requirement of a water conservation program adopted pursuant to Section 376 is a misdemeanor. Upon conviction thereof such person shall be punished by imprisonment in the county jail for not more than 30 days, or by fine not exceeding one thousand dollars ($1,000), or by both.

Section 378

A public entity may enter into agreements with other public entities, businesses, community associations, or private entities to provide water conservation services and measures and materials for implementing water conservation programs adopted pursuant to this chapter.

RESOLUTION ______

RESOLUTION OF THE BOARD OF DIRECTORS

OF THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA SUPPORTING THE GOVERNOR'S CALL FOR A 25 PERCENT REDUCTION IN CONSUMER WATER USE AND EXECUTIVE ORDER B-29-15,

IMPLEMENTING ITS WATER SUPPLY ALLOCATION

PLAN, ESTABLISHING THE

REGIONAL SHORTAGE LEVEL, AND IMPLEMENTING AN ALLOCATION SURCHARGE

PURSUANT TO CALIFORNIA WATER CODE SECTION 375

WHEREAS, on January 17, 2014, the Governor proclaimed a State of Emergency to exist throughout the State of California due to severe drought conditions ; and

WHEREAS, on April 25, 2014, the Governor issued a second proclamation declaring a continuing State of Emergency and noting that drought conditions had persisted for the last three years; and

WHEREAS, Governor Brown issued Executive Order B-29-15 on April 1, 2015 instituting emergency actions and mandatory water use reductions for the State of California; and

WHEREAS, State snowpack levels, as indicated by manual surveys and automatic gauge measurements throughout the Sierra Nevada, have been below normal for four consecutive years; and

WHEREAS, the official projections for the State of California show well below normal runoff for the fourth consecutive year, with the runoff from the Sierra snowpack being below the amounts needed to fill California's storage reservoir system or support delivery of supplies requested by Metropolitan and other export contractors; and

WHEREAS, State runoff that replenishes the state's reservoir system, as indicated by the Department of Water Resources, have been below normal levels eight of the last nine years; and

WHEREAS, rainfall levels locally, as indicated by the measurement at the Los Angeles Civic Center, have been below normal for three consecutive years; and

WHEREAS, the dry year storage available to Metropolitan has been reduced by approximately 55 percent since January 2012; and

WHEREAS, storage in the state's reservoir system is well below normal levels, with Lake Oroville at 50 percent of capacity; and

WHEREAS, runoff in the Colorado River system, as indicated by the Bureau of Reclamation, have been below normal levels 13 of the last 16 years; and

WHEREAS, storage in the Colorado River system is well below normal levels, with Lake Mead at 40 percent of capacity; and

WHEREAS, Biological Opinions issued to protect Delta smelt, Central Valley salmon, longfin smelt and other species have continued to contribute to reduced water supplies available for delivery from the State Water Project; and

WHEREAS, the Department of Water Resources' current allocation of State Water Project water available to Metropolitan and the other state water contractors is only 20 percent of contracted supply as of the date of this resolution; and

WHEREAS, in February 2008, Metropolitan's Board of Directors adopted its Water Supply Allocation Plan under which the Board may determine that a regional shortage exists, establish a regional shortage level and implement an Allocation Surcharge for water use in excess of a member agency's annual allocation under the Water Supply Allocation Plan; and

WHEREAS, the Water Supply Allocation Plan is intended to be implemented during periods of regional water shortages in order to promote conservation of scarce water supplies; and

WHEREAS, pursuant to the Water Supply Allocation Plan, the Board may establish a regional shortage level and assess an allocation surcharge on water use in excess of a member agency's annual allocation under the plan; and

WHEREAS, in light of the extreme drought and poor water supply conditions noted above, the Board believes it is necessary and in the best interests of Metropolitan and its member agencies to implement the Water Supply Allocation Plan at a Level 3 Regional Shortage Level and to assess an allocation surcharge on any member agency whose use exceeds its Level 3 allocations; and

WHEREAS, California Water Code section 375 authorizes public agencies to adopt programs and rate structures aimed at encouraging water conservation after holding a public hearing and making appropriate findings of necessity; and

WHEREAS, adopting the Water Supply Allocation Plan Level 3 allocations and surcharges as a water conservation program is consistent with actions taken by our member agencies and other retail agencies and will assist Metropolitan and its member agencies in public outreach efforts to communicate the severity of the current drought and the need for conservation; and

WHEREAS, on April 13, 2015 Metropolitan conducted a public hearing and made appropriate findings of necessity for the adoption of the Water Supply Allocation Plan Level 3 allocations and surcharges as a water conservation program.

NOW, THEREFORE, the Board of Directors of Metropolitan does hereby resolve, determine and order as follows:

Section 1. Metropolitan's Board of Directors declare Metropolitan's support for the Governor's Executive Order B-29-15.

Section 2. Metropolitan's Board of Directors declare that the regional water shortage in Metropolitan's service area continues and declare a Water Supply Condition 3 – Water Supply Allocation.

Section 3. The Water Supply Allocation Plan shall be implemented, effective July 1, 2015 through June 30, 2016.

Section 4. The Water Supply Allocation Plan shall be set at Regional Shortage Level 3.

Section 5. The Allocation Surcharge, as part of the Water Supply Allocation Plan, shall be the means enabled by Section 375 of the California Water Code to encourage the regional conservation of water supplies.

Section 6. The General Manager is hereby authorized and directed to take all necessary action to implement the Water Supply Allocation Plan, consistent with its terms.

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of a Resolution adopted by the Board of Directors of The Metropolitan Water District of Southern California, at its meeting held on April 14, 2015.

____

Secretary of the Board of Directors
of The Metropolitan Water District
of Southern California

APPENDIX 5.2

METROPOLITAN WATER DISTRICT BOARD LETTER ON WATER SUPPLY ALLOCATION PLAN AMENDMENT, DECEMBER 2014

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THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

BOARD ACTION

- Board of Directors
  Water Planning and Stewardship Committee

12/9/2014 Board Meeting

8-2

Subject

Approve adjustments to Metropolitan's Water Supply Allocation Plan

Executive Summary

Staff is recommending several adjustments to Metropolitan's Water Supply Allocation Plan to address the current unprecedented drought conditions and water needs within the Metropolitan service area. The recommended adjustments were developed with the input of the member agency managers and staff through a member agency working group process that began in July 2014. The recommended adjustments include: (1) Updating the Base Period from Calendar Years 2004 - 2006 to Fiscal Years Ending 2013 and 2014; (2) updating the Conservation Demand Hardening credit to a method based on member agency per capita water use reductions with considerations for the early enforcement of mandatory conservation ordinances and requirements; (3) including a separate allocation for drought-impacted groundwater basins; and (4) replacing the current penalty rates with an Allocation Surcharge based on marginal water conservation program costs.

Details

Background

The state of California and Metropolitan have been managing through severe drought conditions, and 2014 has been called "unprecedented" in terms of drought and water supply[1]. Although Metropolitan has been able to successfully manage its operations during the California drought thus far, 2014 has required significant use of regional storage reserves. It is expected that the end of year total dry year storage reserves will approach levels similar to those in 2009 when mandatory supply allocations were imposed by Metropolitan. While storage levels remain relatively strong, as in 2009, prudent management of remaining storage if severe drought conditions continue into 2015 will likely result in Metropolitan imposing mandatory supply allocations.

In February 2008, the Board approved Metropolitan's Water Supply Allocation Plan (WSAP). The approved WSAP serves as the current policy for allocating water supplies to the member agencies in times of declared water shortages with the goal of reducing the quantity of water used within Metropolitan's service area to conserve supply. The WSAP includes specific formulas for calculating Metropolitan supply allocations to each member agency and also includes implementation elements needed for administering a water supply allocation. The WSAP was developed through an extensive working group process with the management and staff of the member agencies and with the Board. The resulting WSAP allocates supplies based on the needs of agencies throughout the service area and the proposed adjustments in this letter are consistent with that approach. The original development process covered an eight month period starting in July 2007. The WSAP was also formally reviewed on two separate occasions since its adoption. The review processes each resulted in board-adopted adjustments to the plan.

[1] The Governor of California proclaimed a State of Emergency due to drought conditions on January 17, 2014 and, on April 24, 2014 issued an Executive Order proclaiming a continued State of Emergency noting drought conditions have persisted for the last three years and authorizing adoption and implementation of emergency regulations.

The WSAP was implemented in the last drought. The WSAP was implemented at a Regional Shortage Level 2 from July 1, 2009 through June 30, 2010 and again from July 1, 2010 through June 30, 2011. The Board rescinded the allocation in April 2011 due to vastly improved water supply conditions.

Process

Following discussion at the June 2014 Water Planning and Stewardship Committee, Metropolitan staff convened a member agency working group to revisit the WSAP plan. The purpose of the working group was to collaborate with the member agencies to identify potential revisions to the WSAP in preparation for mandatory supply allocations in 2015. There have been eight working group meetings and three discussions at the monthly Member Agency Managers' Meeting. **Attachment 1** shows a listing of the meetings that were held as part of the WSAP working group process.

The process focused on three areas of the WSAP: the Base Period, the Allocation Formula, and the Allocation enforcement mechanism. To prepare the working group for discussion in each of the areas, Metropolitan staff conducted an in-depth review of the current WSAP and its supporting policies. The working group then discussed and reviewed potential revisions in each of the areas, developing or eliminating items from discussion. In some cases, items were deferred and are intended to be addressed at a later time. Based on the process and discussion from the working group, staff recommends the following adjustments to the WSAP.

Recommended Adjustments to the Water Supply Allocation Plan

Staff recommends that the Board consider four adjustments to the WSAP:

1. Update the WSAP Base Period to Fiscal Years Ending 2013 and 2014. This would include a process to account for agencies that had mandatory water use restrictions in place during the updated Base Period;
2. Update the method for calculating Conservation Demand Hardening Credits;
3. Add a separate allocation for drought-impacted groundwater basins; and
4. Replace the WSAP Penalty Rates with an Allocation Surcharge based on the marginal costs of conservation programs.

If approved, these adjustments would replace related elements of the current WSAP. The recommended adjustments are detailed below.

1. Update the WSAP Base Period to Fiscal Years Ending 2013 and 2014 - The WSAP "Base Period" is used to determine the retail consumptive water demands for each member agency. The "Base Period" retail demand is adjusted for growth in population, conservation savings, and non-potable recycling production occurring from the base period to the Allocation Year. The current method uses the average of retail consumptive water demand in Calendar Years 2004-2006. Keeping the current WSAP Base Period for a 2015 Allocation Year would require 10 years of estimated growth adjustments.

   The proposed update to the WSAP Base period replaces Calendar Years 2004-2006 with Fiscal Years 2013 and 2014. These more recent years provide a more up to-date-estimate of current retail consumptive water demand. For a 2015 Allocation Year, only one year of estimated growth adjustments would be required, thus minimizing any estimation error involved in adjusting retail water use. **Attachment 2** includes the data used to calculate retail consumptive water demands for each member agency and estimated Allocation Year amounts.

   There are member and retail agencies within Metropolitan's service area that were in mandatory water use restrictions and/or rationing during the updated Base Period. For those agencies, using the updated Base Period could reflect lower retail water use due to mandatory restrictions that were already in place. Without adjusting for this, those agencies could be required to enforce even higher levels of restrictions under an allocation than those agencies that have not started mandatory restrictions. Staff recommends a consultation process that would allow member agencies to describe mandatory restrictions that were in place during the updated Base Period. Restrictions vary among agencies, but include restricted water uses, fines, and water budget or penalty based rate structures that are enacted by the governing body of the member agency or retail agency. Following the consultation process, staff would recommend adjustments for an agency based on evidence of reduced Gallons Per Capita Per Day (GPCD). To qualify for an adjustment, reductions would have to be observed that are beyond those expected from the agency's ongoing conservation efforts and trends. Any adjustments determined to be appropriate would be reported to the Board in conjunction with future staff recommendations for implementing the WSAP.

2. <u>Update the methodology for calculating Conservation Demand Hardening Credits</u> – Conservation Demand Hardening occurs at the retail water use level as consumers implement more conservation savings devices and programs. In short, member agencies whose customers have implemented conservation savings devices and programs have "harder" demands than those that have not. The current WSAP formula includes a method for estimating total conservation savings and providing additional supply allocation to account for demand hardening due to the conservation savings.

   The current WSAP method uses an extensive model calculation that includes installed conservation devices, water savings rates, demographic growth, plumbing codes/ordinances, and estimates of conservation due to price and water rate structures to determine conservation savings. The updated methodology would replace the current calculation-intensive method with one based on observed reductions in GPCD.

   In order to estimate conservation savings, each member agency will establish a historical baseline GPCD calculated in a manner consistent with California Senate Bill SBx7-7. Reductions from the baseline GPCD to the Allocation Year would be the basis used to calculate the equivalent conservation savings in acre-feet. The Conservation Demand hardening credit will be based on an initial 10 percent of the GPCD-based Conservation savings plus an additional 5 percent for each level of Regional Shortage set by the Board during implementation of the WSAP. The credit will also be adjusted for:

   a. The overall percentage reduction in retail water demand
   b. The member agency's dependence on MWD

   This provides a base demand hardening credit equal to 10 percent of conservation savings and increases the credit as deeper shortages occur, which is when conservation demand hardening has a bigger impact on the retail consumer. The credit also increases based on the percentage of an agency's demand that was reduced through conservation. This accounts for increased hardening that occurs as increasing amounts of conservation are implemented. Lastly, the credit is scaled to the member agency's dependence on Metropolitan to ensure that credits are being applied to the proportion of water demand that is being affected by reductions in Metropolitan supply.

3. <u>Add a separate allocation for drought-impacted groundwater basins</u> - The current WSAP does not provide an allocation specifically to assist drought impacted groundwater basins. Groundwater basins help provide vital local supplies that can buffer the region from short-term drought impacts. Longer droughts can result in reductions to the many sources of water that replenish groundwater basins, resulting in lower basin levels and potential impacts to the overlying consumptive demands. Limited imported deliveries under these conditions may help avoid impacts to the basins that may be drawn out of their normal operating range or subject to water quality or regulatory impacts. Staff recommends a limited allocation for drought impacted groundwater basins based on the following framework:

   a. Staff would hold a consultation with a requesting member agency and the appropriate groundwater basin manager to document whether the basin is in one of the following conditions:

      i. Groundwater basin overdraft conditions that will result in water levels being outside normal operating ranges during the WSAP allocation period; or

      ii. Violations of groundwater basin water quality and/or regulatory parameters that would occur without imported deliveries.

   b. Provide an allocation based on the verified need for groundwater replenishment. The allocation would start with a member agency's ten-year average purchases of imported groundwater replenishment supplies (excluding years in which deliveries were curtailed). The amount would then be reduced by the declared WSAP Regional Shortage Level (5 percent for each Regional Shortage Level).

c. Any allocation provided under this provision for drought impacted groundwater basins is intended to help support and maintain groundwater production for consumptive use. As such, a member agency receiving an allocation under this provision will be expected to maintain groundwater production levels equivalent to the average pumping in the Base Period. Any adjustments to a member agency's M&I allocation due to lower groundwater production would be reduced by deliveries made under this provision.

d. Agencies for which this allocation does not provide sufficient supplies for the needs of the groundwater basin may use the WSAP Appeals Process to request additional supply (subject to Board approval). The appeal should include a Groundwater Management Plan that documents the need for additional supplies according to the following tenets:

i. Maintenance of groundwater production levels;

ii. Maintenance of, or reducing the further decline of, groundwater levels;

iii. Maintenance of key water quality factors/indicators;

iv. Avoidance of permanent impacts to groundwater infrastructure or geologic features; and

v. Consideration of severe and/or inequitable financial impacts.

While final amounts and allocations will be determined following consultation with groundwater basin managers and member agencies, **Attachment 3** shows the ten-year average of historical replenishment purchases for member agencies that have been active in purchasing replenishment water since 2010. **Attachment 3** also shows estimated allocations of Groundwater Replenishment under the different Regional Shortage Levels.

4. <u>Replace the WSAP Penalty Rates with an Allocation Surcharge based on the marginal costs of conservation programs</u> - The current WSAP uses a Penalty Rate to disincentivize member agencies from exceeding their supply allocations. The Penalty Rate is based on a multiple of Metropolitan's fully encumbered Tier 2 Untreated Rate for water. Water use between 100 percent to 115 percent of supply allocations is charged a Penalty Rate of two times the fully encumbered Tier 2 Untreated Rate, and use greater than 115 percent of supply allocations is charged a Penalty Rate of four times the fully encumbered Tier 2 Untreated Rate. The Penalty Rate is charged over and above the water rates for the use of the water.

   Staff recommends replacing the WSAP Penalty Rates with an Allocation Surcharge. The proposed Allocation Surcharge is based on the costs that Metropolitan and its member agencies are incurring to implement outdoor water use reductions through turf removal programs. The Allocation Surcharge would provide a price signal based on the marginal conservation costs incurred to reduce water use in dry and shortage years. Any revenues collected from the Allocation Surcharge would be used to fund the implementation of the Turf Removal program or other similar programs designed to conserve water and reduce future demands.

   The Allocation Surcharge is based on Metropolitan's current cost of the turf removal program. Metropolitan is currently paying $2 per square foot of turf removed. The estimated water savings is 44 gallons per year for each square foot of turf removed for a period of ten years. Based on this savings rate, the estimated cost of the program is $1,480 per acre-foot.

   Water use between 100 percent and 115 percent of WSAP supply allocations would be charged with the Allocation Surcharge of $1,480 per acre-foot. Water use greater than 115 percent of WSAP supply allocations would be charged two times the Allocation Surcharge or $2,960 per acre-foot. Two times the Allocation Surcharge would allow the funding of additional turf removal and conservation programs to conserve additional water and further reduce demand or, if appropriate, allow for a higher per square foot incentive payment.

Recommendation

Following the input from the member agencies during the WSAP working group process, staff recommends that the Board approve the four described adjustments to the WSAP. If approved, staff will incorporate the adjustments into the WSAP and prepare the plan for use in any upcoming implementations of the WSAP. Staff will also make available an updated version of the Water Supply Allocation Plan Handbook that incorporates the approved adjustments.

In the interest of completing WSAP revision discussions for board consideration in December, both Metropolitan and member agency staff recognize that not all outstanding issues can be resolved during this timeframe. Two issues have been identified that remain for future policy development and are not addressed in the current proposed revisions to the WSAP. One issue is to investigate how Metropolitan provides incentives through its varied programs, including the WSAP, to ensure development of locally produced supplies consistent with Metropolitan's Integrated Resource Plan objectives. The second issue is a desire to develop a policy framework for groundwater replenishment deliveries that recognizes the long-term consumptive demand on MWD, and establishes service provisions consistent with both the variable nature of replenishment demands and payment of Metropolitan's full service rate.

Policy

By Minute Item 47393, dated February 12, 2008, the Board adopted the Water Supply Allocation Plan.

By Minute Item 48376, dated August 17, 2010, the Board adopted proposed adjustments to the Water Supply Allocation Plan, and approved the allocation of seawater barrier supplies for 2010/11.

By Minute Item 48803, dated September 13, 2011, the Board adopted proposed adjustments to the Water Supply Allocation Plan.

California Environmental Quality Act (CEQA)

CEQA determination for Option #1

The Water Supply Allocation Plan previously was determined to be categorically and statutorily exempt under the provisions of CEQA and State CEQA Guidelines. Specifically, the WSAP was found to be exempt under 15301 (Class 1), 15307 (Class 7), 15308 (Class 8) and 15378(b)(4) of the State CEQA Guidelines. In addition, the WSAP was found to be exempt pursuant to Water Code Section 10652, to the extent this plan serves as the basis for the urban water shortage contingency analysis required under Water Code Section 10631 and is incorporated into Metropolitan's RUWMP. These determinations were made on February 12, 2008, and a Notice of Exemption (NOE) was filed shortly thereafter. With the current board action, there is no substantial change proposed to the project. Hence, the previous environmental documentation prepared in conjunction with the project fully complies with CEQA and the State CEQA Guidelines. In addition, the proposed action is not defined as a project under CEQA because it involves continuing administrative actions, such as general policy and procedure making (Section 15378(b)(2) of the State CEQA Guidelines), and other government fiscal activities which do not involve any commitment to any specific project which may result in a potentially significant physical impact on the environment (Section 15378(b)(4) of the State CEQA Guidelines). Accordingly, no further CEQA documentation is necessary for the Board to act with regard to the proposed action.

The CEQA determination is: Determine that the WSAP has been addressed previously in the original NOE, the proposed action is not defined as a project subject to CEQA, and that no further environmental analysis or documentation is required.

CEQA determination for Option #2:

None required

Board Options

Option #1

Adopt the CEQA determination that the item is categorically and statutorily exempt and approve adjustments to the Water Supply Allocation Plan.

Fiscal Impact: None

Business Analysis: Recommended adjustments improve the existing WSAP and also address groundwater basin needs during shortage conditions.

Option #2

Do not approve adjustments to the Water Supply Allocation Plan and keep the current Water Supply Allocation Plan as Metropolitan's policy and method for allocating water to the member agencies.

Fiscal Impact: None

Business Analysis: Current Water Supply Allocation Plan has some deficiencies that will be kept in place without the approval of adjustments. Groundwater replenishment needs and deliveries will not be addressed under the current Water Supply Allocation Plan.

Staff Recommendation

Option #1

11/26/2014	
Deven N. Upadhyay	*Date*
Manager, Water Resource Management	

11/26/2014	
Jeffrey Kightlinger	*Date*
General Manager	

Attachment 1 – 2014 WSAP Review Process Meeting Summary

Attachment 2 – 2014 WSAP Member Agency Base Period and Allocation Year Data

Attachment 3 – 2014 WSAP Member Agency Maximum Potential Seawater Barrier and Replenishment Allocations

Ref# wrm12633988

2014 WSAP Review Process Meeting Summary

Meetings with Member Agencies to Discuss and Consider Improvements to the Water Supply Allocation Plan

Date	Meeting	Description
July 14, 2014	WSAP Workgroup Meeting #1	First meeting of the 2014 WSAP Review process; review of the existing WSAP policy and formula; review of the process timeline; began discussion of issues related to base period selection
July 25, 2014	WSAP Workgroup Meeting #2	Discussion of base period selection
August 27, 2014	WSAP Workgroup Meeting #3	Continuation of prior workshop discussion; comparison of base period alternatives
September 10, 2014	WSAP Workgroup Meeting #4	Discussion of a base period proposal; discussion of replenishment issues in the WSAP; discussion of 2015 water supply scenarios.
September 12, 2014	Member Agency Managers Meeting	Review of WSAP workgroup process; discussion on issues related to base period, demand hardening, and local resources development
September 29, 2014	WSAP Workgroup Meeting #5	Review of base period recommendation; discussion of issues regarding agencies in mandatory conservation during a base period; discussion on replenishment in the WSAP
October 9, 2014	WSAP Workgroup Meeting #6	Continuation of prior workshop discussion; discussion of alternative methods for conservation demand hardening credit; discussion of new and existing local supplies
October 17, 2014	Member Agency Managers Meeting	Review of WSAP workgroup process; discussion of issues related to base period and demand hardening
November 3, 2014	WSAP Workgroup Meeting #7	Review and discussion of issues and potential methods for base period selection and adjustment, replenishment allocation, and conservation demand hardening credit; review of estimated effects of potential WSAP changes at the regional level
November 14, 2014	WSAP Workgroup Meeting #8	Review of proposed recommendations for the WSAP based on workgroup discussion
November 21, 2014	Member Agency Managers Meeting	Review of proposed recommendations for the WSAP based on workgroup discussion

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2014 WSAP Member Agency Base Period and Allocation Year Data

Member Agency	Local Supplies		MWD Purchases		Retail Demand		Allocation Year 2015		
	FY2012-13	FY2013-14	FY2012-13	FY2013-14	FY2012-13	FY2013-14	Retail Demand	Local Supply	WSAP Baseline
Anaheim	44,980	51,402	21,105	13,635	66,084	65,037	66,006	51,402	14,604
Beverly Hills	733	747	11,114	11,632	11,847	12,379	12,149	747	11,402
Burbank	11,754	10,976	7,628	8,817	19,382	19,793	19,885	10,976	8,908
Calleguas	37,490	42,451	109,933	116,685	147,423	159,136	153,911	42,451	111,460
Central Basin	185,830	183,330	37,501	33,951	223,331	217,280	215,719	183,330	32,390
Compton	6,347	7,858	1,683	44	8,030	7,902	8,012	7,858	154
Eastern	100,071	102,370	96,913	104,627	197,855	206,997	209,275	102,370	106,905
Foothill	9,519	8,845	8,112	10,018	17,631	18,863	18,304	8,845	9,459
Fullerton	19,489	21,279	9,205	8,776	28,694	30,055	29,567	21,279	8,288
Glendale	8,666	7,598	18,764	20,341	27,429	27,939	28,609	7,598	21,011
Inland Empire	192,972	199,330	59,051	67,038	252,023	266,367	267,791	199,330	68,461
Las Virgenes	141	144	22,741	22,360	22,882	22,504	22,951	144	22,807
Long Beach	32,399	29,085	27,376	30,540	59,775	59,625	60,060	29,085	30,975
Los Angeles	176,567	139,643	388,907	447,113	565,474	586,756	620,179	139,643	480,536
MWDOC	231,655	252,486	190,804	191,515	422,459	444,001	435,069	252,486	182,582
Pasadena	14,648	10,883	18,254	23,097	32,902	33,979	33,578	10,883	22,695
SDCWA	252,484	239,961	462,849	536,712	544,437	596,416	574,215	239,961	334,254
San Fernando	3,100	3,108	118	61	3,218	3,170	3,209	3,108	101
San Marino	4,552	4,418	814	1,583	5,367	6,001	5,695	4,418	1,277
Santa Ana	26,730	27,914	12,454	10,343	39,184	38,257	39,056	27,914	11,143
Santa Monica	7,231	8,551	6,331	5,900	13,562	14,452	14,005	8,551	5,454
Three Valleys	53,448	52,007	58,484	67,962	111,932	119,968	117,051	52,007	65,044
Torrance	4,691	4,623	16,855	17,210	21,546	21,833	21,278	4,623	16,655
Upper San Gabriel	161,506	164,038	3,529	3,490	165,035	167,528	166,695	164,038	2,657
West Basin	32,662	34,283	117,288	117,455	149,950	151,738	151,677	34,283	117,395
Western	186,497	183,858	68,457	75,910	260,997	259,768	261,793	183,858	77,934
TOTAL	**1,806,162**	**1,791,189**	**1,776,268**	**1,946,813**	**3,418,448**	**3,557,746**	**3,555,737**	**1,791,189**	**1,764,548**

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2014 WSAP Member Agency Maximum Potential Seawater Barrier and Replenishment Allocations

Member Agency	Maximum Seawater Barrier Allocation	Maximum Replenishment Allocation										
		Baseline	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
Anaheim	-	3,000	2,850	2,700	2,550	2,400	2,250	2,100	1,950	1,800	1,650	1,500
Beverly Hills	-	-	-	-	-	-	-	-	-	-	-	-
Burbank	-	2,800	2,660	2,520	2,380	2,240	2,100	1,960	1,820	1,680	1,540	1,400
Calleguas	-	-	-	-	-	-	-	-	-	-	-	-
Central Basin	-	23,100	21,945	20,790	19,635	18,480	17,325	16,170	15,015	13,860	12,705	11,550
Compton	-	-	-	-	-	-	-	-	-	-	-	-
Eastern	-	7,000	6,650	6,300	5,950	5,600	5,250	4,900	4,550	4,200	3,850	3,500
Foothill	-	-	-	-	-	-	-	-	-	-	-	-
Fullerton	-	2,700	2,565	2,430	2,295	2,160	2,025	1,890	1,755	1,620	1,485	1,350
Glendale	-	-	-	-	-	-	-	-	-	-	-	-
Inland Empire	-	17,100	16,245	15,390	14,535	13,680	12,825	11,970	11,115	10,260	9,405	8,550
Las Virgenes	-	-	-	-	-	-	-	-	-	-	-	-
Long Beach	4,000	5,100	4,845	4,590	4,335	4,080	3,825	3,570	3,315	3,060	2,805	2,550
Los Angeles	-	-	-	-	-	-	-	-	-	-	-	-
MWDOC	-	51,100	48,545	45,990	43,435	40,880	38,325	35,770	33,215	30,660	28,105	25,550
Pasadena	-	-	-	-	-	-	-	-	-	-	-	-
SDCWA	-	-	-	-	-	-	-	-	-	-	-	-
San Fernando	-	-	-	-	-	-	-	-	-	-	-	-
San Marino	-	-	-	-	-	-	-	-	-	-	-	-
Santa Ana	-	3,500	3,325	3,150	2,975	2,800	2,625	2,450	2,275	2,100	1,925	1,750
Santa Monica	-	-	-	-	-	-	-	-	-	-	-	-
Three Valleys	-	5,100	4,845	4,590	4,335	4,080	3,825	3,570	3,315	3,060	2,805	2,550
Torrance	-	-	-	-	-	-	-	-	-	-	-	-
Upper San Gabriel	-	29,500	28,025	26,550	25,075	23,600	22,125	20,650	19,175	17,700	16,225	14,750
West Basin	11,200	-	-	-	-	-	-	-	-	-	-	-
Western	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**15,200**	**150,000**	**142,500**	**135,000**	**127,500**	**120,000**	**112,500**	**105,000**	**97,500**	**90,000**	**82,500**	**75,000**

Member Agency	Total Maximum Seawater Barrier and Replenishment Allocations										
	Baseline	Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Level 8	Level 9	Level 10
Anaheim	3,000	2,850	2,700	2,550	2,400	2,250	2,100	1,950	1,800	1,650	1,500
Beverly Hills	-	-	-	-	-	-	-	-	-	-	-
Burbank	2,800	2,660	2,520	2,380	2,240	2,100	1,960	1,820	1,680	1,540	1,400
Calleguas	-	-	-	-	-	-	-	-	-	-	-
Central Basin	23,100	21,945	20,790	19,635	18,480	17,325	16,170	15,015	13,860	12,705	11,550
Compton	-	-	-	-	-	-	-	-	-	-	-
Eastern	7,000	6,650	6,300	5,950	5,600	5,250	4,900	4,550	4,200	3,850	3,500
Foothill	-	-	-	-	-	-	-	-	-	-	-
Fullerton	2,700	2,565	2,430	2,295	2,160	2,025	1,890	1,755	1,620	1,485	1,350
Glendale	-	-	-	-	-	-	-	-	-	-	-
Inland Empire	17,100	16,245	15,390	14,535	13,680	12,825	11,970	11,115	10,260	9,405	8,550
Las Virgenes	-	-	-	-	-	-	-	-	-	-	-
Long Beach	9,100	8,845	8,590	8,335	8,080	7,825	7,570	7,315	7,060	6,805	6,550
Los Angeles	-	-	-	-	-	-	-	-	-	-	-
MWDOC	51,100	48,545	45,990	43,435	40,880	38,325	35,770	33,215	30,660	28,105	25,550
Pasadena	-	-	-	-	-	-	-	-	-	-	-
SDCWA	-	-	-	-	-	-	-	-	-	-	-
San Fernando	-	-	-	-	-	-	-	-	-	-	-
San Marino	-	-	-	-	-	-	-	-	-	-	-
Santa Ana	3,500	3,325	3,150	2,975	2,800	2,625	2,450	2,275	2,100	1,925	1,750
Santa Monica	-	-	-	-	-	-	-	-	-	-	-
Three Valleys	5,100	4,845	4,590	4,335	4,080	3,825	3,570	3,315	3,060	2,805	2,550
Torrance	-	-	-	-	-	-	-	-	-	-	-
Upper San Gabriel	29,500	28,025	26,550	25,075	23,600	22,125	20,650	19,175	17,700	16,225	14,750
West Basin	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200	11,200
Western	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**165,200**	**157,700**	**150,200**	**142,700**	**135,200**	**127,700**	**120,200**	**112,700**	**105,200**	**97,700**	**90,200**

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APPENDIX 5.3

HISTORICAL TEN YEAR ROLLING AVERAGE
(FY 2004-14 PLUS ONE YEAR LAG BASIS)

Tier 1 Annual Limit (AFY)
For CY 2015

Member Agency	10 YRA FY 2004-14	Percent Allocation	Tier 1 Volume
City of Chino	3,575	12.6%	3,946
City of Chino Hills[1]	136	26.4%	8,287
Monte Vista WD[1]	7,373		
City of Ontario	12,286	43.2%	13,559
City of Upland	5,066	17.8%	5,592
WFA Total	**28,436**	**100.0%**	**31,384**

[1] Chino Hills deliveries combined with MVWD, per agreement

Adopted Ordinance 2010-07-01 July 2010

Tier 1 Annual Limit (Effective CY): Ten-year rolling average of firm deliveries of treated water, excluding in-lieu deliveries for the Dry Year Yield Program, on a fiscal year basis trailing one-year. Beginning July 2010, utilized unsubscribed capacity volumes from that time forward shall be subtracted from the delivery volumes. An individual Member Agency's share of the Tier 1 Annual Limit shall be based on the Authority's 10 YRA. (The "ten-year running average" of metered deliveries utilized in Fund 1 and Fund 2 for allocating capital replacement costs remains unchanged and is not replaced by the "10 YRA" described above).

Indirect Operating Cost (Effective FY): The cost will be allocated to the Member Agencies based on each Agency's percentage of the 10 YRA. At the end of the fiscal year, each Member Agency's charges will be adjusted to reflect their proportionate share of the indirect operating net audited cost for that fiscal year. (In those instances where a negative value is given to the City of Chino Hills for its 10 YRA determination, due to its water supply agreement with Monte Vista Water District and use of in-lieu deliveries for the DYY Program, the values for these Member Agencies will be combined when applying the cost allocation for Indirect Operations.)

Capacity Charge (Effective FY): The Capacity Charge will be allocated to each Member Agency based on each Agency's percentage of average water deliveries in the 10 YRA.

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WFA DELIVERIES (Acre-Feet), FY 2004 - 2005

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	675.2	670.5	653.6	641.4	367.9	392.0	407.8	346.0	385.3	495.3	592.0	636.1	6,263.1
in-lieu	0.0	0.0	0.0	(257.7)	(224.9)	(212.6)	(156.7)	(120.1)	(198.7)	(112.9)	(321.0)	(287.8)	(1,892.4)
Adjusted Deliveries	675.2	670.5	653.6	383.7	143.0	179.4	251.1	225.9	186.6	382.4	271.0	348.3	4,370.7
City of Chino Hills	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	732.5	1,146.9	1,879.4
in-lieu	0.0	0.0	0.0	0.0	(250.0)	(250.0)	(250.0)	(150.0)	(150.0)	(150.0)	(150.0)	(150.0)	(1,500.0)
Adjusted Deliveries	0.0	0.0	0.0	0.0	(250.0)	(250.0)	(250.0)	(150.0)	(150.0)	(150.0)	582.5	996.9	379.4
Monte Vista WD	1,417.0	1,472.7	1,280.0	780.1	617.6	675.7	498.0	235.5	873.7	1,513.9	653.8	721.5	10,739.5
in-lieu	(125.0)	(300.0)	(650.0)	(675.0)	(550.0)	(550.0)	(400.0)	(200.0)	(825.0)	(1,450.0)	(625.0)	(700.0)	(7,050.0)
Adjusted Deliveries	1,292.0	1,172.7	630.0	105.1	67.6	125.7	98.0	35.5	48.7	63.9	28.8	21.5	3,689.5
City of Ontario	1,624.9	1,860.1	1,763.8	1,370.7	842.0	884.5	400.6	139.5	599.7	1,006.8	1,471.2	1,490.7	13,454.4
in-lieu	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(600.0)	0.0	600.0	0.0	0.0
Adjusted Deliveries	1,624.9	1,860.1	1,763.8	1,370.7	842.0	884.5	400.6	139.5	(0.3)	1,006.8	2,071.2	1,490.7	13,454.4
City of Upland	1,267.5	1,287.6	1,239.4	635.7	257.5	205.7	107.1	101.1	60.5	287.7	624.5	830.7	6,905.1
in-lieu	0.0	0.0	0.0	0.0	0.0	0.0	(107.1)	(101.1)	(60.5)	(287.7)	(624.5)	(830.7)	(2,011.6)
Adjusted Deliveries	1,267.5	1,287.6	1,239.4	635.7	257.5	205.7	0.0	(0.0)	(0.0)	0.0	0.0	0.0	4,893.5
Total Adj. Deliv.	**4,859.6**	**4,990.9**	**4,286.9**	**2,495.2**	**1,060.0**	**1,145.3**	**499.7**	**250.9**	**85.0**	**1,303.1**	**2,953.4**	**2,857.5**	**26,787.5**

WFA DELIVERIES (Acre-Feet), FY 2005 - 2006

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	670.3	650.9	633.2	587.4	407.8	415.8	381.1	344.4	381.0	375.4	383.2	361.3	5,591.9
in-lieu	0.0	0.0	0.0	(294.8)	(224.9)	(212.6)	(156.7)	(93.4)	(198.7)	(238.1)	(80.8)	0.0	(1,500.0)
Adjusted Deliveries	670.3	650.9	633.2	292.6	182.9	203.2	224.4	251.0	182.3	137.3	302.4	361.3	4,091.9
City of Chino Hills	158.9	192.8	63.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	415.5
in-lieu	0.0	(600.0)	(550.0)	(700.0)	(600.0)	(350.0)	(150.0)	(150.0)	(150.0)	(150.0)	(150.0)	0.0	(3,550.0)
Adjusted Deliveries	158.9	(407.2)	(486.2)	(700.0)	(600.0)	(350.0)	(150.0)	(150.0)	(150.0)	(150.0)	(150.0)	0.0	(3,134.5)
Monte Vista WD	2,259.9	2,206.9	1,899.3	1,487.2	1,273.3	1,303.5	843.5	678.9	443.7	603.4	1,212.5	1,853.5	16,065.7
in-lieu	(950.0)	(950.0)	(950.0)	(700.0)	(550.0)	(600.0)	(600.0)	(450.0)	(280.0)	(450.0)	(800.0)	(1,220.0)	(8,500.0)
Adjusted Deliveries	1,309.9	1,256.9	949.3	787.2	723.3	703.5	243.5	228.9	163.7	153.4	412.5	633.5	7,565.7
City of Ontario	1,599.0	1,608.5	1,525.5	1,507.1	1,138.0	910.0	658.4	503.0	583.0	681.9	928.1	697.6	12,340.3
in-lieu	(599.0)	(609.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1,208.0)
Adjusted Deliveries	1,000.0	999.5	1,525.5	1,507.1	1,138.0	910.0	658.4	503.0	583.0	681.9	928.1	697.6	11,132.3
City of Upland	1,304.0	847.7	495.7	381.0	202.6	374.6	293.2	406.4	93.7	4.8	260.9	286.8	4,951.6
in-lieu	(1,304.0)	(847.7)	(495.7)	(353.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(3,001.0)
Adjusted Deliveries	0.0	0.0	0.0	27.4	202.6	374.6	293.2	406.4	93.7	4.8	260.9	286.8	1,950.6
Total Adj. Deliv.	**3,139.2**	**2,500.2**	**2,621.8**	**1,914.4**	**1,646.9**	**1,841.3**	**1,269.6**	**1,239.3**	**872.7**	**827.4**	**1,753.9**	**1,979.3**	**21,606.0**

WFA DELIVERIES (Acre-Feet), FY 2006 - 2007

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	420.2	444.8	431.1	440.0	417.0	419.4	380.7	195.0	224.2	227.0	324.4	355.7	**4,279.5**
in-lieu	0.0	(447.5)	(434.5)	(448.9)	(423.2)	(423.9)	(380.7)	(199.1)	(223.1)	0.0	0.0	0.0	**(2,980.9)**
Adjusted Deliveries	420.2	(2.7)	(3.4)	(8.9)	(6.2)	(4.5)	(0.0)	(4.1)	1.1	227.0	324.4	355.7	**1,298.6**
City of Chino Hills	85.0	40.5	45.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.7	**180.2**
in-lieu	(600.0)	0.0	(600.0)	(450.0)	(400.0)	(400.0)	(300.0)	(150.0)	0.0	0.0	0.0	0.0	**(2,900.0)**
Adjusted Deliveries	(515.0)	40.5	(554.1)	(450.0)	(400.0)	(400.0)	(300.0)	(150.0)	0.0	0.0	0.0	8.7	**(2,719.9)**
Monte Vista WD	2,035.0	1,986.5	1,782.9	1,328.8	1,010.7	835.0	721.3	314.4	740.4	688.2	1,121.6	1,438.5	**14,003.3**
in-lieu	(1,300.0)	(1,300.0)	(1,200.0)	(550.0)	(500.0)	(400.0)	(400.0)	(300.0)	(650.0)	0.0	0.0	0.0	**(6,600.0)**
Adjusted Deliveries	735.0	686.5	582.9	778.8	510.7	435.0	321.3	14.4	90.4	688.2	1,121.6	1,438.5	**7,403.3**
City of Ontario	1,509.8	1,502.8	1,084.5	1,473.7	1,416.4	1,202.6	995.6	328.7	706.3	685.7	1,110.8	1,205.4	**13,222.2**
in-lieu	(510.0)	(790.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**(1,300.0)**
Adjusted Deliveries	999.8	712.8	1,084.5	1,473.7	1,416.4	1,202.6	995.6	328.7	706.3	685.7	1,110.8	1,205.4	**11,922.2**
City of Upland	604.8	495.1	458.8	336.9	315.0	267.6	240.6	40.0	192.4	266.2	705.2	895.3	**4,817.8**
in-lieu	(604.8)	(495.1)	(458.8)	(336.9)	(315.0)	(267.6)	0.0	0.0	0.0	0.0	0.0	0.0	**(2,478.2)**
Adjusted Deliveries	0.0	(0.0)	(0.0)	0.0	0.0	0.0	240.6	40.0	192.4	266.2	705.2	895.3	**2,339.6**
Total Adj. Deliv.	**1,640.0**	**1,437.1**	**1,110.0**	**1,793.6**	**1,520.9**	**1,233.0**	**1,257.5**	**229.0**	**990.1**	**1,867.1**	**3,262.0**	**3,903.6**	**20,243.9**

WFA DELIVERIES (Acre-Feet), FY 2007 - 2008

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	460.5	514.6	539.4	483.7	394.8	319.0	277.0	183.6	257.7	181.2	331.6	499.9	**4,443.0**
DYY Cert.											0.0	0.0	**0.0**
Adjusted Deliveries	460.5	514.6	539.4	483.7	394.8	319.0	277.0	183.6	257.7	181.2	331.6	499.9	**4,443.0**
City of Chino Hills	43.2	200.8	105.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9	0.0	**364.4**
DYY Cert.											0.0	0.0	**0.0**
Adjusted Deliveries	43.2	200.8	105.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9	0.0	**364.4**
Monte Vista WD	1,906.5	1,737.4	1,454.6	1,107.3	414.7	108.0	416.9	357.8	1,145.9	1,546.9	675.4	674.1	**11,545.5**
DYY Cert.											1,056.0	1,580.0	**2,636.0**
Adjusted Deliveries	1,906.5	1,737.4	1,454.6	1,107.3	414.7	108.0	416.9	357.8	1,145.9	1,546.9	1,731.4	2,254.1	**14,181.5**
City of Ontario	1,454.3	1,556.3	1,333.7	1,130.6	1,089.7	1,137.2	1,139.0	739.2	1,151.8	1,109.0	199.4	287.3	**12,327.5**
DYY Cert.											45.0	2,119.0	**2,164.0**
Adjusted Deliveries	1,454.3	1,556.3	1,333.7	1,130.6	1,089.7	1,137.2	1,139.0	739.2	1,151.8	1,109.0	244.4	2,406.3	**14,491.5**
City of Upland	938.0	963.2	680.7	497.9	300.0	427.3	500.5	1.5	0.0	250.7	110.4	220.6	**4,890.8**
DYY Cert.											337.0	309.4	**646.4**
Adjusted Deliveries	938.0	963.2	680.7	497.9	300.0	427.3	500.5	1.5	0.0	250.7	447.4	530.0	**5,537.2**
Total Adj. Deliv.	4,802.5	4,972.3	4,113.9	3,219.5	2,199.2	1,991.5	**2,333.4**	**1,282.1**	**2,555.4**	**3,087.8**	**2,769.7**	**5,690.3**	**39,017.6**

WFA DELIVERIES (Acre-Feet), FY 2008 - 2009

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	505.3	459.8	299.6	253.9	200.4	146.9	36.7	0.0	0.0	216.1	335.6	266.9	**2,721.2**
DYY Cert.	0.0	0.0	0.0	238.4	629.5	175.2	0.0	0.0	0.0	0.0	353.1	315.9	**1,712.1**
Adjusted Deliveries	505.3	459.8	299.6	492.3	829.9	322.1	36.7	0.0	0.0	216.1	688.7	582.8	**4,433.3**
City of Chino Hills	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
DYY Cert.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Monte Vista WD	1,101.5	1,147.8	895.2	894.8	522.8	298.8	180.5	0.0	0.0	370.1	497.4	384.2	**6,293.1**
DYY Cert.	1,700.0	0.0	0.0	0.0	292.0	533.0	250.0	0.0	0.0	0.0	1,536.0	1,514.0	**5,825.0**
Adjusted Deliveries	2,801.5	1,147.8	895.2	894.8	814.8	831.8	430.5	0.0	0.0	370.1	2,033.4	1,898.2	**12,118.1**
City of Ontario	517.5	856.1	828.4	857.3	577.1	440.3	66.6	0.0	0.0	42.0	0.0	5.5	**4,190.8**
DYY Cert.	2,184.0	2,427.0	2,525.0	580.0	119.5	0.0	0.0	0.0	0.0	0.0	3,489.1	3,249.0	**14,573.6**
Adjusted Deliveries	2,701.5	3,283.1	3,353.4	1,437.3	696.6	440.3	66.6	0.0	0.0	42.0	3,489.1	3,254.5	**18,764.4**
City of Upland	605.1	986.7	889.2	830.1	144.0	174.0	28.7	0.0	0.0	58.9	10.7	3.4	**3,730.8**
DYY Cert.	330.4	259.2	301.5	326.9	275.6	217.6	272.3	71.2	0.0	0.0	288.8	359.0	**2,702.5**
Adjusted Deliveries	935.5	1,245.9	1,190.7	1,157.0	419.6	391.6	301.0	71.2	0.0	58.9	299.5	362.4	**6,433.3**
Total Adj. Deliv.	**6,943.8**	**6,136.6**	**5,738.9**	**3,981.4**	**2,760.9**	**1,985.8**	**834.8**	**71.2**	**0.0**	**687.1**	**6,510.7**	**6,097.9**	**41,749.1**

WFA DELIVERIES (Acre-Feet), FY 2009 - 2010

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	420.0	394.0	394.0	240.0	124.0	127.0	116.0	65.0	147.0	110.7	252.5	366.2	**2,756.4**
DYY Cert.	373.9	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	289.0	298.0	**961.9**
Adjusted Deliveries	793.9	395.0	394.0	240.0	124.0	127.0	116.0	65.0	147.0	110.7	541.5	664.2	**3,718.3**
City of Chino Hills	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
DYY Cert.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Monte Vista WD	663.0	597.0	703.0	275.0	208.0	222.0	425.0	32.0	188.0	213.7	385.9	553.1	**4,465.7**
DYY Cert.	1,825.8	1,073.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	510.0	510.0	**3,918.8**
Adjusted Deliveries	2,488.8	1,670.0	703.0	275.0	208.0	222.0	425.0	32.0	188.0	213.7	895.9	1,063.1	**8,384.5**
City of Ontario	416.0	575.0	611.0	632.0	584.0	565.0	590.0	255.0	143.0	65.1	68.1	378.8	**4,883.0**
DYY Cert.	2,022.0	250.0	340.0	360.0	289.9	0.0	0.0	0.0	0.0	0.0	100.0	678.8	**4,040.7**
Adjusted Deliveries	2,438.0	825.0	951.0	992.0	873.9	565.0	590.0	255.0	143.0	65.1	168.1	1,057.6	**8,923.7**
City of Upland	370.0	619.0	706.0	347.0	195.0	0.0	0.0	0.0	210.0	232.3	63.7	16.1	**2,759.1**
DYY Cert.	366.2	497.8	435.9	293.1	272.7	187.6	0.0	0.0	0.0	0.0	189.7	124.5	**2,367.5**
Adjusted Deliveries	736.2	1,116.8	1,141.9	640.1	467.7	187.6	0.0	0.0	210.0	232.3	253.4	140.6	**5,126.6**
Total Adj. Deliv.	**6,456.9**	**4,006.8**	**3,189.9**	**2,147.1**	**1,673.6**	**1,101.6**	**1,131.0**	**352.0**	**688.0**	**621.8**	**1,858.9**	**2,925.5**	**26,153.1**

WFA DELIVERIES (Acre-Feet), FY 2010- 2011

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	378.9	365.6	316.3	160.6	177.2	132.9	135.9	170.0	143.8	135.9	233.0	270.0	**2,620.1**
DYY Cert.	0.0	0.0	0.0	0.0	17.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**17.1**
Adjusted Deliveries	378.9	365.6	316.3	160.6	194.3	132.9	135.9	170.0	143.8	135.9	233.0	270.0	**2,637.2**
City of Chino Hills	0.0	0.0	0.0	0.0	208.1	251.1	253.6	224.4	57.4	81.6	181.5	253.9	**1,511.6**
DYY Cert.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	0.0	0.0	0.0	0.0	208.1	251.1	253.6	224.4	57.4	81.6	181.5	253.9	**1,511.6**
Monte Vista WD	1,027.6	1,091.3	999.8	580.9	183.6	30.5	86.1	50.7	0.0	0.0	0.0	10.0	**4,060.5**
DYY Cert.[(2)]	300.0	300.0	335.0	335.0	330.4	200.0	0.0	0.0	0.0	0.0	0.0	0.0	**1,800.4**
Adjusted Deliveries	1,327.6	1,391.3	1,334.8	915.9	514.0	230.5	86.1	50.7	0.0	0.0	0.0	10.0	**5,860.9**
City of Ontario	683.4	1,466.7	1,417.9	1,068.3	697.1	532.7	486.6	430.1	441.0	580.5	852.1	867.5	**9,523.9**
DYY Cert.	155.0	2,065.0	846.6	468.7	529.1	408.8	0.0	0.0	0.0	0.0	0.0	0.0	**4,473.2**
Adjusted Deliveries	838.4	3,531.7	2,264.5	1,537.0	1,226.2	941.5	486.6	430.1	441.0	580.5	852.1	867.5	**13,997.1**
City of Upland	474.3	519.2	498.4	152.7	0.0	24.6	63.7	3.9	85.0	357.0	420.4	754.0	**3,353.2**
DYY Cert.[(2)]	210.0	210.0	210.0	210.0	210.0	200.0	0.0	0.0	0.0	0.0	0.0	0.0	**1,250.0**
Adjusted Deliveries	684.3	729.2	708.4	362.7	210.0	224.6	63.7	3.9	85.0	357.0	420.4	754.0	**4,603.2**
Total Adj. Deliv.	**3,229.2**	**6,017.8**	**4,624.0**	**2,976.2**	**2,352.6**	**1,780.6**	**1,025.9**	**879.1**	**727.2**	**1,155.0**	**1,687.0**	**2,155.4**	**28,610.0**

WFA DELIVERIES (Acre-Feet), FY 2011- 2012

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	327.3	334.4	328.2	260.1	188.0	158.3	137.1	131.2	152.0	134.3	256.3	336.2	**2,743.4**
in-lieu	0.0	0.0	0.0										**0.0**
Adjusted Deliveries	327.3	334.4	328.2	260.1	188.0	158.3	137.1	131.2	152.0	134.3	256.3	336.2	**2,743.4**
City of Chino Hills	256.1	258.2	240.5	172.0	15.6	19.3	0.7	214.0	250.1	245.4	256.7	244.9	**2,173.5**
in-lieu	0.0	0.0	0.0										**0.0**
Adjusted Deliveries	256.1	258.2	240.5	172.0	15.6	19.3	0.7	214.0	250.1	245.4	256.7	244.9	**2,173.5**
Monte Vista WD	138.0	386.9	1,106.9	0.0	0.0	0.0	0.0	321.4	542.8	145.6	181.5	682.4	**3,505.5**
in-lieu	0.0	0.0	(682.2)										**(682.2)**
Adjusted Deliveries	138.0	386.9	424.7	0.0	0.0	0.0	0.0	321.4	542.8	145.6	181.5	682.4	**2,823.3**
City of Ontario	1,040.2	1,052.0	1,107.0	203.7	813.3	997.4	906.7	911.8	958.9	879.0	981.6	955.9	**10,807.5**
in-lieu	(492.5)	(69.4)	(222.6)										**(784.5)**
Adjusted Deliveries	547.7	982.6	884.4	203.7	813.3	997.4	906.7	911.8	958.9	879.0	981.6	955.9	**10,023.0**
City of Upland	1,063.2	1,028.7	756.4	313.0	179.8	184.1	335.5	210.8	181.9	351.8	827.5	1,013.6	**6,446.3**
in-lieu	0.0	0.0	0.0										**0.0**
Adjusted Deliveries	1,063.2	1,028.7	756.4	313.0	179.8	184.1	335.5	210.8	181.9	351.8	827.5	1,013.6	**6,446.3**
Total Adj. Deliv.	**2,332.3**	**2,990.8**	**2,634.2**	**948.8**	**1,196.7**	**1,359.1**	**1,380.0**	**1,789.2**	**2,085.7**	**1,756.1**	**2,503.6**	**3,233.0**	**24,209.5**

WFA DELIVERIES (Acre-Feet), FY 2012- 2013

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	398.5	467.5	440.9	412.4	243.8	185.0	185.6	166.5	254.0	389.1	452.6	488.7	**4,084.6**
Unsubscribed Capacity	0.0	(25.8)	(22.4)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(9.7)	(56.3)	**(114.2)**
Adjusted Deliveries	398.5	441.7	418.5	412.4	243.8	185.0	185.6	166.5	254.0	389.1	442.9	432.4	**3,970.4**
City of Chino Hills	259.6	286.8	286.8	198.2	114.0	5.4	5.3	1.7	19.8	271.3	222.0	150.6	**1,821.5**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	259.6	286.8	286.8	198.2	114.0	5.4	5.3	1.7	19.8	271.3	222.0	150.6	**1,821.5**
Monte Vista WD	730.3	990.6	903.3	624.2	359.0	17.0	16.7	5.3	62.3	854.4	699.2	474.3	**5,736.6**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	730.3	990.6	903.3	624.2	359.0	17.0	16.7	5.3	62.3	854.4	699.2	474.3	**5,736.6**
City of Ontario	812.1	552.9	829.0	938.3	869.4	819.4	689.2	696.1	829.0	801.9	1,056.7	1,349.5	**10,243.5**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	812.1	552.9	829.0	938.3	869.4	819.4	689.2	696.1	829.0	801.9	1,056.7	1,349.5	**10,243.5**
City of Upland	967.3	962.8	592.8	159.8	176.9	113.9	213.0	257.9	444.7	539.4	682.7	956.1	**6,067.3**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	967.3	962.8	592.8	159.8	176.9	113.9	213.0	257.9	444.7	539.4	682.7	956.1	**6,067.3**
Total Adj. Deliv.	**3,167.8**	**3,234.8**	**3,030.4**	**2,332.9**	**1,763.1**	**1,140.7**	**1,109.8**	**1,127.5**	**1,609.8**	**2,856.1**	**3,103.5**	**3,362.9**	**27,839.3**

WFA DELIVERIES (Acre-Feet), FY 2013- 2014

Member Agency	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	Total Deliveries
City of Chino	545.2	536.7	479.6	336.4	274.3	345.7	436.4	253.9	257.7	263.6	304.3	324.7	**4,358.5**
Unsubscribed Capacity	(102.8)	(90.3)	(67.2)	0.0	0.0	(5.5)	(49.1)	0.0	0.0	0.0	0.0	0.0	**(314.9)**
Adjusted Deliveries	442.4	446.4	412.4	336.4	274.3	340.2	387.3	253.9	257.7	263.6	304.3	324.7	**4,043.6**
City of Chino Hills	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	**962.0**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	81.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	81.0	**962.0**
Monte Vista WD	776.4	695.7	666.6	581.1	185.1	169.8	371.2	242.2	319.7	412.3	698.8	845.6	**5,964.5**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	776.4	695.7	666.6	581.1	185.1	169.8	371.2	242.2	319.7	412.3	698.8	845.6	**5,964.5**
City of Ontario	1,435.6	1,439.6	1,310.1	667.4	464.0	228.2	366.5	562.9	756.0	802.4	964.6	906.9	**9,904.2**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	1,435.6	1,439.6	1,310.1	667.4	464.0	228.2	366.5	562.9	756.0	802.4	964.6	906.9	**9,904.2**
City of Upland	943.6	926.2	804.4	534.1	503.2	225.4	389.0	150.9	211.6	493.7	945.1	1,138.1	**7,265.3**
Unsubscribed Capacity	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Adjusted Deliveries	943.6	926.2	804.4	534.1	503.2	225.4	389.0	150.9	211.6	493.7	945.1	1,138.1	**7,265.3**
Total Adj. Deliv.	**3,679.0**	**3,587.9**	**3,273.5**	**2,199.0**	**1,506.6**	**1,043.6**	**1,594.0**	**1,289.9**	**1,625.0**	**2,052.0**	**2,992.8**	**3,296.3**	**28,139.6**

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APPENDIX N

Land Use Based Demand Model Development Tech Memo

Inland Empire Utilities Agency

LAND USE BASED DEMAND MODEL DEVELOPMENT

FINAL Technical Memorandum

May 24, 2016

LAND USE BASED DEMAND MODEL DEVELOPMENT

Technical Memorandum

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Date:

May 19, 2016

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TABLES

FIGURES

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ABBREVIATIONS AND ACRONYMS

AF	acre-feet
af/ac/yr	acre-feet per acre per year
AFY	acre-feet per year
CEQA	California Environmental Quality Act
CVWD	Cucamonga Valley Water District
DU	Dwelling Units
du/ac	dwelling units per acre
FWC	Fontana Water Company
GIS	Geographic Information System
GIS	Geographic Information System
GPCD	gallons per capita per day
IEUA	Inland Empire Utilities Agency
IRP	Integrated Regional Plan
LAFCO	San Bernardino County Local Agency Formation Commission
LUD	Land Use Unit Demands
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
NOAA	National Oceanic and Atmospheric Administration
SAWCo	San Antonio Water Company
SOI	Sphere Of Influence
TM	Technical Memorandum
UWMP	Urban Water Management Plan

1 INTRODUCTION

This Technical Memorandum (TM) summarizes the process used to develop a water demand projection model and identify land use based water demand projections for Inland Empire Utilities Agency (IEUA) and its member agencies. IEUA's member agencies include the cities of Chino, Chino Hills, Ontario, and Upland, Cucamonga Valley Water District (CVWD), Fontana Water Company (FWC), Monte Vista Water District (MVWD), and San Antonio Water Company (SAWCo).

Data development and assumptions are presented in this TM along with a description of the methodologies used to develop the model and projections. The demand projection analysis includes data development and assumptions; and a discussion of the model tool and resulting projections.

2 METHODOLOGY

Project objectives are described in this section along with the project study area, an overview of the projection methodology, and a summary of the Demand Model development and use.

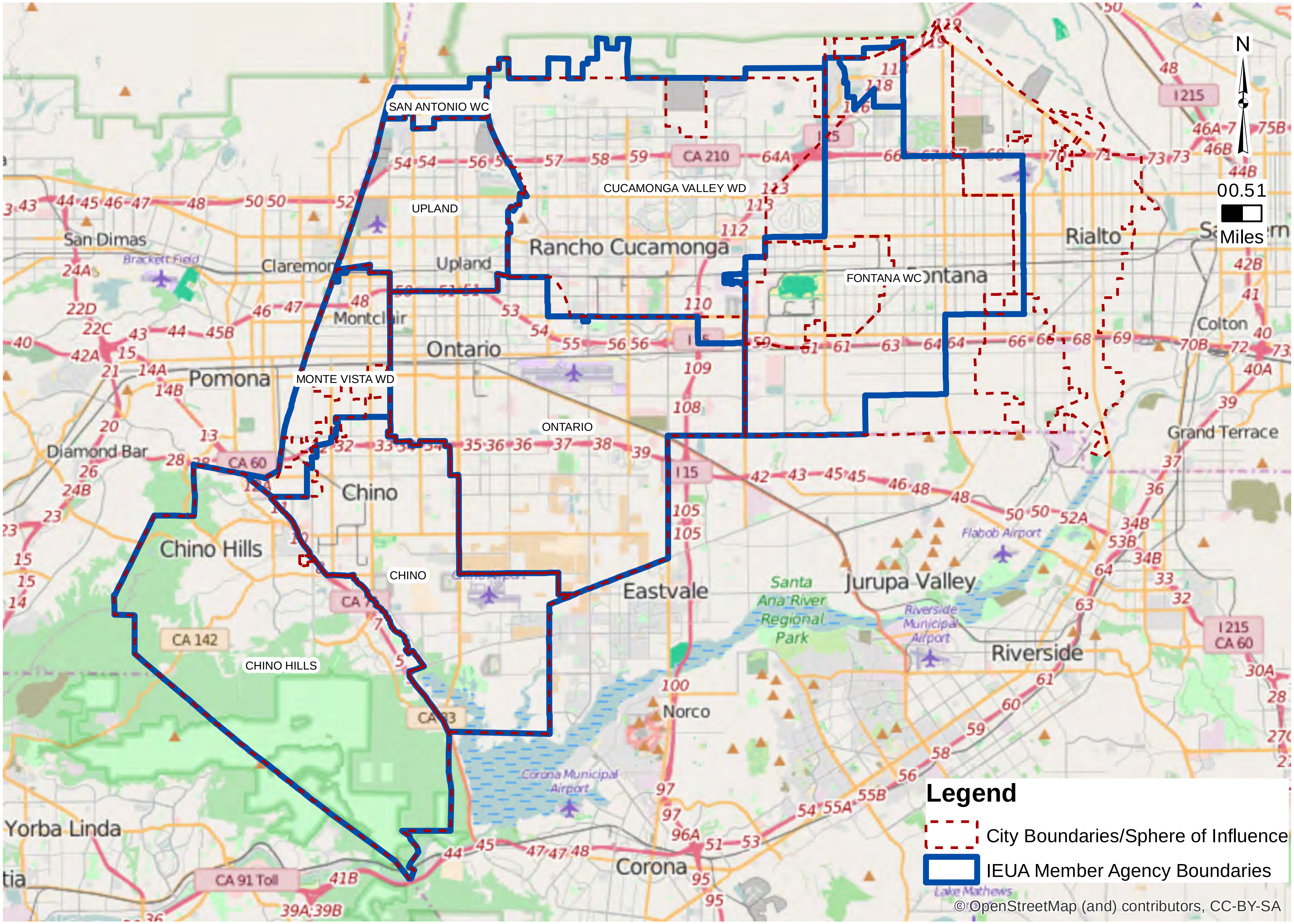
2.1 Objectives

To support its planning efforts, IEUA developed a Land Use Based Demand Model (Demand Model) to augment its Integrated Regional Plan (IRP) process in order to provide consistently developed member agency demand projections through 2040. The primary objective was to develop a land use based water demand model that disaggregates regional data to the member agency level for IEUA's Urban Water Management Plan (UWMP). The demand projections can be used by IEUA and member agencies for any system or supply planning purpose that requires detailed demand estimates and projections, such as conservation savings analyses.

2.2 Study Area and Boundaries

The study area is IEUA's sphere of influence (SOI). This boundary was established by IEUA to define its limit of future annexation to their existing service area. The SOI for IEUA is established by San Bernardino County Local Agency Formation Commission (LAFCO) to represent LAFCO's designation of the spatial extent of IEUA service. The IEUA SOI is the outermost extent of the study area, with demands projected within this boundary. The SOI delineation has undergone public review and California Environmental Quality Act (CEQA) analysis on growth inducing and other impacts.

Within this IEUA SOI boundary, the eight member agencies have boundaries established to prevent overlapping water service and demand projections. The SOIs for public water purveyors are also established by San Bernardino County LAFCO. Private water companies are governed by the State of California Public Utilities Commission, and do not have LAFCO designated SOIs, thus the use of their established member agency boundaries within IEUA is important. These boundaries are presented on Figure 2-1.



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Study Area Boundaries

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FIGURE 2-1

Within the study area and underlying each of the member agency boundaries, lie eight cities with land use planning authority. The cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Rancho Cucamonga, Rialto, and Upland, also have SOIs established by San Bernardino County LAFCO. These boundaries were useful in developing demand projections based on future land uses, as discussed in more detail in Section 3.

2.3 Overview of Projection Methodology

As presented on Figure 2-2, , the methodology used to create the Demand Model and identify demand projections relied on developing a land use database within a geographic information system (GIS), and determining Land Use Unit Demands (LUDs). LUDs measure water use on a per acre basis. Figure 2-2 presents the primary tasks for: 1) developing a land use database in orange, 2) unit demands in blue, and 3) demand projections in green.

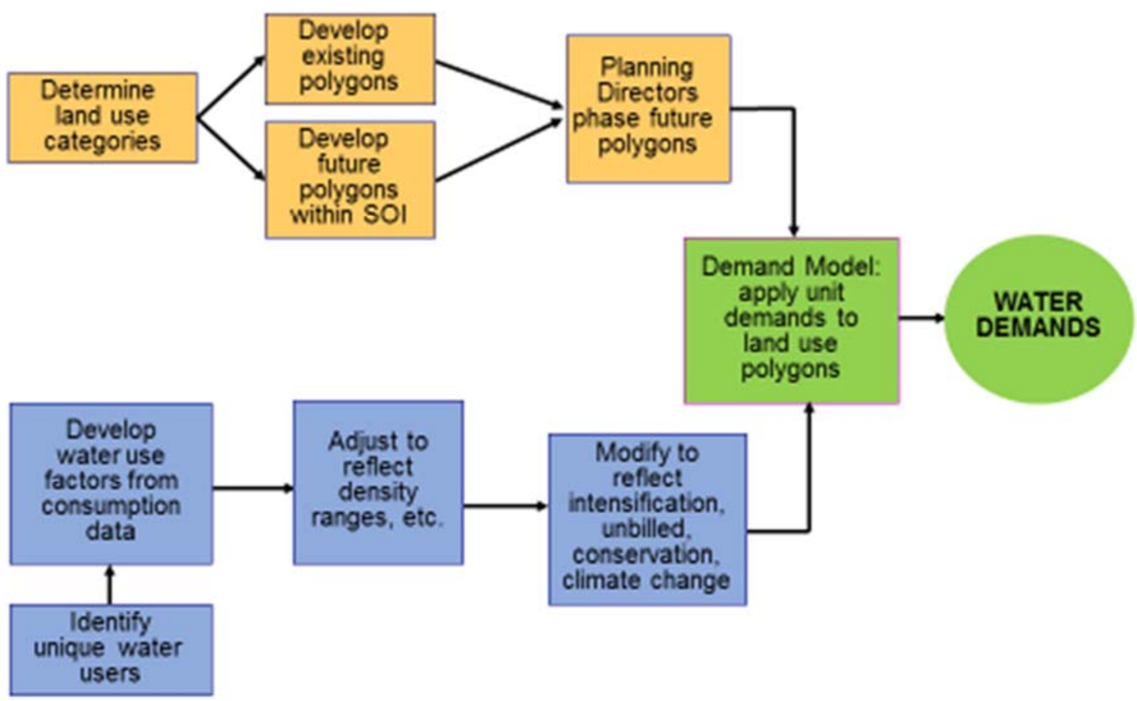


Figure 2-2: Land Use Based Demand Model Development Process

The demand projection process relied on the following key assumptions and data development steps.

Land Use

- The land use database relied on the SOIs as boundaries for IEUA, public member agencies, and cities.
- Because general plans reflect allowable development, not existing development, actual land uses were mapped by first using city parcel data that was updated as a part of the project to reflect actual land use, thus improving accuracy.
- The projections relied on using approved general plans, specifically the land use element and map for vacant lands identified for future development.
- Planning staff at each land use agency phased development by providing an estimate of potential construction dates for these future land uses.

Land Use Unit Demands

- Billing data and unbilled water estimates were provided by member agencies for the previous five years.
- The billing data from 2010 through 2014 were averaged to determine the existing year 2015 “normalized demands”, thus smoothing out the annual and seasonal effects of weather and other variables. This approach to normalizing demands was used because of the difficulty separating out the economic complexities of the past eight years (i.e., the Great Recession) and years of drought. The normalized demand became the starting point for the demand projections.
- LUDs were generated for each member agency using existing land use acreage and member agency billing data to ensure that the LUDs reflected the unique demand characteristics of each water purveyor’s service area.
- The unbilled water estimate (or unaccounted for water) reflects the percent difference between metered production and consumption; these percentages were provided by each member agency and used as an adjustment factor.
- Climate change impacts on estimated demands in 2040 were obtained from IRP assumptions and used as an adjustment factor.
- Redevelopment, increased densities, repurposing buildings, and other forms of land use intensification as land values increase can have a great effect on future water demands. This was accounted for in the adjustment factors based on an analysis of demand impacts associated with strong market conditions, which was noted in the IRP.
- Conservation savings were obtained from the IRP for plumbing code and efficiency regulation impacts.
- The Demand Model has an adjustment factor category called “Other” that is available to accommodate active conservation savings analyses, by percentage, for each land use, time frame, and member agency.

Demand Model

- The Demand Model relied on existing land use and LUDs normalized for 2015 existing demands.
- The Demand Model relied on future land uses and future LUDs, which were existing LUDs adjusted to reflect future changed conditions, to determine water demand projections in five year increments to 2040.
- Demands were identified and projected for each member agency separately which were combined for the IEUA service area in total.

More specific information follows regarding each of these key assumptions and data development steps.

2.4 Demand Model Development and Use

The project resulted in a GIS based software application, or tool, to calculate future water demands, called the Demand Model. The Demand Model linked GIS land use polygons and existing land use unit demands (input data) to calculate average annual projections 25 years into the future.

The Demand Model is a Microsoft Access database that contains GIS data collected from IEUA members and land use agencies including parcel data, member agency SOIs, and land use agency boundaries. Additionally, the database also contains layers for future land uses that were developed by the consultant team after consultation with each of the eight land use planning directors (described in Section 3.3 and 3.4). All original data in the individual parcel layer were maintained in this database. A few fields were added to each parcel layer, including the general plan land use, existing land use, year anticipated to be developed, and water purveyor serving the parcel.

The Demand Model can be used to develop demands spatially (by member agency and land use) and temporally (2015 to 2040 in five-year increments). Analysis, such as determining the savings associated with various demand management tools, can be conducted by land use and time frame for member agencies or the entire IEUA service area. The resulting study area Demand Model projections were similar to IRP projections, as described in Section 5.1. The Demand Model projection of approximately 278,000 AF at 2040 were four percent higher than the high range IRP projection.

3 LAND USE AND TRENDS

The process of consolidating general plan land use categories for all eight land use planning agencies into one master set of categories is described below, along with how existing and future land use GIS layers and the resulting land use inventories were developed.

3.1 Consolidation of Land Use Categories

All cities and counties in California have a general plan to provide and implement the vision for development of each community. All general plans contain a land use element and land use map to describe specific allowable land use and densities for each parcel. City general plans include all lands within their SOI overlapping in some areas with the San Bernardino County general plan that addresses all lands outside of city limits (unincorporated lands).

Each city uses different land use categories in their general plan; therefore, it was important to standardize these categories into a master set for the Demand Model. Appendix A presents the various general plan land use designations and the master set developed for the land use mapping and demand projections. Table 3-1 presents the resulting master set of land use categories and associated residential densities.

Table 3-1: Land Use Categories

Master Land Use Categories
Very Low Residential (<1-2 dwelling units per acre [du/ac])
Low Residential (3-7 du/ac)
Medium Residential (8-14 du/ac)
High Residential (15-24 du/ac)
Very High Residential (25+ du/ac)
Commercial
Industrial
Public/Institutional
Parks, Schools, Irrigation
Agriculture
Unique Water Users
Non-irrigated
Vacant

These land use categories were grouped to reflect similar water demand patterns. For example, parks, and other large turf areas receiving irrigation water (served with potable or recycled water, versus private wells) were identified as Parks, Schools, Irrigation, and retained in the database. Lands that do not receive water service were removed or identified as non-irrigated lands. The parks, schools, and other primarily irrigation uses reflect outdoor irrigation water use that aids in analyzing outdoor water demands. This category includes homeowner association common area irrigation accounts wherever possible.

Residential densities were separated into five categories that reflect new development patterns, density groupings of most general plans, and general customer control over irrigation. For example, residential densities associated with apartment buildings and condominiums typically have no control over outdoor irrigation.

“Mixed use” designations in the general plans reflected different configurations of mixed uses such as different commercial use, or commercial and residential use within the same project boundary but not necessarily on the same parcel. A standard convention for mixed use designations is commercial use on the ground floor with residential above, with a “mixed use” land use category developed. However, since the model needs spatial land use data, and the standard convention was not used for these cities, mixed use lands were delineated to reflect the percentages identified in the general plan or specific plan of planned land uses for each individual development project.

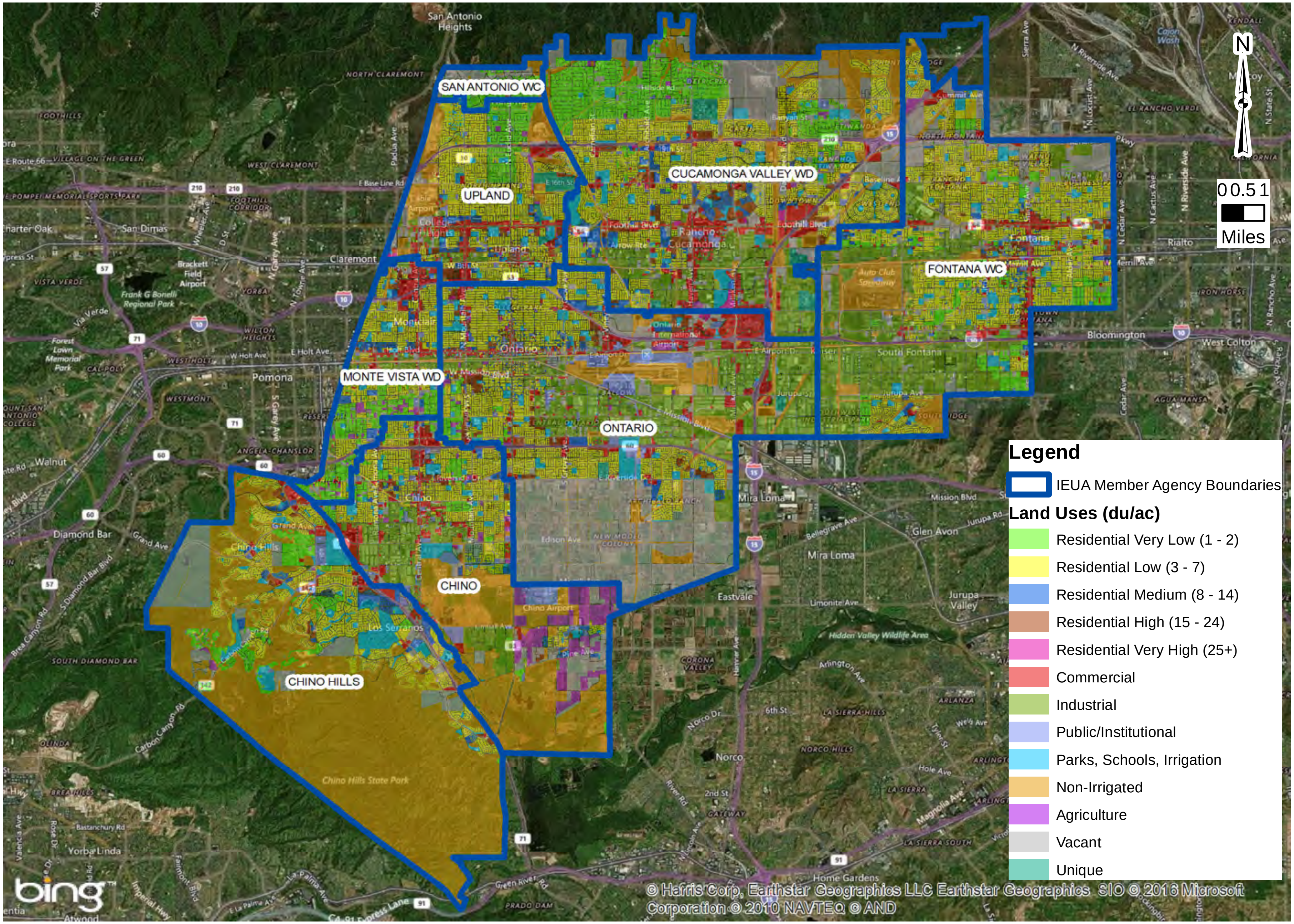
When the Demand Model is updated in the future, a new land use category should be considered to reflect higher densities of residential use. The Very High category in the model reflects densities of 25 du/ac or greater, which is appropriate now. As the region develops “up not out”, it is likely the general plans will be amended to accommodate higher density development.

3.2 Existing Land Use Layer Development

Spatially referenced existing land use polygons were created for the entire IEUA service area. Each polygon represents an area of predominant land use identified through parcel data provided by the cities and the county. The parcel data indicating existing land use typically have one category each for single family residential and multi-family residential use. In addition, many of the parcels are labeled “undefined”. For this study, existing land use categories were more specifically defined (e.g., five categories of residential land use and identification of all undefined parcels) using Google Earth maps and street view, windshield surveys, and meetings with community development departments. This extensive effort to improve the classification accuracy of over 70 percent of the existing land use resulted in a detailed database of existing land use that will yield increased accuracy of the LUDs.

The existing land use layer is not an exact replica of land uses but a best estimate. The process started with the use of parcel boundaries used to delineate each land use. But this often resulted in odd shaped polygons in areas such as airport tarmacs or new growth areas in southern Ontario where the ownership boundary does not match the general plan land use boundaries. Areas with parcel shapes that would have a significant impact on the accuracy of the demands, such as New Model Colony in Ontario, were modified to reflect the general plan land use map polygons.

“Unique water users” are identified as customers with consumption patterns determined by the agencies to be unusual, significantly higher (up to 1,240 percent higher) or lower (up to 340 percent lower) than the average customer of that sector. Unique users were separated from general land use categories to prevent a high or low water user from skewing the average unit demand for that particular land use for



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Existing Land Uses

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FIGURE 3-1

each member agency. The unique water users were maintained in the Demand Model as a separate land use.

The result is a GIS layer with existing land use that is presented on Figure 3-1 for the entire study area. Figure 3-2 presents an example of existing land use polygons. Existing land use maps for each member agency can be found in Appendix B.

Figure 3-2: Detail of Existing Land Uses

An important land use category in the existing land use database is "Vacant" lands. These vacant lands were defined as not having a current water demand but were designated on the general plans for future urban use having a demand for water. Vacant and agricultural lands that were not identified in the general plan for a future urban use were designated as "Non-irrigated" and include open space, agricultural lands with private water supply, or other lands with private water supplies that will remain private. Although open space lands could include uses with a water demand, each was carefully reviewed to determine if it was natural open space that was not irrigated or was irrigated by private well water. Non-irrigated lands also include significant road and highway rights-of-way and airport tarmacs; supporting airport uses with a water demand were not included in the non-irrigated tarmac polygons; these large land areas are an urban use but typically have minimal demand. The vacant lands with a future urban use were incorporated into a new GIS mapping layer for future land uses.

3.3 Future Land Use Layer Development

An important part of developing land use based water demand projections, is reliance on locally defined visions of how communities are to grow and change during the planning horizon. Using vacant land use parcels identified during existing GIS land use map development, the city general plan maps were applied to these vacant lands to identify future land uses. Future GIS land use maps were then generated to reflect these future developments. General plans are the most reliable indicators of future development policy because they have been subjected to extensive public review and rigorous environmental documentation prior to adoption. General plans, however, have a single hypothetical buildout date, used for analyses of environmental impacts associated with the full buildout of all lands in accordance with the land use map. Actual development will occur at varying rates and times, and can extend beyond these general plan dates. Therefore, a more accurate method for identifying the timing of projected water demands based on the general plan was used and is described in the subsequent section.

3.4 Land Use Planning Agency Meetings

It is important to have city land use planners identify anticipated timing of development. They are the most knowledgeable of development activities, growth patterns, and trends within their city. The project team held meetings with planning or community development departments of each city (see inset below), with representatives of the applicable water purveyor in attendance, along with IEUA representative(s).

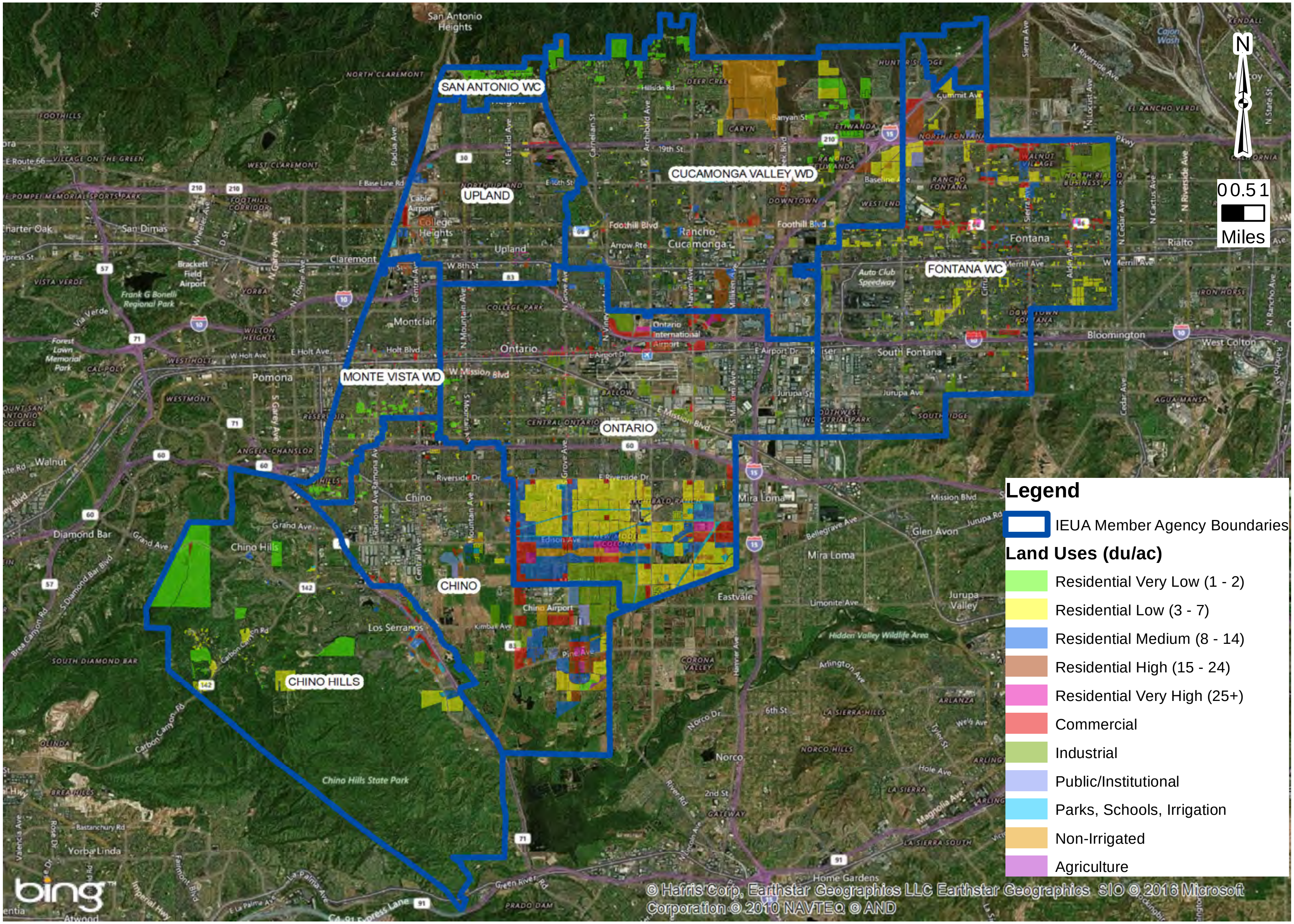
Existing land use maps were provided for each of the eight member agencies using their boundaries to capture service area land use. Future land use maps were also provided for each city within their SOIs. The meetings focused on the confirmation or identification of general plan land use for vacant land that is developable, and the planning representatives' best estimate of development time frame in five year increments through 2040. As 2015 is the year for existing demands, any development under way currently or in the recent past, and not in water billing data, was assigned a 2020 development date for water demand purposes. Also addressed at the meetings were confirmation of boundaries and a general review of existing land uses.

Land Use Agencies

- City of Chino
- City of Chino Hills
- City of Fontana
- City of Montclair
- City of Ontario
- City of Rancho Cucamonga
- City of Rialto (partially in Fontana Water Company boundary)

Planning staff provided information on observed land use trends and areas of redevelopment (creating denser development) and reuse (reusing existing buildings for different purposes) in their cities. Trends are discussed later in Section 4.3. Most densification changes are anticipated to not be a change in land use designation, but rather a reuse or repurposing of buildings or redevelopment of lands with higher density buildings within general plan-allowable ranges. These areas reflecting an intensification of use, will result in increased water demands but not necessarily a change in land use designation. The process to accommodate intensification of uses is discussed in Section 4.3.

The existing and future land use maps were edited in the GIS database based on these planning agency meetings. Figure 3-3 presents future land uses within the study area. Appendix B provides future land use maps for each of the member agencies.



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Future Land Uses

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FIGURE 3-3

3.5 Acreage Inventories

Based on the existing and future land use GIS mapping effort as described in previous sections, acreage inventories were generated in the Demand Model for each member agency. Table 3-2 presents the acreage of each land use within the study area to be developed over the planning horizon. The total acreage may not reflect the total IEUA service area because large areas of open space lands that will not have a water demand (e.g., most of Chino Hills State Park) were not included. Table 3-3 presents the net change in acreages for each land use.

Table 3-2: Study Area Acreage Inventory

	Acreage Inventory by Year					
Land Use (du/ac)	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	9,089	9,504	10,155	10,282	10,115	11,522
Residential Low (3 - 7)	26,329	27,090	28,463	29,691	30,804	32,593
Residential Medium (8 - 14)	3,067	3,500	3,959	4,425	4,663	5,915
Residential High (15 - 24)	2,349	2,678	3,131	3,263	3,300	3,427
Residential Very High (25+)	231	256	283	408	466	646
Commercial	6,838	6,925	7,180	7,994	8,456	9,221
Industrial	16,974	18,587	19,856	20,141	20,306	20,420
Public/Institutional	2,979	2,990	3,066	3,095	3,289	3,334
Parks, Schools, Irrigation	5,629	5,687	5,657	5,890	5,963	6,154
Agriculture	2,026	1,534	1,175	630	376	68
Unique Water Users	863	863	852	852	852	852
Non-Irrigated	34,438	34,410	35,668	35,833	35,904	36,085
Vacant	19,724	16,512	11,090	8,032	6,042	298
Total	**130,537**	**130,537**	**130,537**	**130,537**	**130,537**	**130,537**

Acreage inventories from the Demand Model for each member agency can be found in Appendix C. As shown in Table 3-2, the largest percent increase in land use in the study area is very high density residential at 180 percent increase. The largest acreage increase by 2040 is low density residential by 6,264 acres. The majority of this new low density residential is attributed to new growth areas in Ontario's New Model Colony and Chino's The Preserve. These lands are currently agricultural lands, but as shown in Table 3-2, most agricultural lands will decline over time as they are converted to urban uses. Medium and high density residential lands are also anticipated to increase at a greater rate (percentage) than very low and low density.

Land use patterns that are unique to each member agency can be identified by studying the maps in Appendix B and the acreage inventories in Appendix C. This is where the agricultural conversions of Ontario and to a lesser extent, Chino, are apparent. And MVWD's service area does not have a lot of vacant or agricultural land for development but is still growing as infill parcels are developed. Another interesting characteristic in the future acreage inventories in Appendix C is the decrease in acreage for the Parks, Schools, Irrigation land use designation for Rancho Cucamonga and Upland. This decrease in acreage reflects a statewide trend of golf courses replacing some or all of its lands with medium or other density residential uses.

Table 3-3: Changes in Acreage from 2015 to 2040

Land Use (du/ac)	Percent Change
Residential Very Low (1 - 2)	27
Residential Low (3 - 7)	24
Residential Medium (8 - 14)	93
Residential High (15 - 24)	46
Residential Very High (25+)	180
Commercial	35
Industrial	20
Public/Institutional	12
Parks, Schools, Irrigation	9
Agriculture	-97

What is not apparent from the inventories are characteristics such as the extensive underutilized lands in the Fontana Water Company service area that will be consolidated and developed with higher densities. There are currently many acres of very low density (<1 to 2 du/ac) residential lands with a small house on a large unirrigated parcel, and is designated as low density residential. A development pattern has emerged where parcels have been consolidated and homes replaced with a subdivision reflecting a general plan designation of low density (up to 7.6 du/ac in the Fontana General Plan). An example is provided on Figure 3-4.

As discussed in Section 4, acreages have a LUD assigned to them that represents average conditions for that land use within that service area. The LUDs for each land use were adjusted to reflect changing conditions in the study area such as intensification of land uses. An exception to the use of LUD adjustment factors to accommodate intensification can be found with Fontana's very low density land use.

Fontana Very Low Density Residential

This is an example of very low density residential land use next to a subdivision of low density residential that was likely built from a consolidation of parcels.

Figure 3-4: Fontana Very Low Density Residential

4 WATER USE AND ADJUSTMENT FACTORS

Existing water demands are described in this section, along with the development of LUDs, LUD adjustment factors, and the resulting future LUDs.

4.1 Existing Demands

4.1.1 Establishing Existing Year Demands

Year 2015 was selected at the "existing year" to develop existing demands. To smooth out the effects of weather, and other annual variability, five years of billing data by billing sector were averaged. Averaging of data was used as the methodology to "normalize" demands because of the difficulty teasing out the effects of multiple dry years sandwiching a wet year versus conservation outreach to the public versus the economy partially rebounding from the Great Recession. Water billing data reflects metered consumption. Both the historical five year period of metered consumption and the normalized 2015 demand are presented on Figure 4-1. The existing year (2015) demands are 190,175 acre-feet (AF).

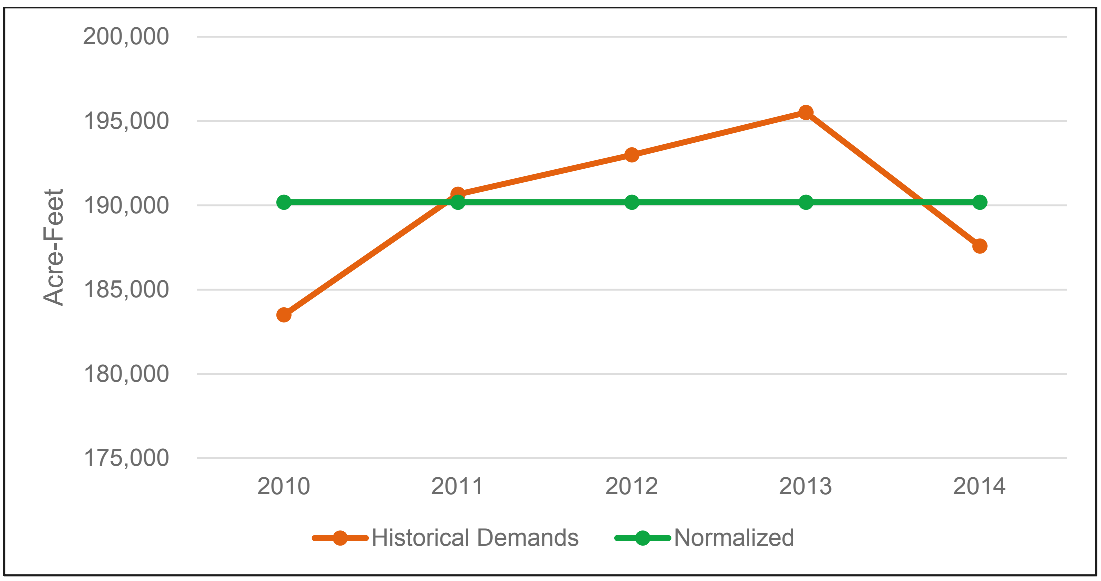


Figure 4-1: Historical Water Demands

4.2 Existing Land Use Unit Demands

Consumption patterns vary throughout IEUA's service area based on local conditions such as microclimate, demographics, economics, and land use densities. Land Use Unit Demands or LUDs were generated to represent these spatial characteristics of consumption patterns by developing existing LUDs on a per acre basis for each land use within each member agency boundary.

4.2.1 Disaggregation of Billing Data

In general, LUDs are calculated by dividing the estimated normalized consumption by the acres for a similar land use. This results in a unit demand of x acre-feet per acre per year (af/ac/yr) for each land use for each member agency. For example, five years of commercial billing data in CVWD averaged 2,196 acre-feet per year (AFY). The total acreage of commercial use is 1,592 acres. Therefore, 2,196 divided by 1,592 equals an existing CVWD commercial LUD of 1.38 af/ac/yr.

Each member agency tracks and bills metered water consumption differently. The billing data range from 3 to 10 billing sectors or categories for each member agency. Since many of these do not align exactly with the 13 master land uses of the Demand Model, the billing data were disaggregated to apply to the land use categories. For example, data for a “single family residential” billing category were disaggregated into three land use categories: Very Low, Low, and Medium, by determining the prevalent average density of each of the three land use categories multiplied by the total number of existing acres of each land use (based on the Demand Model acreage inventory) to determine the approximate number of dwelling units.

An AFY)/Dwelling Unit (DU) factor was developed using the sum of the dwelling units; this unit factor was then apportioned to each of the three single family land use densities to reflect consumption patterns based on density. For example, approximately 40,600 single family residential dwelling units (i.e., very low, low, and medium densities) in CVWD’s service area were calculated from identified densities. Single family residential billing data of 27,790 AFY was divided by 40,600 DUs resulting in 0.68 AFY/DU. Applying 0.68 AFY/DU to approximately 26,140 single family-low density dwelling units resulted in a distribution of Low Density Residential demands of approximately 17,900 AFY. The Very Low category has a higher consumption for the individual home (approximately 1 AF/DU) yet has a lower consumption on a per acre basis (1.85 af/ac/yr), compared with the other categories. Conversely, a Medium density residential dwelling unit has a lower consumption (0.46 AF/DU) than a Very Low and Low density dwelling unit, but has a higher consumption on a per acre basis (4.57 af/ac/yr) because there are more dwelling units per acre.

For multi-family residential billing data, since the majority of water demands are associated with indoor water consumption, the billing data were applied to the estimated total number of dwelling units (based on the prevalent average densities) and the same unit demand per dwelling unit was applied to the average prevalent density to obtain the calculated LUD.

Often the commercial, industrial, and other non-residential uses are combined in the billing data. LUDs from other communities were sometimes used to separate out the demands associated with a specific land use. For example, Fontana Water Company has a Public Authority billing category. The Public/Institutional LUDs from four other member agencies were averaged to obtain an LUD for Public/Institutional for Fontana Water Company with the balance of its Public Authority billing data assigned to Parks, Schools, and Irrigation. This resulted in LUDs for both categories that are within range of the other member agencies.

Another example is the City of Upland. Billing data from its Commercial/Industrial category was separated by applying a typical commercial LUD obtained from Irvine Ranch Water District and East Bay Municipal Utility District LUDs, which were similar, to the data with the balance assigned to Industrial. This resulted in an Industrial LUD for Upland which is higher than the other member agencies for Industrial. Since Upland does not have low water uses associated with warehousing and distribution that other member agencies have, the resulting LUDs are reasonable.

4.2.2 Existing LUDs

Table 4-1 presents a comparison of existing LUDs for each member agency by land use. These LUDs represent normalized consumption, but without unbilled water (production) estimates. As shown in Table 4-1, each agency has different service area characteristics represented in their unit demands. These LUDs are calculated outside of the Demand Model using current billing data. They can be easily updated in the future with new billing data and updated existing land use inventories for each agency.

Table 4-1: Existing Land Use Unit Demands

Land Use	Existing Land Use Unit Demands (af/ac/yr)							
	Chino	Chino Hills	CVWD	FWC	MVWD	Ontario	SAWCO	Upland
Residential Very Low (<1 - 2)	1.73	1.40	1.85	1.25	1.27	1.20	2.34	1.90
Residential Low (3 - 7)	2.60	2.47	2.88	2.75	2.11	2.12	0.00	2.84
Residential Medium (8 - 14)	4.36	4.10	4.57	6.70	4.67	5.27	4.95[1]	4.95
Residential High (15 - 24)	4.78	4.28	6.07	11.55	9.86	7.60	6.36	8.95
Residential Very High (25+)	6.88	6.88[4]	8.81	15.66	0.00	13.20	0.00	13.96
Commercial	1.31	3.34	1.38	6.54	2.13	2.82	2.20	2.13
Industrial	0.22[3]	1.07	0.51	0.33	0.65	0.38	0.00	1.07
Public/Institutional	1.31	1.17	2.73[2]	2.73[2]	2.39	2.82	2.20	3.52
Parks, Schools, Irrigation	4.99	3.11	6.88	4.99	4.72	7.48	0.00	5.87
Agriculture	0.00	0.00	0.28	0.00	0.34	15.08	0.00	0.00
Unique Water Users #1	299[5]		3.62		5.59	47.57		1.33
Unique Water Users #2	186[5]		1.47		43.49	18.81		242[5]
Unique Water Users #3	81[5]		7.43			10.07		4.57
Unique Water Users #4			2.58					3.08

Note: Existing LUDs reflect normalized consumption billing data. Unbilled estimate (production) not included here.
[1] Used Upland Medium density residential LUD for SAWCO Medium density residential

[2] Average Public/Institutional LUD from four agencies applied to FWC and CVWD

[3] Highest Industrial LUD used for Chino Hills due to lack of warehousing and distribution uses

[4] Used Chino Very high density residential LUD for future Chino Hills Very high density residential

[5]Chino Unique Water Users and 1 Upland Unique are not located; 1 acre was used with full water demands.

4.3 Adjustment Factors

Looking back on Figure 2-2, the LUDs presented in Table 4-1 are applied in the Demand Model to the acreages of land use to determine existing and future demands. The land uses may be undeveloped or agricultural lands presently to be converted to an urban use in the future – this is a simple calculation of changing the agricultural land use category for each polygon reflecting the City planning staff input on timing resulting in overall increased urban acreage. The next step is to adjust the resulting water demands to reflect more specific existing and future conditions. There are two types of adjustment factors applied to existing LUDs. One, an unbilled water estimate to change the demands from billed consumption to total production demands. The second type are future adjustment factors to approximate how water demands change over time due to climate change, intensification, and conservation. The land use changes over time were discussed in Section 3.3. The adjustment factors described here were applied to the Existing LUDs using the Demand Model to calculate Future LUDs. Each of these adjustment factors are described here along with their correlation to impacts on water demands.

4.3.1 Unbilled Water

The existing demand reflects metered consumption data, or billed water use. The Demand Model identified water needs for the quantity of water entering distribution systems, or production requirements. The difference between production and consumption demands has historically been called unaccounted for water or unmetered water. These uses reflect authorized water use that is not billed and other water losses. Authorized uses typically include fire flows, unmetered public facilities, and water main flushing. Other water system losses typically include losses from pipe breaks, storage facilities, and service connections. System losses also can include unauthorized consumption, metering inaccuracies, and other unidentified loss. For the Demand Model, the difference between production and billed consumption is called the unbilled water estimate.

Unbilled water, as provided by each member agency, ranged from two to nine percent of production. The unbilled water estimates were applied to the individual existing LUDs for each member agency. The total production demands are five percent higher than total normalized metered consumption data. It is recommended that as the member agencies conduct water loss analyses, or reduce system losses over time, that their adjustment factor be modified to reflect updated information.

4.3.2 Climate Change

The following impacts identified by the Department of Water Resources are associated with climate change that could also impact the study area.

- Increased surface temperature of 5.5 to 10.4 degrees fahrenheit anticipated by the end of the century
- Heat waves will increase in frequency, magnitude, and duration
- Longer, drier, and more frequent periods of droughts are anticipated with up to 2.5 times the number of critically dry years by the end of the century

The IEUA IRP analyzed long term climate change impacts on water demands by reviewing recent predictions of potential increases in temperature. Long term climate change assumptions were based on a National Oceanic and Atmospheric Administration (NOAA) Technical Report (NOAA, 2013), which stated that the anticipated increased temperatures of 3.6 degrees Fahrenheit have the potential to increase water use by as much as 4.3 percent by 2040. However, this number was reduced to 3.2 percent by 2040 for this Demand Model region and applied to four of the residential density demands and outdoor irrigation demands to reflect the trend of new development having less outdoor irrigated landscaping. Using 0 percent at 2015 and 3.2 percent at 2040, an adjustment factor for the intervening years was calculated as a linear interpolation and input to the Demand Model.

4.3.3 Intensification

There are many factors that influence water demands associated with land use development patterns, land uses, and activities. Our understanding of these factors is based on discussions during the eight land use planning agency meetings, research on local socioeconomic trends and conditions, analyses of land use patterns observed from the GIS database in the Demand Model, and land use planning trends observed throughout California. The study area is still rebounding from the Great Recession and market conditions for the region are noted by economists to be strong with higher employment and higher occupancy rates anticipated. As agricultural lands develop to urban uses, some communities are reaching "buildout". But the term buildout is a bit of a misnomer as lands are continually evolving over time, resulting in an "up not out" land use pattern shift. In addition, land values are increasing and are anticipated to increase over the 25 year planning horizon which contributes to higher densities and higher utilization of existing buildings or lands. Although difficult to quantify specifically, all of these conditions result in an intensification of land uses and thus higher water demands on a per acre basis. Visual examples are provided in the photos of denser commercial land use patterns (e.g., newer 2-story buildings with high occupancy, smaller floor space but more businesses, more food services, and less parking) reflecting intensification resulting in higher unit water use demands on a per acre basis.

Comparison of Retail Uses

New, more compact strip commercial centers (photo right) typically have higher water demands per acre than older centers (below). Newer construction may have two-stories, smaller parking lots, smaller floor space, more restaurants in vibrant shopping centers, etc.

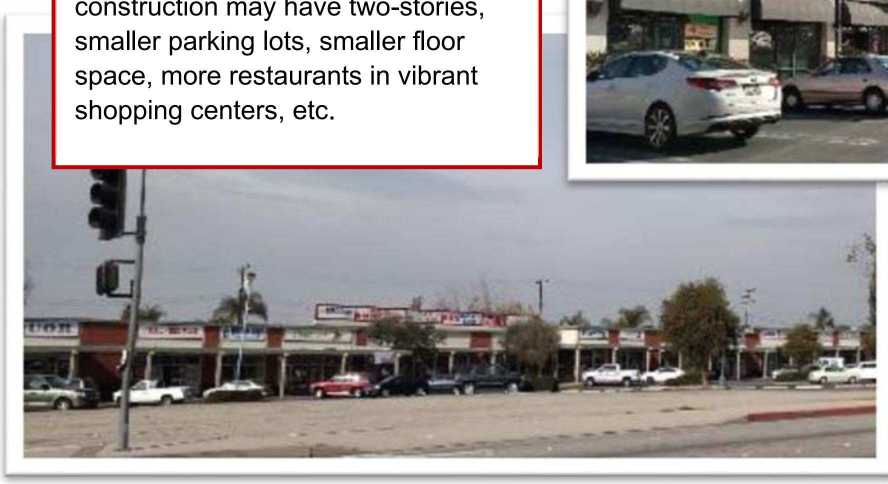


Figure 4-2: Comparison of Retail Uses

Figure 4-3: Comparison of Downtowns

As the member agencies observed during the past eight years, recessions result in reduced water use. Rebound from the Great Recession is still occurring in the study area with gradually increasing demands with strong market conditions anticipated through 2040. Vacant industrial lands are rapidly being developed, and although the predominant industrial use is warehousing and distribution – with low water use – most vacant industrial lands were anticipated by the land use agencies to be built out by 2025 if not sooner. When these large vacant parcels are built out, the region will likely see a consolidation of smaller parcels with currently underutilized uses, replaced with new industrial uses. For example, several city planning staff indicated that older industrial buildings that are vacant or have low occupancy or otherwise underutilized uses are being purchased with adjoining parcels with the intent to consolidate the lands and build larger industrial facilities. Although office commercial vacancy rates are currently very high, with no construction occurring in this sector, the lack of new construction will eventually result in vacancy rates decreasing with more employees per acre, until new commercial office lands are developed.

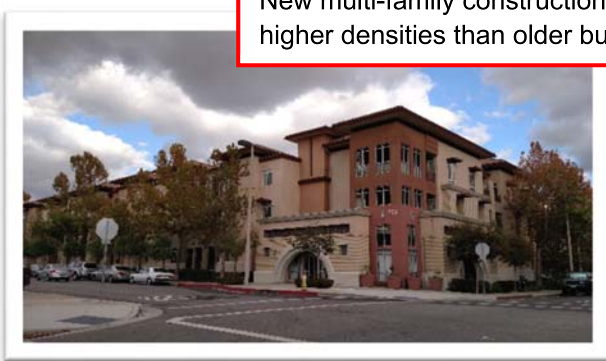
A "jobs per acre" analysis was conducted to determine the intensification of employment on non-residential lands. The total 2015 employment estimate of 350,460 for the study area (IRP data from Center for Demographic Research using Southern California Association of Governments data) was applied to the 2015 acreage inventory (for commercial, industrial, and public/ institutional land uses) resulting in 13.1 jobs per acre. The 2035 employment estimate of 488,930 was applied to the 2035 acreage, resulting in 15.3 jobs per acre, a 17 percent increase.

There are many acres of underutilized lands which will change in character as land values increase, such as the industrial example described above. Another example is new retail or office construction in shopping center parking lots. Most of the large areas of underutilized lands are in unincorporated areas under San Bernardino County development regulations, although all unincorporated lands in the study area are also within a sphere of influence of a city. Within cities, underutilized lands and buildings also exist, but aren't as prevalent. Land use planners discussed many redevelopment projects where obsolete buildings will be replaced with higher density and intensity of uses, within the same land use designation. This is likely to occur throughout the study area as land values continue to increase and population increases.

Existing residential land use, of which 35,420 acres are low and very low density residential (46 percent of 2015 lands with a water demand), will have changes in water demands associated with unpermitted conversion of garages to living spaces, increased numbers of multiple generational households under one roof, and expansion of homes to accommodate more people per household. A study in the Bay Area comparing water consumption between 1996 and 2005 for low density residential sample areas, found an increase in water demands ranging from 6 to 12 percent due increased intensification of existing land uses (EBMUD, 2009).

Repurposing buildings – for example a train station housing retail stores or restaurants – will likely occur throughout the study area as the economy improves. Another trend is that cities are allowing underutilized industrial buildings to accommodate more customer related functions, such as will-call centers or sports activities, resulting in more employees and customers per acre.

The most prominent trend discussed at the land use agency meetings and observed in the analysis of existing land uses, is the overall increased densities of residential land use occurring and planned in the study area. Increased residential densities have the greatest potential for increasing water demands on a per acre basis, although actual demands decrease on a per dwelling unit and per capita basis due to the reduction of outdoor landscaping associated with compact residential growth.



New multi-family construction has higher densities than older buildings.

Compact development is evident in the land use inventory data that shows the majority of land uses are low density residential but the greatest increase in residential land use is associated with very high density residential use. Each community is planning for higher densities and in general, developers are maximizing allowable densities as cities experience frequent general plan amendment requests. Smart growth is a concept typically associated with compact development along and near transportation corridors, and this trend is being observed in the cities' promoting a revitalization of their downtowns and near Metrolink stations.

Another form of intensification is typically found with the development of small infill parcels that are too small, less than five acres, to be identified on the GIS existing land use layer. However, for this analysis, because much of the existing land use data provided in the GIS parcel files needed clarification, it provided an opportunity to specifically identify many of these small vacant lots. They were therefore included with the land use inventory as vacant, instead of being included as another factor to consider in the development of an intensification adjustment factor.

The intensification adjustment factor was determined using economic data developed for the IRP. The impact to water demands associated with strong market conditions alone, were estimated to increase demands by seven percent. A more conservatively lower estimate of six percent by 2040, with an extrapolation from 2015 for interim demands, was applied in the Demand Model.

In the future when individual customer meters are geocoded and consumption data can be linked and saved in the Demand Model GIS, it is recommended that sample areas be analyzed to compare consumption patterns of older development to newer development of similar land use. This historical comparison data will contribute to quantifying part of the intensification adjustment factor.

4.3.4 Conservation

Conservation savings associated with plumbing code changes and water use efficiency programs were determined in IEUA's 2015 Wastewater Facilities Master Plan. Flow monitoring of older residential developments compared with new homes indicated a reduction of indoor flows from an average of 55 gallons per capita per day (GPCD) to 37 GPCD. The proportional share of this indoor reduction on total 2040 residential demands is approximately 2.8 percent. This 2.8 percent at 2040, with an extrapolation from 2015 for interim demands, was used as the conservation adjustment factor and applied to the member agencies' land uses in the Demand Model.

4.3.5 Other

The Demand Model has an additional tab in the adjustment factors to allow the user to conduct demand management or other scenarios. The conservation adjustment factor addresses the indoor plumbing code and other efficiency savings, but the "Other" adjustment factor tab could be used by IEUA or its member agencies to study savings potential associated with conservation program scenarios for different land uses.

4.4 Future Land Use Unit Demands

There are over 2,000 adjustment factors in the Demand Model. Tables with these adjustment factors can be found in Appendix D. The adjustment factors for each member agency, are applied in the Demand Model to the Existing LUDs to generate Future LUDs, for each land use under each planning period and each member agency. Appendix D Land Use Unit Demands, contains tables of the resulting LUDs after they were adjusted. The LUDs are applied in the Demand Model to the acreage inventories for each member agency to calculate the total production water demands.

5 WATER DEMAND PROJECTIONS

Based on the land use GIS layers (existing and future) and the LUDs (existing and future) developed for each member agency, future demands for each land use within each member agency were calculated. This process is summarized in this section along with a discussion of other projection methodologies. Use of the Demand Model is also summarized here with a reference to the User Guide.

5.1 Demand Projections through 2040

Future demands were calculated in the Demand Model by applying the Final LUDs (Appendix D) to the acreage inventories of land use for each member agency's service area. This resulted in a total IEUA demand of approximately 278,040 AF at 2040, a 38 percent increase over 2015 normalized production demands (production demands include system losses). Table 5-1 and Figure 5-1 presents the water demands for the IEUA service area for existing normalized 2015, and projected years 2020, 2025, 2030, 2035, and 2040.

Table 5-1: Demand Projections for IEUA

Land Use (du/ac)	Five Year Incremental Demand Projections (AF)					
	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	15,761	16,753	18,097	18,557	18,778	21,303
Residential Low (3 - 7)	73,060	75,949	80,499	84,647	88,824	94,202
Residential Medium (8 - 14)	16,012	18,376	20,967	24,117	25,806	33,264
Residential High (15 - 24)	18,611	21,212	25,739	27,062	27,752	28,827
Residential Very High (25+)	2,634	2,904	3,300	5,105	6,009	8,292
Commercial	19,607	19,922	20,885	24,281	27,068	29,455
Industrial	6,974	7,601	8,143	8,318	8,436	8,529
Public/Institutional	7,285	7,354	7,627	7,746	8,138	8,257
Parks, Schools, Irrigation	32,890	33,607	33,756	35,988	36,975	38,926
Agriculture	2,274	1,466	1,188	559	309	23
Unique Water User #1	3,848	3,872	3,878	3,903	3,926	3,949
Unique Water User #2	1,487	1,498	1,507	1,515	1,523	1,533
Unique Water User #3	1,068	1,074	1,082	1,088	1,095	1,101
Unique Water User #4	368	371	373	375	377	379
	201,879	**211,959**	**227,041**	**243,261**	**255,016**	**278,040**

On Figure 5-1, total IEUA demands are shown using the shaded area and values read from the right vertical axis. The individual member agency demands are shown using different lines and values are reads from the left vertical axis.

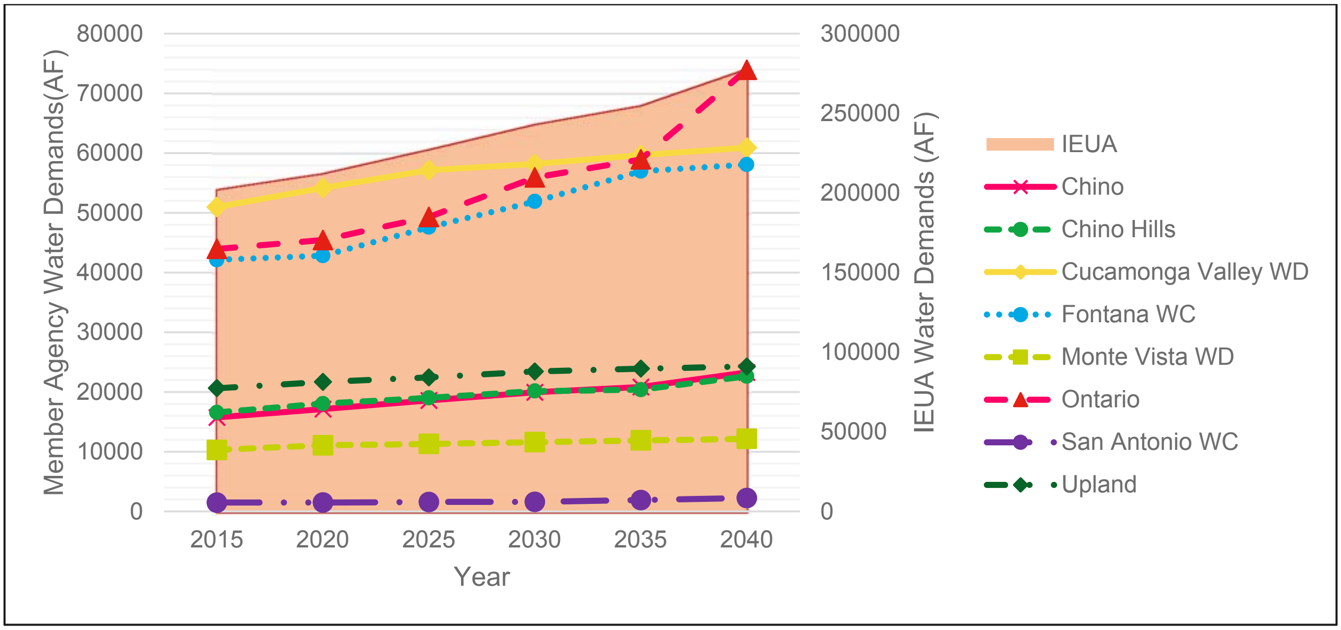


Figure 5-1: Demand Projections by Member Agency

As shown on Figure 5-1, total water demands increase gradually between 2015 and 2035 with a slightly steeper curve between 2035 and 2040. The steeper curve in later years is primarily attributed to the large amounts of residential land uses to be developed in Ontario's New Model Colony. Development this land is anticipated to be at the outer end of the study planning horizon. Appendix E contains tables of the resulting projection of water demands by member agency and combined into a total IEUA demand.

Because the projections do not include active conservation efforts, these projections should be considered an upper end. If the City of Ontario's New Model Colony developments are delayed, its projections will likely extend beyond 2040.

There are many methodologies used to project water demands, ranging from simple per capita projections to complex, data-intensive econometric models. The various methodologies rely on different data and assumptions in trying to project future conditions in a changing environment. The land use based demand projections are typically within approximately 10 percent above and 10 percent below actual demands when smoothed to remove annual climatic influences, assuming nothing significant occurs like a great recession. If something significant occurs, since the demands are based on general plan land uses, the later date projections typically remain while interim demands recover.

Different methods can result in slightly or significantly different projections. Per capita projections are inexpensive and simple to develop because they rely on easily available data. However, they are not rigorous, and do not reflect the complexities of water demand patterns or different community characteristics. Therefore, although the results may be consistent with land use based demands for the first few years, as the land use composition (changing percentage of each land use) and characteristics (e.g., higher densities) change over time to reflect that planned for by the community, the per capita demands do not reflect these changing conditions.

Econometric models can be rigorous if socioeconomic data are available and used, as with the IEUA IRP model. These models are typically more cost effective for large service areas, such as Metropolitan Water

District (MWD) or IEUA as a region, to capture regional demographic, economic, and other (e.g., climate change) characteristics and trends that are not site specific to smaller entities. IEUA's econometric model demand projections were similar to the land use based demand projections. Several of its analytical analyses quantifying demand characteristics, such as passive conservation, economic rebound, and climate change, were of particular value to the Demand Model, as presented in this TM.

In summary, different demand projection methodologies will result in different projections. The more rigorous methodologies typically result in projections within a range of plus 20 percent and minus 20 percent of each other. This may be attributable to the use of underlying source data. The similarity in projections of the land use based Demand Model and the IRP econometric model (within four percent) provides a very high level of confidence to use the results as a reliable predictor for future planning projects.

It is recommended that demand projections be updated every ten years or less. This will ensure that changing community characteristics are captured, and that accurate projections are continually relied on for planning purposes.

5.2 Use of Demand Model

The land use based Demand Model (welcome menu screenshot presented on Figure 5-2) was developed to perform the calculations described in the previous sections. The major inputs to the model included city general plans, parcel data, city boundaries, IEUA retail agency SOIs in GIS format, and LUDs calculated as described in sections 4.3 and 4.4.

The main purpose of the Demand Model was to provide detailed, rigorously developed demand projections for each member agency. The model does that, as well as test various scenarios to study the effects of conservation, for example, through the use of adjustment factors. The resulting projections described in Section 5.1 were developed using the best available data at a point in time.

As the cities and communities in IEUA's service area develop and change over time, the demand projections can be updated based on new data. For example, if new growth areas in the City of Ontario, which has large land areas converting from agricultural uses to urban over an extended period of time, change land use designations to higher densities than now planned, the acreage inventories can be modified through changes to the GIS files. The model would be re-run to determine the effect on the city's or IEUA's overall demand. Another example is with the intensification of the older commercial areas in the IEUA service area; higher densities are being proposed by developers for underutilized and infill sites. The land use categories can be easily modified in the GIS files to reflect these approved changes and the model re-run. The underlying GIS files and LUDs can also be updated if the development timelines assumed in this study change or updated LUDs are calculated by retail agencies. Appendix F contains a User Guide as a reference document to run these scenarios. The Demand Model, created in Microsoft Access, is completely open and customizable if IEUA or its member agencies choose to add more features in the future.

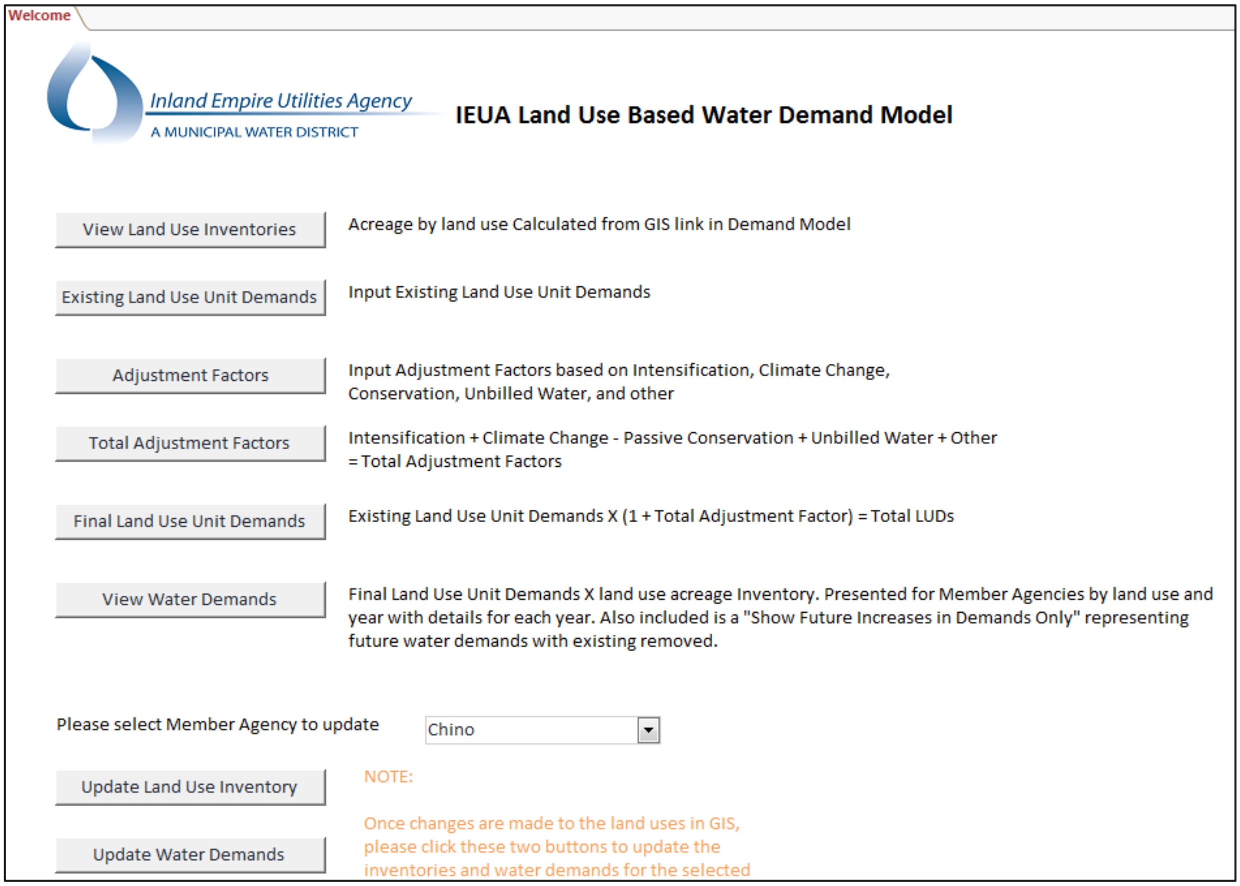


Figure 5-2: Land Use Based Demand Model Screenshot

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APPENDIX A

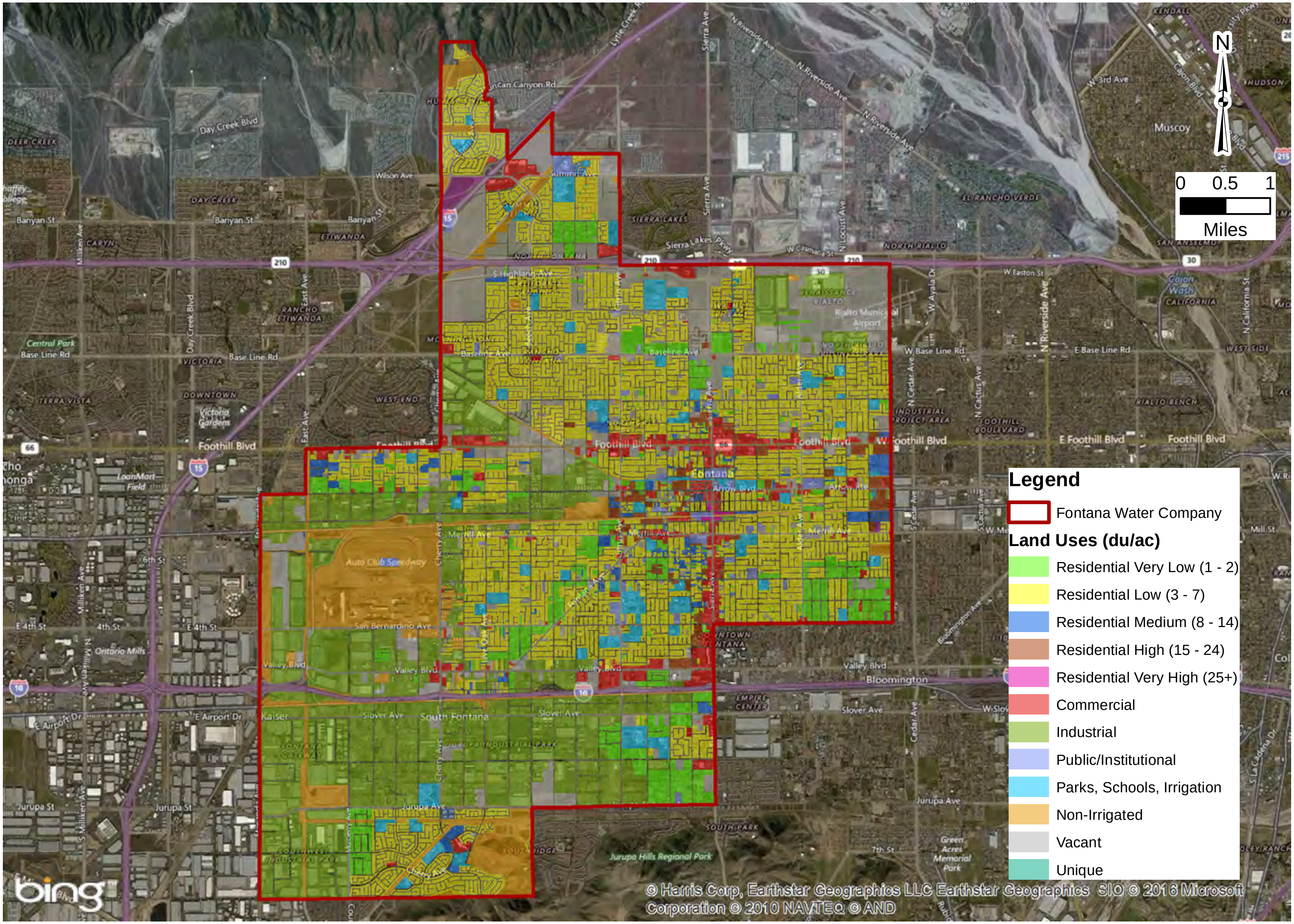
Land Use Categories

Appendix A - Land Use Categories

Master		City of Chino		City of Chino Hills		City of Fontana		City of Montclair		City of Ontario		City of Rancho Cucamonga		City of Rialto		City of Upland	
GP LU Categories	Density (du/ac)	Chino GP Land Uses	Density (du/ac)	Chino Hills GP Land Uses	Density (du/ac)	Fontana GP Land Uses	Density (du/ac)	Montclair GP Land Uses	Density (du/ac)	Ontario GP Land Uses	Density (du/ac)	Rancho Cucamonga GP Land Uses	Density (du/ac)	Rialto GP Land Uses	Density (du/ac)	Upland GP Land Uses	Density (du/ac)
Residential		Agriculture		Agriculture/Ranches	0-0.2							Hillside Residential	0.1-2	Residential 2	0-2	SFR	0-2
Very Low	<1.0-2.0	RD 1	0-1	Rural Residential	up to 2	Residential Estates	2.0	Very Low	0-2	Rural	0-2	Very Low	0.1-2			SFR	2-3
		RD 2	1-2														
Low	3.0-7.0	RD 4.5	3-4.5	Low Density Res	up to 6	Single Family Res	2.1-5					Low	2-4	Residential 6	2.1-6	SFR	3-4
						Residential Planned Community	3-6.4	Low	3-7	Low Density	2.1-5	Low Medium	4-8			SFR	4-6
		RD 8	4.5-8			Medium Density Res SFR detached	5.1-7.6										
Medium	8.0-14.0			Medium Density Res	up to 12	SFR attached or MFR	7.7-12	Medium	8-14	Low-Medium Density	5.1-11	Medium	8-14	Residential 12	6.1-12	SFR	7-10
		RD 12	8-12													MFR / Condo	7-12
		RD 14	12-14													Mobile Home	8-14
High	15.0-24			High Density Res	up to 25	Multi-Family Res	12.1-24	High	15-30	Medium Density	11.1-25	Medium High	14-24	Residential 21	12.1-21	MFR	12-20
		RD 20	14-20					Senior Housing				High	24-30			MFR Condo	12-20
		Mixed Use 20	0-20; 1.25 FAR														
Very High	25.0+	Mixed Use 30	0-30; 1.5 FAR	Very High Density Res	up to 35	MFR Medium/High	24.1-39			High Density	25.1-45			Residential 30	22.1-30		
						MFR High	39.1-50										
Mixed Uses were identified by actual planned uses		College Park Specific Plan The Preserve Specific Plan		Mixed Use	NA	Regional Mixed Use	12-24 du/ac; 0.1-1.0 FAR	Planned Development (i.e., mixed uses)		Mixed Uses: 12 identified areas		Mixed Use: 13 identified areas	0.25-1.0	Downtown Mixed Use	6.1-60 du/ac; 1.5 FAR	Specific Plans: 3 areas	
												Haven Ave Office Overlay		Specific Plan Overlay			
Commercial		Office Commercial	1.0 FAR	Commercial	0.3 FAR	Community Commercial	0.1-1.0 FAR	Medical Center		Hospitality	1.0 FAR	Office	0.4-1.0	Office	0.75	Highway Commercial	
		Neighborhood Commercial	0.3 FAR	Business Park	0.75:1 FAR	General Commercial	0.1-1.0 FAR	Office Professional		Office Commercial	0.75 FAR	Neighborhood Commercial	0.25-0.35	Community Commercial	0.35	Central Trading	
		General Commercial	1.0 FAR					Neighborhood Commercial		Neighborhood Commercial	0.4 FAR	General Commercial	0.25-0.35	General Commercial	0.5	Neighborhood Shopping	
		Regional Commercial	0.6 FAR					General Commercial		General Commercial	0.4 FAR	Community Commercial	0.25-0.35	Business Park	1.0	Commercial Professional	
		Business Park	0.6 FAR					Regional Commercial		Business Park	0.6 FAR					Office Only	
		Service Commercial	0.6 FAR					Business Park								Transit Commercial	
																Regional Commercial	
																Neighborhood Business - Specialty	
																Neighborhood Conservation	
																Mixed Use: Commercial/Industrial	
Industrial		Light Industrial	0.6 FAR			Light Industrial	0.1-0.6 FAR	Industrial Park		Industrial	0.55 FAR	Industrial Park	0.4-0.6	Light Industrial	1.0	Light Industrial	
		General Industrial	0.6 FAR			General Industrial	0.1-0.6 FAR	Limited Manufacturing		Airport		General Industrial	0.5-0.6	General Industrial	1.0	Industrial/Loft Mixed	
												Heavy Industrial	0.4-0.5			Neighborhood Industrial	
																Cable Airport	
																Light Industrial/Neighborhood	
Public/ Institutional		Public		Institutional/Public	0.5:1	Public Facilities	0.1 FAR	Public/Quasi Public		Public Facility		Civic/Regional	0.4-1.0	Public Facility	1.0		
				Commercial Recreation	0.10:1	Activity Center Overlay	7.1-24 du/ac; 0.1-1.0 FAR	Community Plan (unincorporated Narod Tract and Kadota Homes Tract)								Public/Gvnt: civic center, schools, public works, hospital, etc.	
Parks, Schools, Irrigation		Public Schools		Public Park		Recreational Facilities	0.1 FAR	Neighborhood Park		Public School		Schools	0.1-0.2	School Facility		Park	
				Private Open Space (HOAs etc)						Open Space - park land		Parks		Open Space Recreation			
										Open Space - NonRecreation							
Non-Irrigated Open Space		Recreation/Open Space		CH State Park		Open Space		Conservation Basins		Open Space - Water		Open Space		Open Space Resources		Open Space	
		Urban Reserve		Public Open Space		Public Utility Corridors				Rail		Conservation				Flood Control	
										Landfill		Flood Control/Utility Corridor				Reservoir	
Agriculture		Agriculture														Edison Easement	
																Landfill closed	

APPENDIX B

Land Use Maps



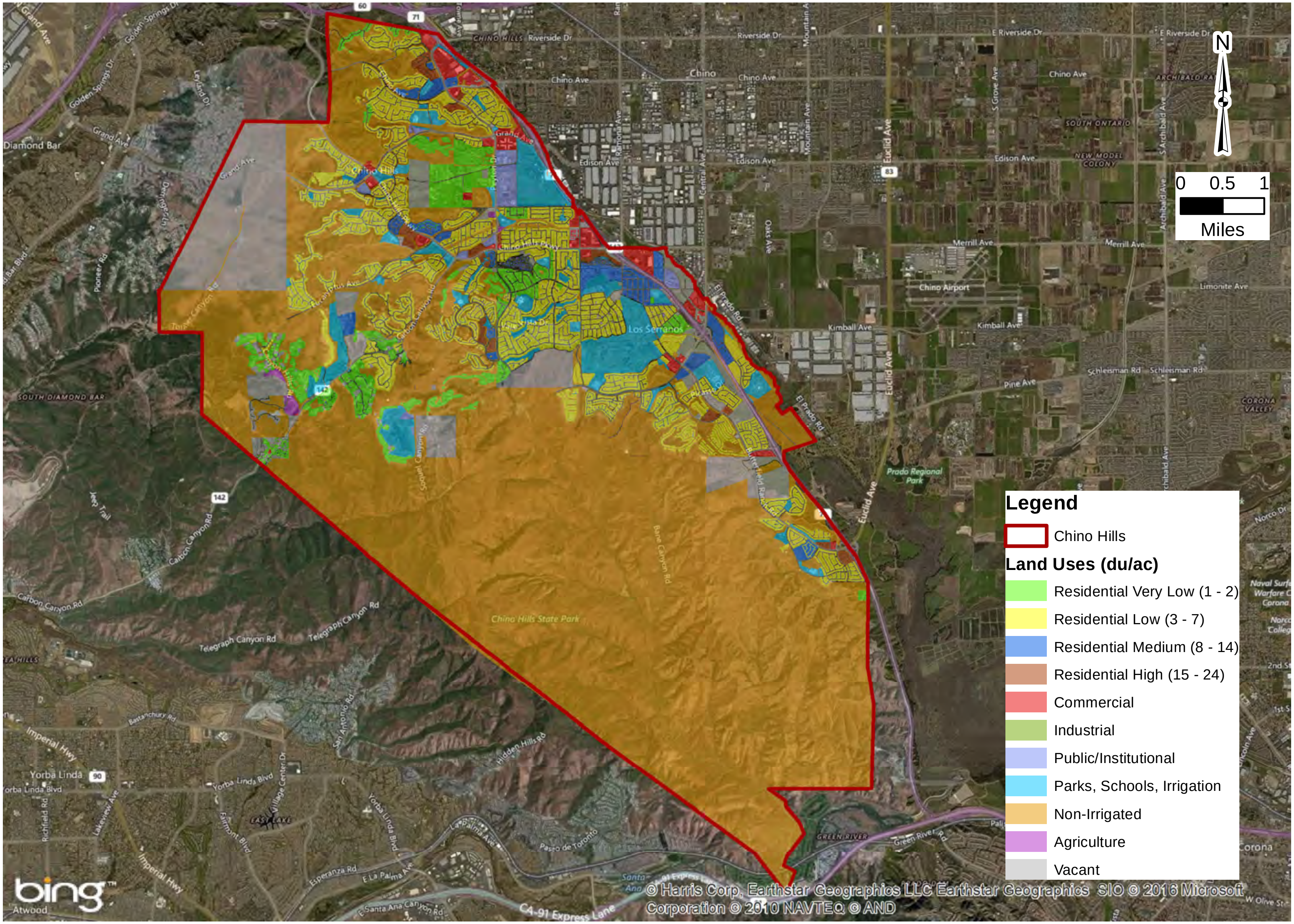
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Fontana Water Company – Existing Land Use

ARCADIS

May 2016
FIGURE B-1



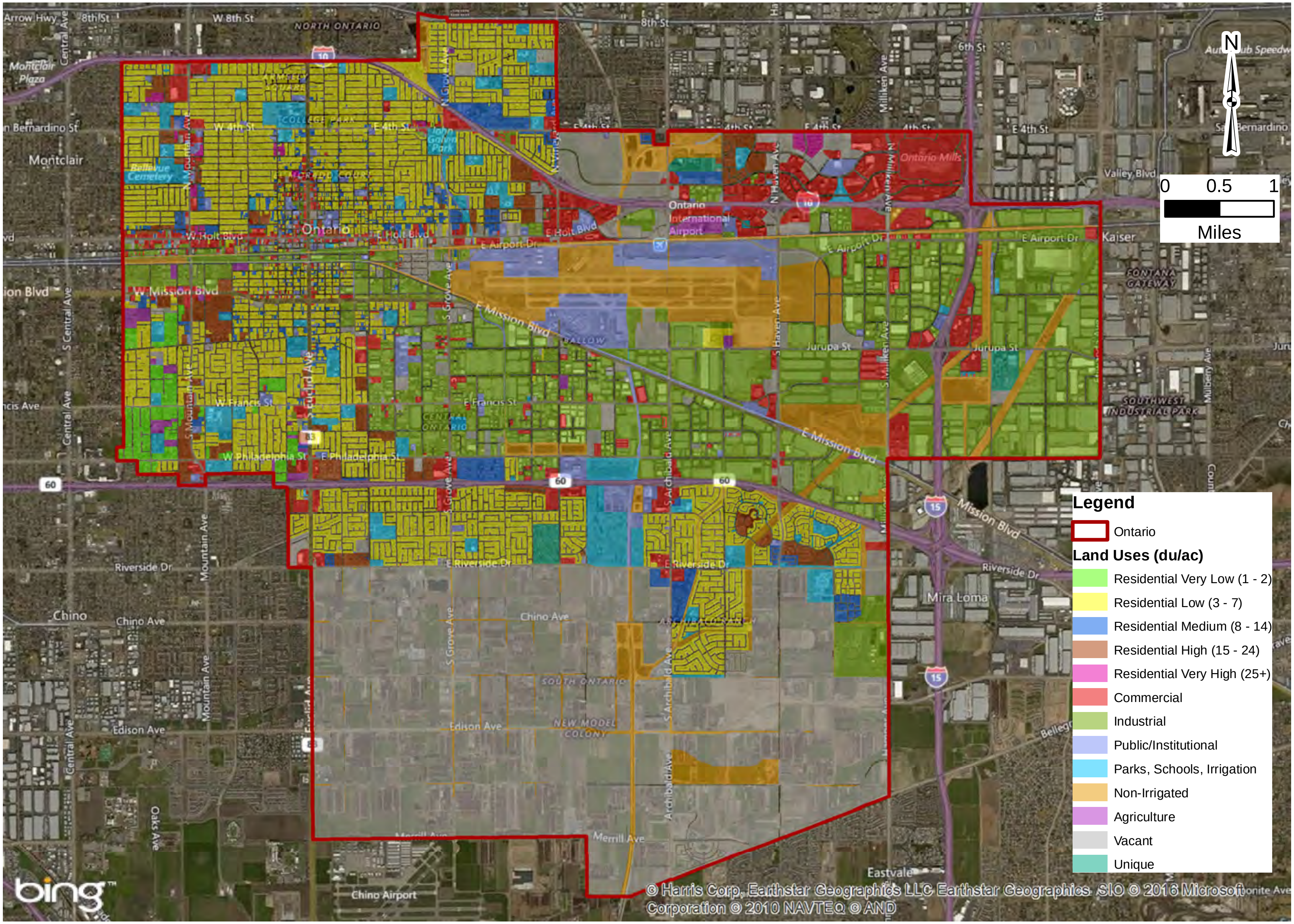
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Chino Hills – Existing Land Use

ARCADIS

May 2016
FIGURE B-2



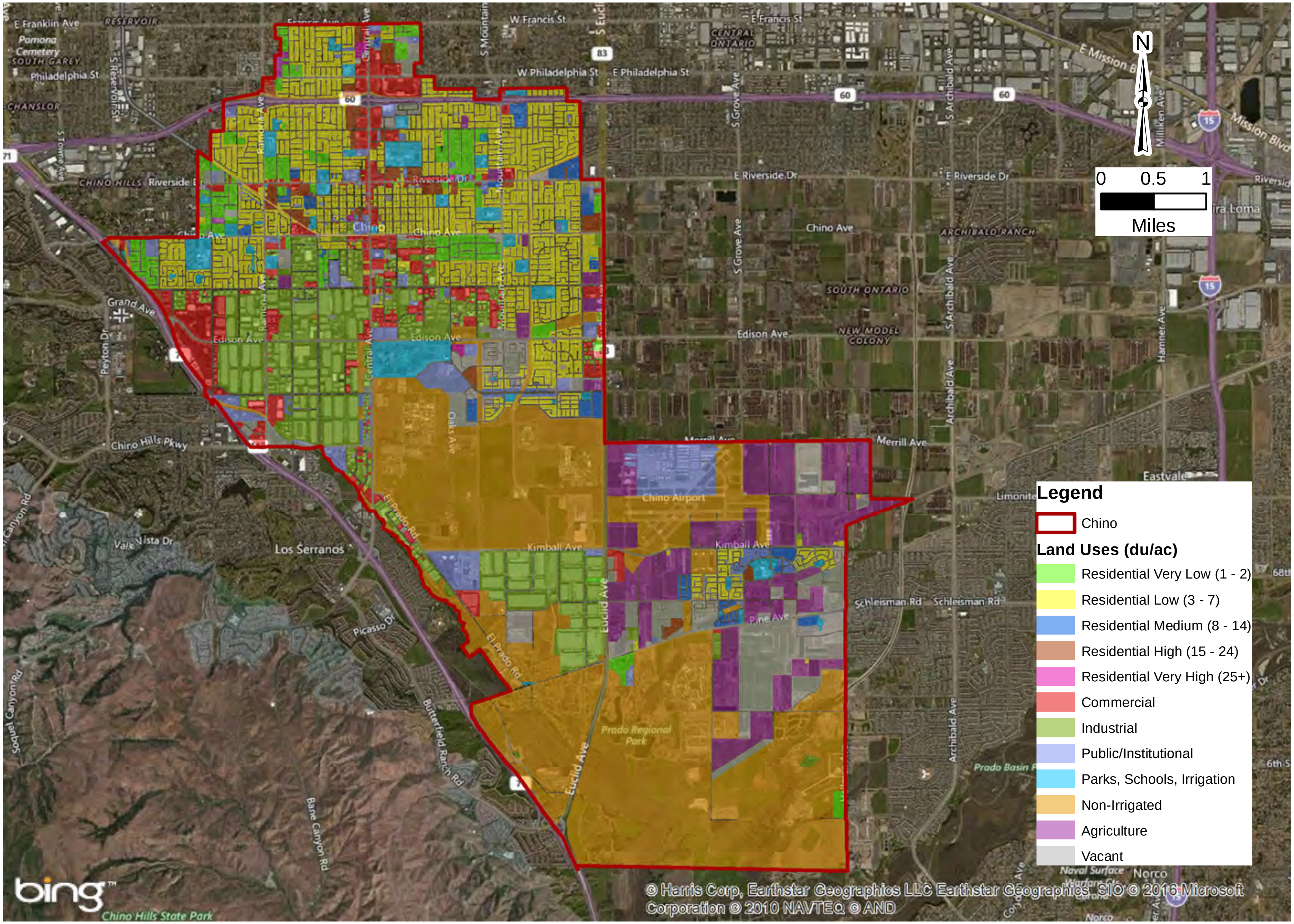
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Ontario – Existing Land Use

ARCADIS

May 2016
FIGURE B-3



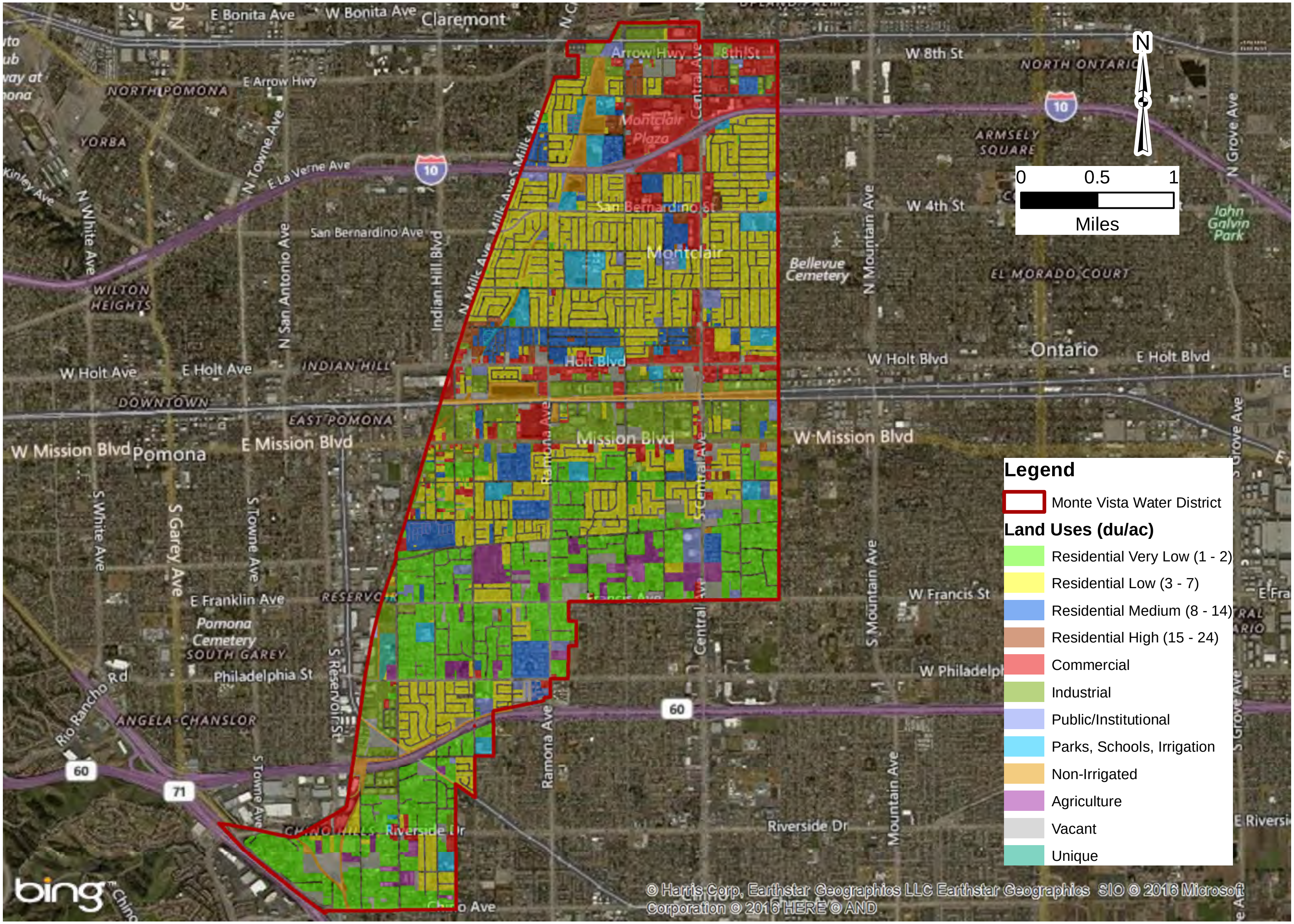
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Chino – Existing Land Use

ARCADIS

May 2016
FIGURE B-4



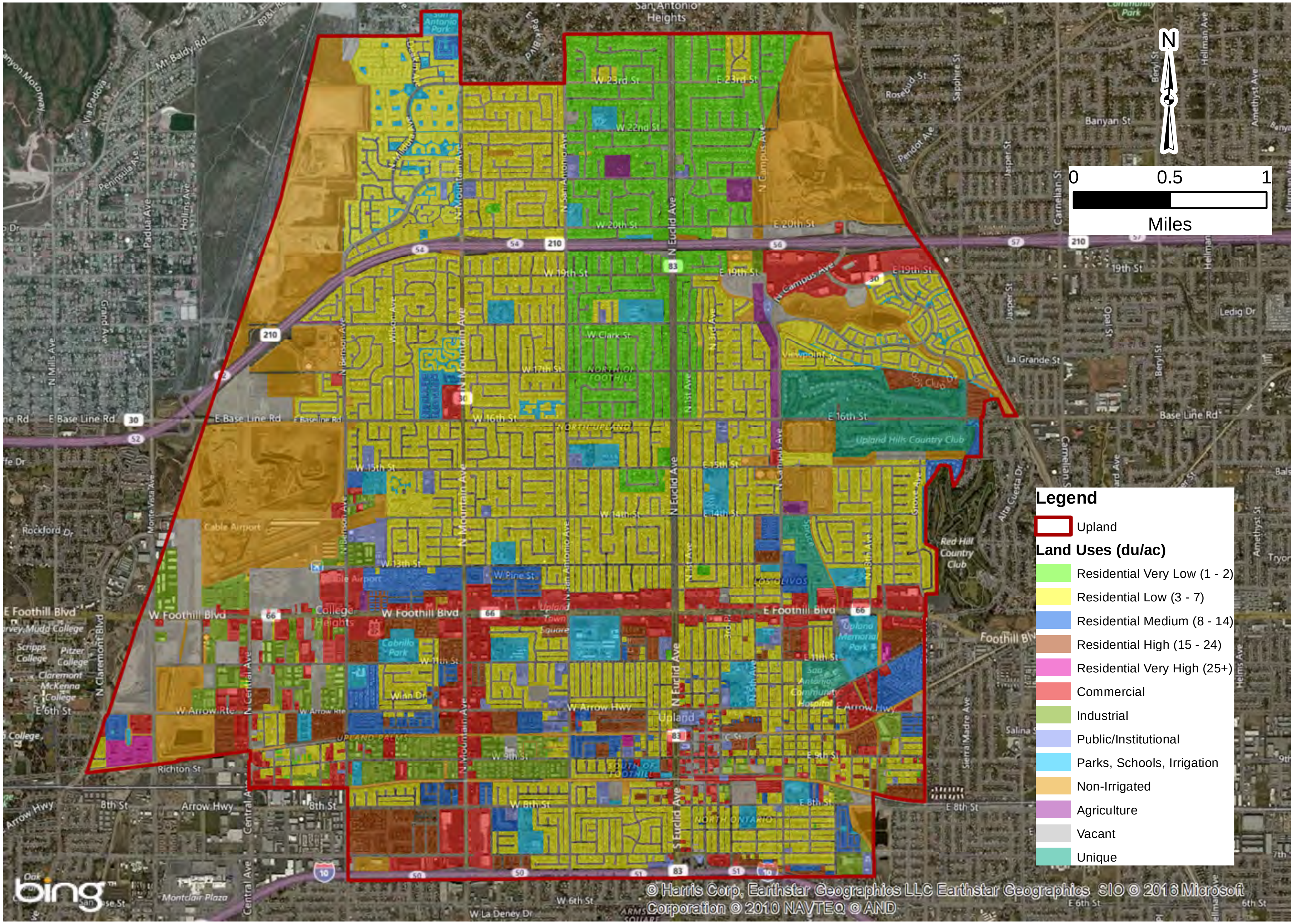
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Monte Vista Water District – Existing Land Use

ARCADIS

May 2016
FIGURE B-5



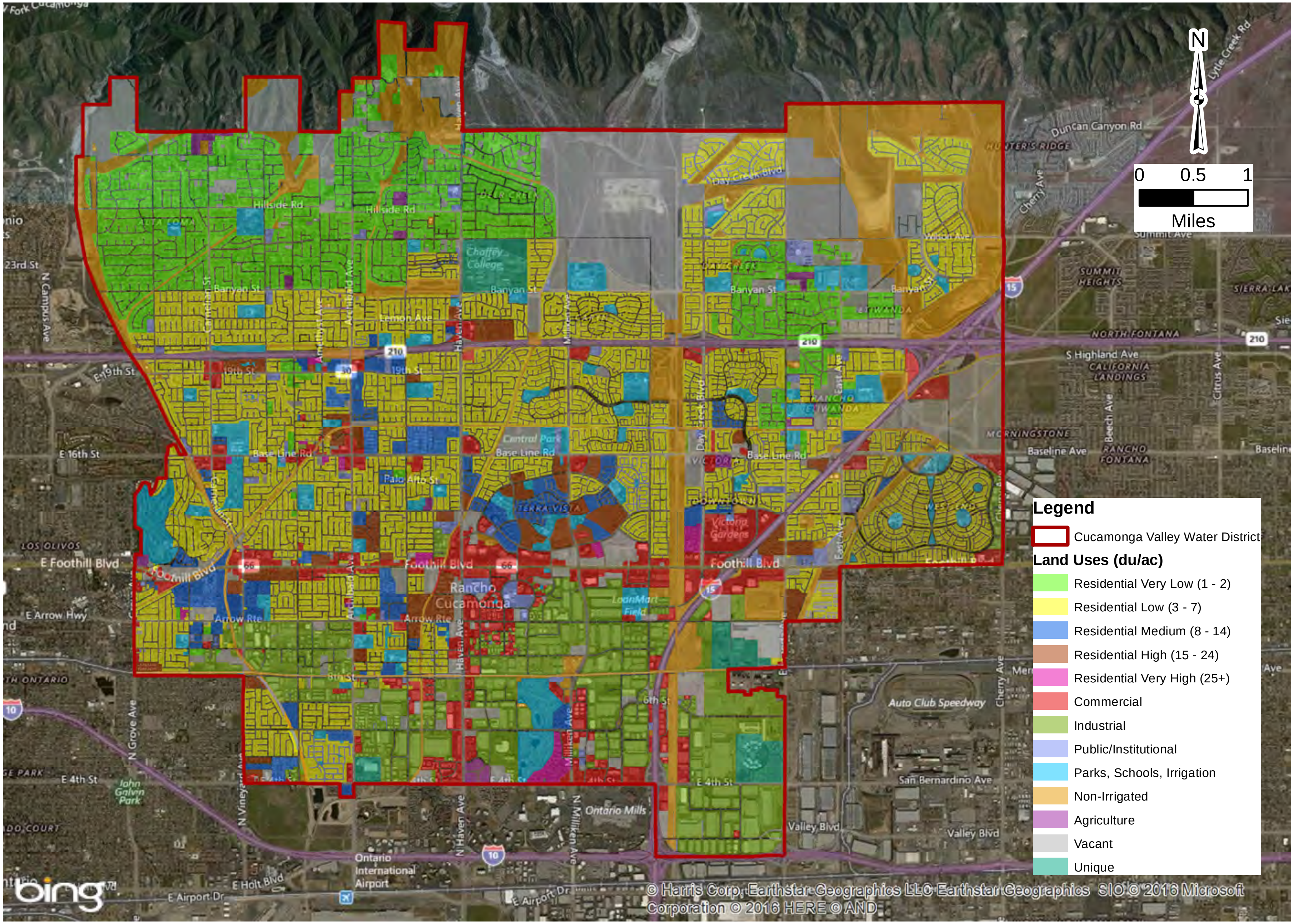
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Upland – Existing Land Use

ARCADIS

May 2016
FIGURE B-6



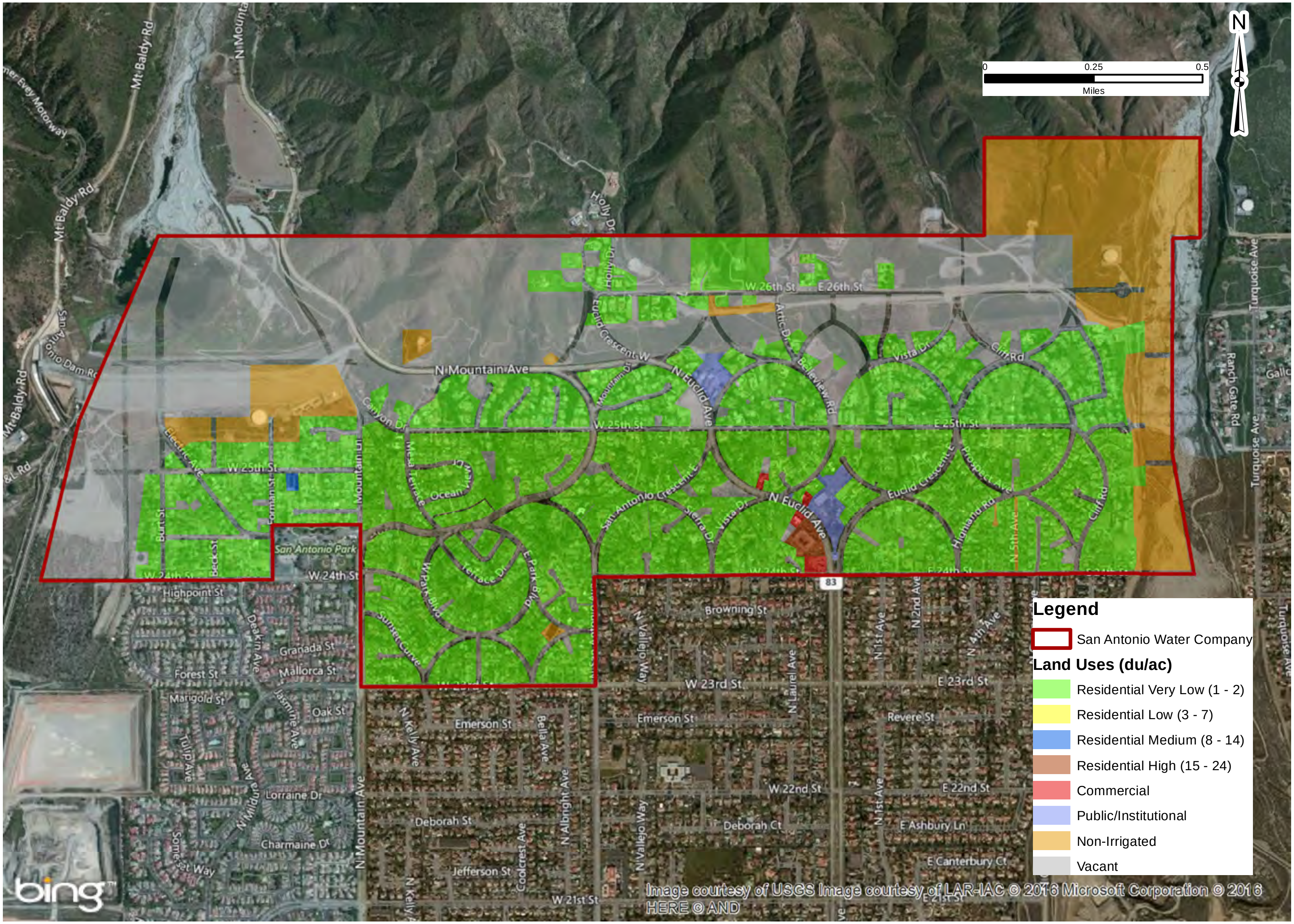
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Cucamonga Valley Water District – Existing Land Use

ARCADIS

May 2016
FIGURE B-7



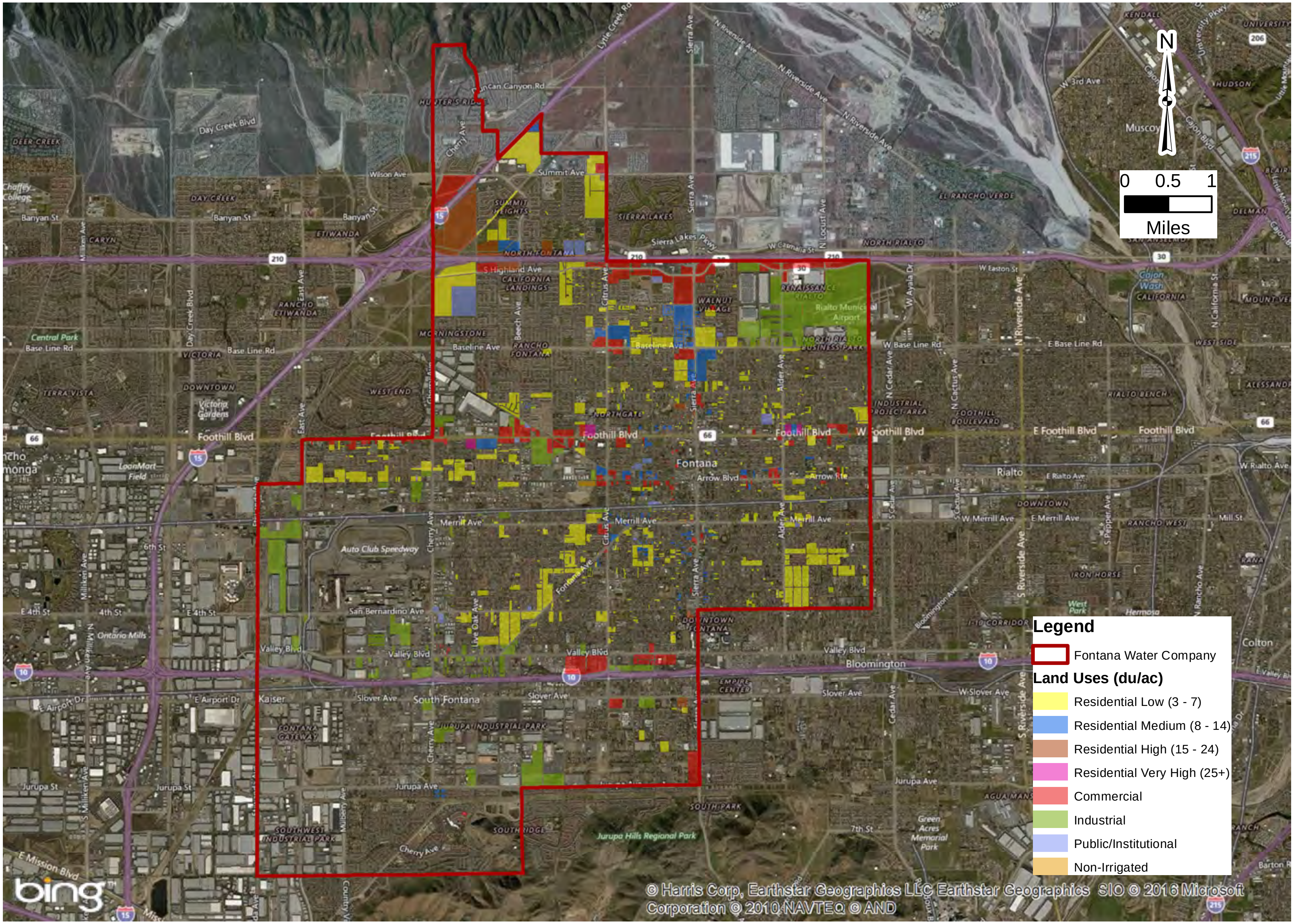
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

San Antonio Water Company – Existing Land Use

ARCADIS

May 2016
FIGURE B-8



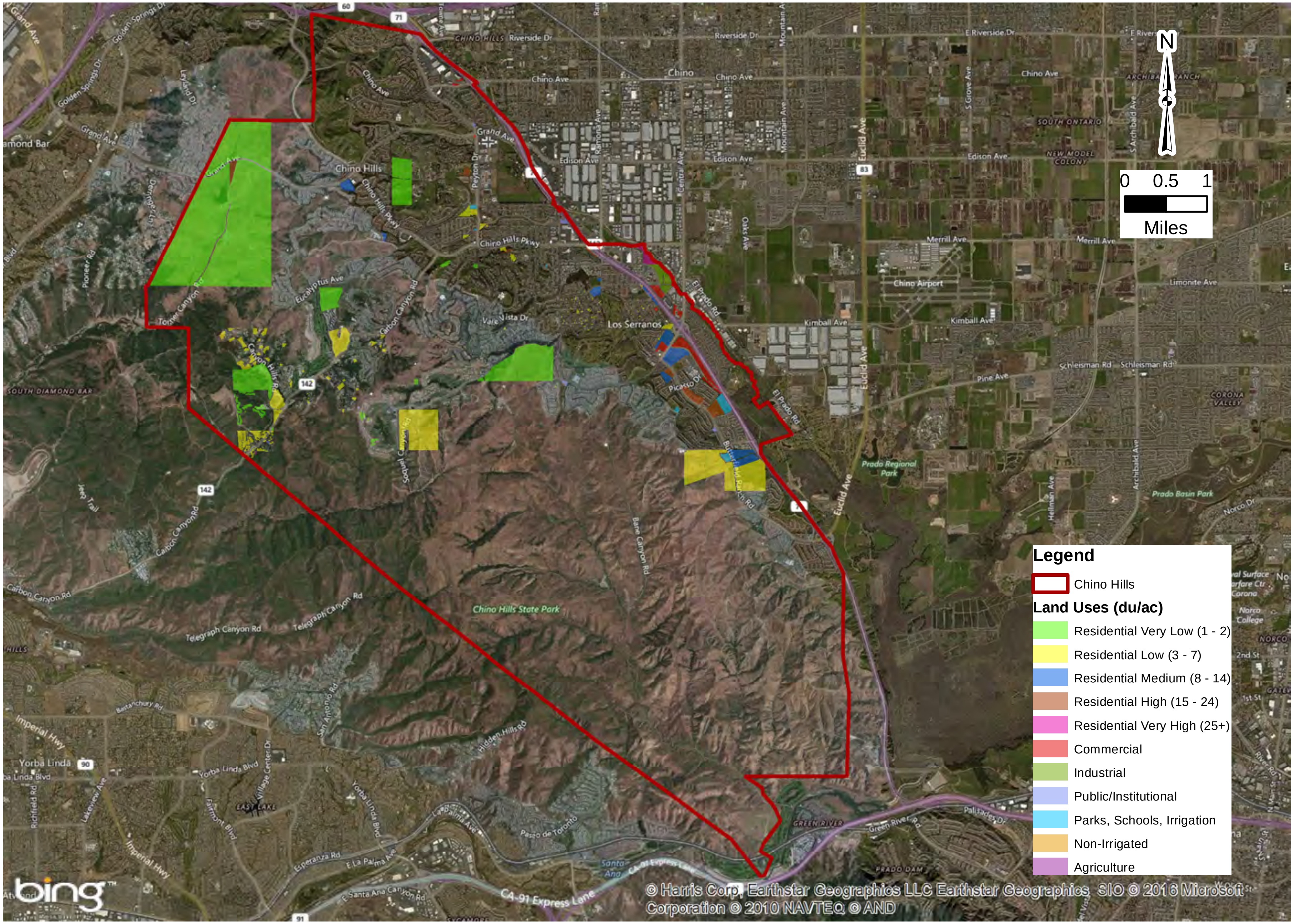
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Fontana Water Company – Future Land Use

ARCADIS

May 2016
FIGURE B-9



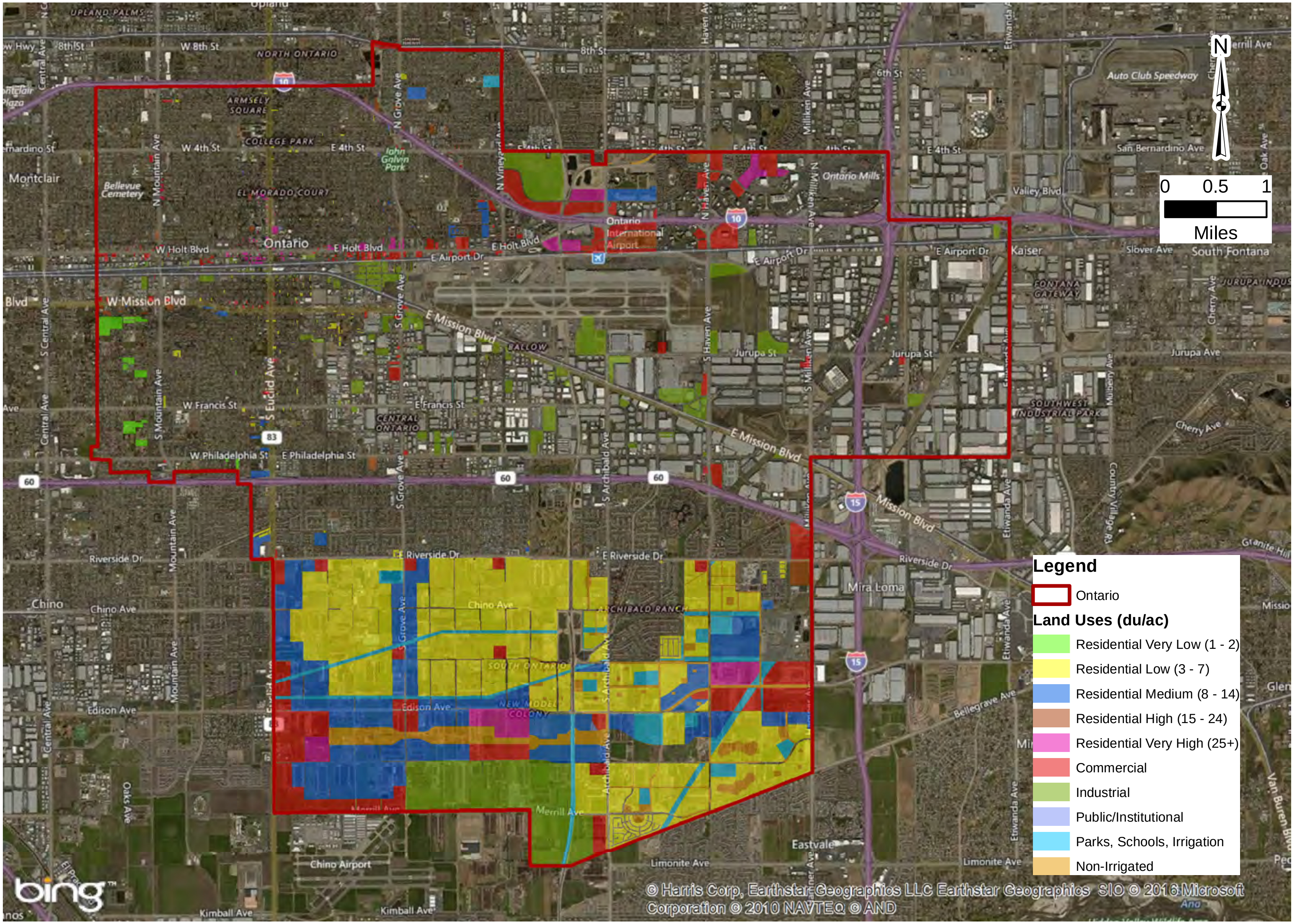
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Chino Hills – Future Land Use

ARCADIS

May 2016
FIGURE B-10



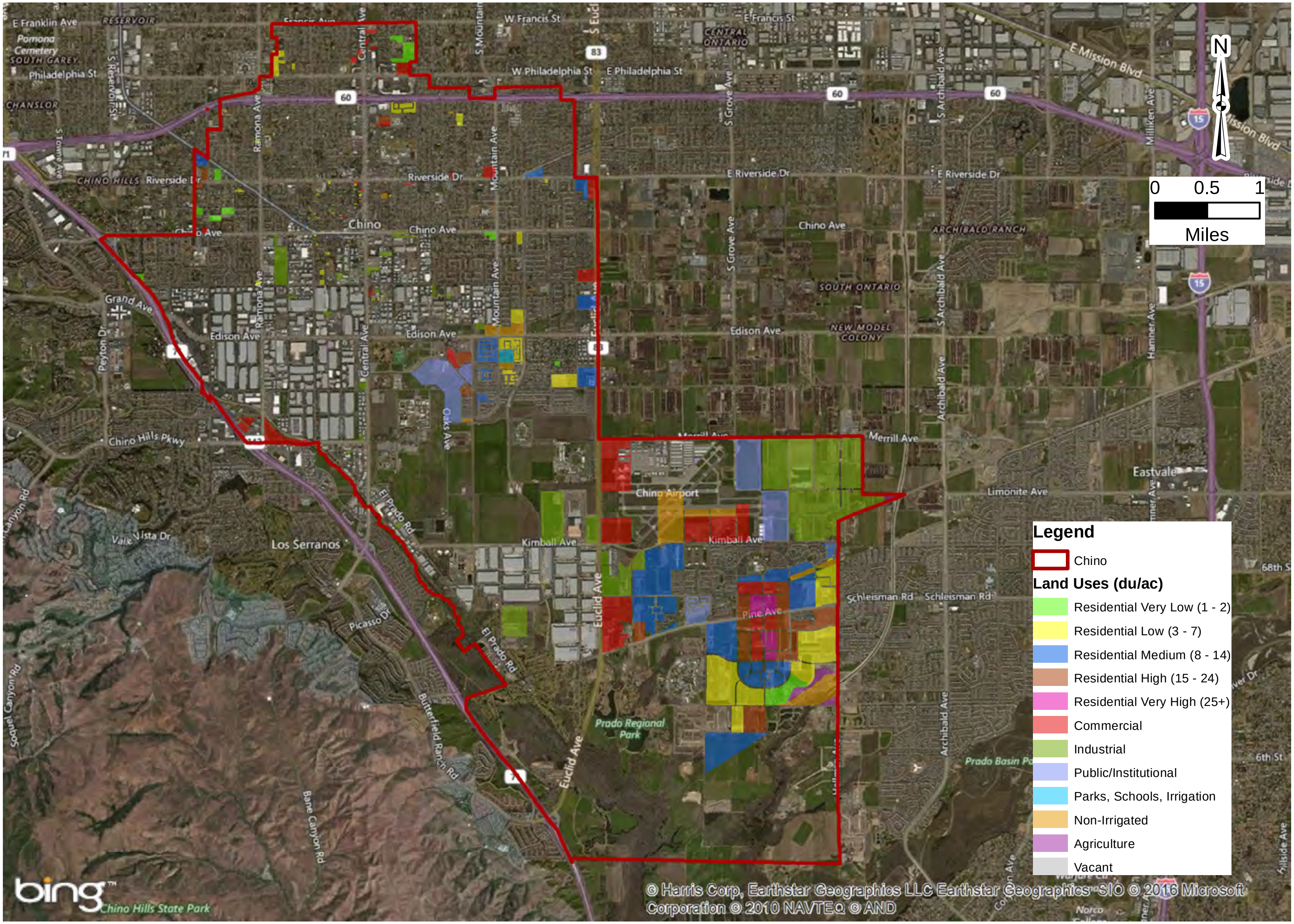
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Ontario – Future Land Use

ARCADIS

May 2016
FIGURE B-11



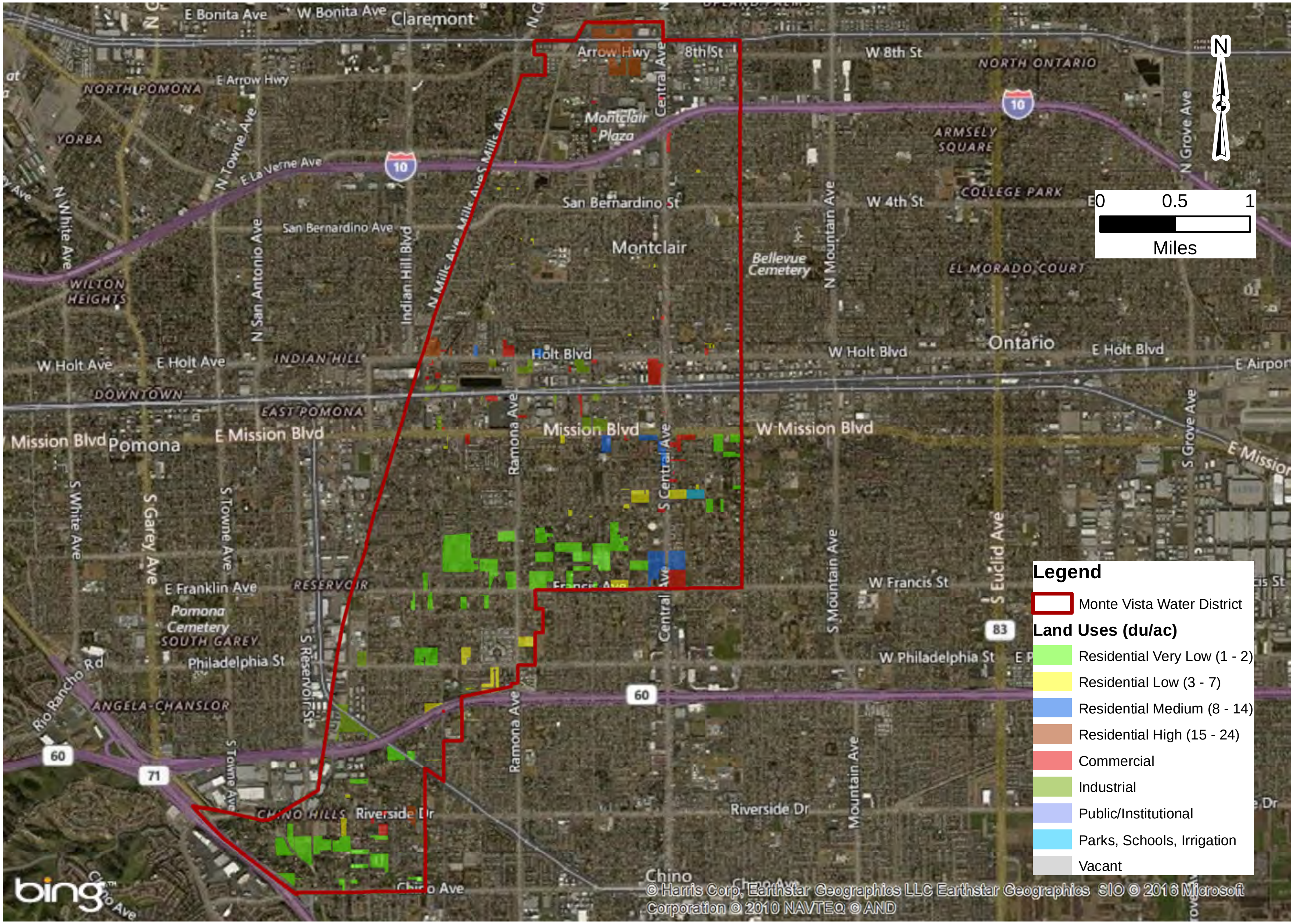
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Chino – Future Land Use

ARCADIS

May 2016
FIGURE B-12



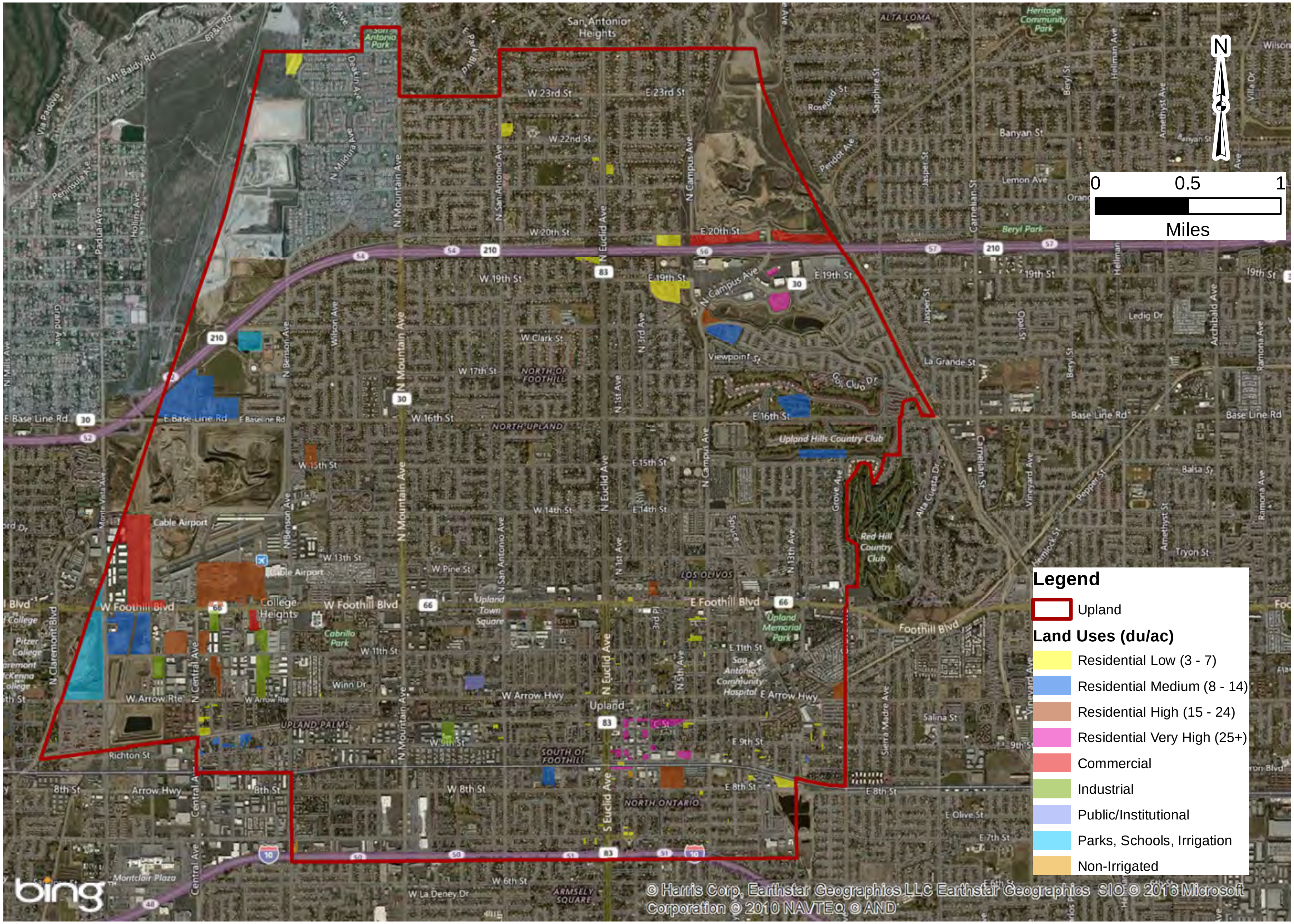
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Monte Vista Water District – Future Land Use

ARCADIS

May 2016
FIGURE B-13



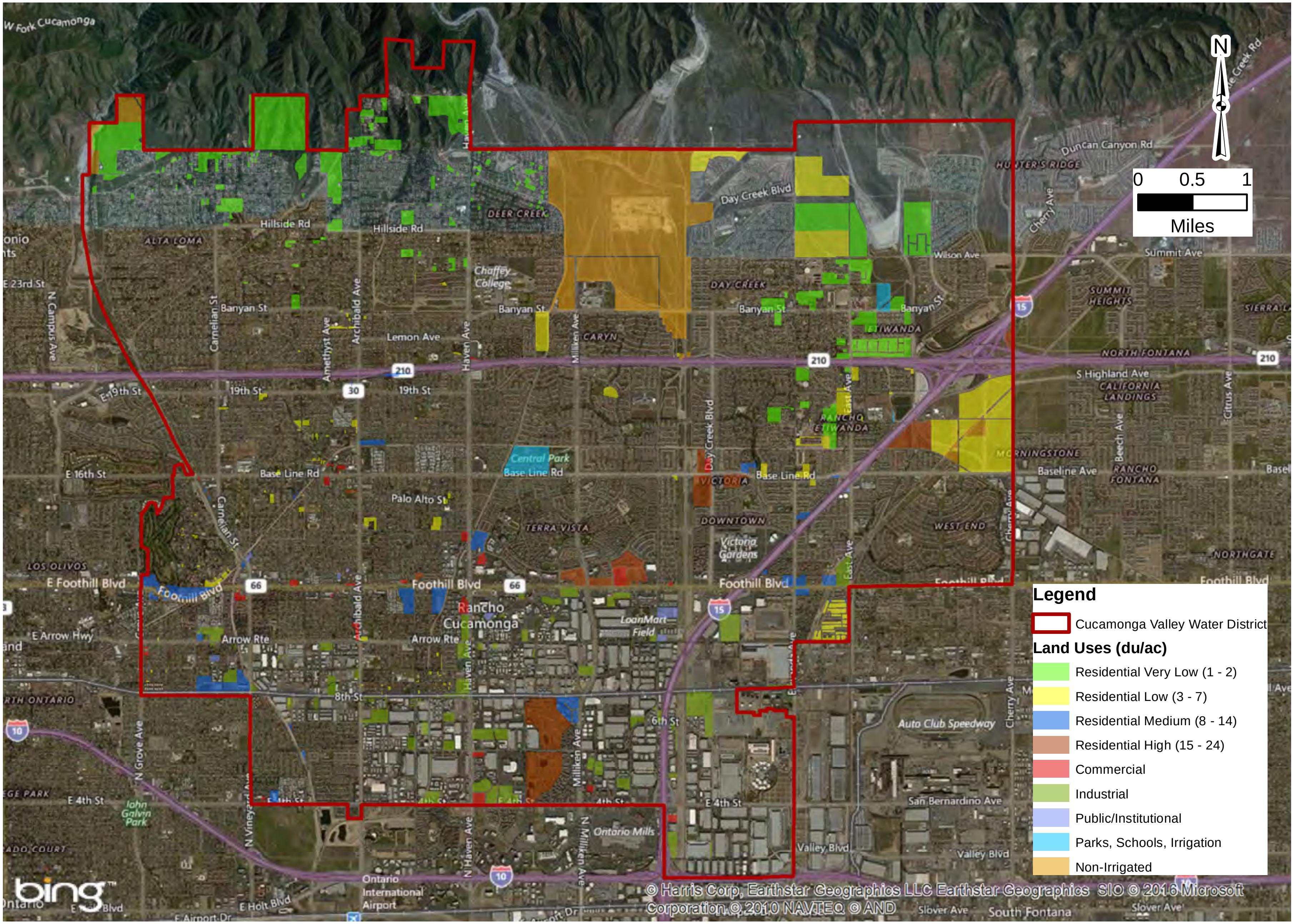
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Upland – Future Land Use

ARCADIS

May 2016
FIGURE B-14



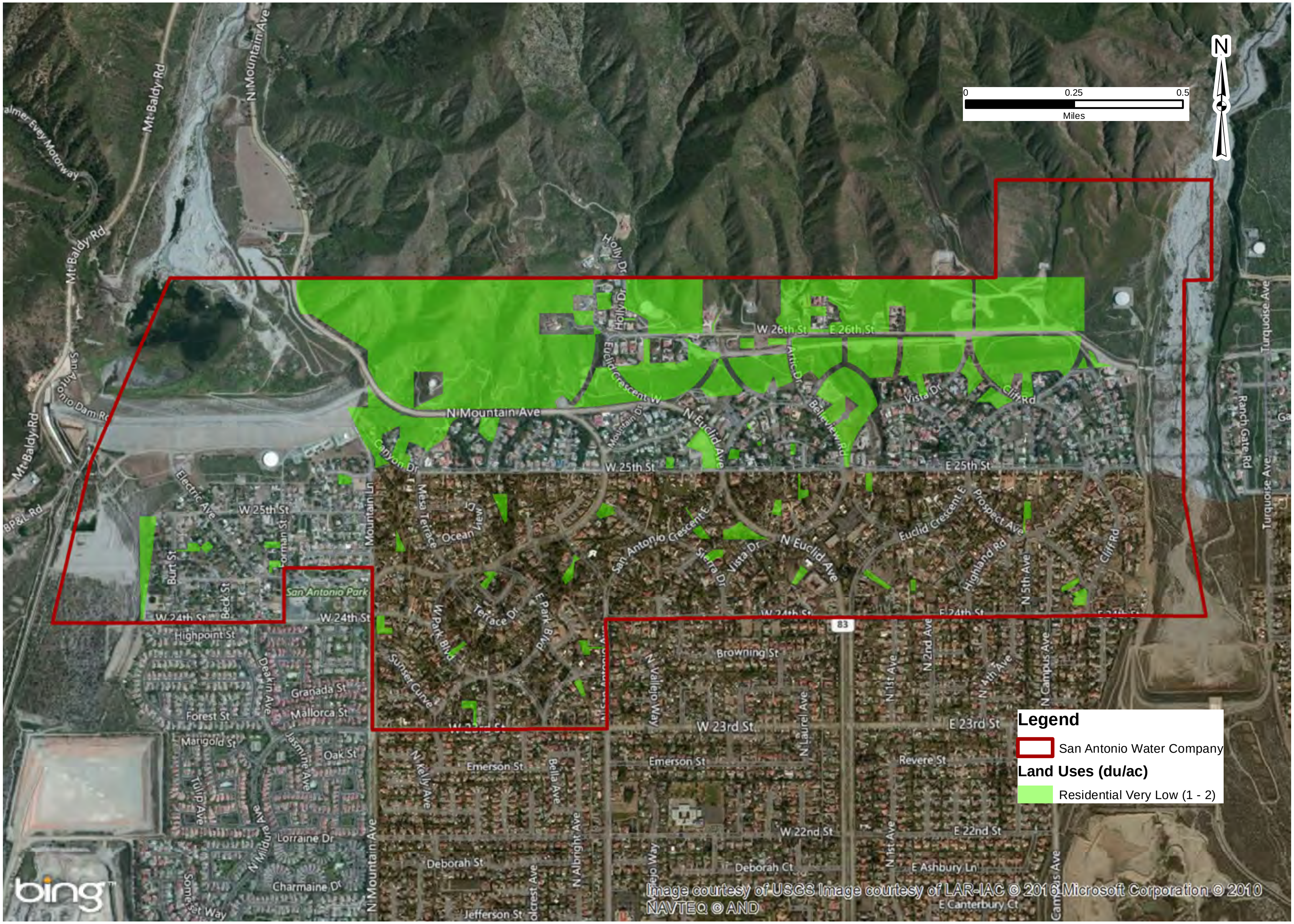
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

Cucamonga Valley Water District – Future Land Use

ARCADIS

May 2016
FIGURE B-15



Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

INLAND EMPIRE UTILITIES AGENCY, CALIFORNIA
DEMAND MODEL

San Antonio Water Company – Future Land Use

ARCADIS

May 2016
FIGURE B-16

APPENDIX C

Acreage Inventories

Appendix C - Member Agency Acreages

CHINO Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	533	526	526	530	569	605
Residential Low (3 - 7)	2234	2286	2337	2365	2471	2602
Residential Medium (8 - 14)	204	312	528	631	636	754
Residential High (15 - 24)	205	267	267	315	321	411
Residential Very High (25+)	18	18	18	18	18	67
Commercial	894	923	953	1183	1195	1352
Industrial	2062	2611	2728	2746	2759	2771
Public/Institutional	793	806	806	806	959	1002
Parks, Schools, Irrigation	499	509	509	509	509	509
Agriculture	1497	1069	821	448	255	4
Unique Water User #1	1	1	1	1	1	1
Unique Water User #2	1	1	1	1	1	1
Unique Water User #3	1	1	1	1	1	1
Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	6124	6096	6131	6132	6136	6137
Undefined	-	-	-	-	-	-
Vacant	1156	796	595	538	390	5
Total	**16,222**	**16,222**	**16,222**	**16,224**	**16,221**	**16,222**

CHINO HILLS Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	1034	1057	1411	1464	1464	2740
Residential Low (3 - 7)	2761	2973	3009	3290	3290	3290
Residential Medium (8 - 14)	413	479	480	488	488	494
Residential High (15 - 24)	174	210	215	219	219	228
Residential Very High (25+)	0	15	15	15	15	15
Commercial	369	387	420	430	430	430
Industrial	1	29	29	29	29	29
Public/Institutional	170	161	161	170	170	170
Parks, Schools, Irrigation	1277	1298	1298	1303	1303	1303
Agriculture	38	38	25	1	1	1
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	18311	18294	18294	18294	18294	18294
Undefined	-	-	-	-	-	-
Vacant	2454	2059	1644	1300	1300	8
Total	**27,002**	**27,000**	**27,001**	**27,003**	**27,003**	**27,002**

Appendix C - Member Agency Acreages

CUCAMONGA VALLEY WATER DISTRICT Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	3206	3596	3895	4011	4178	4204
Residential Low (3 - 7)	6224	6481	6804	6827	6872	6876
Residential Medium (8 - 14)	869	928	1031	1031	1075	1076
Residential High (15 - 24)	652	745	959	975	975	988
Residential Very High (25+)	113	113	113	113	113	113
Commercial	1592	1611	1638	1643	1650	1651
Industrial	2675	2849	2984	3010	3011	3013
Public/Institutional	471	489	476	477	478	479
Parks, Schools, Irrigation	1326	1326	1165	1165	1185	1246
Agriculture	123	111	52	41	13	0
Unique Water User #1	120	120	120	120	120	120
Unique Water User #2	190	190	190	190	190	190
Unique Water User #3	36	36	36	36	36	36
Unique Water User #4	95	95	95	95	95	95
Non-Irrigated	3323	3312	4460	4517	4517	4517
Undefined	0	0	0	0	0	0
Vacant	3688	2703	687	452	196	100
Total	**24,703**	**24,705**	**24,705**	**24,703**	**24,704**	**24,704**

FONTANA WATER COMPANY Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	1534	1534	1492	1275	761	633
Residential Low (3 - 7)	6379	6392	6700	7051	7682	7823
Residential Medium (8 - 14)	360	360	390	578	624	624
Residential High (15 - 24)	320	320	519	524	544	544
Residential Very High (25+)	13	13	13	23	42	42
Commercial	930	934	973	1214	1524	1564
Industrial	5734	6306	6645	6708	6767	6806
Public/Institutional	231	231	317	335	362	362
Parks, Schools, Irrigation	861	861	861	861	861	861
Agriculture	65	65	65	7	7	7
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	2370	2370	2371	2379	2379	2379
Undefined						
Vacant	2870	2280	1320	711	113	21
Total	**21,667**	**21,666**	**21,666**	**21,666**	**21,666**	**21,666**

Appendix C - Member Agency Acreages

MONTE VISTA WATER DISTRICT Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	1122	1122	1122	1251	1277	1345
Residential Low (3 - 7)	1388	1402	1403	1416	1428	1431
Residential Medium (8 - 14)	328	342	365	365	365	365
Residential High (15 - 24)	63	115	115	115	115	119
Residential Very High (25+)	-	-	-	-	-	-
Commercial	589	598	598	600	620	628
Industrial	528	516	516	520	541	543
Public/Institutional	127	128	128	129	137	137
Parks, Schools, Irrigation	223	223	223	223	228	228
Agriculture	167	167	146	46	27	0
Unique Water User #1	16	16	16	16	16	16
Unique Water User #2	1	1	1	1	1	1
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	195	195	195	195	195	195
Undefined					0	0
Vacant	261	184	180	132	58	0
Total	**5,008**	**5,009**	**5,008**	**5,009**	**5,008**	**5,008**

ONTARIO Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	271	280	293	334	334	335
Residential Low (3 - 7)	4532	4743	5397	5925	6215	7725
Residential Medium (8 - 14)	586	694	754	918	1060	2183
Residential High (15 - 24)	611	666	698	699	708	720
Residential Very High (25+)	62	66	93	200	239	364
Commercial	1777	1776	1888	2273	2337	2896
Industrial	5647	5939	6617	6774	6846	6904
Public/Institutional	1054	1047	1049	1050	1050	1050
Parks, Schools, Irrigation	1041	1068	1144	1371	1420	1550
Agriculture	139	86	70	33	18	1
Ontario Unique Water User #1	54	54	54	54	54	54
Ontario Unique Water User #2	35	35	35	35	35	35
Ontario Unique Water User #3	55	55	55	55	55	55
Ontario Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	2498	2526	2609	2708	2773	2953
Undefined	-	-	-	-	-	-
Vacant	8479	7806	6085	4413	3698	16
Total	**26,841**	**26,841**	**26,841**	**26,842**	**26,842**	**26,841**

Appendix C - Member Agency Acreages

SAN ANTONIO WATER CO Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	603	603	631	631	745	874
Residential Low (3 - 7)	0	0	0	0	0	0
Residential Medium (8 - 14)	1	1	1	1	1	1
Residential High (15 - 24)	3	3	3	3	3	3
Residential Very High (25+)	-	-	-	-	-	-
Commercial	3	3	3	3	3	3
Industrial	-	-	-	-	-	-
Public/Institutional	10	10	10	10	10	10
Parks, Schools, Irrigation	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-
Non-Irrigated	167	167	167	167	167	167
Undefined	0					
Vacant	414	414	385	385	272	143
Total	**1,201**	**1,201**	**1,200**	**1,200**	**1,201**	**1,201**

UPLAND Acreage

LAND USE	2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)	786	786	786	786	786	786
Residential Low (3 - 7)	2811	2813	2813	2817	2846	2846
Residential Medium (8 - 14)	306	384	410	414	414	418
Residential High (15 - 24)	319	351	354	413	413	413
Residential Very High (25+)	26	32	32	39	39	46
Commercial	685	693	706	706	755	755
Industrial	327	337	337	353	353	353
Public/Institutional	124	119	119	119	124	124
Parks, Schools, Irrigation	401	401	457	457	457	457
Agriculture	55	55	55	55	55	55
Unique Water User #1	200	200	189	189	189	189
Unique Water User #2	1	1	1	1	1	1
Unique Water User #3	25	25	25	25	25	25
Unique Water User #4	33	33	33	33	33	33
Non-Irrigated	1457	1457	1448	1449	1450	1450
Undefined	-	-	-	-	-	-
Vacant	401	269	192	100	16	5
Total	**7,957**	**7,956**	**7,957**	**7,956**	**7,956**	**7,956**

APPENDIX D

Land Use Unit Demands

Appendix D - Land Use Unit Demands (af/ac/yr)

	Chino*	Chino Hills	CVWD	FWC	MVWD	Ontario	SAWCO	Upland*
Residential Very Low (1 - 2)	1.73	1.40	1.85	1.25	1.27	1.20	2.34	1.90
Residential Low (3 - 7)	2.60	2.47	2.88	2.75	2.11	2.12	0.00	2.84
Residential Medium (8 - 14)	4.36	4.10	4.57	6.70	4.67	5.27	4.95	4.95
Residential High (15 - 24)	4.78	4.28	6.07	11.55	9.86	7.60	6.36	8.95
Residential Very High (25+)	6.88	6.88	8.81	15.66	0.00	13.20	0.00	13.96
Commercial	1.31	3.34	1.38	6.54	2.13	2.82	2.20	2.13
Industrial	0.22	1.07	0.51	0.33	0.65	0.38	0.00	1.07
Public/Institutional	1.31	1.17	2.73	2.73	2.39	2.82	2.20	3.52
Parks, Schools, Irrigation	4.99	3.11	6.88	4.99	4.72	7.48	0.00	5.87
Agriculture	0.00	0.00	0.28	0.00	0.34	15.08	0.00	0.00
Unique Water Users #1	299.01		3.62	0.00	5.59	47.57		1.33
Unique Water Users #2	186.62		1.47		43.49	18.81		242.43
Unique Water Users #3	81.60		7.43			10.07		4.57
Unique Water Users #4			2.58					3.08

Notes:

Used Upland Medium for SAWCO Medium density residential (4.95 af/ac/yr)

Avg Public/Institutional from 4 agencies applied to FWC and CVWD (2.73 af/ac/yr)

Highest Industrial LUD used for Chino Hills due to lack of warehousing and distribution uses (1.07 af/ac/yr)

Used Chino VH for future Chino Hills VH density residential (6.88 af/ac/yr)

*Chino Unique users and 1 Upland Unique are not located; 1 acre was used with full water demands.

	Final LUDS (af/ac/yr)					
CHINO	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.89	1.91	1.93	1.95	1.97	1.99
Residential Low (3 - 7)	2.83	2.87	2.90	2.93	2.96	3.00
Residential Medium (8 - 14)	4.75	4.81	4.86	4.91	4.97	5.02
Residential High (15 - 24)	5.21	5.27	5.33	5.39	5.45	5.51
Residential Very High (25+)	7.50	7.54	7.59	7.63	7.68	7.72
Commercial	1.43	1.44	1.44	1.45	1.46	1.47
Industrial	0.24	0.24	0.24	0.24	0.25	0.25
Public/Institutional	1.43	1.44	1.44	1.45	1.46	1.47
Parks, Schools, Irrigation	5.44	5.50	5.56	5.62	5.69	5.75
Agriculture	-	-	-	-	-	-
Unique Water User #1	325.92	327.83	329.75	331.66	333.58	335.49
Unique Water User #2	203.42	204.61	205.80	207.00	208.19	209.39
Unique Water User #3	88.94	89.47	89.99	90.51	91.03	91.56
Unique Water User #4						

	Final LUDS (af/ac/yr)					
CHINO HILLS	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.44	1.46	1.48	1.49	1.51	1.53
Residential Low (3 - 7)	2.54	2.57	2.61	2.64	2.67	2.70
Residential Medium (8 - 14)	4.22	4.27	4.32	4.38	4.43	4.48
Residential High (15 - 24)	4.41	4.46	4.51	4.57	4.62	4.67
Residential Very High (25+)	7.09	7.13	7.17	7.22	7.26	7.31
Commercial	3.44	3.46	3.48	3.50	3.53	3.55
Industrial	1.10	1.11	1.12	1.12	1.13	1.14
Public/Institutional	1.21	1.21	1.22	1.23	1.24	1.24
Parks, Schools, Irrigation	3.20	3.24	3.28	3.32	3.36	3.40
Agriculture	-	-	-	-	-	-
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4						

	Final LUDS (af/ac/yr)					
CVWD	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.96	1.99	2.01	2.03	2.06	2.08
Residential Low (3 - 7)	3.06	3.09	3.13	3.17	3.20	3.24
Residential Medium (8 - 14)	4.85	4.91	4.97	5.02	5.08	5.14
Residential High (15 - 24)	6.45	6.52	6.60	6.67	6.75	6.82
Residential Very High (25+)	9.36	9.41	9.47	9.53	9.58	9.64
Commercial	1.47	1.47	1.48	1.49	1.50	1.51
Industrial	0.54	0.54	0.55	0.55	0.55	0.56
Public/Institutional	2.90	2.92	2.93	2.95	2.97	2.99
Parks, Schools, Irrigation	7.31	7.39	7.48	7.56	7.65	7.73
Agriculture	0.30	0.30	0.30	0.31	0.31	0.31
Unique Water User #1	3.84	3.87	3.89	3.91	3.94	3.96
Unique Water User #2	1.56	1.57	1.58	1.59	1.60	1.61
Unique Water User #3	7.89	7.94	7.99	8.03	8.08	8.13
Unique Water User #4	2.74	2.76	2.77	2.79	2.81	2.82

	Final LUDS (af/ac/yr)					
Fontana WC	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.36	1.38	1.39	1.41	1.42	1.44
Residential Low (3 - 7)	3.00	3.03	3.06	3.10	3.13	3.17
Residential Medium (8 - 14)	7.30	7.38	7.47	7.55	7.63	7.71
Residential High (15 - 24)	12.58	12.73	12.87	13.01	13.16	13.30
Residential Very High (25+)	17.06	17.16	17.26	17.36	17.46	17.56
Commercial	7.12	7.17	7.21	7.25	7.29	7.33
Industrial	0.36	0.36	0.36	0.37	0.37	0.37
Public/Institutional	2.97	2.99	3.01	3.03	3.04	3.06
Parks, Schools, Irrigation	5.44	5.50	5.56	5.62	5.68	5.75
Agriculture	-	-	-	-	-	-
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-

	Final LUDS (af/ac/yr)					
Monte Vista WD	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.36	1.37	1.39	1.40	1.42	1.44
Residential Low (3 - 7)	2.25	2.28	2.31	2.33	2.36	2.38
Residential Medium (8 - 14)	4.99	5.05	5.10	5.16	5.22	5.28
Residential High (15 - 24)	10.53	10.65	10.78	10.90	11.02	11.14
Residential Very High (25+)	-	-	-	-	-	-
Commercial	2.28	2.29	2.30	2.32	2.33	2.34
Industrial	0.69	0.70	0.70	0.71	0.71	0.72
Public/Institutional	2.55	2.57	2.58	2.60	2.61	2.63
Parks, Schools, Irrigation	5.04	5.10	5.16	5.22	5.28	5.33
Agriculture	0.36	0.37	0.37	0.38	0.38	0.38
Unique Water User #1	5.97	6.01	6.04	6.08	6.11	6.15
Unique Water User #2	46.45	46.73	47.01	47.29	47.57	47.84
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-

	Final LUDS (af/ac/yr)					
Ontario	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	1.25	1.26	1.28	1.29	1.31	1.32
Residential Low (3 - 7)	2.20	2.23	2.26	2.28	2.31	2.34
Residential Medium (8 - 14)	5.48	5.55	5.61	5.68	5.74	5.81
Residential High (15 - 24)	7.90	8.00	8.09	8.19	8.28	8.38
Residential Very High (25+)	13.73	13.81	13.90	13.98	14.07	14.15
Commercial	2.93	2.95	2.97	2.99	3.00	3.02
Industrial	0.40	0.40	0.40	0.40	0.40	0.41
Public/Institutional	2.93	2.95	2.97	2.99	3.00	3.02
Parks, Schools, Irrigation	7.78	7.87	7.96	8.06	8.15	8.24
Agriculture	15.68	15.87	16.06	16.24	16.43	16.62
Unique Water User #1	49.47	49.78	50.08	50.39	50.69	51.00
Unique Water User #2	19.56	19.68	19.80	19.92	20.04	20.16
Unique Water User #3	10.47	10.54	10.60	10.67	10.73	10.80
Unique Water User #4	-	-	-	-	-	-

	Final LUDS (af/ac/yr)					
San Antonio WC	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	2.39	2.42	2.44	2.47	2.50	2.53
Residential Low (3 - 7)	-	-	-	-	-	-
Residential Medium (8 - 14)	5.05	5.11	5.17	5.23	5.29	5.36
Residential High (15 - 24)	6.49	6.57	6.64	6.72	6.80	6.88
Residential Very High (25+)	-	-	-	-	-	-
Commercial	2.24	2.26	2.27	2.29	2.30	2.31
Industrial	-	-	-	-	-	-
Public/Institutional	2.24	2.26	2.27	2.29	2.30	2.31
Parks, Schools, Irrigation	-	-	-	-	-	-
Agriculture	-	-	-	-	-	-
Unique Water User #1	-	-	-	-	-	-
Unique Water User #2	-	-	-	-	-	-
Unique Water User #3	-	-	-	-	-	-
Unique Water User #4	-	-	-	-	-	-

	Final LUDS (af/ac/yr)					
Upland	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)	2.01	2.03	2.06	2.08	2.10	2.13
Residential Low (3 - 7)	3.00	3.04	3.07	3.11	3.14	3.18
Residential Medium (8 - 14)	5.23	5.29	5.35	5.42	5.48	5.54
Residential High (15 - 24)	9.46	9.57	9.68	9.79	9.90	10.02
Residential Very High (25+)	14.76	14.85	14.93	15.02	15.11	15.20
Commercial	2.25	2.27	2.28	2.29	2.31	2.32
Industrial	1.13	1.14	1.14	1.15	1.16	1.17
Public/Institutional	3.72	3.74	3.77	3.79	3.81	3.83
Parks, Schools, Irrigation	6.20	6.28	6.35	6.42	6.50	6.57
Agriculture	-	-	-	-	-	-
Unique Water User #1	1.41	1.41	1.42	1.43	1.44	1.45
Unique Water User #2	256.25	257.80	259.35	260.90	262.45	264.01
Unique Water User #3	4.83	4.86	4.89	4.92	4.95	4.98
Unique Water User #4	3.26	3.28	3.29	3.31	3.33	3.35

APPENDIX E

Demand Projections

Appendix E - Demands Projection by Member Agency

		Water Demands (AF)					
CHINO		**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)		1,004	1,003	1,015	1,034	1,122	1,205
Residential Low (3 - 7)		6,330	6,553	6,775	6,930	7,322	7,793
Residential Medium (8 - 14)		967	1,499	2,566	3,099	3,158	3,787
Residential High (15 - 24)		1,070	1,407	1,423	1,695	1,747	2,261
Residential Very High (25+)		138	139	139	140	141	518
Commercial		1,277	1,325	1,377	1,719	1,747	1,988
Industrial		495	630	662	670	677	684
Public/Institutional		1,132	1,157	1,164	1,171	1,402	1,473
Parks, Schools, Irrigation		2,713	2,800	2,832	2,863	2,895	2,926
Agriculture		-	-	-	-	-	-
Unique Water User #1		326	328	330	332	334	335
Unique Water User #2		203	205	206	207	208	209
Unique Water User #3		89	89	90	91	91	92
Unique Water User #4		-	-	-	-	-	-
	Total	**15,744**	**17,135**	**18,579**	**19,951**	**20,844**	**23,271**

		Water Demands (AF)					
CHINO HILLS		**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Residential Very Low (<1 - 2)		1,491	1,543	2,084	2,187	2,213	4,189
Residential Low (3 - 7)		7,024	7,655	7,839	8,672	8,773	8,874
Residential Medium (8 - 14)		1,745	2,048	2,078	2,133	2,158	2,212
Residential High (15 - 24)		767	938	971	1,001	1,013	1,066
Residential Very High (25+)		-	106	107	107	108	108
Commercial		1,269	1,340	1,463	1,506	1,515	1,524
Industrial		1	33	33	33	33	33
Public/Institutional		204	196	197	208	209	211
Parks, Schools, Irrigation		4,091	4,207	4,257	4,324	4,375	4,425
Agriculture		-	-	-	-	-	-
Unique Water User #1		-	-	-	-	-	-
Unique Water User #2		-	-	-	-	-	-
Unique Water User #3		-	-	-	-	-	-
Unique Water User #4		-	-	-	-	-	-
	Total	**16,592**	**18,066**	**19,029**	**20,171**	**20,397**	**22,642**

Appendix E - Demands Projection by Member Agency

CVWD		2015	2020	2025	2030	2035	2040
		Water Demands (AF)					
Residential Very Low (<1 - 2)		6,299	7,148	7,830	8,156	8,592	8,742
Residential Low (3 - 7)		19,037	20,053	21,295	21,613	21,999	22,259
Residential Medium (8 - 14)		4,217	4,556	5,122	5,180	5,463	5,525
Residential High (15 - 24)		4,206	4,858	6,327	6,506	6,579	6,742
Residential Very High (25+)		1,054	1,060	1,066	1,073	1,079	1,085
Commercial		2,333	2,375	2,430	2,452	2,476	2,492
Industrial		1,449	1,552	1,635	1,660	1,670	1,681
Public/Institutional		1,366	1,425	1,397	1,409	1,418	1,431
Parks, Schools, Irrigation		9,688	9,801	8,715	8,814	9,065	9,632
Agriculture		36	33	16	13	4	-
Unique Water User #1		460	462	465	468	471	474
Unique Water User #2		296	298	300	301	303	305
Unique Water User #3		284	286	288	289	291	293
Unique Water User #4		261	263	264	266	267	269
	Total	**50,986**	**54,170**	**57,150**	**58,200**	**59,677**	**60,930**

Fontana WC		2015	2020	2025	2030	2035	2040
		Water Demands (AF)					
Residential Very Low (<1 - 2)		2,088	2,112	2,077	1,796	1,084	911
Residential Low (3 - 7)		19,110	19,366	20,529	21,846	24,061	24,771
Residential Medium (8 - 14)		2,631	2,661	2,908	4,360	4,763	4,815
Residential High (15 - 24)		4,029	4,075	6,682	6,820	7,161	7,239
Residential Very High (25+)		216	217	219	399	728	732
Commercial		6,628	6,697	7,016	8,801	11,117	11,467
Industrial		2,061	2,281	2,417	2,454	2,490	2,519
Public/Institutional		687	691	953	1,014	1,101	1,109
Parks, Schools, Irrigation		4,682	4,735	4,789	4,842	4,895	4,949
Agriculture		-	-	-	-	-	-
Unique Water User #1		-	-	-	-	-	-
Unique Water User #2		-	-	-	-	-	-
Unique Water User #3		-	-	-	-	-	-
Unique Water User #4		-	-	-	-	-	-
	Total	**42,132**	**42,835**	**47,590**	**52,332**	**57,400**	**58,512**

Appendix E - Demands Projection by Member Agency

Monte Vista WD		Water Demands (AF) 2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)		1,522	1,540	1,557	1,756	1,813	1,930
Residential Low (3 - 7)		3,129	3,197	3,235	3,301	3,367	3,413
Residential Medium (8 - 14)		1,635	1,724	1,863	1,884	1,905	1,926
Residential High (15 - 24)		666	1,223	1,237	1,251	1,272	1,326
Residential Very High (25+)		-	-	-	-	-	-
Commercial		1,339	1,368	1,378	1,389	1,444	1,472
Industrial		367	360	363	367	385	388
Public/Institutional		324	329	331	335	358	360
Parks, Schools, Irrigation		1,125	1,138	1,152	1,165	1,203	1,216
Agriculture		61	61	54	17	10	-
Unique Water User #1		93	94	94	95	95	96
Unique Water User #2		51	51	52	52	52	53
Unique Water User #3		-	-	-	-	-	-
Unique Water User #4		-	-	-	-	-	-
	Total	**10,312**	**11,085**	**11,316**	**11,612**	**11,904**	**12,180**

Ontario		Water Demands (AF) 2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)		338	353	374	432	437	442
Residential Low (3 - 7)		9,993	10,581	12,183	13,531	14,357	18,047
Residential Medium (8 - 14)		3,212	3,851	4,231	5,214	6,087	12,678
Residential High (15 - 24)		4,830	5,327	5,652	5,719	5,864	6,031
Residential Very High (25+)		845	914	1,298	2,793	3,357	5,157
Commercial		5,213	5,241	5,606	6,789	7,021	8,754
Industrial		2,232	2,361	2,647	2,727	2,772	2,813
Public/Institutional		3,090	3,089	3,115	3,135	3,154	3,174
Parks, Schools, Irrigation		8,101	8,407	9,111	11,046	11,575	12,778
Agriculture		2,177	1,372	1,118	529	295	23
Unique Water User #1		2,688	2,705	2,721	2,738	2,755	2,771
Unique Water User #2		681	686	690	694	698	702
Unique Water User #3		573	577	581	584	588	591
Unique Water User #4		-	-	-	-	-	-
	Total	**43,973**	**45,464**	**49,327**	**55,931**	**58,960**	**73,961**

Appendix E - Demands Projection by Member Agency

San Antonio WC		Water Demands (AF) 2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)		1,440	1,457	1,544	1,562	1,864	2,212
Residential Low (3 - 7)		-	-	-	-	-	-
Residential Medium (8 - 14)		4	4	4	4	4	4
Residential High (15 - 24)		21	21	21	22	22	22
Residential Very High (25+)		-	-	-	-	-	-
Commercial		6	6	6	6	6	6
Industrial		-	-	-	-	-	-
Public/Institutional		22	22	22	23	23	23
Parks, Schools, Irrigation		-	-	-	-	-	-
Agriculture		-	-	-	-	-	-
Unique Water User #1		-	-	-	-	-	-
Unique Water User #2		-	-	-	-	-	-
Unique Water User #3		-	-	-	-	-	-
Unique Water User #4		-	-	-	-	-	-
	Total	**1,493**	**1,510**	**1,597**	**1,617**	**1,919**	**2,267**

Upland		Water Demands (AF) 2015	2020	2025	2030	2035	2040
Residential Very Low (<1 - 2)		1,579	1,597	1,616	1,634	1,653	1,672
Residential Low (3 - 7)		8,437	8,544	8,643	8,754	8,945	9,045
Residential Medium (8 - 14)		1,601	2,033	2,195	2,243	2,268	2,317
Residential High (15 - 24)		3,022	3,363	3,426	4,048	4,094	4,140
Residential Very High (25+)		381	468	471	593	596	692
Commercial		1,542	1,570	1,609	1,619	1,742	1,752
Industrial		369	384	386	407	409	411
Public/Institutional		460	445	448	451	473	476
Parks, Schools, Irrigation		2,490	2,519	2,900	2,934	2,967	3,000
Agriculture		-	-	-	-	-	-
Unique Water User #1		281	283	268	270	271	273
Unique Water User #2		256	258	259	261	262	264
Unique Water User #3		122	122	123	124	125	125
Unique Water User #4		107	108	109	109	110	110
	Total	**20,647**	**21,694**	**22,453**	**23,447**	**23,915**	**24,277**

APPENDIX N

Model User Guide

Land Use Base Water Demand Model User Guide

This Demand Model is built in Microsoft Access which is linked with ArcGIS and provides users with an easy-to-use interface to view and update factor and demands.

1 WELCOME

The Welcome page (Figure 1-1) is the first interface the user sees when they open the model and is the primary interface for viewing, entering and updating model parameters and inputs like acreages, Land Use Demand Factors (LUD), and adjustment factors.

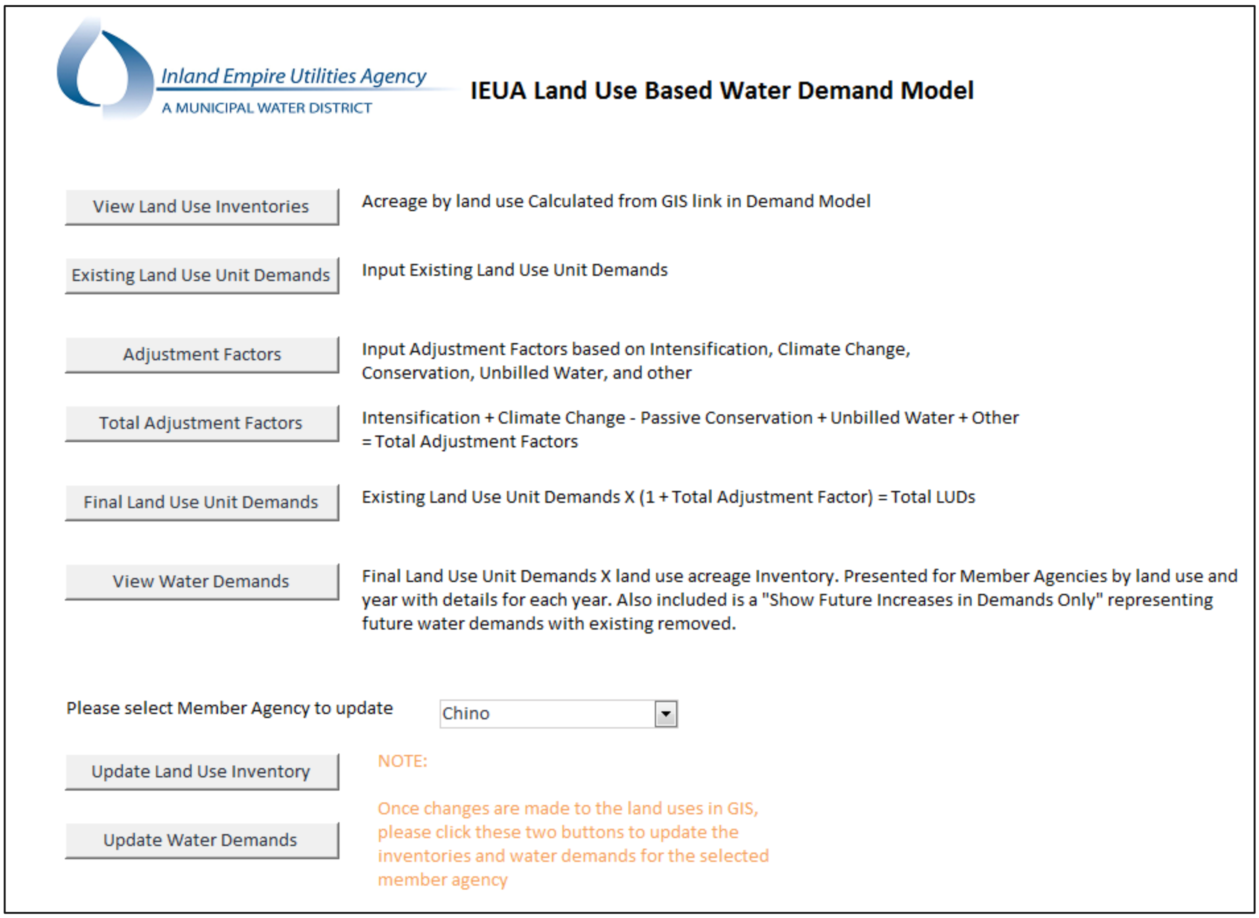


Figure 1-1 Welcome Form

Below list describes the functions for each of the buttons on the Welcome page -

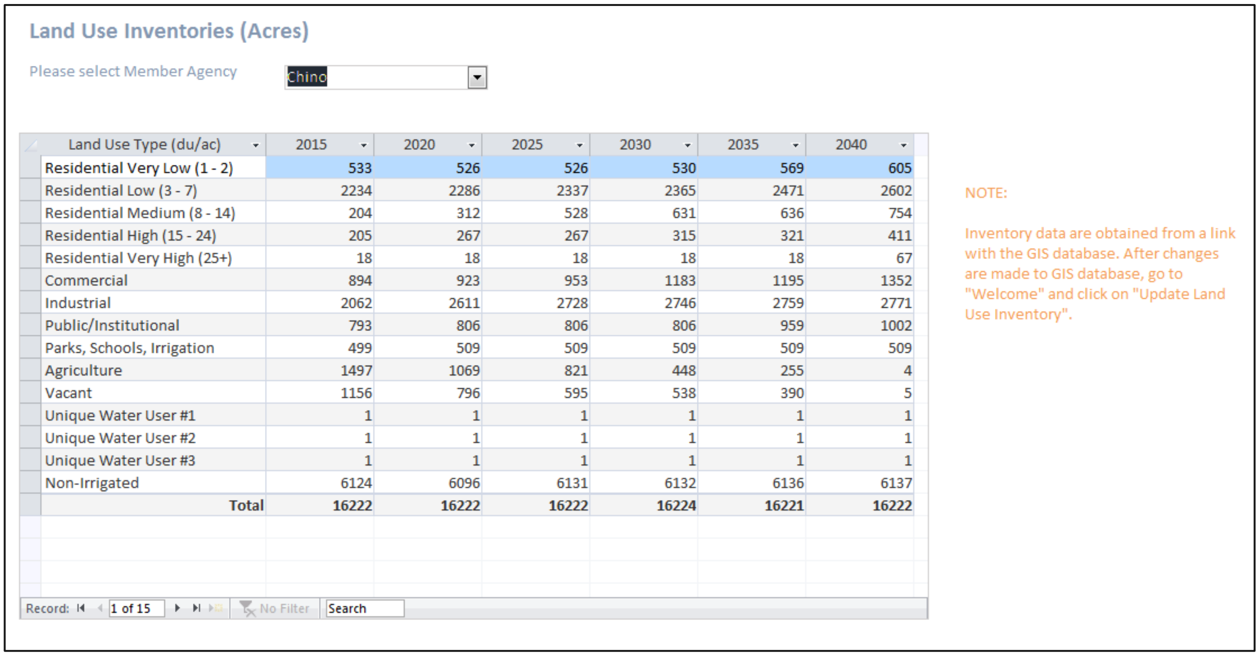
- Click "View Land Use Inventories" to view land use acreages by member agency which are calculated from GIS linked in the Demand Model. Any modification to the acreages and Landuse type must be done using GIS.
- Click "Existing Land Use Unit Demands" to view or update Existing LUD by member agency. LUDs are calculated outside the model as described in the memo. Users can manually update the LUDs when they are updated in the futures. Users can also update the Final Land Use Unit Demands from this form.

- Click “Adjustment Factors” to view or update Adjustment Factors by member agency. Users can also update the Total Adjustment Factors from this form.
- Click “Total Adjustment Factors” to view Total Adjustment Factors by member agency and update the Final Land Use Unit Demands.
- Click “Final Land Use Unit Demands” to view Final Land Use Unit Demands by member agency and update the Water Demands.

If updates are made to the GIS land use layers, users can select the appropriate member agency or all member agencies from the dropdown list and click ”Update Land Use Inventory” and “Update Water Demands” to update acreage inventories and total water demands.

2 VIEW LAND USE INVENTORIES

Click on View Land Use Inventories on the Welcome Page to view the acreages by land use. Select a member agency or “All Member Agencies” from the dropdown list to view their land use acreages. The acreages are calculated directly from the GIS database. This table cannot be manually updated without updating the background GIS layers.



Land Use Inventories (Acres)

Please select Member Agency: Chino

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	533	526	526	530	569	605
Residential Low (3 - 7)	2234	2286	2337	2365	2471	2602
Residential Medium (8 - 14)	204	312	528	631	636	754
Residential High (15 - 24)	205	267	267	315	321	411
Residential Very High (25+)	18	18	18	18	18	67
Commercial	894	923	953	1183	1195	1352
Industrial	2062	2611	2728	2746	2759	2771
Public/Institutional	793	806	806	806	959	1002
Parks, Schools, Irrigation	499	509	509	509	509	509
Agriculture	1497	1069	821	448	255	4
Vacant	1156	796	595	538	390	5
Unique Water User #1	1	1	1	1	1	1
Unique Water User #2	1	1	1	1	1	1
Unique Water User #3	1	1	1	1	1	1
Non-Irrigated	6124	6096	6131	6132	6136	6137
Total	**16222**	**16222**	**16222**	**16224**	**16221**	**16222**

Record: 1 of 15 No Filter Search

NOTE:

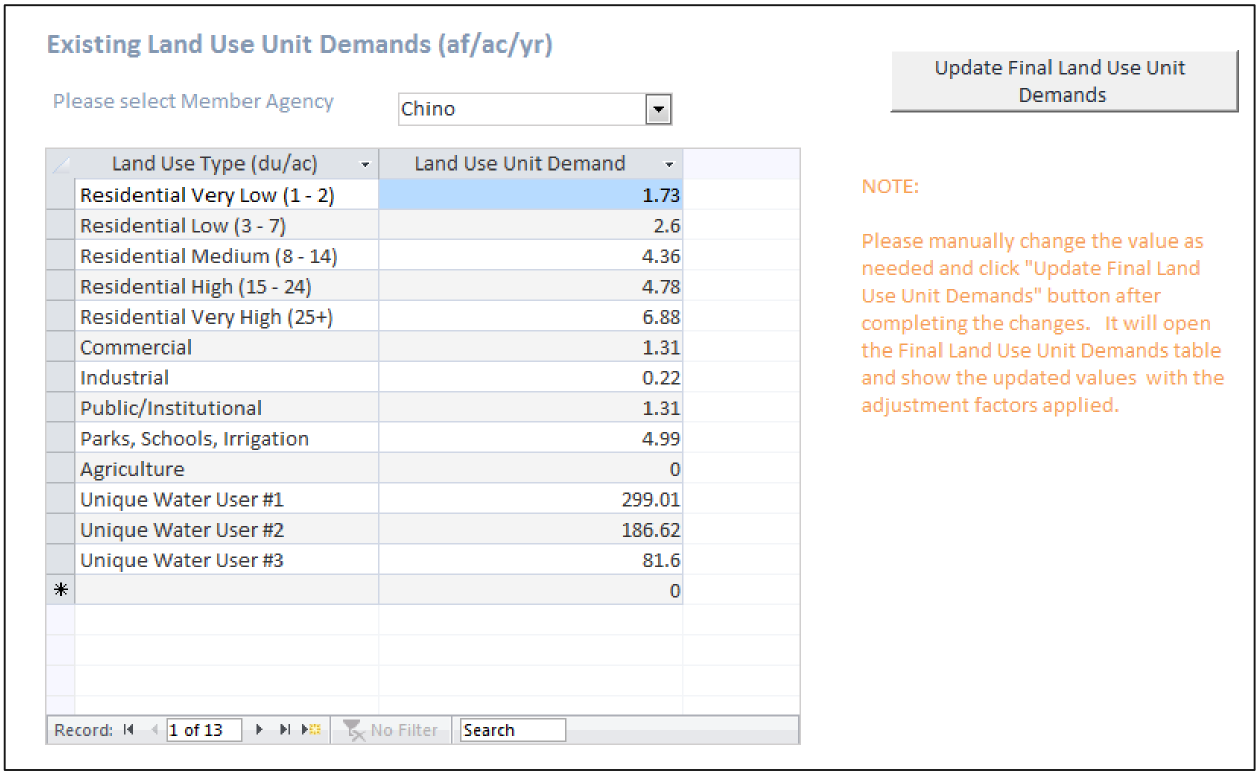
Inventory data are obtained from a link with the GIS database. After changes are made to GIS database, go to "Welcome" and click on "Update Land Use Inventory".

Figure 2-1 Land Use Inventories Form

3 EXISTING LAND USE UNIT DEMANDS

Click on Existing Land Use Unit Demands on the Welcome Page to view and update the Existing land Use Unit Demands manually. The Dropdown menu on the Existing Land Use Unit Demand table can be used view and update LUDs. These Existing LUDs are calculated from the Existing Water Consumption based on the Land Uses (explained in the Technical Memorandum). Updates to LUDS can be made by simply entering the number in the appropriate cell in the table.

After updating the LUD values, Click “Update Final Land Use Unit Demands” to update the final unit demands of all member agencies with the adjustment factors applied.



Existing Land Use Unit Demands (af/ac/yr)

Please select Member Agency: Chino

Update Final Land Use Unit Demands

Land Use Type (du/ac)	Land Use Unit Demand
Residential Very Low (1 - 2)	1.73
Residential Low (3 - 7)	2.6
Residential Medium (8 - 14)	4.36
Residential High (15 - 24)	4.78
Residential Very High (25+)	6.88
Commercial	1.31
Industrial	0.22
Public/Institutional	1.31
Parks, Schools, Irrigation	4.99
Agriculture	0
Unique Water User #1	299.01
Unique Water User #2	186.62
Unique Water User #3	81.6
*	0

Record: 1 of 13 No Filter Search

NOTE:

Please manually change the value as needed and click "Update Final Land Use Unit Demands" button after completing the changes. It will open the Final Land Use Unit Demands table and show the updated values with the adjustment factors applied.

Figure 3-1 Existing land Use Unit Demands Form

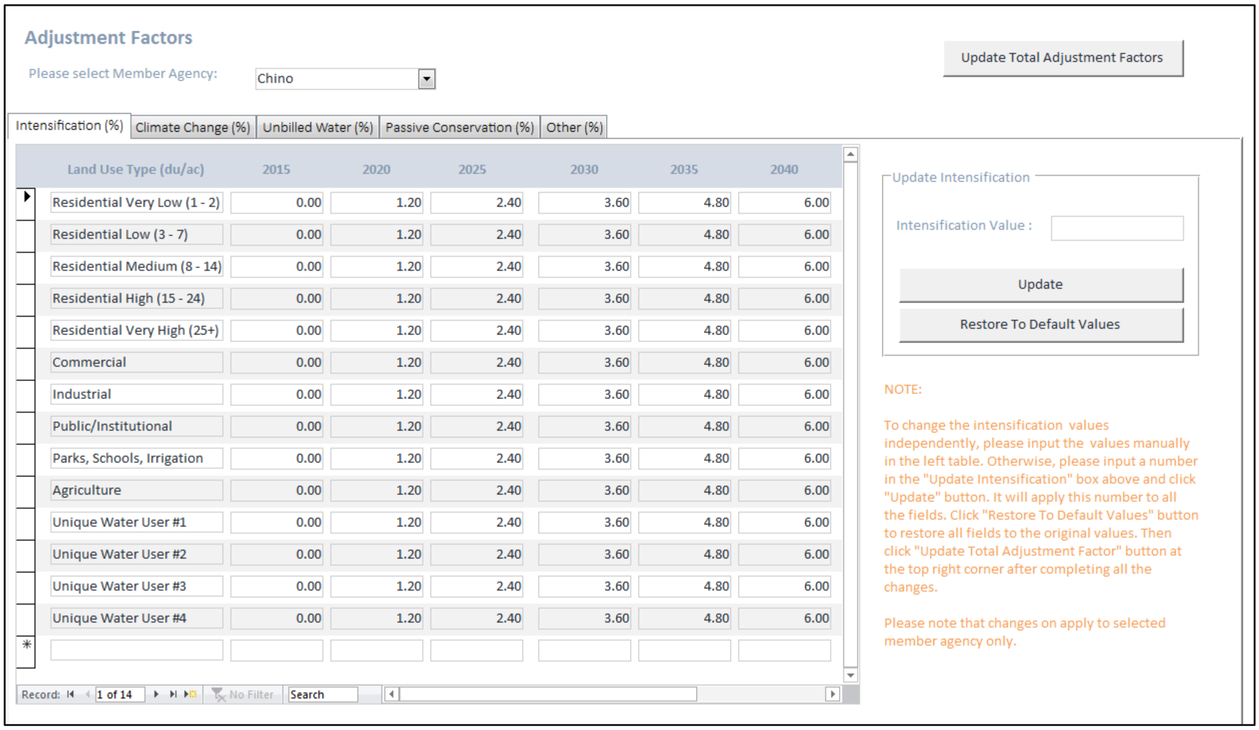
4 ADJUSTMENT FACTORS

Click on 

on the Welcome Page to view and update the various Adjustment Factors (Figure 4-1). Select a member agency from the drop down menu on the Adjustment Factors table to view and update factor values in each factors. Definition for each Adjustment Factor and how it affects the existing LUDs is provided in the Technical Memorandum.

4.1 Intensification

Click on the “Intensification” tab to view the values for each land use by member agency and to update the intensification factors independently. To perform a global update for all land use types, enter a number in the "Update Intensification" box and click "Update" button. Click "Restore To Default Values" button to restore all fields to the original values.



Adjustment Factors

Please select Member Agency: Chino

Update Total Adjustment Factors

Intensification (%) | Climate Change (%) | Unbilled Water (%) | Passive Conservation (%) | Other (%)

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	0.00	1.20	2.40	3.60	4.80	6.00
Residential Low (3 - 7)	0.00	1.20	2.40	3.60	4.80	6.00
Residential Medium (8 - 14)	0.00	1.20	2.40	3.60	4.80	6.00
Residential High (15 - 24)	0.00	1.20	2.40	3.60	4.80	6.00
Residential Very High (25+)	0.00	1.20	2.40	3.60	4.80	6.00
Commercial	0.00	1.20	2.40	3.60	4.80	6.00
Industrial	0.00	1.20	2.40	3.60	4.80	6.00
Public/Institutional	0.00	1.20	2.40	3.60	4.80	6.00
Parks, Schools, Irrigation	0.00	1.20	2.40	3.60	4.80	6.00
Agriculture	0.00	1.20	2.40	3.60	4.80	6.00
Unique Water User #1	0.00	1.20	2.40	3.60	4.80	6.00
Unique Water User #2	0.00	1.20	2.40	3.60	4.80	6.00
Unique Water User #3	0.00	1.20	2.40	3.60	4.80	6.00
Unique Water User #4	0.00	1.20	2.40	3.60	4.80	6.00

Record: 1 of 14 No Filter Search

Update Intensification

Intensification Value :

Update

Restore To Default Values

NOTE:

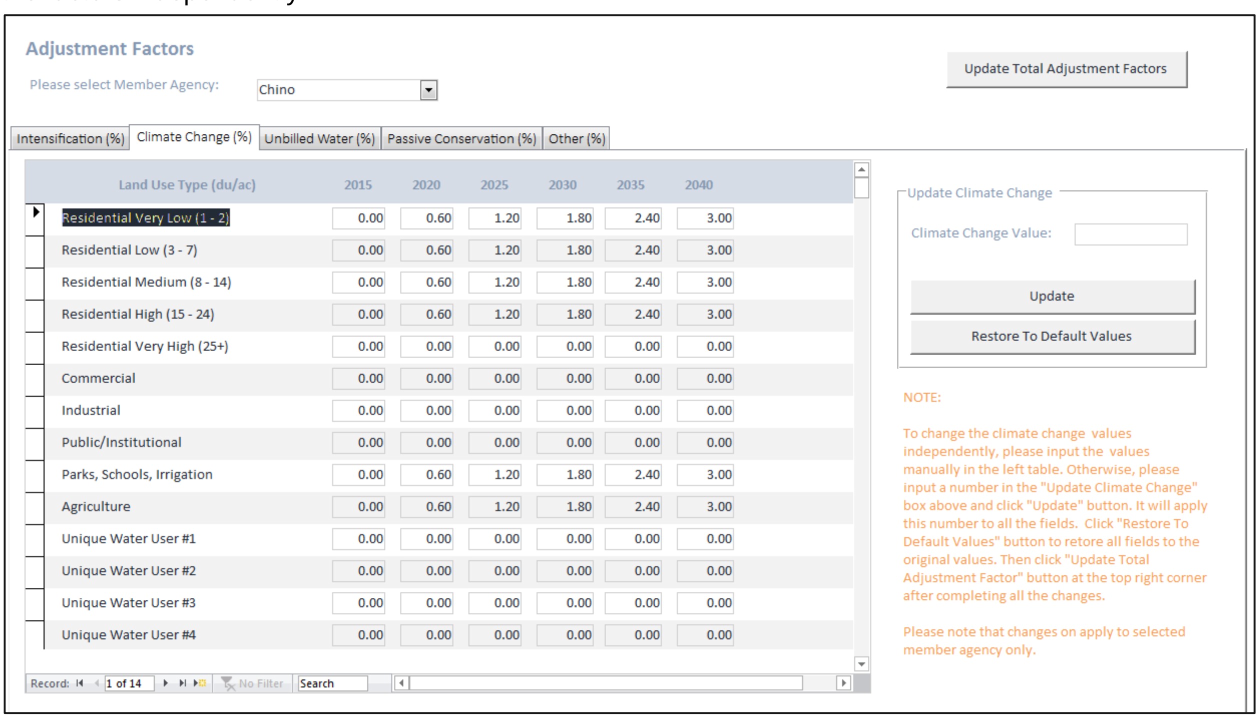
To change the intensification values independently, please input the values manually in the left table. Otherwise, please input a number in the "Update Intensification" box above and click "Update" button. It will apply this number to all the fields. Click "Restore To Default Values" button to restore all fields to the original values. Then click "Update Total Adjustment Factor" button at the top right corner after completing all the changes.

Please note that changes on apply to selected member agency only.

Figure 4-1 Intensification Form

4.2 Climate Change

Click on the “Climate Change” tab to view the values for each land use by member agency and to update the factors independently.



Adjustment Factors

Please select Member Agency: Chino

Update Total Adjustment Factors

Intensification (%) | Climate Change (%) | Unbilled Water (%) | Passive Conservation (%) | Other (%)

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	0.00	0.60	1.20	1.80	2.40	3.00
Residential Low (3 - 7)	0.00	0.60	1.20	1.80	2.40	3.00
Residential Medium (8 - 14)	0.00	0.60	1.20	1.80	2.40	3.00
Residential High (15 - 24)	0.00	0.60	1.20	1.80	2.40	3.00
Residential Very High (25+)	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00
Public/Institutional	0.00	0.00	0.00	0.00	0.00	0.00
Parks, Schools, Irrigation	0.00	0.60	1.20	1.80	2.40	3.00
Agriculture	0.00	0.60	1.20	1.80	2.40	3.00
Unique Water User #1	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #2	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #3	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #4	0.00	0.00	0.00	0.00	0.00	0.00

Record: 1 of 14 No Filter Search

Update Climate Change

Climate Change Value:

Update

Restore To Default Values

NOTE:

To change the climate change values independently, please input the values manually in the left table. Otherwise, please input a number in the "Update Climate Change" box above and click "Update" button. It will apply this number to all the fields. Click "Restore To Default Values" button to retore all fields to the original values. Then click "Update Total Adjustment Factor" button at the top right corner after completing all the changes.

Please note that changes on apply to selected member agency only.

Figure 4-2 Climate Change Form

To perform a global update for all land use types, enter a number in the "Update Climate Change" box and click "Update" button. Click "Restore To Default Values" button to restore all fields to the original values.

4.3 Unbilled Water

Click on the “Unbilled Water” tab to view the values by member agency and to update the factors. Unbilled Water factors is applied uniformly for all land uses. Click "Restore To Default Values" button to restore it to the original value.

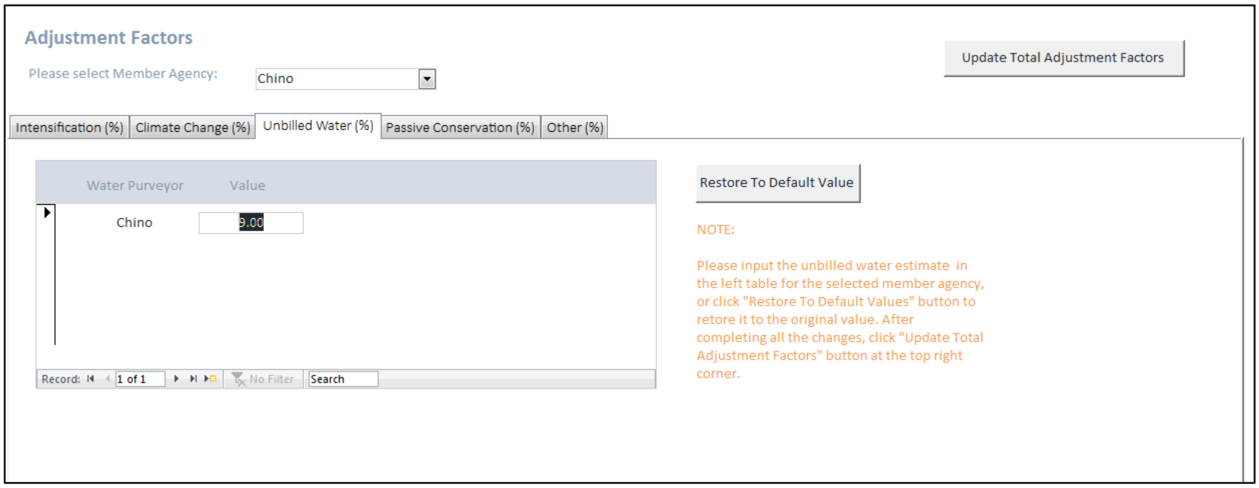
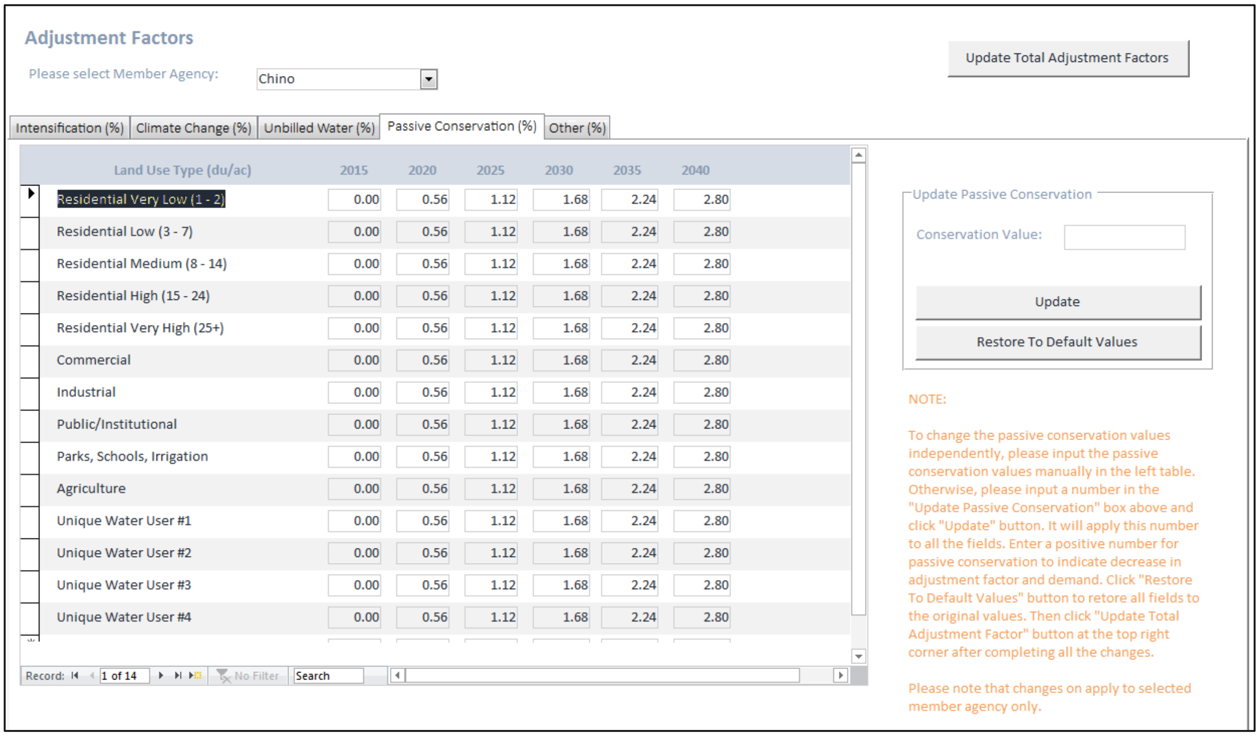


Figure 4-3 Unbilled Water Form

4.4 Passive Conservation

Click on the “Passive Conservation” tab to view the values for each land use by member agency and to update the factors independently. To perform a global update for all land use types, enter a number in the "Update Passive Conservation” box and click "Update" button. Click "Restore To Default Values" button to restore all fields to the original values.

Entering a positive number for passive conservation to indicate decrease in adjustment factor and demand.



Adjustment Factors

Please select Member Agency: Chino

Update Total Adjustment Factors

Intensification (%) | Climate Change (%) | Unbilled Water (%) | Passive Conservation (%) | Other (%)

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	0.00	0.56	1.12	1.68	2.24	2.80
Residential Low (3 - 7)	0.00	0.56	1.12	1.68	2.24	2.80
Residential Medium (8 - 14)	0.00	0.56	1.12	1.68	2.24	2.80
Residential High (15 - 24)	0.00	0.56	1.12	1.68	2.24	2.80
Residential Very High (25+)	0.00	0.56	1.12	1.68	2.24	2.80
Commercial	0.00	0.56	1.12	1.68	2.24	2.80
Industrial	0.00	0.56	1.12	1.68	2.24	2.80
Public/Institutional	0.00	0.56	1.12	1.68	2.24	2.80
Parks, Schools, Irrigation	0.00	0.56	1.12	1.68	2.24	2.80
Agriculture	0.00	0.56	1.12	1.68	2.24	2.80
Unique Water User #1	0.00	0.56	1.12	1.68	2.24	2.80
Unique Water User #2	0.00	0.56	1.12	1.68	2.24	2.80
Unique Water User #3	0.00	0.56	1.12	1.68	2.24	2.80
Unique Water User #4	0.00	0.56	1.12	1.68	2.24	2.80

Record: 1 of 14 No Filter Search

Update Passive Conservation

Conservation Value:

Update

Restore To Default Values

NOTE:

To change the passive conservation values independently, please input the passive conservation values manually in the left table. Otherwise, please input a number in the "Update Passive Conservation" box above and click "Update" button. It will apply this number to all the fields. Enter a positive number for passive conservation to indicate decrease in adjustment factor and demand. Click "Restore To Default Values" button to retore all fields to the original values. Then click "Update Total Adjustment Factor" button at the top right corner after completing all the changes.

Please note that changes on apply to selected member agency only.

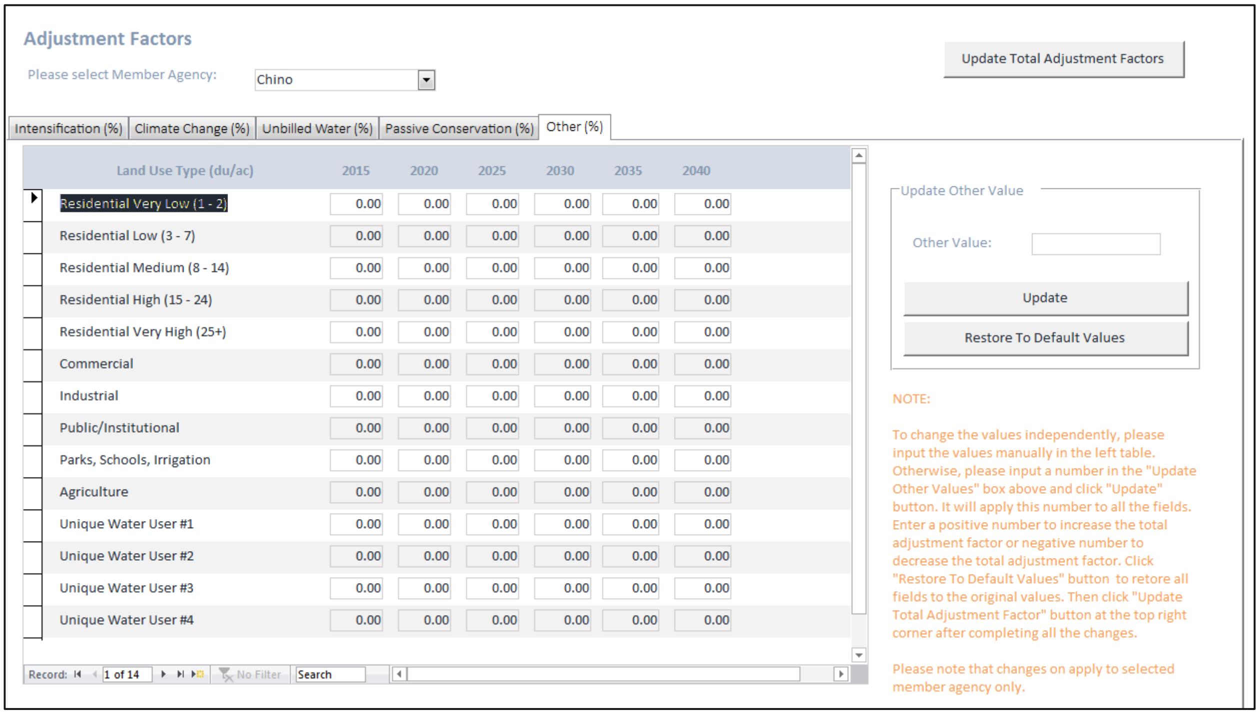
Figure 4-4 Passive Conservation Form

4.5 Other

The “Other” tab is an empty form that user can use to capture any additional adjustment factor not captures in the other tabs.   The default value is 0 in all cells.

To perform a global update for all land use types, enter a number in the "Update Other Value” box and click "Update" button. Click "Restore To Default Values" button to restore all fields to 0.

A positive value will increase the Existing LUD and hence the total demand. And a negative number will decrease the Existing LUD.



Adjustment Factors

Please select Member Agency: Chino

Update Total Adjustment Factors

Intensification (%) | Climate Change (%) | Unbilled Water (%) | Passive Conservation (%) | Other (%)

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	0.00	0.00	0.00	0.00	0.00	0.00
Residential Low (3 - 7)	0.00	0.00	0.00	0.00	0.00	0.00
Residential Medium (8 - 14)	0.00	0.00	0.00	0.00	0.00	0.00
Residential High (15 - 24)	0.00	0.00	0.00	0.00	0.00	0.00
Residential Very High (25+)	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00
Public/Institutional	0.00	0.00	0.00	0.00	0.00	0.00
Parks, Schools, Irrigation	0.00	0.00	0.00	0.00	0.00	0.00
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #1	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #2	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #3	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #4	0.00	0.00	0.00	0.00	0.00	0.00

Record: 1 of 14 No Filter Search

Update Other Value

Other Value:

Update

Restore To Default Values

NOTE:

To change the values independently, please input the values manually in the left table. Otherwise, please input a number in the "Update Other Values" box above and click "Update" button. It will apply this number to all the fields. Enter a positive number to increase the total adjustment factor or negative number to decrease the total adjustment factor. Click "Restore To Default Values" button to retore all fields to the original values. Then click "Update Total Adjustment Factor" button at the top right corner after completing all the changes.

Please note that changes on apply to selected member agency only.

Figure 4-5 Other Form

After updating or changing any adjustment factor, click "Update Total Adjustment Factor" button. It will recalculate the Total Adjacent Factors for all member agencies. Then the “Total Adjustment Factors” Form will pop up to show the new Adjustment Factors.

5 TOTAL ADJUSTMENT FACTORS

Click on Total Adjustment Factors on the Welcome Page to view the Total Adjustment Factors (Figure 5-1). Use the dropdown box to select the appropriate member agency. These values cannot be changed in this table. These values is calculated using the Adjustment Factors table using below equation

Total Adjustment Factors = Intensification + Climate Change - Conservation + Unbilled Water + Other.

If changes were made to the adjustment factors, please click "Update Final Land Use Unit Demands" button to update the Final Land Use Unit Demands of all member agencies. Then the “Final Land Use Unit Demands” form will pop up to show the results (Figure 6-1)

Total Adjustment Factors (%)

Please select Member Agency: Chino

Update Final Land Use Unit Demands

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	9.00	10.24	11.48	12.72	13.96	15.20
Residential Low (3 - 7)	9.00	10.24	11.48	12.72	13.96	15.20
Residential Medium (8 - 14)	9.00	10.24	11.48	12.72	13.96	15.20
Residential High (15 - 24)	9.00	10.24	11.48	12.72	13.96	15.20
Residential Very High (25+)	9.00	9.64	10.28	10.92	11.56	12.20
Commercial	9.00	9.64	10.28	10.92	11.56	12.20
Industrial	9.00	9.64	10.28	10.92	11.56	12.20
Public/Institutional	9.00	9.64	10.28	10.92	11.56	12.20
Parks, Schools, Irrigation	9.00	10.24	11.48	12.72	13.96	15.20
Agriculture	9.00	10.24	11.48	12.72	13.96	15.20
Unique Water User #1	9.00	9.64	10.28	10.92	11.56	12.20
Unique Water User #2	9.00	9.64	10.28	10.92	11.56	12.20
Unique Water User #3	9.00	9.64	10.28	10.92	11.56	12.20
Unique Water User #4	9.00	9.64	10.28	10.92	11.56	12.20

NOTE:

This table shows the Total Adjustment Factor derived from Adjustment factors input. Total Adjustment Factors = Intensification + Climate Change - Conservation + Unbilled Water + Other.

If changes were made to the adjustment factors, please click "Update Final Land Use Unit Demands" button to update the Final Land Use Unit Demands.

Figure 5-1 Total Adjustment Factors Form

6 FINAL LAND UNIT DEMANDS

Click on Final Land Use Unit Demands on the Welcome Page to view the Final LUDs (Figure 6-1) by member agency. Final LUDs is calculated using the below formula

Final Land Use Unit Demands = Existing Land Use Unit Demands X (1 + Total Adjustment Factor)

If changes were made to Adjustment Factors or Existing Land Use Unit Demands, please click "Update Water Demands" button to update the water demands of all member agencies. Then the “Water Demands” Form will pop up to show results.

Final Land Use Unit Demands (af/ac/yr)

Please select Member Agency Chino

Update Water Demands

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	1.89	1.91	1.93	1.95	1.97	1.99
Residential Low (3 - 7)	2.83	2.87	2.90	2.93	2.96	3.00
Residential Medium (8 - 14)	4.75	4.81	4.86	4.91	4.97	5.02
Residential High (15 - 24)	5.21	5.27	5.33	5.39	5.45	5.51
Residential Very High (25+)	7.50	7.54	7.59	7.63	7.68	7.72
Commercial	1.43	1.44	1.44	1.45	1.46	1.47
Industrial	0.24	0.24	0.24	0.24	0.25	0.25
Public/Institutional	1.43	1.44	1.44	1.45	1.46	1.47
Parks, Schools, Irrigation	5.44	5.50	5.56	5.62	5.69	5.75
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00
Unique Water User #1	325.92	327.83	329.75	331.66	333.58	335.49
Unique Water User #2	203.42	204.61	205.80	207.00	208.19	209.39
Unique Water User #3	88.94	89.47	89.99	90.51	91.03	91.56

NOTE:

This table shows the Final Land Use Unit Demands. Final Land Use Unit Demands = Existing Land Use Unit Demands X (1 + Total Adjustment Factor).

If any changes are made to Adjustment Factors or Existing Land Use Unit Demands, please click "Update Water Demands" button to update the water demands.

Figure 6-1 Final Land Unit Demands Form

7 VIEW WATER DEMANDS

Click on View Water Demands on the Welcome Page to view the Water Demands, either by Member Agency (Figure 7-1) or Year (Figure 7-3).

7.1 By Member Agency

In “By Member Agency” tab, Use the dropdown menu to view the Water Demands by Member Agency.

Water Demands (afy)

By Member Agency | By Year

Please select Member Agency: Chino

Show Future Increases in Demands Only

Land Use Type (du/ac)	2015	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	1004	1003	1015	1034	1122	1205
Residential Low (3 - 7)	6330	6553	6775	6930	7322	7793
Residential Medium (8 - 14)	967	1499	2566	3099	3158	3787
Residential High (15 - 24)	1070	1407	1423	1695	1747	2261
Residential Very High (25+)	138	139	139	140	141	518
Commercial	1277	1325	1377	1719	1747	1988
Industrial	495	630	662	670	677	684
Public/Institutional	1132	1157	1164	1171	1402	1473
Parks, Schools, Irrigation	2713	2800	2832	2863	2895	2926
Agriculture	0	0	0	0	0	0
Unique Water User #1	326	328	330	332	334	335
Unique Water User #2	203	205	206	207	208	209
Unique Water User #3	89	89	90	91	91	92
Total	**15744**	**17135**	**18579**	**19951**	**20844**	**23271**

Record: 1 of 13 No Filter Search

NOTE:

This table shows total water demands for each year. Click the "Show Future Increases in Demands Only" button to view just the future demands - the difference between existing demands and projected demands.

Figure 7-1 Water Demands by Member Agency

Click the "Show Future Increases in Demands Only" button to view just the future demands - the difference between existing demands and projected demands.

Future Increases in Demands (afy)

Please select Member Agency: Chino

Land Use Type (du/ac)	2020	2025	2030	2035	2040
Residential Very Low (1 - 2)	-1	10	29	118	201
Residential Low (3 - 7)	223	445	600	992	1463
Residential Medium (8 - 14)	532	1599	2132	2190	2819
Residential High (15 - 24)	337	353	625	677	1191
Residential Very High (25+)	1	2	2	3	380
Commercial	48	100	442	470	711
Industrial	135	167	175	183	189
Public/Institutional	25	32	39	270	342
Parks, Schools, Irrigation	87	119	150	182	213
Agriculture	0	0	0	0	0
Unique Water User #1	2	4	6	8	10
Unique Water User #2	1	2	4	5	6
Unique Water User #3	1	1	2	2	3
Total	**1391**	**2834**	**4206**	**5100**	**7528**

NOTE:

This table presents the difference between existing demands and total future water demands to isolate the new future water demands.

Figure 7-2 Future Increase in Demands by Member Agency

7.2 By Year

In "By Year" tab, use the dropdown menu to view the Water Demands for each year. This table also displays the total amounts in the last column and last row.

Water Demands (afy)

By Member Agency | By Year

Please select year: 2015

Land Use Type (du/ac)	Chino	Chino Hills	Cucamonga Valley WD	Fontana WC	Monte Vista WD	Ontario	San Antonio WC	Upland	Total
Residential Very Low (1 - 2)	1004	1491	6299	2088	1522	338	1440	1579	15761
Residential Low (3 - 7)	6330	7024	19037	19110	3129	9993	0	8437	73060
Residential Medium (8 - 14)	967	1745	4217	2631	1635	3212	4	1601	16012
Residential High (15 - 24)	1070	767	4206	4029	666	4830	21	3022	18611
Residential Very High (25+)	138	0	1054	216	0	845	0	381	2634
Commercial	1277	1269	2333	6628	1339	5213	6	1542	19607
Industrial	495	1	1449	2061	367	2232	0	369	6974
Public/Institutional	1132	204	1366	687	324	3090	22	460	7285
Parks, Schools, Irrigation	2713	4091	9688	4682	1125	8101	0	2490	32890
Agriculture	0	0	36	0	61	2177	0	0	2274
Unique Water User #1	326	0	460	0	93	2688	0	281	3848
Unique Water User #2	203	0	296	0	51	681	0	256	1487
Unique Water User #3	89	0	284	0	0	573	0	122	1068
Unique Water User #4	0	0	261	0	0	0	0	107	368
*									0
Total	15744	16592	50986	42132	10312	43973	1493	20647	201879

Record: No Filter Search

Figure 7-3 Water Demands by Year

7.3 Water Demands Graph

Water Demands table also displays a graph of the water demands of all member agencies throughout the years. Total IEUA demands is shown as default. Click "Not Show IEUA" to show curves of member agencies only.

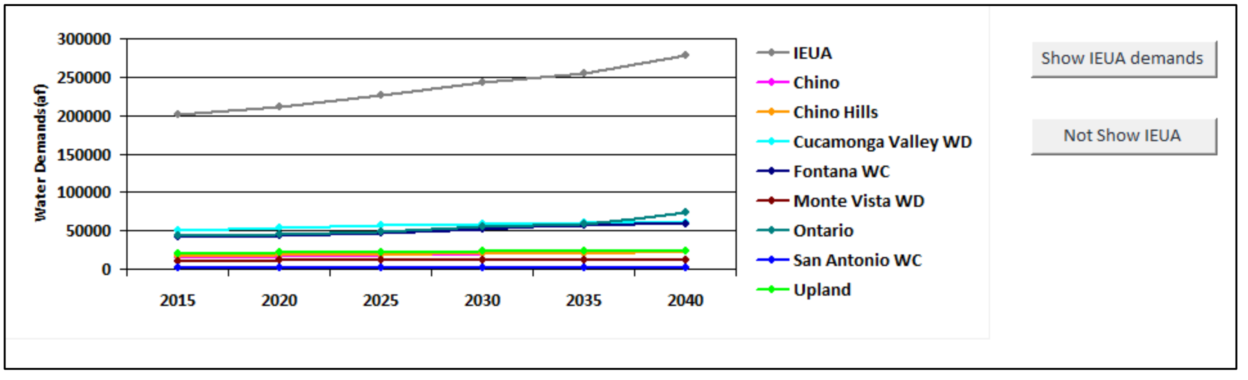


Figure 7-4 Water Demands Graph

8 UPDATE LAND USES IN ARCGIS

The model database contain multiple GIS feature classes with land use data which can be updated if changes to land uses occurs or year of development changes. These updates must be done within GIS.

The feature classes in the database is organized based on Cities within IEUA service area. Each city has two data tables: existing data and future data except City of Ontario and City of Upland. These two cities have existing and future data combined in one feature classes.

Since the land uses are mapped to existing parcel data, users only need to update the existing and future land use in the [CityName]_Existing or [CityName]_Existing_GeneralPlan tables. Below table shows which Feature Class is used to calculates acreages in the model. These can be updated within GIS when changes to Land Use type or development year happens.

City Name	Feature Class Name	Used for Inventory Calculation
Chino	Chino_Existing Chino_GeneralPlan	Y Y
Chino Hills	ChinoHills_Existing ChinoHills_GeneralPlan	Y N
Fontana	Fontana_Existing Fontana_GeneralPlan	Y N
Montclair	Montclair_Existing Montclair_GeneralPlan	Y N
Ontario	Ontario_Existing_GeneralPlan	Y
Rancho Cucamonga	RanchoCucamonga_Existing RanchoCucamonga_GeneralPlan	Y N
Rialto	Rialto_Existing Rialto_GeneralPlan	Y N
Unincorporated area between Montclair and Chino	UINC_MontClair_Chino_Existing UINC_MontClair_Chino_GP	Y N
Upland	Upland_Existing_GeneralPlan	Y

In the [CityName]_Existing or [CityName]_Existing_GeneralPlan, besides the geographic information, a few new fields were added (below table).

Field Name	Description
Master_LU	Existing land use (in 2015)
GeneralPlan_LU	Original planned future land use (Not used in inventory calculation)
Future_LU	Future land use
Year_Developed	The year the future land use developed
WaterPurveyor	The member agency belonged to

To update land use in ArcGIS,

A) Be sure to close the database opened in MS Access
B) Add the needed feature classes to ArcMap and start Editor.
C) Change the land use in Master_LU for existing or change the land use in Future_LU for future and change the Year_Developed as well. Year_Developed value need to be multiples of 5 and starting from 2015 (till 2040). For example, a future land use will be developed in 2023, please input “2020” in Year_Developed field
D) Save the edits and close ArcGIS

Please note, Chino is a special case when editing future land uses. Since the parcels at southeast of Pine Ave & Chino Corona Rd changes significantly in future, the parcels in Chino_GeneralPlan are used for representing the land use in future. If future land uses in the colored area (shown in figure 8-1) needs to be changed, please update the Future_LU and Year_Developed fields in Chino_GeneralPlan feature class. For all other landuse changes, please update these two fields in Chino_Existing feature class.

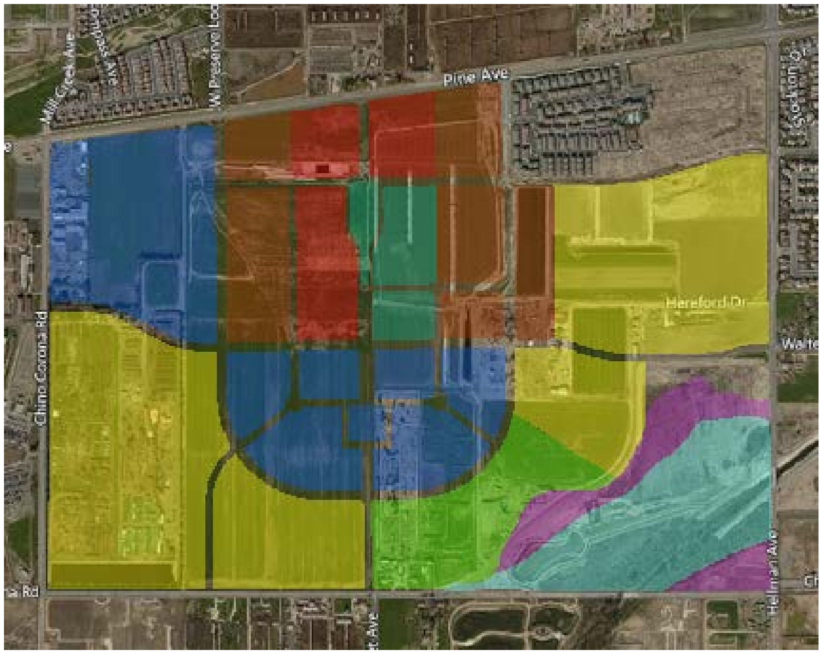


Figure 8-1 Parcels representing future land uses in Chino

9 UPDATE WATER DEMAND MODEL

Once you have completed and saved the changes to the GIS feature classes, use the update features on Welcome page to update land use inventories and water demands.

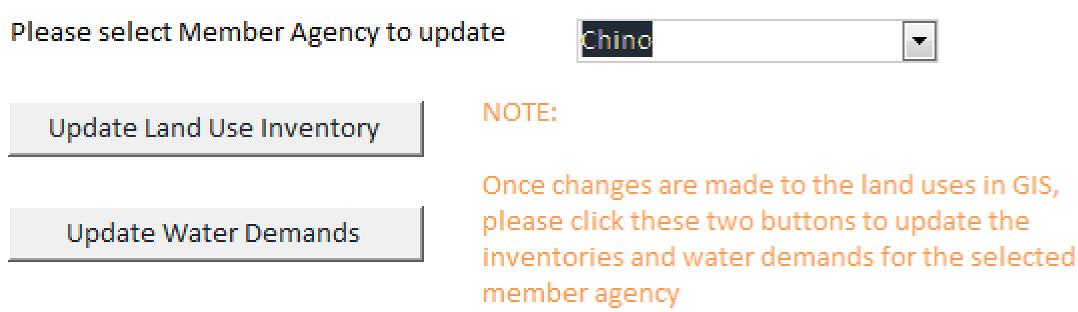


Figure 9-1 Update section in Welcome Form

9.1 Update Land Use Inventories

Before making the update, make sure the database is not opened in ArcGIS. Select a member agency or “All Member Agencies” in the dropdown list and click “Update Land Use Inventory” button to run the calculation. This update procedure can take several minutes, please don't interrupt it. The "Land Use Inventories" window will pop up once the updating finished.

9.2 Update Water Demands

Once the inventories update is done, click "Update Water Demands" button to re-calculate the total water demands and the "Water Demands" form will pop up once the updating finished.

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APPENDIX O

Water Loss Audit

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person:	Terry Caitlin	
Email Address:	tlcatlin@wfajpa.org	
Telephone | Ext.:	909-981-9454	12
Name of City / Utility:	Water Facilities Authority	
City/Town/Municipality:	Upland	
State / Province:	California (CA)	
Country:	USA	
Year:	2014	Financial Year
Start Date:	07/2014	Enter MM/YYYY numeric format
End Date:	06/2015	Enter MM/YYYY numeric format
Audit Preparation Date:	4/5/2016	
Volume Reporting Units:	Acre-feet	
PWSID / Other ID:		

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons:

Pcnt:			Value:
0.25%	◉	○	

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

? Click to access definition
\+ Click to add a comment

Water Audit Report for: Water Facilities Authority
Reporting Year: 2014 | 7/2014 - 6/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

Master Meter and Supply Error Adjustments

	Grade	Value	Units	Grade	Pcnt	Value	Units
Volume from own sources:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water imported:	8	27,605.500	acre-ft/yr	5			acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 27,605.500 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Units	Pcnt	Value	Units
Billed metered:	6	27,338.900	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	n/a	0.000	acre-ft/yr			
Unbilled unmetered:	10	0.001	acre-ft/yr		0.001	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 27,338.901 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

266.599 acre-ft/yr

Apparent Losses

	Grade	Value	Units	Pcnt	Value	Units
Unauthorized consumption:	6	0.001	acre-ft/yr		0.001	acre-ft/yr
Customer metering inaccuracies:	7	68.519	acre-ft/yr	0.25%		acre-ft/yr
Systematic data handling errors:		68.347	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 136.867 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 129.732 acre-ft/yr

WATER LOSSES: 266.599 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 266.600 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Units
Length of mains:	7	4.9	miles
Number of active AND inactive service connections:	9	7	
Service connection density:		1	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

	Grade	Value	Units
Average operating pressure:	9	89.5	psi

COST DATA

	Grade	Value	Units
Total annual cost of operating water system:	9	$3,342,185	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$1.50	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	7	$638.71	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 76 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Water imported
2: Billed metered
3: Systematic data handling errors

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: Water Facilities Authority
Reporting Year: 2014 | 7/2014 - 6/2015

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 76 out of 100 *****

System Attributes:

Apparent Losses:	136.867	acre-ft/yr
+ Real Losses:	129.732	acre-ft/yr
= **Water Losses:**	**266.599**	acre-ft/yr
? Unavoidable Annual Real Losses (UARL):	See limits in definition	acre-ft/yr
Annual cost of Apparent Losses:	$89,429	
Annual cost of Real Losses:	$82,861	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:

Non-revenue water as percent by volume of Water Supplied:	1.0%	
Non-revenue water as percent by cost of operating system:	5.2%	Real Losses valued at Variable Production Cost

Operational Efficiency:

Apparent Losses per service connection per day:	17455.26	gallons/connection/day
Real Losses per service connection per day:	N/A	gallons/connection/day
Real Losses per length of main per day*:	23,636.21	gallons/mile/day
Real Losses per service connection per day per psi pressure:	N/A	gallons/connection/day/psi

From Above, Real Losses = Current Annual Real Losses (CARL):	129.73	acre-feet/year
? Infrastructure Leakage Index (ILI) [CARL/UARL]:		

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: User Comments

WAS v5.0

Use this worksheet to add comments or notes to explain how an input value was calculated, or to document the sources of the information used.

General Comment: Water Facilities Authority provides wholesale water treatment and delivery to its five Member Agencies. Scope of water audit software designed primarily for retail water delivery. Water supply volumes for Water Facilities Authority in this audit includes both water treatment process and distribution delivery volumes.

Audit Item	Comment
Volume from own sources:	
Vol. from own sources: Master meter error adjustment:	
Water imported:	Calibration results from 2011 for treatment plant process meters and Member Agency service meters, owned by Water Facilities Authority. Raw water supply received from Metropolitan's meter at CB-12 on the Rialto Feeder (#3). MWD meter serves the CB-12 connection and is used as the reference. Set score of 8.
Water imported: master meter error adjustment:	Standard
Water exported:	
Water exported: master meter error adjustment:	
Billed metered:	Member Agency service meters and MWD's CB-12 meter are reviewed and logged once a month (Audit Questionaire #2c). Meter calibration for treatment plant process meters and Member Agency service meters completed in 2011 and scheduled for 2016 per "Flow Meter" p. 8). Meter reads are manual on a monthly basis. Collective Member Agency service meters' readings is compared to single CB-12 treatment plant influent meter reading, resulting in variance adjustments to Member Agency service meters billing volume, compared to MWD's CB-12 meter. Net billed volume includes both Distribution & Treatment Plant process volumes.
Billed unmetered:	
Unbilled metered:	

Audit Item	Comment
Unbilled unmetered:	
Unauthorized consumption:	Not clear that actual policies or procedures are in place to identify or mitigate potential unauthorized consumption.
Customer metering inaccuracies:	Limited customer rmeter inaccuary testing is conducted. Meter population is small and fairly new (oldest from 2004).
Systematic data handling errors:	
Length of mains:	Wholesale transmission/distribution pipeline is 3.8 mile (14). Electronic model not used to store information (17).
Number of active AND inactive service connections:	6 active and 1 inactive service connection (12). No fire hydrants or retail meters. Electronic system does not exist but location of meters assumed to be accurate due to number and frequency of reads (14).
Average length of customer service line:	N/A
Average operating pressure:	Weighted average for pipeline was calculated. Main pipeline (2.2 mi @ 87.9 psi); MVDW#1 (0.2 mi @ 183.5 psi); Ontario pipeline (2.5 mi @ 98 psi)
Total annual cost of operating water system:	Reliable cost accounting system in place, audited internally yearly. (25)
Customer retail unit cost (applied to Apparent Losses):	Used $593+15+45.71 = $653.71 per AF is equal to $1.50 per CCF from wholesale billing statement. Audited monthly and annualy by third party and CPA, not by third party aware of M36 methodology.
Variable production cost (applied to Real Losses):	Charge for MWD imported water purchases and WFA Direct Operating Cost ($593 + 45.71 = $638.71)

AWWA Free Water Audit Software: Water Balance

WAS v5.0

American Water Works Association.

Water Audit Report for:	Water Facilities Authority
Reporting Year:	2014 — 7/2014 - 6/2015
Data Validity Score:	76

Own Sources / Water Imported	System Input	Water Exported / Water Supplied	Authorized Consumption / Water Losses	Component	Sub-component	Revenue / NRW
		Water Exported *0.000*			Billed Water Exported	Revenue Water 0.000
Own Sources (Adjusted for known errors) *0.000*	System Input *27,605.500*	Water Supplied *27,605.500*	Authorized Consumption *27,338.901*	Billed Authorized Consumption *27,338.900*	Billed Metered Consumption (water exported is removed) *27,338.900*	Revenue Water 27,338.900
					Billed Unmetered Consumption *0.000*	
				Unbilled Authorized Consumption *0.001*	Unbilled Metered Consumption *0.000*	Non-Revenue Water (NRW) 266.600
					Unbilled Unmetered Consumption *0.001*	
			Water Losses *266.599*	Apparent Losses *136.867*	Unauthorized Consumption *0.001*	
					Customer Metering Inaccuracies *68.519*	
					Systematic Data Handling Errors *68.347*	
Water Imported *27,605.500*				Real Losses *129.732*	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

AWWA Free Water Audit Software: Dashboard

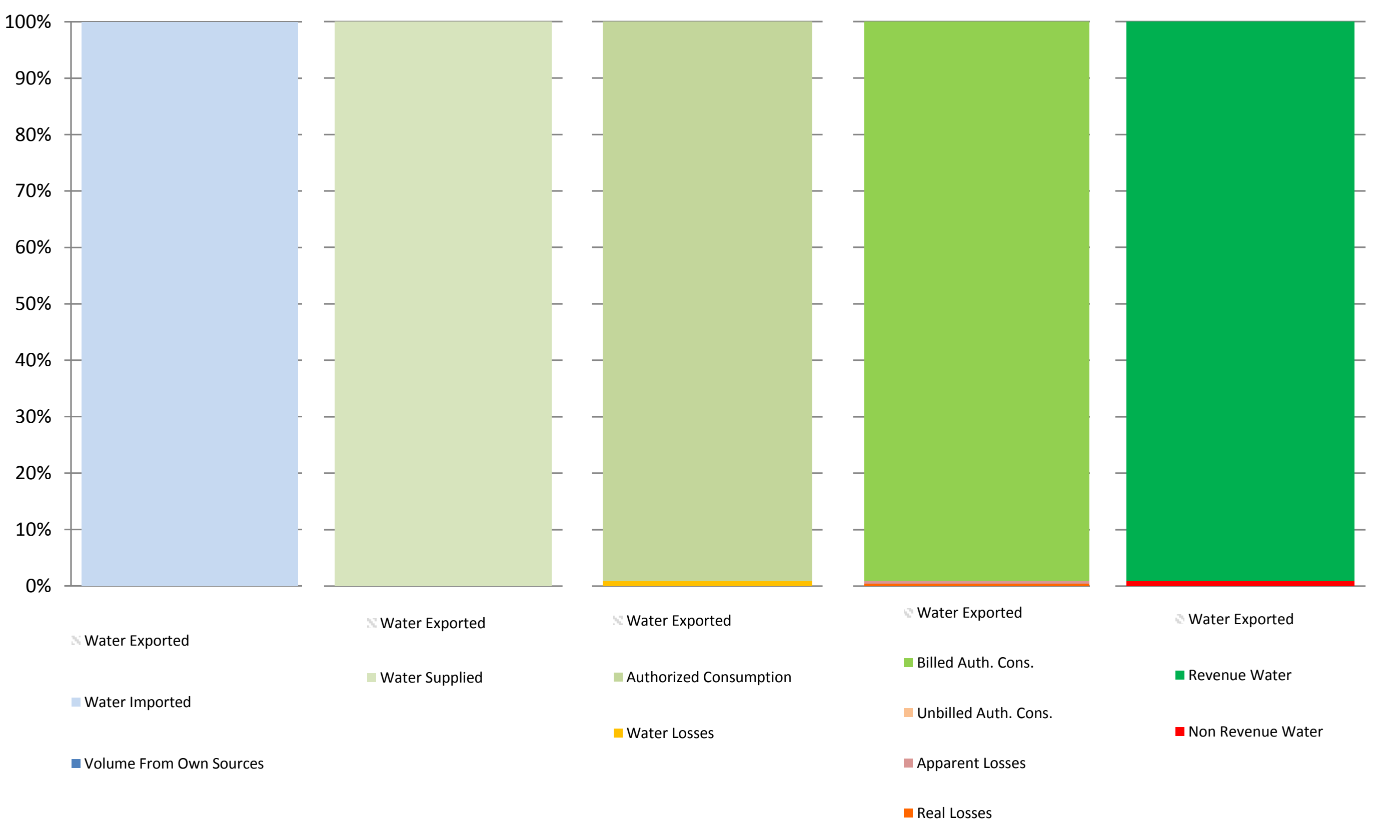
WAS v5.0

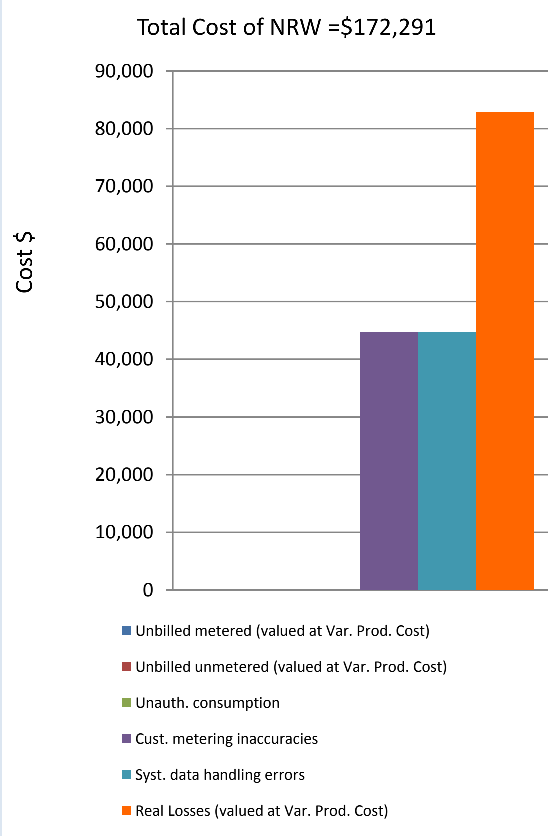
The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	Water Facilities Authority	
Reporting Year:	2014	7/2014 - 6/2015
Data Validity Score:	76	

○ Show me the VOLUME of Non-Revenue Water

◉ Show me the COST of Non-Revenue Water





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