IEUA FACILITIES MASTER PLANS

Final Program Environmental Impact Report
State Clearinghouse #2016061064
Appendices

Prepared for
Inland Empire Utilities Agency

February 2017

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TABLE OF CONTENTS

Facilities Master Plans Final PEIR

Page

Appendices

Appendix A
Scoping Materials

ESA

Notice of Preparation and Notice of Public Scoping Meeting

NOTICE OF PREPARATION
AND
NOTICE OF PUBLIC SCOPING MEETING

IEUA Facilities Master Plans Program Environmental Impact Report

To: California Office of Planning and Research
Responsible and Trustee Agencies
Other Interested Parties

Subject: Notice of Preparation of Program Environmental Impact Report and Notice of Public Scoping Meeting

Project: Facilities Master Plans

Lead Agency: Inland Empire Utilities Agency

Date: June 29, 2016

Notice of Preparation

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties that the Inland Empire Utilities Agency (IEUA) as the Lead Agency has independently determined that there are potentially significant impacts associated with implementation of projects identified in the proposed Facilities Master Plans, and an Environmental Impact Report (EIR) is required. The Facilities Master Plans encompass six distinct Facility Plans (described below) that outline facility improvements needed to meet IEUA's long-term planning objectives. Because these proposed facilities include a series of actions and these actions can be characterized as one large project to be implemented over many years, the IEUA is preparing a Program EIR (PEIR) pursuant to Section 15168 of the California Environmental Quality Act (CEQA) Guidelines. The IEUA has prepared this Notice of Preparation in accordance with the State CEQA Guidelines (Section 15082).

The IEUA is soliciting the input from interested persons and agencies to assist in the development of the scope and content of the environmental information to be studied in the PEIR. In accordance with CEQA, agencies are requested to review the project description that includes a program of proposal facilities and provide comments on environmental issues related to the statutory responsibilities of the agency. The PEIR will be used by IEUA when considering approval of the proposed program.

In accordance with CEQA, comments to the NOP must be received by IEUA no later than 30 days after publication of this notice. The review period for this NOP is from June 29, 2016 to July 29, 2016. We request that comments to this NOP be received no later than July 29, 2016.

Please include a return address and contact name with your comments and send them via mail or email to the address shown below:

Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708
Email: Pcambias@ieua.org Telephone: 909-993-1639

Notice of Public Scoping Meeting

A public scoping meeting will be held to receive public comments and suggestions on the environmental issues associated with implementation of the Facilities Master Plans that will be addressed in the PEIR. It will include a brief presentation providing an overview of the facilities proposed in the Facilities Master Plans. After the presentation, oral comments will be accepted. Written comment forms will be made available for those who wish to submit comments in writing at the scoping meeting. The scoping meeting will be open to the public and held at the following location:

Inland Empire Utility Agency
Agency Headquarters
6075 Kimball Avenue, Building A
Chino, CA 91708

At 6:00 pm on Thursday, July 21, 2016

PROJECT LOCATION

The locations of the proposed facilities in the Facilities Master Plans are within the 242-square-mile IEUA service area. The service area is illustrated in **Figure 1** and includes the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills; City of Rancho Cucamonga; and the unincorporated areas of San Bernardino County. The service area is bordered to the north by the San Gabriel Mountains; to the east by the Rialto-Colton Basin, the Jurupa Mountains and the Riverside County/San Bernardino County boundary, to the south by the Prado Flood Control Basin and to the west by the Chino Hills, Puente Hills and the Pomona and Claremont Basins

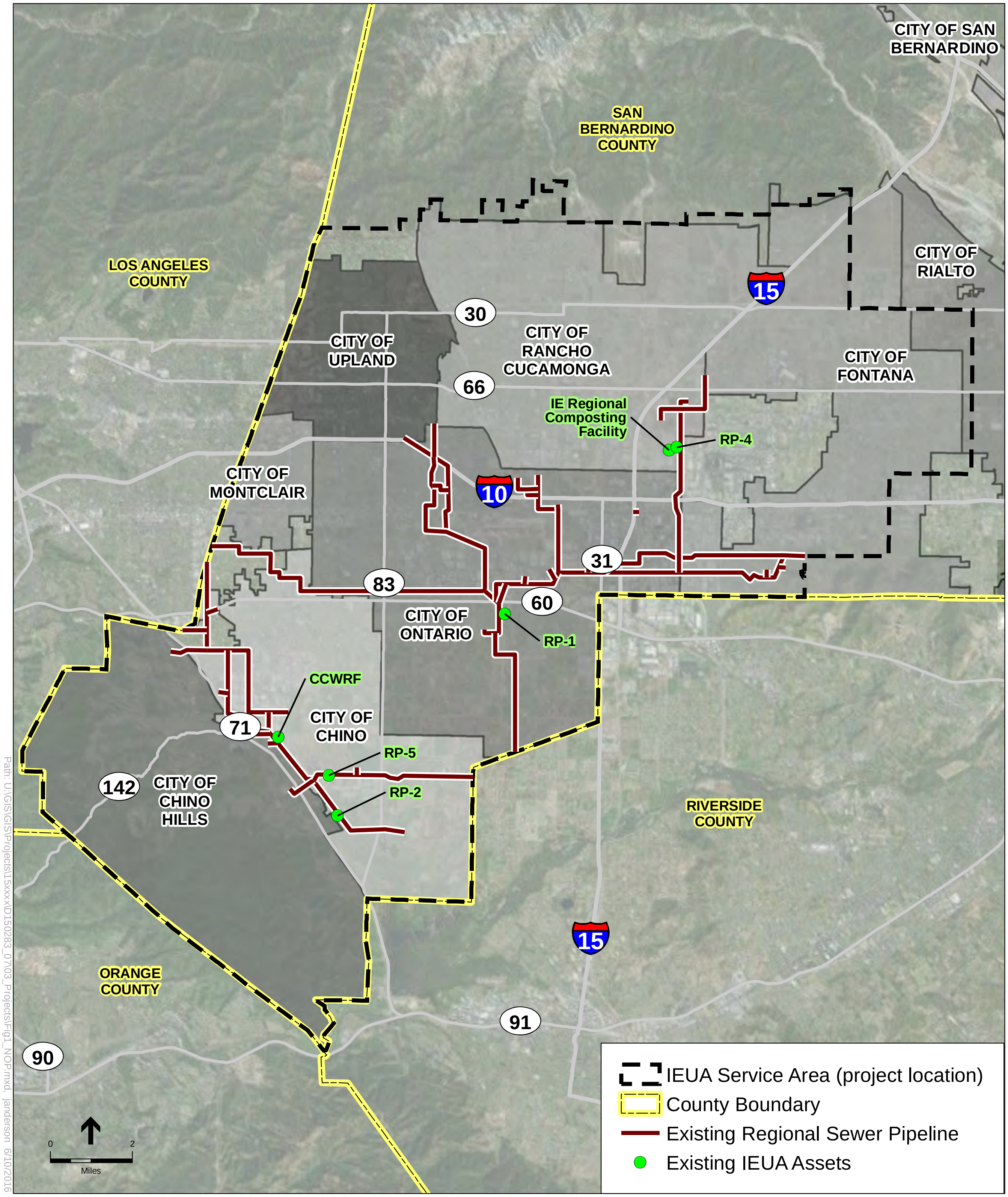
PROJECT BACKGROUND

The Inland Empire Utilities Agency (IEUA or Agency) is a regional wastewater treatment agency and wholesale distributor of imported water and recycled water. Today the Agency is responsible for serving approximately 830,000 people in southwestern San Bernardino County. The Agency is focused on providing three key services: (1) treating wastewater and developing programs to reduce the region's dependence on imported water supplies; (2) converting biosolids and waste products into high-quality compost made from recycled materials; and (3) generating electrical energy from renewable sources to offset energy demand by IEUA facilities.

IEUA owns and operates four regional water recycling plants (RWRPs) where industrial and municipal wastewater is treated and recycled water is produced. Figure 1 shows the locations of these RWRPs. In addition, the Agency treats biosolids at Regional Plant 1 (RP-1), RP-2 and at the Inland Empire Regional Composting Facility (IERCF).

In addition to recycled water and wastewater services, the Agency operates a network of groundwater recharge facilities in partnership with Chino Basin Watermaster (CBWM), San Bernardino County Flood Control District (SBCFCD), and Chino Basin Water Conservation District (CBWCD). The Agency participates in the operation of the Chino Desalter I facility in coordination with the Chino Basin Desalter Authority and other area agencies. The Agency also manages an extensive regional water use efficiency program.

Over the past several years, IEUA, in conjunction with the CBWM, has prepared or participated in the preparation of several master plans to provide the foundation for development and expansion of future wastewater treatment, biosolids handling, stormwater capture, groundwater recharge, and recycled water delivery to the Chino Basin and the Agency's service area. The six IEUA facility plans have now reached the stage where the Agency intends to consider these plans for final approval and implementation.



SOURCE: ESRI; County of San Bernardino

IEUA Facilities Master Plans NOP . 150283.07

Figure 1
IEUA Service Area

PROJECT OBJECTIVES

The primary objectives of the proposed project are to:

- Implement a program strategy that is consistent with the mission, vision, and core values of IEUA.
- Ensure that the IEUA service area is served with adequate wastewater treatment capacity that meets regulatory requirements and recycled water objectives through service area build out.
- Ensure that IEUA produces adequate recycled water supply to meet the objectives established in the Recycled Water Program Strategy through service area build out.
- Deliver sufficient wastewater discharge to meet IEUA's discharge obligations to the Santa Ana River.
- Provide sufficient processing capacity at the Inland Empire Regional Composting Facility to meet service area biosolids management demands through service area build out.
- Provide sustainable energy generation to minimize IEUA demand for electricity and natural gas from the Southern California Edison (SCE) and the Southern California Gas Company (SCG) grids to the maximum amount feasible.
- Maintain IEUA's leadership role in developing and providing new water resources and working with other stakeholders in the Chino Basin to maintain the Chino Groundwater Basin aquifer as a suitable source of potable water within its service area.
- Identify key water resource supply vulnerabilities and evaluate water supply options that could reduce these vulnerabilities and continue to develop a robust water resource strategy that can adapt and respond to a wide range of possible futures.
- Implement an organics diversion program and food waste co-digestion in support of IEUA's Member Agencies and local businesses in complying with the State's organics diversion requirements, and the Agency long term goals of peak power independence and carbon neutrality.

PROJECT DESCRIPTION

The IEUA is proposing to construct and operate facilities identified in the six interrelated Facility Master Plans. These proposed facilities would implement the comprehensive strategy for managing IEUA's regional wastewater and recycled water distribution system in the future; the future strategy for the treatment and disposal of biosolids and manure; and reliable and sustainable energy infrastructure to support these activities. These six master plans are outlined below.

1. **Wastewater Facilities Master Plan Update Report**

   The Wastewater Facilities Master Plan Update Report (WFMP) was prepared by CH2MHill in association with Carollo Engineers and dated March 2015. Changes in economic conditions and water use efficiency practices, discharge permit requirements, and water recycling needs necessitated the re-evaluation of the assumptions put forth in the 2002 WFMP and resulted in the update of the WFMP.

2. **IEUA Asset Management Plan**

   The IEUA Asset Management Plan for the Fiscal Year 2015/2016 was developed by staff members of the Agency. The Asset Management Plan addresses the Agency's need to manage their assets in order to coordinate decisions and take actions that allow the Agency to meet the business goals set in the document at the lowest lifecycle cost.

3. **Recycled Water Program Strategy**

   The Recycled Water Program Strategy (RWPS), which is considered a Facility Master Planning Study, was prepared by Stantec for the Agency in April 2015. This document serves to update the 2005 Recycled Water Implementation Plan and the 2007 Recycled Water Three Year Business Plan. The objective of the RWPS is to update supply and demand forecasts and to help map changes for the Recycled Water Program to maximize the beneficial use of recycled water through the planning year 2035.

4. **2013 Amendment to the 2010 Recharge Master Plan Update**

   The 2013 Amendment to the 2010 Recharge Master Plan Update (RMPU), prepared in September 2013 by Wildermuth Environmental, Inc., documents the investigation that was conducted pursuant to the direction of the Court and the Chino Basin Watermaster to amend its 2010 RPMU.

5. **IEUA 2015 Energy Management Plan**

   The IEUA 2015 Energy Management Plan of December 2015 analyzes historical energy use, defines a current energy and Greenhouse Gas emissions baseline, forecasts future demands, examines procurement strategies (including an Organics Diversion program), and proactively explores measures that can ease the Agency's load on utilities while cultivating a reliable and sustainable energy infrastructure across its facilities

6. **2015 Integrated Water Resources Plan**

   The 2015 Integrated Resources Plan: Water Supply & Climate Change Impacts 2015-2040 (IRP) is a regional 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.

In addition to facilities proposed within the six master plans, there are additional facilities proposed within the Agency's Capital Improvement Plan.

Fiscal Year 2016/17 Ten-Year Capital Improvement Plan

Fiscal Year 2016/17 Ten-Year Capital Improvement Plan (CIP) provides a cataloging and scheduling of projects over a multiyear period. Projects within the CIP are necessary to accomplish the Agency's goals based on physical conditions of assets and forecasted regional projections of water and wastewater needs. The projects involve the purchase, improvement or construction of major fixed assets and equipment, which are typically large in size, expensive, and permanent.

The six master plans and the CIP are collectively known as the Facilities Master Plans. Many of the projects that make up the Facilities Master Plans are in the concept development or planning phase and all would take place within the IEUA service area, largely in the vicinity of IEUA's existing assets as shown in Figure 1. The implementation of the facilities proposed within the Facilities Master Plans consists of construction, operation and maintenance. The general types of projects that are proposed are identified below.

- Regional wastewater treatment system improvements include, but are not limited to, liquid and solid treatment capacity, sludge system, dewatering treatment, pipelines, dosing facilities, odor control, flairs, electrical, pumps, pump stations, lift stations, meters, tanks, filters, HVAC (heating, ventilation, and air conditioning), emergency generators, rip-rap, lighting, drains, energy storage, and maintenance/rehabilitation of existing facilities.
- Recycling composting facility improvements include, but are not limited to, odor control, HVAC, solar panels, energy storage, filters, fire sprinklers, conveyor belts, lighting, drains, screens, and blowers.
- Recycled water improvements include, but are not limited to, pipelines, pump stations, emergency generators, meters, electrical, system improvements, tanks, wells, and discharge relocations.
- Groundwater recharge improvements include, but are not limited to, recharge basins, pump stations, pipelines, basin maintenance, emergency generators, and groundwater treatment.
- Regional conveyance system improvements include, but are not limited to, facility repairs, manhole replacements, and pipelines.
- Agency-wide/other facility improvements include, but are not limited to, lighting, discharge infrastructure to creeks, HVAC, pump and compressor replacements, pipe rehabilitations, maintenance, parking lot improvements, bathrooms, and signage.

POTENTIAL RESPONSIBLE AGENCIES

The IEUA Board of Directors must approve and certify the PEIR before any of the proposed development will be allowed to proceed and cause potential changes to the environment. This PEIR will be used as the information source and CEQA compliance document for the following discretionary actions or approvals by the IEUA, and subsequently by the Watermaster and any constituent agencies should they decide to adopt the six master plans or carry out specific projects. Responsible agencies for proposed facilities that will be addressed in the PEIR may include:

- Chino Basin Watermaster
- Chino Basin Water Conservation District
- San Bernardino County Flood Control District
- California Air Resources Board
- California Department of Water Resources
- Regional Water Quality Control Board
- South Coast Air Quality Management District

- State Water Resources Control Board
- United States Army Corps of Engineers
- Cities as follows:
    - Chino
    - Chino Hills
    - Ontario
    - Rancho Cucamonga
    - Montclair
    - Upland
    - Fontana
    - Pomona
- Counties as follows
    - San Bernardino County
    - Riverside County
- Monte Vista Water District
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Metropolitan Water District of Southern California
- Santa Ana River Water Company
- Santa Ana Watershed Project Authority
- Three Valleys Municipal Water District
- Western Municipal Water District
- California Department of Toxic Substances Control
- California Department of Transportation
- California Department of Fish and Wildlife
- U.S. Fish and Wildlife Service
- California Department of Public Health will be a responsible agency if permits or funding are requested from their department.
- Encroachment permits may be required from local jurisdictions, such as individual cities (listed above), California Department of Transportation (Caltrans), the two counties (Riverside and San Bernardino), Flood Control agencies, and private parties such as Southern California Edison, The Gas Company, or others such as BNSF Railway Company.

DISCUSSION OF ENVIRONMENTAL IMPACTS

The Program Environmental Impact Report (PEIR) analysis will primarily focus on the plan level implementation, but would also include site-specific construction and operation details of some individual actions. The PEIR will serve as a first-tier environmental document that focuses on the overall effects of implementing the activities that are described within the Facilities Master Plans (proposed program) with some site specific evaluation.

The PEIR will assess the physical changes to the environment that would likely result from the proposed program, including direct, indirect and cumulative impacts. Potential impacts of the proposed program are summarized below. The PEIR will identify mitigation measures, if necessary, to minimize potentially significant impacts of the proposed program.

Aesthetics

The IEUA service area consists primarily of the Chino Basin which is an alluvial valley that is relatively flat from east to west, sloping north to south at a one to two percent grade. Elevations range from 2,000 feet above mean sea level (msl) adjacent to the San Gabriel Foothills to approximately 500 feet above msl near Prado Dam. The service area is characterized primarily by distant mountain vistas and dense urbanization including residential, commercial and industrial land uses interspersed with undeveloped portions of the valley. Construction and operation of the facilities identified in the Facilities Master Plans could result in significant impacts on scenic vistas, scenic resources, visual character and land uses that are sensitive to light and glare. The potential construction activities associated with the proposed facilities would be temporary while operations of the facilities would be for long-term. The PEIR will evaluate the potential aesthetic impacts (i.e., scenic vistas, scenic resources, visual character and land uses that are sensitive to light and glare) associated with the construction and operations of the proposed facilities. Mitigation measures will be provided to reduce potential significant impacts, if feasible.

Agricultural and Forestry Resources

The IEUA service area is located within an area that historically contained substantial agricultural resources; primarily dairy ranches located in the southwestern portion of San Bernardino County in the cities of Chino and Ontario. A limited amount of agricultural land is located in the remaining portions of the IEUA service area. In the early 2000s, there were approximately 19,706 acres of agricultural land, including The Preserve at Chino. Since the 2000s, both the City of Chino and City of Ontario have approved development projects within the agricultural land area that have converted agricultural land to urban land uses. Throughout the IEUA service area, there are several parcels of land designated by the California Department of Conservation as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.

Construction activities associated with the facilities identified in the Facilities Master Plans could result in the removal of agricultural land that is currently designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. This removal could represent a significant impact on agricultural resources. The PEIR will evaluate the potential impacts on agricultural land include lands placed within the Williamson Contract from the implementation of the facilities identified in the Facilities Master Plans. Mitigation measures will be provided to reduce potential significant impacts, if feasible.

The San Bernardino National Forest is located just north of Upland, Rancho Cucamonga, Fontana, and portions of the unincorporated area San Bernardino County. The IEUA service area borders, but does not extend into, the San Bernardino National Forest. Therefore, construction and operation activities associated with the facilities identified in the Facilities Master Plans would not impact forest land or timberland, and these environmental issues will not be further discussed in the PEIR.

Air Quality

The IEUA service area is located within the South Coast Air Basin (SCAB). Construction of various activities proposed in the Facilities Master Plans would generate emissions from construction equipment exhaust, earth movement, construction workers' commute, and material hauling. Operational activities associated with the facilities within the Facilities Master Plans could generate air pollutants from employee commuting, truck deliveries and stationary equipment. The PEIR will evaluate the generation of air pollutants during construction and operational activities associated within the facilities in the Facilities Master Plans. Conflict with or obstructions with the implementation of the South Coast Air Quality Management District Air Quality Plan will also be discussed in the PEIR. Furthermore, pollutant concentration that could expose sensitive receptors will be addressed along with potential objectionable odors. If it is determined that the proposed facilities could result in significant air quality impacts, mitigation measures will be identified to reduce the impacts, where feasible.

Biological Resources

The IEUA service area is largely urbanized with some agriculture and few remaining natural areas. There are four natural areas within the IEUA service area that contain biological communities and special species: Prado Basin Reservoir, San Gabriel Mountain foothills and alluvial fans, Delhi sand dunes, and the Chino Hills State Park. Additionally, six natural biological communities that require special management occur within the IEUA service area, including Southern California Arroyo Chub/Santa Ana Sucker Stream, Southern Sycamore Alder Riparian Woodland, Riversidian Alluvial Fan Sage Scrub, California Walnut Woodland, Southern Willow Scrub, and Southern Cottonwood-Willow Riparian Forest. The proposed facilities associated with the Facilities Master Plans could result in significant impacts on sensitive plant species, wildlife species, and habitats. The PEIR will evaluate the potential direct and indirect impacts of the proposed facilities associated with the Facilities Master Plans on sensitive plant and wildlife species and habitats of special concern and will evaluate the consistency of the implementation of the proposed facilities with any habitat conversation plans, San Bernardino County General Plan, local ordinances, and state and federal regulations. If it is determined that the proposed facilities could have significant impacts to biological resources, mitigation measures will be identified to reduce the impacts, where feasible.

Cultural Resources

San Bernardino County encompasses over 20,000 square miles and only approximately 15 percent has been subject to cultural resources surveys. As a result of these surveys, more than 11,000 prehistoric and historic archaeological resources and over 2,000 historic structures have been documented within San Bernardino County. Additionally, San Bernardino County has more than 3,000 paleontologic localities recorded in the Regional Paleontologic Locality Inventory. The proposed facilities associated with the Facilities Master Plans will include excavation activities. These excavations could uncover previously known or unknown historical, archaeological, or paleontological resources or unknown human burial resources. The PEIR will assess the potential effects of the proposed facilities on cultural resources in the IEUA service area. If it is determined that the proposed facilities will have significant impacts to cultural resources, mitigation measures will be identified to reduce the impacts, where feasible.

Geology, Soils, and Seismicity

The IEUA service area is located in a seismically active region. The high population density coupled with the presence of the San Andreas, San Jacinto, and the Cucamonga faults and close proximity to other major faults make the Valley Region of the County have the greatest risk for potential geological hazards. Construction and operation of proposed facilities could be subject to potential seismic hazards including surface fault rupture, strong seismic shaking, soil liquefaction, and landslides, and geologic hazards such as subsidence, soil erosion, ground collapse, and expansive soil. The PEIR will further evaluate the potential seismic and geologic hazards that could occur on the proposed facilities. If it is determined that the proposed facilities will have significant impacts associated with geology, soils, and seismicity, mitigation measures will be identified to reduce the impacts, where feasible.

Greenhouse Gas/Climate Change

In addition to air emissions, the facilities associated with the proposed Facilities Master Plans would emit greenhouse gases from construction and operation activities. Construction activities could generate greenhouse gas emissions from equipment exhaust, construction workers' commutes, and material hauling. Operational activities could generate emissions from employee commuting, truck deliveries, and stationary equipment. The PEIR will evaluate the contribution of construction and operational greenhouse gas emissions to global climate change. The PEIR will evaluate the proposed Facilities Master Plans' consistency with state and local regulatory requirements and regulations. If it is determined that the proposed facilities associated with the Facilities Master Plans would have significant greenhouse gas emission impacts, mitigation measures will be identified to reduce impacts, where feasible.

Hazards and Hazardous Materials

A records search using the California Department of Toxic Substances Control (DTSC) EnviroStor and State Water Resources Control Board (SWRCB) GeoTracker databases revealed multiple listed and active sites within the IEUA service area, including the Chino Prisoner of War Camp, GE Engine Services Test Cell Facility, and San Bernardino Ontario Army Airfield which are on the Cortese List – a list of hazardous waste facilities subject to corrective action. Excavation activities could uncover contaminated soils or hazardous substances that pose a hazard to human health or the environment. In addition, operational activities association with some of the proposed facilities could use hazardous materials as part of the operations of the facilities. Furthermore, the facilities that are identified in the Facilities Master Plans that will include above ground structural development could result in safety hazard impacts if the structures are located near airports. The PEIR will assess the potential for encountering contaminated soils and hazardous materials as well as using, storing and transporting hazardous materials associated with the operation of proposed facilities. The PEIR will also evaluate the potential for facilities that include above ground structural development to cause safety hazards near airports. If it is determined that the project will have significant impacts related to hazardous materials or safety hazards, mitigation measures will be identified to reduce the impacts, where feasible.

Hydrology and Water Quality

The IEUA service area is located within the highly urbanized South Coast Hydrologic Region (HR) of the Santa Ana River Watershed that includes Chino Basin. The Santa Ana River Watershed drains from the steep-slopes of the San Bernardino Mountains to the valley floor of the Inland Empire, through the Prado Basin and on to Orange County and the Pacific Ocean. The implementation of the proposed facilities that are within the Facilities Master Plans could increase impervious surfaces within the IEUA area and thus increase storm water runoff. These facilities could also impact groundwater quantity and quality as well as surface water quality and cumulative hydrological issues. The increase in surface water runoff could result in the exceedance of existing drainage facilities as well as potentially expose structures to flooding, mudflow, and seiches. The PEIR will evaluate these potential hydrology and water quality impacts of the proposed facilities on the existing facilities. If it is determined that the project will have significant hydrology and water quality impacts related to surface water hydrology, groundwater or water quality, mitigation measures will be identified to reduce the impacts, where feasible.

Land Use

Land use designations within the IEUA service area are established by San Bernardino County as well as the seven cities within the service area. The types of land uses that have been established include residential, commercial, office, mixed use, industrial/manufacturing, government/public facilities, schools, transportation, open space/parks, utilities, agriculture, resource conservation, and floodway. The implementation of most of the proposed facilities would not result in the division of an established community due to the location and size of the proposed facilities; however, there may be some proposed facilities that will require further discussions within the PEIR of their potential to cause a division of an established community. In addition, construction activities of the proposed facilities could result in temporary disturbances of land uses while operation activities could result in long-term disturbances to land uses. The consistency of the proposed facilities with the plans and general policies of the cities and the county located within the IEUA service area will be discussed within the PEIR. If it is determined that the project will have significant impacts related to land use planning, mitigation measures will be identified to reduce the impacts, where feasible.

Mineral Resources

Based on a review of the California Geologic Survey (CGS) mineral resource zones for western San Bernardino County, there are various areas that are designated as significant mineral deposits. The CGS mineral resource zones (MRZ) categories are MRZ-1 (areas where adequate information is available that indicates no significant mineral deposits are present), MRZ-2 (areas where adequate information indicates that significant mineral deposits are present), and MRZ-3 (areas containing mineral deposits but the significance cannot be evaluated. MRZ-2 zones are primarily in the northern portion of the IEUA service area; however, there are a few MRZ-2 zones in the southern portion of the IEUA service area. The implementation of the facilities proposed within the Facilities Master Plans could result in significant impacts on mineral resources. These potential impacts will be addressed in the PEIR.

If it is determined that the project will have significant impacts to mineral resources, mitigation measures will be identified to reduce the impacts, where feasible.

Noise

Construction and operation of the proposed facilities within the Facilities Master Plans would generate noise and vibration that could potentially affect nearby sensitive receptors. The PEIR will evaluate the proximity of sensitive receptors to the proposed facilities and the potential noise and vibration increases. If it is determined that the project will have significant impacts to related to noise and vibration, mitigation measures will be identified to reduce the impacts, where feasible.

Population and Housing

The Southern California Association of Governments (SCAG) profile for San Bernardino County shows that the total population of the County has increased rapidly from 2000 to 2014 and forecasts that the West Valley Region will continue to grow. The PEIR will evaluate the potential for the proposed facilities to induce substantial population growth, displace substantial housing units, or displace people. If it is determined that the project will have significant impacts to related population and housing, mitigation measures will be identified to reduce the impacts, where feasible.

Public Services

Public services that are provided within the IEUA service area include fire protection, police protection, schools, parks, and other public facilities. The construction of the proposed facilities could impact emergency services such as police and fire responses due to increases in construction truck traffic and lane closures. The operation of the proposed facilities may increase employment within the IEUA service area which may result in a long-term impact on schools, parks, and other public facilities. The potential impacts from the construction and operation of the proposed facilities on the public services within the IEUA service area will be addressed in the PEIR. If it is determined that the project will have significant impacts related to public services, mitigation measures will be identified to reduce the impacts where feasible.

Recreation

Recreational facilities are located throughout the IEUA service area. These facilities are managed by the seven cities and county. In addition, the California Department of Parks and Recreation manages the Chino Hills State Park which is partially located within the IEUA service area. There are a variety of recreational activities that are provided throughout the IEUA service area including hiking, biking, horseback riding, camping, playfields, swimming, and fishing. The construction and operation of the proposed facilities could result in impacts to recreational facilities. The PEIR will evaluate the potential impacts on recreational facilities. If it is determined that the project will have significant impacts to recreational facilities, mitigation measures will be identified to reduce the impacts, where feasible.

Traffic and Transportation

The IEUA service area is extensively developed with urban land uses that already include an established circulation system. Construction activities associated with the proposed facilities that are within the Facilities Master Plans could result in short-term disruption in traffic flow along existing roadways. This disruption could include the placement of facilities within the roadways, the closure of lanes to provide adequate area for construction or staging, or the increase in construction traffic. During operational activities, employee trips, deliveries, and maintenance trips may increase along roadways. The PEIR will evaluate the construction and operation impact of the proposed facilities on traffic and circulation as well as the potential for hazardous circulation design features. If it is determined that the project will have significant impacts to traffic and transportation, mitigation measures will be identified to reduce the impacts, where feasible.

Utilities and Service Systems

IEUA provides water and sewer services to the purveyors located within the IEUA service area. Regional drainage facilities are provided by the County of San Bernardino while local drainage facilities are provided by the local jurisdiction. Landfill services are provided by the County. The construction and operation of the proposed facilities within the Facilities Master Plans could result in impacts to existing utilities. The proposed facilities will accommodate growth anticipated throughout the IEUA service area; therefore, the proposed facilities would not require additional water and wastewater facilities beyond those identified in the Facilities Master Plans. These proposed facilities could require additional drainage facilities to accommodate increases in storm water runoff due to increases in impervious services. In addition, construction activities associated with the proposed facilities could increase construction waste that could be required to be placed in a landfill. The PEIR will assess the potential impacts of the proposed facilities on existing utilities. If it is determined that the project will have significant impacts to utilities and service systems, mitigation measures will be identified to reduce the impacts, where feasible.

Notice of Preparation Comment Letters Received

Edmund G. Brown Jr.
Governor

Ken Alex
Director

Notice of Preparation

June 29, 2016

To: Reviewing Agencies

Re: IEUA Facilities Master Plan
SCH# 2016061064

Attached for your review and comment is the Notice of Preparation (NOP) for the IEUA Facilities Master Plan draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Pietro Cambiaso
Inland Empire Utility Agency
6075 Kimball Avenue
Chino, CA 91710

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# **2016061064**
Project Title IEUA Facilities Master Plan
Lead Agency Inland Empire Utilities Agency

Type **NOP** Notice of Preparation

Description The Inland Empire Utility Agency (IEUA) Facilities Master Plans include proposed facilities within the 242-square-mile IEUA service area. The service area is illustrated in Figure 1 and includes the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills; City of Rancho Cucamonga; and the unincorporated areas of San Bernardino County.

The implementation of the facilities proposed within the Facilities Master Plans consists of construction, operation and maintenance. The general types of projects that are proposed are identified below.

" Regional wastewater treatment system improvements
" Recycling composting facility improvements
" Recycled water improvements
" Groundwater recharge improvements
" Regional conveyance system improvements

Agency-wide/ other facility improvements include, but are not limited to, lighting, discharge infrastructure to creeks, HVAC, pump and compressor replacements, pipe rehabilitations, maintenance, parking lot improvements, bathrooms, and signage.

Lead Agency Contact

Name Pietro Cambiaso
Agency Inland Empire Utility Agency
Phone 909-993-1639 ***Fax***
email
Address 6075 Kimball Avenue
City Chino ***State*** CA ***Zip*** 91710

Project Location

County San Bernardino
City Chino, Chino Hills, Ontario, Rancho Cucamonga, Montclair, ...
Region
Cross Streets
Lat / Long 34° 05' 03.97N" N / 117° 31' 30.88W" W
Parcel No.
Township 1S ***Range*** 6W ***Section*** ***Base*** SB

Proximity to:

Highways 30,31,66,71,83,142
Airports Ontario,Chino,Cable
Railways BNSF Railway, Union Pacific
Waterways Santa Ana River
Schools
Land Use

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Cumulative Effects; Drainage/Absorption; Flood Plain/Flooding; Geologic/Seismic; Growth Inducing; Housing; Job Generation; Landuse; Minerals; Noise; Other Issues; Population/Housing Balance; Public Services; Recreation/Parks; Schools/Universities; Septic System; Sewer Capacity; Social; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife

Note: Blanks in data fields result from insufficient information provided by lead agency.

Reviewing Agencies California Energy Commission; Resources Agency; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 6; Public Utilities Commission; Caltrans, Division of Aeronautics; California Highway Patrol; Caltrans, District 8; Air Resources Board, Major Industrial Projects; State Water Resources Control Board, Division of Drinking Water, District 13; State Water Resources Control Board, Division of Drinking Water; State Water Resources Control Board, Divison of Financial Assistance; State Water Resources Control Board; State Water Resources Control Board, Division of Water Quality; Regional Water Quality Control Board, Region 8

Date Received 06/29/2016 ***Start of Review*** 06/29/2016 ***End of Review*** 07/28/2016

Notice of Completion & Environmental Document Transmittal

2016061064

Mail to: State Clearinghouse, P. O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH # ____

Project Title: IEUA Facilities Master Plans

Lead Agency: Inland Empire Utilities Agency — Contact Person: Pietro Cambiaso, P.E.
Mailing Address: 6075 Kimball Avenue — Phone: 909.993.1639
City: Chino — Zip: 91708 — County: San Bernardino

Project Location: County: San Bernardino — City/Nearest Community: Chino, Chino Hills, Ontario, Rancho Cucmonga, Montclair, Upland, Fontana
Cross Streets: Multiple — Zip Code: NA
Lat. / Long. (degrees, minutes, and seconds): 34° 05′ 03.97″ N/ 117° 31′ 30.88″ W — Total Acres: 242 square miles
Assessor's Parcel No.: NA — Section: NA — Twp.: 1 S — Range: 6W — Base: SB
Within 2 Miles: State Hwy #: 30, 31, 66, 71, 83, 142 — Waterways: Santa Ana River
Airports: Ontario, Chino, Cable — Railways: BNSF Railway, Union Pacific — Schools: Multiple

Document Type:

CEQA: ☒ NOP ☐ Early Cons ☐ Neg Dec ☐ Mit Neg Dec ☐ Draft EIR ☐ Supplement/Subsequent EIR (Prior SCH No.) ____ Other ____

NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI

Other: ☐ Joint Document ☐ Final Document ☐ Other ____

Governor's Office of Planning & Research

JUN 29 2016

STATE CLEARINGHOUSE

Local Action Type:

☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☒ Master Plans ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (Subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☐ Other ____

Development Type:

☐ Residential: Units ____ Acres ____
☐ Office: Sq.ft. ____ Acres ____ Employees ____
☐ Commercial: Sq.ft. ____ Acres ____ Employees ____
☐ Industrial: Sq.ft. ____ Acres ____ Employees ____
☐ Educational ____
☐ Recreational ____
☒ Water Facilities: Type ____ MGD ____
☐ Transportation: Type ____
☐ Mining: Mineral ____
☒ Power: Type ____ MW ____
☒ Waste Treatment: Type ____ MGD ____
☐ Hazardous Waste: Type ____
☒ Other: Groundwater Recharge and Pipeline Facilities

Project Issues Discussed in Document:

☒ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☒ Biological Resources
☐ Coastal Zone
☒ Drainage/Absorption
☐ Economic/Jobs
☐ Fiscal
☒ Flood Plain/Flooding
☐ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☒ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☒ Schools/Universities
☒ Septic Systems
☒ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic/Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Growth Inducement
☒ Land Use
☒ Cumulative Effects
☒ Other: Energy
☐ Other ____

Present Land Use/Zoning/General Plan Designation:

Multiple Present Land Uses/Multiple Zoning/Multiple General Plan Designations

Project Description: *(please use a separate page if necessary)*

See Attachment A

Note: The state Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Revised 2010

NOP Distribution List

County: San Bernardino

SCH# 2016061064

esources Agency

- [x] **Resources Agency** Nadell Gayou
- [ ] **Dept. of Boating & Waterways** Denise Peterson
- [ ] **California Coastal Commission** Elizabeth A. Fuchs
- [ ] **Colorado River Board** Lisa Johansen
- [ ] **Dept. of Conservation** Elizabeth Carpenter
- [x] **California Energy Commission** Eric Knight
- [ ] **Cal Fire** Dan Foster
- [ ] **Central Valley Flood Protection Board** James Herota
- [ ] **Office of Historic Preservation** Ron Parsons
- [x] **Dept of Parks & Recreation** Environmental Stewardship Section
- [ ] **California Department of Resources, Recycling & Recovery** Sue O'Leary
- [ ] **S.F. Bay Conservation & Dev't. Comm.** Steve McAdam
- [ ] **Dept. of Water Resources** Resources Agency, Nadell Gayou

Fish and Game

- [ ] **Depart. of Fish & Wildlife** Scott Flint, Environmental Services Division
- [ ] **Fish & Wildlife Region 1** Curt Babcock
- [ ] **Fish & Wildlife Region 1E** Laurie Harnsberger
- [ ] **Fish & Wildlife Region 2** Jeff Drongesen
- [ ] **Fish & Wildlife Region 3** Craig Weightman
- [ ] **Fish & Wildlife Region 4** Julie Vance
- [ ] **Fish & Wildlife Region 5** Leslie Newton-Reed, Habitat Conservation Program
- [x] **Fish & Wildlife Region 6** Tiffany Ellis, Habitat Conservation Program
- [ ] **Fish & Wildlife Region 6 I/M** Heidi Calvert, Inyo/Mono, Habitat Conservation Program
- [ ] **Dept. of Fish & Wildlife M** Becky Ota, Marine Region

Other Departments

- [ ] **Food & Agriculture** Sandra Schubert, Dept. of Food and Agriculture
- [ ] **Depart. of General Services** Public School Construction
- [ ] **Dept. of General Services** Cathy Buck/George Carollo, Environmental Services Section
- [ ] **Delta Stewardship Council** Kevan Samsam
- [ ] **Housing & Comm. Dev.** CEQA Coordinator, Housing Policy Division

Independent Commissions,Boards

- [ ] **Delta Protection Commission** Michael Machado
- [ ] **OES (Office of Emergency Services)** Monique Wilber
- [x] **Native American Heritage Comm.** Debbie Treadway
- [x] **Public Utilities Commission** Supervisor
- [ ] **Santa Monica Bay Restoration** Guangyu Wang
- [ ] **State Lands Commission** Jennifer Deleong
- [ ] **Tahoe Regional Planning Agency (TRPA)** Cherry Jacques

Cal State Transportation Agency CalSTA

- [x] **Caltrans - Division of Aeronautics** Philip Crimmins
- [ ] **Caltrans – Planning** HQ LD-IGR, Terri Pencovic
- [x] **California Highway Patrol** Suzann Ikeuchi, Office of Special Projects

Dept. of Transportation

- [ ] **Caltrans, District 1** Rex Jackman
- [ ] **Caltrans, District 2** Marcelino Gonzalez
- [ ] **Caltrans, District 3** Eric Federicks – South, Susan Zanchi - North
- [ ] **Caltrans, District 4** Patricia Maurice
- [ ] **Caltrans, District 5** Larry Newland
- [ ] **Caltrans, District 6** Michael Navarro
- [ ] **Caltrans, District 7** Dianna Watson
- [x] **Caltrans, District 8** Mark Roberts
- [ ] **Caltrans, District 9** Gayle Rosander
- [ ] **Caltrans, District 10** Tom Dumas
- [ ] **Caltrans, District 11** Jacob Armstrong
- [ ] **Caltrans, District 12** Maureen El Harake

Cal EPA

Air Resources Board

- [ ] Airport & Freight, Cathi Slaminski
- [ ] Transportation Projects, Nesamani Kalandiyur
- [x] Industrial/Energy Projects, Mike Tollstrup
- [x] **State Water Resources Control Board** Regional Programs Unit, Division of Financial Assistance
- [x] **State Water Resources Control Board** Cindy Forbes – Asst Deputy, Division of Drinking Water
- [x] **State Water Resources Control Board** **Div. Drinking Water #** 13
- [x] **State Water Resources Control Board** Student Intern, 401 Water Quality Certification Unit, Division of Water Quality
- [ ] **State Water Resouces Control Board** Phil Crader, Division of Water Rights
- [ ] **Dept. of Toxic Substances Control** CEQA Tracking Center
- [ ] **Department of Pesticide Regulation** CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] **RWQCB 1** Cathleen Hudson, North Coast Region (1)
- [ ] **RWQCB 2** Environmental Document Coordinator, San Francisco Bay Region (2)
- [ ] **RWQCB 3** Central Coast Region (3)
- [ ] **RWQCB 4** Teresa Rodgers, Los Angeles Region (4)
- [ ] **RWQCB 5S** Central Valley Region (5)
- [ ] **RWQCB 5F** Central Valley Region (5), Fresno Branch Office
- [ ] **RWQCB 5R** Central Valley Region (5), Redding Branch Office
- [ ] **RWQCB 6** Lahontan Region (6)
- [ ] **RWQCB 6V** Lahontan Region (6), Victorville Branch Office
- [ ] **RWQCB 7** Colorado River Basin Region (7)
- [x] **RWQCB 8** Santa Ana Region (8)
- [ ] **RWQCB 9** San Diego Region (9)
- [ ] Other ____________
- [ ] ____________ Conservancy

Last Updated 4/25/2016

DEPARTMENT OF TRANSPORTATION
DISTRICT 8
PLANNING (MS 725)
464 WEST 4th STREET, 6th FLOOR
SAN BERNARDINO, CA 92401-1400
PHONE (909) 388-7017
FAX (909) 383-5936
TTY 711
www.dot.ca.gov/dist8

Serious Drought.
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July 27, 2016 **File: 08-SBd-TBD**

Pietro Cambiaso
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91710

Inland Empire Utilities Agency Facilities Master Plan – Notice of Preparation of the Program Environmental Impact Report

Dear Mr. Cambiaso:

Thank you for providing the California Department of Transportation (Caltrans) the opportunity to review and comment on the Notice of Preparation of the Program Environmental Impact Report (PEIR) for the Inland Empire Utilities Agency (IEUA) Facilities Master Plan (Project). The locations of the proposed facilities are within the 242-square mile IEUA service area, including the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills, Rancho Cucamonga; and the unincorporated areas of San Bernardino County. The project proposes to construct and operate facilities identified in the six interrelated Facility Master Plans, including Wastewater Facilities Master Plan Update Report, IEUA Asset Management Plan, Recycled Water Program Strategy, 2013 Amendment to the 2010 Recharge Master Plan Update, IEUA 2015 Energy Management Plan, 2015 Integrated Water Resources Plan, and Fiscal Year 2016/17 Ten-Year Capital Improvement Plan.

As the owner and operator of the State Highway System (SHS), it is our responsibility to coordinate and consult with local jurisdictions when proposed development may impact our facilities. Under the California Environmental Quality Act, we are required to make recommendations to offset associated impacts with the proposed project. Although the project is under the jurisdiction of the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills, Rancho Cucamonga; and the unincorporated areas of San Bernardino County, due to the project's potential impact to State facilities, it is also subject to the policies and regulations that govern the SHS. We offer the following comments:

- We recommend a preliminary scoping meeting prior to the preparation of the Traffic Impact Analysis (TIA) to discuss any potential issues and accurately evaluate the extent of potential impacts of the project to the operational characteristics of the existing State facilities. Additionally, we recommend the TIA be submitted prior to the circulation of the

PEIR to ensure timely review of the submitted materials. Submit three hard and electronic copies of the TIA. (See *Caltrans Guide for the Preparation of Traffic Impact Studies* at http://www.dot.ca.gov/hq/traffops/developserv/operationalsystems/reports/tisguide.pdf).

- To ensure that proposed site grading and drainage design does not result in an adverse impact to State Right-of-Way, we request that a requirement to review Hydraulic Report and plans and provide written construction clearance be included among the project conditions of approval. Submit two hard and electronic copies of site grading and drainage plans, prior to issuance of construction permits.

- Provide a Traffic Control Plan to be reviewed by Caltrans prior to the initiation of any construction activities where a normal function of a public roadway will be affected/suspended.

These recommendations are preliminary and summarize our review of materials provided for our evaluation. If this project is later modified in any way, please forward copies of revised plans as necessary so that we may evaluate all proposed changes for potential impacts to the SHS. If you have any questions regarding this letter, please contact Adrineh Melkonian (909) 806-3928 or myself at (909) 383-4557.

Sincerely,

Mark Roberts

MARK ROBERTS
Office Chief
Intergovernmental Review, Community and Regional Planning

Guidelines for Developments in the
Area of Facilities, Fee Properties, and/or Easements
of The Metropolitan Water District of Southern California

1. Introduction

a. The following general guidelines should be followed for the design of proposed facilities and developments in the area of Metropolitan's facilities, fee properties, and/or easements.

b. We require that 3 copies of your tentative and final record maps, grading, paving, street improvement, landscape, storm drain, and utility plans be submitted for our review and written approval as they pertain to Metropolitan's facilities, fee properties and/or easements, prior to the commencement of any construction work.

2. Plans, Parcel and Tract Maps

The following are Metropolitan's requirements for the identification of its facilities, fee properties, and/or easements on your plans, parcel maps and tract maps:

a. Metropolitan's fee properties and/or easements and its pipelines and other facilities must be fully shown and identified as Metropolitan's on all applicable plans.

b. Metropolitan's fee properties and/or easements must be shown and identified as Metropolitan's with the official recording data on all applicable parcel and tract maps.

c. Metropolitan's fee properties and/or easements and existing survey monuments must be dimensionally tied to the parcel or tract boundaries.

d. Metropolitan's records of surveys must be referenced on the parcel and tract maps.

3. Maintenance of Access Along Metropolitan's Rights-of-Way

a. Proposed cut or fill slopes exceeding 10 percent are normally not allowed within Metropolitan's fee properties or easements. This is required to facilitate the use of construction and maintenance equipment, and provide access to its aboveground and belowground facilities.

b. We require that 16-foot-wide commercial-type driveway approaches be constructed on both sides of all streets crossing Metropolitan's rights-of-way. Openings are required in any median island. Access ramps, if necessary, must be at least 16-feet-wide. Grades of ramps are normally not allowed to exceed 10 percent. If the slope of an access ramp must exceed 10 percent due to the topography, the ramp must be paved. We require a 40-foot-long level area on the driveway approach to access ramps where the ramp meets the street. At Metropolitan's fee properties, we may require fences and gates.

c. The terms of Metropolitan's permanent easement deeds normally preclude the building or maintenance of structures of any nature or kind within its easements, to ensure safety and avoid interference with operation and maintenance of Metropolitan's pipelines or other facilities. Metropolitan must have vehicular access along the easements at all times for inspection, patrolling, and for maintenance of the pipelines and other facilities on a routine basis. We require a 20-foot-wide clear zone around all above-ground facilities for this routine access. This clear zone should slope away from our facility on a grade not to exceed 2 percent. We must also have access along the easements with construction equipment. An example of this is shown on Figure 1.

d. The footings of any proposed buildings adjacent to Metropolitan's fee properties and/or easements must not encroach into the fee property or easement or impose additional loading on Metropolitan's pipelines or other facilities therein. A typical situation is shown on Figure 2. Prints of the detail plans of the footings for any building or structure adjacent to the fee property or easement must be submitted for our review and written approval as they pertain to the pipeline or other facilities therein. Also, roof eaves of buildings adjacent to the easement or fee property must not overhang into the fee property or easement area.

e. Metropolitan's pipelines and other facilities, e.g. structures, manholes, equipment, survey monuments, etc. within its fee properties and/or easements must be protected from damage by the easement holder on Metropolitan's property or the property owner where Metropolitan has an easement, at no expense to Metropolitan. If the facility is a cathodic protection station it shall be located prior to any grading or excavation. The exact location, description and way of protection shall be shown on the related plans for the easement area.

4. <u>Easements on Metropolitan's Property</u>

a. We encourage the use of Metropolitan's fee rights-of-way by governmental agencies for public street and utility purposes, provided that such use does not interfere with Metropolitan's use of the property, the entire width of the property is accepted into the agency's public street system and fair market value is paid for such use of the right-of-way.

b. Please contact the Director of Metropolitan's Right of Way and Land Division, telephone (213) 250-6302, concerning easements for landscaping, street, storm drain, sewer, water or other public facilities proposed within Metropolitan's fee properties. A map and legal description of the requested easements must be submitted. Also, written evidence must be submitted that shows the city or county will accept the easement for the specific purposes into its public system. The grant of the easement will be subject to Metropolitan's rights to use its land for water pipelines and related purposes to the same extent as if such grant had not been made. There will be a charge for the easement. Please note that, if entry is required on the property prior to issuance of the easement, an entry permit must be obtained. There will also be a charge for the entry permit.

5. <u>Landscaping</u>

Metropolitan's landscape guidelines for its fee properties and/or easements are as follows:

a. A green belt may be allowed within Metropolitan's fee property or easement.

b. All landscape plans shall show the location and size of Metropolitan's fee property and/or easement and the location and size of Metropolitan's pipeline or other facilities therein.

c. Absolutely no trees will be allowed within 15 feet of the centerline of Metropolitan's existing or future pipelines and facilities.

d. Deep-rooted trees are prohibited within Metropolitan's fee properties and/or easements. Shallow-rooted trees are the only trees allowed. The shallow-rooted trees will not be permitted any closer than 15 feet from the centerline of the pipeline, and such trees shall not be taller than 25 feet with a root spread no greater than 20 feet in diameter at maturity. Shrubs, bushes, vines, and ground cover are permitted, but larger shrubs and bushes should not be planted directly over our pipeline. Turf is acceptable. We require submittal of landscape plans for Metropolitan's prior review and written approval. (See Figure 3).

e. The landscape plans must contain provisions for Metropolitan's vehicular access at all times along its rights-of-way to its pipelines or facilities therein. Gates capable of accepting Metropolitan's locks are required in any fences across its rights-of-way. Also, any walks or drainage facilities across its access route must be constructed to AASHTO H-20 loading standards.

f. Rights to landscape any of Metropolitan's fee properties must be acquired from its Right of Way and Land Division. Appropriate entry permits must be obtained prior to any entry on its property. There will be a charge for any entry permit or easements required.

6. <u>Fencing</u>

Metropolitan requires that perimeter fencing of its fee properties and facilities be constructed of universal chain link, 6 feet in height and topped with 3 strands of barbed wire angled upward and outward at a 45 degree angle or an approved equal for a total fence height of 7 feet. Suitable substitute fencing may be considered by Metropolitan. (Please see Figure 5 for details).

7. <u>Utilities in Metropolitan's Fee Properties and/or Easements or Adjacent to Its Pipeline in Public Streets</u>

Metropolitan's policy for the alinement of utilities permitted within its fee properties and/or easements and street rights-of-way is as follows:

a. Permanent structures, including catch basins, manholes, power poles, telephone riser boxes, etc., shall not be located within its fee properties and/or easements.

b. We request that permanent utility structures within public streets, in which Metropolitan's facilities are constructed under the Metropolitan Water District Act, be placed as far from our pipeline as possible, but not closer than 5 feet from the outside of our pipeline.

c. The installation of utilities over or under Metropolitan's pipeline(s) must be in accordance with the requirements shown on the enclosed prints of Drawings Nos. C-11632 and C-9547. Whenever possible we request a minimum of one foot clearance between Metropolitan's pipe and your facility. Temporary support of Metropolitan's pipe may also be required at undercrossings of its pipe in an open trench. The temporary support plans must be reviewed and approved by Metropolitan.

d. Lateral utility crossings of Metropolitan's pipelines must be as perpendicular to its pipeline alinement as practical. Prior to any excavation our pipeline shall be located manually and any excavation within two feet of our pipeline must be done by hand. This shall be noted on the appropriate drawings.

e. Utilities constructed longitudinally within Metropolitan's rights-of-way must be located outside the theoretical trench prism for uncovering its pipeline and must be located parallel to and as close to its rights-of-way lines as practical.

f. When piping is jacked or installed in jacked casing or tunnel under Metropolitan's pipe, there must be at least two feet of vertical clearance between the bottom of Metropolitan's pipe and the top of the jacked pipe, jacked casing or tunnel. We also require that detail drawings of the shoring for the jacking or tunneling pits be submitted for our review and approval. Provisions must be made to grout any voids around the exterior of the jacked pipe, jacked casing or tunnel. If the piping is installed in a jacked casing or tunnel the annular space between the piping and the jacked casing or tunnel must be filled with grout.

g. Overhead electrical and telephone line requirements:

1) Conductor clearances are to conform to the California State Public Utilities Commission, General Order 95, for Overhead Electrical Line Construction or at a greater clearance if required by Metropolitan. Under no circumstances shall clearance be less than 35 feet.

2) A marker must be attached to the power pole showing the ground clearance and line voltage, to help prevent damage to your facilities during maintenance or other work being done in the area.

3) Line clearance over Metropolitan's fee properties and/or easements shall be shown on the drawing to indicate the lowest point of the line under the most adverse conditions including consideration of sag, wind load, temperature change, and support type. We require that overhead lines be located at least 30 feet laterally away from all above-ground structures on the pipelines.

4) When underground electrical conduits, 120 volts or greater, are installed within Metropolitan's fee property and/or easement, the conduits must be incased in a minimum of three inches of red concrete. Where possible, above ground warning signs must also be placed at the right-of-way lines where the conduits enter and exit the right-of-way.

h. The construction of sewerlines in Metropolitan's fee properties and/or easements must conform to the California Department of Health Services Criteria for the Separation of Water Mains and Sanitary Services and the local City or County Health Code Ordinance as it relates to installation of sewers in the vicinity of pressure waterlines. The construction of sewerlines should also conform to these standards in street rights-of- way.

i. Cross sections shall be provided for all pipeline crossings showing Metropolitan's fee property and/or easement limits and the location of our pipeline(s). The exact locations of the crossing pipelines and their elevations shall be marked on as-built drawings for our information.

j. Potholing of Metropolitan's pipeline is required if the vertical clearance between a utility and Metropolitan's pipeline is indicated on the plan to be one foot or less. If the indicated clearance is between one and two feet, potholing is suggested. Metropolitan will provide a representative to assists others in locating and identifying its pipeline. Two-working days notice is requested.

k. Adequate shoring and bracing is required for the full depth of the trench when the excavation encroaches within the zone shown on Figure 4.

l. The location of utilities within Metropolitan's fee property and/or easement shall be plainly marked to help prevent damage during maintenance or other work done in the area. Detectable tape over buried utilities should be placed a minimum of 12 inches above the utility and shall conform to the following requirements:

1) Water pipeline: A two-inch blue warning tape shall be imprinted with:

"CAUTION BURIED WATER PIPELINE"

2) Gas, oil, or chemical pipeline: A two-inch yellow warning tape shall be imprinted with:

"CAUTION BURIED _______ PIPELINE"

3) Sewer or storm drain pipeline: A two-inch green warning tape shall be imprinted with:

"CAUTION BURIED ______ PIPELINE"

4) Electric, street lighting, or traffic signals conduit: A two-inch red warning tape shall be imprinted with:

"CAUTION BURIED _______ CONDUIT"

5) Telephone, or television conduit: A two-inch orange warning tape shall be imprinted with:

"CAUTION BURIED _______ CONDUIT"

m. Cathodic Protection requirements:

1) If there is a cathodic protection station for Metropolitan's pipeline in the area of the proposed work, it shall be located prior to any grading or excavation. The exact location, description and manner of protection shall be shown on all applicable plans. Please contact Metropolitan's Corrosion Engineering Section, located at Metropolitan's F. E. Weymouth Softening and Filtration Plant, 700 North Moreno Avenue, La Verne, California 91750, telephone (714) 593-7474, for the locations of Metropolitan's cathodic protection stations.

2) If an induced-current cathodic protection system is to be installed on any pipeline crossing Metropolitan's pipeline, please contact Mr. Wayne E. Risner at (714) 593-7474 or (213) 250-5085. He will review the proposed system and determine if any conflicts will arise with the existing cathodic protection systems installed by Metropolitan.

3) Within Metropolitan's rights-of-way, pipelines and carrier pipes (casings) shall be coated with an approved protective coating to conform to Metropolitan's requirements, and shall be maintained in a neat and orderly condition as directed by Metropolitan. The application and monitoring of cathodic protection on the pipeline and casing shall conform to Title 49 of the Code of Federal Regulations, Part 195.

4) If a steel carrier pipe (casing) is used:

(a) Cathodic protection shall be provided by use of a sacrificial magnesium anode (a sketch showing the cathodic protection details can be provided for the designers information).

(b) The steel carrier pipe shall be protected with a coal tar enamel coating inside and out in accordance with AWWA C203 specification.

n. All trenches shall be excavated to comply with the CAL/OSHA Construction Safety Orders, Article 6, beginning with Sections 1539 through 1547. Trench backfill shall be placed in 8-inch lifts and shall be compacted to 95 percent relative compaction (ASTM D698) across roadways and through protective dikes. Trench backfill elsewhere will be compacted to 90 percent relative compaction (ASTM D698).

o. Control cables connected with the operation of Metropolitan's system are buried within streets, its fee properties and/or easements. The locations and elevations of these cables shall be shown on the drawings. The drawings shall note that prior to any excavation in the area, the control cables shall be located and measures shall be taken by the contractor to protect the cables in place.

p. Metropolitan is a member of Underground Service Alert (USA). The contractor (excavator) shall contact USA at 1-800-422-4133 (Southern California) at least 48 hours prior to starting any excavation work. The contractor will be liable for any damage to Metropolitan's facilities as a result of the construction.

8. Paramount Right

Facilities constructed within Metropolitan's fee properties and/or easements shall be subject to the paramount right of Metropolitan to use its fee properties and/or easements for the purpose for which they were acquired. If at any time Metropolitan or its assigns should, in the exercise of their rights, find it necessary to remove any of the facilities from the fee properties and/or easements, such removal and replacement shall be at the expense of the owner of the facility.

9. Modification of Metropolitan's Facilities

When a manhole or other of Metropolitan's facilities must be modified to accommodate your construction or reconstruction, Metropolitan will modify the facilities with its forces. This should be noted on the construction plans. The estimated cost to perform this modification will be given to you and we will require a deposit for this amount before the work is performed. Once the deposit is received, we will schedule the work. Our forces will coordinate the work with your contractor. Our final billing will be based on actual cost incurred, and will include materials, construction, engineering plan review, inspection, and administrative overhead charges calculated in accordance with Metropolitan's standard accounting practices. If the cost is less than the deposit, a refund will be made; however, if the cost exceeds the deposit, an invoice will be forwarded for payment of the additional amount.

10. Drainage

a. Residential or commercial development typically increases and concentrates the peak storm water runoff as well as the total yearly storm runoff from an area, thereby increasing the requirements for storm drain facilities downstream of the development. Also, throughout the year water from landscape irrigation, car washing, and other outdoor domestic water uses flows into the storm drainage system resulting in weed abatement, insect infestation, obstructed access and other problems. Therefore, it is Metropolitan's usual practice not to approve plans that show discharge of drainage from developments onto its fee properties and/or easements.

b. If water must be carried across or discharged onto Metropolitan's fee properties and/or easements, Metropolitan will insist that plans for development provide that it be carried by closed conduit or lined open channel approved in writing by Metropolitan. Also the drainage facilities must be maintained by others, e.g., city, county, homeowners association, etc. If the development proposes changes to existing drainage features, then the developer shall make provisions to provide for replacement and these changes must be approved by Metropolitan in writing.

11. Construction Coordination

During construction, Metropolitan's field representative will make periodic inspections. We request that a stipulation be added to the plans or specifications for notification of Mr. __________ of Metropolitan's Operations Services Branch, telephone (213) 250-____, at least two working days prior to any work in the vicinity of our facilities.

12. Pipeline Loading Restrictions

a. Metropolitan's pipelines and conduits vary in structural strength, and some are not adequate for AASHTO H-20 loading. Therefore, specific loads over the specific sections of pipe or conduit must be reviewed and approved by Metropolitan. However, Metropolitan's pipelines are typically adequate for AASHTO H-20 loading provided that the cover over the pipeline is not less than four feet or the cover is not substantially increased. If the temporary cover over the pipeline during construction is between three and four feet, equipment must restricted to that which imposes loads no greater than AASHTO H-10. If the cover is between two and three feet, equipment must be restricted to that of a Caterpillar D-4 tract-type tractor. If the cover is less than two feet, only hand equipment may be used. Also, if the contractor plans to use any equipment over Metropolitan's pipeline which will impose loads greater than AASHTO H-20, it will be necessary to submit the specifications of such equipment for our review and approval at least one week prior to its use. More restrictive requirements may apply to the loading guideline over the San Diego Pipelines 1 and 2, portions of the Orange County Feeder, and the Colorado River Aqueduct. Please contact us for loading restrictions on all of Metropolitan's pipelines and conduits.

b. The existing cover over the pipeline shall be maintained unless Metropolitan determines that proposed changes do not pose a hazard to the integrity of the pipeline or an impediment to its maintenance.

13. Blasting

a. At least 20 days prior to the start of any drilling for rock excavation blasting, or any blasting, in the vicinity of Metropolitan's facilities, a two-part preliminary conceptual plan shall be submitted to Metropolitan as follows:

b. Part 1 of the conceptual plan shall include a complete summary of proposed transportation, handling, storage, and use of explosions.

c. Part 2 shall include the proposed general concept for blasting, including controlled blasting techniques and controls of noise, fly rock, airblast, and ground vibration.

14. CEQA Requirements

a. When Environmental Documents Have Not Been Prepared

1) Regulations implementing the California Environmental Quality Act (CEQA) require that Metropolitan have an opportunity to consult with the agency or consultants preparing any environmental documentation. We are required to review and consider the environmental effects of the project as shown in the Negative Declaration or Environmental Impact Report (EIR) prepared for your project before committing Metropolitan to approve your request.

2) In order to ensure compliance with the regulations implementing CEQA where Metropolitan is not the Lead Agency, the following minimum procedures to ensure compliance with the Act have been established:

a) Metropolitan shall be timely advised of any determination that a Categorical Exemption applies to the project. The Lead Agency is to advise Metropolitan that it and other agencies participating in the project have complied with the requirements of CEQA prior to Metropolitan's participation.

b) Metropolitan is to be consulted during the preparation of the Negative Declaration or EIR.

c) Metropolitan is to review and submit any necessary comments on the Negative Declaration or draft EIR.

d) Metropolitan is to be indemnified for any costs or liability arising out of any violation of any laws or regulations including but not limited to the California Environmental Quality Act and its implementing regulations.

b. <u>When Environmental Documents Have Been Prepared</u>

If environmental documents have been prepared for your project, please furnish us a copy for our review and files in a timely manner so that we may have sufficient time to review and comment. The following steps must also be accomplished:

1) The Lead Agency is to advise Metropolitan that it and other agencies participating in the project have complied with the requirements of CEQA prior to Metropolitan's participation.

2) You must agree to indemnify Metropolitan, its officers, engineers, and agents for any costs or liability arising out of any violation of any laws or regulations including but not limited to the California Environmental Quality Act and its implementing regulations.

15. <u>Metropolitan's Plan-Review Cost</u>

a. An engineering review of your proposed facilities and developments and the preparation of a letter response giving Metropolitan's comments, requirements and/or approval that will require 8 man-hours or less of effort is typically performed at no cost to the developer, unless a facility must be modified where Metropolitan has superior rights. If an engineering review and letter response requires more than 8 man-hours of effort by Metropolitan to determine if the proposed facility or development is compatible with its facilities, or if modifications to Metropolitan's manhole(s) or other facilities will be required, then all of Metropolitan's costs associated with the project must be paid by the developer, unless the developer has superior rights.

b. A deposit of funds will be required from the developer before Metropolitan can begin its detailed engineering plan review that will exceed 8 hours. The amount of the required deposit will be determined after a cursory review of the plans for the proposed development.

c. Metropolitan's final billing will be based on actual cost incurred, and will include engineering plan review, inspection, materials, construction, and administrative overhead charges calculated in accordance with Metropolitan's standard accounting practices. If the cost is less than the deposit, a refund will be made; however, if the cost exceeds the deposit, an invoice will be forwarded for payment of the additional amount. Additional deposits may be required if the cost of Metropolitan's review exceeds the amount of the initial deposit.

16. Caution

We advise you that Metropolitan's plan reviews and responses are based upon information available to Metropolitan which was prepared by or on behalf of Metropolitan for general record purposes only. Such information may not be sufficiently detailed or accurate for your purposes. No warranty of any kind, either express or implied, is attached to the information therein conveyed as to its accuracy, and no inference should be drawn from Metropolitan's failure to comment on any aspect of your project. You are therefore cautioned to make such surveys and other field investigations as you may deem prudent to assure yourself that any plans for your project are correct.

17. <u>Additional Information</u>

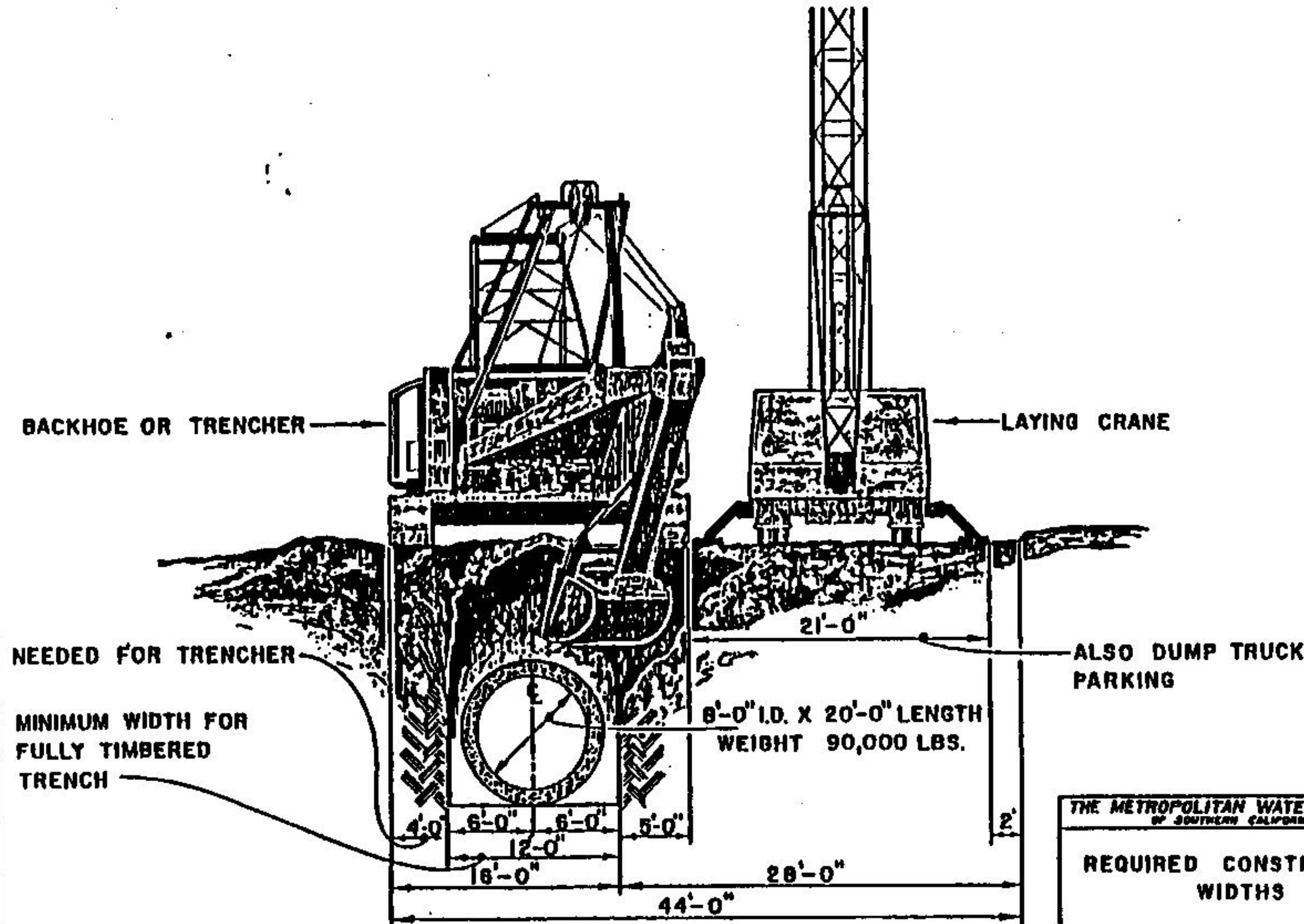
Should you require additional information, please contact:

Civil Engineering Substructures Section
Metropolitan Water District
of Southern California
P.O. Box 54153
Los Angeles, California 90054-0153
(213) 217-6000

JEH/MRW/lk

Rev. January 22, 1989

Encl.

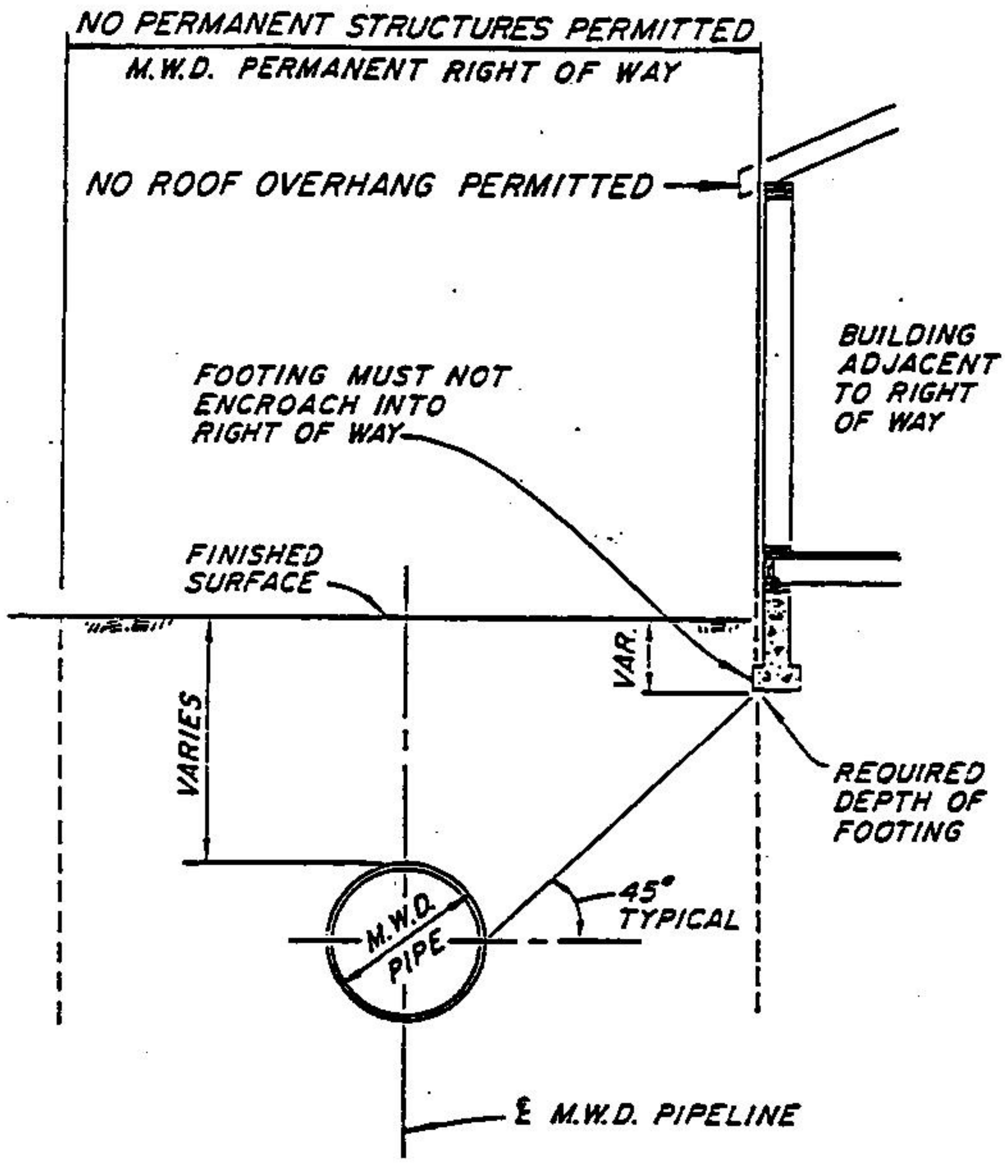


THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

REQUIRED CONSTRUCTION WIDTHS

DRAWN........ TRACED........ CHECKED........ RECOMMENDED........ APPROVED........

FIGURE I



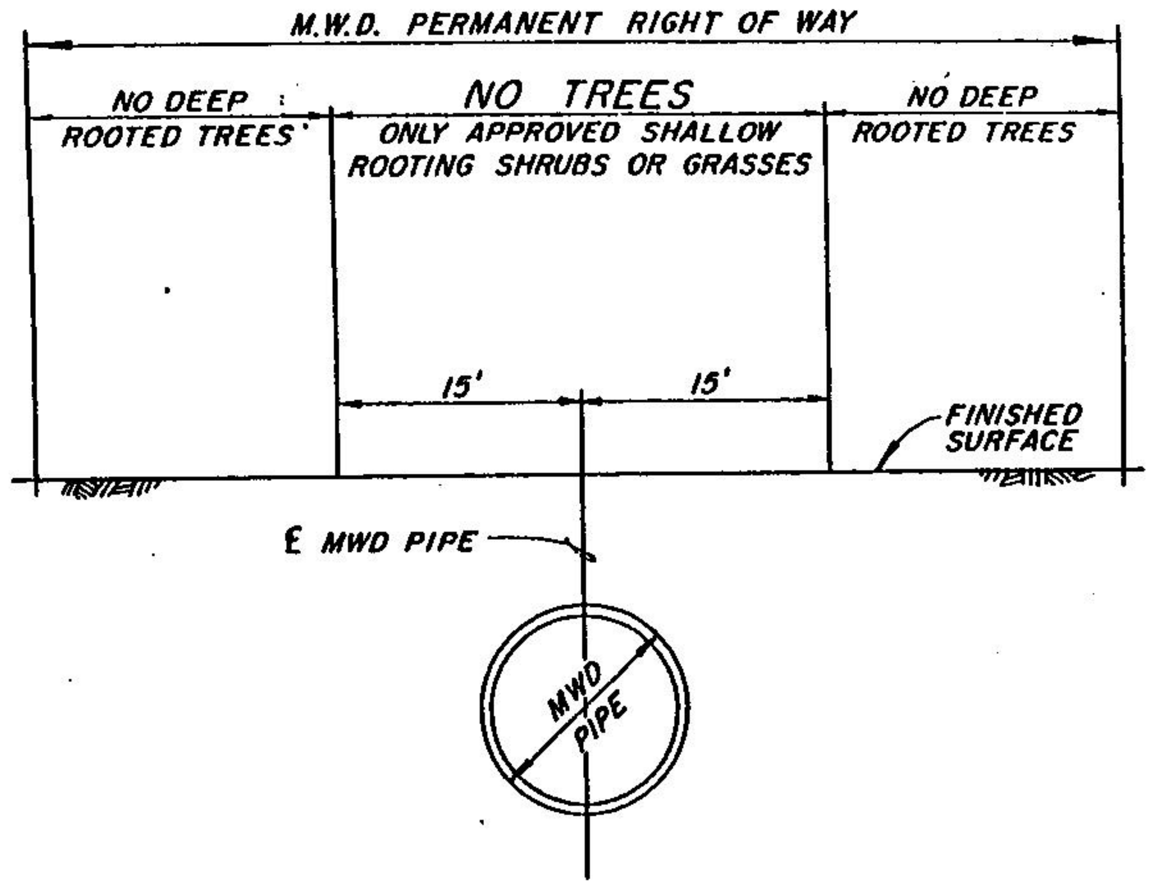
NOTE: M.W.D. PIPELINE SIZE, DEPTH, LOCATION AND WIDTH OF PERMANENT RIGHT OF WAY VARIES.

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

REQUIREMENTS FOR BUILDINGS AND FOOTINGS ADJACENT TO M.W.D. RIGHT OF WAY

DRAWN ______ RECOMMENDED ______
TRACED ______
CHECKED ______ APPROVED ______

FIGURE 2

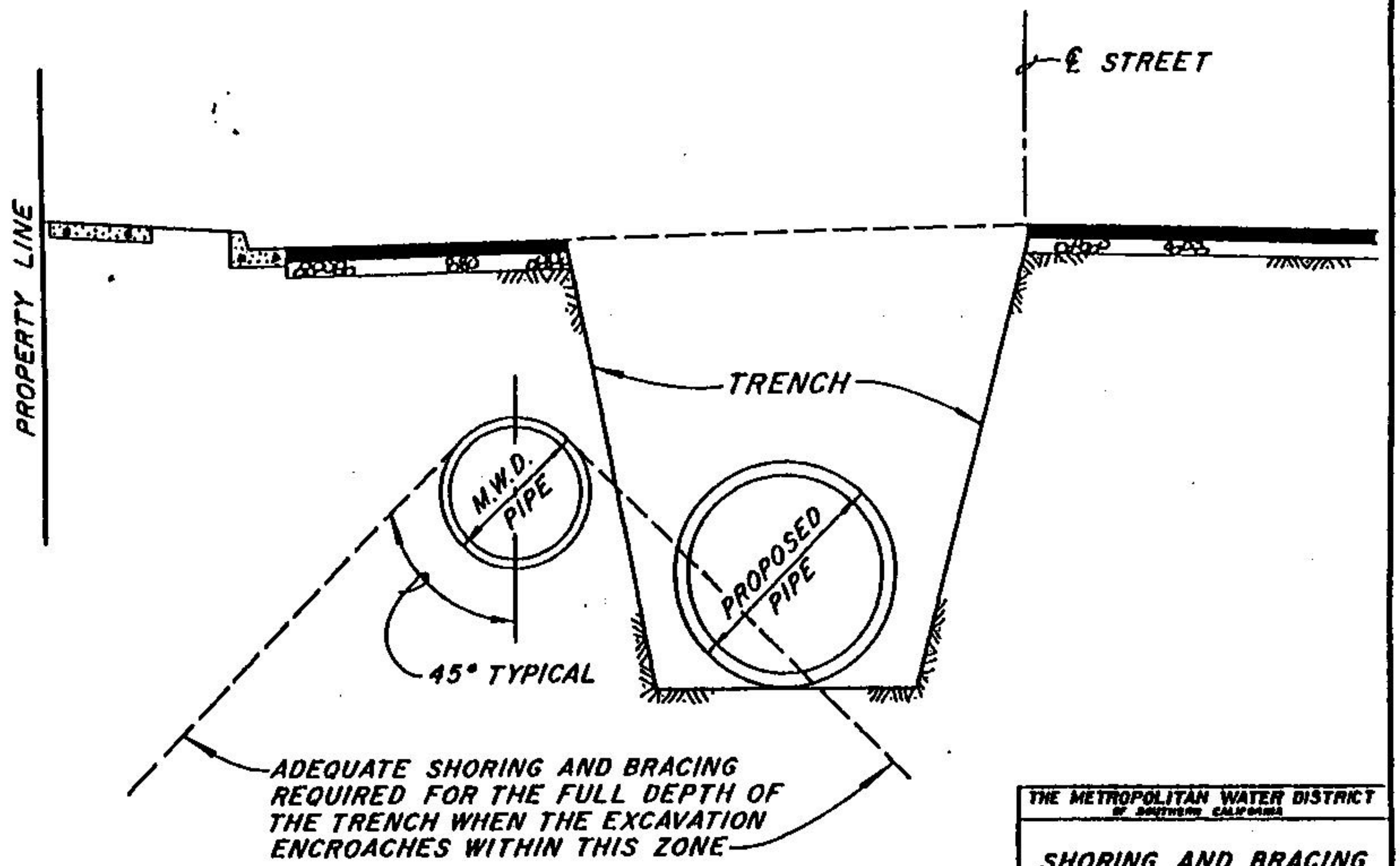


THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

LANDSCAPE GUIDELINES FOR M.W.D. RIGHT OF WAY

DRAWN........ RECOMMENDED........
TRACED........
CHECKED........ APPROVED........

FIGURE 3



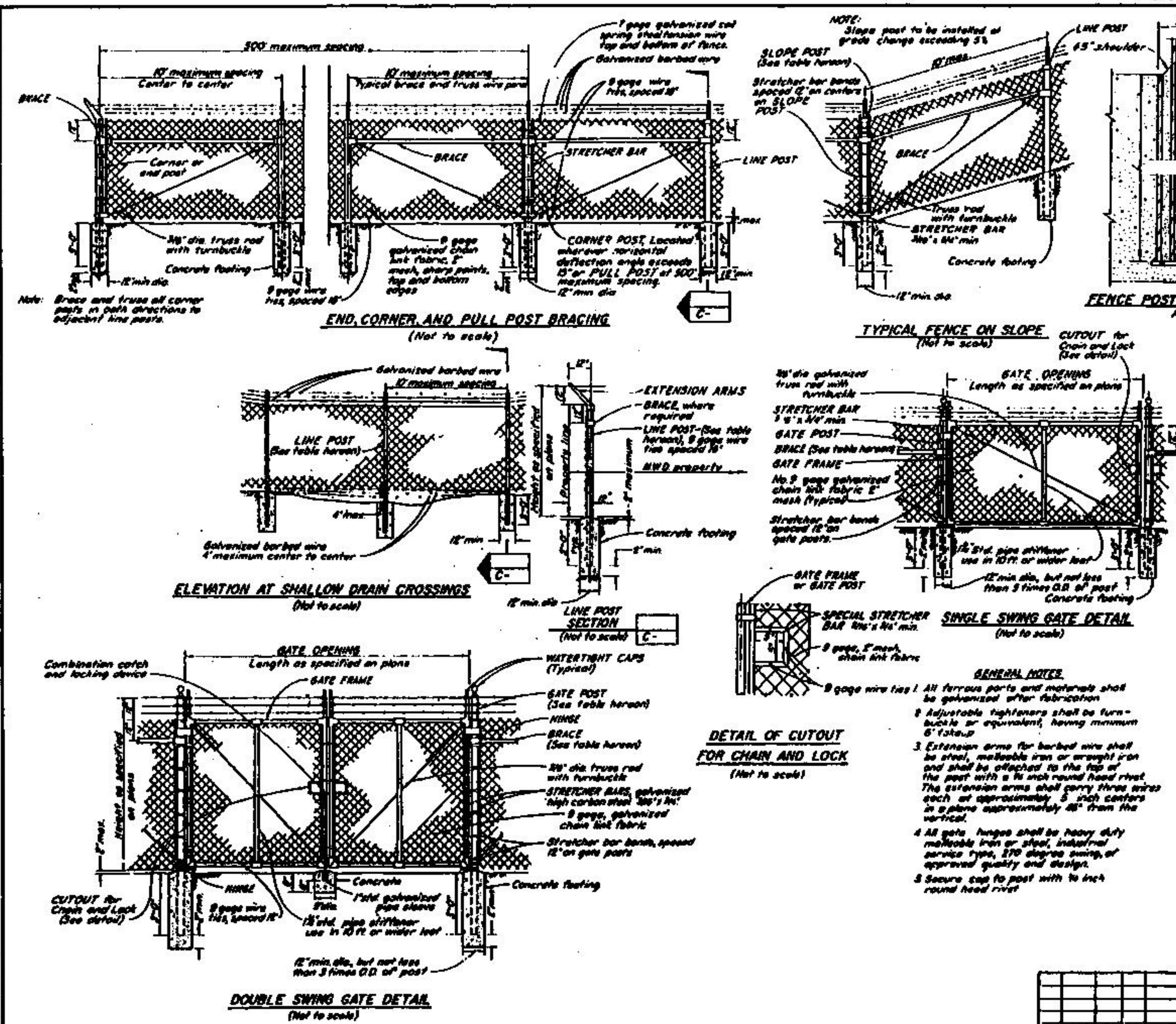
THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

SHORING AND BRACING REQUIREMENTS

DRAWN.......... RECOMMENDED..........
TRACED..........
CHECKED.......... APPROVED..........

FIGURE 4

SPECIFICATIONS NO. SHEET NO.



Use	Type	Nominal Size (Inches)	Actual O.D. (Inches)	Weight per foot (Pounds)
End, corner, slope, pull and gate posts (for single gates 6 feet or less in width and double gates 12 feet or less in width) for chain link fabric 72 inches or higher	Pipe	2½	2.875	5.79
End, corner, slope, pull and gate posts (for single gates 6 feet or less in width and double gates 12 feet or less in width) for chain link fabric less than 72 inches height	Pipe	2	2.375	3.65
Gate posts for single swing gates over 6 feet but not over 13 feet in width and double swing gates over 12 feet but not over 26 feet in width.	Pipe	3½	4.000	9.1
Gate posts for single swing gates over 13 feet but not over 18 feet in width and double swing gates over 26 feet but not over 36 feet in width.	Pipe	6	6.625	18.97
Gate posts for single swing gates over 18 feet in width and double swing gates over 36 feet in width	Pipe	8	8.625	24.70
Line posts for chain link fabric 72 inches or higher	Pipe	2	2.375	3.65
	H-Section	2¼ x 1⅞		4.10
Line posts for chain link fabric less than 72 inches in height	Pipe	1½	1.900	2.72
	H-Section	1⅞ x 1⅝		2.80
Braces	Pipe	1¼	1.660	2.27
	H-Section	1⅝ x 1¼		2.20
Frames for gates	Pipe	1½	1.900	2.72
Stiffeners for gates	Pipe	1¼	1.660	2.27

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA
DISTRIBUTION SYSTEM

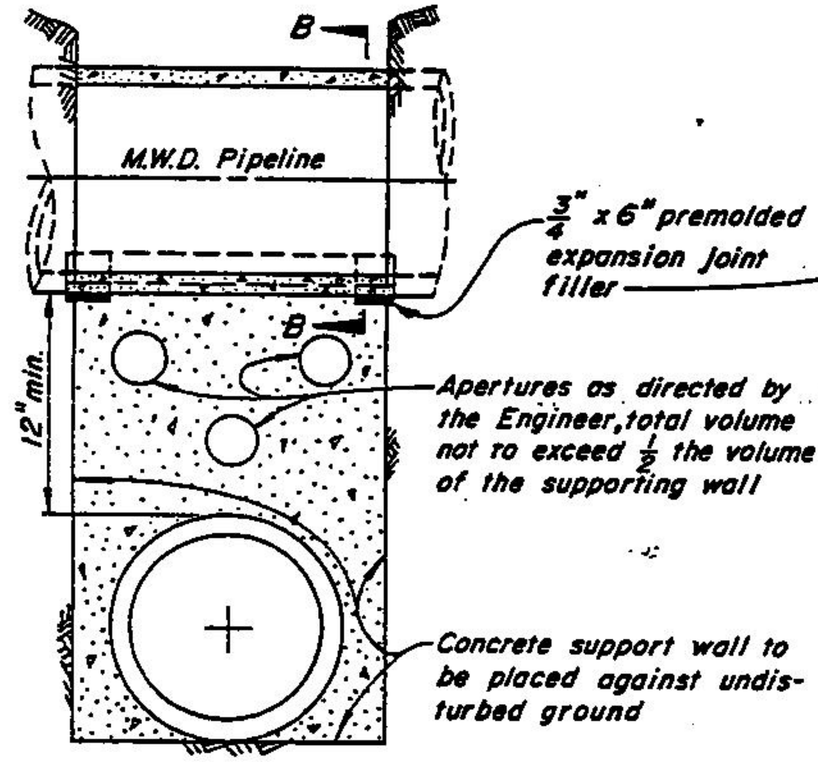
CHAIN LINK
FENCE DETAILS

DESIGNED / DRAWN / CHECKED / RECOMMENDED / APPROVED / LOS ANGELES

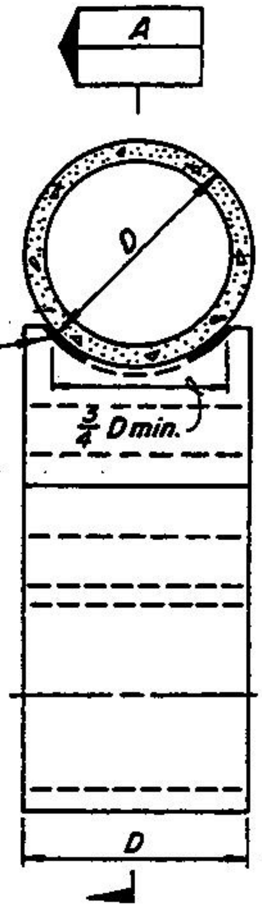
NO. | DATE | DWN. | CKD. | REVISION | REC. | APP.

REVISION COORDINATION CHECK / INTERSECTIONAL COORDINATION CHECK — ORIGINAL RELEASE | MECH. | STRUCT. | ELEC. | CIVIL | SPECS. | DATE

FIGURE 5

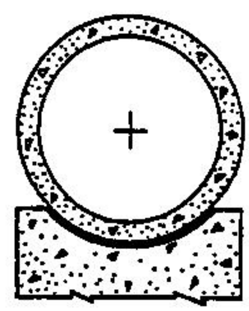


SECTION "A-A"



CROSS SECTION

1. Supporting wall shall have a firm bearing on the subgrade and against the side of the excavation.
2. Premolded expansion joint filler per ASTM D-1751-73 to be used in support for steel pipe only.
3. If trench width is 4 feet or greater, measured along centerline of M.W.D. pipe, concrete support must be constructed.
4. If trench width is less than 4 feet, clean sand backfill, compacted to 90% density in accordance with the provisions of ASTM Standard D-1557-70 may be used in lieu of the concrete support wall.



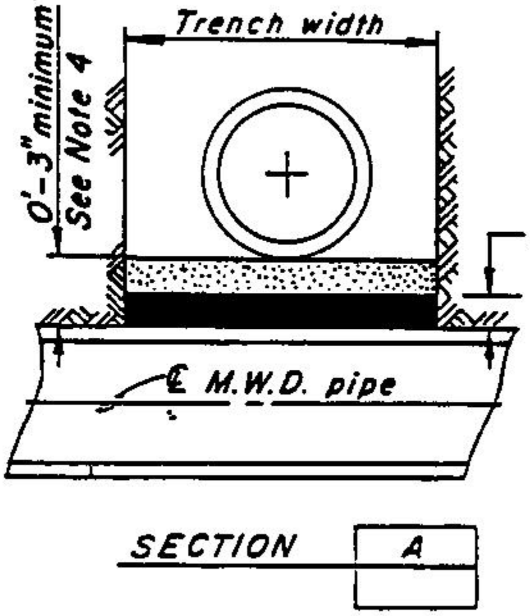
SECTION "B-B"

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

TYPICAL SUPPORT FOR M.W.D. PIPELINE

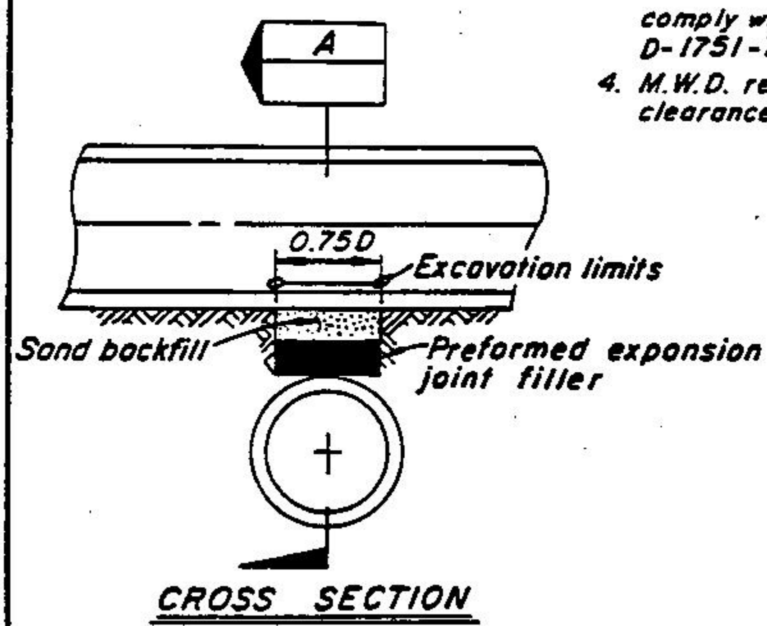
DRAWN........ RECOMMENDED........
TRACED........
CHECKED........ APPROVED........

C-9547



NOTES

1. This method to be used where the utility line is 24" or greater in diameter and the clearance between the utility line and M.W.D. pipe is 12" or less.
2. Special protection may be required if the utility line diameter is greater than M.W.D. pipe or if the cover over the utility line to the street surface is minimal and there is 12" or less clearance between M.W.D. pipe and the utility line.
3. Preformed expansion joint filler to comply with ASTM designation D-1751-73.
4. M.W.D. requests 12" minimum clearance whenever possible.



THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

TYPICAL EXPANSION JOINT FILLER PROTECTION FOR OVERCROSSING OF M.W.D. PIPELINE

DRAWN / TRACED / CHECKED / RECOMMENDED / APPROVED

C-11632

THE METROPOLITAN WATER DISTRICT
OF SOUTHERN CALIFORNIA

Office of the General Manager

August 1, 2016 **Via Electronic and Regular Mail**

Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

Dear Pietro Cambiaso:

Notice of Preparation and Public Scoping Meeting
For the IEUA Facilities Master Plans Program Environmental Impact Report (PEIR)

The Metropolitan Water District of Southern California (Metropolitan) reviewed the public notice for the Facilities Master Plans project (Project). The Inland Empire Utilities Agency (IEUA) is acting as the Lead Agency under the California Environmental Quality Act (CEQA) for this project. The Project consists of constructing and operating facilities in six interrelated Facilities Master Plans. The Facilities Master Plans would implement the strategy to manage IEUA's regional wastewater and recycled water distribution system; future strategy for the treatment and disposal of biosolids and manure; reliable and sustainable energy infrastructure to support these activities; and capital improvement plan projects. The projects would be long-term and implemented over a series of years. The Project is located within the IEUA's service area which includes cities of Upland, Claremont, Montclair, Rancho Cucamonga, Rialto, Fontana, Pomona, Chino, Chino Hills, Ontario, and Corona, in San Bernardino County. This letter contains Metropolitan's comments on the proposed Project as an affected responsible agency.

The public notice lists Metropolitan as a potential responsible agency. As such, Metropolitan would rely on the PEIR for any Metropolitan actions associated with the proposed Project; therefore, we recommend the PEIR discuss any Metropolitan involvement as a responsible agency.

Metropolitan reviewed the project description of the proposed Project and has determined the following facilities, which we own and operate, are within the Project area. The enclosed map shows these facilities in relation to the proposed Project. It will be necessary for the IEUA to consider these facilities in its Facilities Master Plans; all are located within the Project area:

- Rialto Feeder, which runs in a westerly to easterly direction in the cities of Fontana, Rialto, Rancho Cucamonga, Claremont, La Verne, San Dimas, and Glendora,

- Etiwanda Feeder, which runs in a northeasterly to southwesterly direction in the cities of Rancho Cucamonga and Fontana,

- Upper Feeder, which runs in a westerly to easterly direction in the cities of Fontana, Ontario, Rancho Cucamonga, Pomona, and Chino,

- Yorba Linda Feeder, which runs in a northerly to southerly direction in the cities of Chino Hills and Yorba Linda, and

- Lower Feeder, which runs in a northwesterly to southeasterly direction in the cities of Chino and Corona.

We are concerned with potential impacts to these facilities associated with future excavation, construction, utilities or any development that may result from implementation of the proposed Project. Development and redevelopment associated with the proposed Project must not restrict any of Metropolitan's day-to-day operations and/or access to its facilities. Nor can the Project affect the water quality of Metropolitan supplies by allowing for non-compatible land uses.

In order to avoid potential conflicts with Metropolitan's rights-of-way, we require that any design plans for any activity in the area of Metropolitan's pipelines or facilities be submitted for our review and written approval. Approval of the Project where it could impact Metropolitan's property should be contingent on Metropolitan's approval of design plans for the Project. Detailed prints of drawings of Metropolitan's pipelines and rights-of-way may be obtained by calling Metropolitan's Substructure Information Line at (213) 217-6564. To assist in preparing plans that are compatible with Metropolitan's facilities, easements, and properties, we have enclosed a copy of the "Guidelines for Developments in the Area of Facilities, Fee Properties, and/or Easements of The Metropolitan Water District of Southern California." Please note that all submitted designs or plans must clearly identify Metropolitan's facilities and rights-of-way.

We appreciate the opportunity to provide input to your planning process and we look forward to receiving future environmental documentation on this Project. If we can be of further assistance, please contact, Ms. Brenda Marines at (213) 217-7902.

Very truly yours,

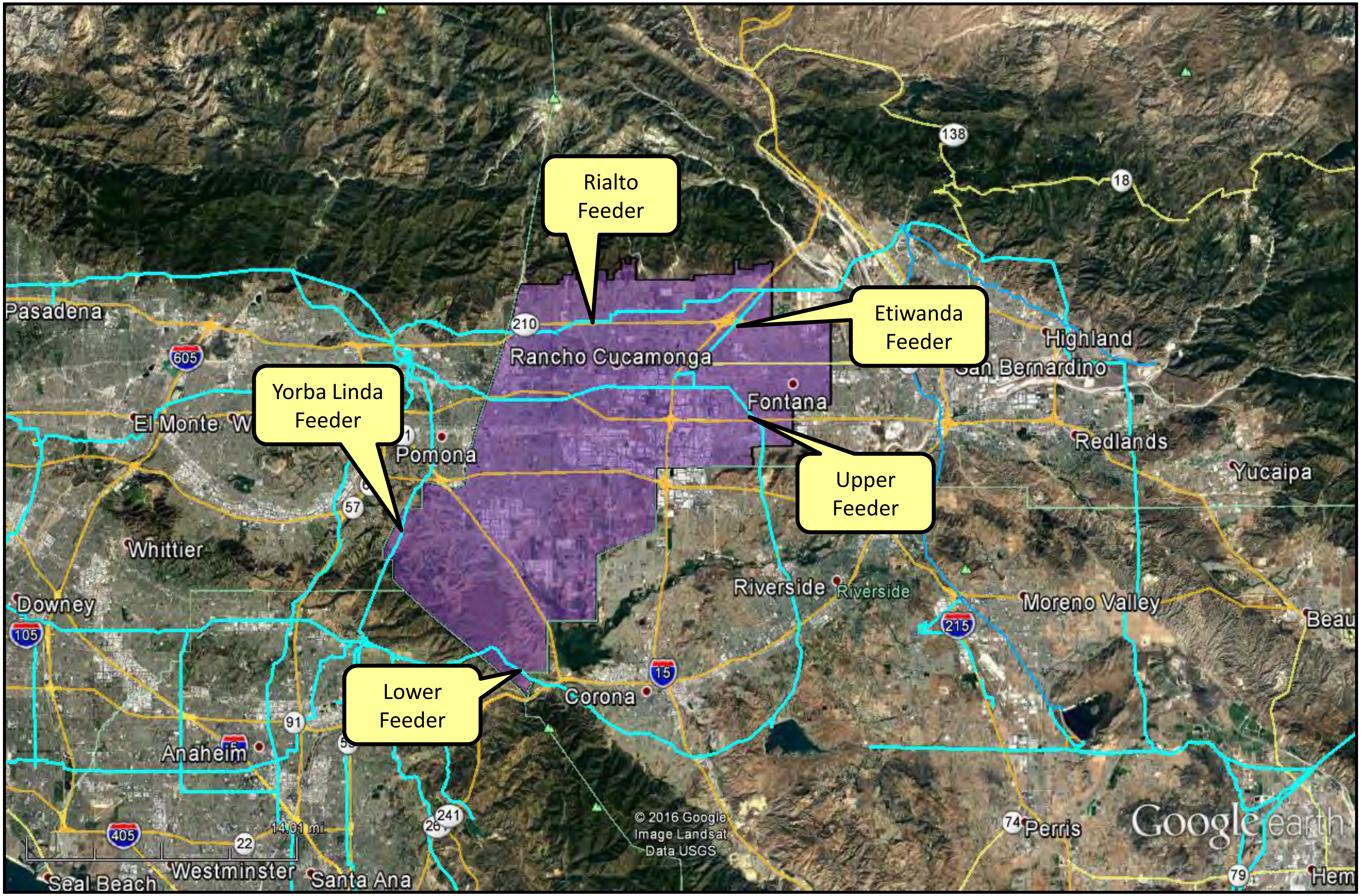
Deborah Drezner

Deirdre West, Team Manager
By Deborah Drezner, Principal Environmental Specialist

BSM/bsm
EPT Project No. 20160704EXT

Enclosures: Planning Guidelines
Map

The Metropolitan Water District of Southern California
and the Inland Empire Utilities Agency Facilities Master Plans project



Metropolitan Water District of Southern California.

July 29, 2016

Mr. Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91708
Phone: (909) 993-1639
E-mail: pcambias@ieua.org

RE: SCAG Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Facilities Master Plans [SCAG NO. IGR8919]

Dear Mr. Cambiaso,

Thank you for submitting the Notice of Preparation of a Draft Environmental Impact Report for the Facilities Master Plans ("proposed project") to the Southern California Association of Governments (SCAG) for review and comment. SCAG is the authorized regional agency for Inter-Governmental Review (IGR) of programs proposed for Federal financial assistance and direct Federal development activities, pursuant to Presidential Executive Order 12372. Additionally, SCAG reviews the Environmental Impact Reports of projects of regional significance for consistency with regional plans pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.

SCAG is also the designated Regional Transportation Planning Agency under state law, and is responsible for preparation of the Regional Transportation Plan (RTP) including the Sustainable Communities Strategy (SCS) pursuant to Senate Bill (SB) 375. As the clearinghouse for regionally significant projects per Executive Order 12372, SCAG reviews the consistency of local plans, projects, and programs with regional plans.[1] Guidance provided by these reviews is intended to assist local agencies such as local jurisdictions and project proponents to take actions that help contribute to the attainment of the regional goals and policies in the RTP/SCS.

SCAG staff has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Facilities Master Plans in San Bernardino County. The proposed project includes the construction and operation of facilities in the six interrelated Facility Master Plans, which encompasses the 242-square-mile service area, outlines facility improvements that are needed to meet the Inland Empire Utilities Agency's (IEUA) long term planning objectives. These proposed facilities would implement the comprehensive strategy for managing IEUA's regional wastewater and recycled water distribution system in the future, the future strategy for the treatment and disposal of biosolids and manure, and reliable and sustainable energy infrastructure to support these activities.

When available, please send environmental documentation to SCAG's *office in Los Angeles or by email to sunl@scag.ca.gov* providing, at a minimum, the full public comment period for review. If you have any questions regarding the attached comments, please contact the Inter-Governmental Review (IGR) Program, attn.: Lijin Sun, Senior Regional Planner, at (213) 236-1882 or sunl@scag.ca.gov. Thank you.

Sincerely,

Ping Chang

Ping Chang
Acting Manager, Compliance and Performance Monitoring

---

[1] Lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2016 RTP/SCS for the purpose of determining consistency for CEQA. Any "consistency" finding by SCAG pursuant to the IGR process should not be construed as a determination of consistency with the 2016 RTP/SCS for CEQA.

COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE FACILITIES MASTER PLANS [SCAG NO. IGR8919]

CONSISTENCY WITH RTP/SCS

SCAG reviews environmental documents for regionally significant projects for their consistency with the adopted RTP/SCS. For the purpose of determining consistency with CEQA, lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the RTP/SCS.

2016 RTP/SCS GOALS

The SCAG Regional Council adopted the 2016 RTP/SCS in April 2016. The 2016 RTP/SCS seeks to improve mobility, promote sustainability, facilitate economic development and preserve the quality of life for the residents in the region. The long-range visioning plan balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health (see http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx). The goals included in the 2016 RTP/SCS may be pertinent to the proposed project. These goals are meant to provide guidance for considering the proposed project within the context of regional goals and policies. Among the relevant goals of the 2016 RTP/SCS are the following:

SCAG 2016 RTP/SCS GOALS	
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*
RTP/SCS G3:	*Ensure travel safety and reliability for all people and goods in the region*
RTP/SCS G4:	*Preserve and ensure a sustainable regional transportation system*
RTP/SCS G5:	*Maximize the productivity of our transportation system*
RTP/SCS G6:	*Protect the environment and health for our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)*
RTP/SCS G7:	*Actively encourage and create incentives for energy efficiency, where possible*
RTP/SCS G8:	*Encourage land use and growth patterns that facilitate transit and active transportation*
RTP/SCS G9:	*Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies**
	**SCAG does not yet have an agreed-upon security performance measure.*

For ease of review, we encourage the use of a side-by-side comparison of SCAG goals with discussions of the consistency, non-consistency or non-applicability of the goals and supportive analysis in a table format. Suggested format is as follows:

SCAG 2016 RTP/SCS GOALS		
Goal		Analysis
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
etc.		etc.

2016 RTP/SCS STRATEGIES

To achieve the goals of the 2016 RTP/SCS, a wide range of land use and transportation strategies are included in the 2016 RTP/SCS. Technical appendances of the 2016 RTP/SCS provide additional supporting information in detail. To view the 2016 RTP/SCS, please visit: http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. The 2016 RTP/SCS builds upon the progress from the 2012 RTP/SCS and continues to focus on integrated, coordinated, and balanced planning for land use and transportation that the SCAG region strives toward a more sustainable region, while the region meets and exceeds in meeting all of applicable statutory requirements pertinent to the 2016 RTP/SCS. These strategies within the regional context are provided as guidance for lead agencies such as local jurisdictions when the proposed project is under consideration.

DEMOGRAPHICS AND GROWTH FORECASTS

Local input plays an important role in developing a reasonable growth forecast for the 2016 RTP/SCS. SCAG used a bottom-up local review and input process and engaged local jurisdictions in establishing the base geographic and socioeconomic projections including population, household and employment. At the time of this letter, the most recently adopted SCAG jurisdictional-level growth forecasts that were developed in accordance with the bottom-up local review and input process consist of the 2020, 2035, and 2040 population, households and employment forecasts. To view them, please visit http://www.scag.ca.gov/Documents/2016GrowthForecastByJurisdiction.pdf. The growth forecasts for the region and applicable jurisdictions are below.

	Adopted SCAG Region Wide Forecasts			**Adopted County of San Bernardino Forecasts**		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	19,663,000	22,091,000	22,138,800	2,197,400	2,637,400	2,71,300
Households	6,458,000	7,325,000	7,412,300	687,100	824,600	854,300
Employment	8,414,000	9,441,000	9,871,500	789,500	998,000	1,028,100

	Adopted City of Chino Forecasts			**Adopted City of Chino Hills Forecasts**		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	86,200	114,200	120,400	76,500	89,000	94,900
Households	24,500	32,200	34,000	23,500	27,400	28,300
Employment	45,500	50,000	50,600	13,900	17,900	18,600

	Adopted City of Fontana Forecasts			**Adopted City of Montclair Forecasts**		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	204,900	266,300	280,900	37,900	42,300	42,700
Households	53,500	70,000	74,000	10,200	11,400	11,600
Employment	55,400	68,900	70,800	17,400	18,800	19,000

	Adopted City of Ontario Forecasts			**Adopted City of Rancho Cucamonga Forecasts**		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	197,600	248,800	258,600	173,900	198,300	204,300
Households	58,300	72,200	75,300	57,100	70,200	73,100
Employment	129,300	170,600	175,400	82,300	101,800	104,600

	Adopted City of Upland Forecasts			**Adopted Unincorporated San Bernardino County Forecasts**		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	76,200	81,600	81,700	304,300	340,400	344,100
Households	27,200	28,800	28,900	99,900	110,500	111,300
Employment	35,900	42,300	43,500	69,600	88,300	91,100

MITIGATION MEASURES

SCAG staff recommends that you review the Final Program Environmental Impact Report (Final PEIR) for the 2016 RTP/SCS for guidance, as appropriate. SCAG's Regional Council certified the Final PEIR and adopted the associated Findings of Fact and a Statement of Overriding Considerations (FOF/SOC) and Mitigation Monitoring and Reporting Program (MMRP) on April 7, 2016 (please see: http://scagrtpscs.net/Pages/FINAL2016PEIR.aspx). The Final PEIR includes a list of project-level performance standards-based mitigation measures that may be considered for adoption and implementation by lead, responsible, or trustee agencies in the region, as applicable and feasible. Project-level mitigation measures are within responsibility, authority, and/or jurisdiction of project-implementing agency or other public agency serving as lead agency under CEQA in subsequent project- and site- specific design, CEQA review, and decision-making processes, to meet the performance standards for each of the CEQA resource categories.

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

July 12, 2016

pcambias@ieua.org

Mr. Pietro Cambiaso
Inland Empire Utilities Agency
6075 Kimball Ave.
Chino, CA 91709

Notice of Preparation of a CEQA Document for the IEUA Facilities Master Plans

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The SCAQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the Draft EIR. Please send the SCAQMD a copy of the CEQA document upon its completion. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to the SCAQMD. Please forward a copy of the Draft EIR directly to SCAQMD at the address in our letterhead. **In addition, please send with the Draft EIR all appendices or technical documents related to the air quality and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files. These include original emission calculation spreadsheets and modeling files (not Adobe PDF files). Without all files and supporting air quality documentation, the SCAQMD will be unable to complete its review of the air quality analysis in a timely manner. Any delays in providing all supporting air quality documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. More recent guidance developed since this Handbook was published is also available on SCAQMD's website here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). SCAQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the analysis.

The SCAQMD has also developed both regional and localized significance thresholds. The SCAQMD staff requests that the lead agency quantify criteria pollutant emissions and compare the results to the recommended regional significance thresholds found here: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. In addition to analyzing regional air quality impacts, the SCAQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LSTs can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a Draft EIR. Therefore, when preparing the air quality analysis for the proposed project, it is recommended that the lead agency perform a localized analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

In the event that the proposed project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the lead agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses (such as placing homes near freeways) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Perspective*, which can be found at the following internet address: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate these impacts. Pursuant to CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying possible mitigation measures for the project, including:

- Chapter 11 of the SCAQMD *CEQA Air Quality Handbook*
- SCAQMD's CEQA web pages at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies.
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions
- Other measures to reduce air quality impacts from land use projects can be found in the SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. This document can be found at the following internet address: http://www.aqmd.gov/docs/default-source/planning/air-quality-guidance/complete-guidance-document.pdf.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's webpage (http://www.aqmd.gov).

The SCAQMD staff is available to work with the Lead Agency to ensure that project emissions are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at jcheng@aqmd.gov or call me at (909) 396-2448.

Sincerely,

Barbara Radlein

Barbara Radlein
Program Supervisor, CEQA Special Projects
Planning, Rule Development & Area Sources

JC:BR
SBC160901-042
Control Number

825 East Third Street, San Bernardino, CA 92415-0835 | Phone: 909.387.8109 Fax: 909.387.7876
www.SBCounty.gov

SAN BERNARDINO COUNTY

Department of Public Works
Environmental & Construction • Flood Control
Operations • Solid Waste Management
Surveyor • Transportation

Gerry Newcombe
Director

July 27, 2016

Inland Empire Utilities Agency
Pietro Cambiaso, P.E.
6075 Kimball Avenue
Chino, CA. 91708
Pcambias@ieua.org

File: 10(ENV)-4.01

RE: NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE FACILITIES MASTER PLAN FOR THE INLAND EMPIRE UTILITIES AGENCY

Dear Mr. Cambiaso:

Thank you for giving the San Bernardino County Department of Public Works the opportunity to comment on the above-referenced project. **We received this request on July 05, 2016** and pursuant to our review, we have no comments.

Sincerely,

NIDHAM ARAM ALRAYES, MSCE, PE, QSD/P
Public Works Engineer III
Environmental Management

NAA:PE:sr

From: Cunningham, Kevin [mailto:kcunningham@rcflood.org]
Sent: Thursday, July 28, 2016 1:04 PM
To: Pietro Cambiaso <Pcambias@ieua.org>
Cc: Flanigan, Kris <KFLANIGA@rcflood.org>
Subject: RCFCD/WCD Comment Letter for NOP on Facilities Master Plans PEIR

Dear Mr. Cambiaso,

This email is written in response to the Notice of Preparation (NOP) and Notice of Public Scoping Meeting for the Inland Empire Utilities Agency (IEUA) Facilities Master Plans Program Environmental Impact Report. The IEUA is proposing to construct and operate facilities in six interrelated Facility Master Plans. As noted in the NOP, construction of these facilities will implement the comprehensive strategy for managing IEUA's regional wastewater and recycled water distribution system in the future; the future strategy for the treatment and disposal of biosolids and manure; and reliable and sustainable energy infrastructure to support these activities. The Riverside County Flood Control and Water Conservation District's (District) has reviewed the NOP and has the following comments:

1. Based on the information that was provided about the project, it is unclear whether there will be any impacts to Riverside County Flood Control and Water Conservation District facilities and/or properties. If there will be impacts to any District facility, please be sure to evaluate the potential for such impacts to be significant in the CEQA document. Potential impacts to District facilities should be coordinated with the District so that they can be minimized to the maximum extent feasible. Please also note that if there are impacts to District facilities and/or properties, the District should be named as a Responsible Agency in the EIR.

2. Please be advised that any work that involves District rights-of-way, easement, or facilities will require an encroachment permit from the District. The encroachment permit process includes ensuring that activities within the District's right's-of-way are compliant with CEQA and consistent with the sections of the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). As a permittee to the MSHCP, the District is required to ensure activities (including issuance of encroachment permits) are consistent with Sections 6.1.2, 6.1.3, 6.1.4, 6.3.2, 7.3.7, 7.5.3 and Appendix C of the MSHCP. To obtain further information on encroachment permits or existing facilities, contact Amy McNeill of the Encroachment Permit Section at 951.955.1266.

3. Please provide the District with a draft copy of the environmental document and all appendices when it becomes available for public review so that we may more adequately determine if there is potential for our facilities/properties to be impacted.

Thank you for the opportunity to review the NOP. For our record keeping purposes, we request that you acknowledge receipt of this email. If you have any questions concerning this email, I may be contacted at 951.955.1526. You may also contact Kris Flanigan at 951.955.8581.

Kevin Cunningham
Associate Engineer – Air/Water Quality Control
Environmental Regulatory Services 2
Riverside County Flood Control
& Water Conservation District

Office: 951.955.1526
Fax: 951.788.9965

CITY OF RANCHO CUCAMONGA

10500 Civic Center Drive | P.O. Box 807 | Rancho Cucamonga, CA 91729-0807 | 909.477.2700 | www.CityofRC.us

July 28, 2016

Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

SUBJECT: Notice of Preparation IEUA Facilities Master Plans Program Environmental Impact Report

Dear Mr. Cambiaso:

The City of Rancho Cucamonga appreciates the opportunity to comment on the proposed Notice of Preparation for the Facilities Master Plans Program Environmental Impact Report. We are supportive of IEUA's efforts to efficiently improve and provide services to our residents.

Based upon the notice of Preparation, it appears that IEUA is intending to prepare a program EIR to facilitate future construction projects implementing a series of 6 previously adopted master plans, and additional facilities within the Agency's Capital Improvement Plan. We are concerned that the breadth of the proposed Program EIR will be overly broad and too general to adequately comment or identify environmental concerns which may directly affect the City of Rancho Cucamonga. Each of these master plans and capital improvement projects individually and cumulatively could have direct effects on the community and lead to substantial environmental impacts. With an incomplete and overly general Notice of Preparation, it is impossible to provide input or comment on what the focus or scope of this proposed environmental impact report should be.

The City of Rancho Cucamonga requests that IEUA recirculate the Notice of Preparation and provide a more complete project description of the intended projects which would be evaluated by this Program EIR. Simply itemizing the several master plans and capital improvement plans does not provide sufficient information from which to provide input. The City will continue to work with the IEUA staff to understand the scope and breadth of the EIR, but based upon the information presently made available in the Notice of Preparation, there is not a sufficient or complete explanation of the scope of projects to allow proper comment.

We are hopeful that IEUA would allow for greater transparency and discussion before commencing work on a Program EIR of this breadth.

If you have any questions, please contact Jeff Bloom, Deputy City Manager, by phone at (909) 477-2750, ext. 4301, Monday through Thursday from 7:00 a.m. to 6:00 p.m., or e-mail at Jeff.Bloom@CityofRC.us at your convenience.

Sincerely,

Jeffry Bloom
Deputy City Manager Economic/Community Development

c: John Gillison, City Manager

FONTANA WATER COMPANY
A DIVISION OF SAN GABRIEL VALLEY WATER COMPANY
15966 ARROW ROUTE • P.O. BOX 987, FONTANA, CALIFORNIA 92334 • (909) 822-2201

July 29, 2016

Mr. Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91708

Subject: Facilities Master Plan Environmental Impact Report
Fontana Water Company Review and Comments

Dear Mr. Cambiaso:

Fontana Water Company has reviewed IEUA's Notice of Preparation pursuant to the Facilities Master Plan Program Environmental Impact report and provides the following:

Fontana Water Company provides potable and recycled water service within its California Public Utilities Commission approve service area and intends to work with Inland Empire Utilities Agency (IEUA) to expand its delivery of recycled water as the demand for this renewable supply increases.

As defined by Chino Basin Watermaster, Fontana Water Company's service area predominantly overlays Management Zone 3 which historically receives limited stormwater or recycled water recharge and is experiencing decreasing groundwater levels. Fontana Water Company looks forward to working with IEUA and the City of Fontana to utilize recycled water for groundwater recharge within Management Zone 3.

Additionally, Fontana Water Company owns and operates extensive water production, treatment, storage and delivery infrastructure throughout its service area and is committed to working with IEUA to resolve any new facility impacts if/when encountered.

Lastly, Fontana Water Company requests sufficient notice and the ability to comment on any activities that would impact the groundwater or surface water quality that is used to serve its customers.

Very truly yours,

Josh Swift
General Manager

JMS:bf

FONTANA WATER COMPANY
P. O. BOX 987
FONTANA, CALIFORNIA 92334-0987

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Mr. Pietro Cambiaso, P.E.
Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, California 91708

Received
AUG 12 2016

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Appendix B

List of Potential Facilities Master Plan Projects

ESA

ATTACHMENT 3.1

TABLES

PROJECT CATEGORY 1: TREATMENT FACILITY UPGRADES
RP-1 POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	RP-1 Solids Treatment Rehabilitation Project	WFMP	Increased solids treatment capacity to meet existing and projected future flows	2035
	RP-1 Liquid Treatment Rehabilitation and Primary Effluent Equalization Elimination Project	WFMP	Increased liquid treatment capacity to meet projected future flows; Eliminating primary flow equalization and converting ponds for other uses	2035
	Demand Response Energy Storage Installation	EMP (RP-1 RP-5, and CCWRF)	The DRES project would involve a third party installing battery storage at IEUA facilities (at no cost to IEUA) that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times.	2033/2034 fiscal year
	RP-1 Digester Gas Mixing	EMP	Acid phase gas produced at RP-1 is currently directed to the flare. Projects utilizing the gas for beneficial use have shown to be cost prohibitive. An evaluation will be conducted to determine the most cost efficient way to mix the acid phase gas with the digester gas loop so that all of the gas produced at RP-1 is beneficially used. The project could involve gas storage.	2033/2034 fiscal year
EN13056	Agency-Wide HVAC Improvements Package No. 2	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/ upgrades for the RP-1 Maintenance Building.	2025
EN15032	Agency-Wide HVAC Improvements Package No. 3	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/ upgrades for the RP-1 Chemical Storage Warehouse	2025
	RP-1 Headworks Rehab	AMP (Preliminary Treatment Process – Preliminary Treatment)	Project to comprehensively rehab and upgrade the Preliminary Treatment Process. Bar Screens and Grit/Sand Removal System.	10-50 Year Planning Period
	RP-1 Grit Washing and Disposal Upgrades	AMP (Preliminary Treatment Process – Grit Washing Rehabilitation)	Upgrade and repair the existing grit washer and conveyor	10-50 Year Planning Period
	RP-1 Septage Dump System	AMP (Preliminary Treatment Process – Grit Washing Rehabilitation)	Provide a modernized septage dump system at the most appropriate location within the Agency.	10-50 Year Planning Period
	RP-1 Cylinder Valve Repairs	AMP (Primary Treatment Process – Trickling Filter Pumps)	Repair the cylinder valve that controls the output of the Trickling Filter Pumps	10-50 Year Planning Period
	RP-1 MLR Pump Improvements	AMP (Secondary Treatment Process – Activated Sludge	This project will install mixed liquor return pumps into the activated sludge system to improve nutrient removal.	10-50 Year Planning Period

Project #	Project Name	Referencing Report	Project Summary	Planning Year
		System)		
	RP-1 Secondary Clarifier Rehab	AMP (Secondary Treatment Process – Secondary Clarifiers)	This project will rehab Clarifiers 5 and 6 and will upgrade the weir and launder washing system for algae control.	10-50 Year Planning Period
	RP-1 Capacity Rehabilitation	AMP (Secondary Treatment Process – Plant Rehabilitation)	Expand existing RP-1 liquid and solids treatment capacity.	10-50 Year Planning Period
	RP-1 Sludge Thickening Upgrades	AMP (Solids Treatment Process – Gravity Thickener System and DAFT System)	Project to upgrade the sludge thickening processes for primary and secondary sludge.	10-50 Year Planning Period
	RP-1 Digester Cleaning and Rehab	AMP (Solids Treatment Process – Digester System)	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment. Include in Agency-wide TYCIP.	10-50 Year Planning Period
	RP-1 Flare Improvements	AMP (Solids Treatment – Gas Conveyance System)	RP-1 Flare improvements and gas system upgrades.	10-50 Year Planning Period
	RP-1 Poly Blending Units Replacement	AMP (Dewatering Treatment Process – RP-1 Centrifuge Polymer Blending Units)	This project will replace the polymer blending units at the RP-1 Centrifuge Building.	10-50 Year Planning Period
	RP-1 Utility/Potable Water Rehab	AMP (Auxiliary Systems – Plant Utility and Potable Water Systems)	This project will provide replacement pipe and valves for an aging conveyance system within RP-1.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 930 Pressure Zone – RP-1 930 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 930 Pressure Zone – RP-1 930 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	RW VFD Replacement	AMP (1050 Pressure Zone – RP-1 1050 Pumps)	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station	10-50 Year Planning Period
	RP-1 Utility Water Flow Meter	AMP (1050 Pressure Zone – Philadelphia Street Pipeline)	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 1050 Pressure Zone – RP-1 1050 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	RW VFD Replacement	AMP (1158 Pressure Zone – RP-1 1158 Pumps)	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 1158 Pressure Zone – RP-1 1158 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 1158 Pressure Zone – RP-1 1158 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
EN08023	RP-1 Asset Replacement	AMP	Redesign needed for the RP-1 Primary Clarifier flights.	2025
EN11039	RP-1 Disinfection Pump Improvements	AMP	Engineering project to upgrade dosing facilities at OES and NES to allow full post filtration chlorination.	2025
EN13046	RP-1 Flare System Improvements	AMP	Project to upgrade to pressure regulating valve, replace digester valve, pressure loss evaluation, and pavement addition.	2025
TBD	RP-1 Flare Improvements	AMP	RP-1 flare improvement and gas system upgrades.	2025
EN14019	RP-1 Headworks Gate Replacement	AMP	Engineering project to comprehensively rehab and upgrade the Preliminary Treatment Process. Gate Replacement. Start design in FY15/16.	2025
EN15012	RP-1 East Primary Effluent Pipe Rehab	AMP	Rehab of the east primary effluent piping between the rectangular primary clarifiers and the Inter-mediate Pump Station wet well. Also includes the IPS structure updates	2025
EN15013	RP-1 TWAS and Primary Effluent Piping Replacement 2014	AMP	Failures in the TWAS and primary effluent piping require pipe to be replaced.	2025
EN13019	RP-1 Odor Control Improvements Evaluation	AMP	Odor control improvements (clarifier covers, foul air equipment, etc.)	2025
EN15020	RP-1 Plant 3 Primary Scum Well Upgrade	AMP	Potential project to address scum pumping capacity issues, as well as, evaluate MCC in primary pumping gallery.	2025
EN18004	RP-1 IPS System Improvements	AMP	Project to address deficiencies in system (e.g., replace eddy clutches with VFDs)	2025
EN19007	RP-1 Primary Effluent EQ Elimination	AMP	Scope will be determined by findings of Master Plan update. Potential project to address odor related to equalizing primary effluent.	2025
EN20006	RP-1 Digester Mixing Upgrade	AMP	Potential Engineering project to upgrade the digester mixing systems. Start design in FY19/20.	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
TBD	Chino Basin Groundwater Supply Wells and Raw Water Pipeline (Plume)	AMP	Project Scope Description needs to be defined.	2025
TBD	RP-1 Liquid Treatment Rehabilitation	AMP	Expand RP-1 liquid train treatment to 40mgd	2025
TBD	RP-1 Liquid Treatment Rehabilitation	AMP	Expand RP-1 solids treatment capacity.	2025
TBD	RP-1 Mixed Liquor Return Pump Improvements	AMP	Install Mixed Liquor Return pumps to the six aeration trains at RP-1.	2025
TBD	RP-1 Rehabilitation PDR	AMP	As recommended by the WWFMP and also needs to include the Headworks assessment, GT, Odor Control, Septage Dump Station	2025
TBD	RP-1 NGO Meters Interconnection Agreement Installation	AMP	SCE interconnection	2025
	RP-1 1158 Pump Station Improvements	AMP (Recycled Water Distribution and Ground Water Recharge Systems)	Pump station improvements to increase capacity.	2025
	RP-1 Parallel Outfall Pipeline from RP-1 to Riverside Dr	AMP (Recycled Water Distribution and Ground Water Recharge Systems)	This project will provide for a parallel pipeline following the TP-1 Out fall Pipeline from RP-1 to Edison Ave. to address the existing pipeline capacity issues.	2025
	RP-1 Utility Water Flow Meter	AMP (Recycled Water Distribution and Ground Water Recharge Systems)	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.	2025
	24 MG EQ Storage at RP-1	RWPS	Insufficient supply capacity from RP-1, Demand Trigger Max Summer Direct Use (DU) and Groundwater Recharge (GWR)	2025
	RP-1 930 PZ PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	1.6 MG EQ Storage at RP-4	RWPS	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-4. Max Summer Direct Use & GWR. **1.6 MG.**	2030
	3 MG EQ Storage at CCWRF	RWPS	Capacity in the 930 PZ, reduce supply constraint from RP-1. Max Summer Direct Use & GWR. **3 MG.**	2030
	RP-1 930 Pump Station Capacity Upgrades	RMPU Amendment	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2035
	RP-1 1050 Pump Station Capacity Upgrades	RMPU Amendment	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2035

Project #	Project Name	Referencing Report	Project Summary	Planning Year
TBD	RP-1 Filter Valve Replacement	CIP – Capital Projects		
TBD	RP-1 Power Reliability Building Controls Upgrade	CIP – Capital Projects		
TBD	RP-1 Dewatering Silo/Conveyer Safety Repairs	CIP – Capital Projects		
TBD	RP-1 Dewatering Vertical Conveyor Repair	CIP – Capital Projects		
TBD	RP-1 Safety Improvement	CIP – Capital Projects		
TBD	RP-4 Safety Improvements	CIP – Capital Projects		
EP17003	RP-1 Training Room	CIP – Capital Projects		
EP17003	RP-1 Training Room	CIP – Capital Projects		
IS17002	RP-1 Filter PLC Upgrade	CIP – Non-Capital Projects		
IS17017	RP-1 Centrifuge Plant Ethernet Upgrade	CIP – Non-Capital Projects		
IS17019	Replace VM Host Server RP-1	CIP – Non-Capital Projects		
EN16036	RP-1 Disinfection Pump Improve-ments	CIP – Capital Projects		
12	RP-1 RW Injection-Increment 1	IRP – Strategy B: Portfolios 2 & 3; Strategy C: Portfolios 4 & 5; Strategy E: Portfolio 8	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.	
13	RP-1 RW Injection 2	IRP – Strategy C: Portfolios 4 & 5	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.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
14	RP-1 RW Injection 3	IRP – Strategy C: Portfolios 4 & 5	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.	
65	RP-1 NRWS Treatment	IRP – Non-Categorized Projects	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 rehabilitation and partial reverse osmosis for blending.	
	RP-1 Utility Water Flow Meter	AMP (1050 Pressure Zone – Philadelphia St. Pipeline)	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.	10-50 Year Planning Period
	3 MG EQ Storage at CCWRF	RWPS	Capacity in the 930 PZ, reduce supply constraint from RP-1 . Demand Trigger Max Summer DU.	2035

PROJECT CATEGORY 1: TREATMENT FACILITY UPGRADES
RP-4 POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	RP-4 Liquid Treatment Expansion Project	WFMP	Increased liquid treatment capacity to meet projected future flows	2035
	HVAC Controls and Upgrades	EMP (RP-4/IECRF)	RP-4 and IERCF have many buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	2033/2034 fiscal year
	Expand Solar Installation	EMP (RP-4/IECRF)	The power generated from the 1 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering installing additional panels on the roof of IERCF or on available land at RP-4 to expand the solar generation capacity.	2033/2034 fiscal year
	Energy Storage Installation	EMP (RP-4/IECRF)	Considering the facility load is highest during the middle of the day, when TOU pricing is highest from the IOU, RP-4/IERCF can benefit from the installation of energy storage technology to assist with load management. Storage could ensure that renewable installations could be used to charge batteries (or similar storage technology) outside of peak periods and then used on site when IOU rates are highest.	2033/2034 fiscal year
EN13056	Agency-Wide HVAC Improve-ments Package No. 2	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-4 Motor Control Center #5 and RP-4 Main Building.	2025
	RP-4 Process Improvements Phase II	AMP (Preliminary Treatment Process – Grit Removal System)	Replace the grit chamber isolation gates and retrofit the grit removal pumping system of grit chamber no.1.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Primary Treatment Process – Primary Diversion Structure)	Repair concrete and coat the diversion structure, install larger inspection hatches, and replace primary influent gates.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Primary Treatment Process – Ferric Chloride System)	Rehab the ferric chloride system by recoating the ferric containment area and replacing the chemical metering pumps.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Primary Treatment Process – Polymer System)	Rehab the existing polymer dosing system by constructing a chemical dosing pipeline to the primary diversion structure and replacing the chemical metering pumps.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Secondary Treatment Process – Activated Sludge System)	Replace the Kawasaki blower.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Secondary Treatment Process – Secondary Clarifier)	Install weir washing units and replace drain valves on the secondary clarifiers.	10-50 Year Planning Period
	RP-4 Process Improvements	AMP (Secondary Treatment Process – RAS Pumping	Retrofit the piping to flood the flow meter and wasted flows shall be diverted directly to the	10-50 Year Planning

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Phase II	Station)	sewer.	Period
	RP-4 Process Improvements Phase II	AMP (Secondary Treatment Process – WAS Station Pumping System)	Retrofit the piping to flood the flow meter and wasted flows shall be diverted directly to the sewer.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Secondary Treatment Process – Emergency Lagoon)	Replace the lagoon recovery pump station pumps and ancillary equipment.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Tertiary Treatment – Trident Filters)	Replace worn filter ancillary equipment.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Tertiary Treatment Process – Chlorine Contact Basin)	Replace gate and controls on CCB1A.	10-50 Year Planning Period
	RP-4 Process Improvements Phase II	AMP (Auxiliary Systems – Utility Water System)	Install a utility water flow meter with manual bypass, install additional 1 1/2" utility water connections, and install actuators to automate recycled water valves.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (Auxiliary Systems – 1299 Pressure Zone – RP-4 1299 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
EN09021	RP-4 Headworks Retrofit	AMP	This project will include replacing both of the bar rack screens with fine screens, modifying the screening enclosure, repaving damaged concrete within the screening enclosure and replacing gates isolating the headworks screens.	2025
EN14018	RP-4 Chlorination Facility Retrofit	AMP	The project will replace the existing chlorination facility and associated equipment. Possible pipe gallery as an option.	2025
TBD	RP-4 Process Improvements	AMP	The project will include various process improvements (grit removal system, primary diversion structure, aeration blower replacement, RAS wasting station, MLSS wasting station, filtration system, secondary clarifier drain valves, lagoon recovery pump station, secondary clarifier weir washers, and recycled water distribution system).	2025
	RP-4 1158 PZ Pump Station Capacity Upgrades	RWPS	Pump capacity exceeded. GWR Increase to Upper Zones.	2020
	RP-4 1158 PZ PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	1.6 MG EQ Storage at RP-4	RWPS	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-4. Max Summer Direct Use & GWR. **1.6 MG.**	2030
	Capacity Upgrades to 1299 at RP-4	RWPS	Supply Deficiency in RP-4. Max Summer Direct Use & GWR.	2030
TBD	RP-4 Primary	CIP – Capital Projects		

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Clarifier Rehab			
EN17030	RP-4 South Side Sight-Proofout	CIP – Capital Projects		
EN17032	RP-4 Outfall Repair from Mission Blvd. to RP-1	CIP – Capital Projects		
EN14018	RP-4 Disinfection Facility Improvements	CIP – Capital Projects		
IS17015	Replace VM Host Server RP-4	CIP – Non-Capital Projects		
IS17023	RP-4 Replace OITS	CIP – Non-Capital Projects		

PROJECT CATEGORY 1: TREATMENT FACILITY UPGRADES
RP-5 POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	RP-5 Solids Handling Facilities Project (RP-2 Relocation)	WFMP	Relocation of RP-2 solids handling operations to RP-5; Increased solids treatment capacity to meet existing and projected future flows; Relocation of RP-2 Lift Station to above the flood elevation; Demolition of RP-2 facilities	2035
	RP-5 Liquid Treatment Expansion Project	WFMP	Increased liquid treatment capacity to meet projected future flows	2035
	Demand Response Energy Storage Installation	EMP (RP-1 RP-5, and CCWRF)	The DRES project would involve a third party installing battery storage at IEUA facilities (at no cost to IEUA) that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times.	2033/2034 fiscal year
	RP-5 Decrease Solar Installation	EMP	RP-5 currently has 1 MW of solar panels installed on the southwest portion of the facility, covering nearly 10 acres of land. With the relocation of solids processing to RP-5, land use is expected to be a concern when designing the plant modifications. An understanding of IEUA's options to remove or relocate a portion of the solar panels would be beneficial prior to project design.	2033/2034 fiscal year
EN15032	Agency-Wide HVAC Improvements Package No. 3	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-5 Control Room and RP-5 Power Center No. 3. RP-5 Control Room HVAC ducting system will be modified to serve the Control Room via the adjacent SCADA Room air conditioning (AC) system to enhance performance and save energy. Power Center No. 3 AC system will be augmented to provide additional cooling for the electrical equipment for reliable operation and extend equipment life.	2025
	RP-5 IPS Wetwell Self Cleaning Automation	AMP (Preliminary Treatment Process – Influent Pump Station)	Automatically clean the RP-5 IPS wet-well by installing new equipment.	10-50 Year Planning Period
	RP-5 Headworks Screening Replacement	AMP (Preliminary Treatment Process – Screening Equipment)	Install fine screens to replace the current bar screens. The new fine screens will screen out smaller unwanted inorganics to pass through into the system, allowing for better and more efficient process treatment.	10-50 Year Planning Period
	RP-5 Odor Control Modifications	AMP (Preliminary Treatment Process – Biofilter)	Modify existing biofilters to new bio-scrubbers or more efficient means of odor control.	10-50 Year Planning Period
	RP-5 Emergency Overflow Pond Pumps Station	AMP (Primary Treatment Process – Emergency Overflow Pond)	Install permanent pump station to return flows from the EOP to the headworks. Concrete line the Emergency Overflow Pond.	10-50 Year Planning Period
	RP-5 Tertiary Filters	AMP (Tertiary Treatment Process –	Install new tertiary filter system with less maintenance and better performance.	10-50 Year Planning

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Modifications	Filters)		Period
EN09023	RP-5 SHF/REEP Independent Evaluation	AMP	Provide technical support to Inland Bioenergy (Lessee of RP-5 SHF/REEP)	2025
EN11031	RP-5 Flow Equalization and Effluent Monitoring	AMP	The RP-5 Flow Equalization and Effluent Monitoring consist of modifications in the primary effluent splitter box. The 12' weir gate and automation of the slide gate to allow flow to the aeration basin will better optimize the flow equalization of plant treatment process.	2025
EN19001	RP-5 Liquid Treatment Expansion	AMP	Expand existing RP-5 liquid treatment capacity from 15 to 22.5 MGD. Project cost estimated at $75M. (include RP-5 satellite warehouse & MM shop)	2025
EN19006	RP-5 Solids Treatment Facility - RC	AMP	Construct new solids handling facility at RP-5 to decommission RP-2.	2025
TBD	RP-5 Process Improvements	AMP	Project to provide various process improvements that couldn't be addressed under EN11031 (e.g., secondary effluent diversion to lagoon, headworks fine screens, grit piping modifications, lagoon pump station, weir washers, influent wet well cleaning.)	2025
TBD	RP-5 Expansion PDR	AMP	As defined by WWFMP, includes both solids and liquids facilities	2025
	RP-5 RW PS Process Control Sys Migration	AMP (Recycled Water Distribution and Ground Water Recharge Systems)	Project to migrate the RP-5 RW PS to a Rockwell based system.	2025
	New RP-5 1158 PZ Pump Station	RWPS	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5. GWR Supply to Upper Zones.	2030
EN14012	RP-2 Drying Beds Rehabilitation	CIP – Capital Projects		
IS17024	Invensys/ Foxboro RP-5 and RP-2 Upgrades	CIP – Non-Capital Projects		
TBD-04	RP-2 Preliminary Design Report for Decomissioning	CIP – Non-Capital Projects		

PROJECT CATEGORY 1: TREATMENT FACILITY UPGRADES
CCWRF POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Demand Response Energy Storage Installation	EMP (RP-1 RP-5, and CCWRF)	The DRES project would involve a third party installing battery storage at IEUA facilities (at no cost to IEUA) that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times.	2033/2034 fiscal year
EN13056	Agency-Wide HVAC Improvements Package No. 2	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the CCWRF Switchgear Room. Replace the evaporative coolers for the CCWRF switchgear with air conditioning system and modify the ventilation system configuration.	2025
	CCWRF Odor Control and Headworks Replacement	AMP (Preliminary Treatment Process – Screening Equipment)	Replace screening equipment and isolation gates.	10-50 Year Planning Period
	CCWRF Odor Control and Headworks Replacement	AMP (Preliminary Treatment Process – Screening Conveyance and Disposal)	Replace screening conveyance and disposal equipment.	10-50 Year Planning Period
	CCWRF Odor Control and Headworks Replacement	AMP (Preliminary Treatment Process – Odor Scrubber)	Replace Odor Control Scrubber Equipment.	10-50 Year Planning Period
	Primary Clarifier Sidewalk Repair	AMP (Primary Treatment Process – Primary Clarifiers)	Evaluate the uneven settling of the concrete around the primary clarifiers. Replace concrete and ancillary piping as needed to address the system issues	10-50 Year Planning Period
	CCWRF Lagoon Riprap Reinforcement	AMP (Primary Treatment Process – Storage Lagoon)	Reinforce existing riprap	10-50 Year Planning Period
	CCWRF Aeration Blower Replacement	AMP (Secondary Treatment Process – Activated Sludge System)	Evaluate and replace the aeration blower and controls.	10-50 Year Planning Period
	RAS Pumping System Upgrades	AMP (Secondary Treatment Process – RAS Pumping System)	Replace RAS flowmeter and control valves.	10-50 Year Planning Period
	CCWRF Backup Generator Control Upgrade	AMP (Auxiliary Systems – Electrical System)	Automatic Transfer Control for the backup generator is nearing the end of its service life and should be upgraded with new technology	10-50 Year Planning Period
	Mixed Liquor Return Line Inspection	AMP (Auxiliary Systems – Yard Piping)	CCWRF mixed liquor line from MLR pump station to secondary clarifiers is showing evidences of leak. Inspect and repair the line	10-50 Year Planning Period
	930 to 800 West CCWRF PRV	AMP (930 Pressure Zone – CCWRF System Pipeline)	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF	10-50 Year Planning Period
EN14027	CCWRF Secondary	AMP	Rehab steel components and coat concrete of	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Clarifier #3 Rehabilitation		clarifier.	
TBD	CCWRF Lagoon Riprap Reinforcement	AMP	When flow is bypassed at flocculation basin or overflown from chlorine contact basin splitter box, the existing riprap does not sufficiently prevent side slope erosion near the discharge pipes. Engineering has a project in the development stage to address this issue.	2025
TBD	CCWRF Odor Control and Headworks Replacements (AMP)	AMP	Odor control equipment and others equipment are at the end of their useful life - project necessitated by AMP	2025
TBD	CCWRF Backup Generator Control Upgrade	AMP	Automatic Transfer Control for the backup generator is nearing the end of its service life and should be upgraded with new technology	2025
TBD	CCWRF Aeration Blower Replacement	AMP	The existing blower system is nearing the end of its service life. Blowers #1 through #3 are 23 years old and Blower #4 is 20 years old. Blower start is not standardized: #1 and #4 are soft start, #2 and #3 are across the line. #1 blower has high vibration (or high vibration sensor) issue and is not being used. #3 has bad bearing. #1 through #3 does not have outlet diffusers and have limited turn down.	2025
	CCWRF PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	3 MG EQ Storage at CCWRF	RWPS	Capacity in the 930 PZ, reduce supply constraint from RP-1. Max Summer Direct Use & GWR. **3 MG.**	2030
	CCWRF Pump Station Capacity Upgrades	RWPS	Increase capacity at the CCWRF 930 PZ Pump Station. Demand Trigger Max Summer DU.	2035
TBD	CCWRF Valve Replacement	CIP – Non-Capital Projects		

PROJECT CATEGORY 1: TREATMENT FACILITY UPGRADES
IERCF POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	HVAC Controls and Upgrades	EMP (RP-4/IECRF)	RP-4 and IERCF have many buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	2033/2034 fiscal year
	Expand Solar Installation	EMP (RP-4/IECRF)	The power generated from the 1 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering installing additional panels on the roof of IERCF or on available land at RP-4 to expand the solar generation capacity.	2033/2034 fiscal year
	Energy Storage Installation	EMP (RP-4/IECRF)	Considering the facility load is highest during the middle of the day, when TOU pricing is highest from the IOU, RP-4/IERCF can benefit from the installation of energy storage technology to assist with load management. Storage could ensure that renewable installations could be used to charge batteries (or similar storage technology) outside of peak periods and then used on site when IOU rates are highest.	2033/2034 fiscal year
	IERCF Trommel Screen Improve-ments	AMP (Treatment Process – Trommel Screens)	Retrofit existing trommel screen equipment	10-50 Year Planning Period
	IERCF Transition Air Duct Improvements	AMP (Treatment Process – Active Curing Screening)	Upgrade the foul-air rectangular transition air duct running north/south through the active curing screening.	10-50 Year Planning Period
	IERCF Biofilter Media Replacement	AMP (Treatment Process – Biofilter)	Full replacement of the biofilter media in all 12 cells, recurring every 5 years. Turnover of existing biofilter media and replenishment of material as necessary, annually. This will not be conducted on years of a full media replacement.	10-50 Year Planning Period
	IERCF Fire Sprinkler Improvements	AMP (Auxiliary Systems – Potable Water System)	Retrofit the fire sprinkler system pipelines and Victaulic fittings.	10-50 Year Planning Period
RA11001	IERCF Capital Replacement	AMP	General project for facility/equipment repair and replacement, including replacement of front end loaders, and evaluation of the Baghouse.	2025
RA11004	IERCF Process Improvements	AMP	The belt conveyance system will be modified to transfer material from Active to Curing, then from Curing to Screening. Currently, the system transfers material from Active to Screening and then Screening to Curing.	2025
RA12009	IERCF Structure Protection	AMP	Column protection and repair.	2025
RA12011	IERCF Lighting Improvements	AMP	Additional lighting is going to be installed in all process areas to increase visibility for front end loader operators.	2025
RA14003	IERCF Receiving Pit & Fan Corridor Drains	AMP	Installation of drains in the receiving pit and fan corridors for housekeeping purposes.	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
RA15001	IERCF Baghouse Improvements	AMP	Based upon system evaluation, this project is to improve the existing Baghouse, install new blowers downstream of the Baghouse structure, and install a foam fire suppression system.	2025
TBD	IERCF Trommel Screen Improvements	AMP	Retrofit existing trommel screen equipment	2025
TBD	IERCF Fire Sprinkler Improvements	AMP	Retrofit the fire sprinkler system pipelines and Victaulic fittings.	2025
TBD	IERCF Transition Air Duct Improvements	AMP	Upgrade the foul-air rectangular transition air duct running north/south through the active curing screening.	2025
RA17002	IECRF Replace Printers	CIP – Capital Projects		
RA17003	IECRF Replace VM Host Servers	CIP – Non-Capital Projects		
RA17004	IERCF Replace Network Switches	CIP – Non-Capital Projects		
RA17005	IERCF UPS Replacement	CIP – Non-Capital Projects		
RA19001	IERCF Pugmill Improvements	CIP – Non-Capital Projects		
RA20003	IERCF Belt Conveyor Improvements	CIP – Non-Capital Projects		
RA16001	IERCF Misc Fan Improvements	CIP – Non-Capital Projects		
RA11001	IERCF Capital Replacement	CIP – Non-Capital Projects		
RA15001	IERCF Baghouse Improvements	CIP – Non-Capital Projects		
TBD	IERCF Inner Roof Lining Repair	CIP – Non-Capital Projects		

PROJECT CATEGORY 1: CONVEYANCE SYSTEMS AND ANCILLARY FACILITIES AGENCY-WIDE / OTHER POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Comprehensive Energy Audits	EMP	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retro its, but also process modifications that can result in higher operational efficiencies.	2033/2034 fiscal year
	Lighting Upgrades	EMP	All IEUA facilities can benefit from lighting retro its and increased controls. A preliminary evaluation showed that retrofitting indoor and outdoor lighting systems with LEDs could reduce demand by over 550 kW and yield a payback of five years or less.	2033/2034 fiscal year
	Purchase Existing Solar Installations	EMP	All of the existing solar arrays at IEUA are owned and maintained by a third party. If IEUA would like to purchase the arrays at fair market value in order to terminate ongoing costs of purchasing the power generated by the solar systems.	2033/2034 fiscal year
	Install 5 MW Solar Array	EMP	SCE's RESBCT program allows for exported electricity from renewable energy projects to act as credits on other accounts held by the same organization. This project would involve the installation of a solar array at one IEUA facility that could export enough electricity to offset utility costs at IEUA's other facilities.	2033/2034 fiscal year
EN13056	Agency-Wide HVAC Improvements Package No. 2	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-4 Motor Control Center #5, CCWRF Switchgear Room, RP-4 Main Building and RP-1 Maintenance Building. Replace the evaporative coolers for the CCWRF switchgear with air conditioning system and modify the ventilation system configuration.	2025
EN15032	Agency-Wide HVAC Improvements Package No. 3	AMP	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-1 Chemical Storage Warehouse, RP-5 Control Room, and RP-5 Power Center No. 3. RP-5 Control Room HVAC ducting system will be modified to serve the Control Room via the adjacent SCADA Room air conditioning (AC) system to enhance performance and save energy. Power Center No.3 AC system will be augmented to provide additional cooling for the electrical equipment for reliable operation and extend equipment life.	2025
EN17003	Aeration System Improvements	AMP	Agencywide upgrades to the lighting systems and process equipment systems to improve efficiency. Start design in FY18/19.	2025
EN17004	Agency-wide Energy Efficiency Study	AMP	Agencywide upgrades to the lighting systems and process equipment systems to improve efficiency. Start design in FY18/19.	2025
TBD	Agency-wide Energy Efficiency Improvements	AMP	Agencywide upgrades to the lighting systems and process equipment systems to improve efficiency. Start design in FY18/19.	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
EP15002	Major Equipment Rehab/Replace	AMP	Agencywide annual R&R of major equipment (pumps, heat exchangers, compressors, etc)	2025
PA15001	Underground Piping Rehab Assessments	AMP	Annual underground piping rehab Agency wide within facilities.	2025
PA15002	Agency Wide Coatings and Paving	AMP	Agencywide annual maintenance for coatings and paving	2025
PA15008	Major Asset Rehab/Replaceme nt	AMP	Agencywide annual R&R of major assets (buildings, vehicles, etc)	2025
SR12001	Agency-wide Security Equipment Upgrade	AMP	Agencywide Security Equipment Upgrade	2025
TBD	CEQA document for implementation of WWFMP, IRP, RWPS, etc.	AMP	-----	2025
TBD	As Built Database Upgrades (TMP)	AMP	Provide a tool to facilitate the search capability of as-builts.	2025
TBD	NRWS OE Projects	AMP	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	2025
TBD	RC OE Projects	AMP	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	2025
TBD	NRWS Emergency O&M Projects	AMP	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	2025
TBD	WC Emergency O&M Projects	AMP	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			year.	
TBD	RC Emergency O&M Projects	AMP	This project will allow Engineering and Construction Management to fund unforeseen RC O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	2025
TBD	RO Emergency O&M Projects	AMP	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	2025
TBD	Agency-wide Digester Cleaning and Rehab	AMP	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment.	2025
TBD	Regional Wastewater Projects AMP	AMP	Facility Asset Management projects as determined in the future.	2025
	HQ Parking Lot	AMP (Agency Headquarters and Park – HQ Structures)	Remove and Replace 26 concrete stalls, remove and replace trees, and install root barriers.	10-50 Year Planning Period
	Central Energy Plant HVAC	AMP (Agency Headquarters and Park – HQ HVAC)	Upgrade controls, add backup equipment and expand process required for future uses	10-50 Year Planning Period
	HQ Vandalism and Theft Deterrent Improvements	AMP (Agency Headquarters and Park – HQ Plumbing)	Provide cages, additional lighting and upgrades to discourage vandalism and theft of the external fixtures at the Agency Headquarters.	10-50 Year Planning Period
EN15008	New Water Quality Laboratory	AMP (Agency Laboratory)	This project will replace the existing operation laboratory at RP-1. A possible site location will be south of Headquarters at RP-5.	2025
EN15008	New Water Quality Laboratory (Equipment)	AMP (Agency Laboratory)	This project will replace the existing operation laboratory at RP-1. A possible site location will be south of Headquarters at RP-5. (Note: new lab equipment LCMS, GCMS, fume hood, Low level Hex. Chromium, perchlorate), additional receiving area for efficiency and chemical storage)	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
EN14002	CIPO Enhancements	AMP (Agency Headquarters)	Construction Management tracking software upgrades.	2025
EN21002	Chino Creek Wetlands and Educational Park Upgrades	AMP (Agency Headquarters)	Grant dependent project to facilitate the education program and increase community involvement the Park needs three ramadas (pavilions) with educational signage, a restroom/storage facility and the construction of a pervious parking lot with additional signage.	2025
TBD	HQ Parking Lot	AMP (Agency Headquarters)	FY15/16-Remove and Replace 26 concrete stalls, remove and replace trees, and install root barriers.	2025
EB15053	Upgrades to Existing P6 Application	AMP (Agency Headquarters)	Implementation of P6 ERP Portfolio: Which will include a Management Plan, a step by step procedure to implement the EPS Portfolio, assist agency in EPS Portfolio Implementation, train staff in building project schedules, review schedules against baseline; Train Analyst and Supervisor Staff in maintaining ERP system including EPS security levels, and monthly updates of rolled up individual portfolios into a master portfolio and report writing. Create training materials including step by step contractor schedule review procedures. Project will also include 1 x/month 1 hour training sessions for 12 months and a 2 hour claims management workshop.	2025
EN13016	SCADA Enterprise System	AMP (Business Network and Process Automation Control Network)	SCADA Enterprise System. Replacing the DCS over the next five years.	2025
EN13040	Prado Dechlor Communication System	AMP (Business Network and Process Automation Control Network)	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	2025
EN13042	Philadelphia Pump Station Communication System	AMP (Business Network and Process Automation Control Network)	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	2025
EN13043	Montclair Lift Station Communication System	AMP (Business Network and Process Automation Control Network)	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	2025
IS15001	HCM Phase 2 HR Process & Automation & ESS/MSS Enhancements	AMP (Business Network and Process Automation Control Network)	HCM Phase 2 HR Process & Automation & ESS/MSS Enhancements	2025
IS15003	Document Management System - Implementation	AMP (Business Network and Process Automation Control Network)	Document Management System - Implementation	2025
IS15012	Business Network IT Improvements (TMP)	AMP (Business Network and Process Automation Control Network)	Annual business network improvements and replacement	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
IS15015	PAC- L55 Processor Replacement / Redundancy Modules	AMP (Business Network and Process Automation Control Network)	Replace ethernet (EN2T) North/South (2 year project)	2025
IS15020	Process Automation Controls IT Improvements	AMP (Business Network and Process Automation Control Network)	Annual PAC network improvements.	2025
IS16001	HCM Phase 2 Position Budgeting & Control	AMP (Business Network and Process Automation Control Network)	HCM Phase 2 Position Budgeting & Control	2025
IS16003	SAP Archiving	AMP (Business Network and Process Automation Control Network)	SAP Archiving	2025
YBD	SAP User Interface Improvement	AMP (Business Network and Process Automation Control Network)	Implementation of User Interface (UI) technologies that address the ease-of- use and mobility needs (e.g., FIORI and Persona)	2025
TBD	GIS Master Plan (TMP)	AMP (Business Network and Process Automation Control Network)		2025
TBD	SAP Strategy and Roadmap (TMP)	AMP (Business Network and Process Automation Control Network)	For various enterprise systems improvements (SAP HANA in FY19, SAP Cloud in FY18) From TMP	2025
TBD	Conference Rooms AV (Agencywide)	AMP (Business Network and Process Automation Control Network)	Upgrade the Audio/Video equipment in the conference rooms.	2025
TBD	IS Improvement Projects (TMP)	AMP (Business Network and Process Automation Control Network)	Placeholder for SAP projects as identified through TMP process	2025
EN16055	Headquarters Back Up Generator	CIP – Capital Projects		
EN16012	Capital Project's Document Management Program	CIP – Capital Projects		
CP16003	HQ Roofing Replacement	CIP – Non-Capital Projects		
CP16004	HQ LEED OM Certification	CIP – Non-Capital Projects		
EN17023	HQ Drainage Investigations	CIP – Non-Capital Projects		
IS14001	IEUA Website Consultant	CIP – Non-Capital Projects		
IS4025	Finance Process/SAP	CIP – Non-Capital Projects		

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Functional Analysis			
IS15003	Document/Records Management System	CIP – Non-Capital Projects		
IS16003	SAP Roadmap & Strategy	CIP – Non-Capital Projects		
IS17007	Exchange (Email) Software Upgrades	CIP – Non-Capital Projects		
IS17018	HyperV Host Server	CIP – Non-Capital Projects		
IS17021	Keyboard/ Video/ Monitor Console Replacement	CIP – Non-Capital Projects		
IS17009	Replace VM Host Server GWR	CIP – Non-Capital Projects		
WR16001	Water Softener Removal Rebate Program	CIP – Capital Projects		
IS17022	VersaView Replacement Project	CIP – Capital Projects		
RW17001	Truck Purchase x 2	CIP – Capital Projects		
TBD	Primavera Enhancements	CIP – Capital Projects		
WR16025	SARCCUP Projects	CIP – Non-Capital Projects		
WR17002	CBWCD Landscape Audit and Monitoring Program	CIP – Non-Capital Projects		
WR17004	Garden in Every School	CIP – Non-Capital Projects		
WR17006	Residential Landscape Device Retrofit – Lg Land	CIP – Non-Capital Projects		
WR17007	Residential Rebate Incentives	CIP – Non-Capital Projects		
WR17008	CII Rebate Incentives			
WR17009	National Theater for Children	CIP – Non-Capital Projects		
WR17010	Regional Educational Outreach Activities	CIP – Non-Capital Projects		
WR17011	Freesprinklernozzles .com Program	CIP – Non-Capital Projects		
WR17013	Sponsorships & Public Outreach	CIP – Non-Capital Projects		
WR17015	Residential Landscape Training	CIP – Non-Capital Projects		

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Classes			
WR17017	Residential Pressure Regulation Program	CIP – Non-Capital Projects		
WR17018	IEUA QUE Model Update and Workshops	CIP – Capital Projects		
TBD	Member Agency Locally Implemented Programs	CIP – Capital Projects		
WR17027	Residential Education, Surveys and Controller Upgrade Program	CIP – Capital Projects		
WR16019	Technology Based Software	CIP – Capital Projects		
WR16020	Budget Based Water Rates	CIP – Non-Capital Projects		
CP16001	Regional Plant Facilities Aesthetics	CIP – Non-Capital Projects		
IS17012	RACO Alarm System Replacement Project	CIP – Non-Capital Projects		
IS17020	VantagePoint Connectors	CIP – Non-Capital Projects		
IS17106	Virtualization Host Server Replacement	CIP – Non-Capital Projects		
PK11001	Water Discovery Field Trip & Bus Grant	CIP – Capital Projects		
IS17016	Host Servers for Test Environment	CIP – Capital Projects		
PL16016	Sewer Use Fee Evaluation	CIP – Non-Capital Projects		
-	CDA Printer Replacement	CIP – Non-Capital Projects		
-	CDA RO/CW/IEX PLC Replacement	CIP – Capital Projects		
-	Purchase Web Based HMI for Desalter/Wonder-ware	CIP – Capital Projects		
-	ICP Instrument	CIP – Capital Projects		
-	TOC Instrument	CIP – Capital Projects		
-	Dionex Integrion HPIC	CIP – Non-Capital Projects		
LB17001	TKN Block Digester	CIP – Non-Capital		

Project #	Project Name	Referencing Report	Project Summary	Planning Year
		Projects		
-	RO Planning Documents	CIP – Non-Capital Projects		
PL16015	Septic to Sewer Feasibility Study	CIP – Non-Capital Projects		
TBD	Agency-Wide Condition Assessments	CIP – Non-Capital Projects		
TBD	Agency-Wide Pump Efficiencies Improvements	CIP – Non-Capital Projects		
LB17002	Integrion HPIC	CIP – Non-Capital Projects		
WR18001	Agricultural Conservation	CIP – Non-Capital Projects		
RW17002	West Valley (Midge)	CIP – Non-Capital Projects		
WR16002	CBWCD Landscape Audit and Monitoring Program	CIP – Non-Capital Projects		
WR16006	Residential Education, Surveys, and Controller	CIP – Non-Capital Projects		
WR18XXX	Conservation Programs – Grant Share	CIP – Non-Capital Projects		
TBD	New PC Workstation	CIP – Non-Capital Projects		
WR15022	Water Use Assessments	CIP – Non-Capital Projects		
TBD	Digester 6 and 7 Roof Repairs	CIP – Capital Projects		
TBD	Septic Conversion PDR	CIP – Capital Projects		
RW15002	Upper Santa Ana River Habitat Conservation	CIP – Capital Projects		
IS17017	1630 East Licensed Radio Upgrade	CIP – Capital Projects		
WR16022	Water reliability and sustainability Projects (IRP)	CIP – Capital Projects		

PROJECT CATEORY 2: CONVEYANCE SYSTEMS AND ANCILLARY FACILITIES
REGIONAL CONVEYANCE SYSTEM POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
EN13018	Montclair Diversion Structure Rehabili-tation	AMP	The project entails retrofitting the diversion structure and overcome safety issues.	2025
EN15045	Collection System Manhole Upgrades FY 15/16	AMP	Repair and replace a total of twenty- two (22) sewer collection system manhole frames and covers.	2025
EN15046	NRW Manhole Upgrades FY 15/16	AMP	Repair eight (8) NRW collection system manholes.	2025
TBF	NRWS Manhole Upgrades	AMP	Repair NRW Manholes and lines as determined by Maintenance.	2025
EN22002	NRW East End Flowmeter Replacement	AMP	Flowmeter replacement required by NRWS Agreement.	2025
TBD	Collection System Upgrades	AMP	Repair and replace sewer collection system manhole frames and covers.	2025
EN15043	SBCFCD Recycled Water Easement	CIP – Capital Projects		
EN15042	SBCFCD Sewer Easement	CIP – Capital Projects		
EN15044	SBCFCD NRW Easement	CIP – Capital Projects		
EN16071	San Bernardino Avenue Gravity Sewer	CIP – Capital Projects		

PROJECT CATEORY 2: CONVEYANCE SYSTEMS AND ANCILLARY FACILITIES
AGENCY LIFT STATION POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Philadelphia Lift Station Force Main improvements	AMP (Philadelphia Lift Station – Force Mains)	Replace the force mains, as well as provide inspection manholes for future condition assessment	10-50 Year Planning Period
EN11035	Philadelphia Pump Station Upgrades	AMP	Repair and replacement of section of the force mains in the pump dry sump. Miscellaneous instrumentation and facility improvements will be made. A redundant PLC will also be supplied to provide control system reliability.	2025
EN13028	Preserve Lift Station	AMP	A sewer lift station design prepared by the City of Chino will be reviewed by IEUA. The SCADA system will be connected to IEUA's system; therefore, the lift station SCADA components will be reviewed for conformance to our system.	2025
EN13054	Montclair Lift Station Upgrades	AMP	Replacement of all three lift pumps as well as replacement and improvements of the control and instrumentation system and the electrical distribution system.	2025
EN16011	Whispering Lakes LS Improvements	AMP	Complete rehab of lift station. Replacement of all equipment, replacement of all electrical systems, replacement of control system, and rehab of gates and structures.	2025
EN19005	Haven LS Improvements	AMP	Connect to the SCADA enterprise system and potential sewer force main line added/construction.	2025
TBD	Philadelphia Lift Station Force Main Improvements	AMP	Replace the force mains, as well as provide inspection manholes for future condition assessment on the entire length along Philadelphia. Replace 12" line with a new 18" line and add cleanouts every 500 ft.	2025

PROJECT CATEGORY 2: CONVEYANCE SYSTEMS AND ANCILLARY FACILITIES AGENCY-WIDE / OTHER POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Montclair Pipeline Upgrades Project	WFMP	Upsize four pipeline segments from 21-inch and 30-inch diameter to 36-inch diameter to mitigate deficiencies in conveyance system, reliably accommodate future growth, and convey peak build out flows	2035
	Whispering Lakes Pump Station Expansion Project	WFMP	Increased pumping capacity to meet projected future flows; Ability to send more flows to RP-1 for treatment	2035
EN12020	Chino Creek Invert Repair	AMP	Repair of Chino Creek invert near CCWRF where differential settling occurred. Remove and replace remaining discharge line to the creek.	2025
TBD	Agency Bypass Pumping Project	AMP	Procure pumps for bypass pumping of 20mgd and provide electrical connectivity to MCCs.	2025
	Min General In-Lieu	RMPU Amendment	Construct two wells and related conveyance to move non-MZ3 groundwater or imported water to JCSD. **New Supply: 5,800 AFY**	2035
	Max General In-Lieu	RMPU Amendment	Construct four wells and related conveyance to move non-MZ3 groundwater or imported water to the JCSD. **New Supply: 11,600 AFY**	2035
	Chino Hills/MVWD Exchange Project	RMPU Amendment	Chino Hills forgoes taking Desalter I water and provides that water to the JCSD. Chino Hills making up the exchanged supply from MZ1 groundwater production or imported water treated at the WFA Plant. **New Supply: 2,800 AFY**	2035
	OGRP Project	RMPU Amendment	Installation of one well and extend OGRP raw water conveyance. **New Supply: 2,900 AFY**	2035
	Ont-CDA MZ3 In-Lieu	RMPU Amendment	Ontario sale of 5,000 acre-ft/yr of their CDA water to the JCSD using existing connections. **New Supply: 5,000 AFY**	2035
39	Expand WUE Devices	IRP – Strategy B: Portfolios 2 & 3; Strategy C: Portfolios 4 & 5	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.	
35	Secure SWP IW transfer outside MWD from Irrigation Districts or Ag Transfers	IRP – Strategy B: Portfolio 3; Strategy C: Portfolio 5	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	
36	SBVMWD IW Transfer	IRP – Strategy B: Portfolio 3; Strategy C: Portfolio 5; Strategy D: Portfolio 6; Strategy E:	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.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
		Portfolios 7 & 8	The supply would be temporary or seasonally available and could be purchased and wheeled into the Chino Basin. Assume benefit 1 in 5 years.	
40	WUE-Budget Rates-Increment 1	IRP – Strategy C: Portfolio 5	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.	
43	WUE-Budget Rates-Increment 2	IRP – Strategy C: Portfolios 4 & 5; Strategy D: Portfolio 6; Strategy E: Portfolios 7	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.	
44	WUE-Budget Rates-Increment 3	IRP – Strategy C: Portfolios 4 & 5	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.	
66	WUE-Advanced Metering Technologies	IRP – Strategy C: Portfolios 4 & 5; Strategy E: Portfolios 7 & 8	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.	
88	Maximize Local Surface Water	IRP – Strategy A: Portfolio 1; Strategy C: Portfolios 4 & 5	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.	
95	MWD Replenishment or Discount Wet Year Water-Increment 1	IRP – Strategy C: Portfolios 4 & 5; Strategy D: Portfolio 6	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).	
96	MWD Replenishment or Discount Wet Year Water-Increment 2	IRP – Strategy C: Portfolio 5	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).	
89	Max Tier 1 MWD Import Water-Increment 1	IRP – Strategy B: Portfolio 3; Strategy E: Portfolios 7 & 8	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.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
56	Water Banking Facility-Increment 1	IRP – Strategy D: Portfolio 6	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.	
90	Max Tier MWD Imported Water-Increment 2	IRP – Strategy E: Portfolios 7 & 8	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.	
91	Max Tier MWD Imported Water-Increment 3	IRP – Strategy E: Portfolios 7 & 8	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.	
18	Desalter Recovery Improvement	IRP – Non-Categorized Projects	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.	
37	Ocean Desalination Exchange	IRP – Non-Categorized Projects	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.	
41	WUE - Turf Removal-Increment 2	IRP – Non-Categorized Projects	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.	
42	WUE - Turf Removal-Increment 3	IRP – Non-Categorized Projects	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.	
45	WUE - Budget Rates- Increment 3	IRP – Non-Categorized Projects	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.	
48	Dry Weather Flow Diversions	IRP – Non-Categorized Projects	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.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
46	WUE – RW Demand Management-Increment 1	IRP – Strategy A: Portfolio 1; Strategy C: Portfolios 4 & 5	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.	
47	WUE – RW Demand Management-Increment 2	IRP – Strategy A: Portfolio 1; Strategy C: Portfolios 4 & 5	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.	
49	Dry Weather Flow Diversions	IRP – Strategy B: Portfolios 2 & 3	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.	
92	Max Tier 2 MWD Imported Water-Increment 1	IRP – Non-Categorized Projects	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.	
93	Max Tier 2 MWD Imported Water-Increment 2	IRP – Non-Categorized Projects	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.	
94	Max Tier 2 MWD Imported Water-Increment 3	IRP – Non-Categorized Projects	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.	
97	MWD Replenishment or discount wet year water- Increment 3	IRP – Non-Categorized Projects	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).	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
98	Watershed Wide Water Transfers	IRP – Non-Categorized Projects	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.	
99	Chino Basin Water Transfers	IRP – Non-Categorized Projects	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.	

PROJECT CATEGORY 2: GROUNDWATER RECHARGE AND EXTRACTION RECYCLED WATER AND GROUNDWATER RECHARGE POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	930 to 800 West CCWRF PRV	AMP (930 Pressure Zone – CCWRF System Pipeline)	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF	10-50 Year Planning Period
	930 Pressure Zone Pipeline Cathodic Protection	AMP (930 Pressure Zone – CCWRF System Pipeline)	Install cathodic protection on the CCWRF RW pipeline and Edison Segment B pipeline, and repair cathodic protection on Edison Segment A Pipeline.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (930 Pressure Zone – Auxiliary Systems – RP-1 930 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (930 Pressure Zone – Auxiliary Systems – RP-1 930 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	RW VFD Replacement	AMP (1050 Pressure Zone – RP-1 1050 Pumps)	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (1050 Pressure Zone – RP-1 1050 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	RW VFD Replacement	AMP (1158 Pressure Zone – RP-1 1158 Pumps)	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station	10-50 Year Planning Period
	1158 Reservoir Pipeline Cathodic Protection	AMP (1158 Pressure Zone – 1158 Reservoir Pipelines)	Repair 1158 reservoir pipeline cathodic protection test stations.	10-50 Year Planning Period
	Recycled Water	AMP (1158 Pressure	Upgrade the emergency generator system to	10-50 Year

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Pump Station Emergency Generation Upgrade	Zone – Auxiliary Systems – RP-1 1158 Pump Station Electrical System)	provide sufficient power during peak recycled water pump station electrical demand.	Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (1158 Pressure Zone – Auxiliary Systems – RP-1 1158 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	1299 Pressure Zone Cathodic Protection	AMP (1299 Pressure Zone)	Per 2014 Corrpro Report: Repair electrical discontinuities on Jurupa force main, and repair test stations on the North Etiwanda pipeline, Antonio Channel Seg A, RP4 Western Extension Phase 1 and Phase 2.	10-50 Year Planning Period
	1299 Pressure Zone Pipeline Capacity Upgrades	AMP (1299 Pressure Zone – 7th & 8th St. Pipeline Capacity)	Upgrade 7th & 8th street pipeline to provide sufficient capacity to not exceed the recom-mended velocity of the pipeline during peak demand.	10-50 Year Planning Period
	1299 Pressure Zone Pipeline Capacity Upgrades	AMP (1299 Pressure Zone – Whittram Ave. Pipeline Capacity	Upgrade Whittram avenue pipeline to provide sufficient capacity to not exceed the recom-mended velocity of the pipeline during peak demand.	10-50 Year Planning Period
	Recycled Water Pump Station Emergency Generation Upgrade	AMP (1299 Pressure Zone – Auxiliary Systems – RP-4 1299 Pump Station Electrical System)	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.	10-50 Year Planning Period
	1299 pressure zone pipeline surge tank	AMP (1630 West Pressure Zone – 1630 West Pumps)	Install a surge tank on the 1299 pressure zone pipeline. To be located at the 1630 west pump station.	10-50 Year Planning Period
TBD	WC OE Projects	AMP	The project establishes an annual budget for applying the labor hours for project evalua-tion, design review, permit issuance, inspec-tion, and closeout for office engineering projects related to recycled water connections and modifications.	2025
EN06025	Wineville Extension Pipeline Segment A	AMP	A new 24” recycled water pipeline along Wineville Ave. from Airport Dr. to Jurupa St. continuing with a new 36” recycled water pipeline to RP-3 Groundwater Recharge Basin. The project includes a recycled water turnout to feed RP-3 Basin and a turnout to feed Declez Basin.	2025
EN12016	North CIM Lateral	AMP	Construct recycled water lateral to the north side of CIM.	2025
EN12019	GWR & RW SCADA Communication System Upgrades	AMP	This project will upgrade the SCADA communication system for all GWR and RW facilities.	2025
EN13001	San Sevaine Improvements	AMP	Project will modify the San Sevaine Basin Turnout to extend the discharge location from San Sevaine Cell No. 5 to the furthest north Cell No. 1.	2025
EN13022	930 RW Reservoir	AMP	-----	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
EN13023	930 Pressure Zone Pipeline	AMP	Approximately 18,000 LF of 30” pipeline connects the CCWRF System Pipeline to the new 930 Reservoir.	2025
EN13041	RP-5 RW PS Process Control Sys Migration	AMP	Project to migrate the RP-5 RW PS to a Rockwell based system.	2025
EN13045	Wineville Extension Pipeline Segment B	AMP	A new 24” recycled water pipeline along Wineville Ave. from Airport Dr. to Jurupa St. continuing with a new 36” recycled water pipeline to RP-3 Groundwater Recharge Basin. The project includes a recycled water turnout to feed RP-3 Basin and a turnout to feed Declez Basin.	2025
EN13048	Second 12kV Feeder to TP-1	AMP	Potential Engineering project to provide a second 12kV feeder to TP-1 to support the RP-1 1158 PS Upgrades. RP-1 electrical PDR.	2025
EN14042	RP-1 1158 Pump Station Improvements	AMP	Pump station improvements to increase capacity.	2025
EN14043	800 Zone Capacity Implementation	AMP	Evaluation of additional recycled water pipeline leaving RP-5 to allow more recycled water to be delivered from this facility into the 800 Pressure Zone.	2025
EN14044	RW Hydraulic Modeling for FY 14/15	AMP	RW Hydraulic Modeling	2025
TBD	RW Hydraulic Modeling	AMP	Ongoing RW hydraulic modeling needs.	2025
TBD	RW Program Strategy	AMP	-----	2025
EN15002	1158 Reservoir Site Cleanup Project	AMP	Cleanup associated with old piping and associated material.	2025
EN15050	1630 W PS Improvements (Surge Protection & VFD Replacement)	AMP	Design and construction of a surge tank to dampen the surges in the 1299 Recycled water pipeline. Surge protection on the suction side of the 1630 Pump Station. Replace constant speed pumps with VFD.	2025
EN19003	RP-1 Parallel Outfall Pipeline from RP-1 to Riverside Dr	AMP	This project will provide for a parallel pipeline following the TP-1 Out fall Pipeline from RP-1 to Edison Ave. to address the existing pipeline capacity issues.	2025
RW15003	RMPU Soft Costs	AMP	Address the design for the RMPU	2025
RW15004	Lower Day RMPU Project	AMP	Address the design and construction of the lower day recharge master plan update	2025
WR15021	Napa Lateral/SB Speedway	AMP	Napa Lateral	2025
TBD	RMPU Construction Costs	AMP	Construction cost for the remaining RMPU projects.	2025
TBD	RP-1 Utility Water Flow Meter	AMP	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.	2025

Project #	Project Name	Referencing Report	Project Summary	Planning Year
TBD	930 to 800 West CCWRF PRV	AMP	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF	2025
TBD	1299 pressure zone pipeline surge tank	AMP	Install a surge tank on the 1299 pressure zone pipeline. To be located at the 1630 west pump station.	2025
TBD	Energy Manage-ment system EMP	AMP	Install energy management system integrating though SCADA to monitor and optimize RW equipment	2025
TBD	RW Pressure Sustaining Valve	AMP	-----	2025
TBD	WC Planning Documents	AMP	-----	2025
TBD	RW Asset Management	AMP	-----	2025
TBD	RC Planning Documents	AMP	Planning efforts	2025
TBD	WC Asset Management	AMP	-----	2025
TBD	WRCWRA	AMP	As defined by the PDR and the MOU with JCSD/WMWD	2025
TBD	UWMP	AMP	-----	2025
TBD	Conservation Programing	AMP	-----	2025
TBD	WW Planning Documents	AMP	-----	2025
TBD	Drought Proofing Projects	AMP	-----	2025
TBD	RW AMP	AMP	-----	2025
TBD	Recycled Water Pump Station Emergency Generation Upgrade	AMP	Upgrade the emergency generators at the RW pump stations to meet load at high demand (RP1 930 Pump Station, CCWRF 930 Pump Station, RP-1 1050 Pump Station, RP-4 1158 Pump Station, RP-1 1158 Pump Station, RP-4 1299 Pump Station)	2025
TBD	Wineville Basin Pipeline	AMP	Construction of a pipeline to provide recycled water to Wineville Basin	2025
	Conversion of 18 MG 1630E Storage Tank	RWPS	System optimization for GWR Flows, system expansion to serve GWR. GWR in 1630E PZ.	Exist
	36-inch 1630E Pipeline to 1630E Tank	RWPS	System optimization for GWR Flows, system expansion to serve GWR. GWR in 1630E PZ. **6715 LF.**	Exist
	RP-1 1158 PS Upgrades	RWPS	Insufficient supply capacity to 1630 PZ for GWR flows, system expansion to serve GWR. GWR in 1630E PZ.	Exist
	16-inch Parallel 1299 PZ Pipeline	RWPS	Deficient 1299 PZ transmission mains, serve east & 7th/8th St Basins. **15289 LF.** GWR Increase Flow.	Exist
	24-inch Parallel	RWPS	Deficient 1299 PZ transmission mains, serve	Exist

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	1299 PZ Pipeline		east & 7th/8th St Basins. **13600 LF.** GWR Increase Flow	
	16-inch Pipeline to Wineville Basin	RWPS	System expansion to serve GWR Basin. GWR to Wineville Basin. **1200 LF.**	2020
	1630E Pump Station Upgrades	RWPS	Capacity in 1630E PZ. GWR Increase to 1630E PZ.	2020
	RP-4 1158 PZ Pump Station Capacity Upgrades	RWPS	Pump capacity exceeded. GWR Increase to Upper Zones.	2020
	16-inch Parallel 1299 PZ Pipeline	RWPS	Pipe capacity exceeded from Etiwanda to Hickory turnout. GWR to Banana. **3000 LF.**	2020
	Conversion of 18 MG 1630E Storage Tank	RWPS	System optimization for GWR flows, system expansion to serve GWR . Demand Trigger GWR to basins in 1630 E PZ.	2020
	36-inch 1630E Pipeline to 1630E Tank	RWPS	System optimization for GWR flows, system expansion to serve GWR. Demand Trigger GWR to basins in 1630 E PZ. **6,715 LF**	2020
	RP-1 1158 PS Upgrades	RWPS	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR . Demand Trigger GWR to basins in 1630 E PZ.	2020
	24-inch 800 PZ Pipeline in Kimball Ave	RWPS	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5. Average Direct Use. **12,620 LF**	2020
	16-inch 1630E Pipeline	RWPS	System expansion to serve GWR Basin. GWR to Lower Day Basin. **10520 LF.**	2025
	36-inch 1630W Pipeline in Foothill Blvd	RWPS	System expansion to serve GWR Basin. GWR to Etiwanda Debris Basin. **2670 LF.**	2025
	16-inch Parallel 1299 PZ Pipeline	RWPS	Deficient 1299 PZ transmission mains, to serve east & 7th/8th Street Basins. Demand Trigger Max Summer DU. **12,289 LF**	2025
	24-inch Parallel 1299 PZ Pipeline	RWPS	Deficient 1299 PZ transmission mains, to serve east & 7th/8th Street Basins . Demand Trigger Max Summer DU. **13,600 LF**	2025
	54-inch 930 PZ Parallel Pipeline	RWPS	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr. Demand Trigger Max Summer DU. **2,300 LF**	2025
	RP-4 1158 PZ PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	RP-1 930 PZ PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	CCWRF PS Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2025
	36-inch 1630W Pipeline in Foothill Blvd	RWPS	System expansion to serve GWR Basin. GWR to College Heights Basin. **19600 LF.**	2030
	30-inch 1299 PZ Pipeline to	RWPS	System expansion to serve GWR Basin. GWR to Montclair Basin. **7840 LF.**	2030

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Montclair Basins			
	1630W Booster Pump Station Capacity Upgrades	RWPS	System expansion to serve GWR Basin. GWR to 1630W PZ.	2030
	15 MG 1630W Storage Tank	RWPS	System operations for 1630 W PZ and reduce impacts to 1299 PZ. GWR to 1630W PZ. **15 MG.**	2030
	New RP-5 1158 PZ Pump Station	RWPS	Increased flow to upper zones, deficient supply from RP-1, surplus at RP-5. GWR Supply to Upper Zones.	2030
	30-inch 1158 PZ Pipeline from RP-5	RWPS	Increased flow to 1630E PZ, deficient capacity in 1299 PS. GWR to 1630E PZ. **48500 LF.**	2030
	CCWRF Pump Station Capacity Upgrades	RWPS	Increase capacity at the CCWRF 930 PZ Pump Station. Max Summer Direct Use & GWR.	2030
	42-inch Parallel Pipeline in Chino Ave.	RWPS	Capacity in the 930 PZ . Demand Trigger Max Summer DU. **1,690 LF**	2030
	30-inch 1158 PZ Pipeline	RWPS	Capacity in the 1158 PZ and 1299 PZ. Demand Trigger Max Summer DU. **31,800 LF**	2030
	5.0 MG 1158 PZ Storage Tank	RWPS	Capacity in the 1158 PZ and 1299 PZ. Demand Trigger Max Summer DU.	2030
	New 1158 to 1299 Booster Pump Station	RWPS	Capacity in the 1158 PZ and 1299 PZ. Demand Trigger Max Summer DU.	2030
	12-inch to Grove Basin	RWPS	System expansion to serve GRW Basin. GWR to Grove Basin. **1000 LF.**	2035
	36-inch Pipeline in 1158 PZ	RWPS	System expansion to serve GRW Basin. GWR to Jurupa (1158 PZ). **19600 LF.**	2035
	30-inch Pipeline in Jurupa Street to Jurupa Basin	RWPS	System expansion to serve GRW Basin. GWR to Jurupa (1158 PZ). **5400 LF.**	2035
	20-inch Pipeline in Jurupa Street	RWPS	System expansion to serve GRW Basin. GWR to Jurupa (1158 PZ). **1300 LF.**	2035
	CCWRF Pump Station Capacity Upgrades	RWPS	Increase capacity at the CCWRF 930 PZ Pump Station. Demand Trigger Max Summer DU.	2035
	24-inch 1050 PZ Parallel Pipeline	RWPS	Pipeline undersized for demands condition. Demand Trigger Max Summer DU. **2,000 LF**	2035
	RP-1 930 Pump Station Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2035
	RP-1 1050 Pump Station Capacity Upgrades	RWPS	Pump capacity exceeded to serve peak direct use demand periods. Demand Trigger Max Summer DU.	2035
TBD	Baseline RWPL Extension	CIP – Capital Projects		
EN15002	1158 Reservoir Site Clean-up	CIP – Capital Projects		
Potential	1630 East Pump	CIP – Non-Capital		

Project #	Project Name	Referencing Report	Project Summary	Planning Year
RW	Station Upgrades	Projects		
Potential GWR	Orchard Recycled Water Turnout Upgrades	CIP – Non-Capital Projects		
9	WRCRWA RW Intertie	IRP – Strategy B: Portfolios 2 & 3; Strategy D: Portfolio 6; Strategy E: Portfolio 8	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.	
33	Maximize ASR wells	IRP – Strategy C: Portfolios 4 & 5	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.	
10	Rialto Intertie	IRP – Strategy D: Portfolio 6	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.	

PROJECT CATEGORY 3: GROUNDWATER RECHARGE AND EXTRACTION
RECYCLED WATER AND GROUNDWATER RECHARGE POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Montclair Basins	RMPU 2013 Amendment	Transfer water between Montclair Basins and deepen MC 4	PY 2030, Implementation 2018-2019
	Montclair Basins	RMPU 2013 Amendment	New drop inlet structures to MC 2 and MC 3	PY 2030, Implementation 2018-2019
	Montclair Basins	RMPU 2013 Amendment	Automate inlet to MC 1	PY 2030, Implementation 2018-2019
	Montclair Basins	RMPU 2013 Amendment	Construct low-level drains from Basin 1 to 2 and 2 to 3	PY 2030, Implementation 2018-2019
	North West Upland Basin	RMPU 2013 Amendment	Increase drainage area and basin enlarge-ment	PY 2030, Implementation 2018-2019
	Princeton Basin	RMPU 2013 Amendment	Basin enlargement and increased drainage area	PY 2030, Implementation 2018-2019
	San Sevaine Basins	RMPU 2013 Amendment	Construct pump station, pump water from SS 5 to SS 3, and construct internal berm in SS 5	PY 2030, Implementation 2018-2019
	San Sevaine Basins	RMPU 2013 Amendment	Extend IEUA recycled water pipeline to SS 3 and construct Internal berm in SS 5	PY 2030, Implementation 2018-2019
	San Sevaine Basins	RMPU 2013 Amendment	Construct internal berm in SS 1 and SS 2 and install gate between SS 1 and SS2	PY 2030, Implementation 2018-2019
	San Sevaine Basins	RMPU 2013 Amendment	Increase CB13T capacity and power supply	PY 2030, Implementation 2018-2019
	Victoria Basin	RMPU 2013 Amendment	Abandon the mid-level outlet and extend the lysimeters	PY 2030, Implementation 2018-2019
	Lowe Day Basin (2010 RMPU)	RMPU 2013 Amendment	Inlet improvements, rebuilding embankment, elimination of mid-level outlet	PY 2030, Implementation 2018-2019
	Lower Day Basin	RMPU 2013 Amendment	Install gate on mid-level outlet	PY 2030, Implementation 2018-2019
	Turner Basin	RMPU 2013 Amendment	Raise Turner 2 spillway	PY 2030, Implementation 2018-2019
	Ely Basin	RMPU 2013 Amendment	Basin enlargement and increased drainage area	PY 2030, Implementation 2018-2019
	Ontario Bioswale Project	RMPU 2013 Amendment	New bioswale	PY 2030, Implementation 2018-2019
	Lower San Sevaine	RMPU 2013	New basin	PY 2030,

Project #	Project Name	Referencing Report	Project Summary	Planning Year
	Basin (2010 RMPU)	Amendment		Implementation 2018-2019
	CSI Storm Water Basin	RMPU 2013 Amendment	Deepen basin by 10 feet	PY 2030, Implementation 2018-2019
	Wineville Basin (2010 RMPU)	RMPU 2013 Amendment	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway	PY 2030, Implementation 2018-2019
	Wineville Basin (2010 RMPU)	RMPU 2013 Amendment	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway	PY 2030, Implementation 2018-2019
	Jurupa Basin	RMPU 2013 Amendment	Inlet improvements and CB-18 turnout modifications	PY 2030, Implementation 2018-2019
	RP3 Basin Improvements (2010 RMPU)	RMPU 2013 Amendment	Inlet improvements and enlargement	PY 2030, Implementation 2018-2019
	RP3 Basin Improvements (2010 RMPU)	RMPU 2013 Amendment	Inlet improvements and enlargement	PY 2030, Implementation 2018-2019
	RP3 Basin Improvements (2010 RMPU)	RMPU 2013 Amendment	Increase conservation storage	PY 2030, Implementation 2018-2019
	RP3 Basin Improvements (2010 RMPU)	RMPU 2013 Amendment	Increase conservation storage	PY 2030, Implementation 2018-2019
	MPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 improvements	RMPU 2013 Amendment	2010 RMPU Proposed Wineville Basin Improvements, Wineville 20 cfs PS to Jurupa, Improved Jurupa Basin Inlet, 40 cfs PS to RP3 Basin with Proposed 2013 RMPU RP3	PY 2030, Implementation 2018-2019
	Vulcan Pit	RMPU 2013 Amendment	Construct new inflow and outflow structures	PY 2030, Implementation 2018-2019
	Sierra	RMPU 2013 Amendment	Deepen basin by 10 feet	PY 2030, Implementation 2018-2019
	Sultana Avenue	RMPU 2013 Amendment	Deepen basin by 10 feet	PY 2030, Implementation 2018-2019
	Declez Basin	RMPU 2013 Amendment	Reconstruct existing embankment and install a gate on the low level outlet	PY 2030, Implementation 2018-2019
	Banana Basin (annual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.6 ft/day)	PY 2030, Implementation 2018-2019
	Banana Basin (semiannual cleanings)	RMPU 2013 Amendment	Increased frequency of basin maintenance (Increased infiltration rate to 0.72 ft/day)	PY 2030, Implementation 2018-2019
	Declez Basin (annual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0. 66ft/day)	PY 2030, Implementation

Project #	Project Name	Referencing Report	Project Summary	Planning Year
				2018-2019
	Declez Basin (semiannual cleanings)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.78 ft/day)	PY 2030, Implementation 2018-2019
	Ely Basin (annual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.27 ft/day)	PY 2030, Implementation 2018-2019
	Ely Basin (semiannual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.33 ft/day)	PY 2030, Implementation 2018-2019
	Hickory Basin (annual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.44 ft/day)	PY 2030, Implementation 2018-2019
	Hickory Basin (semiannual cleaning)	RMPU 2013 Amendment	Increase frequency of basin maintenance (Increased infiltration rate to 0.52 ft/day)	PY 2030, Implementation 2018-2019
	Ely Basin Turnout Remote Control Upgrades	AMP (1050 Pressure Zone – Ely Basin Turnouts)	Upgrade remote control capability at the turnout.	10-50 Year Planning Period
WR15019	RP-3 Basin Improvements	AMP	Groundwater Recharge Master Plan Update 2013 project #11. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion	2025
WR15020	Victoria Basin Improvements	AMP	Groundwater Recharge Master Plan Update 2013 project #22a. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion.	2025
TBD	Agencywide GWR Environmental Permits	AMP	-----	2025
TBD	Mag Channel Spillway Improvement	AMP	Address the required repairs and improvements. Spillway repair and sediment cleanup. ACOE Permit required.	2025
TBD	Ely Basin Turnout Remote Control Upgrades	AMP	Upgrade remote control capability at the Ely Basin turnout. Possible addition of monopole.	2025
TBD	Prado Basin Adaptive Management Plan Monitoring & Report	AMP	-----	2025
TBD	RW Injection Pilot Study	AMP	-----	2025
	Increase Basin turnout capacities	RWPS	Turnout Capacities undersized at Brooks, Ely, Hickory, Turner, Victoria. GWR Increase Flow.	Exist
EN17038	GWR Level Transmitter Upgrades	CIP – Non-Capital Projects		
1	Groundwater Treatment (Rehab)-Increment 1	IRP – Strategy A: Portfolio 1; Stretegy B: Portfolios 2 & 3	This project category will rehabilitate an existing groundwater production wells decommissioned due to water quality	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			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.	
2	Groundwater Treatment (Rehab)- Increment 2	IRP – Strategy A: Portfolio 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 + 2 will provide up to 10,000 AFY of production.	
5	Production Wells- Increment 1	IRP – Strategy A: Portfolio 1; Strategy B: Portfolios 2 & 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 will provide up to 5,000 AFY of production.	
6	Production Wells- Increment 2	IRP – Strategy A: Portfolio 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+2 will provide up to 10,000 AFY of production.	
23	Existing GWR Basin Improvements beyond RMPU- Increment 1	IRP – Strategy A: Portfolio 1; Strategy B: Portfolios 2 & 3; Strategy C: Portfolios 4 & 5; Strategy E: Portfolio 8	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.	
24	Existing GWR Basin Improvements beyond RMPU- Increment 2	IRP – Strategy A: Portfolio 1; Strategy B: Portfolios 2 & 3; Strategy C: Portfolios 4 & 5; Strategy E: Portfolio 8	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	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			increase recharge at existing basins within the Chino Basin by an additional 5,000 AFY.	
25	Existing GWR Basin Improvements beyond RMPU- Increment 3	IRP – Strategy A: Portfolio 1; Strategy B: Portfolios 2 & 3; Strategy C: Portfolios 4 & 5; Strategy E: Portfolio 8	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.	
26	Existing GWR Basin Improvements beyond RMPU- Increment 4	IRP – Strategy A: Portfolio 1; Strategy B: Portfolios 2 & 3; Strategy E: Portfolio 8	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.	
11	Pomona RW Exchange/Transfer	IRP – Strategy B: Portfolios 2 & 3; Strategy E: Portfolio 8	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.	
19	RW Direct Use Expansion- Increment 1	IRP – Strategy B: Portfolios 2 & 3; Strategy E: Portfolio 8	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.	
20	RW Direct Use Expansion- Increment 2	IRP – Strategy B: Portfolios 2 & 3; Strategy E: Portfolio 8;	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.	
27	Construct New GWR Basins- Increment 1	IRP – Strategy B: Portfolios 2 & 3; Strategy E: Portfolio 8	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	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			2,450 AFY of recharge capacity, which is approximately one new basin at 350 AF per month for 7 months of operation.	
38	Six Basin Groundwater Transfer	IRP – Strategy B: Portfolio 3; Strategy C: Portfolio 5; Strategy D: Portfolio 6	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.	
21	RW Direct Use Expansion-Increment 3	IRP – Strategy C: Portfolios 4 & 5	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.	
62	Cucamonga Basin Upgrades	IRP – Strategy D: Portfolio 6	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.	
87	Prior Stored Chino Groundwater	IRP – Strategy A: Portfolio 1; Strategy D: Portfolio 6	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.	
3	Groundwater Treatment (Rehab)-Increment 1	IRP – Non-Categorized Projects	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	
4	Groundwater Treatment (Rehab)-Increment 2	IRP – Non-Categorized Projects	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	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			(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	
7	Production Wells Increment 3	IRP – Non-Categorized Projects	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.	
8	Production Wells Increment 4	IRP – Non-Categorized Projects	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.	
15	Satellite RW Injection Increment 1	IRP – Non-Categorized Projects	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.	
16	Satellite RW Injection Increment 2	IRP – Non-Categorized Projects	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.	
17	Satellite RW Injection Increment 3	IRP – Non-Categorized Projects	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 7,500 AFY.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
22	RW Direct Use Expansion Increment 4	IRP – Non-Categorized Projects	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.	
28	Construct New GWR Basins Increment 2	IRP – Non-Categorized Projects	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.	
29	Construct New GWR Basins Increment 3	IRP – Non-Categorized Projects	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.	
30	Construct New GWR Basins Increment 4	IRP – Non-Categorized Projects	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.	
31	ASR wells MZ1 and MZ2	IRP – Non-Categorized Projects	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.	
32	ASR wells MZ3	IRP – Non-Categorized Projects	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.	
34	Cadiz IW Transfer	IRP – Non-Categorized Projects	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.	
52	San Antonio Creek SW Capture	IRP – Non-Categorized Projects	Modify existing basins along San Antonio Creek to increase stormwater capture beyond the 2013 RMPU. Increase facilities to better accommodate the "big gulp" concept.	

Project #	Project Name	Referencing Report	Project Summary	Planning Year
			Assume benefit 1 in 5 years	
53	Cucamonga Creek SW Capture	IRP – Non-Categorized Projects	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.	
54	Day Creek SW Capture	IRP – Non-Categorized Projects	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.	
55	San Sevaine Creek SW Capture	IRP – Non-Categorized Projects	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.	
63	Maximize Other Groundwater	IRP – Non-Categorized Projects	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.	
100	Reliability Production Wells	IRP – Non-Categorized Projects	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.	

PROJECT CATEGORY 3: CONVEYANCE SYSTEMS AND ANCILLARY FACILITIES AGENCY-WIDE / OTHER POTENTIAL PROJECTS

Project #	Project Name	Referencing Report	Project Summary	Planning Year
EN13012	Magnolia Channel Monitoring & Maintenance	AMP (Agency Headquarters)	The Mag Channel will need to be weeded of invasive plant species, and maintain natural native habitat per the Habitat Mitigation and Monitoring Plan (HMMP) for the project. A certified biologist needs to oversee the work, monitor the progress and complete quarterly reports which are then submitted to the regulatory agencies for compliance. Water quality monitoring will also be performed to demonstrate project effectiveness and meet conditions of the grant.	2025
58	Regional LID Increment 1	IRP – Non-Categorized Projects	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.	
59	Regional LID-Increment 2	IRP – Non-Categorized Projects	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.	
60	Direct Potable Reuse-Increment 1	IRP – Non-Categorized Projects	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.	
61	Direct Portable Reuse-Increment 2	IRP – Non-Categorized Projects	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.	

Appendix C

Air Quality and Greenhouse Gas Data

ESA

IEUA Annual Construction Assumptions

September 22, 2016

The following estimates are considered worst-case annual construction activities. The construction equipment and trip estimates for the Regional Plant Improvements are considered the worst-case annual construction activities for Project Category 1. The Project Category 1 annual construction assumption assumes that the restoration of the Plant 2 site will occur within one year as well as assuming 10 percent of each construction phase for the regional plant improvements occurring in one year.

demolition The construction equipment and trip estimates for Pipelines are considered the worst-case annual construction activities for Project Category 2. The construction equipment and trip estimates for Groundwater Recharge are considered the worst-case daily construction activities for Project Category 3.

The information below also provides the construction activity required for individual projects within the IEUA Facilities Management Plan. The estimates for the Regional Plan Improvements are expected to account for all Project Category 1 projects. The Pipelines provide only one project type under Project Category 2; however, the construction of the pipelines would represent the majority of the construction activities associated with Project Category 2. Furthermore, the Groundwater Recharge, which includes new and upgraded recharge basins, would represent the majority of the construction activities associated with Project Category 3.

Annual Construction Equipment Estimates

Regional Plant Improvements						
Improvement/Phase	Equipment	Number	Peak Hour Days	Total Days in One Year[1]	Total Hours	HP Rating
Regional Plant 2 Demolition/Restoration						
Demolition (10 Percent of Total Demolition for RP-2)						
	Haul Truck	20	4	15		189
	Loader	2	7	15		108
	Dozer	2	7	15		250
	Water Truck	1	4	15		189
Restoration (100 Percent of Restoration Soil Import for RP-2)						
	Haul Truck	20	4	30		189
	Dozer	2	7	30		250
	Water Truck	1	4	30		189
Regional Plants 1, 4, and 5 and CCWRF						
Site Preparation and Earthwork (10 percent [15 days] of total Site Preparation and Earthwork which is assumed to be 150 construction days)						
	Haul Truck	2	4	15	1,200	189
	Excavator	1	7	15	750	168
	Loader	1	7	15	750	108
	Dozer	1	7	15	750	250
	Compactor	1	4	15	600	200

	Water Truck	1	4	15	600	189
Piping and Forming Concrete (10 percent [105 days] of total Piping and Forming Concrete which is assumed to be 1,500 construction days)						
	Backhoe	1	7	105	735	108
	15-Ton Crane	2	5	105	1,050	399
	Water Truck	1	4	105	420	189
	Concrete Trucks	1	8	105	840	350
	Concrete Pump	1	4	105	420	84
	Concrete Vibrator	1	4	105	420	81
	Diesel Generator	2	7	105	1,470	60
	Material Truck	2	6	105	1,260	189
	Welding Machine	3	5	105	1,575	300
	Concrete Saw	1	5	105	525	81
Site Finishing (10 percent [30 days] of total Site Finishing which is assumed to be 300 construction days)						
	Paver	1	5	30	1,500	175
	Material Truck	1	6	30	1,800	189
	Sand Blaster	1	4	30	1,200	84
	Dozer	1	5	30	1,500	250
	Roller/Compactor	1	4	30	1,200	200
	15-Ton Crane	1	7	30	2,100	399
	Water Truck	1	4	30	1,200	189

[1]The annual construction activities associated with the Regional Plants include: (1) 10 percent of the total demolition of RP 2, (2) 100 percent of the restoration, soil fill, at RP 2, and (3) 10 percent of the total Regional Plant improvements.

Pipelines and Ancillary Facilities[1]						
Improvement/Phase	Equipment	Number	Peak Hour Days	Total Days	Total Hours	HP Rating
Pipeline (12,000 linear feet per year)(This assumes 10 percent of all pipelines to be constructed in one year)						
Excavation and Shoring						
	Haul Truck	2	4	60	240	189
	Excavator	2	7	60	840	168
	Backhoe	1	7	60	420	108
	Loader	1	7	60	420	108
	15-ton Crane	1	7	60	420	399
	Compactor	1	4	60	240	200
	Pavement Cutter	1	4	60	240	81
	Grinder	1	6	60	360	85
	Water Truck	1	3	60	180	189
Pipe Installation						

	Haul Truck	3	6	60	1,080	189
	Hydraulic Jack	1	6	60	360	87
	Welding Truck with Generator	1	4	60	240	300
	40-KW Generator	1	6	60	360	60
Street Restoration						
	Paver	1	2	60	120	100
	Roller	1	2	60	120	80
Reservoir Tank (4 MG)						
Site Preparation and Earthwork						
	Haul Truck	2	6	30	360	189
	Excavator	1	6	30	180	168
	Loader	1	6	30	180	108
	Dozer	1	6	30	180	250
	Grader	1	6	30	180	162
	Water Truck	1	4	30	120	189
Construction						
	Concrete Trucks	7	2	30	420	189
	15-Ton Crane	1	5	165	825	399
	Forklift	1	6	165	990	90
	Backhoe	1	2	165	330	381
	Loader	1	4	165	660	108
	Water Truck	1	4	165	660	189
	Concrete Pump	1	4	30	120	84
	Diesel Generator	2	7	165	2,310	60
Pump Station						
Site Preparation and Piping						
	Excavator	1	8	15	120	157
	Generator	1	8	15	120	84
	Loader	1	8	15	120	108
	Material Truck	1	8	15	120	189
	Water Truck	1	4	15	60	189
Building Construction						
	Cement/Mortar Mixers	1	4	30	120	9
	Excavator	1	8	30	240	168
	40-KW Generator	1	8	30	240	60
	Loader	1	8	30	240	108
Equipment Installation						
	Concrete/Industrial Saw	2	8	15	240	81
	Off-Highway Truck	1	8	15	120	381
	Loader	1	8	15	120	108
	Welder	1	8	15	120	46

[1]The worst-case annual construction activities associated with the Pipeline and Ancillary Facilities include: (1) up to 12,000 linear feet will be installed in one year [10 percent of the total 120,000 linear feet of pipeline], (2) one 24-million gallon reservoir tank, and (3) one pump station.

Groundwater Recharge Facilities						
Improvement/Phase	**Equipment**	**Number**	**Peak Hour Days**	**Total Days[1]**	**Total Hours**	**HP Rating**
Recharge Basin						
Excavation						
	Haul Truck	20	7	312	43,680	189
	Loader	2	7	312	4,368	108
	Excavator	2	7	312	4,368	168
	Dozer	2	7	312	4,368	250
	Water Truck	3	4	312	3,744	189
Fine Grading and Site Improvements						
	Work Truck	6	3	60	1,080	189
	Backhoe	1	7	60	420	108
	Mixer	1	4	60	240	250
	Grader	1	4	60	240	162
	Water Truck	1	3	60	180	189
Wells – 0.5 acre per well						
Drilling						
	Bore/Drill Rig	1	15	45x7 wells = 315	4,725	209
	Generator	1	15	45x7 wells = 315	4,725	50
	Rough Terrain Forklift	1	15	45 x7 wells = 315	4,725	93
Well Development						
	Work Truck	1	8	15x7 wells = 105	840	189
	Backhoe	1	8	15x7 wells = 105	840	108
	Welder	1	8	15x7 wells = 105	840	46

	Generator	1	8	15x7 wells = 105	840	84

[1] Assumes the worst-case annual construction activities associated with the Groundwater Recharge and Extraction Facilities includes (1) one recharge basin and (2) up to seven groundwater wells. The recharge basin component will include both export and import of soil over 312 days and fine grading/site improvements over 60 days. The groundwater wells include drilling activities for each well over 45 days which includes 20 days at 24 hours per day and 25 days at 8 hours per day which is an average of 15 hours per day over 45 days for each well. Well development for each groundwater well is assumed to take approximately 15 days.

Annual Trip and Mileage Estimates

Project Category	Maximum Annual Trips	Maximum Annual Mileage
Project Category 1 - Regional Plant Improvements		
Regional Plant 2 Demolition/Restoration – 3 acres/year demo		
Demolition (10 Percent of Total Demolition for RP-2)		
Workers	16 workers for 15 days = 240 trips	240 x 40 miles/trip = 9,600 miles
Haul Trucks	1,650 cy/8 cy per truck = 207 trips	207 x 40 miles/trip = 8,280 miles
Vendors	2 vendors for 15 days = 30 trips	30 x 20 miles/trip = 600 miles
Restoration (100 Percent of Restoration Soil Import for RP-2) – **30 acres/year restoration**		
Workers	16 workers for 30 days = 480 trips	480 x 40 miles/trip = 19,200 miles
Haul Trucks	46,000 cy/15 cy per truck = 3,067 trips	3,067 x 40 miles/trip = 122,680 miles
Vendors	2 vendors for 30 days = 60 trips	30 x 20 miles/trip = 600 miles
Subtotal Regional Plant 2 Demolition/Restoration	**4,084 trips**	**160,960 miles**
Regional Plants 1, 4 and 5 and CCWRF – 12 acres/year max		
Site Preparation and Earthwork		
Workers	16 workers for 15 days = 240 trips	240 x 40 miles/trip = 9,600 miles
Haul Trucks	20 trucks for 15 days = 300 trips	300 x 40 miles/trip = 12,000 miles
Vendors	2 vendors for 15 days = 30 trips	30 x 20 miles/trip = 600 miles
Piping and Forming Concrete		
Workers	24 workers for 105 days = 2,520 trips	2,520 x 40 miles/trip = 100,800 miles
Haul Trucks	0	0
Vendors	10 vendors for 15 days = 150 trips	150 x 20 miles/trip = 3,000 miles
Site Finishing		
Workers	12 workers for 30 days = 360 trips	360 x 40 = 14,400 miles
Haul Trucks	0	0
Vendors	10 vendors for 30 days = 300 trips	300 x 20 miles/trip = 6,000 miles
Subtotal Regional Plants 1, 4 and 5	**3,900 trips**	**146,400 miles**

and CCWRF Improvements		
TOTAL REGIONAL PLANT IMPROVEMENTS	**7,984 trips**	**307,360 miles**
Project Category 2 - Pipelines and Ancillary Facilities		
Pipeline – 12,000 linear feet per year; 2 acres total disturbed		
Excavation and Shoring		
Workers	12 workers for 110 days = 1,320 trips	1,320 x 40 miles/trip = 52,800 miles
Haul Trucks	Amount of Soil Export = TT R^2 (length): TT = 3.14, R=12 inches (1 foot), length = 12,000 feet 3.14 x1 sf x 12,000 ft = 37680 cf = 1396 cy 1396/15 cy per truck = 93 trips	93 x 40 miles/trip = 3,720 miles
Vendors	1 vendor for 110 days = 110 trips	110 x 20 miles/trip = 2,200 miles
Pipe Installation		
Workers	12 workers for 110 days = 1,320 trips	1,320 x 40 miles/trip = 52,800 miles
Haul Trucks		
Vendors	50 (46 for pipe and 4 others) for 110 days = 5,500 trips	5,500 x 20 miles/trip = 110,000 miles
Street Restoration		
Workers	12 workers for 110 days = 1,320 trips	1,320 x 40 miles/trip = 52,800 miles
Haul Trucks	0	0
Vendors	1 vendor for 110 days = 110 trips	110 x 20 miles/trip = 2,200 miles
Subtotal Pipelines	**9,851 trips**	**276,520 miles**
Reservoir Tank (4 MG)		
Site Preparation and Earthwork		
Workers	8 workers for 30 days = 240 trips	240 x 40 miles/trip = 9,600 miles
Haul Trucks	2 trucks for 30 days = 60 trips	60 x 40 miles/trip = 2,400 miles
Vendors	1 vendor for 30 days = 30 trips	30 x 20 miles/trip = 600 miles
Construction		
Workers	12 workers for 60 days = 720 trips	720 x 40 miles/trip = 28,800 miles
Haul Trucks	0	0

Vendors	6 vendors for 60 days = 360 trips	360 x 20 miles/trip = 7,200 miles
Subtotal Reservoir Tank	**1,410 trips**	**48,600 miles**
Pump Station – 1 acre/year; 2,500 SF		
Site Preparation and Piping		
Workers	8 workers for 15 days = 120 trips	120 x 40 miles/trip = 4,800 miles
Haul Trucks	0	0
Vendors	1 vendor for 15 days = 15 trips	15 x 20 miles/trip = 300 miles
Building Construction		
Workers	5 workers for 30 days = 150 trips	150 x 40 miles/trip = 6,000 trips
Haul Trucks	0	0
Vendors	6 vendors for 30 days = 90 trips	90 x 20 miles/trip = 1,800 miles
Equipment Installation		
Workers	5 workers for 15 days = 75 trips	75 x 40 miles/trip = 3,000 trips
Haul Trucks	0	0
Vendors	6 vendors for 15 days = 45 trips	45 x 20 miles/trip = 900 miles
Subtotal Pump Station	**495 trips**	**16,800 miles**
TOTAL PIPELINES AND ANCILLARY FACILITIES	**11,756 trips**	**457,240 trips**
Project Category 3 - Groundwater Recharge and Extraction		
Recharge Basin – 3,000 CY/day; 936,000 CY/year; 40 acres/year (largest)		
Excavation		
Workers	35 workers for 312 days = 10,920 trips	10,920 x 40 miles/trip = 436,800 miles
Haul Trucks	200 trucks for 312 days = 62,400 trips	62,400 x 40 miles/trip = 2,496,000 miles
Vendors	2 vendors for 312 days = 624 trips	624 x 20 miles/trip = 12,480
Fine Grading and Site Improvements		
Workers	15 workers for 60 days = 900 trips	900 x 40 miles/trip = 36,000 miles
Haul Trucks	0	0
Vendors	1 vendor for 60 days = 60 trips	60 x 20 miles/trip = 1,200 miles

Subtotal Recharge Basin	**74,904 trips**	**2,982,480 miles**
Wells – 3.5 acre/year		
Drilling		
Workers	2 workers for 315 days = 630 trips	630 x 40 miles/trip = 25,200 miles
Haul Trucks	Amount of Soil Export = TT R^2 (length): TT = 3.14, R=18 inches (1.5 foot), length = 850 feet 3.14 x 2.25 sf x 850 ft = 6,005 cf = 223 cy x 7 wells = 1,561 cy 1,561/15 cy per truck = 104 trips3.5	104 x 40 miles/trip = 4,160 miles
Vendors	1 vendor for 315 days = 315 trips	315 x 20 miles/trip = 6,300 miles
Well Development		
Workers	2 workers for 105 days = 210 trips	210 x 40 miles/trip = 8,400 miles
Haul Trucks	0	0
Vendors	1 vendor for 105 days = 105 trips	105 x 20 miles/trip = 2,100 trips
Subtotal Wells	**1,364 trips**	**46,160 miles**
TOTAL GROUNDWATER RECHARGE	**76,268 trips**	**3,028,640 miles**
TOTAL FOR PROJECT CATEGORIES 1, 2 and 3	**96,008 trips**	**3,793,240 miles**

Assumptions for IEUA Daily/Annual Energy Use, Water Consumption and Vehicle Trips During Operation

September 23, 2016

Regional Plant Improvements – 500 KSF, 12 acres		
Improvement/Phase	**Program Increase in Daily Mega Watts (MW)**	**Program Increase in Annual Mega Watts (MW)**
Regional Plant 2 Demolition/Restoration	160 kW at 24 hrs/day = 3,840 kW/day = 3.8MW/day	3.8 MW/day x 365 days = 1,387 MW/year
Regional Plants 1, 4, and 5 and CCWRF		0.0
RP 1	**KWh increase = 3700 kWh x .125 = 462.5 KWh/day** RP 1 Facility increase = 12.5% Existing = 3,700 kW at 24 hrs/day = 88,800 = 88.8 MW/day 12.5% increase = 88.8 MW/day x .125 = 11.1 MW/day	11.1 MW/day x 365 days = 4,052 MW/year
RP 4	**KWh increase = 2700 kWh x .133 = 359.1 KWh/day** RP 4 Facility increase = 13.3% Existing = 2,700 kW at 24 hrs/day = 64,800 kW/day = 65 MW/day 13.3% increase = 65 MW/day x .133 = 8.6 MW/day	8.6 MW/day x 365 days = 3,139 MW/year
RP 5	**KWh increase = 1600 kWh x .733 = 1172.8 KWh/day** RP 5 Facility increase = 73.3% Existing = 1,600 kW at 24 hrs/day = 38,400 kW/day = 38.4 MW/day 73.3% increase = 38.4 MW/day x .73.3 = 28.1 MW/day	24.3 MW/day x 365 days = 8,870 MW/year

	Subtract RP-2 – 28.1 MW/day – 3.8 MW/day = 24.3 MW/day	
CCWRF	0	0
TOTAL	**44 MW/day**	**16,061 MW/year**

Pipelines and Ancillary Facilities[1]		
Improvement/Phase	**Program Increase in Daily Mega Watts (MW)**	**Program Increase in Annual Mega Watts (MW)**
Pipeline	0	0
Reservoir Tank	0	0
Pump Station	Assumes 29 new (16) and replaced (13)pumps 16 new pumps would be at 250 hp 250 hp pump = 186.5 kW 6 hours per pump = 186.5 kW x 6 = 1,119 kW/day = 1.1 MW/day 1.1 MW/day x 16 pumps = 17.6 MW/day 13 replaced pumps would add an additional 125 hp 125 hp pump = 94 kW 6 hours per pump = 564 kW/day 564 kW/day x 13 pumps = 7,332 kW/day = 7.3 MW/day Total = 17.6 MW/day + 7.3 MW/day = 24.9 MW/day	24.9 MW/day x 365 days = 9,089 MW/year
Booster Station	380 kW per hour at 6 hours/day = 2,280 kW/day = 2.3 MW/day	2.3 MW/day x 365 days = 840 MW/year
TOTAL	**27.2 MW/day**	**9,929 MW/year**

Groundwater Recharge Facilities		
Improvement/Phase	**Program Increase in Daily Mega Watts (MW)**	**Program Increase in Annual Mega Watts (MW)**
Reservoir Basin	0	0
Wells	500 kW per hour at 6 hours/day = 3,000 kW/day 7 wells x 3,000 kW/day = 21,000 kW/day = 21 MW/day	21 MW/day x 365 days = 7,665 MW/year
TOTAL	**21 MW/day**	**7,665 MW/year**

Water Use

Regional Plant Improvements – **35 new employees** using 25 gallons/day = 875 gallons/day
875 gallons/day x 365 days/day = 319,375 gallons/year = 0.98 acre-feet/year

Pipelines and Ancillary Facilities – 0 gallons

Groundwater Recharge Facilities – 0 gallons

All landscaping is assumed to use recycled water which will be generated by the project.

Total Water Use = 319,375 gallons/year = 0.98 acre-feet/year

Vehicle Trips

Estimate of the total long-term daily trips is **no more than 20 trips per day**
Estimate for **annual trips is 7,300 trips per year**.

Regional Plant Improvements – max **8 trips per day for chemical deliveries and maintenance**

Pipelines and Ancillary Facilities – max **6 trips per day**

Groundwater Recharge Facilities – Maintenance – max **3 trips per day**

Total is max of 17 trips per day but less say it is no more than 20 long-term trips per day.

If you need an annual number then as a worst case, you multiple 20 x 365 = 7,300 annual trips.

Solid Waste

8 lbs per day per person
35 new employees at RPs
280 lbs/day
0.14

IEUA Facilities Master Plans
AQ/GHG Construction Assumptions and Calculations

Project Location:	San Bernardino County	Climate Zone:	10
Air District:	South Coast	Operational Year:	2035
Land Use Setting:	Urban	Utility Provider:	Southern California Edison

Project Category 1: Treatment Facility Upgrades

Land Use	KSF	Acres	CalEEMod LU Type
General Light Industrial	500	12	Building Construction

Notes

Regional Plant Modifications: constructed in several phases over the next 20 years. Construction phases would include (1) site prep/earthwork, (2) piping and forming concrete, and (3) site finishing, delivery, installation of equipment. Regional Plants (RPs) already exist and sites have been engineered, thus minimal mass grading will be required at these facilities.

Demolition of RP-2: RP-2 will be abandoned over the next 20 years and existing facilties will be demolished. It is anticipated that 16,500 CY of concrete and materials will be removed from site, and 46,000 CY of clean fill material will be imported to site for level grading. 10 percent of total demolition in one year is modeled as a worst case scenario below. Restoration of RP-2 is anticipated to occur all at one time, so 100 percent of restoration (soil import/grading) in one year is modeled below.

Construction scenario has been modeled as a worst case year of construction. The following construction schedule was used to represent the total days of each construction phase within one year. Actual construction phases may not occur on consecutive days; they may occur spaced out over the course of the year. In addition the phases may overlap in durations not represented in the scenario below (i.e. site prep at RP-4 may concurrently occur with piping at RP-5). Therefore, a worst-case peak-day of construction assumes all phases occuring on one single day.

Example Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Total Days
Demolition of RP-2	Demolition	1/2/2016	1/18/2016	15
Restoration of RP-2	Grading	1/23/2016	2/25/2016	30
Site Preparation and Earthwork	Site Preparation	1/2/2016	1/18/2016	15
Piping and Forming Concrete	Building Construction	1/2/2016	5/3/2016	105
Site Finishing	Paving	3/6/2016	4/8/2016	30

Demo/Export/Import of Materials

Demolition of RP-2	1,650	CY of concrete exported annually (10% of total 16,500 CY of demo material)
	3,350	tons (1650 CY x 2.03 concrete CY/ton conversion factor)
	3	acres/year of demolition (10% of total demolition)
Restoration of RP-2	46,000	CY of material imported
	3,067	truck trips (based on 15 CY/truck)
	30	maximum acres disturbed in worst-case year
Site Prep & Earthwork	4,500	maximum CY of material exported annually (300 truck trips x 15 CY/truck)
	300	truck trips (based on 20 trucks for 15 days)
	12	maximum acres disturbed in worst-case year

Trips and VMT (provided from Construction Assumptions sheet)

Phase Name	# Worker Trips (/day)	# Vendor Trips (/day)	Total # Haul Trips (/year)	Worker Trip Length (miles)	Vendor Trip Length (miles)	Hauling Trip Length (miles)
Demolition of RP-2	16	2	207	40	20	40
Site Preparation and Earthwork	16	2	300	40	20	40
Piping and Forming Concrete	24	10	0	40	20	40
Restoration of RP-2	16	2	3,067	40	20	40
Site Finishing	12	10	0	40	20	40

Project Category 2: Conveyance Systems and Ancillary Facilities

PIPELINE INSTALLATION

Phase Name	Phase Type	# of Days
Excavation and Shoring	Grading	60
Pipeline Installation	Trenching	60
Street Restoration	Paving	60

For modeling purposes, the 'Parking Lot' CalEEMod Land Use type was inputted for Pipeline Installation, based on similarity of asphalt surface within rights of way.

Approximately 120,000 linear feet of pipeline installation are proposed in the program. Two scenarios were conducted for pipeline installation modeling - worst case daily and worst case annual scenarios. Annual construction assumes 10 percent of all pipelines (12,000 linear feet) to be constructed in one year. The project assumes that construction will occur over 60 days within a year (not necessarily consecutive days). Therefore, daily construction assumes approximately 200 linear feet of pipeline installation per day.

Daily Scenario

Excavation & Shoring	1,200	sq ft	area to be disturbed/day (assumes 6 foot trench width and 200 feet of pipe).
	7,200	cu ft	volume excavated/day (assumes 6 foot depth of excavation)
	267	CY	volume excavated/day
	134	CY export	assumes 1/2 of all soil excavated is taken offsite
	9	haul trucks per day (approx)	

Annual Scenario

Excavation & Shoring	12,000	sq ft	total area to be disturbed (assumes 6 foot trench width and 200 feet of pipe).
	72,000	cu ft	volume excavated/year (assumes 6 foot depth of excavation)
	2,667	CY	volume excavated/year
	1,334	CY export	assumes 1/2 of all soil excavated is taken off site
	93	haul trips/year (approx)	

RESERVOIR CONSTRUCTION

Phase Name	Phase Type	Start Date	End Date	# of Days
Site Preparation and Earthwork	Site Preparation	1/2/2016	2/10/2016	30
Reservoir Construction	Building Construction	2/13/2016	9/29/2016	165
Architectural Coating	Architectural Coating	10/2/2016	11/10/2016	30

The program proposes to construct five new storage tanks, the largest of which is a 24 million gallon (MG) reservoir tank. As a worst-case scenario, the model assumes that the 24 MG tank will be constructed during one year. Tank dimensions are estimated and calculated below.

Storage Tank Dimensions of 24 MG tank

diameter =	270	ft
radius =	135	ft
height =	60	ft
footprint area =	57,227	sq ft
volume =	3,433,590	cu ft
capacity =	24,035,130	gallons (approx)

Architectural Coating

Exterior shell area =	50,868	sq ft (π x d x h)
Cone roof area=	58,320	sq ft (π x d x d)
Total coating area=	109,188	sq ft
Max daily disturbance	2	acres

PUMP STATION

Phase Name	Phase Type	Start Date	End Date	# of Days
Site Preparation and Piping	Site Preparation	1/2/2016	1/20/2016	15
Building Construction	Building Construction	1/23/2016	2/17/2016	20
Equipment Installation	Building Construction	2/18/2016	3/10/2016	15

Max acres disturbance	1	acre
Max SF of station	2,500	SF

Project Category 3: Groundwater Recharge and Extraction

RECHARGE BASINS

Phase Name	Phase Type	Start Date	End Date	# of Days
Excavation	Site Preparation	1/2/2016	12/30/2016	312
Fine Grading/Site Improvement	Grading	6/5/2016	8/12/2016	60

For modeling purposes, the 'Parking Lot - Non-Asphalt Surface' CalEEMod Land Use type was inputted for Recharge Basins. The program proposes to construct a number of groundwater recharge basins in the service area. It is assumed that up to 3,000 CY per day of cut soil will be exported from the project site and excavation is anticipated to occur for 312 days in one given year. Therefore, a maximum of 936,000 CY of material will be exported from the site, on approximately 40 total acres of land.

Excavation

Total Disturbance	40	acres (annual)			
Material export	3,000	CY/day	Truck capacit	15	CY
Excavation duration	312	days	Truck trips	200	trips/day
Total material export	936,000	CY/year		62,400	trips/year

EXTRACTION WELLS

Phase Name	Phase Type	Start Date	End Date	# of Days
Drilling	Grading	1/2/2016	1/3/2016	315
Well Development	Building Construction	11/1/2016	3/1/2016	105

For modeling purposes, the 'Parking Lot - Non-Asphalt Surface' CalEEMod Land Use type was inputted for Extraction Wells. The program proposes to constructup to 7 wells in the service area. Construction phases (1) Drilling and (2) Well Development could occur concurrently if one well is being drilled in one location and another is already being constructed at a different location. Therefore, a worst-case construction day assumes both phases occur simultaneously. It is assumed that up to 1,561 CY of soil will be exported for well drilling and a maximum of 3.5 acres disturbed.

Well Dimensions for Drilling

radius	1.5	ft
depth	850	ft
volume	6,005	cu ft/well
	223	CY (per well)
Total export	1561	CY (for 7 wells)
Truck trips	104	trips (15 CY/truck)

IEUA Facilities Master Plans
AQ/GHG Operations Assumptions and Calculations

Project Category 1: Treatment Facility Upgrades

Land Use	**KSF**	**Acres**
General Light Industrial	500	12

Increase in Trips 8 max trips per day (chemical deliveries/maintenance)

Increase in Energy Use (All values below represent the net new increase in energy usage)

RP-2 Demo/Restoration

Energy/hr	160	KWh	Size Metric	500000	SF
	365	days/year	Energy increase	0.1168	KWh/size/year
Energy/yr	58400	KWh/year	Energy distribution	**0.04**	Title 24
				0.08	Non Title 24

RP-1

Energy/hr	462.5	KWh	Size Metric	500000	SF
	365	days/year	Energy increase	0.337625	KWh/size/year
Energy/yr	168812.5	KWh/year	Energy distribution	**0.12**	Title 24
				0.22	Non Title 24

RP-4

Energy/hr	359.1	KWh	Size Metric	500000	SF
	365	days/year	Energy increase	0.262143	KWh/size/year
Energy/yr	131071.5	KWh/year	Energy distribution	**0.09**	Title 24
				0.17	Non Title 24

RP-5

Energy/hr	1172.8	KWh	Size Metric	500000	SF
	365	days/year	Energy increase	0.856144	KWh/size/year
Energy/yr	428072	KWh/year	Energy distribution	0.30	Title 24
				0.56	Non Title 24

Obtained initial energy/hr (KWh) from Operational Assumptions sheet. Values are based off existing energy obtained from RP plans.

Subtract energy use from RP-2:

Energy distribution	**0.26**	Title 24
	0.48	Non Title 24

Distribution of Energy to T24/NonT24

	default	**% of total**
Title 24	2.69	0.35
Non Title 24	5.02	0.65
	7.71	total energy intensity (default)

Total Energy Use	**0.47**	**KWh/size/year Title 24**
	0.87	**KWh/size/year Non Title 24**

Increase in Water Use

35	new employees
25	gallons/day/person
875	gallons/day (all new employees)
319,375	**gallons/year**

Increase in Solid Waste

35	new employees
8	lbs/day/person
280	lbs/day (all new employees)
51.1	**tons/year**

Project Category 2: Conveyance and Ancillary Facilities

Land Use	KSF	Acres
General Light Industrial	2.5	1

Increase in Trips **6 max trips per day (maintenance)**

Increase in Energy Use (All values below represent the net new increase in energy usage)

Pump Station

Energy/pump	186.5	KWh	Size Metric	2500	SF
# of 250HP pumps	16	pumps	Energy increase	1.1936	KWh/size/year
Energy usage	2984	KWh	Energy distribution	**0.42**	Title 24
	1089160	KWh/year		**0.78**	Non Title 24
Energy/pump	94	KWh	Size Metric	2500	SF
# of 125HP pumps	13	pumps	Energy increase	0.4888	KWh/size/year
Energy usage	1222	KWh	Energy distribution	**0.17**	Title 24
	446030	KWh/year		**0.32**	Non Title 24
Booster Station	380	KWh	Size Metric	2500	SF
	365	days/year	Energy increase	55.48	KWh/size/year
Energy/yr	138700	KWh/year	Energy distribution	**0.00**	Title 24
				0.00	Non Title 24

Total Water Use	**0 gal/year**	**Total Energy Increase**	**0.59**	**Title 24**
Total Solid Waste	**0 tons/year**		**1.10**	**Non Title 24**

Project Category 3: Recharge Basins and Extraction Wells

Land Use	KSF	Acres
General Light Industrial	100	3.5

Increase in Trips 3 max trips per day (maintenance)

Increase in Energy Use (All values below represent the net new increase in energy usage)

Well

Energy/well	500	KWh	Size Metric	2500	SF
# of wells	7	wells	Energy increase	1.4	KWh/size/year
Energy usage	3500	KWh	**Total Energy Increase**	**0.49**	Title 24
	1,277,500	KWh/year		**0.91**	Non Title 24
			Total Water Use	**0**	gal/year
			Total Solid Waste	**0**	tons/year

IEUA Facilities Master Plans
Category 1 Construction Emissions Summaries

Project Category 1 Emissions

Year	ROG	NOx	CO	SO2	Fugitive PM10 (lbs/day)	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Demolition of	3.93	44.75	22.42	0.05	2.77	2.04	4.82	0.54	1.88	2.42
Restoration of	5.64	84.94	42.58	0.17	8.44	2.24	10.68	3.31	2.06	5.37
Site Preparatic	3.69	44.59	23.21	0.06	3.50	1.78	5.28	1.44	1.64	3.08
Piping and For	5.92	58.20	36.72	0.08	0.91	2.77	3.68	0.25	2.65	2.90
Site Finishing	3.21	35.86	20.49	0.04	0.55	1.65	2.20	0.15	1.52	1.67
Total	**22.40**	**268.34**	**145.42**	**0.41**	**16.17**	**10.49**	**26.66**	**5.68**	**9.75**	**15.43**

Demolition of RP-2

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					1.7707	0	1.7707	0.2681	0	0.2681
Off-Road	3.4053	36.4449	15.6522	0.0278		1.913	1.913		1.76	1.76
Hauling	0.3987	7.6306	4.0947	0.0199	0.4805	0.1178	0.5982	0.1315	0.1084	0.2399
Vendor	0.0292	0.4465	0.3091	1.18E-03	0.0363	8.18E-03	0.0445	0.0104	7.53E-03	0.0179
Worker	0.1013	0.2285	2.3604	5.49E-03	0.4864	3.39E-03	0.4898	0.129	3.11E-03	0.1321
Total	**3.9345**	**44.7505**	**22.4164**	**0.05437**	**2.7739**	**2.04237**	**4.8162**	**0.539**	**1.87904**	**2.418**

Restoration of RP-2

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					4.3617	0	4.3617	2.1984	0	2.1984
Off-Road	2.553	27.7334	9.5794	0.0182		1.3516	1.3516		1.2435	1.2435
Hauling	2.9534	56.529	30.3343	0.1477	3.5593	0.8726	4.4319	0.9744	0.8027	1.7771
Vendor	0.0292	0.4465	0.3091	1.18E-03	0.0363	8.18E-03	0.0445	0.0104	7.53E-03	0.0179
Worker	0.1013	0.2285	2.3604	5.49E-03	0.4864	3.39E-03	0.4898	0.129	3.11E-03	0.1321
Total	**5.6369**	**84.9374**	**42.5832**	**0.17257**	**8.4437**	**2.23577**	**10.6795**	**3.3122**	**2.05684**	**5.369**

Site Preparation and Earthwork

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					2.2792	0	2.2792	1.109	0	1.109
Off-Road	2.9842	32.8526	14.6046	0.0291		1.5992	1.5992		1.4712	1.4712
Hauling	0.5778	11.0588	5.9343	0.0289	0.6963	0.1707	0.867	0.1906	0.157	0.3477
Vendor	0.0292	0.4465	0.3091	1.18E-03	0.0363	8.18E-03	0.0445	0.0104	7.53E-03	0.0179
Worker	0.1013	0.2285	2.3604	5.49E-03	0.4864	3.39E-03	0.4898	0.129	3.11E-03	0.1321
Total	**3.6925**	**44.5864**	**23.2084**	**0.06467**	**3.4982**	**1.78147**	**5.2797**	**1.439**	**1.63884**	**3.0779**

Piping and Forming Concrete

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	5.6207	55.6233	31.6348	0.0659		2.7261	2.7261		2.6081	2.6081
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.1461	2.2323	1.5457	5.92E-03	0.1816	0.0409	0.2226	0.0518	0.0376	0.0895
Worker	0.152	0.3428	3.5406	8.24E-03	0.7296	5.08E-03	0.7346	0.1934	4.67E-03	0.1981
Total	**5.9188**	**58.1984**	**36.7211**	**0.08006**	**0.9112**	**2.77208**	**3.6833**	**0.2452**	**2.65037**	**2.8957**

Site Finishing

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	2.9918	33.4612	17.1769	0.0281		1.611	1.611		1.4822	1.4822
Paving	0					0	0		0	0
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.1461	2.2323	1.5457	5.92E-03	0.1816	0.0409	0.2226	0.0518	0.0376	0.0895
Worker	0.076	0.1714	1.7703	4.12E-03	0.3648	2.54E-03	0.3673	0.0967	2.33E-03	0.0991
Total	**3.2139**	**35.8649**	**20.4929**	**0.03814**	**0.5464**	**1.65444**	**2.2009**	**0.1485**	**1.52213**	**1.6708**

IEUA Facilities Master Plans
Category 2 Construction Emissions Summaries

Project Category 2 Emissions

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
					(lbs/day)					
Pipelines - Excvation and	3.91	41.84	29.61	0.06	0.80	2.10	2.90	0.20	1.97	2.17
Pipelines - Pipe Installat	3.16	35.75	20.76	0.06	1.27	1.39	2.66	0.36	1.29	1.64
Pipelines - Street Restor	0.95	2.26	3.13	0.01	0.38	0.15	0.53	0.10	0.14	0.24
Reservoirs - Site Prep an	2.68	28.49	14.82	0.03	2.03	1.46	3.49	1.01	1.35	2.36
Reservoirs - Reservoir Co	2.49	23.17	15.51	0.03	0.47	1.31	1.78	0.13	1.25	1.38
Reservoirs - Architectura	39.48	2.44	2.62	0.00	0.15	0.20	0.35	0.04	0.20	0.24
Pump Stations - Site Pre	2.31	22.26	14.61	0.03	0.26	1.23	1.49	0.07	1.16	1.23
Pump Stations - Building	1.39	13.27	10.78	0.02	0.26	0.78	1.04	0.07	0.74	0.81
Pump Stations - Equipm	3.25	26.42	18.69	0.04	0.26	1.53	1.79	0.07	1.48	1.55
Total	**59.62**	**195.90**	**130.52**	**0.27**	**5.90**	**10.15**	**16.04**	**2.05**	**9.56**	**11.61**

Pipelines - Excvation and Shoring

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					0.1038	0	0.1038	0.0115	0	0.0115
Off-Road	3.5591	36.4682	25.0193	0.0388		2.0188	2.0188		1.8978	1.8978
Hauling	0.26	4.9765	2.6704	0.013	0.3133	0.0768	0.3902	0.0858	0.0707	0.1565
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.076	0.1714	1.7703	4.12E-03	0.3648	2.54E-03	0.3673	0.0967	2.33E-03	0.0991
Total	**3.9097**	**41.8393**	**29.6146**	**0.05651**	**0.8001**	**2.10223**	**2.9024**	**0.19918**	**1.97459**	**2.17384**

Pipelines - Pipe Installation

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	2.3579	24.4148	11.2612	0.0258		1.1817	1.1817		1.0968	1.0968
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.7306	11.1613	7.7285	0.0296	0.9082	0.2046	1.1128	0.2591	0.1882	0.4472
Worker	0.076	0.1714	1.7703	4.12E-03	0.3648	2.54E-03	0.3673	0.0967	2.33E-03	0.0991
Total	**3.1645**	**35.7475**	**20.76**	**0.05952**	**1.273**	**1.38884**	**2.6618**	**0.3558**	**1.28733**	**1.6431**

Pipelines - Street Restoration

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	0.2046	1.8683	1.2013	1.55E-03		0.1419	0.1419		0.1305	0.1305
Paving	0.655					0	0		0	0
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.076	0.1714	1.7703	4.12E-03	0.3648	2.54E-03	0.3673	0.0967	2.33E-03	0.0991
Total	**0.9502**	**2.2629**	**3.1262**	**0.00626**	**0.383**	**0.14853**	**0.5315**	**0.10188**	**0.13659**	**0.23854**

Reservoirs - Site Prep and Earthwork

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					1.6996	0	1.6996	0.9227	0	0.9227
Off-Road	2.5532	27.0449	12.8875	0.0206		1.4405	1.4405		1.3252	1.3252
Hauling	0.0578	1.1059	0.5934	2.89E-03	0.0696	0.0171	0.0867	0.0191	0.0157	0.0348
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.0507	0.1143	1.1802	2.75E-03	0.2432	1.69E-03	0.2449	0.0645	1.56E-03	0.066
Total	**2.6763**	**28.4883**	**14.8157**	**0.02683**	**2.0306**	**1.46338**	**3.494**	**1.01148**	**1.34622**	**2.35764**

Reservoirs - Reservoir Construction

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	2.3301	21.6613	12.8116	0.0234		1.2804	1.2804		1.2261	1.2261
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0877	1.3394	0.9274	3.55E-03	0.109	0.0246	0.1335	0.0311	0.0226	0.0537
Worker	0.076	0.1714	1.7703	4.12E-03	0.3648	2.54E-03	0.3673	0.0967	2.33E-03	0.0991
Total	**2.4938**	**23.1721**	**15.5093**	**0.03107**	**0.4738**	**1.30754**	**1.7812**	**0.1278**	**1.25103**	**1.3789**

Reservoirs - Architectural Coating

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Archit. Coating	39.0839					0	0		0	0
Off-Road	0.3685	2.3722	1.8839	2.97E-03		0.1966	0.1966		0.1966	0.1966
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0
Worker	0.0317	0.0714	0.7376	1.72E-03	0.152	1.06E-03	0.1531	0.0403	9.70E-04	0.0413
Total	**39.4841**	**2.4436**	**2.6215**	**0.00469**	**0.152**	**0.19766**	**0.3497**	**0.0403**	**0.19757**	**0.2379**

Pump Stations - Site Prep and Piping

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					0	0	0	0	0	0
Off-Road	2.2415	21.9234	13.2772	0.0244		1.2238	1.2238		1.153	1.153
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.0507	0.1143	1.1802	2.75E-03	0.2432	1.69E-03	0.2449	0.0645	1.56E-03	0.066
Total	**2.3068**	**22.2609**	**14.612**	**0.02774**	**0.2614**	**1.22958**	**1.491**	**0.06968**	**1.15832**	**1.22794**

Pump Stations - Building Construction

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	1.2677	11.8571	9.1123	0.014		0.7545	0.7545		0.7141	0.7141
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0877	1.3394	0.9274	3.55E-03	0.109	0.0246	0.1335	0.0311	0.0226	0.0537
Worker	0.0317	0.0714	0.7376	1.72E-03	0.152	1.06E-03	0.1531	0.0403	9.70E-04	0.0413
Total	**1.3871**	**13.2679**	**10.7773**	**0.01927**	**0.261**	**0.78016**	**1.0411**	**0.0714**	**0.73767**	**0.8091**

Pump Stations - Equipment Installation

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	3.1318	25.0068	17.0202	0.0311		1.5056	1.5056		1.4521	1.4521
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0877	1.3394	0.9274	3.55E-03	0.109	0.0246	0.1335	0.0311	0.0226	0.0537
Worker	0.0317	0.0714	0.7376	1.72E-03	0.152	1.06E-03	0.1531	0.0403	9.70E-04	0.0413
Total	**3.2512**	**26.4176**	**18.6852**	**0.03637**	**0.261**	**1.53126**	**1.7922**	**0.0714**	**1.47567**	**1.5471**

IEUA Facilities Master Plans
Category 3 Construction Emissions Summaries

Project Category 3 Emissions

Category	ROG	NOx	CO	SO2	Fugitive PM10 (lbs/day)	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Basin - Excavation	10.51	159.77	87.63	0.34	12.14	4.22	16.37	4.37	3.88	8.25
Basin - Fine Grading anc	2.94	31.16	15.38	0.03	0.47	1.48	1.96	0.13	1.36	1.49
Wells - Drilling	2.55	20.02	12.33	0.03	0.10	1.01	1.11	0.02	0.96	0.99
Wells - Well Developme	2.17	16.63	11.22	0.02	0.08	1.03	1.11	0.02	0.98	1.01
Total	**18.17**	**227.58**	**126.56**	**0.43**	**12.79**	**7.74**	**20.53**	**4.54**	**7.19**	**11.73**

Basin - Excavation

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					4.0806	0	4.0806	2.1707	0	2.1707
Off-Road	4.4857	48.2305	22.8124	0.04		2.4987	2.4987		2.2988	2.2988
Hauling	5.7778	110.5883	59.3432	0.289	6.9631	1.707	8.6701	1.9062	1.5703	3.4766
Vendor	0.0292	0.4465	0.3091	1.18E-03	0.0363	8.18E-03	0.0445	0.0104	7.53E-03	0.0179
Worker	0.2216	0.4999	5.1634	0.012	1.0639	7.41E-03	1.0714	0.2821	6.81E-03	0.2889
Total	**10.5143**	**159.7652**	**87.6281**	**0.34218**	**12.1439**	**4.22129**	**16.3653**	**4.3694**	**3.88344**	**8.2529**

Basin - Fine Grading and Site Improvement

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					0	0	0	0	0	0
Off-Road	2.8276	30.7273	13.013	0.028		1.4746	1.4746		1.3567	1.3567
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.095	0.2142	2.2129	5.15E-03	0.456	3.18E-03	0.4592	0.1209	2.92E-03	0.1238
Total	**2.9372**	**31.1647**	**15.3805**	**0.03374**	**0.4742**	**1.48187**	**1.9561**	**0.12608**	**1.36338**	**1.48944**

Wells - Drilling

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Fugitive Dust					4.57E-03	0	4.57E-03	5.00E-04	0	5.00E-04
Off-Road	2.5122	19.5884	11.7858	0.0283		1.0035	1.0035		0.9544	0.9544
Hauling	9.54E-03	0.1826	0.098	4.80E-04	0.0116	2.82E-03	0.0144	3.16E-03	2.59E-03	5.75E-03
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.0127	0.0286	0.2951	6.90E-04	0.0608	4.20E-04	0.0612	0.0161	3.90E-04	0.0165
Total	**2.54904**	**20.0228**	**12.3335**	**0.03006**	**0.09517**	**1.01083**	**1.10597**	**0.02494**	**0.96114**	**0.98609**

Wells - Well Development

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Off-Road	2.1452	16.3746	10.7691	0.0187		1.023	1.023		0.9796	0.9796
Hauling	0	0	0	0	0	0	0	0	0	0
Vendor	0.0146	0.2232	0.1546	5.90E-04	0.0182	4.09E-03	0.0223	5.18E-03	3.76E-03	8.94E-03
Worker	0.0127	0.0286	0.2951	6.90E-04	0.0608	4.20E-04	0.0612	0.0161	3.90E-04	0.0165
Total	**2.1725**	**16.6264**	**11.2188**	**0.01998**	**0.079**	**1.02751**	**1.1065**	**0.02128**	**0.98375**	**1.00504**

IEUA Facilities Master Plans

All Categories - Total Construction Emissions

Year	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
					(lbs/day)					
Demolition of RP-2	3.93	44.75	22.42	0.05	2.77	2.04	4.82	0.54	1.88	2.42
Restoration of RP-2	5.64	84.94	42.58	0.17	8.44	2.24	10.68	3.31	2.06	5.37
Site Preparation and Earthwork	3.69	44.59	23.21	0.06	3.50	1.78	5.28	1.44	1.64	3.08
Piping and Forming Concrete	5.92	58.20	36.72	0.08	0.91	2.77	3.68	0.25	2.65	2.90
Site Finishing	3.21	35.86	20.49	0.04	0.55	1.65	2.20	0.15	1.52	1.67
Pipelines - Excvation and Shorin	3.91	41.84	29.61	0.06	0.80	2.10	2.90	0.20	1.97	2.17
Pipelines - Pipe Installation	3.16	35.75	20.76	0.06	1.27	1.39	2.66	0.36	1.29	1.64
Pipelines - Street Restoration	0.95	2.26	3.13	0.01	0.38	0.15	0.53	0.10	0.14	0.24
Reservoirs - Site Prep and Earth	2.68	28.49	14.82	0.03	2.03	1.46	3.49	1.01	1.35	2.36
Reservoirs - Reservoir Construc	2.49	23.17	15.51	0.03	0.47	1.31	1.78	0.13	1.25	1.38
Reservoirs - Architectural Coati	39.48	2.44	2.62	0.00	0.15	0.20	0.35	0.04	0.20	0.24
Pump Stations - Site Prep and F	2.31	22.26	14.61	0.03	0.26	1.23	1.49	0.07	1.16	1.23
Pump Stations - Building Const	1.39	13.27	10.78	0.02	0.26	0.78	1.04	0.07	0.74	0.81
Pump Stations - Equipment Ins	3.25	26.42	18.69	0.04	0.26	1.53	1.79	0.07	1.48	1.55
Basin - Excavation	10.51	159.77	87.63	0.34	12.14	4.22	16.37	4.37	3.88	8.25
Basin - Fine Grading and Site In	2.94	31.16	15.38	0.03	0.47	1.48	1.96	0.13	1.36	1.49
Wells - Drilling	2.55	20.02	12.33	0.03	0.10	1.01	1.11	0.02	0.96	0.99
Wells - Well Development	2.17	16.63	11.22	0.02	0.08	1.03	1.11	0.02	0.98	1.01
All Project Categories	**100.19**	**691.82**	**402.50**	**1.10**	**34.86**	**28.38**	**63.24**	**12.27**	**26.50**	**38.78**

IEUA Facilities Master Plans
Maximum Daily Operational Emissions
All values in lbs/day

Project Category 1

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Area	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00
Energy	0.00	0.01	0.01	0.00		0.00	0.00		0.00	0.00
Mobile	0.02	0.06	0.23	0.00	0.08	0.00	0.08	0.02	0.00	0.02
Total	**0.04**	**0.07**	**0.24**	**0.00**	**0.08**	**0.00**	**0.08**	**0.02**	**0.00**	**0.02**

PRoject Category 2

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Area	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00
Energy	0.00	0.01	0.01	0.00		0.00	0.00		0.00	0.00
Mobile	0.01	0.04	0.18	0.00	0.06	0.00	0.06	0.02	0.00	0.02
Total	**0.03**	**0.05**	**0.18**	**0.00**	**0.06**	**0.00**	**0.06**	**0.02**	**0.00**	**0.02**

Project Category 3

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Area	0.02	0.00	0.00	0.00		0.00	0.00		0.00	0.00
Energy	0.00	0.01	0.01	0.00		0.00	0.00		0.00	0.00
Mobile	0.01	0.02	0.09	0.00	0.03	0.00	0.03	0.01	0.00	0.01
Total	**0.03**	**0.03**	**0.10**	**0.00**	**0.03**	**0.00**	**0.03**	**0.01**	**0.00**	**0.01**

Combined Project Categories

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Cat 1	0.04	0.07	0.24	0.00	0.08	0.00	0.08	0.02	0.00	0.02
Cat 2	0.03	0.05	0.18	0.00	0.06	0.00	0.06	0.02	0.00	0.02
Cat 3	0.03	0.03	0.10	0.00	0.03	0.00	0.03	0.01	0.00	0.01
Total	**0.10**	**0.15**	**0.52**	**0.00**	**0.16**	**0.01**	**0.17**	**0.04**	**0.01**	**0.05**

IEUA Facilities Master Plans

GHG Emissions Raw Data

All values in MT/year

Maximum Annual Construction Emissions

	Bio- CO2	NBio- CO2	Total CO2 (MT/yr)	CH4	N2O	CO2e
Category 1	0	754.6493	754.6493	0.0905	0	756.5496
Pipelines	0	266.9735	266.9735	0.038	0	267.7705
Reservoir	0	270.1318	270.1318	0.0467	0	271.1117
Pump Station	0	61.5381	61.5381	0.0122	0	61.794
Basins	0	4,969.84	4,969.84	0.2378	0	4,974.84
Wells	0	508.0281	508.0281	0.1263	0	510.6808
Total	0	6831.1644	6831.1644	0.5515	0	**6842.7446**

Total Construction GHG Emissions		
20 years of construction	136,855	MT/yr
30 years amortized	**4,562**	**MT/yr**

Maximum Annual Operational Emissions

Category 1

	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Area	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.00	3.12	3.12	0.00	0.00	3.14
Mobile	0.00	9.62	9.62	0.00	0.00	9.62
Waste	10.37	0.00	10.37	0.61	0.00	23.25
Water	0.10	1.19	1.29	0.01	0.00	1.59
Total	**10.47**	**13.93**	**24.40**	**0.62**	**0.00**	**37.60**

Category 2

	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Area	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.00	3.22	3.22	0.00	0.00	3.24
Mobile	0.00	7.21	7.21	0.00	0.00	7.22
Waste	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.00**	**10.43**	**10.43**	**0.00**	**0.00**	**10.45**

Category 3

	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Area	0.00	0.00	0.00	0.00	0.00	0.00
Energy	0.00	3.14	3.14	0.00	0.00	3.15
Mobile	0.00	3.61	3.61	0.00	0.00	3.61
Waste	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00
Total	**0.00**	**6.74**	**6.74**	**0.00**	**0.00**	**6.76**

Combined Operational Emissions

	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category 1	10.47	13.93	24.40	0.62	0.00	37.60
Category 2	0.00	10.43	10.43	0.00	0.00	10.45
Category 3	0.00	6.74	6.74	0.00	0.00	6.76
Total	**10.47**	**31.10**	**41.58**	**0.62**	**0.00**	**54.81**

Total Operational GHG Emissions	**55**	**MT/yr**
Total Amortized Construction GHG Emissions	**4,562**	**MT/yr**
Total Program GHG Emissions	**4,617**	**MT/yr**

Appendix D
Biological Resources Data

ESA

California Natural Diversity Database

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE **RareFind**

Query Summary:
Taxonomic Group IS (Dune OR Scrub OR Herbaceous OR Marsh OR Riparian OR Woodland OR Forest OR Alpine OR Inland Waters OR Marine OR Estuarine OR Riverine OR Palustrine)
AND Quad IS (Corona North (3311785) OR Cucamonga Peak (3411725) OR Devore (3411724) OR Fontana (3411714) OR Guasti (3411715) OR Mt. Baldy (3411726) OR Ontario (3411716) OR Prado Dam (3311786) OR San Bernardino North (3411723) OR San Bernardino South (3411713) OR San Dimas (3411717) OR Yorba Linda (3311787))

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
California Walnut Woodland	California Walnut Woodland	Woodland	CTT71210CA	76	25	None	None	G2	S2.1	null	null	Cismontane woodland
Canyon Live Oak Ravine Forest	Canyon Live Oak Ravine Forest	Riparian	CTT61350CA	50	14	None	None	G3	S3.3	null	null	Riparian forest
Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh	Marsh	CTT52410CA	60	1	None	None	G3	S2.1	null	null	Marsh & swamp, Wetland
Riversidian Alluvial Fan Sage Scrub	Riversidian Alluvial Fan Sage Scrub	Scrub	CTT32720CA	30	12	None	None	G1	S1.1	null	null	Coastal scrub
Southern California Arroyo Chub/Santa Ana Sucker Stream	Southern California Arroyo Chub/Santa Ana Sucker Stream	Inland Waters	CARE2330CA	4	2	None	None	GNR	SNR	null	null	null
Southern Coast Live Oak Riparian Forest	Southern Coast Live Oak Riparian Forest	Riparian	CTT61310CA	246	8	None	None	G4	S4	null	null	Riparian forest
Southern Cottonwood Willow Riparian Forest	Southern Cottonwood Willow Riparian Forest	Riparian	CTT61330CA	111	4	None	None	G3	S3.2	null	null	Riparian forest
Southern Riparian Forest	Southern Riparian Forest	Riparian	CTT61300CA	20	1	None	None	G4	S4	null	null	Riparian forest
Southern Riparian Scrub	Southern Riparian Scrub	Riparian	CTT63300CA	56	1	None	None	G3	S3.2	null	null	Riparian scrub
Southern Sycamore Alder Riparian Woodland	Southern Sycamore Alder Riparian Woodland	Riparian	CTT62400CA	230	19	None	None	G4	S4	null	null	Riparian woodland
Southern Willow Scrub	Southern Willow Scrub	Riparian	CTT63320CA	45	1	None	None	G3	S2.1	null	null	Riparian scrub
Walnut Forest	Walnut Forest	Forest	CTT81600CA	6	3	None	None	G1	S1.1	null	null	Broadleaved upland forest

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE **RareFind**

Query Summary:
Taxonomic Group IS (Ferns OR Gymnosperms OR Monocots OR Dicots OR Lichens OR Bryophytes)
AND Quad IS (Corona North (3311785) OR Cucamonga Peak (3411725) OR Devore (3411724) OR Fontana (3411714) OR Guasti (3411715) OR Mt. Baldy (3411726) OR Ontario (3411716) OR Prado Dam (3311786) OR San Bernardino North (3411723) OR San Bernardino South (3411713) OR San Dimas (3411717) OR Yorba Linda (3311787))

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Abronia villosa var. aurita	chaparral sand-verbena	Dicots	PDNYC010P1	81	2	None	None	G5T2T3	S2	1B.1	BLM_S-Sensitive, USFS_S-Sensitive	Chaparral, Coastal scrub, Desert dunes
Ambrosia monogyra	singlewhorl burrobrush	Dicots	PDAST50010	16	2	None	None	G5	S2	2B.2	null	Chaparral, Sonoran desert scrub
Arctostaphylos glandulosa ssp. gabrielensis	San Gabriel manzanita	Dicots	PDERI042P0	35	4	None	None	G5T2	S2	1B.2	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral
Arenaria paludicola	marsh sandwort	Dicots	PDCAR040L0	15	1	Endangered	Endangered	G1	S1	1B.1	SB_SBBG-Santa Barbara Botanic Garden	Freshwater marsh, Marsh & swamp, Wetland
Astragalus hornii var. hornii	Horn's milk-vetch	Dicots	PDFAB0F421	14	1	None	None	G4G5T2T3	S1	1B.1	BLM_S-Sensitive	Alkali playa, Meadow & seep, Wetland
Atriplex coulteri	Coulter's saltbush	Dicots	PDCHE040E0	102	1	None	None	G3	S1S2	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden	Coastal bluff scrub, Coastal dunes, Coastal scrub, Valley & foothill grassland
Berberis nevinii	Nevin's barberry	Dicots	PDBER060A0	31	4	Endangered	Endangered	G1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden, SB_SBBG-Santa Barbara Botanic Garden	Chaparral, Cismontane woodland, Coastal scrub, Riparian scrub
Brodiaea filifolia	thread-leaved brodiaea	Monocots	PMLIL0C050	131	2	Threatened	Endangered	G2	S2	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden	Chaparral, Cismontane woodland, Coastal scrub, Valley & foothill grassland, Vernal pool, Wetland
California macrophylla	round-leaved filaree	Dicots	PDGER01070	162	1	None	None	G3?	S3?	1B.2	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, SB_SBBG-Santa Barbara Botanic Garden	Cismontane woodland, Valley & foothill grassland
Calochortus clavatus var. gracilis	slender mariposa-lily	Monocots	PMLIL0D096	105	5	None	None	G4T2T3	S2S3	1B.2	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral, Coastal scrub, Valley & foothill grassland
												Chaparral, Cismontane

Calochortus plummerae	Plummer's mariposa-lily	Monocots	PMLIL0D150	230	41	None	None	G4	S4	4.2	SB_RSABG-Rancho Santa Ana Botanic Garden	woodland, Coastal scrub, Lower montane coniferous forest, Valley & foothill grassland
Calochortus weedii var. intermedius	intermediate mariposa-lily	Monocots	PMLIL0D1J1	116	13	None	None	G3G4T2	S2	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral, Coastal scrub, Valley & foothill grassland
Calystegia felix	lucky morning-glory	Dicots	PDCON040P0	9	6	None	None	GHQ	SH	3.1	null	Meadow & seep, Riparian scrub
Carex comosa	bristly sedge	Monocots	PMCYP032Y0	29	1	None	None	G5	S2	2B.1	null	Coastal prairie, Freshwater marsh, Marsh & swamp, Valley & foothill grassland, Wetland
Castilleja lasiorhyncha	San Bernardino Mountains owl's-clover	Dicots	PDSCR0D410	46	1	None	None	G2	S2	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral, Meadow & seep, Pavement plain, Riparian woodland, Upper montane coniferous forest, Wetland
Centromadia pungens ssp. laevis	smooth tarplant	Dicots	PDAST4R0R4	104	5	None	None	G3G4T2	S2	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden	Alkali playa, Chenopod scrub, Meadow & seep, Riparian woodland, Valley & foothill grassland, Wetland
Chloropyron maritimum ssp. maritimum	salt marsh bird's-beak	Dicots	PDSCR0J0C2	27	1	Endangered	Endangered	G4?T1	S1	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden	Coastal dunes, Marsh & swamp, Salt marsh, Wetland
Chorizanthe parryi var. parryi	Parry's spineflower	Dicots	PDPGN040J2	127	20	None	None	G3T3	S3	1B.1	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral, Cismontane woodland, Coastal scrub, Valley & foothill grassland
Chorizanthe xanti var. leucotheca	white-bracted spineflower	Dicots	PDPGN040Z1	52	2	None	None	G4T3	S3	1B.2	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, SB_USDA-US Dept of Agriculture, USFS_S-Sensitive	Coastal scrub, Mojavean desert scrub, Pinon & juniper woodlands
Cladium californicum	California saw-grass	Monocots	PMCYP04010	13	1	None	None	G4	S2	2B.2	USFS_S-Sensitive	Alkali marsh, Freshwater marsh, Meadow & seep, Wetland
Claytonia lanceolata var. peirsonii	Peirson's spring beauty	Dicots	PDPOR03097	6	2	None	None	G5T2Q	S2	3.1	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Subalpine coniferous forest, Upper montane coniferous forest
Cuscuta obtusiflora var. glandulosa	Peruvian dodder	Dicots	PDCUS01111	6	1	None	None	G5T4T5	SH	2B.2	null	Marsh & swamp, Wetland
Dodecahema leptoceras	slender-horned spineflower	Dicots	PDPGN0V010	35	7	Endangered	Endangered	G1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden	Chaparral, Cismontane woodland, Coastal scrub
Dudleya multicaulis	many-stemmed dudleya	Dicots	PDCRA040H0	147	14	None	None	G2	S2	1B.2	BLM_S-Sensitive, SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Chaparral, Coastal scrub, Valley & foothill grassland
Eriastrum densifolium ssp.	Santa Ana River woollystar	Dicots	PDPLM03035	30	21	Endangered	Endangered	G4T1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic	Chaparral, Coastal scrub

sanctorum											Garden	
Eriogonum microthecum var. johnstonii	Johnston's buckwheat	Dicots	PDPGN083W5	7	2	None	None	G5T2	S2	1B.3	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Limestone, Subalpine coniferous forest, Upper montane coniferous forest
Fimbristylis thermalis	hot springs fimbristylis	Monocots	PMCYP0B0N0	19	1	None	None	G4	S1S2	2B.2	null	Meadow & seep, Wetland
Galium californicum ssp. primum	Alvin Meadow bedstraw	Dicots	PDRUB0N0E6	4	1	None	None	G5T1	S1	1B.2	BLM_S-Sensitive, USFS_S-Sensitive	Chaparral, Lower montane coniferous forest
Helianthus nuttallii ssp. parishii	Los Angeles sunflower	Dicots	PDAST4N102	8	1	None	None	G5TH	SH	1A	null	Freshwater marsh, Marsh & swamp, Salt marsh, Wetland
Horkelia cuneata var. puberula	mesa horkelia	Dicots	PDROS0W045	103	12	None	None	G4T1	S1	1B.1	USFS_S-Sensitive	Chaparral, Cismontane woodland, Coastal scrub
Imperata brevifolia	California satintail	Monocots	PMPOA3D020	31	1	None	None	G3	S3	2B.1	SB_SBBG-Santa Barbara Botanic Garden, USFS_S-Sensitive	Chaparral, Coastal scrub, Meadow & seep, Mojavean desert scrub, Riparian scrub, Wetland
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	Dicots	PDBRA1M114	142	12	None	None	G5T3	S3	4.3	null	Chaparral, Coastal scrub
Lilium parryi	lemon lily	Monocots	PMLIL1A0J0	138	3	None	None	G3	S3	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Lower montane coniferous forest, Meadow & seep, Riparian forest, Upper montane coniferous forest, Wetland
Linanthus concinnus	San Gabriel linanthus	Dicots	PDPLM090D0	31	4	None	None	G3	S3	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Lower montane coniferous forest, Upper montane coniferous forest
Lycium parishii	Parish's desert-thorn	Dicots	PDSOL0G0D0	21	1	None	None	G3?	S1	2B.3	null	Coastal scrub, Sonoran desert scrub
Monardella australis ssp. jokerstii	Jokerst's monardella	Dicots	PDLAM18112	3	2	None	None	G4T1	S1	1B.1	USFS_S-Sensitive	Chaparral, Lower montane coniferous forest
Monardella macrantha ssp. hallii	Hall's monardella	Dicots	PDLAM180E1	38	3	None	None	G5T3	S3	1B.3	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Broadleaved upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest, Valley & foothill grassland
Monardella pringlei	Pringle's monardella	Dicots	PDLAM180J0	2	2	None	None	GX	SX	1A	null	Coastal scrub
Muhlenbergia californica	California muhly	Monocots	PMPOA480A0	5	1	None	None	G4	S4	4.3	null	Chaparral, Coastal scrub, Lower montane coniferous forest, Meadow & seep
Nasturtium gambelii	Gambel's water cress	Dicots	PDBRA270V0	12	1	Endangered	Threatened	G1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden, SB_SBBG-Santa Barbara Botanic Garden	Brackish marsh, Freshwater marsh, Marsh & swamp, Wetland
Navarretia prostrata	prostrate vernal pool navarretia	Dicots	PDPLM0C0Q0	60	1	None	None	G2	S2	1B.1	null	Coastal scrub, Meadow & seep, Valley & foothill grassland, Vernal pool, Wetland
											BLM_S-Sensitive,	Chaparral, Joshua tree

Opuntia basilaris var. brachyclada	short-joint beavertail	Dicots	PDCAC0D053	131	1	None	None	G5T3	S3	1B.2	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	woodland, Mojavean desert scrub, Pinon & juniper woodlands
Oreonana vestita	woolly mountain-parsley	Dicots	PDAPI1G030	40	8	None	None	G3	S3	1B.3	SB_RSABG-Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Lower montane coniferous forest, Subalpine coniferous forest, Upper montane coniferous forest
Orobanche valida ssp. valida	Rock Creek broomrape	Dicots	PDORO040G2	12	2	None	None	G4T2	S2	1B.2	USFS_S-Sensitive	Chaparral, Pinon & juniper woodlands
Phacelia stellaris	Brand's star phacelia	Dicots	PDHYD0C510	15	1	None	None	G1	S1	1B.1	SB_RSABG-Rancho Santa Ana Botanic Garden	Coastal dunes, Coastal scrub
Pseudognaphalium leucocephalum	white rabbit-tobacco	Dicots	PDAST440C0	15	1	None	None	G4	S2	2B.2	null	Chaparral, Cismontane woodland, Coastal scrub, Riparian woodland
Ribes divaricatum var. parishii	Parish's gooseberry	Dicots	PDGRO020F3	4	1	None	None	G4TH	SH	1A	null	Riparian woodland
Sagittaria sanfordii	Sanford's arrowhead	Monocots	PMALI040Q0	93	1	None	None	G3	S3	1B.2	BLM_S-Sensitive	Marsh & swamp, Wetland
Schoenus nigricans	black bog-rush	Monocots	PMCYP0P010	13	1	None	None	G4	S2	2B.2	USFS_S-Sensitive	Marsh & swamp, Wetland
Senecio aphanactis	chaparral ragwort	Dicots	PDAST8H060	47	2	None	None	G3	S2	2B.2	null	Chaparral, Cismontane woodland, Coastal scrub
Sidalcea neomexicana	Salt Spring checkerbloom	Dicots	PDMAL110J0	15	3	None	None	G4	S2	2B.2	USFS_S-Sensitive	Alkali playa, Chaparral, Coastal scrub, Lower montane coniferous forest, Mojavean desert scrub, Wetland
Sphenopholis obtusata	prairie wedge grass	Monocots	PMPOA5T030	19	2	None	None	G5	S2	2B.2	null	Cismontane woodland, Meadow & seep, Wetland
Streptanthus bernardinus	Laguna Mountains jewelflower	Dicots	PDBRA2G060	22	2	None	None	G3G4	S3S4	4.3	SB_RSABG-Rancho Santa Ana Botanic Garden	Chaparral, Lower montane coniferous forest, Upper montane coniferous forest
Streptanthus campestris	southern jewelflower	Dicots	PDBRA2G0B0	40	1	None	None	G3	S3	1B.3	BLM_S-Sensitive, USFS_S-Sensitive	Chaparral, Lower montane coniferous forest, Pinon & juniper woodlands
Symphyotrichum defoliatum	San Bernardino aster	Dicots	PDASTE80C0	76	6	None	None	G2	S2	1B.2	BLM_S-Sensitive, USFS_S-Sensitive	Cismontane woodland, Coastal scrub, Lower montane coniferous forest, Marsh & swamp, Meadow & seep, Valley & foothill grassland
Symphyotrichum greatae	Greata's aster	Dicots	PDASTE80U0	56	4	None	None	G2	S2	1B.3	BLM_S-Sensitive	Broadleaved upland forest, Chaparral, Cismontane woodland, Lower montane coniferous forest, Riparian woodland
Thysanocarpus rigidus	rigid fringepod	Dicots	PDBRA2Q070	5	1	None	None	G1G2	S1	1B.2	BLM_S-Sensitive, USFS_S-Sensitive	Pinon & juniper woodlands
Viola pinetorum var. grisea	grey-leaved violet	Dicots	PDVIO04431	59	1	None	None	G4G5T3?	S3?	1B.3	null	Meadow & seep, Subalpine coniferous forest, Upper montane coniferous forest

CALIFORNIA DEPARTMENT OF FISH and WILDLIFE RareFind

Query Summary:
Taxonomic Group IS (Fish OR Amphibians OR Reptiles OR Birds OR Mammals OR Mollusks OR Arachnids OR Crustaceans OR Insects)
AND Quad IS (Corona North (3311785) OR Cucamonga Peak (3411725) OR Devore (3411724) OR Fontana (3411714) OR Guasti (3411715) OR Mt. Baldy (3411726) OR Ontario (3411716) OR Prado Dam (3311786) OR San Bernardino North (3411723) OR San Bernardino South (3411713) OR San Dimas (3411717) OR Yorba Linda (3311787))

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CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Agelaius tricolor	tricolored blackbird	Birds	ABPBXB0020	675	3	None	None	G2G3	S1S2	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, NABCI_RWL-Red Watch List, USFWS_BCC-Birds of Conservation Concern	Freshwater marsh, Marsh & swamp, Swamp, Wetland
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	Birds	ABPBX91091	194	5	None	None	G5T3	S2S3	null	CDFW_WL-Watch List	Chaparral, Coastal scrub
Ammodramus savannarum	grasshopper sparrow	Birds	ABPBXA0020	18	1	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Valley & foothill grassland
Anaxyrus californicus	arroyo toad	Amphibians	AAABB01230	135	1	Endangered	None	G2G3	S2S3	null	CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered	Desert wash, Riparian scrub, Riparian woodland, South coast flowing waters, South coast standing waters
Anniella pulchra pulchra	silvery legless lizard	Reptiles	ARACC01012	94	4	None	None	G3G4T3T4Q	S3	null	CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Chaparral, Coastal dunes, Coastal scrub

Antrozous pallidus	pallid bat	Mammals	AMACC10010	402	2	None	None	G5	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive, WBWG_H-High Priority	Chaparral, Coastal scrub, Desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Riparian woodland, Sonoran desert scrub, Upper montane coniferous forest, Valley & foothill grassland
Aquila chrysaetos	golden eagle	Birds	ABNKC22010	312	3	None	None	G5	S3	null	BLM_S-Sensitive, CDF_S-Sensitive, CDFW_FP-Fully Protected, CDFW_WL-Watch List, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Broadleaved upland forest, Cismontane woodland, Coastal prairie, Great Basin grassland, Great Basin scrub, Lower montane coniferous forest, Pinon & juniper woodlands, Upper montane coniferous forest, Valley & foothill grassland
Artemisiospiza belli belli	Bell's sage sparrow	Birds	ABPBX97021	57	2	None	None	G5T2T4	S2?	null	CDFW_WL-Watch List, USFWS_BCC-Birds of Conservation Concern	Chaparral, Coastal scrub
Asio otus	long-eared owl	Birds	ABNSB13010	43	1	None	None	G5	S3?	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Cismontane woodland, Great Basin scrub, Riparian forest, Riparian woodland, Upper montane coniferous forest
Aspidoscelis hyperythra	orangethroat whiptail	Reptiles	ARACJ02060	346	8	None	None	G5	S2	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Cismontane woodland, Coastal scrub
Aspidoscelis tigris stejnegeri	coastal whiptail	Reptiles	ARACJ02143	114	3	None	None	G5T3T4	S2S3	null	null	null
Athene	burrowing owl	Birds	ABNSB10010	1882	49	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-	Coastal prairie, Coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert

cunicularia											Least Concern, USFWS_BCC-Birds of Conservation Concern	scrub, Valley & foothill grassland
Batrachoseps gabrieli	San Gabriel slender salamander	Amphibians	AAAAD02110	8	5	None	None	G2G3	S2S3	null	IUCN_DD-Data Deficient, USFS_S-Sensitive	Talus slope
Bombus crotchii	Crotch bumble bee	Insects	IIHYM24480	232	12	None	None	G3G4	S1S2	null	null	null
Buteo swainsoni	Swainson's hawk	Birds	ABNKC19070	2392	3	None	Threatened	G5	S3	null	BLM_S-Sensitive, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Great Basin grassland, Riparian forest, Riparian woodland, Valley & foothill grassland
Callophrys mossii hidakupa	San Gabriel Mountains elfin butterfly	Insects	IILEPE2206	3	3	None	None	G4T1T2	S1S2	null	USFS_S-Sensitive	Lower montane coniferous forest
Campylorhynchus brunneicapillus sandiegensis	coastal cactus wren	Birds	ABPBG02095	151	3	None	None	G5T3Q	S3	null	CDFW_SSC-Species of Special Concern, USFS_S-Sensitive, USFWS_BCC-Birds of Conservation Concern	Coastal scrub
Carolella busckana	Busck's gallmoth	Insects	IILEM2X090	4	1	None	None	G1G3	SH	null	null	Coastal dunes, Coastal scrub
Catostomus santaanae	Santa Ana sucker	Fish	AFCJC02190	27	7	Threatened	None	G1	S1	null	AFS_TH-Threatened, IUCN_VU-Vulnerable	Aquatic, South coast flowing waters
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	Mammals	AMAFD05031	94	14	None	None	G5T3T4	S3S4	null	CDFW_SSC-Species of Special Concern	Chaparral, Coastal scrub
Chaetodipus fallax pallidus	pallid San Diego pocket mouse	Mammals	AMAFD05032	79	1	None	None	G5T34	S3S4	null	CDFW_SSC-Species of Special Concern	Desert wash, Pinon & juniper woodlands, Sonoran desert scrub
Charina trivirgata	rosy boa	Reptiles	ARADA01020	48	2	None	None	G4G5	S3S4	null	IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Mojavean desert scrub, Sonoran desert scrub
Charina umbratica	southern rubber boa	Reptiles	ARADA01011	50	1	None	Threatened	G2G3	S2S3	null	USFS_S-Sensitive	Meadow & seep, Riparian forest, Riparian woodland, Upper montane coniferous forest, Wetland

Cicindela tranquebarica viridissima	greenest tiger beetle	Insects	IICOL02201	1	1	None	None	G5T1	S1	null	null	Riparian woodland
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Birds	ABNRB02022	155	5	Threatened	Endangered	G5T2T3	S1	null	BLM_S-Sensitive, NABCI_RWL-Red Watch List, USFS_S-Sensitive, USFWS_BCC-Birds of Conservation Concern	Riparian forest
Coleonyx variegatus abbotti	San Diego banded gecko	Reptiles	ARACD01031	5	1	None	None	G5T3T4	S1S2	null	null	Chaparral, Coastal scrub
Crotalus ruber	red-diamond rattlesnake	Reptiles	ARADE02090	173	6	None	None	G4	S3	null	CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Chaparral, Mojavean desert scrub, Sonoran desert scrub
Cypseloides niger	black swift	Birds	ABNUA01010	46	1	None	None	G4	S2	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, NABCI_YWL-Yellow Watch List, USFWS_BCC-Birds of Conservation Concern	null
Diadophis punctatus modestus	San Bernardino ringneck snake	Reptiles	ARADB10015	10	2	None	None	G5T2T3Q	S2?	null	USFS_S-Sensitive	null
Diplectrona californica	California diplectronan caddisfly	Insects	IITRI23010	1	1	None	None	G1G2	S1S2	null	null	Aquatic
Dipodomys merriami parvus	San Bernardino kangaroo rat	Mammals	AMAFD03143	47	23	Endangered	None	G5T1	S1	null	CDFW_SSC-Species of Special Concern	Coastal scrub
Dipodomys stephensi	Stephens' kangaroo rat	Mammals	AMAFD03100	220	6	Endangered	Threatened	G2	S2	null	IUCN_EN-Endangered	Coastal scrub, Valley & foothill grassland
Elanus leucurus	white-tailed kite	Birds	ABNKC06010	160	3	None	None	G5	S3S4	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_LC-Least Concern	Cismontane woodland, Marsh & swamp, Riparian woodland, Valley & foothill grassland, Wetland
	southwestern										NABCI_RWL-	

Empidonax traillii extimus	willow flycatcher	Birds	ABPAE33043	70	2	Endangered	Endangered	G5T2	S1	null	Red Watch List	Riparian woodland
Emys marmorata	western pond turtle	Reptiles	ARAAD02030	1153	6	None	None	G3G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable, USFS_S-Sensitive	Aquatic, Artificial flowing waters, Klamath/North coast flowing waters, Klamath/North coast standing waters, Marsh & swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Eremophila alpestris actia	California horned lark	Birds	ABPAT02011	83	1	None	None	G5T3Q	S3	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Marine intertidal & splash zone communities, Meadow & seep
Euchloe hyantis andrewsi	Andrew's marble butterfly	Insects	IILEPA5032	6	2	None	None	G3G4T1	S1	null	null	Lower montane coniferous forest
Eumops perotis californicus	western mastiff bat	Mammals	AMACD02011	293	9	None	None	G5T4	S3S4	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, WBWG_H-High Priority	Chaparral, Cismontane woodland, Coastal scrub, Valley & foothill grassland
Falco columbarius	merlin	Birds	ABNKD06030	34	1	None	None	G5	S3S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Estuary, Great Basin grassland, Valley & foothill grassland
Gila orcuttii	arroyo chub	Fish	AFCJB13120	49	6	None	None	G2	S2	null	AFS_VU-Vulnerable, CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Aquatic, South coast flowing waters
Glaucomys sabrinus californicus	San Bernardino flying squirrel	Mammals	AMAFB09021	11	3	None	None	G5T1T2	S1S2	null	CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Broadleaved upland forest, Lower montane coniferous forest
Icteria virens	yellow-breasted chat	Birds	ABPBX24010	87	1	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Riparian forest, Riparian scrub, Riparian woodland
	California										BLM_S-Sensitive, CDFW_SSC-Species of	

Lampropeltis zonata (parvirubra)	mountain kingsnake (San Bernardino population)	Reptiles	ARADB19062	9	1	None	None	G4G5	S2?	null	Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Lower montane coniferous forest, Talus slope
Lasiurus cinereus	hoary bat	Mammals	AMACC05030	235	2	None	None	G5	S4	null	IUCN_LC-Least Concern, WBWG_M-Medium Priority	Broadleaved upland forest, Cismontane woodland, Lower montane coniferous forest, North coast coniferous forest
Lasiurus xanthinus	western yellow bat	Mammals	AMACC05070	57	8	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, WBWG_H-High Priority	Desert wash
Lepus californicus bennettii	San Diego black-tailed jackrabbit	Mammals	AMAEB03051	97	6	None	None	G5T3T4	S3S4	null	CDFW_SSC-Species of Special Concern	Coastal scrub
Lithobates pipiens	northern leopard frog	Amphibians	AAABH01170	22	1	None	None	G5	S2	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Freshwater marsh, Great Basin flowing waters, Great Basin standing waters, Marsh & swamp, Wetland
Neotoma lepida intermedia	San Diego desert woodrat	Mammals	AMAFF08041	115	8	None	None	G5T3T4	S3S4	null	CDFW_SSC-Species of Special Concern	Coastal scrub
Nyctinomops femorosaccus	pocketed free-tailed bat	Mammals	AMACD04010	90	3	None	None	G4	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, WBWG_M-Medium Priority	Joshua tree woodland, Pinon & juniper woodlands, Riparian scrub, Sonoran desert scrub
Nyctinomops macrotis	big free-tailed bat	Mammals	AMACD04020	32	1	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, WBWG_MH-Medium-High Priority	null
	southern										CDFW_SSC-	

Onychomys torridus ramona	grasshopper mouse	Mammals	AMAFF06022	26	1	None	None	G5T3	S3	null	Species of Special Concern	Chenopod scrub
Ovis canadensis nelsoni	desert bighorn sheep	Mammals	AMALE04013	45	2	None	None	G4T4	S3	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, USFS_S-Sensitive	Alpine, Alpine dwarf scrub, Chaparral, Chenopod scrub, Great Basin scrub, Mojavean desert scrub, Montane dwarf scrub, Pinon & juniper woodlands, Riparian woodland, Sonoran desert scrub
Perognathus longimembris brevinasus	Los Angeles pocket mouse	Mammals	AMAFD01041	49	14	None	None	G5T1T2	S1S2	null	CDFW_SSC-Species of Special Concern	Coastal scrub
Phrynosoma blainvillii	coast horned lizard	Reptiles	ARACF12100	728	22	None	None	G3G4	S3S4	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Chaparral, Cismontane woodland, Coastal bluff scrub, Coastal scrub, Desert wash, Pinon & juniper woodlands, Riparian scrub, Riparian woodland, Valley & foothill grassland
Polioptila californica californica	coastal California gnatcatcher	Birds	ABPBJ08081	813	48	Threatened	None	G4G5T2Q	S2	null	CDFW_SSC-Species of Special Concern, NABCI_YWL-Yellow Watch List	Coastal bluff scrub, Coastal scrub
Rana muscosa	southern mountain yellow-legged frog	Amphibians	AAABH01330	186	6	Endangered	Endangered	G1	S1	null	CDFW_SSC-Species of Special Concern, IUCN_EN-Endangered, USFS_S-Sensitive	Aquatic
Rhaphiomidas terminatus abdominalis	Delhi Sands flower-loving fly	Insects	IIDIP05021	13	13	Endangered	None	G1T1	S1	null	null	Interior dunes
Rhinichthys osculus ssp. 3	Santa Ana speckled dace	Fish	AFCJB3705K	14	2	None	None	G5T1	S1	null	AFS_TH-Threatened, CDFW_SSC-Species of Special Concern, USFS_S-Sensitive	Aquatic, South coast flowing waters
Salvadora hexalepis virgultea	coast patch-nosed snake	Reptiles	ARADB30033	22	1	None	None	G5T4	S2S3	null	CDFW_SSC-Species of Special Concern	Coastal scrub
Setophaga petechia	yellow warbler	Birds	ABPBX03010	51	1	None	None	G5	S3S4	null	CDFW_SSC-Species of Special Concern, USFWS_BCC-	Riparian forest, Riparian scrub, Riparian woodland

											Birds of Conservation Concern	
Taricha torosa	Coast Range newt	Amphibians	AAAAF02032	65	2	None	None	G4	S4	null	CDFW_SSC-Species of Special Concern	null
Taxidea taxus	American badger	Mammals	AMAJF04010	487	4	None	None	G5	S3	null	CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern	Alkali marsh, Alkali playa, Alpine, Alpine dwarf scrub, Bog & fen, Brackish marsh, Broadleaved upland forest, Chaparral, Chenopod scrub, Cismontane woodland, Closed-cone coniferous forest, Coastal bluff scrub, Coastal dunes, Coastal prairie, Coastal scrub, Desert dunes, Desert wash, Freshwater marsh, Great Basin grassland, Great Basin scrub, Interior dunes, Ione formation, Joshua tree woodland, Limestone, Lower montane coniferous forest, Marsh & swamp, Meadow & seep, Mojavean desert scrub, Montane dwarf scrub, North coast coniferous forest, Oldgrowth, Pavement plain, Redwood, Riparian forest, Riparian scrub, Riparian woodland, Salt marsh, Sonoran desert scrub, Sonoran thorn woodland, Ultramafic, Upper montane coniferous forest, Upper Sonoran scrub, Valley & foothill grassland
Thamnophis hammondii	two-striped garter snake	Reptiles	ARADB36160	147	3	None	None	G4	S3S4	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Marsh & swamp, Riparian scrub, Riparian woodland, Wetland
Vireo bellii pusillus	least Bell's vireo	Birds	ABPBW01114	468	38	Endangered	Endangered	G5T2	S2	null	IUCN_NT-Near Threatened, NABCI_YWL-Yellow Watch List	Riparian forest, Riparian scrub, Riparian woodland

California Native Plant Society Data

Scientific Name	Common Name	Family	Lifeform	Rare Plant Rank	State Rank	Global Rank	CESA	FESA	Elevation High (meters)	Elevation Low (meters)	CA Endemic
Abronia villosa var. aurita	chaparral sand-verbena	Nyctaginaceae	annual herb	1B.1	S2	G5T2T3	None	None	1600	75	F
Acanthoscyphus parishii var. parishii	Parish's oxytheca	Polygonaceae	annual herb	4.2	S3S4	G4?T3T4	None	None	2600	1220	T
Amaranthus watsonii	Watson's amaranth	Amaranthaceae	annual herb	4.3	S3	G4G5	None	None	1700	20	F
Ambrosia monogyra	singlewhorl burrobrush	Asteraceae	perennial shrub	2B.2	S2	G5	None	None	500	10	F
Ambrosia pumila	San Diego ambrosia	Asteraceae	perennial rhizomatous herb	1B.1	S1	G1	None	FE	415	20	F
Arctostaphylos glandulosa ssp. gabrielensis	San Gabriel manzanita	Ericaceae	perennial evergreen shrub	1B.2	S2	G5T2	None	None	1500	595	T
Asplenium vespertinum	western spleenwort	Aspleniaceae	perennial rhizomatous herb	4.2	S4	G4	None	None	1000	180	F
Astragalus bicristatus	crested milk-vetch	Fabaceae	perennial herb	4.3	S3	G3	None	None	2745	1700	T
Atriplex coulteri	Coulter's saltbush	Chenopodiaceae	perennial herb	1B.2	S2	G3	None	None	460	3	F
Berberis nevinii	Nevin's barberry	Berberidaceae	perennial evergreen shrub	1B.1	S1	G1	CE	FE	825	70	T
Calochortus catalinae	Catalina mariposa lily	Liliaceae	perennial bulbiferous herb	4.2	S4	G4	None	None	700	15	T
Calochortus clavatus var. gracilis	slender mariposa lily	Liliaceae	perennial bulbiferous herb	1B.2	S2S3	G4T2T3	None	None	1000	320	T
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	perennial bulbiferous herb	4.2	S4	G4	None	None	1700	100	T
Calochortus weedii var. intermedius	intermediate mariposa lily	Liliaceae	perennial bulbiferous herb	1B.2	S2	G3G4T2	None	None	855	105	T
Calystegia felix	lucky morning-glory	Convolvulaceae	annual rhizomatous herb	3.1	SH	GHQ	None	None	215	30	T
Camissoniopsis lewisii	Lewis' evening-primrose	Onagraceae	annual herb	3	S4	G4	None	None	300	0	F
Centromadia pungens ssp. laevis	smooth tarplant	Asteraceae	annual herb	1B.1	S2	G3G4T2	None	None	640	0	T
Chorizanthe leptotheca	Peninsular spineflower	Polygonaceae	annual herb	4.2	S3	G3	None	None	1900	300	F
Chorizanthe parryi var. parryi	Parry's spineflower	Polygonaceae	annual herb	1B.1	S3	G3T3	None	None	1220	275	T
Chorizanthe xanti var. leucotheca	white-bracted spineflower	Polygonaceae	annual herb	1B.2	S3	G4T3	None	None	1200	300	T
Cladium californicum	California sawgrass	Cyperaceae	perennial rhizomatous herb	2B.2	S2	G4	None	None	1600	60	F
Claytonia lanceolata var. peirsonii	Peirson's spring beauty	Montiaceae	perennial herb	3.1	S2	G5T2Q	None	None	2745	1510	T
Convolvulus simulans	small-flowered morning-glory	Convolvulaceae	annual herb	4.2	S4	G4	None	None	700	30	F
Deinandra paniculata	paniculate tarplant	Asteraceae	annual herb	4.2	S4	G4	None	None	940	25	F
Dodecahema leptoceras	slender-horned spineflower	Polygonaceae	annual herb	1B.1	S1	G1	CE	FE	760	200	T
Dudleya multicaulis	many-stemmed dudleya	Crassulaceae	perennial herb	1B.2	S2	G2	None	None	790	15	T
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Polemoniaceae	perennial herb	1B.1	S1	G4T1	CE	FE	610	91	T
Eriogonum microthecum var. alpinum	northern limestone buckwheat	Polygonaceae	perennial herb	4.3	S4	G5T4	None	None	3300	2500	T
Eriogonum microthecum var. johnstonii	Johnston's buckwheat	Polygonaceae	perennial deciduous shrub	1B.3	S2	G5T2	None	None	2926	1829	T
Eriogonum umbellatum var. minus	alpine sulfur-flowered buckwheat	Polygonaceae	perennial herb	4.3	S4	G5T4	None	None	3068	1800	T
Galium angustifolium ssp. gabrielense	San Antonio Canyon bedstraw	Rubiaceae	perennial herb	4.3	S3	G5T3	None	None	2650	1200	T
Galium johnstonii	Johnston's bedstraw	Rubiaceae	perennial herb	4.3	S4	G4	None	None	2300	1220	T
Heuchera caespitosa	urn-flowered alumroot	Saxifragaceae	perennial rhizomatous herb	4.3	S3	G3	None	None	2650	1155	T
Horkelia cuneata var. puberula	mesa horkelia	Rosaceae	perennial herb	1B.1	S1	G4T1	None	None	810	70	T
Juglans californica	Southern California black walnut	Juglandaceae	perennial deciduous tree	4.2	S3	G3	None	None	900	50	T
Juncus duranii	Duran's rush	Juncaceae	perennial rhizomatous herb	4.3	S3	G3	None	None	2804	1768	T
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	1B.1	S2	G4T2	None	None	1220	1	F
Lepechinia fragrans	fragrant pitcher sage	Lamiaceae	perennial shrub	4.2	S3	G3	None	None	1310	20	T
Lepidium virginicum var. robinsonii	Robinson's pepper-grass	Brassicaceae	annual herb	4.3	S3	G5T3	None	None	885	1	F
Lilium humboldtii ssp. ocellatum	ocellated Humboldt lily	Liliaceae	perennial bulbiferous herb	4.2	S3	G4T3	None	None	1800	30	T
Lilium parryi	lemon lily	Liliaceae	perennial bulbiferous herb	1B.2	S3	G3	None	None	2745	1220	F
Linanthus concinnus	San Gabriel linanthus	Polemoniaceae	annual herb	1B.2	S3	G3	None	None	2800	1520	T
Monardella australis ssp. jokerstii	Jokerst?s monardella	Lamiaceae	perennial rhizomatous herb	1B.1	S1	G4T1	None	None	1750	1350	T
Monardella macrantha ssp. hallii	Hall's monardella	Lamiaceae	perennial rhizomatous herb	1B.3	S3	G5T3	None	None	2195	730	T
Monardella pringlei	Pringle's monardella	Lamiaceae	annual herb	1A	SX	GX	None	None	400	300	T
Monardella saxicola	rock monardella	Lamiaceae	perennial rhizomatous herb	4.2	S3	G3	None	None	1800	500	T
Muhlenbergia californica	California muhly	Poaceae	perennial rhizomatous herb	4.3	S4	G4	None	None	2000	100	T
Navarretia prostrata	prostrate vernal pool navarretia	Polemoniaceae	annual herb	1B.1	S2	G2	None	None	1210	3	T
Opuntia basilaris var. brachyclada	short-joint beavertail	Cactaceae	perennial stem succulent	1B.2	S3	G5T3	None	None	1800	425	T
Oreonana vestita	woolly mountain-parsley	Apiaceae	perennial herb	1B.3	S3	G3	None	None	3500	1615	T
Orobanche valida ssp. valida	Rock Creek broomrape	Orobanchaceae	perennial herb (parasitic)	1B.2	S2	G4T2	None	None	2000	1250	T
Phacelia mohavensis	Mojave phacelia	Boraginaceae	annual herb	4.3	S4	G4Q	None	None	2500	1400	T
Phacelia stellaris	Brand's star phacelia	Boraginaceae	annual herb	1B.1	S1	G1	None	FC	400	1	F
Pseudognaphalium leucocephalum	white rabbit-tobacco	Asteraceae	perennial herb	2B.2	S2	G4	None	None	2100	0	F
Quercus durata var. gabrielensis	San Gabriel oak	Fagaceae	perennial evergreen shrub	4.2	S3	G4T3	None	None	1000	450	T
Romneya coulteri	Coulter's matilija poppy	Papaveraceae	perennial rhizomatous herb	4.2	S4	G4	None	None	1200	20	F
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb	1B.2	S3	G3	None	None	650	0	T
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	2B.2	S2	G3	None	None	800	15	F
Senecio astephanus	San Gabriel ragwort	Asteraceae	perennial herb	4.3	S3	G3	None	None	1500	400	T
Sidalcea neomexicana	salt spring checkerbloom	Malvaceae	perennial herb	2B.2	S2	G4	None	None	1530	15	F
Sidotheca caryophylloides	chickweed oxytheca	Polygonaceae	annual herb	4.3	S4	G4	None	None	2600	1114	T
Sphenopholis obtusata	prairie wedge grass	Poaceae	perennial herb	2B.2	S2	G5	None	None	2000	300	F
Streptanthus bernardinus	Laguna Mountains jewelflower	Brassicaceae	perennial herb	4.3	S3S4	G3G4	None	None	2500	670	T
Symphyotrichum defoliatum	San Bernardino aster	Asteraceae	perennial rhizomatous herb	1B.2	S2	G2	None	None	2040	2	T
Symphyotrichum greatae	Greata's aster	Asteraceae	perennial rhizomatous herb	1B.3	S3	G3	None	None	2010	300	T
Thysanocarpus rigidus	rigid fringepod	Brassicaceae	annual herb	1B.2	S1	G1G2	None	None	2200	600	F
Viola pinetorum var. grisea	grey-leaved violet	Violaceae	perennial herb	1B.3	S3?	G4G5T3?	None	None	3400	1500	T

U.S Fish and Wildlife Service Data

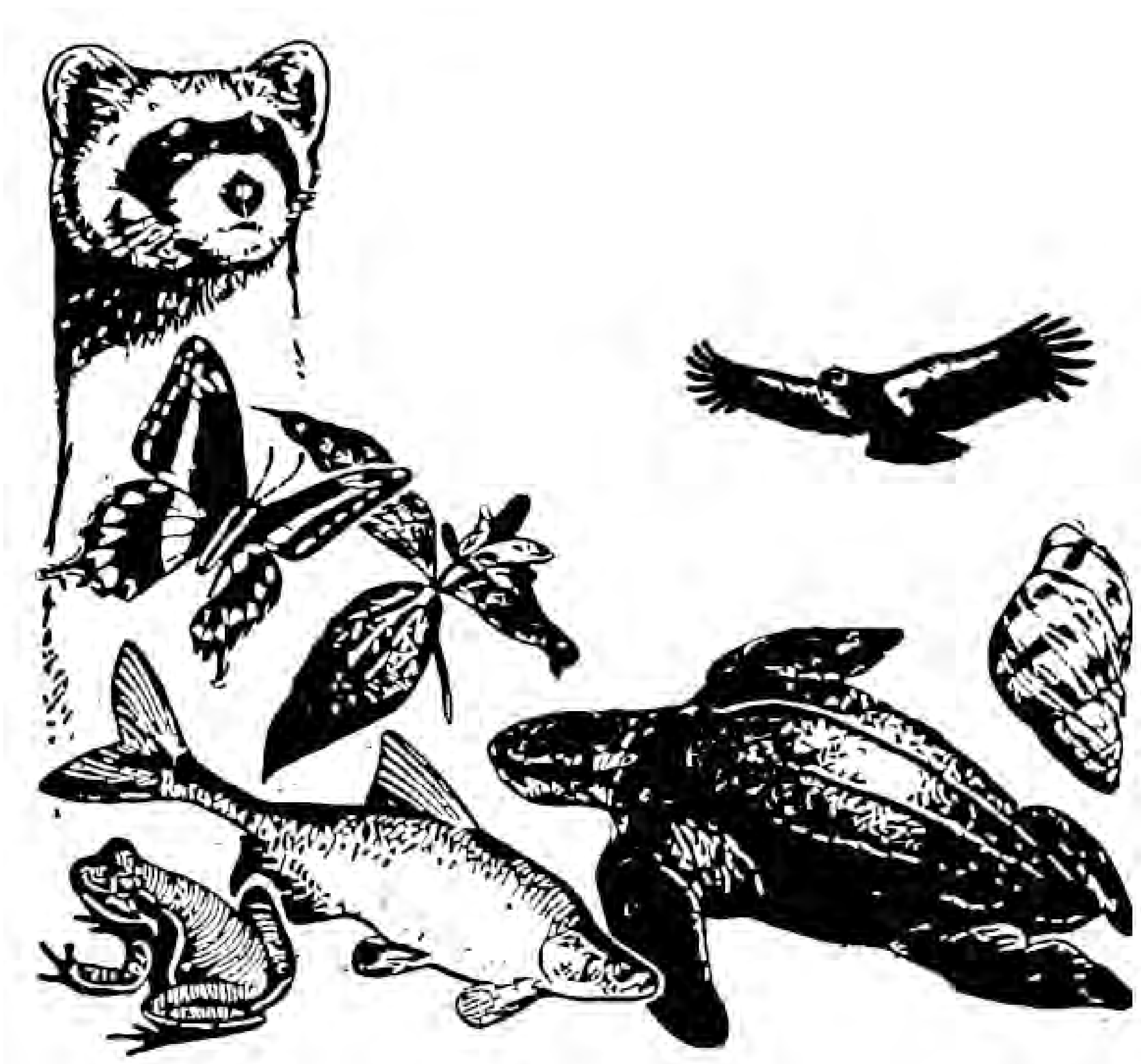
U.S. Fish & Wildlife Service

IEUA Master Plan

IPaC Trust Resources Report

Generated April 22, 2016 02:02 PM MDT, IPaC v3.0.2

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (https://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

Table of Contents

U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

IEUA Master Plan

LOCATION

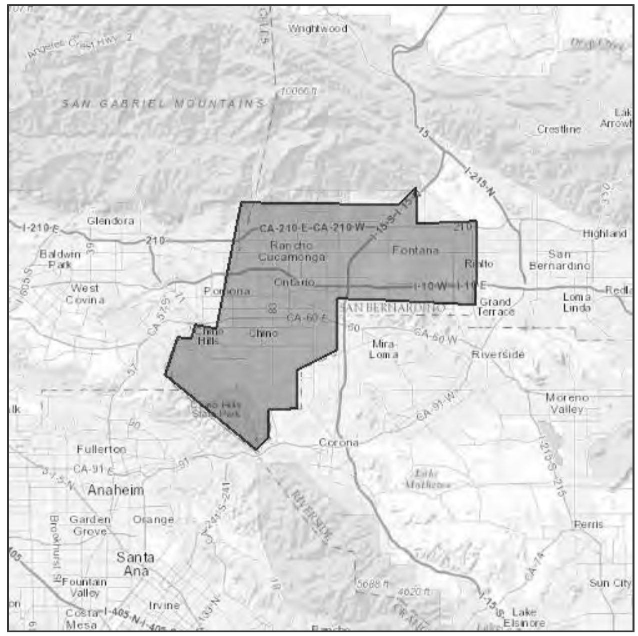
Los Angeles, Riverside and San Bernardino counties, California

DESCRIPTION

Update to Master Plan

IPAC LINK

https://ecos.fws.gov/ipac/project/RCW32-D67MZ-DFPKI-N5J47-LR4YPA



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Carlsbad Fish And Wildlife Office
2177 Salk Avenue - Suite 250
Carlsbad, CA 92008-7385
(760) 431-9440

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Amphibians

Arroyo (=arroyo Southwestern) Toad Anaxyrus californicus Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D020

Mountain Yellow-legged Frog Rana muscosa Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=D02H

Birds

California Condor Gymnogyps californianus — Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B002

Coastal California Gnatcatcher Polioptila californica californica — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08X

Least Bell's Vireo Vireo bellii pusillus — Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B067

Southwestern Willow Flycatcher Empidonax traillii extimus — Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B094

Fishes

Santa Ana Sucker Catostomus santaanae — Threatened

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E07W

Flowering Plants

Braunton's Milk-vetch Astragalus brauntonii — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q05E

Gambel's Watercress Rorippa gambellii — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q38L

Nevin's Barberry Berberis nevinii — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q08G

San Diego Ambrosia Ambrosia pumila — Endangered

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q01H

Santa Ana River Woolly-star Eriastrum densifolium ssp. sanctorum — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q29A

Slender-horned Spineflower Dodecahema leptoceras — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q2T6

Thread-leaved Brodiaea Brodiaea filifolia — Threatened

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q09H

Insects

Delhi Sands Flower-loving Fly Rhaphiomidas terminatus abdominalis — Endangered

CRITICAL HABITAT
No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=I0MG

Mammals

San Bernardino Merriam's Kangaroo Rat Dipodomys merriami parvus — Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0G8

Stephens' Kangaroo Rat Dipodomys stephensi (incl. D. cascus) — Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A08Q

Critical Habitats

This location overlaps all or part of the critical habitat for the following species:

Coastal California Gnatcatcher Polioptila californica californica

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08X#crithab

Least Bell's Vireo Vireo bellii pusillus

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B067#crithab

San Bernardino Merriam's Kangaroo Rat Dipodomys merriami parvus

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=A0G8#crithab

Santa Ana Sucker Catostomus santaanae

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=E07W#crithab

Southwestern Willow Flycatcher Empidonax traillii extimus

Final designated critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B094#crithab

Yellow-billed Cuckoo Coccyzus americanus

Proposed critical habitat
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06R#crithab

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Bell's Vireo Vireo bellii — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JX

Black-chinned Sparrow Spizella atrogularis — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IR

Brewer's Sparrow Spizella breweri — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HA

Burrowing Owl Athene cunicularia — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC

Cactus Wren Campylorhynchus brunneicapillus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FZ

California Spotted Owl Strix occidentalis occidentalis — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B08L

Calliope Hummingbird Stellula calliope — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K3

Costa's Hummingbird Calypte costae — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JE

Flammulated Owl Otus flammeolus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DK

Fox Sparrow Passerella iliaca — Bird of conservation concern
Year-round

Green-tailed Towhee Pipilo chlorurus — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IO

Lawrence's Goldfinch Carduelis lawrencei — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J8

Le Conte's Thrasher toxostoma lecontei — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0GE

Least Bittern Ixobrychus exilis
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092

Lesser Yellowlegs Tringa flavipes — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MD

Lewis's Woodpecker Melanerpes lewis — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HQ

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

Mountain Plover Charadrius montanus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B078

Nuttall's Woodpecker Picoides nuttallii — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HT

Oak Titmouse Baeolophus inornatus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MJ

Olive-sided Flycatcher Contopus cooperi — Bird of conservation concern
Season: Breeding
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0AN

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Pinyon Jay Gymnorhinus cyanocephalus — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0I0

Red-crowned Parrot Amazona viridigenalis — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0GO

Rufous-crowned Sparrow Aimophila ruficeps — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MX

Short-eared Owl Asio flammeus — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Tricolored Blackbird Agelaius tricolor — Bird of conservation concern
Year-round
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06P

Western Grebe aechmophorus occidentalis — Bird of conservation concern
Season: Wintering
http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

White Headed Woodpecker Picoides albolarvatus — Bird of conservation concern

Year-round

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HU

Williamson's Sapsucker Sphyrapicus thyroideus — Bird of conservation concern

Season: Wintering

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FX

Red Knot Calidris canutus ssp. roselaari — Bird of conservation concern

Season: Wintering

http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0G6

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

The area of this project is too large for IPaC to load all NWI wetlands in the area. The list below may be incomplete, or the acreages reported may be inaccurate. Please contact the local U.S. Fish & Wildlife Service office or visit the NWI map for a full list.

Freshwater Emergent Wetland

PEMC	29.7 acres
PEMA	29.3 acres
PEMCh	12.4 acres

PEMCx	12.0 acres
PEMAh	6.04 acres
PEMB	1.89 acres
PEMAx	1.86 acres
PEMFx	0.565 acre

Freshwater Forested/shrub Wetland

PSSJ	445.0 acres
PFOC	101.0 acres
PSSA	64.3 acres
PFOA	60.7 acres
PSSC	19.2 acres
PSSCh	16.0 acres
PSSAh	10.6 acres
PSSAx	5.78 acres
PSSB	4.87 acres
PFOCx	4.09 acres
PFOB	2.32 acres
PSSCd	1.35 acres
PSS/EMC	1.13 acres
PSS/EMCh	0.757 acre
PSSCx	0.731 acre
PSS/EMAh	0.534 acre
PFOCh	0.526 acre
PFOAx	0.434 acre
PSSAd	0.34 acre

Freshwater Pond

PUSCh	103.0 acres
PUBFx	62.9 acres
PUBHx	36.9 acres
PUSAh	30.4 acres
PUSCx	29.1 acres
PUSAx	28.5 acres
PUBFh	22.7 acres
PUBHh	13.4 acres
PUSC	6.72 acres

PUBKh	4.39 acres
PUSA	4.19 acres
PUBKx	1.99 acres
PUS/EMCx	1.04 acres
PUSKh	0.683 acre
PUBH	0.286 acre
PABFx	0.276 acre
PUSCr	0.0244 acre

Lake

L1UBHh	31.4 acres

Riverine

R4SBA	322.0 acres
R4SBCx	63.6 acres
R4SBAx	17.2 acres
R4SBC	12.0 acres
R3USC	8.83 acres
R4SBJ	6.22 acres
R3USCx	3.13 acres
R4SBAr	1.19 acres
R4SBCr	0.531 acre

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

Appendix E
Wastewater Facilities Master Plan Update Report

ESA

DRAFT

Wastewater Facilities Master Plan Update Report

Volume 1 of 2

Submitted to:

Inland Empire Utilities Agency

Submitted by:

CH2MHILL

In Association With:

carollo
Engineers...Working Wonders With Water®

March 2015

WT0122151041SCO

Draft Report

Wastewater Facilities Master Plan Update Report Volume 1 of 2

Prepared for

Inland Empire Utilities Agency

6075 Kimball Avenue
Chino, CA 91708

March 2015

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In Association With

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Engineers...Working Wonders With Water™

WT0326151012SCO

Contents

Tables

Figures

Acronyms and Abbreviations

AF	acre-feet
AQMP	air quality management plan
BOD	biological oxygen demand
C&T	cap and trade
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
Cal-EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CCWRF	Carbon Canyon Water Recycling Facility
CEQA	California Environmental Quality Act
CFR	*Code of Federal Regulations*
CIP	Capital Improvement Plan
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalents
CTR	California Toxics Rule
DDW	Division of Drinking Water
DT/d	dry tons per day
ENR CCI	*Engineering-News Record* Construction Cost Index
EQ	equalization
ft^2	square feet
GIS	Geographic Information System
IERCF	Inland Empire Regional Composting Facility
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resources Plan
MBR	membrane bioreactor
MCL	maximum contaminant level
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MPN	most probable number
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act

NH3-N	ammonia as nitrogen
NL	notification level
NOx	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NRW	Non-Reclaimable Wastewater
NTU	nephelometric turbidity units
PE	primary effluent
PHG	public health goal
ppb	parts per billion
ppmv	parts per million volume
PS	primary sludge
RAS	return activated sludge
RO	reverse osmosis
RP-1	Regional Water Recycling Plant No 1
RP-2	Regional Water Recycling Plant No. 2
RP-4	Regional Water Recycling Plant No. 4
RP-5	Regional Water Recycling Plant No. 5
RWC	recycled water contribution
RWPS	Recycled Water Program Strategy
RWQCB	Regional Water Quality Control Board
RWRP	Regional Water Recycling Plant
Sanitation Districts	Sanitation Districts of Los Angeles County
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Air District
SIP	State Implementation Plan
SWD	sidewater depth
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
TIN	total inorganic nitrogen
TKN	total Kjeldahl nitrogen
TM	Technical Memorandum
TN	total nitrogen
TOC	total organic carbon
TSS	total suspended solids
USACE	United States Army Corps of Engineers

USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WAS	waste activated sludge
WFMP	Wastewater Facilities Master Plan
WT/d	wet tons per day

Executive Summary

The Inland Empire Utilities Agency (IEUA) completed the Wastewater Facilities Master Plan (WFMP) in 2002. Changes in economic conditions and water use efficiency practices, discharge permit requirements, and water recycling needs have created a need to re-evaluate the assumptions and update the WFMP. This WFMP Update Report will provide the basis for developing the Capital Improvement Plan (CIP) over the next 20 years. The report addresses long term projection of growth and capacity needs within the service area, capacity utilization of the four Regional Water Recycling Plants (RWRPs), relocation of RP-2 solids handling facilities to RP-5, and diversion of flows to RP-1 to maximize groundwater recharge in the northern service area. Careful consideration was given to nitrogen limits and other applicable regulatory requirements anticipated in the near future when evaluating facilities planning and expansion needs for each of the RWRPs.

As part of this WFMP effort, IEUA's collection system hydraulic model was updated and validated based on the most recent two years of flow data provided by IEUA and the results of the flow monitoring program conducted in November 2013. While IEUA's collection system generally has adequate capacity to convey buildout peak dry weather flows, capacity limitations were identified in the Montclair pipeline reach that conveys flow from the Montclair pump station to RP-1. In addition to identifying capacity deficiencies within the existing collection system, four flow diversion alternatives were developed to divert flows from RP-5 to RP-1 to optimize groundwater recharge in the northern service area. The selected flow diversion alternative offered cost-effective near-term benefits in diverting flow from both the Whispering Lakes and Haven pump stations to RP-1.

Given the preferred flow diversion alternative identified above, influent wastewater flow and loading projections were established for each of the RWRPs for the planning year 2035, as well as for the buildout year 2060. Influent wastewater flows are projected to increase at each of the RWRPs, primarily as a result of population growth. The increase in flows to RP-4 is largely attributable to the gradual incorporation of septic flows into the system beginning in 2020, whereas 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. An analysis of the current influent wastewater characteristics and plant operations was conducted based on the most recent two years of plant data provided by IEUA to establish the basis for projecting the plant loading. While constituent concentrations have remained relatively constant during the 2-year evaluation period, wastewater strength has increased substantially since the 2002 WFMP.

A process model was then developed for each RWRP using CH2M HILL's whole plant simulator, PRO2D, to evaluate treatment capacities, identify system deficiencies and expansion needs, and establish facilities sizing and footprint requirements for new and expanded facilities. Each model was constructed with the operations and performance criteria reflective of the evaluation period conditions, and then calibrated to reflect the actual performance, solids yields, and water quality data. The capacity expansion and footprint requirements were based on using the membrane bioreactor (MBR) technology, which offers a smaller footprint, elimination of secondary clarifiers and tertiary filters for recycled water production, and superior water quality. Facility reliability and redundancy considerations were based on IEUA's agency-wide approach consistent with Title 22 requirements, with RP-5 being the end-of-the-line facility receiving all flow diversions, if needed, from other RWRPs.

CIP projects were developed based on the expansion needs identified for each RWRP over the next 20 years. Implementation of each of these projects over the next 20 years will depend on actual timing of influent wastewater flows that are projected to exceed treatment or conveyance capacities. However, the immediate need to relocate the RP-2 solids handling facilities to RP-5 is driven by the United States Army Corps of Engineers (USACE) decision to raise the elevation of the Prado Dam, which would cause the solids handling facilities at RP-2 to be below the 100-year flood plain. The RP-5 solids expansion project includes relocation of RP-2 solids handling facilities to RP-5, demolition of the RP-2 facilities, and relocation of the

RP-2 lift station to a location above the flood plain. This solids expansion project, as well as the RP-1 solids expansion project, are most imminent, followed by the liquid treatment expansion projects at RP-5, RP-1, and RP-4. There are no expansion projects planned for Carbon Canyon Water Recycling Facility (CCWRF) or the Inland Empire Regional Composting Facility (IERCF) for the 20-year CIP, since both facilities have sufficient capacity to treat projected flows and loads through 2035. Planning level cost estimates were developed for each project and escalated to mid-point of construction. A summary of these projects and their respective costs are presented in Table 1.

TABLE 1
Major Capital Projects Needed to Meet Projected Capacity for the Next 20 Years

Major Capital Project	Purpose	Project Elements	Escalated Cost[a] ($Million)
Montclair Pipeline Upgrades Project	Upsize four pipeline segments from 21-inch and 30-inch diameter to 36-inch diameter to mitigate deficiencies in conveyance system, reliably accommodate future growth, and convey peak buildout flows	Four Reaches of Montclair Pipeline	$25.4
Whispering Lakes Pump Station Expansion Project	Increased pumping capacity to meet projected future flows; Ability to send more flows to RP-1 for treatment	Whispering Lakes Pump Station	$6.1
RP-1 Solids Treatment Expansion Project	Increased solids treatment capacity to meet existing and projected future flows	Anaerobic Digesters	$24.9
RP-1 Liquid Treatment Expansion and Primary Effluent Equalization Elimination Project	Increased liquid treatment capacity to meet projected future flows; Eliminating primary flow equalization and converting ponds for other uses	MBR (Train D = 5 mgd) Secondary Clarifiers Equalization pond piping modifications	$122.4
RP-4 Liquid Treatment Expansion Project	Increased liquid treatment capacity to meet projected future flows	Tertiary Filter Chlorine Contact Tank	$6.6
RP-5 Solids Handling Facilities Project (RP-2 Relocation)	Relocation of RP-2 solids handling operations to RP-5; Increased solids treatment capacity to meet existing and projected future flows; Relocation of RP-2 Lift Station to above the flood elevation; Demolition of RP-2 facilities	Thickening Anaerobic Digesters High Pressure Gas Storage Dewatering Building Odor Control RP-2 Lift Station	$157.3
RP-5 Liquid Treatment Expansion Project	Increased liquid treatment capacity to meet projected future flows	Primary Clarifiers MBR (7.5 mgd) Chlorine Contact Basin	$125.5

[a] Cost estimates based on 3 percent annual escalation of total project costs to midpoint of construction.
mgd – million gallons per day

Details of the analysis are presented in *Technical Memorandum (TM) No. 1 through 10*, located in Volume 2 of this WFMP Update Report. A summary of each of these TMs is presented herein in Volume 1, along with a discussion of the major capital projects needed to meet projected capacity for the next 20 years, followed by a discussion of regulatory considerations related to water reuse, air quality, biosolids management, and environmental impacts. A brief synopsis is also provided for IEUA's Integrated Resources Plan (IRP) and Recycled Water Program Strategy (RWPS) currently underway, which collectively aim to develop a strategy for meeting projected water resource demands within the IEUA service area in a cost-effective manner and maximize the beneficial use of recycled water. The IRP will integrate findings from the RWPS, this WFMP Update Report, the Recharge Master Plan Update Report, and the Water Use Efficiency Business Plan to create a cost-effective and consistent regional water resource management strategy.

1.0 Summary of TM 1 Existing Facilities

The Inland Empire Utilities Agency (IEUA) provides wastewater treatment, biosolids handling, and recycled water service to the cities of Upland, Montclair, Ontario, Fontana, Chino, and Chino Hills, as well as to Cucamonga Valley Water District, which services the city of Rancho Cucamonga and some unincorporated areas of San Bernardino County.

IEUA's existing wastewater facilities include wastewater collection, wastewater treatment, recycled water distribution, and biosolids handling. Wastewater within IEUA's service area is collected by two collection systems—the Non-Reclaimable Wastewater (NRW) System and the Regional Trunk Sewer System. The NRW System collects industrial and high-salinity wastewater for conveyance to the Sanitation Districts of Los Angeles County (Sanitation Districts) or the Orange County Sanitation District for treatment and ocean disposal. The Regional Trunk Sewer System collects municipal domestic wastewater and conveys it to IEUA's Regional Water Recycling Plants (RWRPs). Municipal domestic wastewater is treated at one of four RWRPs: Regional Water Recycling Plant No. 1 (RP-1), Regional Water Recycling Plant No. 4 (RP-4), Regional Water Recycling Plant No. 5 (RP-5), and Carbon Canyon Water Recycling Facility (CCWRF). The liquid treatment facilities at these plants are designed to produce Title 22 water that can be reused or recharged into the groundwater. Recycled water is distributed from each facility into six different recycled water pressure zones for reuse. Recycled water in excess of the recycled water demand is dechlorinated and discharged to streams that are tributary to the Santa Ana River.

IEUA operates two regional biosolids treatment facilities located at RP-1 and Regional Water Recycling Plant No. 2 (RP-2). The RP-1 solids handling facility treats biosolids produced at RP-1 and RP-4, and the RP-2 solids handling facility treats biosolids produced at RP-5 and CCWRF. Biosolids are thickened, stabilized, and dewatered at each facility, and are trucked to the Inland Empire Regional Composting Facility (IERCF) for composting. The IERCF accepts biosolids from both the IEUA and the Sanitation Districts treatment facilities and produces a high-quality soil amendment.

A map of the existing wastewater system is presented in Figure 1.

1.1 Wastewater Conveyance

The Regional Trunk Sewer System consists of gravity interceptor systems, lift stations, force mains, and diversions. IEUA currently operates four of these lift stations and force mains - the San Bernardino Avenue Lift Station, Montclair Interceptor Lift Station, Prado Park Lift Station, and RP-2 Lift Station.

The Regional Trunk Sewer System has the capability to divert flows within the collection system at several locations. Each of the four RWRPs is interconnected through an intricate network of diversion points within the wastewater collection system, which enables plant influent flows to be shifted between the facilities to efficiently treat the wastewater and meet recycled water demands within the IEUA service area. The Montclair/Westside Interceptor Diversion Structure connects the Westside Interceptor, the Montclair Interceptor, and the Northern NRW System. At this diversion structure, flows can be directed to RP-1 via the Montclair Interceptor Lift Station, to CCWRF via the Westside Interceptor, or to the NRW System. Currently, 3 mgd of flow is diverted from RP-1 to CCWRF to reduce flows in the Montclair Interceptor and at RP-1. RP-4 and CCWRF are also configured to bypass flows to RP-1 and RP-5, respectively, and primary effluent flows from RP-1 can be diverted to RP-5, if needed. Additionally, influent flows to RP-5 and CCWRF can be bypassed from each plant to the Inland Empire Brine Line under emergency conditions.

1.2 Wastewater Treatment

IEUA owns and operates five treatment plants within its service area—RP-1, RP-2, RP-4, RP-5, and CCWRF. Liquid wastewater streams are treated at RP-1, RP-4, RP-5, and CCWRF, and solids produced at the treatment facilities are processed at RP-1 and RP-2.

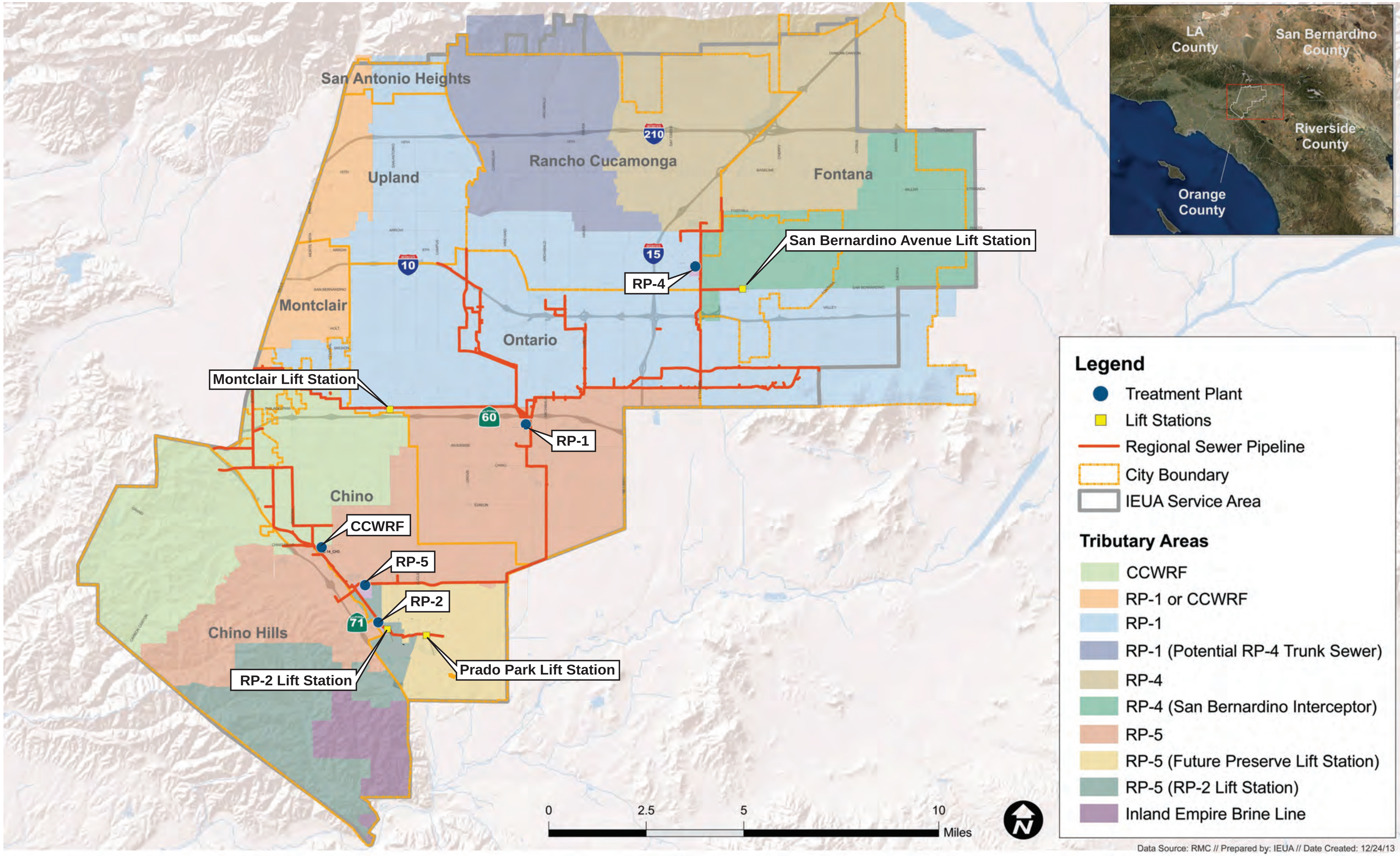

FIGURE 1

IEUA EXISTING WASTEWATER SYSTEM

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

20-IEUA-3-15F1-1-9370A00.AI

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Regional Water Recycling Plant No. 1

RP-1 was originally constructed in 1948 and has undergone many expansions and improvements over the years. The treatment plant includes preliminary, primary, secondary, and tertiary liquid treatment facilities and solids handling facilities. The liquid facilities produce an effluent quality meeting Title 22 standards for spray irrigation, unrestricted recreational use, landscape impoundments, and groundwater recharge. The facility receives waste solids from RP-4 through the sewer system, and biosolids from RP-1 are trucked to IERCF for further treatment and composting.

Regional Water Recycling Plant No. 2

RP-2 was constructed in the 1960s and has both liquid treatment and solids handling facilities. However, due to the United States Army Corps of Engineers (USACE) decision to raise the elevation of the Prado Dam, the RP-2 liquid treatment capacity was relocated to RP-5. This Wastewater Facilities Master Plan (WFMP) evaluates the decision of when and where to relocate the RP-2 solids handling facilities. RP-2 receives waste solids from RP-5 and CCWRF and provides thickening, digestion, and dewatering. The solids handling recycles generated throughout the process are diverted to RP-5 for treatment, and the biosolids are hauled to IERCF for composting and beneficial use.

Regional Water Recycling Plant No. 4

RP-4 has been in operation since 1997. RP-4 serves as an upstream satellite facility to RP-1 by scalping flow from the Etiwanda sewer that is tributary to RP-1. The treatment plant includes preliminary, primary, secondary, and tertiary treatment facilities. The liquid facilities produce an effluent quality meeting Title 22 standards for spray irrigation, unrestricted recreational use, landscape impoundments, and groundwater recharge. Solids produced at RP-4 are returned to the sewer system and conveyed to RP-1 for treatment.

Regional Water Recycling Plant No. 5

RP-5 began operation in March 2004 to replace the liquid treatment process at RP-2. RP-1 and CCWRF have the ability to divert flows to RP-5, thus making RP-5 the end-of-the-line facility for the entire wastewater treatment system. RP-5 also receives flows from the RP-2 Lift Station. The liquid treatment facilities include preliminary, primary, secondary, and tertiary treatment. Recycled water from RP-5 meets Title 22 standards for spray irrigation, unrestricted recreational use, and landscape impoundments. Excess recycled water is dechlorinated and discharged to Chino Creek. Solids produced at RP-5 are sent to RP-2 for treatment through a dedicated sludge line.

Carbon Canyon Water Recycling Facility

CCWRF began operation in 1992 and includes preliminary, primary, secondary, and tertiary treatment facilities producing an effluent quality meeting Title 22 standards for landscape irrigation and other recycled water uses. Excess recycled water is dechlorinated and discharged to Chino Creek.

1.3 Biosolids Management Facilities

Biosolids produced at IEUA's RP-1 and RP-2 regional solids handling facilities are trucked to the IERCF. The Inland Empire Regional Composting Authority was created in February 2002 by a joint powers agreement between IEUA and the Sanitation Districts 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. Additionally, IEUA owns and leases a food-waste processing facility located at RP-5 to treat dairy and food waste.

1.4 Recycled Water System

IEUA currently produces about 60,000 acre-feet (AF) of recycled water annually. In 2013, recycled water use totaled about 32,362 AF. Recycled water produced at the RWRPs is distributed throughout the IEUA service area using six different pressure zones, which are interconnected to allow the transfer of recycled water from higher pressure zones to lower pressure zones.

2.0 Summary of TM 2 Hydraulic Modeling and GIS Implementation

As part of the WFMP, IEUA is planning facilities for growth and the optimization of wastewater treatment, collection, and recycled water systems. An integral part of that planning effort is the continued development of the IEUA Geographic Information System (GIS) and collection system hydraulic model.

The WFMP incorporated the wastewater flow projections developed by the Integrated Resources Plan (IRP) consultant in conjunction with input from IEUA on the operations of the wastewater collection and treatment systems to develop a comprehensive facilities and operations plan. This TM discusses the foundations of those planning efforts.

The model for IEUA's wastewater collection system was updated and validated based on the inputs provided by IEUA. The flow projections were allocated into the model, and tributary areas were reviewed for accuracy. The model was calibrated based on flow monitoring data and the most recent two years of flow data provided by IEUA, and the flows were verified at 33 sites throughout the IEUA collection system. Based on the results of the model calibration, the model was determined to be aligned with industry standards for planning-level analysis and evaluations of flow routing alternatives.

As part of the IRP and the WFMP, goals for the utilization of water resources within IEUA were established. It was determined that the northern portions of the IEUA service area would be the targeted area for groundwater recharge. Therefore, the flow diversion alternatives developed as part of the WFMP focused on diverting additional flows north to RP-1 to optimize groundwater recharge opportunities. Four flow diversion alternatives were developed that utilized a combination of existing IEUA and city of Ontario facilities as well as a new pump station and diversion pipelines to convey either raw wastewater or treated water from RP-5 to RP-1.

2.1 Flow Diversion Alternatives

The flow diversion alternatives focus on options to utilize readily available diversion scenarios, such as areas of the system that currently convey flow to RP-5 but were previously pumped to RP-1. These areas include the service areas tributary to the city of Ontario's Haven and Whispering Lakes pump stations. Those areas would provide IEUA with a relatively quick way to divert flows to RP-1 but would not provide enough flow to account for the additional capacity at RP-1 that could be available after a treatment upgrade. Therefore, diversion alternatives also focused on diverting wastewater flows generated by new growth within the city of Ontario's New Model Colony area. The New Model Colony area is a large area of land within the city of Ontario's sphere of influence that is currently slated for development in the near future.

In addition to evaluating the Haven and Whispering Lakes areas, diversion alternatives consider the impacts of the Montclair diversion structure operations on system capacity and availability of flows to RP-1. Currently, approximately 3.3 mgd of flow enters the Montclair diversion structure. Based on discussions with IEUA staff and data from the flow monitoring program, the flow is split approximately 50 percent to RP-1 and 50 percent to CCWRF. The CCWRF portion of the flow can ultimately end up at RP-5. Diversion alternatives were analyzed taking the Montclair diversion operations into consideration. All of the alternatives include maximizing use of the Montclair diversions to RP-1.

In addition to the flow diversion alternatives discussed herein, the option of adding satellite treatment facilities where the recycled water would most likely be used was also considered. Although the use of satellite facilities for this purpose may be viable in some cases, it was not deemed to be a viable option for this project. IEUA already has an extensive recycled water distribution system and the focus of future growth in reclamation is on groundwater recharge in close proximity to the existing system.

Based on these considerations, the diversion alternatives summarized below were identified, and the benefits of each alternative were analyzed as part of the work conducted for *TM 3 Regional Trunk Sewer Alternatives Analysis*.

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 and Haven tributary areas are conveyed by gravity to RP-5.

Alternative 2

Alternative 2 assumes that the flows from the Whispering Lakes tributary area are pumped to RP-1 for treatment. Currently, the Haven pump station conveys flow to RP-1, and Alternative 2 assumes that the flows would continue to be conveyed to RP-1 in the future. Alternative 2 provides flexibility where the wastewater is routed because IEUA would still have the option to send the flows to RP-5 either through the Eastern Trunk Sewer or the RP-1 Bypass.

Alternatives 3A, 3B, and 3C

Alternative 3 would install a new pump station south of the Archibald Ranch area to convey flows from the Whispering Lakes, Haven, and Archibald Ranch developments to RP-1. There would be three sub-alternatives of Alternative 3 to compare different locations for the new pump station 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. Alternative 3 also includes additional flow diversions from the eastern portions of the New Model Colony. Thus, in contrast to Alternative 2, Alternative 3 maximizes the amount of flow going to RP-1 by taking flow from new development. 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. Each location represents a corresponding sub-alternative (3A, 3B, and 3C).

Alternatives 4A and 4B

Instead of diverting flows to RP-1 for treatment, Alternative 4 assumes that flows are treated at RP-5 and pumped to RP-1 to be distributed in the recycled water distribution system to the northern portions of the IEUA service area. It is assumed that the existing recycled water pump station currently installed at RP-5 would need to be expanded to pump the increased recycled water flow to the recycled water facility at RP-1. Alternative 4 requires an expansion of RP-5 to handle the increase in flow to the plant. This is the least flexible of the alternatives because flows to RP-5 could not be diverted. Alternative 4 has two sub-alternatives. Alternative 4A assumes that all flows at the Montclair Diversion would be diverted to the Montclair pump station and ultimately conveyed to RP-1. Alternative 4B assumes that flows at the Montclair Diversion would be diverted to RP-5.

3.0 Summary of TM 3 Regional Trunk Sewer Alternatives Analysis

IEUA's collection system generally has adequate capacity to convey buildout peak dry weather flows. However, capacity limitations were identified in the Montclair pipeline reach that conveys flow from the Montclair pump station to RP-1. In addition to evaluating the existing collection system, four flow diversion alternatives were developed that would allow IEUA to optimize groundwater recharge opportunities in its northern service area. IEUA identified Alternative 2 as the preferred flow diversion alternative, which utilizes the existing Whispering Lakes and Haven pump stations to divert flows from RP-5 to RP-1.

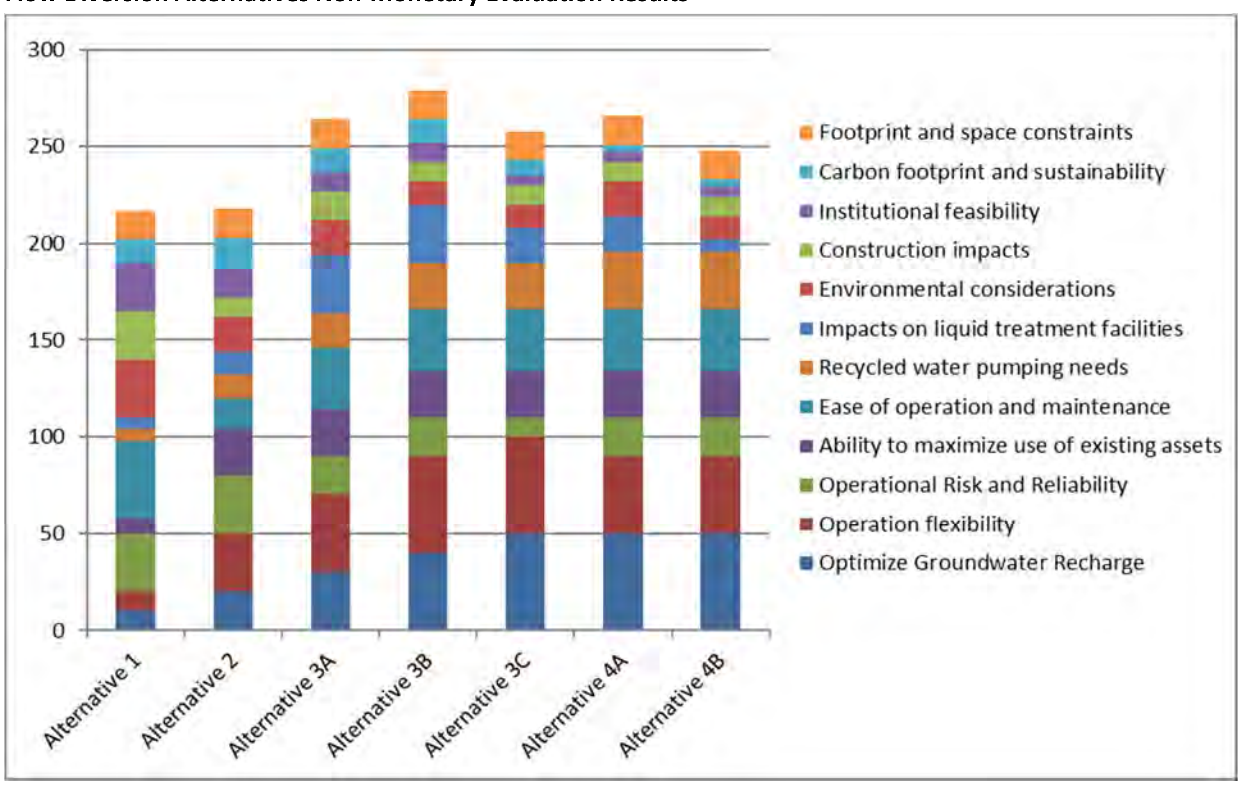
3.1 Evaluation of Existing Collection System

The hydraulic model was run under future system conditions as part of the analysis of the diversion alternatives, and a reach of the Montclair pipeline that includes approximately 24,000 linear feet of 30-inch-diameter sewer was determined to be deficient based on peak buildout flow projections. To mitigate the capacity deficiencies, the pipeline would need to be upgraded to a 36-inch-diameter line to convey peak buildout flows. Other mitigation options also exist such as constructing parallel reaches of the trunk line.

3.2 Evaluation of Flow Diversion Alternatives

Each of the four flow diversion alternatives was evaluated using both monetary and non-monetary evaluation criteria, as well as a benefit-cost analysis to identify the most suitable alternative for meeting IEUA objectives. The analysis was based on a planning horizon of 20 years (2035) and takes into account the infrastructure needs for each alternative based on the projected flows. The results of the non-monetary evaluation of flow diversion alternatives are presented in Figure 2, and the monetary and benefit-cost analysis are presented in Table 2.

FIGURE 2
Flow Diversion Alternatives Non-Monetary Evaluation Results



Evaluation criteria were established collaboratively with IEUA to provide a framework for the analysis of the collection system using the hydraulic model, the conveyance system, and the flow diversion alternatives. For the non-monetary evaluation, a multi-attribute analysis methodology was employed to develop clear and defensible benefit scores for identified alternatives. Once the benefit score was established for each alternative, a monetary evaluation was conducted to estimate life-cycle costs for each alternative.
A benefit-to-cost ratio was then determined for each alternative to establish the recommended alternative.

For each alternative, planning level costs for expansion were developed and escalated to the mid-point of construction using the inflation rate, and were brought back to present worth with the bond interest rate. The year in which each treatment plant expansion would be required was determined based on the flow curves developed for each alternative. Operation and maintenance costs were annualized and brought to a net present value in the same manner. The resulting estimated planning level life-cycle cost for each alternative is summarized in Table 2.

TABLE 2
Flow Diversion Alternatives Life-Cycle Costs and Benefit/Cost Ratios

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

Alternative 2 provides IEUA with cost-effective near-term benefits in diverting flow from both the Whispering Lakes and Haven pump stations, while prolonging the treatment expansions of RP-1 and RP-5. Furthermore, Alternative 2 has a lower capital cost, is easier to implement, and provides a relatively higher benefit related to diverting additional flows to RP-1 for groundwater recharge. Alternative 2 also provides operational flexibility in conveying flows to RP-5 by gravity should the need arise. For these reasons, Alternative 2 was selected as the preferred alternative and forms the basis of the wastewater flow projections established in *TM 4 Wastewater Flow and Loading Forecast* for evaluating treatment plant capacities and expansion needs in subsequent TMs.

To provide greater system reliability and redundancy, IEUA requested that RP-5 facilities planning and expansion needs be evaluated under the assumption that both the Whispering Lakes and Haven pump stations are offline, with flows conveyed by gravity to RP-5 rather than to RP-1. Facilities planning and expansion needs for RP-1 were evaluated under the assumption that both pump stations are online, with flows pumped to RP-1. Facilities planning and expansion needs for each of the RWRPs are discussed in TMs 5 through 8.

4.0 Summary of TM 4 Wastewater Flow and Loading Forecast

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. As discussed in TM 3, the WFMP planning effort was based on the IEUA 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, as well as for the buildout year 2060, are presented in this TM and forms the basis of the master planning effort for each of the treatment plants. Influent wastewater flow projections were developed by the IRP consultant as part of the flow monitoring program. The load projections are calculated based on these flow projections along with analysis of the current influent wastewater characteristics and wastewater system operation.

4.1 Influent Wastewater Flow and Quality

The data analysis is based on two consecutive years of recent IEUA data 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). In general, plant influent flows and constituent concentrations have remained relatively constant over the 2-year evaluation period. As shown in Figure 3, the average influent flow for the entire system was about 56 mgd during the 2-year analysis period. However, influent wastewater flows are projected to increase, as a result of population growth, at 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, while 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 average concentrations for key constituents for each of the RWRPs are summarized in Table 3. For comparison, the concentrations established previously for the 2002 WFMP are also presented. Comparison of the two analyses demonstrates a substantial increase in wastewater strength since the 2002 WFMP.

FIGURE 3
Summary of Current Influent Wastewater Flows

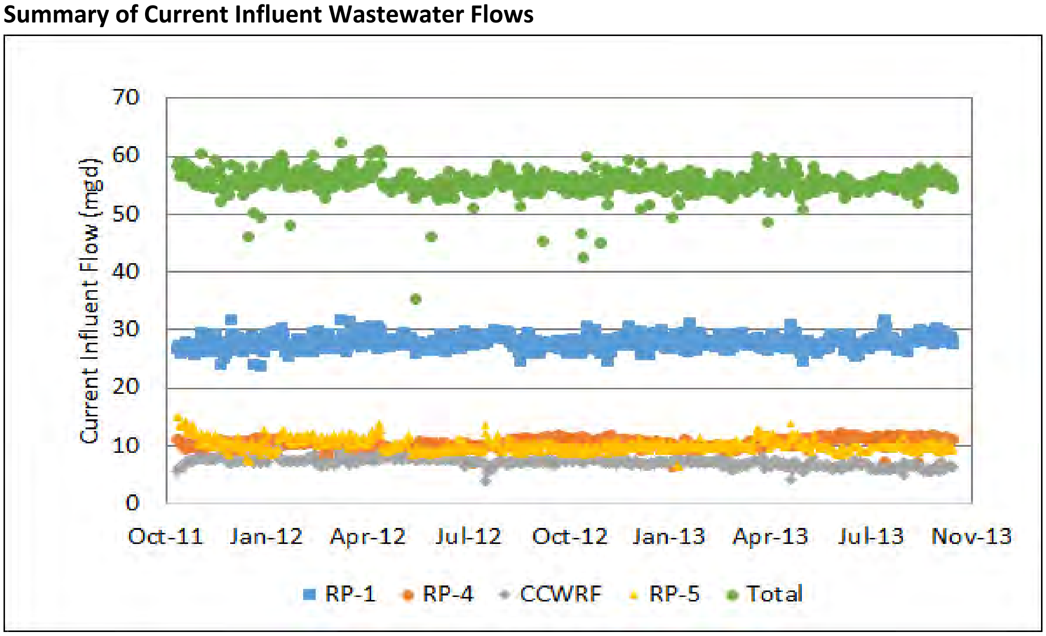


TABLE 3
Summary of Influent Wastewater Concentrations

	Average Influent Water Quality[a,b] (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

[a] Analysis based on plant influent data provided by IEUA for the period between October 15, 2011, and October 15, 2013.
[b] 2002 wastewater characteristics as presented in the 2002 WFMP Volume II memoranda.
mg/L – milligrams per liter

4.2 Wastewater Flow and Loading Forecast

Flow projections were developed by the IRP consultant 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 current and forecasted influent wastewater flows and loads are summarized in Table 4 and form the basis of the master planning effort in subsequent TMs.

TABLE 4
Influent Flow and Loading Projections for Preferred Flow Diversion Alternative 2

		Flows[a,b]		Loads[a,b]							
				BOD		TSS		NH3-N		TKN	
		Max Month PF	Ave Flow mgd	Max Month PF	Ave Load lb/day	Max Month PF	Ave Load lb/day	Max Month PF	Ave Load lb/day	Max Month PF	Ave Load lb/day
RP-4	Current	1.10	10.5	1.85	30,543	1.59	27,630	1.24	3,550	1.46	5,015
	Planning Year 2035	1.10	14.7	1.85	43,207	1.59	38,948	1.24	5,010	1.46	7,186
	Buildout Year 2060	1.10	18.4	1.85	54,082	1.59	48,752	1.24	6,271	1.46	8,994
RP-1	Current	1.04	27.8	1.53	101,197	1.38	109,880	1.20	7,544	1.24	12,975
	Planning Year 2035	1.04	33.1	1.53	119,771	1.38	130,296	1.20	8,937	1.24	15,249
	Buildout Year 2060	1.04	36.3	1.53	131,350	1.38	142,893	1.20	9,801	1.24	16,723
CCWRF	Current	1.13	7.2	1.58	26,839	1.88	21,683	1.21	1,993	1.28	3,105
	Planning Year 2035	1.13	7.3	1.58	27,708	1.88	22,353	1.21	2,048	1.28	3,257
	Buildout Year 2060	1.13	7.9	1.58	29,985	1.88	24,190	1.21	2,217	1.28	3,524
RP-5	Current	1.27	10.0	1.79	27,771	2.47	23,181	1.35	3,005	1.60	4,602
	Planning Year 2035	1.27	20.2	1.79	54,112	2.47	44,972	1.35	5,953	1.60	8,823
	Buildout Year 2060	1.27	27.2	1.79	72,864	2.47	60,556	1.35	8,016	1.60	11,880

[a] Analysis based on average concentrations established from IEUA plant data between October 15, 2011, and October 15, 2013.
[b] Site planning considerations will be based on the projections established for the 2060 buildout year.

5.0 Summary of TM 5 RP-1 Future Plans

This 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. The influent flow and loading projections and effluent requirements 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 facilities expansion needs by planning year 2035.

5.1 Discharge Requirements

IEUA operates under an umbrella permit and must meet water quality requirements for discharge and recycled water. The tertiary effluent from RP-1 is regulated by the Santa Ana Regional Water Quality Control Board (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). Effluent quality standards require tertiary treatment with filters and disinfection equivalent to Title 22 requirements for recycled water, due to the use of the receiving water for recreation.

Effluent from RP-1 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. Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described in Table 5.

TABLE 5
Summary of Effluent Quality Limits[a]

	Weekly Average	Monthly Average	Annual Average	Daily Maximum	Instantaneous Maximum
BOD	30 mg/L[b]	20 mg/L[b]	-	-	-
TSS	30 mg/L[b]	20 mg/L[b]	-	-	-
NH_4-N	-	4.5 mg/L	-	-	-
Chlorine Residual	-	-	-	-	0.1 mg/L[b]
TIN	-	-	8 mg/L	-	-
TDS[c]	-	-	550 mg/L	-	-
pH	-	-	-	6.5 to 8.5	-
Turbidity[d]	24-hr Average 2 NTU	-	-	24-hr 5% Maximum 5 NTU	10 NTU
Coliform	7-day Median 2.2 MPN	30-day Maximum 23 MPN	-	-	240 MPN

[a] RWQCB Order No. R8-2009-0021
[b] Without 20:1 dilution in the receiving water and for recycled water. BOD and TSS limits increased to 45 mg/L average weekly and 30 mg/L average monthly with 20:1 dilution. Chlorine residual limits increased to 2.1 mg/L instantaneous maximum with dilution.
[c] Shall not exceed 12-month running average TDS concentration in water supply by more than 250 mg/L.
[d] When treated through natural undisturbed soils or a bed of filter media.
TIN – total inorganic nitrogen
TDS – total dissolved solids
NTU – nephelometric turbidity unit(s)
MPN – most probable number

The effluent discharge concentration of TIN in the 12-month flow-weighted average of plant effluent 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. In accordance with Water Recycling Order No. R8-2007-0039, TN concentration of the recycled water used for recharge must not exceed 5 mg/L. Samples for TN may be collected before or after surface application. The organic nitrogen content in plant effluent is typically in the range of 1.0 to 2.0 mg/L. Therefore, with a plant effluent TIN of 8 mg/L, the corresponding TN would be about 9.0 to 10 mg/L in the recycled water. Existing recharge basins provide approximately 50 percent nitrogen removal in the soil prior to reaching the groundwater table, and therefore the recycled water complies with the 5 mg/L TN requirement. IEUA has the flexibility to monitor TN in the recycled water either before or after surface application.

5.2 Existing Plant Capacity and Limitations

The capacity of the existing system was evaluated through process modeling using PRO2D. The model was constructed with the operations and performance criteria reflective of the evaluation period conditions, and then calibrated to reflect the actual performance, solids yields, and water quality data. Facility reliability and redundancy considerations were 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 RWRPs. Thus, the capacity evaluation for RP-1 was based on all units in service unless otherwise noted, with reliability and redundancy provided at RP-5. Additional reliability and redundancy considerations driven by the regulatory requirements, such as Title 22 requirements, were also taken into account.

The overall liquid treatment capacity was 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 NRW system or are treated separately. Therefore, the RP-1 liquid treatment capacity is 32 mgd. This is less than the rated capacity of 44 mgd, which was based on completion of Train D not yet constructed, as well as the wastewater strength and permit requirements at the time.

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 results of the analysis indicate digestion is the limiting unit process of the solids handling system. The digestion capacity is evaluated based on a minimum SRT of 15 days with one large unit out of service in accordance with the Part 503 Rule Class B biosolids production requirements. It also considered maximum month design conditions and a 90 percent active digester volume including the digester cone volume. While the digestion capacity is limited to 38 mgd under these criteria, greater digestion capacity may be realized with improved digester feed thickening or if IEUA targets a different biosolids classification since IEUA biosolids are composted at IERCF. The results of the RP-1 capacity evaluation are presented in Table 6.

TABLE 6
RP-1 Existing Process Capacity Summary

	Process Capacity (mgd)[a,b,c]
Primary/Secondary Treatment	32
Filtration	43.8
Disinfection	49.8
Overall Liquid Treatment Capacity	**32**
PS Thickening	43.3
WAS Thickening	54
Digestion	38
Dewatering	54

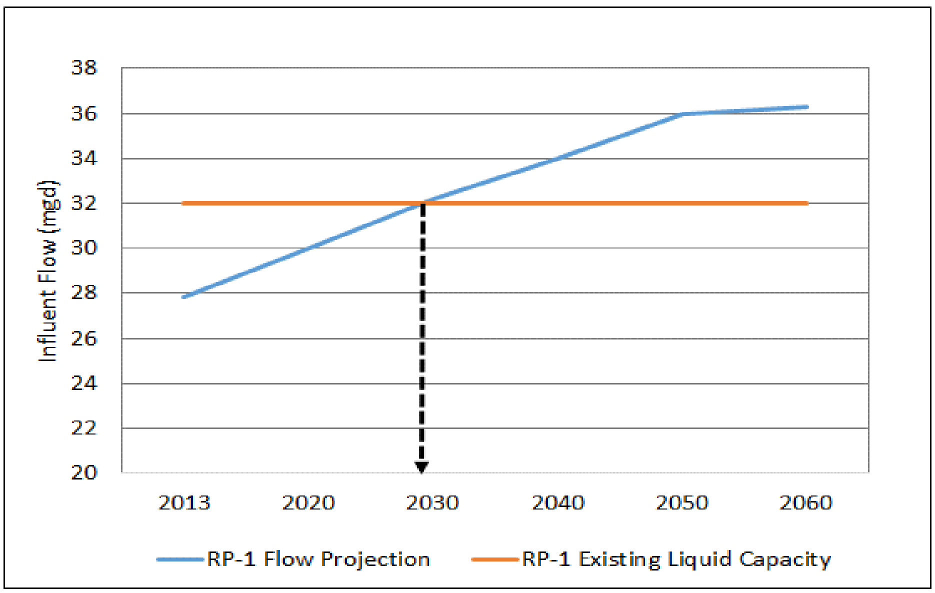
TABLE 6
RP-1 Existing Process Capacity Summary

	Process Capacity (mgd)[a,b,c]
Overall Solids Handling Capacity	**38**

[a] Secondary process capacity based on all units in service, with redundancy provided at RP-5. Plant effluent TIN ≤ 8 mg/L. Assumes internal mixed liquor return is in place and SVI is 150 milliliters per gram or better.
[b] Filtration capacity based on two filter cells out of service. Disinfection capacity based on all units in service.
[c] Solids handling capacities based on largest unit out of service. PS thickening is achieved using one gravity thickener, with redundancy provided by primary clarifiers. 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.
PS – primary sludge

Based on the evaluated capacities presented in Table 6 and the projected influent wastewater flows presented in Table 4, influent flows are projected to exceed the RP-1 liquid treatment capacity by 2030. A graphical illustration of the RP-1 flow projection and when the new capacity needs to be online is presented in Figure 4. In addition, the current influent flows exceed the RP-1 digestion capacity. However, this limited digestion capacity is based on the criteria and assumptions discussed above and on producing Class B biosolids. Currently, biosolids from RP-1 are dewatered and sent to IERCF for composting. Additional digestion capacity will be needed in the future to produce Class B biosolids. The facilities that will be needed to expand the treatment capacity to accommodate future flows and achieve Class B biosolids production are discussed in Section 5.4.

FIGURE 4
RP-1 Influent Flows Projected to Exceed Liquid Treatment Capacity



5.3 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. The facility currently has three flow management lagoons for flow management of primary and secondary effluent. While all three lagoons can receive primary effluent, Lagoon 3 primarily receives secondary effluent. Primary effluent is diverted to remaining lagoons as needed to manage peak flows. The following flow equalization alternatives were evaluated considering both non-monetary and monetary implications:

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 for other uses.

Non-monetary evaluation criteria included operational flexibility, operational risk and reliability, impacts on plant odors, footprint and space considerations. Alternative 1 proved to be unsustainable 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. Alternative 3 was determined to be the preferred alternative because it 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 emergency primary effluent storage, secondary effluent equalization, or recycled water storage.

5.4 Plant Expansion Needs

In addition to the flow equalization improvements discussed above, additional liquid treatment facilities and solids handling facilities will be needed to accommodate projected influent flows and loads at RP-1. These include construction of Train D for secondary treatment, new secondary clarifiers, and new digesters.

For the 2035 capacity expansion requirements that 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. The membrane bioreactor (MBR) technology was used as the basis for capacity expansion and establishing footprint requirements. 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, and superior water quality. 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. The expansion requirements are summarized in Table 7 and illustrated in Figure 5.

TABLE 7
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)	Includes fine screening for the MBR system feed, MBR equipment includes permeate blowers and pumps.
Train D MBR Bioreactor	1 module	Two trains per module.
Train D Membrane Tank	1 module	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)	Includes flow-splitting structure for each train and RAS/WAS piping and pumping equipment.
Anaerobic Digesters	2 digesters	New digesters with complete sludge transfer and recirculation, mixing and heating, and pumping equipment.
Flow Management Lagoons	-	Modifications to piping and pumping systems.

PE – primary effluent
EQ – equalization
RAS – return activated sludge
WAS – waste activated sludge

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FIGURE 5

RP-1 Planning Year 2035 Facilities Site Plan

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The facility expansion configured in Table 7 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. Because the clarifier addition and the MBR system addition are independent projects, they can be implemented separately.

Three plant expansion projects were identified for inclusion in 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. The RP-1 Primary Effluent Equalization Elimination Project and the RP-1 Liquid Treatment Expansion Project may also be combined, and warrants further evaluation during preliminary design. Combining the two projects would involve 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 converting existing infrastructure would need to be further evaluated during preliminary design.

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. The capital costs included in the 20-year CIP for these projects are summarized in Table 8.

TABLE 8
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 Estimated Construction Cost[a,b]	$20,739,000	$48,450,000	$15,848,000
Total Estimated Project Cost[c]	$26,961,000	$62,985,000	$20,602,000

[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.
[c] Total project costs include engineering, construction management, environmental, and legal costs (30 percent).

6.0 Summary of TM 6 RP-4 Future Plans

The flow and loading projections and effluent requirements 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 by planning year 2035.

6.1 Discharge Requirements

Effluent from RP-4 is ultimately 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 is ultimately 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. Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described previously in Table 5.

6.2 Existing Plant Capacity and Limitations

The capacity of the existing system was evaluated through process modeling using PRO2D. 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. Facility reliability and redundancy considerations were 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 RWRPs. Thus, the capacity evaluation for RP-4 was based on all units in service unless otherwise noted, with reliability and redundancy provided at RP-5. Additional reliability and redundancy considerations driven by the regulatory requirements, such as Title 22 requirements, were also taken into account. 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 results of the liquid treatment capacity evaluation are presented in Table 9.

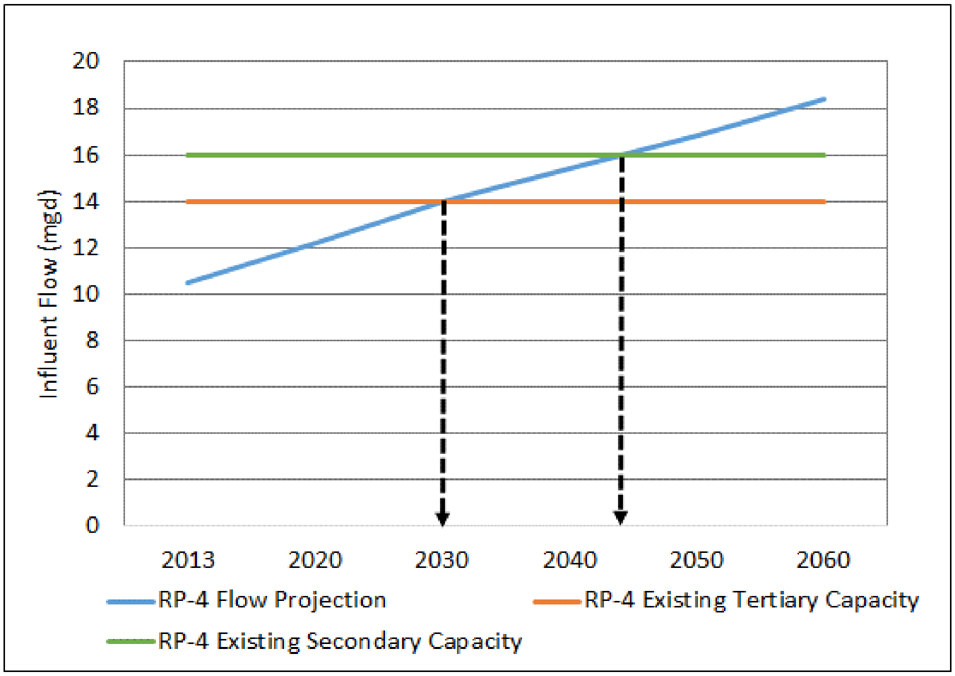
TABLE 9
RP-4 Existing Liquid Treatment Capacity

	Process Capacity (mgd)[a,b]
Primary/Secondary Treatment	16
Filtration	14.1
Disinfection	14.2
Overall Liquid Treatment Capacity	**14**

[a] Secondary process capacity based on all units in service, with redundancy provided at RP-5. Plant effluent TIN $\leq$ 8 mg/L.
[b] Filtration capacity based on one dual-media filter cell in backwash and one cloth filter out of service. Disinfection capacity based on all units in service.

Based on the evaluated capacities presented in Table 9 and the projected influent wastewater flows presented in Table 3, influent flows are projected to exceed the RP-4 tertiary treatment capacity and secondary treatment capacity by 2030 and 2044, respectively. A graphical illustration of this capacity exceedance projection is presented in Figure 6. The facilities that will be needed to expand the treatment capacity to accommodate future flows are discussed in the next section.

FIGURE 6
RP-4 Influent Flows Projected to Exceed Secondary and Tertiary Treatment Capacity



6.3 Plant Expansion Needs

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. Due to the incorporation of septic flows into the 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 expansion requirements are summarized in Table 10 and illustrated in Figure 7.

TABLE 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.

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FIGURE 7

RP-4 Planning Year 2035
Facilities Site Plan

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One plant expansion project was identified for inclusion in the 20-year CIP. 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.

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. The capital costs included in the 20-year CIP for this project are summarized in Table 11.

TABLE 11
RP-4 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-4 Tertiary Expansion Project
Total Estimated Construction Cost[a,b]	$3,622,000
Total Estimated Project Cost[c]	$4,709,000

[a] ENR CCI for Los Angeles (August 2014 - 10,737).
[b] Cost does not include escalation to midpoint of construction.
[c] Total project costs include engineering, construction management, environmental, and legal costs (30 percent).

7.0 Summary of TM 7 RP-5 and RP-2 Complex Future Plans

This 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. The influent flow and loading projections and effluent requirements 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 by planning year 2035.

7.1 Discharge Requirements

Effluent from RP-5 is used as recycled water for irrigation in the area overlying Chino North “Max Benefit” Groundwater Management Zone (DP 007). Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described previously in Table 5.

7.2 Existing Plant Capacity and Limitations

The capacity of the existing system was evaluated through process modeling using PRO2D. 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. Facility reliability and redundancy considerations were 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 RWRPs. Thus, the RP-5 capacity evaluation was based on taking the largest unit out of service. Additional reliability and redundancy considerations driven by regulatory requirements, such as Title 22, were also taken into account.

The RP-5 primary, secondary, and tertiary process capacities are all equally limited to about 16.3 mgd. The primary/secondary treatment capacity is 15 mgd with one unit out of service plus 1.3 mgd of return flows from the RP-2 Lift Station. Therefore, the RP-5 plant capacity is approximately 15 mgd plus 1.3 mgd of return flows, which is consistent with the permitted capacity of 15 mgd previously established during design.

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 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 results of the analysis indicate digestion is the limiting unit process of the solids handling system at 18 mgd under the same assumptions presented for RP-1. The results of the capacity evaluation are presented in Table 12.

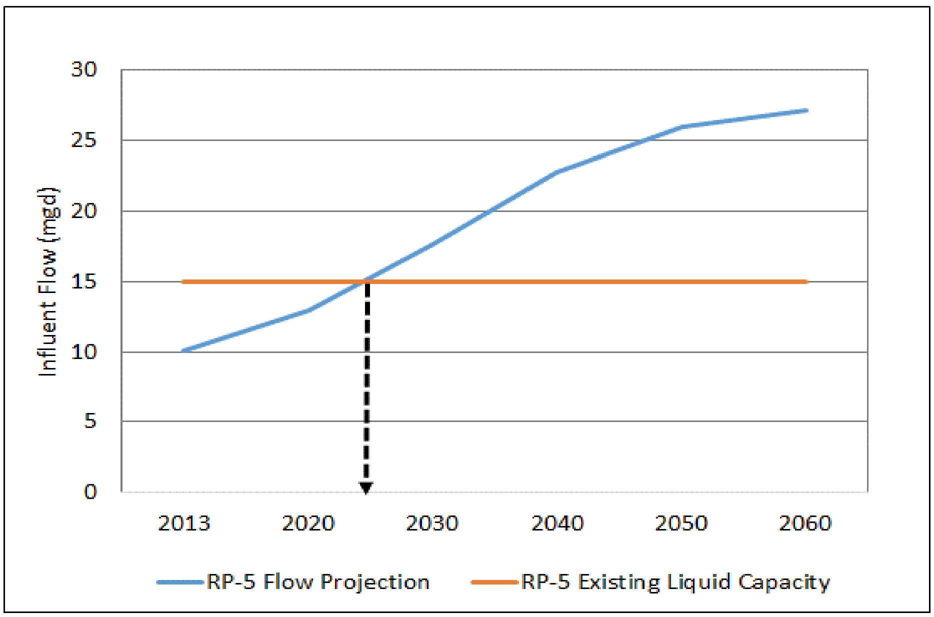
Based on the evaluated capacities presented in Table 12 and the projected influent wastewater flows presented in Table 3, influent flows are projected to exceed the RP-5 liquid treatment capacity by 2025. A graphical illustration of the RP-5 flow projection and when the new capacity needs to be online is presented in Figure 8. In addition, the current influent flows exceed the RP-5/RP-2 digestion capacity. However, this limited digestion capacity is based on the criteria and assumptions discussed above and on producing Class B biosolids. Currently, biosolids from RP-5/RP-2 are dewatered and sent to IERCF for composting. Additional digestion capacity will be needed in the future to produce Class B biosolids. The facilities that will be needed to expand the treatment capacity to accommodate future flows and achieve Class B biosolids production are discussed in Section 7.4.

TABLE 12
RP-5/RP-2 Existing Process Capacity Summary

	Process Capacity (mgd)[a,b,c]
Primary/Secondary Treatment	15 (+1.3 from RP-2 LS)
Filtration	16.5
Disinfection	16.3
Overall Liquid Treatment Capacity	**15 (+1.3 from RP-2 LS)**
PS Thickening	30.3
WAS Thickening	30.3
Digestion	18
Dewatering	34.8
Overall Solids Handling Capacity	**18**

[a] Secondary process capacity based on one secondary clarifier and one aeration basin out of service. Includes solids recycles.
[b] Filtration capacity based on one filter out of service. Disinfection capacity based on all units in service.
[c] Solids handling capacities based on largest unit out of service in each process.

FIGURE 8
RP-5 Influent Flows Projected to Exceed Liquid Treatment Capacity



7.3 RP-2 Solids Handling Facilities Relocation Alternatives Evaluation

Due to the USACE decision to raise the elevation of the Prado Dam, the RP-2 solids handling facilities need to be relocated to RP-5 during the 20-year planning period. Three relocation alternatives were considered:

1. Southwest corner of the RP-5 site
2. East side of the RP-5 site
3. Solids Handling Site at the corner of Flowers Street and Mountain Avenue

In addition to the RP-2 facilities that need to be relocated to RP-5, the existing facilities at RP-2 need to be demolished and removed from the site since RP-2 is on land that is leased from USACE. This demolition would be performed on the existing solids handling facilities, the RP-2 Lift Station, and the RP-2 liquid treatment facilities that were abandoned after RP-5 was placed into service.

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. Therefore, the difference between the alternatives is identified in the nonmonetary evaluation. Alternative 2 was selected as the proposed alternative for its proximity to the RP-5 liquid treatment facilities, distance from neighbors, and minimal impact on the existing solar facility at RP-5.

7.4 Plant Expansion Needs

In addition to the relocation and demolition of RP-2 facilities discussed above, additional liquid treatment facilities and solids handling facilities will be needed to accommodate projected influent flows and loads at RP-5. For the 2035 capacity expansion requirements that 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. Similar to RP-1, the MBR technology was used as the basis for capacity expansion and establishing footprint requirements. As mentioned previously, 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, and superior water quality.

The expansion requirements are summarized in Table 13 and illustrated in Figure 9. An alternative for adding a new MBR train at RP-5 would be to convert the existing secondary treatment facilities to MBR. Although not evaluated in this TM, this could be accomplished by converting the existing secondary treatment system to MBR. The details of this alternative can be evaluated further during preliminary design.

TABLE 13
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 Basin	1	0.8 MG
Solids Treatment		
Gravity Thickener	3	45-foot diameter
DAFT	3	40-foot diameter
Acid-Phase Anaerobic Digestion	6 Cells	20-ft^2 30-foot SWD per cell
Methane-Phase Anaerobic Digestion	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 Building	1	100-foot x 150-foot Building
Biofilter	3 Cells	60-foot x 80-foot per cell
RP-2 Lift Station	1	10 mgd

[a] Includes fine screens, bioreactor, blowers, membrane tanks, RAS/WAS pump station, and associated equipment.
MG – million gallons
ft^2 – square feet
SWD – sidewater depth

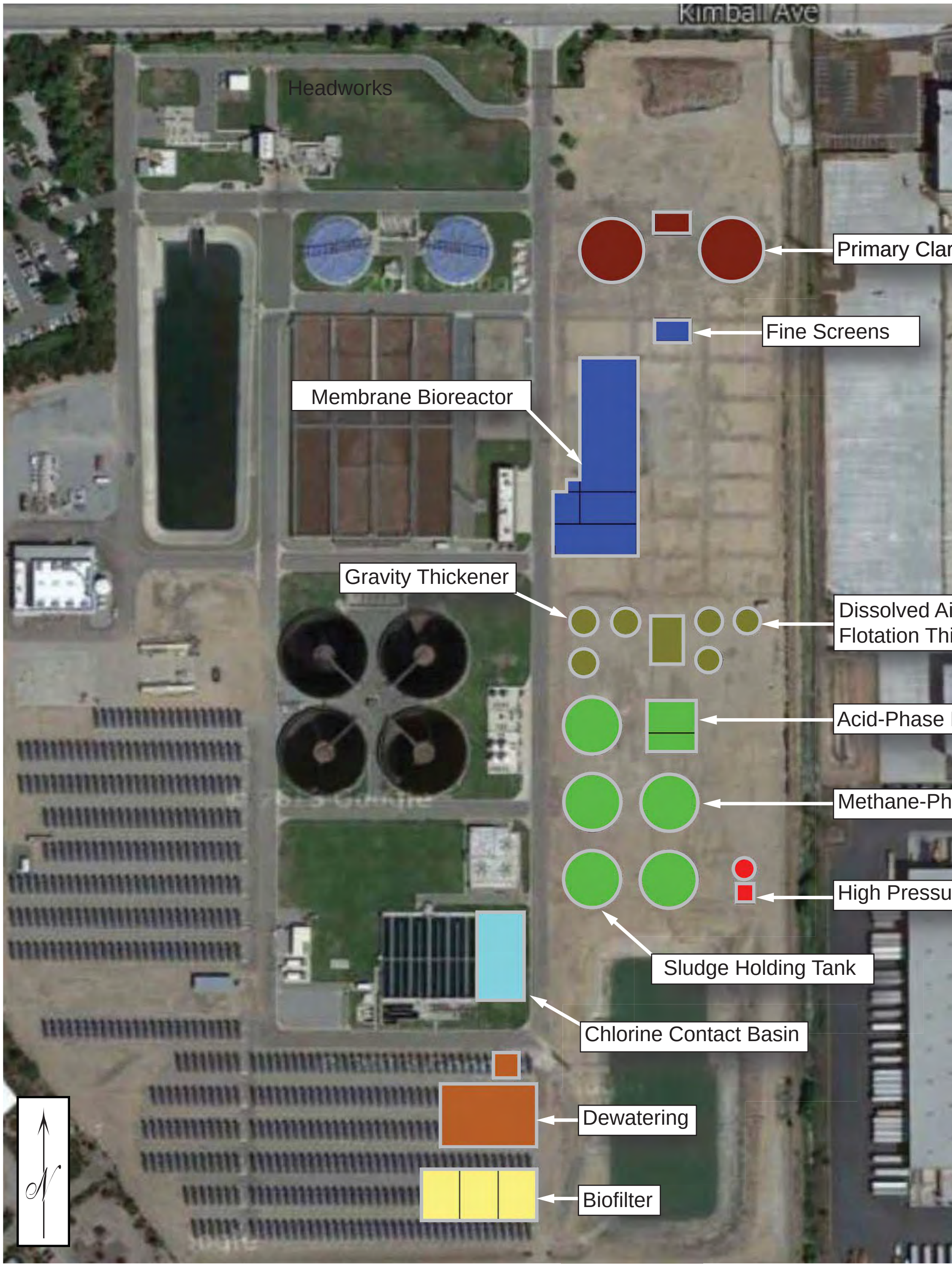


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FIGURE 9

RP-5 Planning Year 2035 Facilities Site Plan

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Two plant expansion projects were identified for 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, demolish RP-2 facilities, and relocate the RP-2 Lift Station to a location above the flood plain. This project would include the construction of thickening, digestion, dewatering, and ancillary facilities at RP-5. The RP-5 Expansion Project would expand the RP-5 liquid treatment capacity from 15 mgd to 22.5 mgd, and would include the construction of primary treatment, MBR, disinfection, and ancillary facilities.

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. The capital costs included in the 20-year CIP for these projects are summarized in Table 14.

TABLE 14
RP-5 Expansion Projects Capital Cost Estimate Summary

Component Description	RP-5 Solids Handling Facilities Project[a]	RP-5 Expansion Project
Total Estimated Construction Cost[b,c]	$99,958,000	$79,791,000
Total Estimated Project Cost[d]	$129,945,000	$103,728,000

[a] Costs include the demolition of the RP-2 facility, which are estimated to range between $7 million and $10 million assuming removal of all assets (above and below ground) and grading to match surrounding contours.
[b] ENR CCI for Los Angeles (August 2014 - 10,737).
[c] Cost does not include escalation to midpoint of construction.
[d] Total project costs include engineering, construction management, environmental, and legal costs (30 percent).

8.0 Summary of TM 8 Carbon Canyon WRF Future Plans

The flow and loading projections and effluent requirements 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 by planning year 2035.

8.1 Discharge Requirements

Effluent from CCWRF is used for irrigation in the area overlying Chino North "Max Benefit" Groundwater Management Zone (DP 008). Recycled water quality for irrigation is regulated by Order No. R8-2009-0021 and must meet the discharge requirements described previously in Table 5.

8.2 Existing Plant Capacity and Limitations

The capacity of the existing system was evaluated through process modeling using PRO2D. 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. Facility reliability and redundancy considerations were 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 RWRPs. Thus, the capacity evaluation for CCWRF was based on all units in service unless otherwise noted, with reliability and redundancy provided at RP-5. Additional reliability and redundancy considerations driven by the regulatory requirements, such as Title 22 requirements, were also taken into account.

The overall plant capacity is determined by its most limiting process capacity. 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 at RP-5. The results of the liquid treatment capacity evaluation are presented in Table 15.

TABLE 15
CCWRF Existing Liquid Treatment Capacity

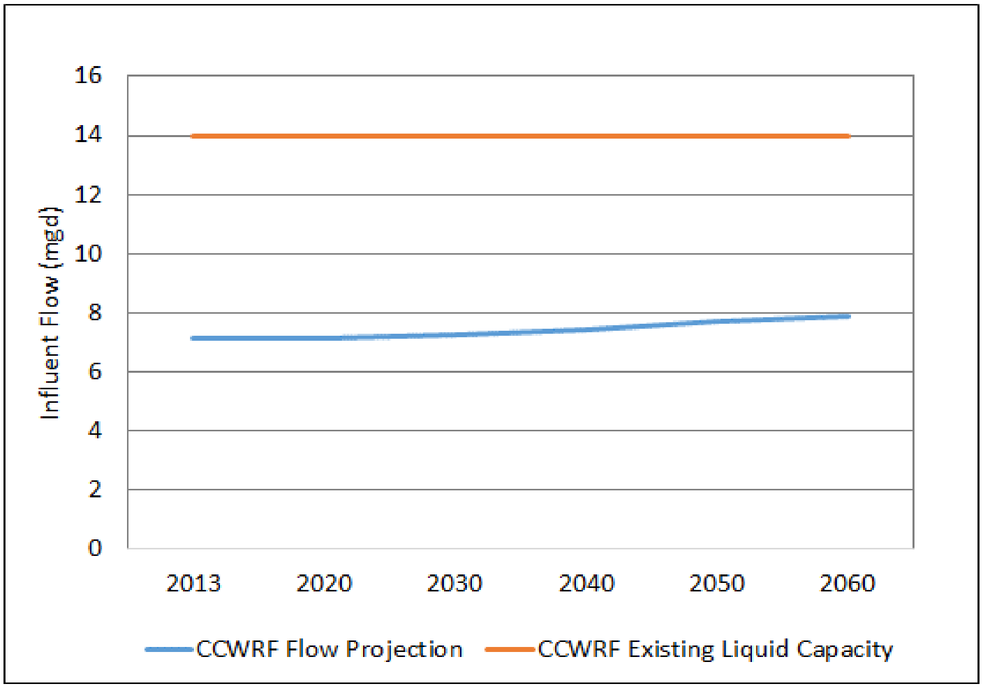
	Process Capacity (mgd)[a,b]
Primary/Secondary Treatment	14
Filtration	18.4
Disinfection	15.4
Overall Liquid Treatment Capacity	**14**

[a] Secondary process capacity based on all units in service, with redundancy provided at RP-5. Plant effluent TIN $\leq$ 8 mg/L.
[b] Filtration capacity based on one filter out of service. Disinfection capacity based on all units in service. 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.

Based on the evaluated capacity presented in Table 15 and the projected influent wastewater flows presented in Table 3, influent flows are not projected to exceed the CCWRF liquid treatment capacity. As illustrated in Figure 10, CCWRF will have excess capacity through buildout. Since some of the CCWRF service area is also tributary to the RP-5 service area, it may be possible to use some of the CCWRF excess capacity by diverting flow that is tributary to both CCWRF and RP-5 to CCWRF. The analysis presented in *TM 7 RP-5 and RP-2 Complex Future Plans* shows that RP-5 will require a capacity expansion during the planning period. Based on a collection system model run with the flows tributary to both RP-5 and CCWRF, approximately

1 mgd of the RP-5 average daily flow can be diverted to CCWRF by gravity. This diversion can delay the RP-5 expansion by about 2 years beyond that projected in the current CIP.

FIGURE 10
CCWRF Influent Flows Not Projected to Exceed Treatment Capacity



8.3 Plant Expansion Needs

CCWRF has sufficient capacity to treat projected flows and loads. There are no expansion projects planned for CCWRF for the 20-year CIP. As there are no projects planned for the expansion of CCWRF, the plant will remain as currently operated. Figure 11 presents the current site layout, which is estimated to be the facilities site plan through buildout.

Aerial image © Google Earth, 2014. Annotation by Carollo, 2014.

WT0122151041SCO 480772.03.31.60.03 inland_empire_fig11_rev1.ai 3/15

FIGURE 11

CCWRF Planning Year 2035 Facilities Site Plan

INLAND EMPIRE UTILITIES AGENCY
WASTEWATER FACILITIES MASTER PLAN

CH2MHILL® carollo Engineers...Working Wonders With Water®

9.0 Summary of TM 9 Organics Management Plan

The purpose of the 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. 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 RWRPs established in *TM 4 Wastewater Flow and Loading Forecast*. 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, and determine what options are available for expansion, if expansion is deemed necessary.

9.1 RWRPs Solids Handling Expansion Considerations

Based on the influent flow and load projections presented in *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 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 USACE raising the Prado Spillway. In addition, the RP-2 Lift Station will also need to be relocated to a location above the flood plain. 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.

9.2 Projections of Biosolids Quantities

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. The projected average biosolids quantities for the northern and southern service areas for planning year 2035 and buildout year 2060 are presented in Table 16. 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 using current dewatering technologies.

TABLE 16
Estimated Current and Projected Average Biosolids Quantities

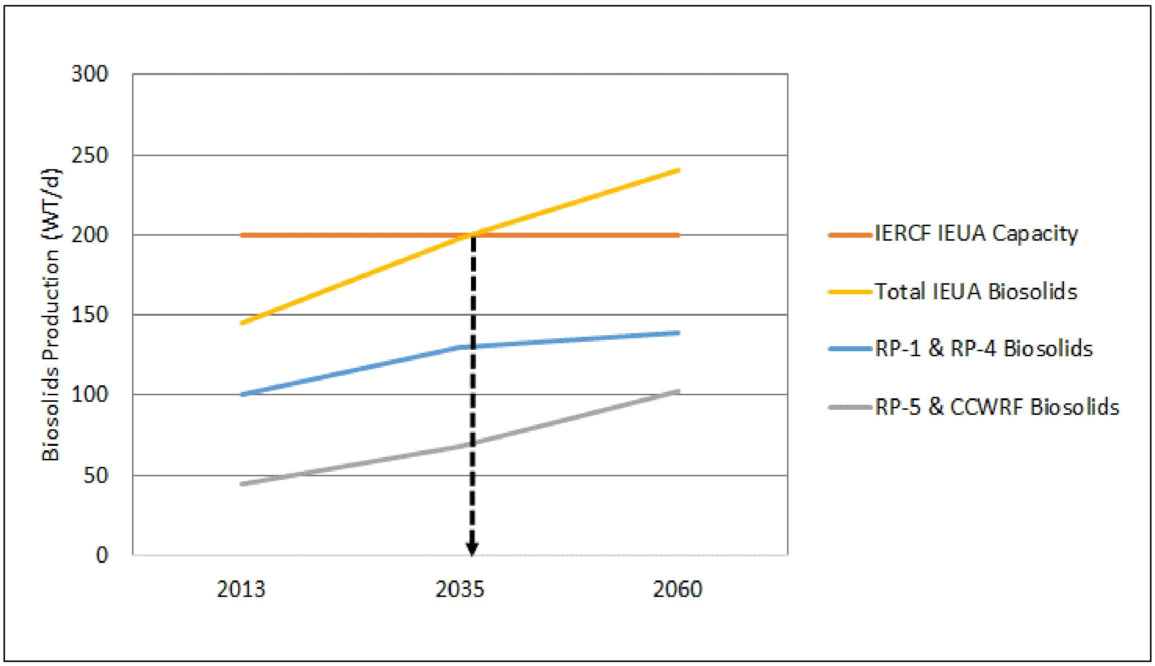
	Current			Planning Year 2035[a]			Buildout Year 2060[a,b]		
	Influent Flow (mgd)	Biosolids (WT/d)	Biosolids (DT/d)	Influent Flow (mgd)	Biosolids (WT/d)	Biosolids (DT/d)	Influent Flow (mgd)	Biosolids (WT/d)	Biosolids (DT/d)
RP-1 / RP-4	38.5	100	24	47.8	130	31	54.7	139	33
RP-5 / CCWRF	17.2	45	11	25.7	68	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 buildout year.
WT/d = wet tons per day
DT/d = dry tons per day

9.3 IERCF Biosolids Management Considerations

Based on recent discussions with the 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 South Coast Air Quality Management District (SCAQMD). 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 beyond 2035, 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. An illustration of the IERCF capacity relative to projected biosolids quantities from IEUA RWRFs is presented in Figure 12.

FIGURE 12
RWRF Biosolids Production Projected to Exceed IERCF Capacity Beyond 2035



10.0 Summary of TM 10 Asset Management Program

IEUA developed a 10-year Asset Management Plan as a means of providing an overview of their function, incorporating their business goals into their future planning, and evaluating their current assets. As part of the development of the Asset Management Plan, several existing and potential projects were identified to address rehabilitation, replacement, and upgrades to each asset to provide key information for budgeting and project planning over the next 10 years. All projects that are expected to exceed $2 million are included in this TM to highlight initial projects for inclusion in the CIP. The 10-year total project cost for each asset system is summarized in Table 17.

TABLE 17
Total Budget of All Asset Management Projects Greater than $2 Million

IEUA System	10-Year Total Budget ($)
Agency-Wide	38,504,000
Regional Water Recycling Plant No. 1 (RP-1)	24,606,000
Regional Water Recycling Plant No. 2 (RP-2)	-
Carbon Canyon Water Recycling Facility (CCWRF)	2,880,000
Regional Water Recycling Plant No. 4 (RP-4)	-
Regional Water Recycling Plant No. 5 (RP-5)	100,250,000
Recycled Water Distribution and Groundwater Recharge (GWR) Systems	72,910,000
Inland Empire Regional Composting Facility (IERCF)	5,000,000
Agency Lift Stations (LS)	8,915,000
Regional Conveyance System (RC)	2,500,000
Agency Laboratory (AL)	17,100,000
Agency Headquarters (HQ)	-
Business (BIZ) and Process Automation Control (PAC) Networks	14,625,000

Summaries of all Asset Management Plan projects greater than $2 million are listed for each IEUA system in TM 10. These projects initially will be included in the 20-year CIP.

11.0 IEUA Integrated Resources Plan and Recycled Water Program Strategy

In addition to the WFMP planning efforts described herein, IEUA is also conducting the Recycled Water Program Strategy (RWPS) and the IRP. All three planning efforts are being conducted in parallel, requiring careful collaboration and coordination throughout. A brief summary of the RWPS and IRP is presented below. Details of these planning efforts will be available upon completion of the reports by IEUA.

The purpose of the RWPS is to update the 2005 IEUA Recycled Water Implementation Plan. The primary objective of the RWPS is to update supply and demand forecasts and to help map changes for the Recycled Water Program to maximize the beneficial use of recycled water throughout the year.

The IRP is intended to develop an overall strategy for meeting projected water resource demands within the IEUA service area in a cost-effective manner. The goal of the IRP process is to integrate historical activity and new planning efforts into a focused, holistic approach and develop an implementation strategy to achieve improved near and long-term water resources management for IEUA and its member agencies. The IRP will integrate findings from the RWPS, this WFMP Update Report, the Recharge Master Plan Update Report, and the Water Use Efficiency Business Plan to create an overall cost-effective and consistent regional water resource management strategy.

12.0 Major Capital Projects Needed to Meet Projected Capacity for the Next 20 Years

A summary of the major capital projects (liquid treatment and solids handling) needed to accommodate projected influent wastewater flows for the next 20 years is presented in this section.

The major capital projects to be included in the IEUA CIP for the next 20 years are as follows:

- Montclair Pipeline Upgrades Project
- Whispering Lakes Pump Station Expansion Project
- RP-1 Solids Treatment Expansion Project
- RP-1 Liquid Treatment Expansion and Primary Effluent Equalization Elimination Project
- RP-4 Liquid Treatment Expansion Project
- RP-5 Solids Handling Facilities (RP-2 Relocation) Project
- RP-5 Liquid Treatment Expansion Project

Implementation of each of these projects over the next 20 years will depend on actual timing of influent wastewater flows that are projected to exceed treatment or conveyance capacities. As demonstrated previously, the solids expansion projects at RP-1 and RP-5/RP-2 are most imminent, followed by the liquid treatment expansion projects at RP-5, RP-1, and RP-4. A preliminary implementation schedule for each project is presented in Figure 13, including the future expansions beyond 2035 through buildout for long-term planning purposes. The schedule for conveyance projects considers 2 years for preliminary and final design, permitting, environmental compliance, and bidding, followed by 2 years of construction, for a total of 4 years. The schedule for treatment projects considers 4.5 years for preliminary and final design, permitting, environmental compliance, and bidding, followed by 3.5 or 4.5 years of construction depending on project scope and complexity, for a total of 8 or 9 years total.

Preliminary capital cost estimates for design and construction, as presented in TMs 5 through 10, were escalated to mid-point of construction and are presented in Table 18 for each of the major capital projects identified herein. The projects beyond 2035 through buildout year 2060 are also shown.

FIGURE 13
Implementation Schedule for Major Capital Projects through Buildout

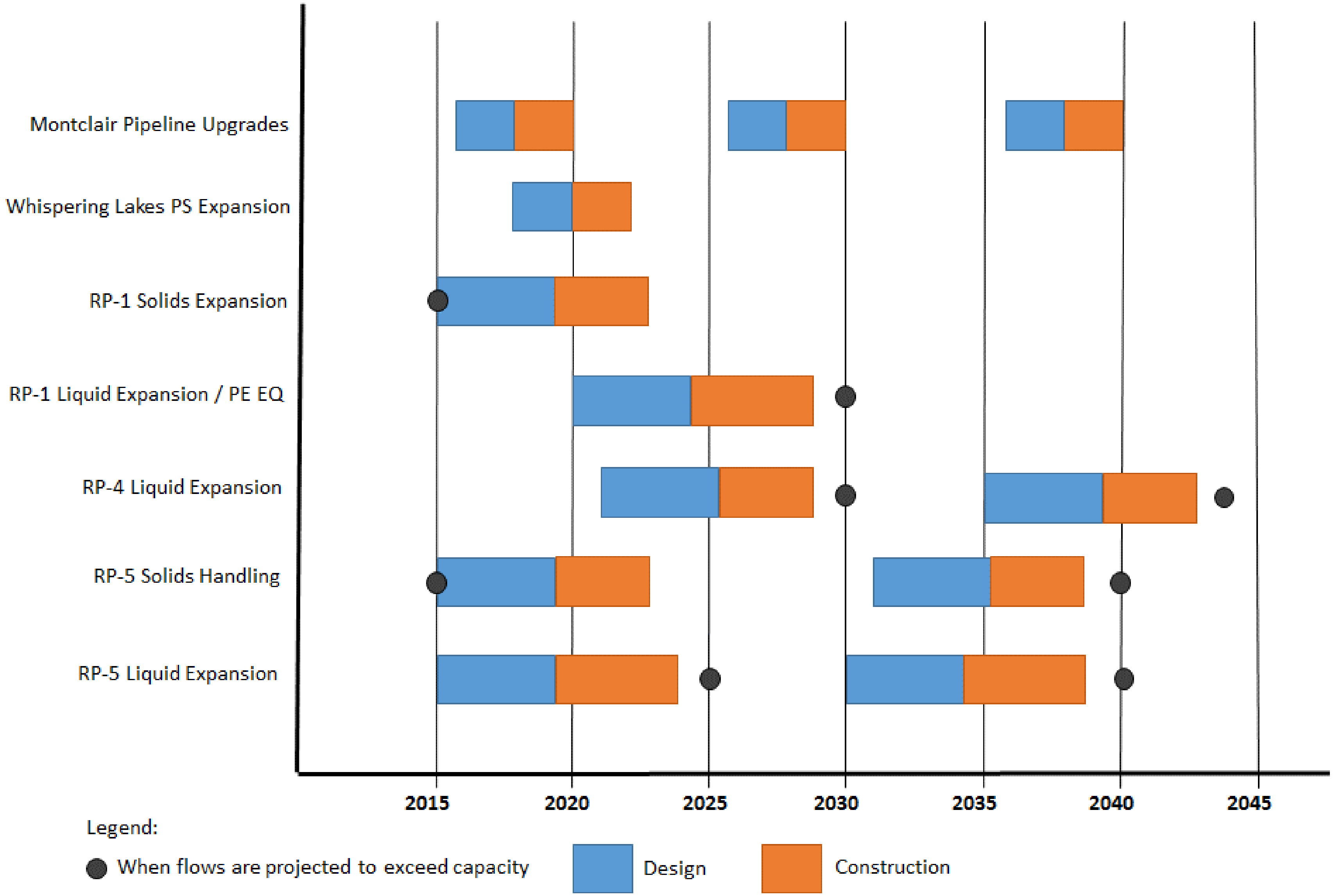


TABLE 18
Major Capital Projects Needed to Meet Projected Capacity for the Next 20 Years and through Buildout

		Planning Year 2035			Buildout Year 2060		
Major Capital Project	**Purpose**	**Project Elements**	**Escalated Cost[a] ($Million)**	**Project Needs to be Online by**	**Project Elements**	**Escalated Cost[a] ($Million)**	**Project Needs to be Online by**
Montclair Pipeline Upgrades Project	Upsize four pipeline segments from 21-inch and 30-inch diameter to 36-inch diameter to mitigate deficiencies in conveyance system, reliably accommodate future growth, and convey peak buildout flows	Four Reaches of Montclair Pipeline	$25.4	2020 2030	-	$1.8	2040
Whispering Lakes Pump Station Expansion Project	Increased pumping capacity to meet projected future flows; Ability to send more flows to RP-1 for treatment	Whispering Lakes Pump Station	$6.1	2030	-	-	-
RP-1 Solids Treatment Expansion Project	Increased solids treatment capacity to meet existing and projected future flows	Anaerobic Digesters	$24.9	2013	-	-	-
RP-1 Liquid Treatment Expansion and Primary Effluent Equalization Elimination Project	Increased liquid treatment capacity to meet projected future flows; Eliminating primary flow equalization and converting ponds for other uses	MBR (Train D = 5 mgd) Secondary Clarifiers Equalization pond piping modifications	$122.4	2030	-	-	-
RP-4 Liquid Treatment Expansion Project	Increased liquid treatment capacity to meet projected future flows	Tertiary Filter Chlorine Contact Tank	$6.6	2030	MBR (4.5 mgd)	$112.3	2044
RP-5 Solids Handling Facilities Project (RP-2 Relocation)	Relocation of RP-2 solids handling operations to RP-5; Increased solids treatment capacity to meet existing and projected future flows; Relocation of RP-2 Lift Station to above the flood elevation; Demolition of RP-2 facilities	Thickening Anaerobic Digesters High Pressure Gas Storage Dewatering Building Odor Control RP-2 Lift Station	$157.3	2015	Thickening Anaerobic Digesters	$50.9	2040
RP-5 Liquid Treatment Expansion Project	Increased liquid treatment capacity to meet projected future flows	Primary Clarifiers MBR (7.5 mgd) Chlorine Contact Basin	$125.5	2025	MBR (7.5 mgd) Chlorine Contact Basin	$193.8	2040

[a] Cost estimates based on 3 percent annual escalation of total project costs to midpoint of construction.

13.0 Regulatory Considerations

A summary of regulatory considerations is presented below for applicable federal and state requirements for water reuse, air quality, biosolids management, and environmental impacts.

13.1 Water Reuse

The requirements of Title 22 regulate production and use of recycled water in California. Criteria for reuse of secondary and tertiary effluent in various reuse applications include limits on the maximum numbers of total coliform bacteria present within the water. In addition to defining permitted uses of recycled water and treatment requirements, Title 22 defines requirements for sampling and analysis of effluent at treatment plants, requires preparation of an engineering report prior to production or use of recycled water, specifies general design criteria for treatment facilities, establishes reliability requirements, and addresses alternative methods of treatment.

Groundwater recharge using recycled water is governed primarily by state and local agencies. The primary agencies that are involved are the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW), the local RWQCB, and the California Department of Water Resources. The federal government does not have direct jurisdiction over groundwater. However, to the extent groundwater may affect surface water quality, and because the United States Environmental Protection Agency (USEPA) has a role in setting wastewater treatment requirements and standards for surface water discharges, some federal regulations may be indirectly applied to groundwater recharge projects.

Groundwater Replenishment Reuse Draft Regulations from DDW were revised in June 2014. Requirements for Groundwater Replenishment Reuse Projects were outlined for surface and subsurface applications, of which surface application would be most applicable for IEUA projects. The 2014 draft regulations for surface application include general requirements, pathogenic microorganism control, nitrogen compound control, recycled water contribution (RWC), diluent water requirements, TOC requirements, soil aquifer treatment process requirements, additional chemical and contaminant monitoring, response retention time, monitoring well requirements, and reporting.

Table 19 presents a summary of the regulations and key information applicable to groundwater recharge using recycled water.

TABLE 19
Summary of Existing and Proposed Regulations

Agency	Regulation	Key Information
USEPA/ Cal-EPA	California Toxics Rule (CTR) (40 *Code of Federal Regulations* [CFR] 131.37)	Contains numeric values for aquatic life criteria and human health criteria for discharge to surface waters. Application of the CTR criteria could result in stringent end-of-the-pipe permit limits for recycled water released to surface waters, which would impact the treatment requirements and subsequent costs associated with the treatment.
	Criteria for Nutrients	Increases efforts to control the discharges of nutrients to waters of the U.S. May require dischargers to install enhanced treatment removal technology, which would impact the treatment alternative and subsequent costs associated with the treatment.
	Criteria for Endocrine Disruptors	Requests that the USEPA develop water quality criteria for the regulation of endocrine disruptors. Ultimately, may require dischargers to install a treatment alternative capable of addressing the endocrine disruptor requirements and may impact subsequent costs associated with the treatment. Current efforts are focused on monitoring and data gathering.

TABLE 19
Summary of Existing and Proposed Regulations

Agency	Regulation	Key Information
SWRCB	Resolution 68-16 Antidegradation Policy	Specifies that no discharge may reduce water quality below baseline unless the change is consistent with the maximum benefit to the people of the state. Governed by the SWRCB Recycled Water Policy for groundwater recharge projects that use recycled water.
	Recycled Water Policy	Contains four key provisions for groundwater recharge projects: • Development of a basin-wide salt/nutrient management plan • Specific requirements for project approval, permit limits, and permit stream lining • Antidegradation analysis • Monitoring for constituents of emerging concern Key issues that may impact the use of recycled water for groundwater recharge: • Application of permit limits set by the RWQCB may be more stringent than those set by DDW; this is determined on a case-by-case basis • Antidegradation analysis and the type of treatment or amount of dilution required to maintain water quality • Time to implement a project will vary on a case-by-case basis
	Groundwater Replenishment using Recycled Water	Groundwater replenishment via surface spreading has been practiced by IEUA for years and key requirements are stated in this table. Currently, groundwater replenishment via subsurface injection requires full advanced treatment using microfiltration, RO, and ultraviolet advanced oxidation.
	SWRCB Nutrient Objective	The SWRCB is developing a statewide nutrient control program. This proposed program will be developed to protect beneficial uses from the effects of nutrient pollution and eutrophication in California water bodies. The program would be adopted as an amendment to the inland surface water and enclosed bays and estuaries plan. Creating nutrient objectives for the State will assist in supporting SWRCB's mission to "preserve, enhance, and restore the quality of California's water resources, and ensure their proper allocation and efficient use for the benefit of present and future generations."
	California Water Code 1211 Petition for Change	Any change in the point of discharge including a reduction in discharge requires a petition of change. This petition must include: • An environmental analysis of the proposed change • Description of impact on the surrounding area • Demonstration that any legal user of the water will not be injured Key issues that may impact the use of recycled water for groundwater recharge: • The time required to prepare the reports • The size of a project and its associated costs
	Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California	Establishes the procedure for establishing limits on priority pollutants, compliance determinations, objectives and provisions for chronic toxicity control, CTR criteria, and exceptions to State Implementation Plan (SIP) on a case-by-case basis for discharges to surface waters. May impact the treatment alternative and subsequent costs associated with the treatment.
	Methylmercury Objectives	The State of California is developing a methylmercury objective based on fish tissue criterion. May impact the treatment alternative and subsequent costs associated with the treatment.

TABLE 19
Summary of Existing and Proposed Regulations

Agency	Regulation	Key Information
DDW	Groundwater Replenishment Reuse Draft Regulations	DDW released an updated version of the draft groundwater recharge regulations in 2014. Listed below are some of the key requirements: • Projects shall be designed and operated to achieve a 12-log enteric virus reduction, 10-log Giardia reduction, and a 10-log Cryptosporidium reduction. • 1-log virus reduction will be credited for each month underground, up to 6 months. • If held for 6 months underground and treated to disinfected tertiary treatment or advanced treatment levels, 10-log Giardia reduction and 10-log Cryptosporidium reduction will be credited. • Retention time determination will require a tracer study. • The current draft allows compliance through one method and requires total nitrogen in the recycled water to meet a limit of 10 mg/L in any two consecutive samples. Reduced monitoring for nitrogen is possible following RWQCB approval. • Diluent water quality must meet the primary MCLs, secondary MCLs, or notification levels (NLs). An approved water quality monitoring plan for specified contaminants must be implemented to demonstrate compliance with the primary MCLs, secondary MCLs, and NLs. • The initial maximum RWC shall not exceed 0.20 unless otherwise approved by DDW. An alternative initial RWC of up to 1.0 may be approved by DDW. • TOC shall not exceed 0.5 mg/L divided by the running monthly average RWC based on: (1) the 20-week running average of all TOC results; and (2) the average of the last four TOC results. • Minimum response retention time should be 2 months.
	New Drinking Water Maximum Contaminant Levels (MCLs)	A number of compounds found in drinking water have an MCL and/or public health goal (PHG) identified in 2014. These compounds are chromium hexavalent (6), monochlorobenzene, trichlorofluoromethane (Freon 11), endothal, hexachlorocyclopentadiene, and 2,4,5-TP (Silvex). The MCL and PHG values for these compounds can be obtained from the SWRCB. In addition, there are PHGs for NDMA and 1,2,3-trichloropropane (which are not yet regulated). An MCL (6 parts per billion [ppb]) and PHG (1 ppb) for perchlorate was established in 2015 by the DDW.

13.2 Air Quality

Federal Regulations

The Clean Air Act (CAA) requires each state to prepare a SIP that details how the federally designated nonattainment areas will achieve the National Ambient Air Quality Standards (NAAQS). In California, each air district prepares an air quality management plan (AQMP) to incorporate into the state's SIP. In the South Coast Air Basin (SCAB), the local regulatory air agency is the SCAQMD. Through the attainment planning process, SCAQMD has developed and adopted rules and regulations to address stationary sources of air pollution in the SCAB. The AQMP addresses several federal planning requirements and incorporates updated emissions inventories, updated ambient measurements, new meteorological episodes, and new air quality modeling tools. The AQMP highlights the necessary reductions and the need to identify additional strategies, especially in the area of mobile sources, to meet federal criteria pollutant standards within the timeframes allowed under the federal CAA.

State Regulations

The California Clean Air Act of 1988, as amended in 1992, outlines a program to attain the California Ambient Air Quality Standards (CAAQS) by the earliest practical date. Because the CAAQS are more stringent than the NAAQS, attainment of the CAAQS will require more emissions reductions than what would be required to show attainment of the NAAQS. Consequently, the main focus of attainment planning in California has shifted from the federal to state requirements. Similar to the federal system, the state requirements and compliance dates are based on the severity of the ambient air quality standard violation within a region.

SCAQMD 1110.2 Rule for Cogen Engines

The purpose of Rule 1110.2 is to reduce nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) from landfill and biogas fired engines. SCAQMD Rule 1110 was first approved in 1990. Numerous revisions have occurred in the intervening years with the latest amendment being approved in July 2010. The February 2008 modification significantly lowered the required limits for the internal combustion gas engines, and placed a timeline on implementation of compliance with these limits. Contingent on results of a technology evaluation, digester gas engines were to be shut down or modified to meet the new limits by July 1, 2012. On the basis of time needed to transition into compliance following the completion of a limited number of technology-based assessments, the amended Rule dated September 7, 2012, extended the compliance deadline. Accordingly, the stationary engines need to comply with NOx and CO limits of 11 and 250 ppmv (parts per million volume, corrected to 15 percent oxygen on a dry basis and averaged over 15 minutes) and with VOC limit of 30 ppmv (parts per million volume, measured as carbon, corrected to 15 percent oxygen on a dry basis and averaged over the sampling time) by January 1, 2016.

AB-32 and Cap and Trade Rule

Cap and trade (C&T) is a market-based regulatory framework in which regulated entities are given “allowances” for their carbon dioxide (CO_2) emissions. To meet compliance obligations, regulated parties can reduce their own emissions or purchase either allowances from other entities within the cap, known as “offsets” or emission reductions made by entities outside the cap. Though federal legislation to institute a national C&T program is not currently in the works, California has recently finalized the long anticipated state C&T program that may link to similar programs in other states and regions. The California Air Resources Board (CARB) implemented the C&T as part of the implementation of California’s landmark climate change legislation, AB 32 – The Global Warming Solutions Act of 2006. CO_2 from the combustion of digester and landfill gas does not count toward the C&T thresholds. Therefore, there are no municipal wastewater treatment plants in California that will have compliance obligations under the C&T that was implemented as follows:

- January 1, 2012: C&T regulation becomes effective.
- August and November 2012: First auctions held.
- January 1, 2013: Compliance obligation for greenhouse gas emissions began.

CARB’s existing offset protocols are restrictive and not suitable for the wastewater agencies’ use, because the wastewater community will have to demonstrate that efforts to reduce carbon through these projects go beyond “business as usual.” As CARB intends to take an adaptive management plan with C&T, the rule will be opened for revisions at a future rulemaking cycle, and new requirements could be added now that the framework is in place and is operational.

California Greenhouse Gas Mandatory Reporting Rule

CARB adopted a Mandatory Reporting Regulation for Greenhouse Gases in 2007, which took effect in January 2009. A number of wastewater agencies currently are reporting their stationary combustion-related emissions under this program and recently have completed their first cycle of third-party verification of their reports. Emissions from wastewater process units are not reported under this program—only those from large combustion sources. Unlike C&T, biomass-related emissions, such as those from combustion of digester gas, are not excluded. They are reported, but are logged separately from fossil-fuel-related emissions.

In order to align with the Federal Mandatory Reporting Regulation adopted by USEPA and to support the C&T program, CARB amended its mandatory reporting program. The final Rule was approved and filed with the Secretary of State on December 14, 2011. The regulation became effective on January 1, 2012. The changes with the greatest potential impacts to wastewater agencies were as follows:

- CARB lowered the reporting threshold for stationary combustion from 25,000 metric tons per year (tons/year) of CO_2 to 10,000 tons/year of CO_2 equivalents (CO_2e), including both biomass and fossil fuel combustion emissions.
- Those facilities with emissions between 10,000 and 25,000 tons/year CO_2 will be able to file an abbreviated report and will not be required to undergo third- party verification.
- Different from the previous reporting periods, only the agencies with combustion emissions greater than 10,000 tons/year will be reporting. If emissions are greater than 10,000 tons/year, they will report as a stationary combustion source.

In November 2014, USEPA released updates and a revised framework for assessing Biogenic CO_2 Emissions from Stationary Sources. Accordingly, it was found that the information considered in preparing the revised Framework, including the Scientific Advisory Board peer review and stakeholder input, supported the finding that use of waste-derived feedstocks is likely to have minimal or no net atmospheric contributions of biogenic CO_2 emissions, or may even reduce such impacts, when compared with an alternate fate of disposal. It was stated that USEPA intends to apply this preliminary finding further within the policy contexts and regulatory actions, meaning that biogenic CO_2 emissions from process and waste processing (including sewage treatment and sludge digestion) will not count toward the reporting limits. However, as the greenhouse gas reduction goals get tighter, it is important to benchmark current operations of the Agency, and to continue monitoring the reporting limits to be able to respond if needed.

13.3 Biosolids Management

Federal Regulations

The USEPA promulgated 40 CFR Part 503 in 1993 to establish general requirements, pollutant limits, management practices, and operational standards for the final use or disposal of biosolids. Part 503 of 40 CFR contains regulations for biosolids management options, such as land application, surface disposal, and incineration. The regulations classify biosolids as Exceptional Quality, Class A, or Class B biosolids. Sludge that does not fulfill the requirements for any classification is termed unclassified. Pathogen and vector attraction reduction requirements are outlined in 40 CFR Part 503.

Class A biosolids are sludges which have been dewatered and heated to remove pathogens and meet vector attraction reduction requirements for unrestricted land application such as fertilizer or compost for farms.

Class B biosolids are treated but still contain detectible levels of pathogens and can be applied to agricultural fields and other areas that are not accessible to the general public. The biosolids producer is responsible for monitoring how the biosolids are applied at the point of use and for compliance with all regulations at the point of use.

State Regulations

The SWRCB enacted State Water Quality Order No. 2000-10-DWQ in August 2000, which was later replaced by State Water Quality Order No. 2004-0012-DWQ, to establish general WDRs for the reuse of biosolids. The California land application requirements are more restrictive than those contained in 40 CFR Part 503 and are designed to account for conditions specific to California soils and local environments through the issuance and oversight of general order permits. Biosolids land application is controversial in California and continues to become more stringent.

AB 1826 (Mandatory Commercial Organics Recycling)

In October 2014, Governor Brown signed AB 1826 Chesbro (Chapter 727, Statutes of 2014), requiring businesses to recycle their organic waste on and after April 1, 2016, depending on the amount of waste they generate per week. This law also requires that by 2016, local jurisdictions across the state implement an organic waste recycling program to divert organic waste generated by businesses, including multifamily residential dwellings that consist of five or more units (please note, however, that, multifamily dwellings are not required to have a food waste diversion program). Organic waste (also referred to as organics throughout this resource) means food waste, green waste, landscape and pruning waste, nonhazardous wood waste, and food-soiled paper waste that is mixed in with food waste. This law phases in the mandatory recycling of commercial organics over time, while also offering an exemption process for rural counties. In particular, the minimum threshold of organic waste generation by businesses decreases over time, which means that an increasingly greater proportion of the commercial sector will be required to comply.

Landfill Status

The Solid Waste Information System facility database contains information on solid waste facilities, operations, and disposal sites throughout the State of California. The types of facilities found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites. For each facility, the database contains information about location, owner, operator, facility type, regulatory and operational status, estimated closure dates, authorized waste types, local enforcement agency and inspection, and enforcement records.

13.4 Environmental Impacts

Federal Regulations

The National Environmental Policy Act (NEPA) is the nation's basic charter for the protection of the environment. It establishes environmental policy for the nation, provides an interdisciplinary framework for federal agencies to prevent environmental damage, and contains procedures to ensure that federal agency decision makers take environmental factors into account. NEPA applies to all federal agencies and most of the activities they manage, regulate, or fund that affect the environment. Under NEPA, the lead agency is the federal agency with the primary responsibility for complying with NEPA for a proposed action.

State Regulations

The California Environmental Quality Act (CEQA) applies to all proposed discretionary activities that will be carried out or approved by California public agencies, such as IEUA, unless such activities are specifically exempted. Under CEQA, a lead agency has the principal discretionary responsibility to approve a project and, therefore, is the agency with the primary responsibility for preparing a CEQA document associated with a proposed discretionary action. The purpose of CEQA is to minimize environmental damage. The primary objectives of CEQA are to (1) disclose to decision makers and the public the significant environmental effects of a proposed project to enable them to consider its environmental consequences, and (2) to balance the benefits of a project with the environmental costs.

Major elements of CEQA include:

- Disclosing environmental impacts
- Identifying and preventing environmental damage
- Fostering intergovernmental coordination
- Enhancing public participation
- Disclosing agency decision making

Appendix F
Asset Management Plan

ESA

Inland Empire Utilities Agency

Asset Management Plan

Fiscal Year 2015/16

Inland Empire Utilities Agency

A MUNICIPAL WATER DISTRICT

Acknowledgments

This Asset Management Plan was developed by staff members of the Inland Empire Utilities Agency. The Agency gratefully acknowledges the important contributions of the authors of the various sections of this plan. In particular, the authors of the Asset Management System Summaries put forth a great deal of effort to develop system summaries that are proving to be a valuable tool in guiding asset management decisions.

Table of Contents

List of Tables

List of Figures

Executive Summary

The Inland Empire Utilities Agency is committed to providing services for its rate payers to reliably meet the business goals approved by the Agency's Board of Directors. This commitment requires the Agency to diligently and carefully manage their assets. Through asset management, the Agency can coordinate decisions and take actions that allow them to meet these business goals at the lowest lifecycle cost.

This Asset Management Plan is intended to be a useful document for those who have a deep understanding of the Agency as well as for those who are only somewhat familiar with it. To meet the needs of both audiences, this plan contains introductory and overview chapters on the Agency's function, service area, business goals, and future growth (Chapters 1 – 4) as well as more detailed information on the Agency's asset valuation, financial projections, and physical assets (Chapters 5 – 7).

The current values for Agency assets are $845 million for replacement and $534 million for depreciation. The various components of these values are summarized in Table 5-1.

The Long-Range Plan of Finance (LRPF) aligns the Agency's financial capacity with long-term service objectives. The LRPF uses forecasts to provide insight into the Agency's future financial capacity so that Agency strategies can achieve long-term sustainability of financial and service objectives. Development of the LRPF is ongoing, with a complete robust and dynamic LRPF model anticipated in summer 2015. Some of the proposed features of the new financial model include extending the scope from 10 to 50 years, execution of multiple "what if" scenarios to highlight the effect of certain variables, and on-screen graphic presentations to more effectively communicate the alternatives and outcomes.

The Agency's physical assets are described in Chapter 7, Asset Management System Summaries, where they are organized according to the following systems:

1. Regional Water Recycling Plant No. 1 (RP-1)
2. Regional Water Recycling Plant No. 2 (RP-2)
3. Carbon Canyon Water Recycling Facility (CCWRF)
4. Regional Water Recycling Plant No. 4 (RP-4)
5. Regional Water Recycling Plant No. 5 (RP-5)
6. Recycled Water Distribution (RW) & Ground Water Recharge (GWR) Systems
7. Inland Empire Regional Composting Facility (IERCF)
8. Agency Lift Stations (LS)
9. Regional Conveyance System (RC)
10. Agency Laboratory (Lab)
11. Agency Headquarters (HQ)
12. Business (BIZ) & Process Automation Control (PAC) Networks

Each system summary comprises six sections: an asset profile, a capacity profile, an asset rating, key issues, history of key assets, and potential projects. Of particular note is that the system summaries identify both existing and potential projects to address needed rehabilitation, replacement, and upgrades to assets. As such, these summaries provide key information for budgeting and project planning.

1. Introduction

1.1. Purpose of the Asset Management Plan

The Asset Management Plan presents the physical assets of the Inland Empire Utilities Agency and discusses the funding required to manage these assets to deliver the services expected by customers.

1.2. Full Economic Cost of Infrastructure Service Delivery

The cost of providing infrastructure services depends on the standard, or level of service, required by the Agency and the community. The Agency must show the full cost of providing that level of service so that they can set a realistic level of service based on customer expectations and appropriate service fees. The cost of infrastructure asset services is a function of the lifecycle costs and the current position of the asset in the asset lifecycle, as shown in Figure 1-1.

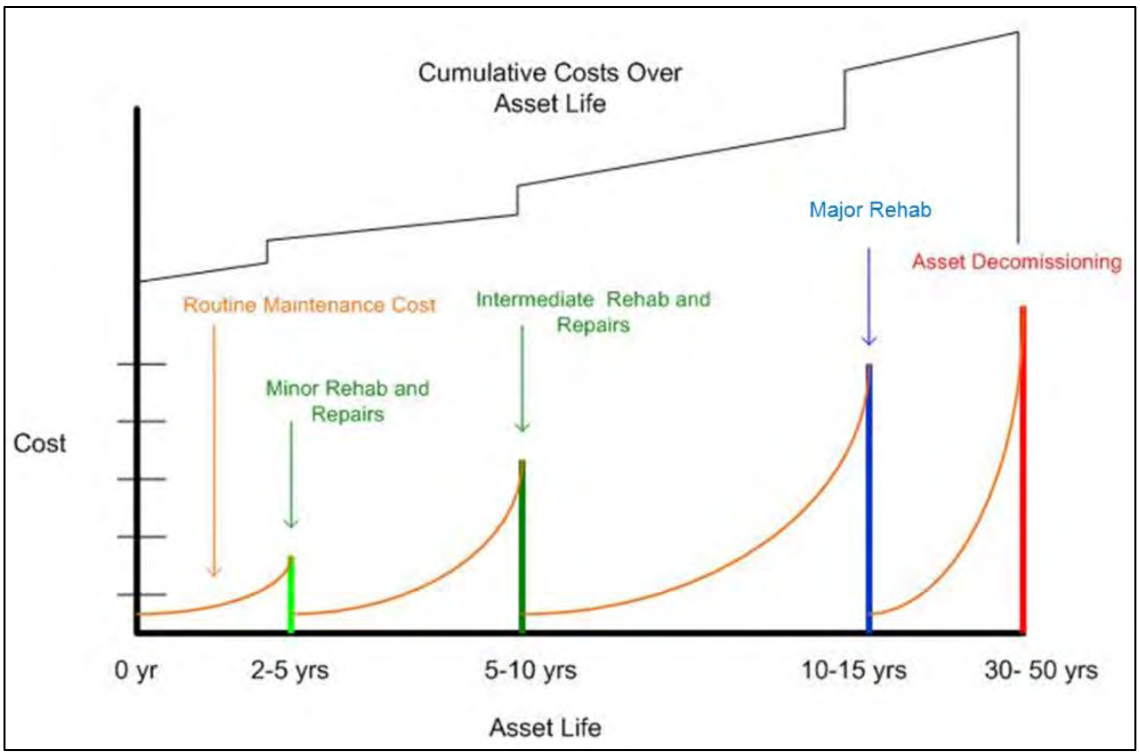


Figure 1-1: Lifecycle Cost

The Agency is better able to make decisions when they consider the lifecycle cost of assets. If costs increase in one area, then a suitable reduction or trade-off must be reflected in another area. For example, in order for the Agency to reduce operating and maintenance cost or business risk exposure, they can either invest capital or improve the offered levels of service.

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2. Inland Empire Utilities Agency Overview

2.1. Service Area

The Inland Empire Utilities Agency is a regional wastewater treatment and water agency that provides sewage treatment, biosolids handling, and recycled water to the west end of San Bernardino county. Its 242-square-mile service area includes the cities of Upland, Montclair, Ontario, Fontana, Chino, Chino Hills; the Cucamonga Valley Water District, which services the City of Rancho Cucamonga; and the unincorporated areas of San Bernardino County, including the Chino Agricultural Preserve.

The Agency, a special assessment district, is governed by a five-seat publicly elected Board of Directors. Each director is assigned to one of the five divisions: Division 1 – Upland/Montclair; Division 2 – Ontario/Agricultural Preserve; Division 3 – Chino/ Chino Hills; Division 4 – Fontana; Division 5 – Rancho Cucamonga. The regional technical and policy committees provide information on technical and policy issues and include representatives from each of the contracting agencies.

Five regional water recycling plants are used to treat raw wastewater from the Agency's service area: Regional Water Recycling Plant No. 1 (RP-1), located in the City of Ontario; Regional Water Recycling Plant No. 2 (RP-2), located in the City of Chino; Regional Water Recycling Plant No. 4 (RP-4), located in the City of Rancho Cucamonga; Carbon Canyon Water Recycling Facility (CCWRF), located in the City of Chino; and Regional Water Recycling Plant No. 5 (RP-5), located in the City of Chino.

The Agency has two main service areas: Northern Service Area and Southern Service Area. The area north of Riverside Drive in Ontario is referred to as the Northern Service Area, and the area south of Riverside Drive is the Southern Service Area. The Northern Service Area is about 162 square miles and has two active treatment plants, RP-1 and RP-4, and one decommissioned treatment plant, RP-3. The Southern Service Area has CCWRF, RP-2, RP-5, and the Agency's Administration Headquarters, certified by *Leadership in Energy & Environmental Design*.

Along with these facilities, the Agency maintains and operates a desalter facility in the City of Chino (Chino I Desalter) on behalf of the Chino Basin Desalter Authority and a biosolids composting facility in the City of Rancho Cucamonga (Inland Empire Composting Facility) on behalf of the Inland Empire Regional Composting Authority. The Agency is also the representative of the Metropolitan Water District of Southern California for the contracting agencies. Figure 2-1 shows the Agency service area.

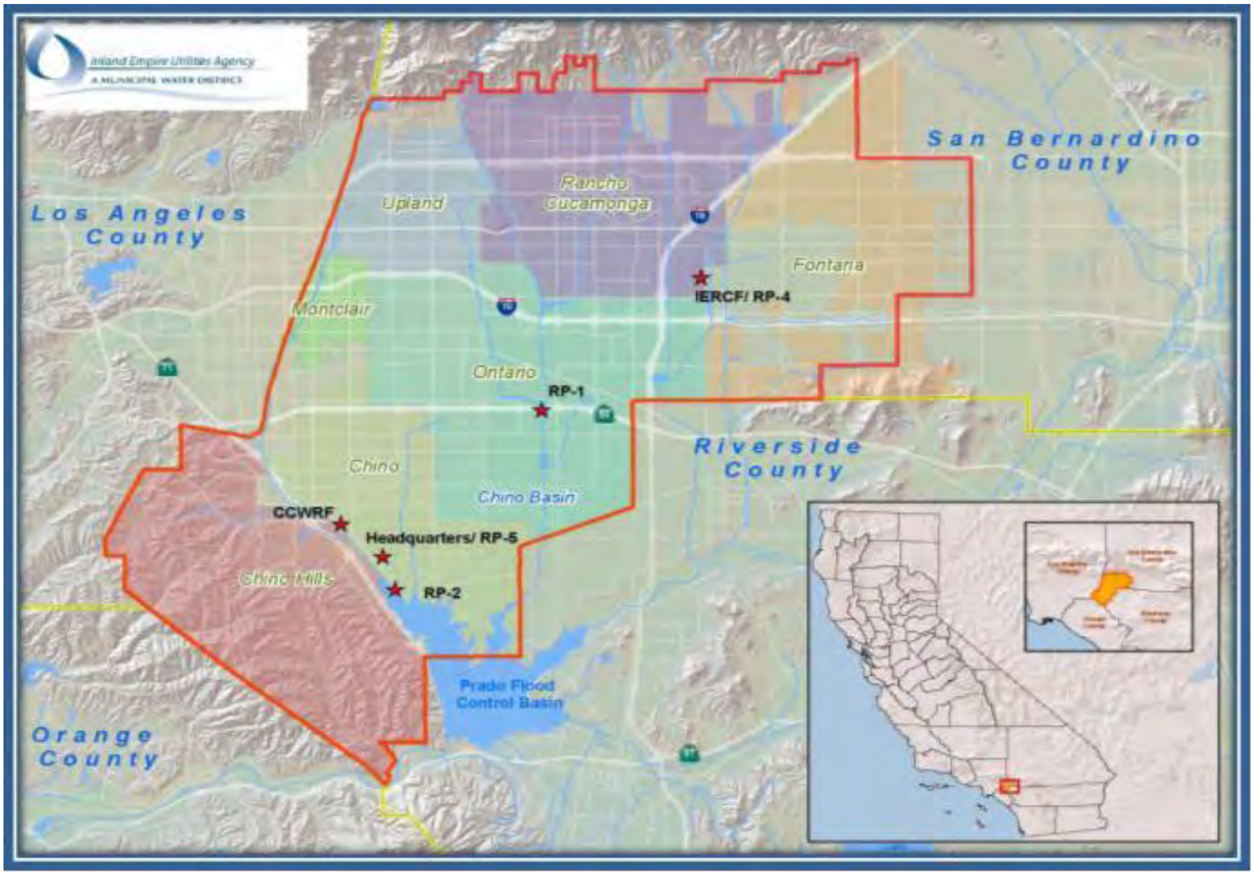

Figure 2-1: Agency Service Area

3. Agency Business Goals

3.1. Background of Agency Policy

Agency policy goals have guided the Agency's decisions and actions in executing their mission, while maintaining their values. Over the last several years, the Agency has categorized these Agency-wide policy goals into nine themes: (1) conservation and water quality, (2) technological innovation, (3) rate stabilization and cost effectiveness, (4) operational and maintenance efficiency, (5) strategic planning and capital implementation, (6) waste management and resource use, (7) interagency relationships and community partnerships, (8) fiscal accountability and regulatory compliance, and (9) staff training, development, and wellbeing. Each budget cycle, these Agency-wide policy goals guide them in developing the capital improvement program, operational budget, and organizational goals and objectives.

As a way to define the Agency's levels of service (LOS), the Agency held several workshops in 2011 with their Board of Directors. The levels of service developed during these workshops focused primarily on the Agency's operational functions. In early 2013, staff recommended that the levels of service be developed into more broad-based business goals. The Agency further decided that to better develop Agency Business Goals they should include input from their stakeholders, which include their Board of Directors, staff, Technical Committee members, and Policy Committee members.

3.2. Purpose of Agency Business Goals

Agency policy goals have guided the Agency's decisions and actions in executing their mission, while maintaining their values. To define the mission, vision, and values, the Agency looked to the needs of their stakeholders and the value of service provided to the public. To develop Agency-wide business goals, the Agency reviewed their existing policy goals and refined these goals according to their current and future needs. The Agency Business Goals sets the framework for developing additional planning documents that will shape and guide the Agency's fundamental decisions and actions over the next several years.

The adopted Agency Business Goals are fundamental to the development of several planning documents, including the Agency Strategic Plan, the Integrated Water Resources Plan, the individual Facility Master Plan Updates, and the Asset Management Plan. For any organization to remain relevant and effective, it must be able to prepare for change and to adapt. As illustrated in Figure 3-1, the Agency Business Goals must be continually evaluated as part of the planning process to ensure that the Agency meets the current and future needs of the region.

Figure 3-1: Relevance of Agency Business Goals to the Planning Process

3.3. Structure of Agency Business Goals

The Agency Business Goals were categorized into six main areas: (1) fiscal responsibility, (2) workplace environment, (3) business practices, (4) water reliability, (5) wastewater management, and (6) environmental stewardship. Within each business goal, the Agency established several objectives to support that business goal. For example, within water reliability, the Agency established the beneficial use of recycled water. For each objective, the Agency developed a commitment to define the level of service that they will provide. For example, the Agency is committed to developing the recycled water infrastructure, so they meet the objective of reusing 50,000 AFY by 2025. The structure of the Agency Business Goals is shown in Figure 3-2.

Figure 3-2: Structure of Agency Business Goals

3.4. Adopted Agency Business Goals

The remainder of this chapter presents the adopted Agency Business Goals, with each business goal presented on a single page.

A. Business Goal: Fiscal Responsibility

The Agency will safeguard their fiscal health through organizational efficiency, adoption of balanced multiyear budgets, and rates that (1) meet full cost-of-service targets, (2) maintain a high-quality credit rating, and (3) preserve established fund balance reserves to effectively address short-term and long-term economic variability. Furthermore, the Agency will provide open and transparent communication to educate member agencies on the Agency's fiscal policies.

1. **Funding & Appropriation (Agency Management; Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To appropriately fund operational, maintenance, and capital investment costs.
   ***Recommended Commitment*:** The Agency will adopt service rates and fees that fully support the costs of service and provide a reliable and steady flow of operating revenue to support all operational expenses, capital replacement, and debt service costs. In addition, the Agency will ensure that service rates and fees support their goal to sustain high-quality commitment levels.

2. **Budget Planning (Agency Management; Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To forecast as accurately as possible costs for operation, repair and replacement, capital improvement, and debt service in an effort to provide financial stability for the Agency and member agencies.
   ***Recommended Commitment*:** The Agency will provide multiyear forecast for costs of operation, repair and replacement, capital investment, and debt service to support the Agency's Board and member agencies' adoption of multiyear budgets and rates, enhancing the Agency's dependability and stability.

3. **Reserves (Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To preserve fund reserves that sustain the Agency's long-term fiscal health and high-quality credit rating and that ensure their ability to effectively address economic variability.
   ***Recommended Commitment*:** The Agency will adopt financial policies to establish and preserve fund reserves above legally or contractually mandated levels so that they can maintain commitment levels. In addition, the Agency will support short- and long-term funding requirements. The Agency will also sustain their long-term fiscal health and high-quality credit rating to reduce future borrowing costs.

4. **Creditworthiness (Financial Planning; Accounting; Fiscal Management)**

   ***Objective*:** To sustain a high-quality credit rating and debt-service-coverage ratio to safeguard the Agency's fiscal health and reduce future borrowing costs.
   Recommended Commitment: The Agency will reinstate their credit rating to AAA by FY 2017/18 to reduce borrowing costs anticipated for expanding and improving existing facilities required to meet future growth in their service area.

B. Business Goal: Workplace Environment

The Agency is committed to providing a positive workplace environment by recruiting, retaining, and developing a highly skilled team dedicated to their mission, vision, and values.

1. **Mission, Vision, and Values (All Agency Staff and Board)**

   Objective: To uphold Agency Business Goals, objectives, and commitment levels that support and advance the Agency's mission, vision, and values.
   Recommended Commitment: The Agency will require the highest standard of ethical conduct from all Agency staff, promoting prudent leadership, integrity, collaboration, open communication, respect, accountability, high quality, passion, and efficiency.

2. **Employer of Choice (Human Resources; Agency Management)**

   Objective: To be an employer of choice.
   Recommended Commitment: The Agency will provide a work environment that will attract and retain highly skilled, motivated, professional, and committed employees.

3. **Training (Agency Management; Human Resources)**

   Objective: To provide employees with state-of-the-art skills and knowledge to meet current and anticipated Agency needs.
   Recommended Commitment: The Agency will facilitate and provide opportunities for staff to further their personal and professional development in support of maintaining a highly skilled workforce.

4. **Staff Safety (Safety; Human Resources; Agency Management)**

   Objective: To promote and ensure a safe, healthy work environment to protect employees and stakeholders.
   Recommended Commitment: The Agency will have no more than one day of lost time because of work-related illness or injury per 1,000 days worked.

C. Business Goal: Business Practices

The Agency is committed to applying ethical, fiscally responsible, and environmentally sustainable principles to all aspects of business and organizational conduct.

1. Efficiency and Effectiveness (All Departments)

Objective: To promote standards of efficiency and effectiveness in all Agency business practices and processes.
Recommended Commitment: The Agency will integrate lean techniques to evaluate their current business practices and processes and will identify ways to improve the quality, cost, and value of their services to the member agencies and the public.

2. Customer Service (All Departments)

Objective: To provide excellent customer service that is cost-effective, efficient, innovative, and reliable.
Recommended Commitment: The Agency will respond to member agencies and meet the Member Agencies' expectation for enhanced value-added services. The Agency will solicit stakeholder feedback on performance and goal alignment each year.

3. Regional Leadership and Community Relations (Agency Management; Planning; Engineering)

Objective: To cultivate a positive and transparent relationship with stakeholders to enhance quality of life, preserve heritage, and protect the environment.
Recommended Commitment: The Agency will partner with stakeholders on common issues to create and implement integrated and innovative solutions, minimize duplication of efforts, and support education and outreach to the public. Furthermore, the Agency will incorporate member agencies and regional water agencies into their various related projects and programs to achieve a transparent and broader regional representation.

4. Policy Leadership (Agency Management; Planning; Engineering)

Objective: To effectively guide, advocate, and campaign for the development of policies and legislation that benefit the region that the Agency serve.
Recommended Commitment: The Agency will promote a collaborative approach to develop positions on policies, legislation, and regulations that affect Agency policy objectives.

D. Business Goal: Water Reliability

The Agency is committed to developing and implementing an integrated water resource management plan that promotes cost-effective, reliable, efficient, and sustainable water use along with economic growth within the Agency's service area.

1. **Water Use Efficiency and Education (Planning; Engineering; Public Information)**

   ***Objective*:** To promote water-use efficiency through public education to enhance water supplies within the region and exceed state goals for reduction in per capita water use within the Agency's service area.
   ***Recommended Commitment*:** The Agency will reduce water use in their service area to less than 200 gallons per capita per day by 2018.

2. **New Water Supplies (Planning; Engineering)**

   ***Objective*:** To support member agencies and regional water agencies, the Agency will develop reliable, drought-proof, and diverse local water resources and supplemental water supplies to reduce dependence on imported water supplies.
   ***Recommended Commitment*:** The Agency will promote efforts to reduce demand for imported water during dry and normal years and to store imported water into the Chino Groundwater Basin during wet years. In addition, The Agency will support maximizing the beneficial use of existing water infrastructure, while meeting future increased demands through investment in local water resources, supplemental water supplies, and conservation efforts.

3. **Recycled Water (Planning; Engineering; Operations & Maintenance)**

   ***Objective*:** To support maximizing the beneficial reuse of recycled water to enhance reliability and to reduce dependence on imported water.
   ***Recommended Commitment*:** The Agency will finish developing a recycled-water infrastructure and will support the member agencies in achieving reuse of 50,000 AFY by 2025.

4. **Groundwater Recharge (Planning; Engineering; Operations & Maintenance)**

   ***Objective*:** To maximize all sources of groundwater recharge.
   ***Recommended Commitment*:** The Agency will support the recharge of all available stormwater and maximize the recharge of recycled water within the Chino Groundwater Basin. Furthermore, the Agency will pursue the purchase and storage of cost-effective supplemental water supplies.

E. Business Goal: Wastewater Management

The Agency will develop master plans for Agency systems and manage and construct these systems to ensure that when expansion planning is triggered, designs and construction can be completed to meet regulatory and growth needs in an expeditious, environmentally responsible, and cost- effective manner.

1. **Capacity (Planning; Engineering; Construction Management)**

   Objective**:** To maintain capacity within systems and facilities to meet essential service demands and to protect public health and environment.
   Recommended Commitment**:** The Agency will ensure that systems are managed and constructed so that 90 percent of capacity is never exceeded.

2. **On-Time Construction (Engineering; Construction Management)**

   Objective**:** To ensure capital projects are designed and implemented in a timely and economically responsible manner.
   Recommended Commitment**:** The Agency will design and construct facilities through efficient project management to ensure that 80 percent of projects are completed on schedule and 90 percent of projects are on budget.

3. **Biosolids Management (Operations & Maintenance)**

   Objective**:** To manage all Agency-produced biosolids in a US EPA compliant, fiscally prudent, and environmentally sustainable manner.
   Recommended Commitment**:** The Agency will ensure that 95 percent of the capacity of the Inland Regional Compost Facility is used, that all biosolids produced by the Agency are treated at this facility, that Agency solids generation is minimized through efficient dewatering operations, and that all compost is marketed for beneficial use.

4. **Energy Management (Planning; Engineering; Operations & Maintenance)**

   Objective**:** To optimize facility energy use and effectively manage renewable resources to achieve peak power independence, contain future energy costs, achieve statewide renewable energy, distribute generation and greenhouse-gas reduction goals, and provide for future rate stabilization.
   Recommended Commitment**:** The Agency will achieve peak power independence by 2020 by implementing renewable projects, energy management agreements, and operational efficiencies.

F. Business Goal: Environmental Stewardship

The Agency is committed to the responsible use and protection of the environment through conservation and sustainable practices.

1. Regulatory Compliance (Compliance; Operations & Maintenance)

Objective: To comply with all federal, state, and local laws at each Agency facility.
Recommended Commitment: The Agency will have no more than two notices of violation annually from the State Water Resources Control Board, Air Quality Management District, or Non-Reclaimable Waste System for all Agency-owned and operated facilities.

2. Good Neighbor Policy (Compliance; Operations & Maintenance)

Objective: To control odors at all Agency facilities for the purpose of improving the environment and being a good neighbor to the local community.
Recommended Commitment: The Agency will perform a quarterly odor-monitoring assessment to develop actual and acceptable baseline odor thresholds. Acceptable baseline thresholds will be used to measure treatment plant performance and drive necessary capital improvements.

3. Response and Complaint Mitigation (Compliance; Operations & Maintenance)

Objective: To investigate any environmental issue or complaint received at any Agency facility and to respond appropriately and promptly.
Recommended Commitment: The Agency will immediately respond to any event that threatens public health and safety and will respond within five working days to any non-emergency complaint or suggestion.

4. Environmental Responsibility (Agency Management; Planning; Engineering)

Objective: To strive to implement actions that enhances or promotes environmental sustainability and preservation of the region's heritage.
Recommended Commitment: The Agency will consider and assess environmental sustainability, public use, and heritage preservation options for all programs and projects.

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4. Future Demand and Growth

4.1. Wastewater Flow Projection

The Agency conducts wastewater flow forecasts annually, deriving the forecast from three components: (1) historical wastewater flow trends; (2) per capita or per dwelling-unit wastewater-generation factors; and (3) expected future growth numbers provided by contracting agencies. Using these projections, the Agency determines future demands on their facilities and anticipates needed modifications to Regional Water Recycling Plants (RWRP).

Based on analyses of the three components, the Agency has made ten-year flow projections for each of their RWRPs and for the service area as a whole. The Agency then compares the projected flows to current and future-planned plant capacities, presenting alternative scenarios that reflect possible diversions, bypasses, and recycle streams. For these forecasts, the "tributary area flow" is defined as raw wastewater flow from the service area that is a natural tributary to a particular RWRP without pumps, diversion, or bypasses. In contrast, the "treated influent flow" is the actual flow that is received and treated at the RWRP. The treated influent flow is different from the tributary area flow because the RWRPs are interconnected, allowing some of the tributary flow to be re-routed between plants. In addition, treated influent flow includes the recycle streams generated during solids processing that are sent back to the plant's headworks for additional treatment.

4.2. Wastewater Flow Trends

Figure 4-1 illustrates the wastewater flow pattern within the Agency in FY 2013/14 and the current flows being treated at each of the Agency's RWRPs. For FY 2013/14, the average raw wastewater flow treated was 52.2 MGD. Since FY 2006/07, the Agency's wastewater flows have declined by about 10 percent (similar to other local agencies). However, even though wastewater flows declined, the Agency has been able to increase the amount of recycled water supplied to users. The Agency has done so by using the San Bernardino Avenue lift station and the Montclair lift station to route additional raw wastewater to the recycling plants in the Northern Service Area, where the system has been expanded and where groundwater recharge basins are located.

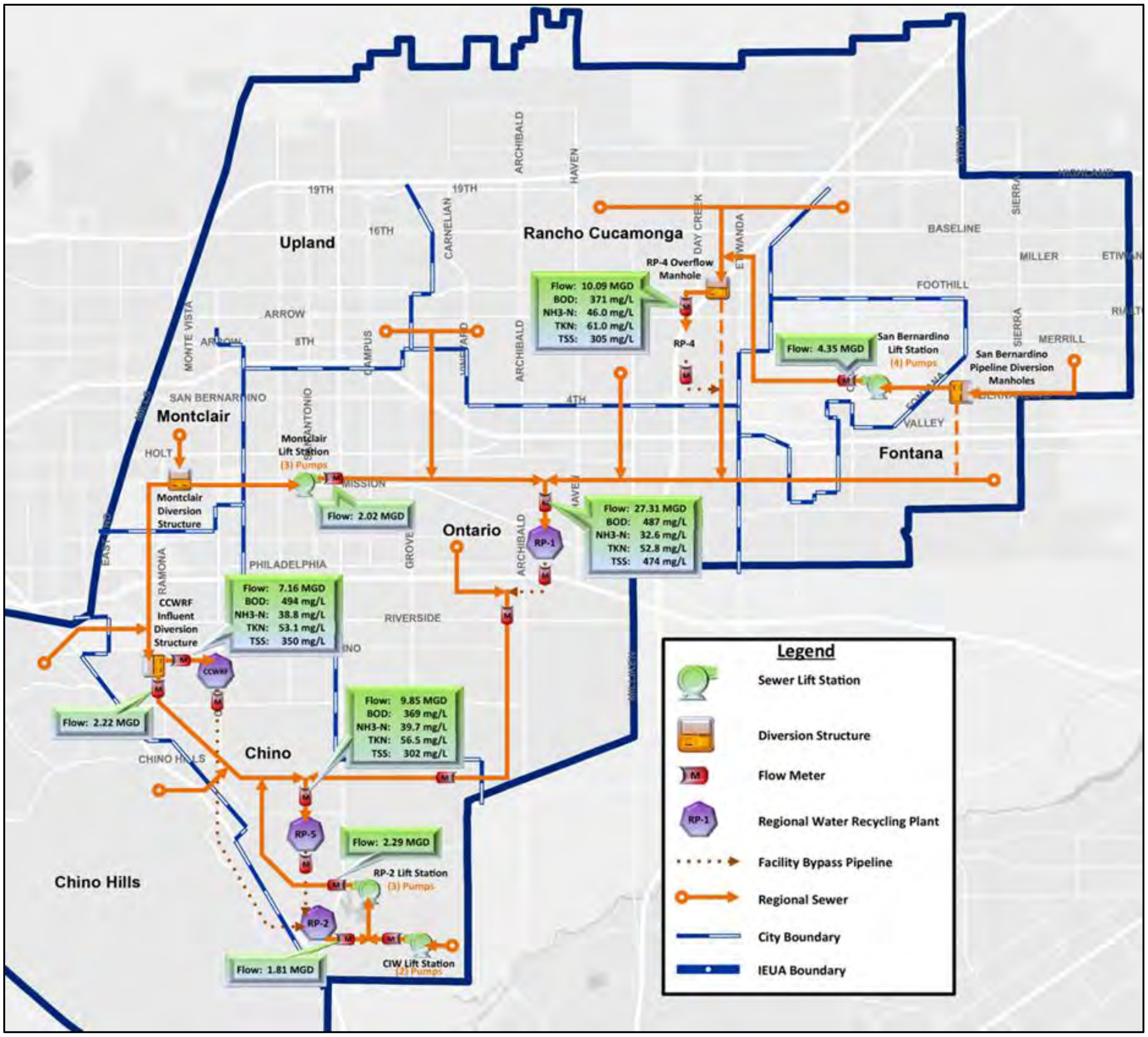
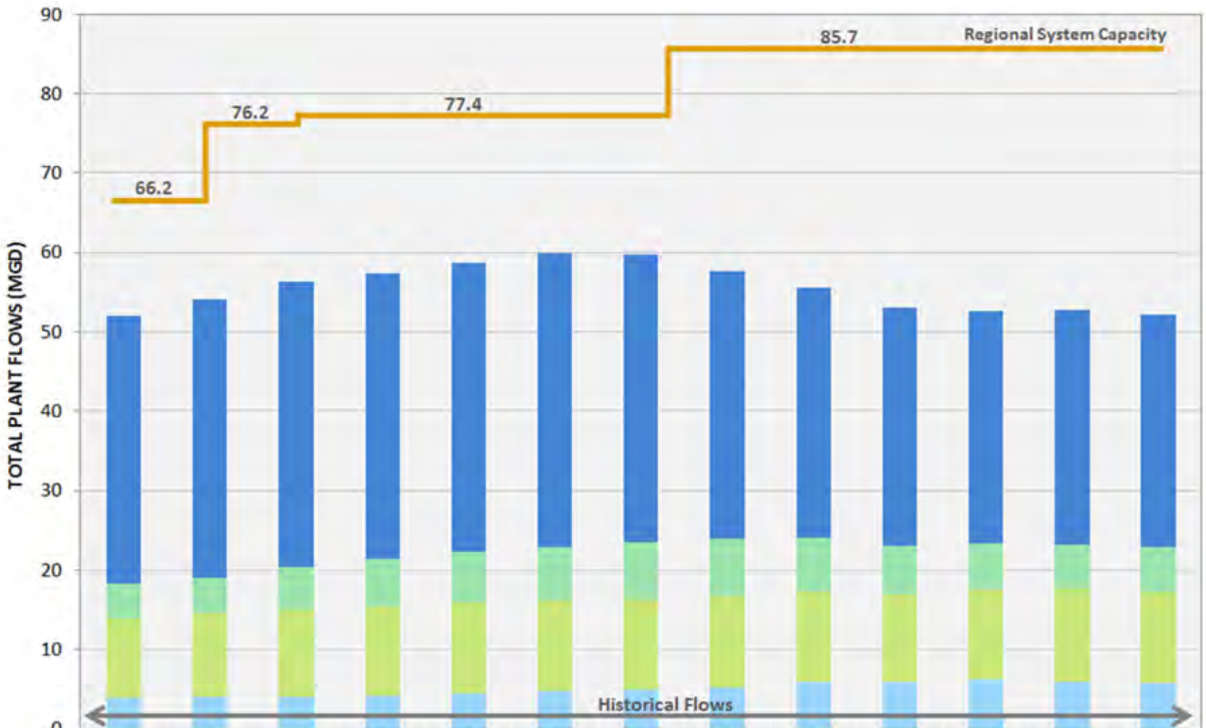


Figure 4-1: Wastewater Flow Pattern and RWRP Flows

The Agency's historical wastewater-flow trend is shown below in Figure 4-2. This figure depicts the raw wastewater from each RWRP's tributary area and the total wastewater for all facilities combined.



	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14
RP-1	33.80	34.97	36.00	35.95	36.46	37.00	36.21	33.70	31.40	30.00	29.30	29.54	29.30
RP-4	4.40	4.60	5.30	6.00	6.30	6.60	7.20	7.30	6.80	6.10	5.70	5.60	5.74
CCWRF	10.02	10.50	10.92	11.29	11.41	11.50	11.41	11.43	11.40	11.10	11.40	11.61	11.40
RP-5	3.80	3.99	4.07	4.18	4.51	4.71	4.91	5.17	5.90	5.90	6.20	6.00	5.76

Figure 4-2: Regional Plant Wastewater Flow History

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5. State of the Assets Summary

5.1. Asset Valuation

The current replacement and depreciated values for Agency assets are summarized in Table 5-1.

Table 5-1: Agency Replacement and Depreciated Values

Asset Group	Acquisition Value	Book Value (Depreciated Value)	Book Value / Replacement Value
Land	$ 14,000,000	$ 14,000,000	100%
Land Improvements	$ 19,000,000	$ 11,100,000	58%
Collection, Outfall & Transfer Lines	$ 120,800,000	$ 59,800,000	50%
Interceptors, Tie-Ins	$ 29,100,000	$ 21,000,000	72%
Recycled Water System	$ 96,600,000	$ 85,300,000	88%
Wells	$ 5,400,000	$ 4,800,000	89%
Reservoirs, Basins, Ponds	$ 104,600,000	$ 83,400,000	80%
Treatment Plants, Pump Stations	$ 216,700,000	$ 122,900,000	57%
Plant Office Buildings	$ 30,000,000	$ 20,300,000	68%
Office Facilities	$ 12,100,000	$ 9,800,000	81%
Equipment	$ 130,100,000	$ 65,600,000	50%
Office Furniture and Fixtures	$ 2,800,000	$ 300,000	11%
Auto and Trucks	$ 3,300,000	$ 200,000	6%
Computer Software	$ 7,900,000	$ 3,800,000	48%
CSLAC-Facility & Capacity Rights	$ 38,200,000	$ 23,800,000	62%
SAWPA-Capacity Rights	$ 12,500,000	$ 6,700,000	54%
MWD Connections	$ 200,000	$ -	0%
Organizational Costs	$ 1,800,000	$ 1,300,000	72%
Total	**$ 845,100,000**	**$ 534,100,000**	**63%**

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6. Long-Term Asset Management

6.1. Long-Range Plan of Finance (LRPF) Model

The Long-Range Plan of Finance (LRPF) aligns the Agency's financial capacity with long-term service objectives. The LRPF uses forecasts to provide insight into the Agency's future financial capacity so that Agency strategies can achieve long-term sustainability of financial and service objectives. Actions taken in the short-term can have implications over multiple years. By projecting financial trends over a long period, the Agency can better anticipate and prepare for necessary adjustments and reduce any sudden impact to its stakeholders and operations. This projection allows for the most cost-effective funding strategy for supporting operations and capital requirements that are in line with established policies and goals of the Agency. As outlined in the FY 2011/12 LRPF, the Agency's financial policies are to

- Maintain programs that are self-supported through user fees and charges;
- Levy moderate rate increases to support program requirements;
- Employ cost containment measures that will ensure achievement of debt-coverage ratio targets recommended by the Board of Directors;
- Maintain adequate fund balances consistent with bond covenant requirements; and
- Minimize the Agency's borrowing costs.

Development of the LRPF is ongoing, with a complete robust and dynamic LRPF model anticipated in summer 2015. Some of the proposed features of the new financial model include extending the scope from 10 to 50 years, execution of multiple "what if" scenarios to highlight the effect of certain variables, and on-screen graphic presentations to more effectively communicate the alternatives and outcomes.

This chapter will be developed further in subsequent Asset Management Plans to present results of modeling work.

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7. Asset Management System Summaries

7.1. Introduction

To assemble a comprehensive description of assets, the Agency developed summaries of each asset management system. These summaries provide the Agency with a useful tool to determine those assets that are most critical to focus on. The Agency assets are organized according to the following twelve systems.

1. Regional Water Recycling Plant No. 1 (RP-1)
2. Regional Water Recycling Plant No. 2 (RP-2)
3. Carbon Canyon Water Recycling Facility (CCWRF)
4. Regional Water Recycling Plant No. 4 (RP-4)
5. Regional Water Recycling Plant No. 5 (RP-5)
6. Recycled Water Distribution (RW) & Ground Water Recharge (GWR) Systems
7. Inland Empire Regional Composting Facility (IERCF)
8. Agency Lift Stations (LS)
9. Regional Conveyance System (RC)
10. Agency Laboratory (Lab)
11. Agency Headquarters (HQ)
12. Business (BIZ) & Process Automation Control (PAC) Networks

When appropriate, systems have been divided into subsystems to aid in the logical presentation of information. For example, the regional water recycling plants have been divided into the following treatment process subsystems.

- Preliminary Treatment
- Primary Treatment
- Secondary Treatment
- Tertiary Treatment
- Solids Treatment
- Dewatering Treatment
- Auxiliary Systems

The Recycled Water & Ground Water Recharge Systems have been divided into the following pressure zone subsystems.

- 800-foot pressure zone
- 930-foot pressure zone
- 1050-foot pressure zone
- 1158-foot pressure zone
- 1299-foot pressure zone
- 1630-foot pressure zone (east and west)

Each summary has been developed by engineers with extensive operations experience to ensure that the systems have been thoroughly evaluated and the critical assets identified.

7.2. Structure of Asset Management System Summaries

The Asset Management System Summaries have been developed with a common base structure, providing a foundation for their continued use and development. The summaries are updated to reflect the current condition of each system. Each system summary follows the structure described below, beginning with a schematic, followed by a project summary table, and culminating in a summary sheet or sheets.

- **System Schematic** – Displays a schematic representation of the system.
- **Project Summary Table for System** – Lists the existing projects relating to the system along with yearly budget allocations over a ten-year period. Please note that Agency departments will individually budget for routine replacement and rehab of system assets, and most of these budgets items will not be summarized in the project summary tables.
- **Subsystem Summaries** – Describes the subsystem of a given system on a single 11 x 17-inch sheet divided into the following six sections:
  - Asset Profile – Describes the assets and their primary functions.
  - Capacity Profile – Describes the key capacity-design values for assets in terms of average flow requirements.
  - Asset Ratings – Presents a summary score on a 1 (best) to 5 (worst) scale, based on the current performance of the asset. The standards for the scoring scale are defined in Appendix A.
  - Key Issues – Lists treatment process and equipment issues (deficiencies) based on performance data and Operations and Maintenance Department Staff knowledge and will indicate which existing project will address the issue. If an issue is not being addressed by an existing project, then the need for a potential project will be noted within the key issue description.
  - History of Select Assets – Provides dates of past capital improvement project activity and of planned or completed condition-assessment reports.
  - Potential Projects – Lists potential projects to consider for addressing deficiencies not being addressed by existing projects.

7.3. Future Development of Asset Management System Summaries

The Agency will continue to maintain, update, and expand Asset Management System Summaries for future Asset Management Plans. The Asset Management System Summary for the Regional Conveyance System could only be partially developed for this Asset Management Plan and will be developed further in the future.

7.4. Asset Management System Summaries

This section starts with Table 7-1 that summarizes Agency-wide projects relating to multiple systems—that is, those not included in project tables for individual systems—followed by the Asset Management System Summaries.

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Table 7-1: Agency-wide Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN12020	Chino Creek Invert Repair	Repair of Chino Creek invert near CCWRF where differential settling occurred. Remove and replace remaining discharge line to the creek.	RC	RP	375,000	0	0	0	0	0	0	0	0	0	375,000
2	EN13056	Agency-Wide HVAC Improvements - Pckg No. 2	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-4 Motor Control Center #5, CCWRF Switchgear Room, RP-4 Main Building and RP-1 Maintenance Building. Replace the evaporative coolers for the CCWRF switchgear with air conditioning system and modify the ventilation system configuration.	RC	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
3	EN15032	Agency-Wide HVAC Improvements-Pckg No. 3	Evaluate electrical and control buildings HVAC systems and provide solutions/upgrades for the RP-1 Chemical Storage Warehouse, RP-5 Control Room, and RP-5 Power Center No. 3. RP-5 Control Room HVAC ducting system will be modified to serve the Control Room via the adjacent SCADA Room air conditioning (AC) system to enhance performance and save energy. Power Center No.3 AC system will be augmented to provide additional cooling for the electrical equipment for reliable operation and extend equipment life.	RC	CC	1,000,000	100,000	0	0	0	0	0	0	0	0	1,100,000
4	EN17003	Aeration System Improvements	Agencywide aeration system improvements. TS currently evaluating membranes: to be completed in 2015. Once complete, will implement across all facilities.	RC	CC	0	0	0	0	0	0	0	250,000	3,000,000	3,000,000	6,250,000
5	EN17004	Agencywide Energy Efficiency Study	Agencywide upgrades to the lighting systems and process equipment systems to improve efficiency. Start design in FY18/19.	RO	OM	200,000	0	0	0	0	0	0	0	0	0	200,000
6	TBD	Agencywide Energy Efficiency Improvements	Agencywide upgrades to the lighting systems and process equipment systems to improve efficiency. Start design in FY18/19.	RO	CC	300,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	4,800,000
7	EP15002	Major Equipment Rehab/Replace	Agencywide annual R&R of major equipment (pumps, heat exchangers, compressors, etc)	RO	EQ	500,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	4,100,000

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
8	PA15001	Underground Piping Rehab Assessments	Annual underground piping rehab Agency wide within facilities.	RO	OM	200,000	200,000	200,000	200,000	200,000	50,000	50,000	50,000	50,000	50,000	1,250,000
9	PA15002	Agency Wide Coatings and Paving	Agencywide annual maintenance for coatings and paving	GG	OM	200,000	200,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	1,200,000
10	PA15008	Major Asset Rehab/Replace	Agencywide annual R&R of major assets (buildings, vehicles, etc)	GG	OM	150,000	50,000	50,000	50,000	150,000	50,000	50,000	50,000	150,000	50,000	800,000
11	SR12001	Agencywide Security Equipment Upgrade	Agencywide Security Equipment Upgrade	RC	CC	0	0	50,000	0	0	0	0	0	0	0	50,000
12	TBD	CEQA document for implementation of WWFMP, IRP, RWPS, etc.		RC	OM	500,000	250,000	0	0	0	0	0	0	0	0	750,000
13	TBD	As Built Database Upgrades (TMP)	Provide a tool to facilitate the search capability of as-builts.	GG	OM	50,000	150,000	0	0	0	0	0	0	0	0	200,000
14	TBD	NRWS OE Projects	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to NRW connections and modifications.	NC	OM	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	100,000
15	TBD	RC OE Projects	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to sewer connections and modifications.	RC	OM	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	500,000
16	TBD	NRWS Emergency O&M Projects	This project will allow Engineering and Construction Management to fund unforeseen NRW O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	NC	OM	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	2,000,000
17	TBD	WC Emergency O&M Projects	This project will allow Engineering and Construction Management to fund unforeseen RW O&M projects	WC	OM	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	5,000,000

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
			that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.													
18	TBD	RC Emergency O&M Projects	This project will allow Engineering and Construction Management to fund unforeseen RC O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RC	OM	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	6,000,000
19	TBD	RO Emergency O&M Projects	This project will allow Engineering and Construction Management to fund unforeseen RO O&M projects that require immediate attention. The project will provide the Agency funds to allow Engineering and Construction Management to facilitate such items as pipeline repairs, property negotiations, and other unforeseen, unbudgeted issues without requesting additional funds (unless absolutely necessary) during a given fiscal year. This project is being budgeted with yearly allocations to be able to handle these issues each fiscal year.	RO	OM	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	600,000	6,000,000
20	TBD	Agencywide Digester Cleaning and Rehab	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment.	RO	OM	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	5,000,000

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
21	TBD	Agency Bypass Pumping Project	Procure pumps for bypass pumping of 20mgd and provide electrical connectivity to MCCs.	RO	EQ	1,000,000	1,000,000	0	0	0	0	0	0	0	0	2,000,000
22	TBD	Regional Wastewater Projects AMP	Facility Asset Management projects as determined in the future.	RO	RP	0	0	0	0	0	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000	50,000,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

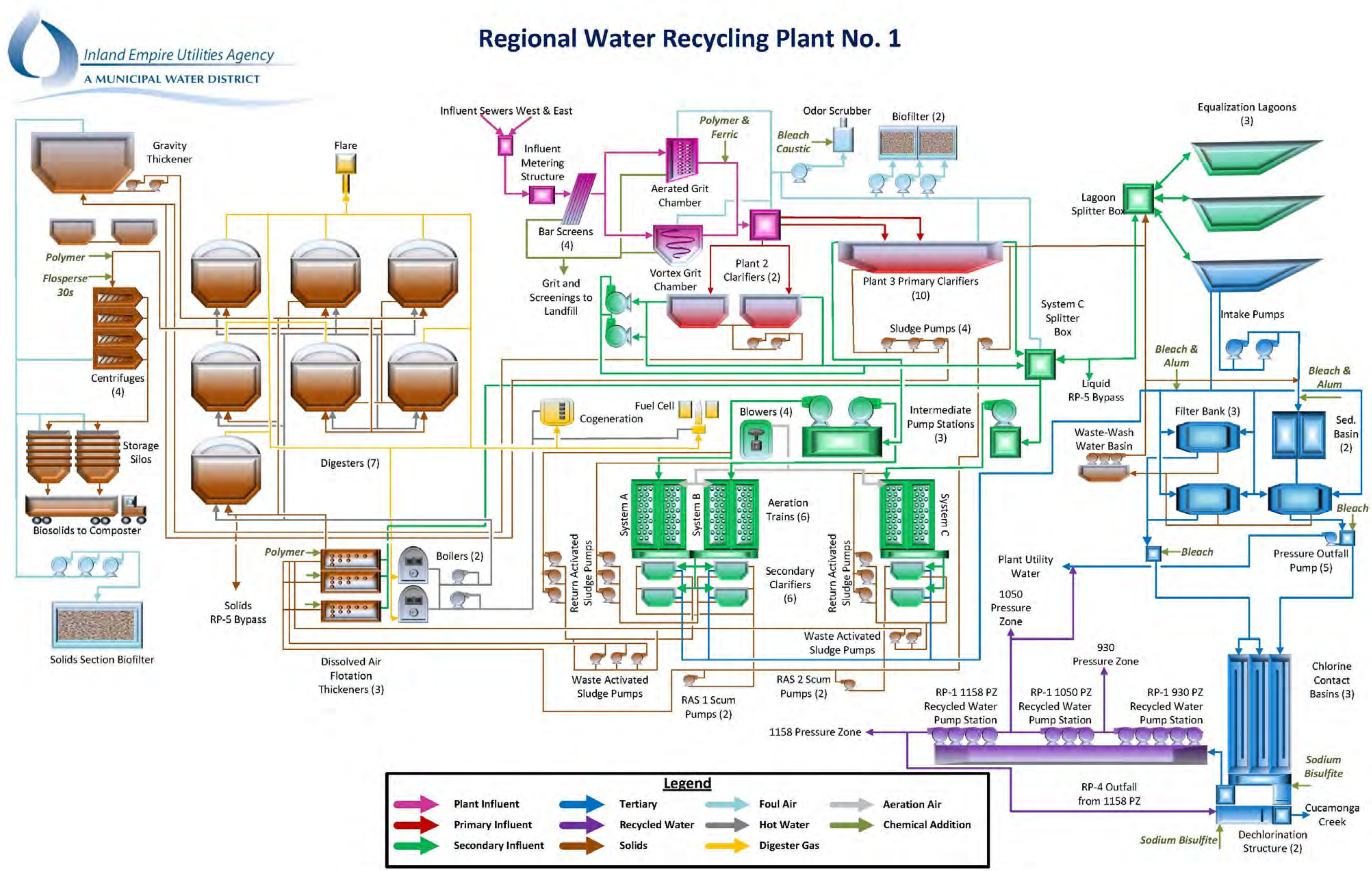

Figure 7-1: Regional Water Recycling Plant No. 1 (RP-1) – Schematic

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Table 7-2: Regional Water Recycling Plant No.1 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN08023	RP-1 Asset Replacement	Redesign needed for the RP-1 Primary Clarifier flights.	RO	CC	600,000	0	0	0	0	0	0	0	0	0	600,000
2	EN11039	TP-1 Disinfection Pump Improvements	Engineering project to upgrade dosing facilities at OES and NES to allow full post filtration chlorination.	RC	RP	95,000	225,000	0	0	0	0	0	0	0	0	320,000
3	EN13046	RP-1 Flare System Improvements	Project to upgrade to pressure regulating valve, replace digester valve, pressure loss evaluation, and pavement addition.	RC	RP	400,000	0	0	0	0	0	0	0	0	0	400,000
4	TBD	RP-1 Flare Improvements	RP-1 flare improvement and gas system upgrades.	RC	RP	0	0	2,000,000	2,000,000	0	0	0	0	0	0	4,000,000
5	EN14019	RP-1 Headworks Gate Replacement	Engineering project to comprehensively rehab and upgrade the Preliminary Treatment Process. Gate Replacement. Start design in FY15/16.	RC	RP	700,000	2,700,000	0	0	0	0	0	0	0	0	3,400,000
6	EN15012	RP-1 East Primary Effluent Pipe Rehab	Rehab of the east primary effluent piping between the rectangular primary clarifiers and the Intermediate Pump Station wet well. Also includes the IPS structure updates	RO	RP	600,000	1,400,000	0	0	0	0	0	0	0	0	2,000,000
7	EN15013	RP-1 TWAS and Primary Effluent Piping Replacement 2014	Failures in the TWAS and primary effluent piping require pipe to be replaced.	RO	RP	350,000	0	0	0	0	0	0	0	0	0	350,000
8	EN15019	RP-1 Odor Control Improvements Evaluation	Odor control improvements (clarifier covers, foul air equipment, etc)	RC	CC	300,000	0	0	0	0	0	0	0	0	0	300,000
9	EN15020	RP-1 Plant 3 Primary Scum Well Upgrade	Potential project to address scum pumping capacity issues, as well as, evaluate MCC in primary pumping gallery.	RC	CC	325,000	0	0	0	0	0	0	0	0	0	325,000
10	EN18004	RP-1 IPS System Improvements	Project to address deficiencies in system (e.g., replace eddy clutches with VFDs)	RC	CC	0	0	250,000	750,000	0	0	0	0	0	0	1,000,000
11	EN19007	RP-1 Primary Effluent EQ Elimination	Scope will be determined by findings of Master Plan update. Potential project to address odor related to equalizing primary effluent.	RC	CC	0	0	0	0	0	0	0	0	2,750,000	2,750,000	5,500,000
12	EN20006	RP-1 Digester Mixing Upgrade	Potential Engineering project to upgrade the digester mixing systems. Start design in FY19/20.	RC	CC	0	0	0	0					250,000	500,000	750,000
13	TBD	Chino Basin Groundwater Supply Wells and Raw Water Pipeline (Plume)	Project Scope Description needs to be defined.	RC	OM	9,000,000	3,000,000	0	0	0	0	0	0	0	0	12,000,000
14	TBD	RP-1 Liquid Treatment Expansion	Expand RP-1 liquid train treatment to 40mgd	RC	CC	0	0	0	0	0	0	0	0	5,700,000	5,700,000	11,400,000

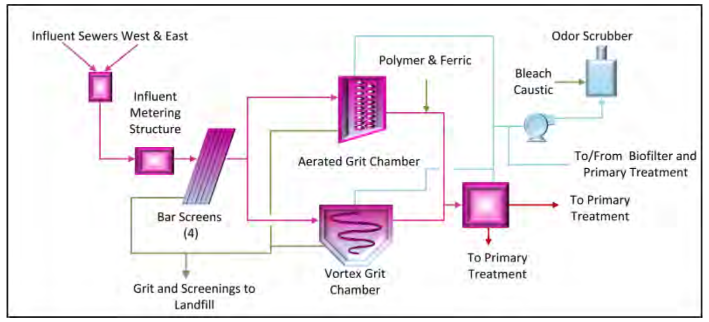
15	TBD	RP-1 Solids Treatment Expansion	Expand RP-1 solids treatment capacity.	RC	CC	0	0	0	0	0	0	0	0	1,617,500	1,617,500	3,235,000
16	TBD	RP-1 Mixed Liquor Return Pump Improvements	Install Mixed Liquor Return pumps to the six aeration trains at RP-1.	RO	EQ	1,000,000	3,000,000	0	0	0	0	0	0	0	0	4,000,000
17	TBD	RP-1 Expansion PDR	As recommended by the WWFMP and also needs to include the Headworks assessment, GT, Odor Control, Septage Dump Station	RC	CC	1,000,000	500,000	0	0	0	0	0	0	0	0	1,500,000
18	TBD	RP-1 NGO Meters Interconnection Agreement Installation	SCE interconnection	RO	CC	800,000	100,000	0	0	0	0	0	0	0	0	900,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (O&M), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – RP-1

Preliminary Treatment Process

1. Asset Profile



Influent Channel and Metering Station
Two main trunk lines (east and west) bring influent sewer flows into RP-1 through the influent structure with gates to divert flow to either of two Parshall flume flow meters. Flow from the influent metering station enters a common channel before the bar screening structure. A septage dump station for private haulers is located upstream of the screening equipment.

Screening Equipment
Gates divert flow to six channels, four mechanical bar screens, one manual bar screen, and one bypass channel. The 5/8-inch spaced bar screens capture large debris, protecting downstream processes. A mechanical climber rake collects debris and drops the screenings on the screening conveyance/disposal system. Liquid flow passes through the bar screen into a common channel that feeds the grit removal systems.

Aerated Grit System
Flow enters a series of three square aerated grit chambers (AGC) through five gates. Three air-lift pumps, supplied by two air blowers, pump collected grit up to the grit washing/disposal system. Air from the blowers also provides air for agitation. Liquid flows pass through gates to a common channel and then to the headworks splitter box.

Vortex Grit System
Flow from the bar screens are directed to the influent of the circular vortex grit chamber. A paddle mixer pushes flow in a circular path; grit collects at the bottom, where it is pumped to the grit washing/disposal system.

Grit Washing/Disposal System
Grit pumped from the AGC and vortex grit chamber enter the Headworks Building where it flows to two grit classifiers. The grit sinks to a submerged screw that pulls the grit out of the water and drops grit into two screw conveyors. The conveyors lift and transport the grit to a roll-off bin. The excess liquid spills out of the grit classifiers and is directed back to the bar screen structure effluent channel.

Screenings Conveyance/Disposal System
Screenings collected by the bar screens are transported by a conveyor and dropped into a hydraulic compactor. The compactor compresses the collected screenings, squeezes out excess water, and pushes the screenings to the roll-off bin.

Ferric Chloride System
Ferric chloride is added to the liquid flow after grit removal to enhance primary treatment and to control sulfide emissions. Ferric chloride can also be valved to the digesters. The ferric station consists of a truck filling station, storage tank, three chemical metering pumps, and associated piping.

Polymer System
Polymer is added the liquid flow after grit removal to enhance primary treatment. The polymer system includes a tote stand, chemical metering pump, mixing chamber, and associated piping.

Headworks Splitter Box
The headworks splitter box receives flow from both grit systems, the bar screens structure bypass, and the overflow from the solids section gravity thickener. Flow can be diverted to the Plant 3 rectangular clarifiers or to the Plant 2 circular clarifiers for primary treatment.

Odor Scrubber
Foul air collected in the preliminary and primary treatment processes is forced through the odor scrubber tower with plastic porous media, where a solution of bleach and caustic soda trickles against the air flow to oxidize hydrogen sulfide and other compounds. The odor scrubber is used to supplement the foul air treatment provided by the biofilter.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	44 MGD	
Influent Channel and Metering Station		
East Sewer	42-inch	
West Sewer	42-inch	
Parshall Flumes	2 @ 55 MGD	Per Unit
Gates	2 units	
Septage Station	1 unit	
Screening Equipment		
Mechanical Screen	4 @ 27.5 MGD	Per Unit
Manual Screen	2 @ 27.5 MGD	
Gates	15 units	
Aerated Grit System		
Chambers	1 @ 44 MGD	
Pumps	3 @ 150 gpm	Per Unit
Blowers	2 @ 360 scfm	Per Unit
Gates	10 units	
Vortex Grit System		
Chamber	1 @ 20.4 MGD	
Pump	1 @ 300 gpm	
Gates	4 units	
Grit Washing/Disposal System		
Classifiers	2 @ 300 gpm	Per Unit
Conveyors	2 @ 3 wet tons per hr	Per Unit
Screening Conveyance/ Disposal System		
Conveyor	5.0 hp	
Compactor	5.0 hp	
Ferric Chloride System		
Tank	13,000 gallons	
Pumps	3 @ 37.4 gph	Per Unit
Polymer System		
Pump	1 @ 4.5 gph	
Headworks Splitter Box		
Gates	3 units	
Odor Scrubber		
Blowers	2 @ 8,000 scfm	Per Unit
Valves	2 units	> 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel and Metering Station	4	2	3	3
Screening Equipment	3	2	3	3
Aerated Grit System	3	3	4	3
Vortex Grit System	4	3	4	5
Grit Washing/Disposal System	3	3	3	4
Screening Conveyance/Disposal System	4	5	3	5
Ferric Chloride System	3	3	3	3
Polymer System	3	3	3	3
Headworks Splitter Box	3	5	3	3
Odor Scrubber	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues

Influent Channel and Metering Station
The east isolation gate leaks. In addition, there is currently no odor control directly tied into the influent channel. A condition assessment planned for 2015 may identify the need for odor control. Project EN14019 will replace the isolation gates.

The septage dump station is out of date and requires manual sampling of the septic flow prior to dumping. A potential project should evaluate a modern septage dump system at the most appropriate location within the Agency. The next major capital project within the preliminary treatment process may address this issue.

Screening Equipment
The bar spacing allows a significant amount of debris to reach downstream processes. A substantial number of the gates are broken and inoperable. In addition, the foul air containment leaks, as evident by internal smoke tests. Project EN14019 will replace the broken and inoperable gates.

Aerated Grit System
The AGC allows large amounts of grit to pass through to downstream processes. Many of the gates are broken and inoperable. Project EN14019 will replace the broken gates and upgrade or replace the AGC.

Vortex Grit System
The vortex grit chamber is not operated because the grit piping clogs frequently when the chamber is in operation. A potential maintenance project will rehab this system.

Grit Washing/Disposal
Recent failures of the classifier and the conveyors screws have indicated excessive wear from heavy use. The availability of spare parts results in parts from both systems being pieced together to have one working system. A potential maintenance project will rehab this system.

Screenings Conveyance/Disposal System
The conveyor equipment is corroded and has limited accessibility for cleaning and repair. The compactor welds and hoses fail regularly (3 to 4 times per year). Maintenance project EP14002 will replace the screenings conveyor and compactor in 2014.

Ferric Chloride System
The ferric chloride system operates effectively, but the equipment is approaching the end of its useful life. Project EN14019 will rehab this system.

Polymer System
This system will be rehabbed by Project EP14002 or EN14019.

Headworks Splitter Box
Many of the gates are broken and inoperable. Project EN14019 will replace these gates.

Odor Scrubber
The odor scrubber is a viable alternative if the primary section biofilter needs to be taken offline.

Table 3 History of Select Assets

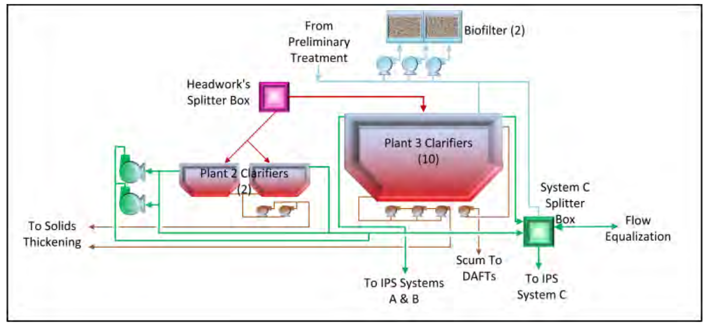
System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel and Metering Station	1977 1987	Planned 14/15
Screening Equipment	1977 1987	Planned 14/15
Aerated Grit System	1987	Planned 14/15
Vortex Grit System	1987	
Grit Washing/Disposal System	1977 1987 2009	
Screening Conveyance/Disposal System	1977 1987	
Ferric Chloride System	1987 1992	
Polymer System		
Headworks Splitter Box	1977	Planned 14/15
Odor Scrubber	1996	

Table 4 Potential Projects

System	Project Name	Project Description
Preliminary Treatment	RP-1 Headworks Rehab	Project to comprehensively rehab and upgrade the Preliminary Treatment Process. Bar Screens and Grit/Sand Removal System.
Grit Washing Rehabilitation	RP-1 Grit Washing and Disposal Upgrades	Upgrade and repair the existing grit washer and conveyor
Influent Channel and Metering Station	Septage Dump System	Provide a modernized septage dump system at the most appropriate location within the Agency.

System Summary Continued on Next Page

Asset Management System Summary – RP-1
Primary Treatment Process
1. Asset Profile



<u>Plant 3</u>
Influent Channel
Two pipes from the headwork's splitter box divert flow to the Plant 3 influent channel. Each clarifier has three gates from the influent channel to allow flow to enter each clarifier. The channel is aerated with air from blowers to keep solids in suspension.

Primary Clarifiers
The rectangular clarifiers consist of chain-driven flights, which push settled solids and collected floatables to a sludge hopper for pumping or to scum troughs for solids processing. Each clarifier consists of three or four effluent troughs with V-notch weirs. The clarifiers are covered for odor control.

Effluent Channel
Each effluent trough discharges into a common channel. Two legs with valves direct flow from the effluent channel to the intermediate pump system A&B wet well or the system C splitter box. The effluent channel is covered and has odor control ducting to the biofilter.

Sludge Pumping System
A series of valves opens and closes to direct solids collected in each clarifier to three pumps, sending flow to solids thickening processes.

Scum System
Scum collected by the primary clarifiers is directed to a common wet well. Periodically a pump will pull from the wet well and pump to solids thickening processes.

<u>Plant 2</u>
Primary Clarifiers
Flow from the headworks splitter box is directed through a flow meter and a series of valves/gates to two circular clarifiers. The clarifiers are center feed with a rotating arm to push solids to a sludge hopper and floatables to the scum removal trough. Effluent from the clarifiers is piped to the Intermediate pump station wet wells. These clarifiers are put in service when flow needs to be diverted from Plant 3, but are not used during normal operation.

Solids Pumping System
Solids collected from the Plant 2 clarifiers are directed to two pumps. The pumps send flow to solids thickening processes in the solids section.

Trickling Filter Pumps
Effluent from the west Plant 2 clarifier can be pumped via the trickling filter pumps to the system C splitter box. The effluent collects in an old trickling filter wet well and is pumped through a series of splitter boxes until it reaches the system C splitter box.

Biofilter
Three blowers pull foul air from the Plant 3 primary clarifiers, system C splitter box, and the preliminary treatment section, forcing the air through two beds of carbon rich media to allow for the biological consumption of hydrogen sulfide and other compounds.

2. Capacity Profile
Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
<u>Plant 3</u>	33.6 MGD	
Influent Channel Blowers	 3 @ 25 hp	 Per Unit
Primary Clarifiers Flight Drives Gates	10 @ 2,400 gpd/ft^2 3,500 ft^2 5 @ 0.5 hp 34 units	Per Unit Per Unit
Effluent Channel Bladder Valves	 2 units	
Sludge Pumping System Pumps	 3 @ 412 gpm 30/20/20 hp	 Per Unit
Scum Pumping System Pump	 1 @ 130 gpm 7.5 hp	 Per Unit
<u>Plant 2</u>	15.1 MGD	
Primary Clarifiers Gates Valve	2 @ 2,400 gpd/ft^2 7,854 ft^2 4 units 1 unit	Per unit
Sludge Pumping System Pumps	 2 @ 175 gpm 15 hp	
Trickling Filter Pumps	2 @ 9,000 gpm 100 hp	
Biofilter Media Blowers Valves	 9,293 ft^2 4.5 ft depth 2 @ 11,700 scfm 40 hp 1 @ 12,205 scfm 50 hp 15 units	 Per Unit > 18-inch

3. Asset Ratings
Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
<u>Plant 3</u>				
Influent Channel	3	3	3	3
Primary Clarifiers	4	1	3	4
Effluent Channel	4	3	3	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	4	3	3
<u>Plant 2</u>				
Primary Clarifiers	3	3	3	3
Sludge Pumping System	3	3	3	3
Trickling Filter Pumps	4	3	4	3
Biofilter	2	3	3	3

* Ratings as defined in Appendix A

4. Key Issues
<u>Plant 3</u>
Influent Channel
The influent channel operates effectively; however, floatable solids have a tendency to collect in the channel, requiring collections crew to make semi-regular cleanings of the channel.

Primary Clarifiers
Small pieces of the chain/flight system break requiring significant maintenance activities to repair. The chain and flight of all the Primary Clarifier are experiencing extensive failures. Remedies are currently being evaluated under project EN08023.

Effluent Channel
The effluent channel is currently in the process of being recoated through Project EN08023.05.It is suspected that the bladder valve leading from the effluent channel to the intermediate pump stations has failed and does not divert flow as originally designed. Recent evaluations of underground piping to the intermediate pump stations have indicated extensive corrosion. Project EN15012 will replace the east primary effluent piping, including structure upgrades.

Sludge Pumping System
No issues require special attention.

Scum System
The scum wet well has limited controls and instrumentation. The floatables form a raft in the wet well, and the scum pump suction pulls from the bottom of the scum box. The floatables are required to be vactored regularly. The scum collection system is currently being retrofitted to a tipping trough under project EN08023; however, EN15020 will address scum accumulation in the wet well is not being addressed; a future project is required.

<u>Plant 2</u>
Primary Clarifiers
The clarifiers are not covered to control odors and have a limited capacity. The current flow meter for the system is a temporary strap-on flow meter placed after the original flow meter and headwork's isolation gate failed. Because of the limited use of these clarifiers, the cost-effectiveness of a rehab will have to be evaluated.

Solids Pumping System
No issues require special attention.

Trickling Filter Pumps
The equipment is left over from an abandoned trickling filter system. Although it's not the original intent, the equipment is used occasionally to increase capacity of the Plant 2 system. The cylinder valve that controls the output of the pumps has corroded and failed requiring repair. A potential maintenance project will address this issue.

Biofilter
The biofilter was constructed on top of the old trickling filter infrastructure. There are several locations of the biofilter that leak. EN15019 should address these leaks as well as evaluate alternative technologies for odor control.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
<u>Plant 3</u>		
Influent Channel	1977 1982	Planned 14/15
Primary Clarifiers	1977 1982 2007 2013	
Effluent Channel	1977 1982 2014	
Sludge Pumping System	1977 1982	
Scum System	1977 1982 2013	
<u>Plant 2</u>		
Primary Clarifiers	1966 1987 1997	Planned 15/16
Solids Pumping System	1966 1985 1987	
Trickling Filter Pumps	1966	
Biofilter	2008 2013	

Table 4 Potential Projects

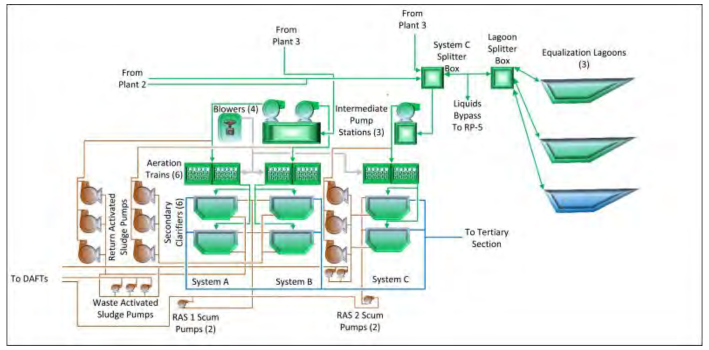
System	Project Name	Project Description
Trickling Filter Pumps	RP-1 Cylinder Valve Repairs	Repair the cylinder valve that controls the output of the Trickling Filter Pumps

<u>System Summary Continued on Next Page</u>

Asset Management System Summary – RP-1

Secondary Treatment Process

1. Asset Profile



Intermediate Pumps Stations
Primary effluent flows to the intermediate pump station wet wells. The wet wells can divert high flows to the flow equalization system. Three sets of pumps (System A – 3 pumps, System B – 3 pumps, System C – 4 Pumps) pump to each designated aeration system.

Flow Equalization System
Primary effluent can flow to three flow equalization lagoons to hold flows and introduce them back to the intermediate pump station at a later time. Flow is diverted to the three lagoons via motorized gates. Two lagoons have floating aerators to slow the rate at which the stored flows become septic.

Activated Sludge System
The three activated sludge systems consist of two aeration trains each (six total). Influent gates divert a combined flow of primary effluent and return activated sludge to each train. Each train consists of four basins. The first basin mixes flows with a paddle mixer. The next three basins can add air via the fine bubble diffusion system supplied by four large blowers with automated valves to control the dissolved oxygen concentrations such that biochemical oxygen demand and total inorganic nitrogen removals are optimized.

Secondary Clarifiers
Effluent from two aeration trains flows in a common channel to two circular clarifiers per system (six in total). Each peripheral feel clarifier has a rotating sludge and skimmer arm. Solids settle out of the liquid flow and are pushed to a center sludge hopper for pumping. Liquid overflows the V-notched weirs.

Return Activated Sludge (RAS) Pumping System
The settled sludge in the secondary clarifiers is pumped back to the influent of the aeration system as return activated sludge (RAS) to mix with primary effluent from the intermediate pump station. The organisms in the RAS must be returned to sustain the biological process. Also, the RAS flow returns nitrate for further removal. Each system has three dedicated pumps (nine in total). The return activated sludge and wasted activated sludge pumps are located inside two separate buildings: RAS 1 (Systems A and B) and RAS 2 (System C).

Waste Activated Sludge (WAS) Pumping System
The waste activated sludge (WAS) pumping system controls the activated sludge (biomass) concentrations in the aeration system. A portion of the settled solids from the secondary clarifiers is pumped out of the secondary system to solids processing as WAS.

Scum Pumping System
Scum collected by the skimmer arm of the secondary clarifiers is routed to two scum wells, where it is pumped out of the system to solids processing.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	50 MGD	
Intermediate Pump Station		
System A Pumps	3 @ 4,200 gpm 60 hp	Per Unit
Valves	4 units	> 18-inch
System B Pumps	3 @ 5,600 gpm 75/60/60 hp	Per Unit
Valves	5 units	> 18-inch
System C Pumps	4 @ 5,600 gpm 75 hp	Per Unit
Valves	5 units	> 18-inch
Gates	5 units	
Flow Equalization System		
Lagoon 1	1 @ 5.8 MG	
Lagoon 2	1 @ 6.2 MG	
Lagoon 3	1 @ 10.3 MG	
Gates	3 units	
Activated Sludge System	2 @ 14.1 MGD 1 @ 15.9 MGD	
Blowers	4 @ 13,426 scfm 700 hp 9.25 psig	Per Unit
System A & B		
Trains	4 @ 1.91 MG	Per Unit
Depth	17.8 ft	
Mixers	4 @ 15 hp	Per Unit
System C		
Trains	2 @ 1.96 MG	Per Unit
Depth	17.8 ft	
Mixers	2 @ 15 hp	Per Unit
Air Panels	142 per train	
Gates	22 per train	
Valve	1 per system	> 18-inch
Valves (air)	6 units	> 18-inch
Secondary Clarifiers		
System A & B	4 @ 700 gpd/ft^2 11,310 ft^2	Per Unit
System C	2 @ 700 gpd/ft^2 13,273 ft^2	Per Unit
RAS Pumping System		
RAS 1: Pumps	6 @ 5,600 gpm 60 hp	Per Unit
RAS 2: Pumps	3 @ 5,600 gpm 60 hp	Per Unit
Valves	40 units	> 14-inch
WAS Pumping System		
RAS 1: Pumps	3 @ 450 gpm 7.5 hp	Per Unit
RAS 2: Pumps	2 @ 600 gpm 7.5 hp	Per Unit
Scum Pumping System		
RAS 1	2 @ 400 gpm	Per Unit
RAS 2	2 @ 200 gpm	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Intermediate Pump Stations	4	3	4	3
Flow Equalization System	3	3	3	3
Activated Sludge System	3	4	4	4
Secondary Clarifiers	3	4	3	3
RAS Pumping System	3	3	3	3
WAS Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues

Intermediate Pump Stations
EN18004 will install new variable frequency drive technology to replace older clutch drives. The System C primary effluent splitter box concrete is corroding, and the gates are not functional. A potential engineering project is needed to address this area. Project EN15012 will replace the east primary effluent piping, including structure upgrades to System C.

Flow Equalization System
Recent crack-repair projects have eliminated the cracks in one of the lagoons. Operations and Maintenance staff monitor the status of cracks in the lagoons. Project EN19007 will provide odor control for the flow equalization system or will provide the ability to equalize secondary effluent.

Activated Sludge System
Leaks in the air ducting system will be addressed by Project EN12022 in 2014/5. A potential project will address upgrades to improve nutrient removal (e.g., mixed-liquor recirculation and anoxic mixers).

Secondary Clarifiers
A rehab of Clarifier No.1 and 2 was done in 2008. A potential project will rehab Clarifier No.5 and 6, including upgrading the weir and launder washing system for algae control.

Return Activated Sludge (RAS) Pumping System
A Maintenance project will address the rehab of valves and flow meters.

Waste Activated Sludge (WAS) Pumping System
The waste activated sludge piping clogs frequently. Flush water is provided; however, the plugging reduces process efficiency. Project EN15020 will address this issue.

Scum Pumping System
The scum discharge piping combines with flow from primary Plant 3 scum pumping system. When all the pumps are running at the same time, the pump station output decreases dramatically, reducing process reliability. This issue will be addressed by Project EN15020.

Table 3 History of Select Assets

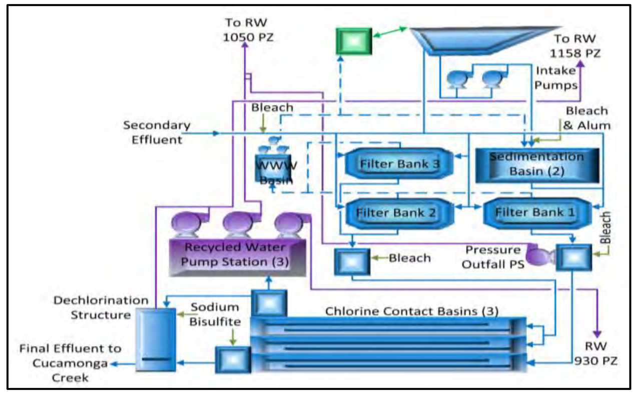
System	Capital Improvement Project Activity	Condition Assessment Report
Intermediate Pump Stations	1977 1987	
Flow Equalization System	1977 1987 1995 2013	
Activated Sludge System	1977 1987 1997	
Secondary Clarifiers	1977 1987	1: Planned 15/16 2: Complete 14/15 3: Planned 15/16 4: Planned 15/16 5: Planned 15/16 6: Complete 14/15
RAS Pumping System	1977 1987	
WAS Pumping System	1977 1987	
Scum Pumping System	1977 1987	

Table 4 Potential Projects

System	Project Name	Project Description
Activated Sludge System	RP1 MLR Pump Improvements	This project will install mixed liquor return pumps into the activated sludge system to improve nutrient removal.
Secondary Clarifiers	RP1 Secondary Clarifier Rehab	This project will rehab Clarifiers 5 and 6 and will upgrade the weir and launder washing system for algae control.
Plant Expansion	RP-1 Capacity Expansion	Expand existing RP-1 liquid and solids treatment capacity.

System Summary Continued on Next Page

Asset Management System Summary – RP-1
Tertiary Treatment Process
1. Asset Profile



Intake Pump Station
Secondary effluent is conveyed across the Cucamonga Creek through a 60-inch pipeline, which feeds the tertiary section or can be diverted to Lagoon 3. The intake pumps convey flow from Lagoon 3 to the sedimentation basin.

Aluminum Sulfate (Alum) System
The aluminum sulfate system consists of two large storage tanks, four pumps, piping, and appurtenances. Alum is added to the process at two locations: (1) flash mixer (FM) 1 and (2) flash mixer 2. FM-1 injects chemical into the main feed to the tertiary section. Alum is a coagulant that helps with the removal of suspended materials in the flow path. FM-2 injects alum to into the sedimentation basin influent flow, acting as a coagulant for the suspended material from the waste-wash water basin

Sedimentation Basin
The sedimentation basin can receive tertiary section drainage and filter backwash water from the waste-wash water basin. The flow is mixed with aluminum sulfate at FM-2 and introduced to the mixing tank. The solids in the flow coagulate and settle to the bottom of the tank. The collected solids are pumped to solids processing, while the overflowing liquid is sent to the filters.

Chlorination System
Three chemical tanks hold 12.5 percent bleach. Two pumps draw from the tanks to feed an injection point ahead of the filters at FM-1. Two additional pumps supply chlorine to a looped pipe system from the tanks to the filter effluent structures (OES and NES). The effluent structures each have a duty and standby peristaltic dosing pump. The duty pumps inject bleach through a mixer into the process streams. Chlorine residual is measured throughout the tertiary process to control the chlorine dose.

Filters
There are three filter banks, consisting of a total of 26 down-flow filters. The flow travels through layers of anthracite, sand, and gravel. The filters are regularly backwashed to remove the solids that have been filtered from the secondary effluent. Backwash water is sent to the waste-wash water basin and pumped back into the lagoons or sedimentation basin.

Waste-Wash Water (WWW) Basin
The waste-wash water (WWW) basin collects drainage from the entire tertiary section of RP-1 and also collects filter backwash and leakage from the three filter banks. The collected water is pumped by three pumps to: (1) equalization lagoons or (2) the sedimentation basin.

Filter Effluent Structures
Flow from the filters enters OES or NES. The structures are equipped with chlorine analyzers and peristaltic bleach pumps to maintain the chlorine residual set point at the end of each effluent structure. Chlorinated flow is conveyed to the chlorine contact basins.

Chlorine Contact Basin (CCB)
The chlorine contact basins (CCB) have a serpentine flow path that allows for the injected chlorine to gain contact time with the treated water to meet permit requirements. The contact basins are covered and have continuous monitoring of chlorine residual. Flow from all three contact basins merge into a common effluent channel and flow to the CCB splitter box.

Effluent Splitter Box
Flow entering the CCB splitter box is directed to the dechlorination structure, recycled water wet well, or the pressure outfall pipeline. Flow is controlled by gates.

Dechlorination System
Flow entering the dechlorination structures is dosed with sodium bisulfite (SBS) and travels through a serpentine flow path to allow for the SBS to neutralize any chlorine residual before flowing into Cucamonga Creek. SBS is stored in two large chemical tanks and is metered into the system via six chemical metering pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	44 MGD	
Intake Pump Station	2 @ 14,000 gpm 60 hp	Per Unit
Alum System Tanks Pumps	 2 @ 20,000 gallons 2 @ 20.25 gph 1 @ 32.20 gph 1 @ 58.50 gph	
Sedimentation Basin Total Weir Length Total Settling Tube Area Chemical Mixer Traveling Bridge Pump	 800 ft 7,600 ft^2 8 @ 3 hp 1 @ 1.5 hp 2 @ 130 gpm	
Filters Bank No.1 Bank No.2 & 3 Filter Loading Rate Valves	 8 @ 299 ft^2 18 @ 299 ft^2 5 gpm/ft^2 118 units	 Per Unit Per Unit 12 - 42-inch
Waste-Wash-Water Basin Pumps Valve	 3 @ 2,100 gpm 2 units	 Per Unit > 18-inch
Filter Effluent Structures Gate Valves	 4 units 2 unit	 > 18-inch
Chlorination System Tanks ME-18 Pumps OES Pumps NES Pumps Mixers	 3 @ 10,300 gal 2 @ 317 gph 2 @ 205 gph 2 @ 205 gph 3 water champs	 Per Unit Per Unit Per Unit Per Unit
Chlorine Contact Basins Gates Valves	3 @ 1.3 MG 6 units 1 unit	Per Unit >18-inch
Effluent Splitter Box Gates	 3 units	
Dechlorination System Tanks Pumps	 2 @ 12,500 gal 4 @ 9-90 gph 2 @ 2-20 gph	 Per Unit Per Unit Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Intake Pump Station	3	3	3	3
Alum System	4	3	3	3
Sedimentation Basin	5	3	3	4
Chlorination System	4	3	4	4
Filters	3	3	3	3
Waste-Wash Water Basin	3	3	3	3
Filter Effluent Structures	4	3	3	3
Chlorine Contact Basins	3	3	3	3
Effluent Splitter Box	3	3	3	3
Dechlorination System	2	2	3	3

* Ratings as defined in Appendix A

4. Key Issues

Intake Pump Station
No issues require special attention.

Aluminum Sulfate (Alum) System
The main alum pumps feeding FM-2 have not been run since the sedimentation basin was taken offline. The pumps will be rehabilitated under project EN11039 in order to put the sedimentation basin back in service.

Sedimentation Basin
The sedimentation basin has not been in operation for several years after the sludge line to solids processing was found to be leaking. During this time the settling tubs were removed from one of the tanks. EN11039 will rehabilitate this system.

Chlorination System
Project EN11039 will upgrade this system to provide more efficient and effective chemical dosing for full post filtration.

Filters
The filters backwash valves leak continuously sending flow to the waste-wash water basin, where the flow must be pumped, resulting in process inefficiencies. Some of the observed underground pipe appears to have significant corrosion. A potential maintenance project will address the valve issue and rehab the internals components of the filters.

Waste-Wash Water (WWW) Basin
The increased on/off cycling of the WWW-basin pumps from the leaking filter-backwash valves results in significantly higher run time than expected. This problem will be addressed by a potential maintenance project.

Effluent Structures
Rails used to mount chemical mixing equipment are corroded and need repair. EN11039 will address this corrosion issue.

Chlorine Contact Basins (CCB)
A potential maintenance project will rehab these basins and address any leaks.

Effluent Splitter Box
No issues require special attention.

Dechlorination System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Intake Pump Station	1977	
Alum System	1977 1998	
Sedimentation Basin	1977 1998	Planned 15/16
Chlorination System	1977 2004	
Filters	1977 1982 1987	Planned 15/16
Waste-Wash Water Basin	1977 1987	
Filter Effluent Structures	1977 1987	
Chlorine Contact Basins	1997	
Effluent Splitter Box	2002	
Dechlorination System	1992 2011	

Table 4 Potential Projects

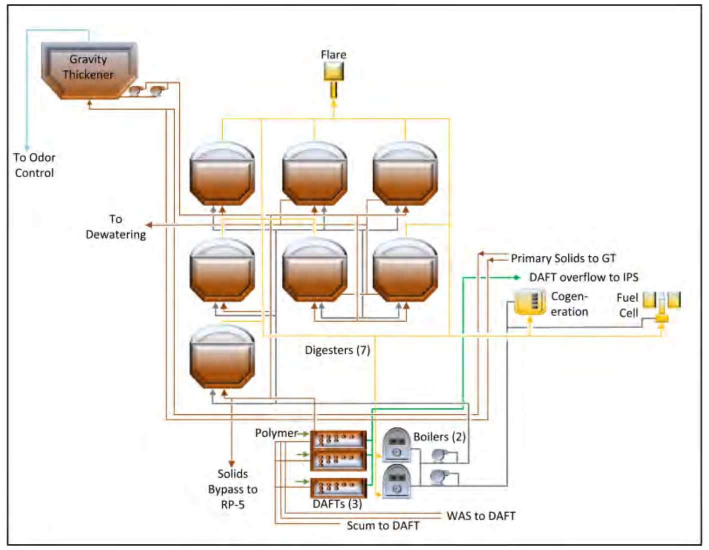
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RP-1

Solids Treatment Process

1. Asset Profile



Gravity Thickener System
Solids collected from the primary clarifiers are pumped to the gravity thickener (GT) and mixed with sweetener water supplied by the utility water system. Solids are allowed to settle to the bottom of the GT. Solids are increased from 1 percent total solids to 2 to 4 percent total solids. The thickened solids are pumped to the digestion system. The liquid overflow is conveyed back to the RP-1 headworks splitter box.

Dissolved Air Flotation Thickener (DAFT) System
The three DAFTs receive solids from the scum collection systems of the primary and secondary clarifiers and also receive waste activated sludge from the secondary system. Solids entering the DAFTs are mixed with recycled flow that has been pressurized with compressed air from two large compressors and dosed with polymer. Solids float to the top, where they are skimmed off and pumped to the digestion system. Solids are thickened from ~1 percent to 4 percent total solids through this process. The liquid underflow of the DAFT flows to the system C splitter box. A solids bypass allows for the diversion of solids to the regional collection system, which flows to RP-5.

Digestion System
Seven digesters receive thickened sludge. Digesters 1 and 2 have floating domes, while Digesters 3, 4, 5, 6, and 7 have fixed covers. The hot water system provides heat, and the sludge recirculation system transfers heat to maintain temperatures from 97 to 128 degrees Fahrenheit. Each recirculation system is equipped with a grinder. Gas-mixing systems mix the contents of the digesters. Gas piping connected to the top of each digester allows the produced gas to enter the gas conveyance system. Several pressure/vacuum relief valves and J-tube safety blow-offs are on each digester to prevent over and under pressurization.

Sludge Transfer System
To allow for phased digestion, RP-1 is equipped with several pump stations and automated valves to transfer sludge throughout the digestion system. The transfer system is designed to offer the greatest flexibility of transferring sludge to each of the seven digesters. Valves are operated from a centralized compressed air system.

Hot Water System
The hot water system consists of two loops: (1) primary (heating) and (2) secondary (delivery). The primary loop collects heat from heat exchangers at the boilers and the fuel cell (note: fuel cell owned by private firm). The secondary loop pulls heated water from the primary loop and sends it to the heat exchangers at each digester. Two boilers are fueled by digester or natural gas, or both. The cogeneration heat exchangers collect heat from the water jacket and the exhaust of the cogeneration engines when the engines are in service. The fuel cell has a heat exchanger on the exhaust stack that collects waste heat.

Gas Conveyance and Waste Gas System
Gas collected from the digestion system enters the gas loop, which can deliver low-pressure gas to the compressors for use in the boiler or fuel cell or to the flare. The gas loop has several J-tubes to prevent over-pressurization. Iron sponges are used to remove hydrogen sulfide from the digester gas. Digesters 1 and 2 have a waste gas line that can deliver low-methane content gas directly to the flare.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Solids Treatment Process	60 MGD	
GT System Tank Drive Pumps	 1 @ 299 gal/ft^2/day 3,848 ft^2 1 @ 1.0 hp 2 @ 150 gpm 15 hp	 Per Unit Per Unit
DAFT System Tanks Recirculation Pumps Sludge Pumps Polymer Blending Units Pressurization Tanks Compressors	 3 @ 85 gal/ft^2/day 2,100 ft^2 3 @ 1,260 gpm 6 @ 200 gpm 4 @ 8.0 gph 3 @ 2,000 gal. 2 @ 40 hp	 Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit
Digester System Digester No.1 & 2 Digester No.3 & 4 Digester No.5 Digester No.6 & 7 Recirc. Pumps Heat Exchangers Tube in Tube Spiral Gas Mixers	 2 @ 112,122 ft^3 2 @ 99,500 ft^3 1 @ 172,995 ft^3 2 @ 224,332 ft^3 5 @ 600 gpm 30 hp 2 @ 500 gpm 30 hp 1 @ 6.0 MMBTU/hr 6 @ 1.5 MMBTU/hr 4 @ 504 SCFM 30 hp 3 @ 3,839 SCFM 70 hp	 Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit
Sludge Transfer System Transfer A Pumps Transfer B Pumps	 2 @ 400 gpm 6 @ 400 gpm	 Per Unit Per Unit
Hot Water System Boiler Fuel Cell Primary Loop Pumps Secondary Loop Pumps	 2 @ 10.5 MMBTU/hr 1 @ 4.4 MMBTU/hr 2 @ 25 hp 900 gpm 3 @ 15 hp 550 gpm	 Per Unit Per Unit Per Unit
Gas Conveyance System Flare Iron Sponges	 1 @ 40,000 SCFH 2 @ 210 ft^3 1 @ 546 ft^3 1 @ 350 ft^3	 Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Gravity Thickener System	3	5	3	3
DAFT System	3	3	3	3
Digester System	3	3	3	3
Sludge Transfer System	2	2	2	3
Hot Water System	3	3	3	3
Gas Conveyance System	4	3	4	3

* Ratings as defined in Appendix A

4. Key Issues

Gravity Thickeners System
Currently, the gravity thickener is heavily loaded, and regular upsets require the diversion of primary solids to the DAFT system or the bypass system. A potential project will address optimizing the current thickening system or addressing alternative sludge thickening methods.

Dissolved Air Flotation Thickeners (DAFT) System
A potential project will address upgrades to this system. Project EN15013 will replace above-ground sludge piping to the digester system.

Digester System
Maintenance has an established regimen to clean and rehab one digester a year to remove collected grit, replace piping, install new seals, and maintain critical pieces of equipment. A potential engineering project will upgrade the mixing systems in 5–10 years. Digester No 4's dome is currently being recoated under maintenance project EP15001. The exterior coating of Digesters 6 and 7 are starting to experience failures and will be repaired by a maintenance project.

Sludge Transfer System
The sludge transfers system was designed to be robust. However, during phased digester with an acid phase digester online, there is a single point of failure on the main transfer pump from the first/acid phase to the second phase digesters. Project EN2006 will upgrade the mixing systems in 5–10 years.

Hot Water System
To meet the strict emission requirements of the Southern California Air Quality Management District, the Agency installed new boilers in FY2012/13. The fuel cell heat exchanger was also installed in FY2012/13. The new additions and limited time of operations have posed challenges for operations related to the controls of the boiler system.

Gas Conveyance System
Project EN13046 will upgrade the flare system and piping system to ensure adequate control of the digester gas pressures. Project PA140001 will replace the iron sponges at the Energy Recovery Building that are starting to deteriorate. A potential project is needed to size the digestion flare system to meet peak digester gas projection.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Gravity Thickener System	1987	2013
DAFT System	1977 1987	
Digester System	1975 1977 1985 1982 1992 1999 2008	1: Complete 2010 2: Complete 2010 4: Complete 2014
Sludge Transfer System	2008	
Hot Water System	1977 1985 2012	
Gas Conveyance System	1975 1985 2008	Planned 15/16

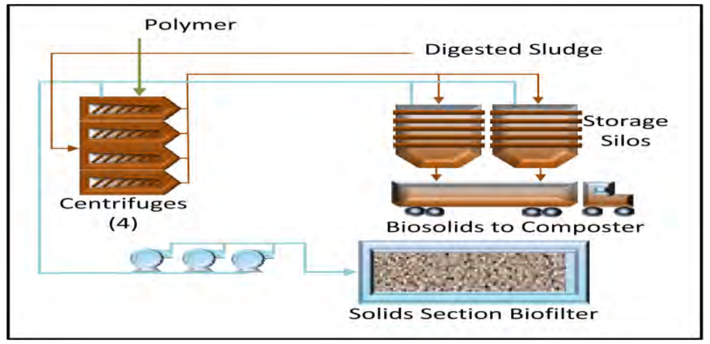
Table 4 Potential Projects

System	Project Name	Project Description
Gravity Thickener System and DAFT System	RP-1 Sludge Thickening Upgrades	Project to upgrade the sludge thickening processes for primary and secondary sludge.
Digester System	Digester Cleaning and Rehab	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment. Include in Agency-wide TYCIP.
Gas Conveyance System	RP-1 Flare Improvements	RP-1 Flare improvements and gas system upgrades.

System Summary Continued on Next Page

Asset Management System Summary – RP-1
Dewatering Treatment Process

1. Asset Profile



Sludge Grinding System
Two inline grinders ensure that large solid objects in the sludge flow are broken up into small pieces to limit the possibility of large objects causing obstructions in downstream piping or equipment.

Sludge Feed Pump System
Four rotary lobe pumps pull sludge from the grinders and pumps flow to the influent of the centrifuges. The sludge pumps are variable speed with flow meters, instrumentation, and controls. A series of cross-connects in the pump discharge piping allows for sludge pumps to feed different centrifuges.

Polymer Blending System
Totes of polymer are transferred to a large day tank via two rotary lobe transfer pumps. Four polymer blending units meter polymer and dilution water to a mixing chamber. The discharge of the polymer blending unit is conveyed through a network of pipes and cross connection valves to three separate dosing points in the sludge piping.

Centrifuge System
The sludge flow mixed with polymer enters the feed tube of the centrifuge and discharges into a spinning bowl. The centrifugal force of the spinning bowl forces the heavier solids to the edge of the bowl and the centrate to rest on top of the solids. A scroll, spinning slightly faster than the bowl, scrapes the solids around the edge of the bowl to one end of the centrifuge, up a beach, and into the discharge shoot to the conveyor. The bowl has dam plates to maintain a depth of centrate until it overflows at the other end to the centrate wet well.

Conveyor System
Two separate screw conveyor systems, configured in parallel, collect dewatered solids (cake) from each centrifuge. Solids are diverted to each system via a diverter gate and then through a series of shaftless screws until solids are discharged into the storage silos.

Storage Silo System
Solids from the conveyor system are dropped into two separate storage silos. The silos hold collected cake until a loading sequence is initiated, and solids are dropped through a series of gates and discharge screws into a truck trailer for hauling to an offsite facility.

Centrate and Drainage Pump System
Centrate collected from the centrifuge operation is conveyed to the centrate pump station where it is pumped to the Non-Reclaimable Wastewater System. The centrate pumps are variable speed to maintain a wet well level. Process flows generated during centrifuge startup and shutdown are conveyed to the drainage pump station, where they are pumped back into the RP-1 process by constant speed drainage pumps.

Anti-Struvite System
Five pumps pull chemical from a storage tote and inject into the centrate pipes of each centrifuge and the centrate wet well. The chemical inhibits Struvite formation that forms naturally in centrate and adheres to walls of downstream piping.

Odor Control/Biofilter System
Three blowers pull foul air from the gravity thickener, miscellaneous sumps, and either the belt press or centrifuge buildings, forcing the air through a bed of carbon-rich media to allow for the biological consumption of hydrogen sulfide and other compounds.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Dewatering Treatment Process	60 MGD	
Sludge Grinding System	2 @ 10 hp	Per Unit
Sludge Feed System Pump	 4 @ 360 gpm	 Per Unit
Polymer System Blending System	 4 @ 5 to 30 gph	 Per Unit
Centrifuge System Centrifuge	 4 @ 360 gpm	 Per Unit
Conveyor System	2 trains w/ 5 conveyors ea. from 7.5 to 30 hp	
Storage Silo System	2 @ 5,636 ft^3	Per Unit
Centrate Pump System Drainage Pump System	3 @ 450 gpm 2 @ 450 gpm	Per Unit Per Unit
Anti-Struvite System Pump	 4 @ 4.0 gpm 1 @ 8 gpm	 Per Unit
Odor Control/Biofilter System Blower Media Depth Valves	 1 @ 4,600 scfm 2 @ 13,700 scfm 5 ft 10 units	 Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Sludge Grinding System	1	3	3	3
Sludge Feed Pump System	1	2	3	3
Polymer Blending System	3	2	3	4
Centrifuge System	1	2	3	3
Conveyor System	1	3	4	3
Storage Silo System	1	3	3	3
Centrate and Drainage Pump System	1	3	3	3
Anti-Struvite System	1	2	3	3
Odor Control/Biofilter System	3	3	4	3

* Ratings as defined in Appendix A

4. Key Issues

Sludge Grinding System
No issues require special attention.

Sludge Feed Pump System
No issues require special attention.

Polymer Blending System
The current polymer blending units are no longer being supported by the manufacturer, and small linkages that control water valves failure regularly. A potential project will review the potential replacement or modification to these systems.

Centrifuge System
The Centrifuge System will be evaluated in 2015 to assess the effectiveness of the Anti-Struvite System.

Conveyor System
The inclined conveyors have been determined to be inaccessible for routine maintenance. Engineering project EN06015 is currently addressing these access issues.

Storage Silo System
No issues require special attention.

Centrate Drainage Pump System
No issues require special attention.

Anti-Struvite System
No issues require special attention.

Odor Control/Biofilter System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Sludge Grinding System	2013	
Sludge Feed Pump System	2013	
Polymer Blending System	2013	
Centrifuge System	2013	Planned 15/16
Conveyor System	2013	Planned 17/18
Storage Silo System	2013	Planned 17/18
Centrate and Drainage Pump System	2013	Planned 17/18
Anti-Struvite System	2013	Planned 17/18
Odor Control/Biofilter System	2003	Planned 17/18

Table 4 Potential Projects

System	Project Name	Project Description
RP-1 Centrifuge Polymer Blending Units	RP-1 Poly Blending Units Replacement	This project will replace the polymer blending units at the RP-1 Centrifuge Building.

System Summary Continued on Next Page

Asset Management System Summary – RP-1

Auxiliary Systems

1. Asset Profile

RP-1 Plant Drain
The RP-1 plant drain collects and pumps surface runoff from storm events, wash-down water, and drains some of the treatment plants tanks and processes in the preliminary, primary, secondary, solids, and dewatering sections. The drain system receives gravity flows to a wet well, where it is pumped to the System C splitter box.

TP-1 Plant Drain
The TP-1 plant drain collects and pumps surface runoff from storm events, wash-down water, and drains TP-1 tanks and processes in the tertiary section. The drain system receives gravity flows to a wet well, where it is pumped to the waste-wash water basin. A second pump station (West Wind Storm Water Pump Station) collects surface runoff and pumps water to the main TP-1 Plant Drain wet well.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 Power Reliability Building, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-1 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. Three generators are located in the Energy Recovery Building and supply power to the preliminary, primary, secondary, solids and dewatering sections. One generator supplies power to the tertiary section. A final generator supplies power to the Dechlorination System.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used for cleaning, supplying pump seal water, cooling, dilution, flushing of clogged pipes, irrigation, and other inner plant uses. The system can be supplied by the 1050-foot pressure zone pump station or the pressure outfall (PO) pump station. The PO pump station is operated on occasion during shutdowns and other activities to supply process water to the treatment plant. The utility water system piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on Philadelphia Street and another service on Walnut Avenue from the city of Ontario. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-1. Nearly all of the processes at the plant are observed and controlled from a centralized control system known as the Supervisory Control and Data Acquisition or SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to three main control terminals at (1) Main Control Building, (2) Dewatering Building, and (3) the Tertiary Control Building.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 Plant Drain	2 @ 1,585 gpm 40 hp	
TP-1 Plant Drain	2 @ 1,000 gpm 15 hp	
Electrical System Utility Voltage Transformers Switchgear Distribution RP-1 Generator TP-1 Generator Dechlorination Generator Mounted Lighting	 12 kV 12 kV to 480 V 2 @ 12 kV to 4,160 V 1 @ 12 kV 22 @ 480 V 1 @ 4160 V 3 @ 1,250 kW 1,801 Bhp 1 @ 670 kW 896 Bhp 1 @ 30 kW > 145 units	 MCCs MCCs
Utility Water System Pipelines Pressure Outfall Pump Station	 Various sizes 3 @ 800 gpm 2 @ 1500 gpm	
Potable Water System Backflow Devices	 31 units	
Instrumentation and Control System HMI Workstations PLC I/O Hub Radio Transmitter	 6 Units 16 Units 1 unit	
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 Plant Drain	3	3	3	3
TP-1 Plant Drain	4	4	4	4
Electrical System	4	4	3	3
Utility Water System	4	3	4	4
Potable Water System	3	3	4	3
Instrumentation and Control System	3	3	3	3
Yard Piping	TBD	3	3	3

* Ratings as defined in Appendix A

4. Key Issues

RP-1 Plant Drain
No issues.

TP-1 Plant Drain
The West Wind Storm Water pumps Station has experienced pump failures. Intense rainfall events have overwhelmed the low capacity pumps station. Several factors can be attributed to the low capacity; inadequate pump sizing, small pump discharge piping and obstructions that clog pumps/piping limiting flow.

Electrical System
Project EN13048 will address the installation of a second 12 kV feeder from the power reliability building to TP-1. Additional information for this project can be found in the asset summary section for recycled water.

The System C main control computer (MCC) panel is located outdoors. Maintenance is planning a project to rehab and provide protection for the MCC.

The Plant 3 primary MCC is aging and no longer supported by the manufacturer. Maintenance is planning a project to rehab and replace the MCC.

Lighting rehab and improvements are being evaluated and implemented by the Engineering Department.

Recent investigation into the backup generator switchgear has indicated the controls are near the end of their useful life. EN13048 will be evaluating a potential project to repair/replace these controls.

Utility Water System
A potential maintenance project will rehab deteriorated portions of this system. Underground piping in the Digester area has failed and temporary above ground hoses are currently being used to supply needed uses. A potential project is needed to fix this piping.

The pressure outfall pump station is minimally maintained since the 1050 RW pumps are used to supply utility water throughout RP-1.

Potable Water System
A potential maintenance project will rehab deteriorated portions of this system.

Instrumentation and Control System
The control system will be updated in 2017 as part of Project EN13016.

Yard Piping
A 2011 condition assessment of the secondary effluent piping showed it to be in good condition. Observations suggest that piping around preliminary, primary, and solids processes that do not run full may have significant deterioration. Condition assessment planned for 2014 will determine the scope of a potential maintenance project to rehab this system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 Plant Drain	1999	
TP-1 Plant Drain	2001	
Electrical System	1994	
Lighting	1977	2011
Utility Water System	1977	
Potable Water System	1977	
Instrumentation and Controls	1977	
Yard Piping	1977	Planned 2014

Table 4 Potential Projects

System	Project Name	Project Description
Plant Utility and Potable Water Systems	RP-1 Utility/Potable Water Rehab	This project will provide replacement pipe and valves for an aging conveyance system within RP-1.

End of System Summary

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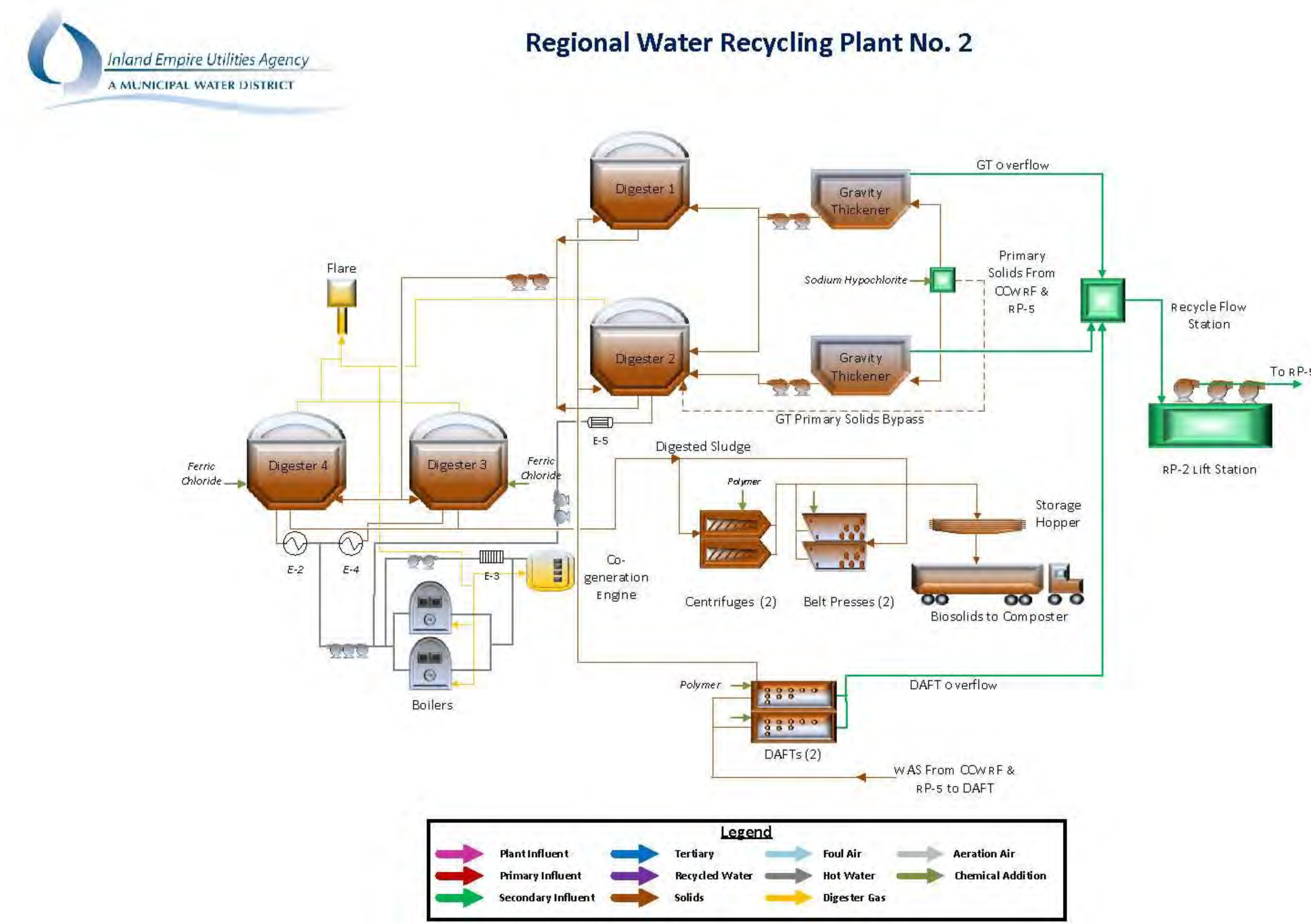

Figure 7-2: Regional Water Recycling Plant No. 2 (RP-2) – Schematic

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Table 7-3: Regional Water Recycling Plant No.2 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 10-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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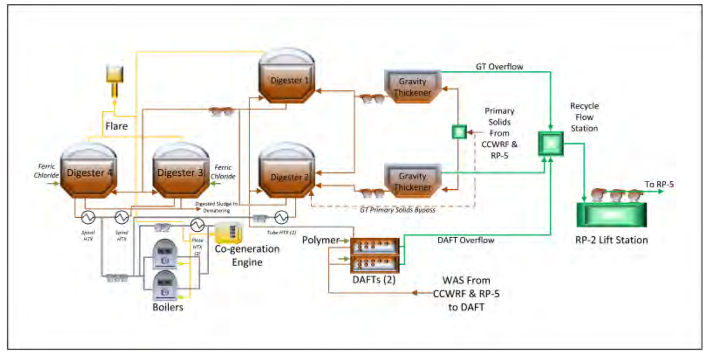
Asset Management System Summary – RP-2
Solids Treatment Process
1. Asset Profile



Gravity Thickener (GT) System START HERE
The gravity thickener (GT) distribution box receives primary clarifier sludge and scum from Carbon Canyon Water Recycling Facility (CCWRF) and RP-5 and distributes flow to GT #1 or #2 or both. Sodium hypochlorite may be introduced to the GT if needed from a 1600-gallon storage tank onsite. Solids are allowed to settle at the bottom of the GT. Solids are increased from ~1 percent total solids (TS) to ~4 percent TS. The thickened solids are then pumped to the digestion system.

Dissolved Air Flotation Thickener (DAFT) System
The DAFT system consists of two circular tanks. Waste activated sludge from the secondary system from CCWRF and RP-5 enters the DAFT and is mixed with recycled flow that has been pressurized with compressed air and dosed with polymer. Solids float to the top, where they are skimmed off and pumped to the digestion system. Solids are thickened from 1 percent TS to 4 percent TS. The overflow of the DAFT flows to the recycle flow station. Flow from the recycle flow station flows to the RP-2 lift station, where it is returned to the RP-5 headworks.

Digestion System
The digestion system consists of three anaerobic digesters and one aerobic digester. Digester 1 is operated only when capacity is limited. Digester 2 is a fixed-dome acid anaerobic digester and receives thickened sludge from the GT and DAFT systems. Digested sludge from Digester 2 is transferred to Digesters 3 and 4. Digesters 3 and 4 are floating-dome digesters and may be fed in series or parallel depending on the mode of operation. Plate and frame heat exchangers from the hot water system and recirculation pumps maintain temperatures from 97 to 128 degrees Fahrenheit. Gas mixers recirculate digester gas and use it to mix the digesters' sludge content with gas cannon mixers. Gas piping connected to the top of each digester allows the digester gas produced to enter the gas conveyance system. Several pressure vacuum regulated valves and J-tube safety blow-offs are installed on each digester to prevent over-pressurization.

Sludge Transfer System
RP-2 is equipped with several pumps and automated valves to transfer sludge through the digestion system.

Hot Water System
The hot water system generates heat in the boilers and cogeneration engines. Two boilers are fueled by digester or natural gas or both. Two tubes in tube heat exchangers are dedicated to heat Digester 2 and two spiral heat exchangers are dedicated to Digesters 3 and 4.The hot water is pumped into a hot water loop, where heat exchangers are used to heat the digestion system.

Gas Conveyance and Waste System
Digester gas collected from the digestion system enters the gas loop and is used for sludge mixing, fuel for boiler, and engine co-generation, or could be wasted to a waste gas burner (flare) when excess gas is in the system. The digester gas may be stored in either a low- or high-pressure tank. Gas compressors are used to compress digester gas into the high-pressure tank. The gas loop has several J-tubes and pressure-vacuum relief valves to prevent over-pressurization. An iron sponge using ferric oxide-impregnated media is used to reduce the hydrogen sulfide content in the gas of Digester 2 before entering the gas loop.

RP-2 Lift Station
The RP-2 lift station collects raw sewage from the Mountain Avenue interceptor, Chino Institute for Women (CIW) sewer, Butterfield force main, and recycle flows from the solids treatment facilities at RP-2, and discharges through a 24-inch pipeline to the RP-5 headworks.

Gas Conveyance and Waste Gas System
Gas collected from the digestion system enters the gas loop, which can deliver low-pressure gas to the compressors for use in the boiler or fuel cell or to the flare. The gas loop has several J-tubes to prevent over-pressurization. Iron sponges are used to remove hydrogen sulfide from the digester gas. Digester 2 has a waste gas line that can deliver low-methane-content gas directly to the flare.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Solids Treatment Process	26.4 MGD	
GT System Tank Drive Pumps	 2 @ 760 gpd/ft^2 1,590 ft^2 2 @ 10 hp 210 gpm 15 hp	 Per Unit Per Unit
DAFT System Tanks Recirculation Pumps Sludge Pumps Polymer Blending Units Compressors	 2 @ 25 gpd/ft^2 707 ft^2 5 @ 40 hp 3 @ 210 gpm 10 hp 2 @ 8.0 gph 4.5 hp	 Per Unit Per Unit Per Unit Per Unit
Digester System Digester No.1 & 2 Digester No.3 & 4 Recirc. Pumps Heat Exchangers Tube in Tube Spiral Plate Gas Mixers	 2 @ 489,565 gallon 2 @ 1.79 MG 3 @ 530 gpm 10 hp 3 @ 412 gpm 15 hp 2 @ 2.5 MMBTU/hr 2 @ 2.0 MMBTU/hr 2 @ 2.6 MMBTU/hr 3 @ 200 SCFM 25 hp	 Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit Per Unit
Sludge Transfer System Digester No.2 Pumps Digester 3 & 4 Pumps	 2 @ 300 gpm 15 hp 2 @ 500 gpm 25 hp	 Per Unit Per Unit
Hot Water System Boiler Hot Water Pumps	 1 @ 3.1 MMBTU 1 @ 3.7 MMBTU 2 @ 400 gpm	
Engine Recovery	3 @ 500 gpm 2 @ 640 gpm 2.15 MMBTU/hr 2.68 MMBTU/hr	
Gas Conveyance System Waste Gas Burner Iron Sponges Gas Compressors	 1 @ 350 ACFM 12.6 MMBTU/hr 1 @ 224 ft^3 2 @ 60 hp 1 @ 50 hp	
RP-2 Lift Station Pumps	 3 @ 3,300 gpm 100 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
GT System	3	3	4	3
DAFT System	3	3	3	3
Digester System	3	3	3	3
Sludge Transfer System	3	3	3	3
Hot Water System	3	3	3	3
Gas Conveyance System	3	3	3	3
RP-2 Lift Station	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Gravity Thickeners System
Rags and large debris pass through the influent distribution box and into the GT influent center-feed columns, where frequent clogging occurs.

DAFT System
No issues require special attention.

Digester System
The RP-2 digester system is aging, and the associated equipment has undergone increased wear and tear. The Agency Maintenance Department has established an agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment.

Sludge Transfer System
No issues require special attention.

Hot Water System
No issues require special attention.

Gas Conveyance System
No issues require special attention.

RP-2 Lift Station
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
GT System	1971 1988 2009	
DAFT System	1988	
Digester System	1960 1971 1979 1988 2003 2009 2011 2014	Dig. 3 – 2011 Dig. 4 – 2013
Sludge Transfer System	1979 1988 2003	
Hot Water System	1988 2003 2013	
Gas Conveyance System	1988 2003	
RP-2 Lift Station	2004	

Table 4 Potential Projects

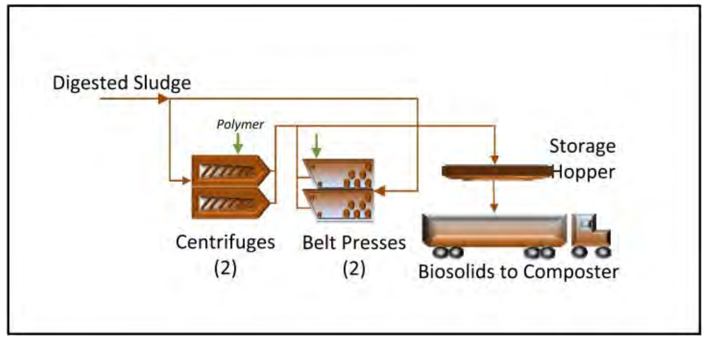
System	Project Name	Project Description
Digester System	Digester Cleaning and Rehab	The Agency has established an Agency-wide digester annual cleaning and rehabilitation regimen to remove solids and inorganics collected at the bottom of the digesters, replace valves, install new seals, and maintain critical pieces of equipment. Include in Agency-wide TYCIP.

System Summary Continued on Next Page

Asset Management System Summary – RP-2

Dewatering Treatment Process

1. Asset Profile



Sludge Grinding System
Digested sludge from Digesters 3 and 4 pass through dedicated sludge grinders before the sludge enters the dewatering feed pumps. Three inline grinders ensure that large solid objects are broken up into small pieces to limit the possibility of plugging downstream piping or equipment.

Sludge Feed Pump System
Three sludge feed pumps pump sludge to the belt press system or the Centrifuge System, or both. The sludge pumps are variable speed with flow meters, instrumentation, and controls.

Polymer Blending System
The dewatering polymer system consists of three chemical metering pumps, three polymer blending units, and static mixers to mix the polymer with the sludge. Polymer is delivered in totes and pumped by the chemical metering pumps, mixed with dilution water, and dosed to the sludge flow.

Belt Press System
The RP-2 belt press system consists of two belt filter presses. A feed box receives sludge flow mixed with polymer and spreads flow across the width of a rotating porous belt. The sludge flow on the belt passes through a series of wedges that separate the sludge and allow collected filtrate to pass through the belt to a drip pan that is piped to the filtrate and centrate pumping system. The sludge flow then passes through the pressured zone, where sludge is pressed between two belts and allowed to drain. The compressed sludge then passes over a series of rollers that squeeze out remaining filtrate to drip pans. The belts then separate, and two scraper blades scrape the dewatered solids (cake) off of each belt, dropping the processed cake on to the conveyor system. Wash-water pumps supply water to spray each belt with high-pressure water to prevent the porous belts from clogging.

Centrifuge System
The sludge flow mixed with polymer enters the feed tube of the centrifuge and discharges into a spinning bowl. The centrifugal force of the spinning bowl forces the heavier solids to the edge of bowl and centrate to rest on top of the solids. A scroll spinning, slightly faster than the bowl, scraps the solids around the edge of the bowl to one end of the centrifuge, up a beach and into the discharge shoot to the conveyor. Dam plates near the center of the spinning bowl hold a depth of centrate until it overflows the opposite end of the centrifuge where it is piped to the centrate wet well.

Conveyor System
Two belt press conveyors transfer cake from the discharge of each belt press and then transfer the collected solids up to the top of the cake hopper. Six shaftless screw conveyors transfer cake from the discharge of each centrifuge to a common belt conveyor. The dewatered cake then travels up to the cake hopper, where it is distributed evenly on the trailer of a sludge hauling truck.

Cake Hopper
The cake hopper receives cake from the conveyor system and holds the cake until a loading sequence has been initiated to discharge the solid cake to a truck trailer for hauling to an offsite facility.

Filtrate and Centrate Pump System
Filtrate and centrate collected from the belt press and centrifuge processes are conveyed to a common wet well where they are pumped into the RP-2 lift station wet well and discharged to RP-5.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Dewatering Treatment Process	30 MGD 211K wet tons per year	
Sludge Grinding System	3 @ 210 gpm	
Sludge Feed System Pump	3 @ 210 gpm 10 hp	
Polymer Blending System Polymer Pump Dilution	3 @ 8.0 gph 3 @ 1200 gph	
Belt Press System Belt Press Wash-water pump	2 @ 150 gpm 1,700 dry lbs/hr 3 @ 100 gpm 7.5 hp	
Centrifuge System Centrifuge Main Drive Back Drive	2 @ 325 gpm 1,200 hp 40 hp	
Conveyor System Belt Conveyor Screw Conveyors	2 @ 44,000 lbs/hr 1 @ 350 ft^3/hr 3 hp 3 @ 700 ft^3/hr 3 hp 2 @ 700 ft^3/hr 7.5 hp 1 @ 1600 ft^3/hr 15 hp	
Cake Hopper	1 @ 1,956 ft^3	
Filtrate and Centrate Pump Station Pumps	2 @ 480 gpm, 7.5 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Sludge Grinding System	3	3	3	3
Sludge Feed Pump System	3	3	3	3
Polymer Blending System	3	3	3	3
Belt Press System	3	3	3	3
Centrifuge System	3	3	3	3
Conveyor System	3	3	3	3
Cake Hopper	3	3	3	3
Filtrate and Drainage Pump Station	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Sludge Grinding System
No issues require special attention.

Sludge Feed Pump System
No issues require special attention.

Polymer Blending System
No issues require special attention.

Belt Press System
No issues require special attention. The belt presses were rehabilitated in 2013.

Centrifuge System
No issues require special attention.

Conveyor System
No issues require special attention.

Cake Hopper
No issues require special attention.

Filtrate and Centrate Pump System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Sludge Grinding System	1988	
Dewatering Sludge Feed Pump System	1988	
Polymer Blending System	1979 1988 2011	
Belt Press System	1979 1988 2013	
Centrifuge System	2001	
Conveyor System	1979 1988 2008	
Cake Hopper	1988 2008	
Filtrate and Centrate Pump Station	1979 1988	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RP-2

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows throughout the facility and is pumped to the RP-2 lagoon, the RP-2 lift station and finally to RP-5 headworks.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE and Direct Access) and onsite co-generation. The electrical feed from the grid is composed of two 12 kV feeders to the power panel switchgear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-2 electrical system is shown in Appendix B.

A 300 kW diesel emergency generator is used in the event of a power failure to power the RP-2 lift station.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on a potable line off El Prado Rd. from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-2. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to three main control terminals at RP-2.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	2 @ 200 gpm	
Electrical System Utility Voltage Transformers Switchgear Distribution Co-Generator Generator	 2 @12 kV 2 @ 12 kV to 480 V 2 @12 kV 5 @ 480 V 1 @ 580 kW 1 @ 600 kW 1 @ 300 kW	
Utility Water System Pipelines Pump Station Valves	 Various sizes Fed from RP-5 PS >10 units	
Potable Water System Backflow Devices	 >10 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub Radio Transmitter		
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	3	3	3	3
Utility Water System	3	4	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Plant Drain
No issues require special attention.

Electrical System
No issues require special attention.

Utility Water (UW) System
No issues require special attention.

Potable Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	1979	
Electrical System	1979 1988 2008	
Utility Water System	2004	
Potable Water System	1979	
Instrumentation and Control System	1979 1988 2008	
Yard Piping	1979 1988	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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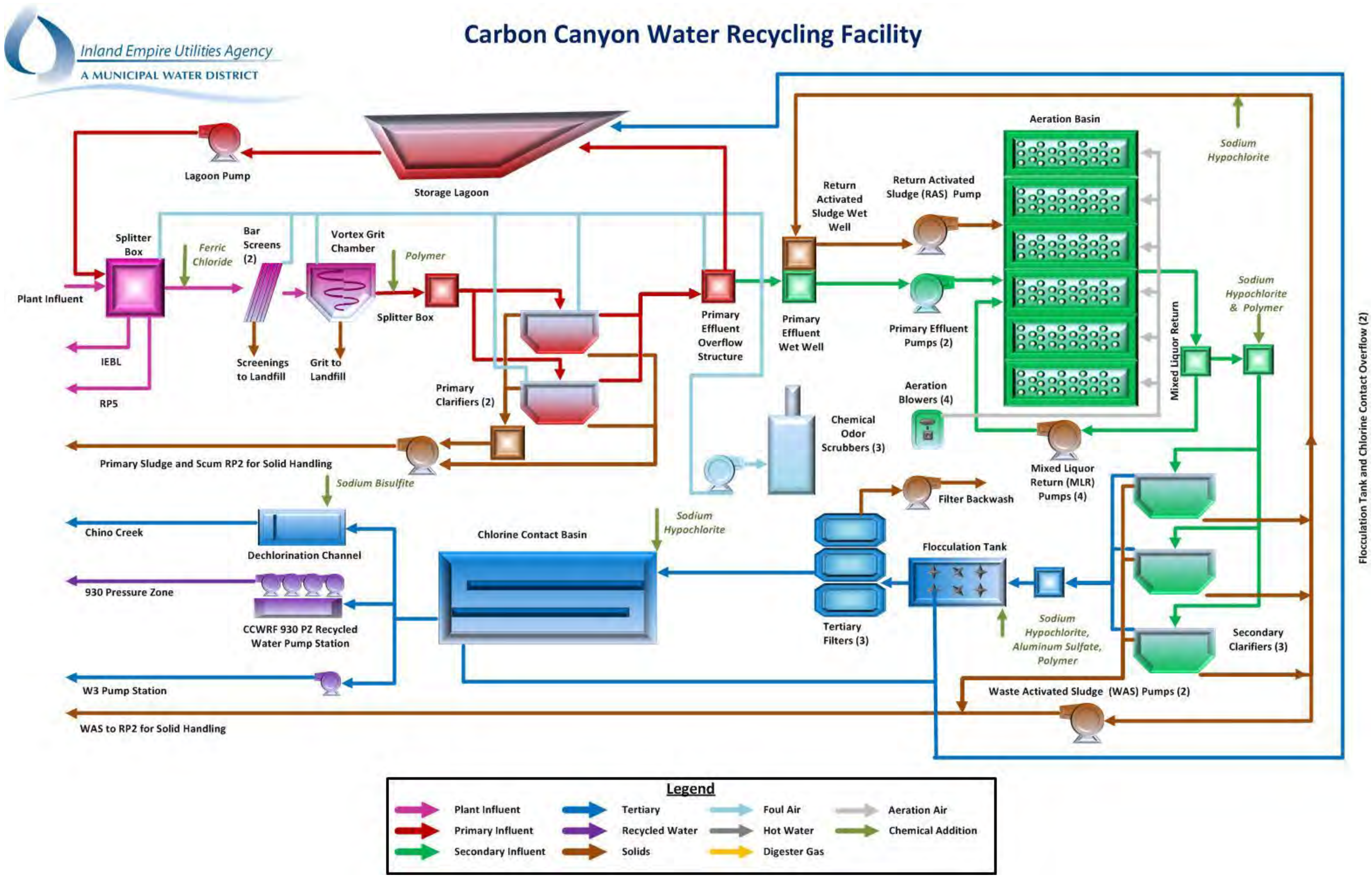

Figure 7-3: Carbon Canyon Water Recycling Facility (CCWRF) – Schematic

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Table 7-4: Carbon Canyon Water Recycling Facility – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN14027	CCWRF Secondary Clarifier #3 Rehabilitation	Rehab steel components and coat concrete of clarifier.	RO	CC	20,000	0	0	0	0	0	0	0	0	0	20,000
2	TBD	CCWRF Lagoon Riprap Reinforcement	When flow is bypassed at flocculation basin or overflown from chlorine contact basin splitter box, the existing riprap does not sufficiently prevent side slope erosion near the discharge pipes. Engineering has a project in the development stage to address this issue.	RC	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
3	TBD	CCWRF Odor Control and Headworks Replacements (AMP)	Odor control equipment and others equipment are at the end of their useful life - project necessitated by AMP	RC	CC	0	600,000	2,500,000	3,900,000	0	0	0	0	0	0	7,000,000
4	TBD	CCWRF Backup Generator Control Upgrade	Automatic Transfer Control for the backup generator is nearing the end of its service life and should be upgraded with new technology	RO	RP	0	0	250,000	0	0	0	0	0	0	0	250,000
5	TBD	CCWRF Aeration Blower Replacement	The existing blower system is nearing the end of its service life. Blowers #1 through #3 are 23 years old and Blower #4 is 20 years old. Blower start is not standardized: #1 and #4 are soft start, #2 and #3 are across the line. #1 blower has high vibration (or high vibration sensor) issue and is not being used. #3 has bad bearing. #1 through #3 does not have outlet diffusers and have limited turn down.	RC	RP	0	0	500,000	1,500,000	500,000	0	0	0	0	0	2,500,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014

(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)

(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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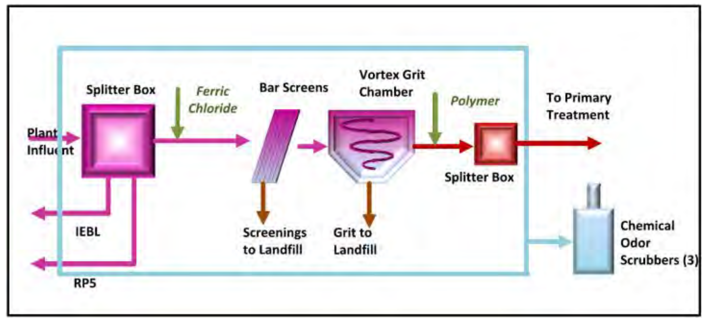
Asset Management System Summary – CCWRF

Preliminary Treatment Process

1. Asset Profile



Influent Channel
Raw wastewater enters Carbon Canyon Water Recycling Facility (CCWRF) through the influent diversion structure. The influent diversion structure enables CCWRF to operate as a skimming plant, taking the majority of raw wastewater and sending the remainder to RP-5. The amount of flow to RP5 is measured at the Parshall flume downstream of the diversion structure, and CCWRF influent is measured at the Parshall flume downstream of the vortex grit chamber.

Screening Equipment
Gates divert flow to three channels: two mechanical bar screens and one manual bar screen. The 5/8-inch bar screens remove rags and large debris that could damage the downstream process equipment or reduce the overall reliability and effectiveness of the treatment process. A manual bar screen provides standby capacity for the mechanical units.

Vortex Grit System
Flow from the bar screens structure is tangentially directed to the 16-foot-diameter circular vortex grit chamber. A paddle mixer pushes flow in a circular path; grit collects at the bottom, where it is pumped to the grit washing/disposal system.

Grit Washing/Disposal System
Grit pumped from the vortex grit chamber is routed to two grit classifiers, where organic matters are removed from the grit. The grit sinks to a submerged inclined screw and moves up the ramp while being washed. The organic rich liquid from the grit classifiers is directed back to the liquid handling stream.

Screening Conveyance/Disposal System
Screening collected by the bar screens is transported by a conveyor and dropped into a hydraulic washer/compactor. The collected rag is washed and organic rich rinsate is routed to liquid treatment. The hydraulic compact or squeezes out the excess water, reducing the moisture content. The compacted rags are pushed out to the roll-off bin for disposal.

Ferric Chloride System
Ferric chloride is added to the raw wastewater flow immediately after the influent diversion structure to enhance the solids capture during primary treatment and to control odors caused by hydrogen sulfides. The ferric station consists of a truck filling station, 7,000-gallon storage tank, two chemical metering pumps, and associated piping.

Polymer System
Polymer can be injected to the liquid flow after grit removal to enhance primary treatment. The polymer system includes a 500-gallon tote stand, chemical metering pump, mixing chamber, and associated piping.

Headworks Splitter Box
The headworks splitter box receives flow from the vortex grit chamber. The flow is normally routed to primary clarifiers; however, it can also be routed to the primary effluent structure, bypassing the primary treatment.

Odor Control Chemical Scrubber
Foul air collected in the preliminary and primary treatment processes are forced through three chemical odor control scrubbers where bleach solution is atomized to chemically remove and oxidize hydrogen sulfide and odor causing gases. The system consists of co-current scrubbing vessel, bleach metering pumps, foul air blowers, air blowers and the associated conveyance pipes.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	20.3 MGD	
Influent Channel Sewer Parshall Flume Gates	 54-inch 1 @ 43.9 MGD 2 units	
Screening Equipment Mechanical Screen Manual Screen Gates	 2 @ 20 mgd 1 @ 40 mgd 3 units	 Per Unit
Vortex Grit System Chamber Grit Pump Gates	 1 @ 20.3 mgd 2 @ 220 gpm 15 hp 2 units	 Per Unit
Grit Washing & Disposal System Classifiers	 2 @ 200 gpm	 Per Unit
Screening Conveyance & Disposal System Conveyor Compactor	 1 hp NA	
Ferric Chloride System Tank Pumps	 7,000 gallons 2 @ 92 gph	 Per Unit
Polymer System Pump	 1 @ 4.5 gph	
Headworks Splitter Box Gates	 3 units	
Odor Control Chemical Scrubbers Blower(1A) Blower(1B1,1B2) Valves	 1 @ 6,500 scfm 2 @ 4,400 scfm 3 units	 Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel	2	2	2	2
Screening Equipment	4	3	4	4
Vortex Grit System	3	3	3	3
Grit Washing & Disposal System	3	3	2	3
Screening Conveyance/Disposal System	3	3	3	4
Ferric Chloride System	4	3	4	3
Polymer System	4	2	3	3
Headworks Splitter Box	3	3	3	3
Odor Control Chemical Scrubber	4	4	4	4

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Influent Channel
CCWRF lagoon pump discharges to upstream of RP5 and CCWRF control gates in the influent diversion structure. The flow may go to RP5, CCWRF or both. There is no flow meter to quantify the amount of flow into the lagoon. Because of this efficiency, the lagoon flow may be double counted as CCWRF influent.

Screening Equipment
The bar spacing allows a large volume of rags to reach downstream processes.

The clearance between the bar screens and the enclosure of the structure is tight, making it difficult for maintenance or housekeeping.

Gate (FGBI-5002, GATE BS-2 Inlet) leading to the west mechanical bar screen has failed in the open position since September 2013.

A potential project will address these issues.

Vortex Grit System
The performance of the vortex grit system is satisfactory. However, it has been 20 years since the original install, and the system is nearing the end of its service life. The downstream processes are vulnerable in the event of a mechanical failure. A condition assessment is needed to identify state of this asset.

Grit Washing/Disposal System
No issues require special attention.

Screening Conveyance/Disposal
The conveyor equipment is corroded and has limited accessibility for cleaning and repair. The screening conveyance system fails regularly (3 to 4 times per year). A potential project will address these issues.

A new rag washer and compaction unit was installed in 2014, reducing the moisture content of screening material

Ferric Chloride System
Ferric chloride system operates effectively, but the storage tank is 20 years old and is approaching the end of its useful life.

Polymer System
No issues require special attention.

Headworks Splitter Box
No issues require special attention.

Odor Control Chemical Scrubbers
The existing concurrent odor control system is in poor condition. The pH, H_2S, pressure transmitters, pumps, and control equipment are broken and inoperable. Sections of bleach conveyance system are clogged with deposits, restricting the flow chemical and requiring additional manpower for upkeep. Bleach and caustic storage tanks are more than 20 years old, and there is evidence of leakages at the flanges. A viable alternative is immediately needed for compliance and reliability.

An in-house maintenance project is in progress to improve short to midterm reliability. The project will install a knock out drum at System A to prevent bleach emission, repair System B and C fiberglass vessels to stop the leak, replace blowers and bleach pumps.

A potential project will address these issues for the long term.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel	1993 2006	Planned 14/15
Screening Equipment	1993	Planned 14/15
Vortex Grit System	1993	Planned 14/15
Grit Washing/Disposal System	1993	
Screening Conveyance/Disposal System	1993 2014	
Ferric Chloride System	1993	
Polymer System	1993	
Headworks Splitter Box	1993	Planned 14/15
Odor Control Chemical Scrubber	1993 2011 2012	

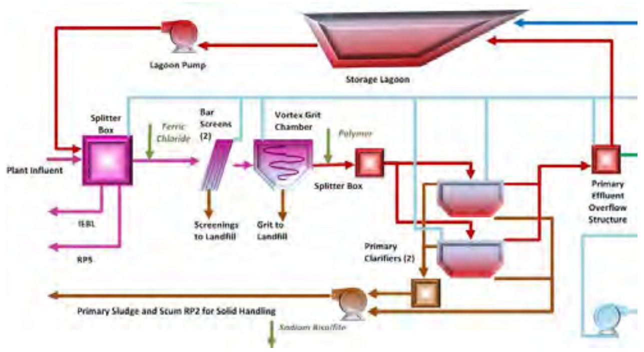
Table 4 Potential Projects

System	Project Name	Project Description
Screening Equipment	CCWRF Odor Control and Headworks Replacement	Replace screening equipment and isolation gates.
Screening Conveyance and Disposal	CCWRF Odor Control and Headworks Replacement	Replace screening conveyance and disposal equipment.
Odor Scrubber	CCWRF Odor Control and Headworks Replacement	Replace Odor Control Scrubber Equipment.

System Summary Continued on Next Page

Asset Management System Summary – CCWRF
Primary Treatment Process

1. Asset Profile



Primary Splitter Box
The splitter box receives flow from the vortex grit chamber. By using a system of gates, the flow is routed to one or two clarifiers or is bypassed to Primary Effluent Overflow Structure. The splitter box has provisions for future expansions and points of connections are established. The splitter box shares a common wall with the primary effluent structure.

Primary Clarifiers
Two 95-foot diameter, center-feed, circular primary clarifiers provide sedimentation. Gear-driven flights direct settled solids to the center, and floatable scum to a system of gates that discharge to an intermediate wet well for temporary storage. The primary effluent is routed by gravity to the primary effluent splitter box, where it is combined with the effluent from other primary clarifiers, and then flows by gravity to the primary effluent pump station.

Sludge Pumping System
Primary sludge is pumped out of the primary clarifiers continuously to RP2 for solid handling. A system of valves automatically alternates between the two clarifiers on operator selected timer.

Scum Pumping System
Scum collected in the primary clarifiers is directed to an intermediate wet well and is combined with spent bleach from System B and C. Depending on the level, a transfer pump will pull from the wet well and pump to RP2 for solids thickening. The scum collection system and intermediate wet well are covered, and the vapor space is connected to the odor control chemical scrubbers.

Primary Effluent Overflow Structure
Primary treated water is routed to the primary effluent overflow structure by gravity before it reaches the primary effluent pump station. By a system of pipes established at pre-set elevations, the primary treated water is routed to (1) the primary effluent pump station for secondary treatment or (2) the storage lagoon if there is a power failure or mechanical problem or if the system is hydraulically overloaded.

Storage Lagoon System
Storage lagoon features an onsite, short-term storage capacity of primary effluent, secondary effluent, or tertiary effluent. The primary effluent passively overflows into the storage lagoon in the event of primary effluent pump failure or power outage. Secondary effluent can overflow into the storage lagoon if the filter influent gate closes. In addition, if a noncompliant condition is reached at the tertiary section, tertiary effluent can be overflown into the storage lagoon. The floor of the lagoon is covered with concrete, and the side slope has vegetation to counter the effect of erosion. Stored water is pumped back into the influent diversion structure on an operator selected time and is retreated in the liquid treatment process.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	13.2 MGD	
Primary Splitter Box Gates	3 units	
Primary Clarifiers Drives Gates	2 @ 1,760 gpd/ft^2 7,088 ft^2 1 @ 0.5 hp 4 units	Per Unit Per Unit
Sludge Pumping System Pumps	2 @ 220 gpm 30 hp	Per Unit
Scum Pumping System Pump	2 @ 220 gpm 10.5 hp	Per Unit
Intermediate Wet Well Gates	N/A units	
Storage Lagoon System Gates Pump	1 @ 9.0 MG N/A units 1 @ 1,500 gpm 30 hp	
Primary Effluent Overflow Structure Gates	N/A Units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Splitter Box	3	3	3	3
Primary Clarifier	4	3	3	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3
Intermediate Wet Well	3	3	3	2
Storage Lagoon System	4	3	4	4
Primary Effluent Overflow Structure	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Primary Splitter Box
Three gates are utilized to either route flow to or bypass primary clarifiers. Two gates that route flow to primary clarifier are normally opened but are typically not exercised. Conversely, the bypass gate is normally closed and is not typically exercised. The functionality of these gates is largely unknown. Gates operating in similar environment in the sister plants showed severe corrosion. The primary splitter box and three gates should be taken down and inspected.

Primary Clarifiers
Concrete sidewalks surrounding the primary clarifiers are detached from the sidewall and have settled more than five inches. In recent years, there have been numerous pipe line breakages: an 8-inch primary sludge line break and utility water line breakages (2012) was near this area. The breakages may be related to the settlement of the soil. A potential project is needed to address this issue.

Sludge Pumping System
No issues require special attention.

Scum Pump System
The scum wet well has limited controls and instrumentation. The floatables form a raft in the wet well, and the scum pump suction pulls from the bottom of the scum box. The floatables must be cleaned regularly.

Intermediate Wet Well
No issues require special attention.

Storage Lagoon System
It is unknown whether the storage lagoon system is intended as a containment system. A survey of historical record does not reveal whether compacted clay liner or geomembrane was used. The bottom of the storage lagoon is concrete, and the side slope is soil with shallow rooted vegetation.

When flow is bypassed at flocculation basin or overflown from chlorine contact basin splitter box, the existing riprap does not sufficiently prevent the side slope erosion at the discharge pipes. A potential project will address this issue.

Primary Effluent Overflow Structure
No issues require special attention.

Table 3 History of Select Assets

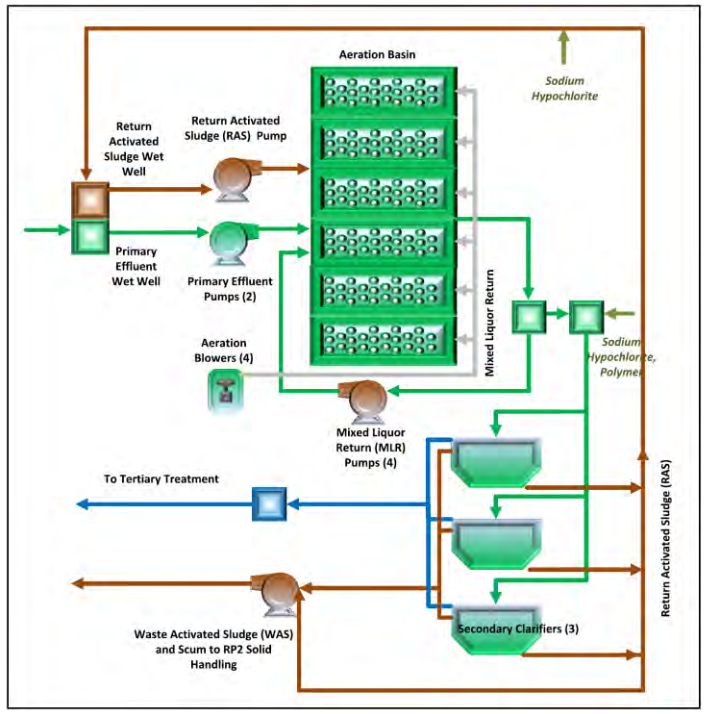
System	Capital Improvement Project Activity	Condition Assessment Report
Primary Splitter Box	1993	Planned 14/15
Primary Clarifiers	1993 2006	1: Complete 2014 2: Complete 2014
Sludge Pumping System	1993	
Scum Pumping System	1993 2006	
Intermediate Wet Well	1993	
Storage Lagoon System	1993	
Primary Effluent Overflow Structure	1993	Planned 15/16

Table 4 Potential Projects

System	Project Name	Project Description
Primary Clarifiers	Primary Clarifier Sidewalk Repair	Evaluate the uneven settling of the concrete around the primary clarifiers. Replace concrete and ancillary piping as needed to address the system issues.
Storage Lagoon	CCWRF Lagoon Riprap Reinforcement	Reinforce existing riprap

System Summary Continued on Next Page

Asset Management System Summary – CCWRF
Secondary Treatment Process
1. Asset Profile



Primary Effluent Pump System
Primary effluent flows by gravity into the primary effluent pump station wet well. The wet well can be interconnected with return activated sludge (RAS) wet well and serve as a common wet well by opening a gate. The normal mode of operation is to operate the primary effluent wet well and RAS wet well independently. One of two vertical-turbine pumps lifts water to the aeration basin.

Activated Sludge System
There are two distribution channels for the aeration basins. By manipulating a system of gates, various combinations of primary effluent, RAS, and MLR can be introduced to the aeration basin. Normal mode of operation is to combine primary effluent, RAS, and MLR flows as one stream and distribute the stream equally to six different aeration basins. Propeller mixers are located at the distribution channel and aeration basin to promote mixing and prevent stratification of the mixed liquor.

The trains, with the exception of Train1, have baffled partitions. Each train operates in modified Ludzak-Ettinger configuration with an anoxic zone followed by three oxic zones to achieve the nitrate removal. A system of aeration sheaths, aeration control valves, and dissolved oxygen probes is used to limit or increase the volume of air introduction. The effluent from each aeration basin is combined in a common channel, a percentage of this mixed liquor is rerouted to the front of the aeration basin and the balance is routed to the secondary clarifiers.

Secondary Clarifiers
Mixed liquor from the aeration trains flows into the mixed liquor return pump station, and any unpumped mixed liquor passively flows into the secondary influent diversion structure. From the diversion structure, the flow is distributed evenly to three 120-feet-diameter, center-feed, circular secondary clarifiers. Each clarifier has a rotating sludge and skimmer arm. Solids settle to the bottom and are recycled to the aeration basin. The overflow of the secondary clarification is combined in the secondary effluent splitter box and is routed to the flocculation basin for further treatment.

Return Activated Sludge (RAS) Pumping System
The settled sludge in the secondary clarifiers is combined in the common header and routed by gravity into the RAS wet well located upstream of the aeration basin. The desired RAS flow rate at each clarifier is controlled by modulating a 16-inch flow-control valve on the RAS line. From the RAS wet well, RAS is pumped to the aeration basin distribution channel, and is mixed with primary effluent and mixed liquor return.

Waste Activated Sludge (WAS) Pumping System
To control the microorganism concentrations in the aeration system, a portion of the settled solids from the secondary clarifiers is wasted. The known volume of WAS is pumped out of the secondary system to RP2 for solid handling.

Scum Pumping System
Scum collected from the skimmer arm of the secondary clarifiers is routed to RP2 for solid handling in a common line along with WAS.

2. Capacity Profile
Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	12.0 MGD	
Primary Effluent Pump System	2 @ 17.6 MGD 125 hp	
Activated Sludge System	6 @ 2.02 MGD	
Blowers	3 @ 6000 scfm 400 hp 10.3 psig 1 @ 6400 scfm 400 hp 12.1 psig	Per Unit
Trains	6 @ 1.49 MG	Per Unit
Depth	21 ft	
Mixers	22_ @ 12 hp	
Gates	5 per train	
Valve	4 per system	
Valves (air)	1 (FCV), 3 (manual) per unit	> 12-inch > 12-inch
MLR Pumps	4 @ 7,425 gpm 50 hp	
Secondary Clarifiers	3 @ 360 gpd/ft^2 120 ft^2	
Gates	6 units	
RAS Pumping System	1 @ 17.6 MGD 125 hp	
Valves	2 units	> 18-inch
Gates	13 units	
WAS Pumping System	2 @ 350 gpm 7.5 hp	
Scum Pumping System	3 @ 450 gpm 5 hp	

3. Asset Ratings
Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Effluent Pump System	3	2	3	2
Activated Sludge System	4	4	4	4
Secondary Clarifiers	3	3	3	3
RAS Pumping System	4	3	3	4
WAS Pumping System	3	2	2	3
Scum Pumping System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation
Primary Effluent Pump System
The primary effluent and RAS pump are reconditioned at a scheduled interval and provide adequate pumping capacity and reliability. One of the two primary effluent pumps and the RAS pump were reconditioned in 2013. The concrete structure (primary effluent distribution channel) is showing some evidences of leakage on top, near the output side of the primary effluent pumps.

Activated Sludge System
An evidence of concrete deterioration exists on the distribution channel leading into Basin #1. The mixed liquor influent gate to Basin #1 is reinforced externally to the concrete structure. The extent of the deterioration is appears to be superficial. However, this area shall be inspected thoroughly during the upcoming condition assessment in 2015.

The aeration flexible sheaths need to be replaced at regular (every five year) intervals because of solid build up or tears in the flexible sheath that reduce oxygen transfer efficiency . An in-house project is in progress to address this issue.

Blower #1 has high vibration issue and does not reliably run. Blower #3 has bad bearings on the blower and does not run. In addition, all four blowers at CCWRF are more than 22 years old and nearing the end of their service life. In addition, Blower #1, #2 and #3 do not have sufficient turn-down ratio. During the low flow condition, the activated sludge system is over-aerated, resulting in excessively high dissolved oxygen concentration. The over-aeration results in waste of energy and operational challenges. A potential project will address these issues

Many of the gates in the RAS channel that route flows to the aeration basins are severely corroded and do not travel up and down. This area shall be inspected thoroughly during the upcoming condition assessment in 2015

An 18 inch Solids Processing Recycle Pump and its associated piping is abandoned in place at Basin #1 and #2. The equipment shall be removed by the Maintenance.

Mixed Liquor Return Pump #3 is out of service due to defective bushing. The pump shall be refurbished by the Maintenance Department.

Secondary Clarifiers
There is a significant geotechnical settlement near secondary clarifiers that may be affecting the structural integrity of the buried pipes and electrical conduits. Secondary Clarifiers 1 and 2 have been rehabilitated, and Secondary Clarifier 3 is scheduled to be rehabilitated under Project EN14027.

RAS Pumping System
The RAS flow meters and RAS flow control valves are more than 20 years old and are nearing the end of their useful service life. The ability to flow desired volume of RAS is important for process control. A maintenance project is needed to replace this equipment.

WAS Pumping System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Primary Effluent Pump System	1993 1998 2013	Planned 15/16
Activated Sludge System	1993	Planned 15/16
Secondary Clarifiers	1993 2012 2013	
RAS Pumping System	1993 2013	
WAS Pumping System	1993	Planned 15/16
Scum Pumping System	1993 2012 2013	

Table 4 Potential Projects

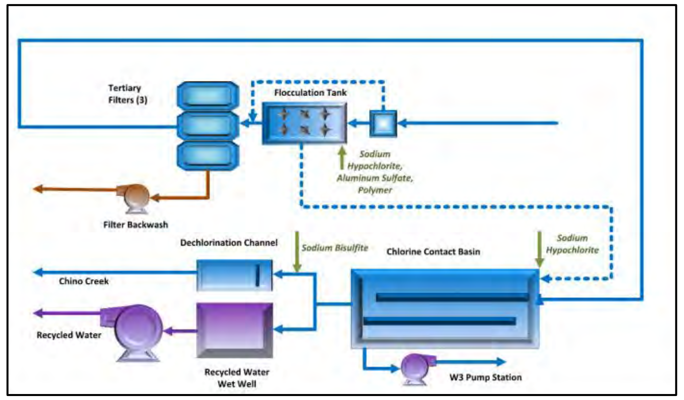
System	Project Name	Project Description
Activated Sludge System	CCWRF Aeration Blower Replacement	Evaluate and replace the aeration blower and controls.
RAS Pumping System	RAS Pumping System Upgrades	Replace RAS flowmeter and control valves.

System Summary Continued on Next Page

Asset Management System Summary – CCWRF

Tertiary Treatment Process

1. Asset Profile



Aluminum Sulfate (Alum) System
Secondary effluents from three secondary clarifiers are combined and travel to the rapid mix system, where aluminum sulfate, sodium hypochlorite, or polymer are introduced. The chemicals neutralize and destabilize the colloidal particles and enhance the solid/liquid separation. After the chemical addition and rapid mix, the water travels through a hydraulic flocculation basin in a baffled serpentine and ends up at three sand filters that are running in parallel.

Filters
The water passes through three automatic backwashing sand filters. The backwashes are initiated by either timer or the head loss across the sand filter. Backwash water is sent to the filter backwash pump station and pumped back into the aeration basin for treatment. The effluent from the filters flows by gravity to the chlorine contact basin for disinfection.

Filter Backwash Pump Station
The scum, backwash water, and drainage from the filter are collected by gravity in the filter backwash pump station. Upon reaching the pre-set level, the filter backwash water is pumped back into the aeration basin for treatment.

Chlorination System
Two 10,000-gallon bleach tanks housed indoor receive and hold 12.5 percent sodium hypochlorite (bleach) solution. Two chemical metering pumps inject bleach into the water champ located at the chlorine contact basin and provide disinfection. Two other pumps inject bleach into either filter influent or RAS for process control.

Chlorine Contact Basins
The chlorine contact basin is a dual-cell concrete structure that uses a serpentine flow path to achieve required contact time and disinfection of treated water. The bleach is introduced at the beginning of the serpentine, and free chlorine remains in the water while undergoing a plug flow. The influent flow rate is measured by a Parshall flume, and chlorine residual is measured at three different locations: influent, mid, and final.

Dechlorination System
The final 5137 cubic feet of last pass of the chlorine contact basin is used as a dechlorination structure, where sodium bisulfite solution (SBS) is introduced. The excess effluent that is not used in the recycled water system is discharged into Chino Creek. Before the discharge, chlorine residual present in the flow is neutralized with SBS by a chemical reaction. Two units of propeller mixers and under-flow baffle promote the mixing. SBS is stored in two 5,500-gallon chemical tanks and is metered into the system via five chemical metering pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	15.4 MGD	
Alum System Tank Pump Mechanical Mixer	 1 @ 5000 gallons 2 @ 3.7 gph 1 @ 15 hp	
Filters Travelling bridge Backwash pump Skimmer pump Filter Loading Gates Valves	3 @ 1,600 ft^2 3 @ 0.5 hp 3 @ 400 gpm 7.5 hp 6 @ 40 gpm 0.5 hp 4 gpm/ft^2 7 units 6 units	Per Unit Per Unit Per Unit Per Unit > 18-inch
Filter Backwash Pump Station	3 @ 950 gpm 14.8 hp	Per Unit
Chlorination System Tanks Pumps Mixers	 2 @ 10,000 gallons 4 @ 77 gph 1 water champ 2 propeller mixers	 Per Unit Per Unit
Chlorine Contact Basins Gates Valves	1 @ 1.0 MG 11 units N/A units	 > 18-inch
Effluent Splitter Box Gates	 2 units	
Dechlorination System Tanks Pumps Gates	 2 @ 5500 gallon 2 @ 2.5 gph; 2 @ 20 gph; 1 @ 77 gph 2 units	 Per Unit Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor Condition	 Redundancy	 Function	 Reliability
Alum System	4	3	3	3
Filters	3	3	3	3
Filter Backwash System	3	3	3	3
Chlorination System	2	2	2	2
Chlorine Contact Basins	3	4	3	3
Effluent Splitter Box	1	3	3	3
Dechlorination System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Alum System
No issues require special attention, but the equipment is 20 years old and is approaching the end of its useful life.

Filters
The performance of three shallow bed filters is adequate. CCWRF tertiary filter media was replaced and rehabilitated in 2012. However, most of the ancillary equipment, such as the influent gates, weir plates, and drain valves, has never been serviced since the original installation in 1993. As the service life of the ancillary equipment is nearing the end of its useful life, a provision to, at minimum, inspect the condition should be made. A condition assessment shall be performed to access the state of the assets.

Filter Backwash System
No issues require special attention, but the equipment is 20 years old and is approaching the end of its useful life.

Chlorination System
The chlorination system for the chlorine contact basin disinfection is adequate.

Chlorine Contact Basins
No issues require special attention.

Effluent Splitter Box
The overflow pipe elevation is higher than the elevation of the effluent gate. During the gate closure event, the water surface level does not reach the overflow pipe as desired. The existing outlet, 90 degree flared elbow, was removed and new overflow box is at elevation 599.25'

Dechlorination System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Alum System	1993	Planned 15/16
Filters	1993 2012	Planned 15/16
Filter Backwash System	1993	Planned 15/16
Chlorination System	1993 2004	
Chlorine Contact Basin	1993	
Effluent Splitter Box	2014	
Dechlorination System	1993 2004 2013	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – CCWRF

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows to a wet well, where it is then pumped and recycled toward the secondary clarifier influent, aeration basin, or head of the treatment process.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the maintenance building, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the CCWRF electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. A 1500 kW generator is located in the maintenance building and supplies power to the preliminary, primary, secondary, and tertiary sections.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water (UW) System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by either 930-foot pressure zone or the W3 pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a service on Telephone Avenue from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at CCWRF. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to two main control terminals at the main control building and the chlorine building.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	10 @ 150 gpm 3 hp	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 12 kV to 4,160 V 12 kV 480 V 1 @ 1500 kW 2010 Bhp >26 units	
Utility Water System Pipelines W3 Pump Station Valves	 Various sizes 2 @ 780 gpm 40 hp 2 @ 270 gpm 20 hp 20 units	
Potable Water System Backflow Devices	 6 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub Radio Transmitter		
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	4	3	4	4
Utility Water System	3	4	4	3
Potable Water System	3	3	3	3
Instrumentation and Control System	4	3	4	3
Yard Piping	4	3	4	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Plant Drain
No issues require special attention.

Electrical System
During 2012 wet seasons, a few components in the headworks electrical system were vulnerable to moisture. Automatic transfer control for the backup generator is nearing the end of its service life and should be upgraded with new technology. A potential project will address these issues.

Utility Water (UW) System
The pumping capacity and the efficiency of the W3 pumps have greatly decreased over time. The pumps are designed to pump 2,100 gpm total, but they pump only half of their combined designed capacity.

Potable Water System
No issues require special attention.

Instrumentation and Control System
CCWRF is first plant that will benefit from the SCADA migration project, EN13016.

Yard Piping
Many of the UW isolation valves do not hold, making it difficult to isolate flow during the shutdown events.

CCWRF mixed liquor line from MLR pump station to secondary clarifiers is showing evidences of leak. Inspect and repair the line.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	1993	
Electrical System	1993	
Utility Water System	1993	
Potable Water System	1993	
Instrumentation and Control System	1993	
Yard Piping	1993	

Table 4 Potential Projects

System	Project Name	Project Description
Electrical System	CCWRF Backup Generator Control Upgrade	Automatic Transfer Control for the backup generator is nearing the end of its service life and should be upgraded with new technology
Yard Piping	Mixed Liquor Return Line Inspection	CCWRF mixed liquor line from MLR pump station to secondary clarifiers is showing evidences of leak. Inspect and repair the line

End of System Summary

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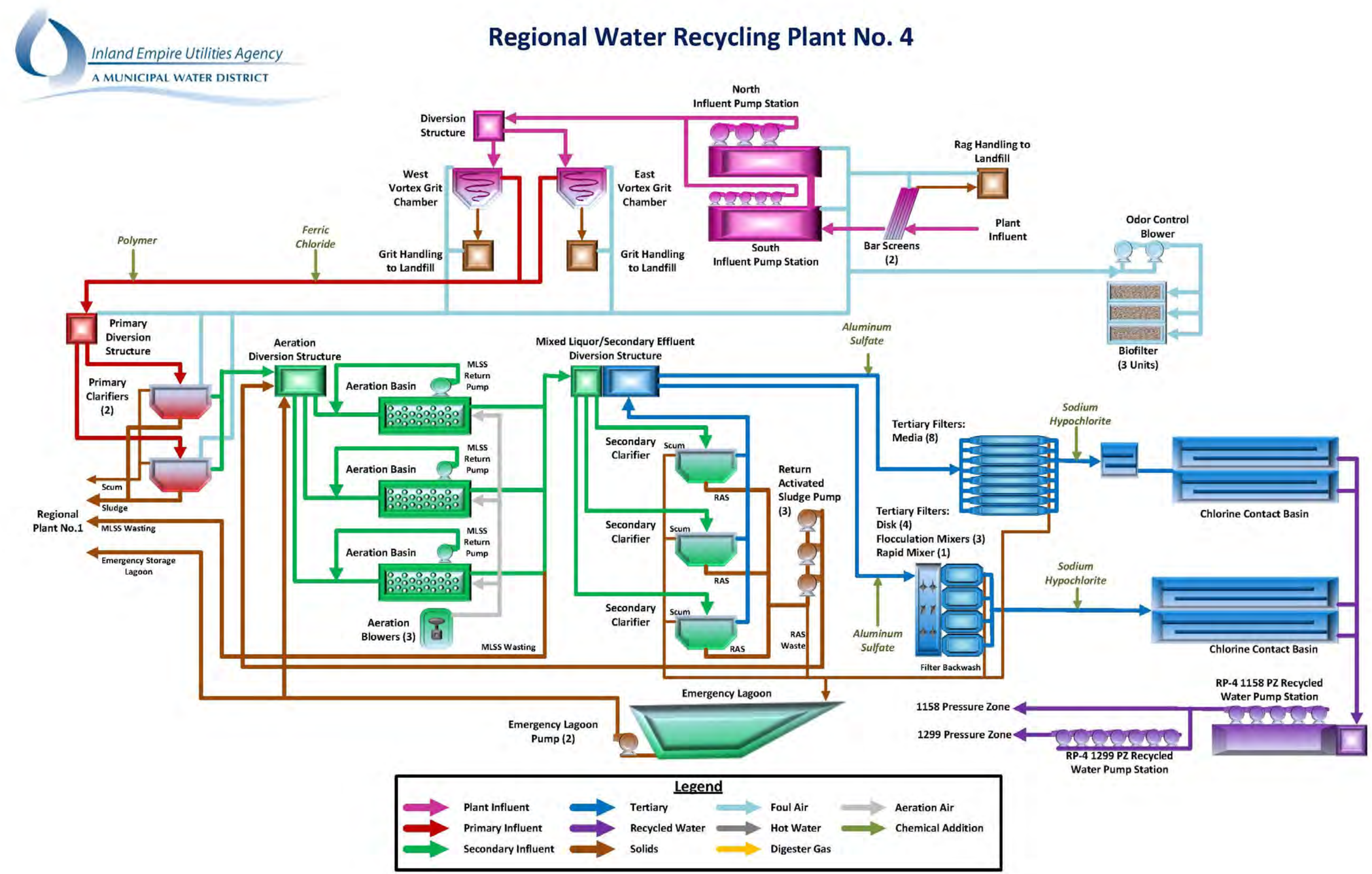

Figure 7-4: Regional Water Recycling Plant No. 4 (RP-4) – Schematic

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Table 7-5: Regional Water Recycling Plant No.4 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN09021	RP-4 Headworks Retrofit	This project will include replacing both of the bar rack screens with fine screens, modifying the screening enclosure, repaving damaged concrete within the screening enclosure and replacing gates isolating the headworks screens.	RO	CC	25,000	0	0	0	0	0	0	0	0	0	25,000
2	EN14018	RP-4 Chlorination Facility Retrofit	The project will replace the existing chlorination facility and associated equipment. Possible pipe gallery as an option.	RO	CC	550,000	1,500,000	0	0	0	0	0	0	0	0	2,050,000
3	TBD	RP-4 Process Improvements	The project will include various process improvements (grit removal system, primary diversion structure, aeration blower replacement, RAS wasting station, MLSS wasting station, filtration system, secondary clarifier drain valves, lagoon recovery pump station, secondary clarifier weir washers, and recycled water distribution system).	RO	CC	0	200,000	3,000,000	2,000,000	0	0	0	0	0	0	5,200,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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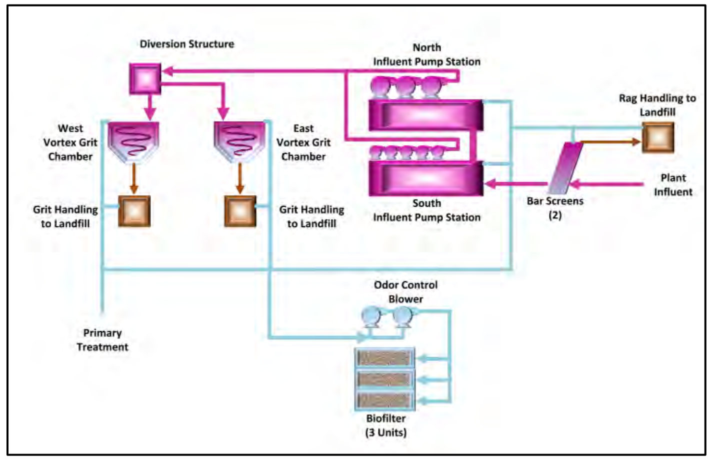
Asset Management System Summary – RP-4

Preliminary Treatment Process

1. Asset Profile



Influent Channel
Raw wastewater enters the plant through a 42-inch gravity sewer pipeline. A composite sample and other instrumentation are used to monitor the plant's influent flow, which establishes the official influent monitoring control point for the treatment plant.

Screening Equipment
Influent flow is diverted into two channels. Both channels are equipped with a mechanical rake and rigid bar screen. These units remove all solids before the solids enter the treatment plant. Screened solids are conveyed to a waste storage bin to await landfill disposal.

Influent Pump Station
The screened wastewater enters the south influent wet well and then flows into the north wet well. The southern influent pump station is equipped with five dry-mount pumps, and the north influent pump station is equipped with three submersible pumps. Both influent pump stations lift screened wastewater into a common pipeline, which enters the headworks flow diversion structure.

Influent Flow Metering
The lifted flow enters the common pipeline, equipped with a magnetic flow meter that records the daily flow through the plant. The common pipeline has a flow meter bypass for flow meter maintenance. Metered flow enters two diversion structures where gates regulate flow through the grit removal system.

Vortex Grit System
The metered flow is diverted into two separate grit-removal systems. Each grit-removal system is equipped with a vortex grit chamber and classifier. Grit and other inorganic material are removed before entering the primary treatment process. The material is conveyed to a waste storage bin to await landfill disposal.

Grit Washing/Disposal System
Grit pumped from the vortex grit chamber is routed to two grit classifiers, where organic matters are removed from the grit. The grit sinks to a submerged inclined screw and moves up the ramp while being washed. The organic rich liquid from the grit classifiers are directed back to the liquid handling stream.

Screening Conveyance/Disposal System
Screening collected by the bar screens is transported by a conveyor and dropped into a waste bin.

Odor Control System
The foul air is extracted from the influent screening enclosure, influent pump stations, the grit-removal vortex chambers, the grit-waste storage bins, and the primary clarifiers and conveyed to the media biofilters to remove odorous compounds. The odor control system is equipped with two blowers and three biofilters.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	16.1 MGD	
Influent Channel Sewer	42-inch	
Screening Equipment Mechanical Screen Gates	2 @ 36.2 mgd 3 hp 4 units	Peak Per Unit
Influent Pump Station Pumps Valves	3 @ 6,000 gpm 100 hp 5 @ 3,275 gpm 50hp 8 units	Per Unit Per Unit > 12-inch
Influent Flow Meter Valves	1 @ 48.3 mgd 3 units	
Vortex Grit System Paddle Drive Pump Gates	2 @ 16.1 mgd 2 @ 1.5 hp 3 @ 250 gpm 10 hp 8 units	Per Unit Per Unit Per Unit
Grit Washing & Disposal System Classifier	2 @ 50 gpm 5 hp	
Screening Conveyance & Disposal System Conveyor	1 hp	
Odor Control System Foul Air Fan Biofilter Pump Valves	2 @ 12,500 scfm 30.8 hp 3 @ 5,011 ft^3 2 @ 214 gpm 3 hp 10 units	Per Unit Per Unit Per Unit > 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Channel	4	3	4	3
Screening Equipment	4	4	4	4
Influent Pump Station	3	3	3	3
Influent Flow Meter	3	3	3	3
Vortex Grit System	4	3	4	4
Grit Washing/Disposal System	3	3	4	3
Screening Conveyance/Disposal	4	4	4	4
Odor Control System	3	3	3	3

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Influent Channel
The isolation gate between screening channels traps solids when the east bar screen is offline and the west bar screen is online. Project EN09021, to be completed FY2014/15, will modify the influent channel to reduce solids buildup. In addition, isolation gates are being replaced on the influent channel and screens.

Screening Equipment
The bar screens have reached the end of their useful life and can no longer be repaired, so an immediate replacement is required. Project EN09021, to be completed FY2014/15, will replace both bar screens with fine screens, which also improves the capture efficiency.

Influent Pump Station
Wet wells have not been cleaned or inspected since construction. Project EN09021 will dewater and clean the structure.

Influent Flow Meter
No issues require special attention.

Vortex Grit System
The suction piping to grit pumps in grit chamber no.1 clogs. Maintenance has setup flushing connections to expedite cleaning in the case of suction pump blockage. Pumps cannot be remotely operated. The east grit chamber isolation gates need to be replaced because they cannot be used by operations. A potential project will rehab this system.

Grit Washing/Disposal System
The screenings and grit are handled separately. Project EN09021, to be completed FY2014/15, will provide flexibility to add screenings and grit to a common dewatering bin.

Screening Conveyance/Disposal System
The screenings are not dewatered before final waste hauling disposal. The screenings and grit are handled separately. Project EN09021, to be completed FY2014/15, will provide flexibility to add screenings and grit to a common dewatering bin. In addition, cleaning and compacting equipment will be installed for the screenings.

Odor Control System
No issues require special attention, but routine media replacement is required to maintain facility air-quality compliance.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Channel	1997	
Screening Equipment	1997 2002	Planned 14/15
Influent Pump Station	1997 2009	Planned 14/15 (Waiting on Report)
Influent Flow Meter	2009	
Vortex Grit System	1997 2009	Planned 14/15
Grit Washing/Disposal System	1997 2009	
Screening Conveyance & Disposal System	1997 2009	
Odor Control System	2009 2012	

Table 4 Potential Projects

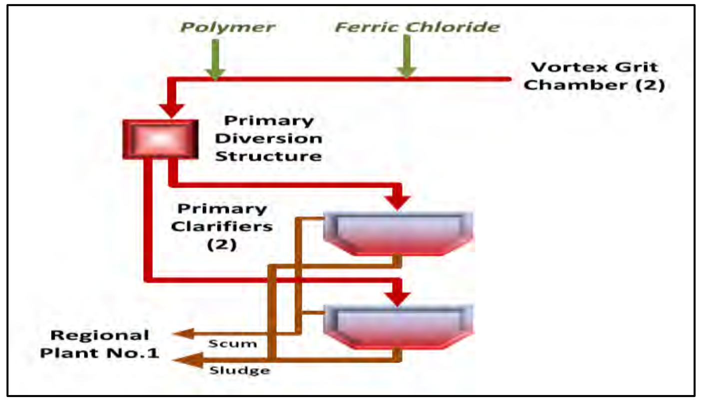
System	Project Name	Project Description
Grit Removal System	RP-4 Process Improvements Phase II	Replace the grit chamber isolation gates and retrofit the grit removal pumping system of grit chamber no.1.

System Summary Continued on Next Page

Asset Management System Summary – RP-4

Primary Treatment Process

1. Asset Profile



Primary Diversion Structure
The preliminary treated flow enters a common 54-inch pipeline and is conveyed to the primary diversion structure. The flow is equally distributed into two 36-inch pipelines, each feeding a circular primary clarifier.

Ferric Chloride System
Ferric chloride is dosed into the raw wastewater before screening. The chemical is used to remove phosphorous and to improve the settling/removal characteristics within the primary clarifiers.

Polymer System
Polymer can be added to the treated flow to improve the settling/removal characteristics within the primary clarifiers, but typically polymer is not used at the plant. Polymer can be injected at the primary diversion structure.

Primary Clarifiers
The facility is equipped with two covered primary clarifiers. The treatment process removes settable solids and floatable scum and grease. There is no solids-handling at RP-4; therefore, all the settled and floatable solids are introduced back into the trunk sewer downstream of RP-4, where they can be processed at RP-1. Solids are wasted out of the clarifier by gravity through actuated valves. Each clarifier is equipped with a flow meter to monitor all solids wasted from the primary treatment process. Primary effluent is conveyed through a 54-inch pipeline.

Sludge/Scum Wasting System
The solids which settle and thicken into sludge are gently mixed by the rotating rake arms on the bottom of the primary clarifiers; this process releases gas bubbles and allows the sludge to compact. A pipe conveys sludge by gravity into the trunk sewer to RP-1; all wasted sludge is recorded by flow meter and automatic control valves. The solids that float and thicken into scum are skimmed into scum beach and stored in a small wet well. A pipe conveys scum by gravity into the trunk sewer to RP-1.

2. Asset Profile

Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	14 MGD	
Primary Diversion Structure Mixer Gates	 1 @ 4 hp 3 units	
Ferric Chloride System Pump Chemical Tank	 2 @ 53.1 gph 8,000 gallons	 Per Unit
Polymer System Metering Pump	 2 @ 4.5 gph	 Per Unit
Primary Clarifier Drive	2 @ 1,617 gpd/ft^2 8,660 ft^2 0.33 hp	Per Unit
Sludge/Scum Wasting System Scum Valves Sludge Valves	 2 units 8 units	 6-inch > 6-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Primary Diversion Structure	4	3	3	3
Ferric Chloride System	4	3	3	3
Polymer System	4	4	4	4
Primary Clarifiers	3	3	3	3
Sludge/Scum Wasting System	3	3	4	4

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Primary Diversion Structure
The top of the diversion structure is showing signs of concrete corrosion. Therefore, a condition assessment is planned for 2015. A potential project may be needed to rehab the concrete, install larger inspection hatches for cleaning, and replace influent gates.

Ferric Chloride System
The ferric containment area needs to be recoated. The ferric chloride is being dosed through the original polymer injection pipeline because the original dosing point is upstream of the screening equipment; ferric should be dosed downstream of the grit removal system. A potential project is needed to rehab this system.

Polymer System
The chemical dosing pipeline is being used to inject ferric chloride, and the system is out of service. Polymer dosing to the secondary system would be beneficial for system upsets or increased future plant flows. The system has been offline for over five years and the status of the chemical metering pumps and ancillary equipment is unknown. A potential project is required to rehab this system.

Primary Clarifiers
No issues require special attention. The primaries have never been inspected since the original construction of both structures.

Primary Sludge/Scum Wasting System
Scum-well effluent piping tends to get clogged, a problem which requires flushing the piping or removing the material with a vacuum truck. This system should be evaluated to determine the feasibility for installing a pumping system in place of the current gravity wasting system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Primary Diversion Structure	2009	Complete 2014 (Waiting on Report)
Ferric Chloride System	2009	
Polymer System	2009	
Primary Clarifiers	2009	1: Complete 2014 (Waiting on Report) 2: Complete 2015 (Waiting on Report)
Sludge/Scum Wasting System	2009	

Table 4 Potential Projects

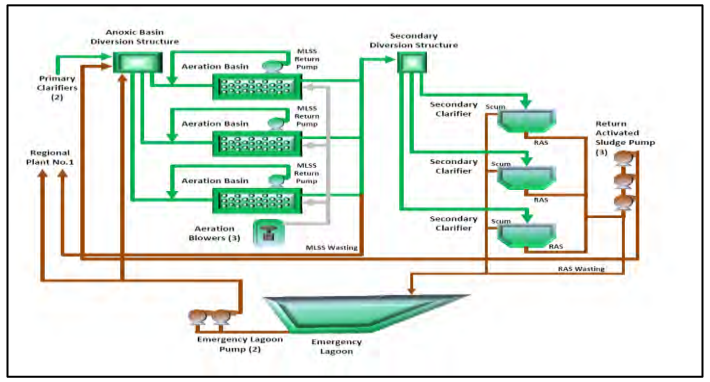
System	Project Name	Project Description
Primary Diversion Structure	RP-4 Process Improvements Phase II	Repair concrete and coat the diversion structure, install larger inspection hatches, and replace primary influent gates.
Ferric Chloride System	RP-4 Process Improvements Phase II	Rehab the ferric chloride system by recoating the ferric containment area and replacing the chemical metering pumps.
Polymer System	RP-4 Process Improvements Phase II	Rehab the existing polymer dosing system by constructing a chemical dosing pipeline to the primary diversion structure and replacing the chemical metering pumps.

System Summary Continued on Next Page

Asset Management System Summary – RP-4

Secondary Treatment Process

1. Asset Profile



Anoxic Basin Diversion Structure
Primary effluent enters the anoxic basin diversion structure and is mixed with return activated sludge, creating mixed liquor. Mixed liquor is diverted equally through three 42-inch pipelines, each feeding an activated sludge system.

Anoxic Basin
One anoxic basin is designated for each of the three activated sludge treatment systems. Each system is composed of an anoxic basin and an aeration basin. The basin is equipped with three mixers to keep solids in suspension throughout the basin. The anoxic basin effluent is diverted through launders into two 30-inch pipelines, which equally feed both aeration basin trains.

Activated Sludge System
An aeration basin is designated for each of the three activated sludge treatment systems. The basins are divided into two trains, and each train is further subdivided into four zones: an extended anoxic zone, oxic zone, another anoxic zone, and another oxic zone. Each zone provides the correct biological environment to consume carbonaceous waste, breakdown ammonia, and reduce pathogens in the mixed liquor. The anoxic zones are equipped with mixers to ensure the solids remain in suspension throughout the treatment process. The oxic zones are equipped with fine-bubble-air diffusers. The diffused air supports the biological process and also provides mixing within the zone. A submersible mixed-liquor return pump is strategically placed at the end of the first oxic zone to recycle flow to the anoxic basin for more efficient treatment. The treatment system is equipped with three blowers to provide pressurized air to the oxic zones. Typically only one or two blowers are needed during the day for the treatment process.

Mixed Liquor Diversion Structure
The mixed liquor enters a common 66-inch pipeline, which feeds the bottom of the mixed liquor diversion structure. The flow is then split equally through three launders, and each launder feeds a secondary clarifier through a 48-inch pipeline.

Secondary Clarifiers
The facility is equipped with three secondary clarifiers. The secondary treatment process provides an environment for the gravity separation of solids from the mixed liquor. The clarified secondary effluent exits the clarifier through a 48-inch pipeline. Scum accumulated on the surface of each of the secondary clarifiers is wasted to the emergency lagoon. The settled solids are referred to as activated sludge. The activated sludge is recycled to the anoxic basin diversion structure through the return activated sludge pump station. The pump station is equipped with three pumps and has a common 24-inch suction pipeline from each secondary clarifier. To control the population of biological species, activated sludge can be wasted from the common effluent pipeline from the aeration basin; wasted activated sludge is diverted to RP-1 for further treatment.

Return Activated Sludge (RAS) Pumping System
The RAS pumping system is designed to return the settled biomass in the secondary clarifier to the head of the activated sludge system. The system is designed to pump at a rate of 30 to 100 percent of the full average daily flow of the facility.

Waste Activated Sludge (WAS) Station
The WAS station is designed to remove the excess biomass from the activated sludge system. Biomass can be removed as mixed liquor suspended solids (MLSS) from the common aeration basin effluent pipeline or from the discharge of the RAS pumping system. MLSS is wasted directly to the trunk sewer, which is treated at RP-1. Wasted RAS is discharged to the emergency lagoon.

Emergency Lagoon
The emergency lagoon is located at the southern end of the plant. The primary function of the lagoon is to recycle the filter effluent backwash from the trident filters and aqua aerobics filters. Secondary scum and plant drainage are also diverted to the lagoon. The recycled flow is pumped into the anoxic basin diversion structure or can be diverted to Regional Plant No.1

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	14.0 MGD	
Anoxic Basin Diversion Structure Gates	 6 units	
Anoxic Basin Mixer Gates	3 @ 7.0 MGD 3 @ 6.2 hp 6 units	Per unit Per Unit
Activate Sludge System Blowers Blower Valves Trains Depth Mixers Air Panels Valve Valve (air) MLR Pump MLR Valve	3 @ 7.0 MGD 2 @ 8,000 scfm 500 hp 13.07 psig 1 @ 8,000 scfm 450 hp 9.00 psig 6 units 6 @ 1,54 MG 15.7 ft 6 @ 4 hp 463 per train 1 per train 6 units 6 @ 14,800 gpm 40 hp 6 units	Per Unit Per Unit >14-inch Per Unit Per Unit > 18-inch > 12-inch Per Unit >30-inch
Mixed Liquor Diversion Structure Gates	 3 units	
Secondary Clarifier	3 @ 848 gpd/ft^2 16,500 ft^2	
RAS Pumping System Pump Valves	 3 @ 6,076 gpm 75 hp 15 units	 Per unit > 18-inch
WAS Station Valves	 3 units	 6-inch
Emergency Lagoon Pump Valves	1 @ 4.0 MG 2 @ - 3,155 gpm 75 hp 2 units	 Per unit > 16-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Anoxic Basin Diversion Structure	3	3	3	3
Anoxic Basin	3	3	3	3
Activated Sludge System	4	4	4	4
Mixed Liquor Diversion Structure	3	3	3	3
Secondary Clarifiers	4	3	3	3
RAS Pumping System	3	3	4	4
WAS System	3	3	4	4
Emergency Lagoon	4	3	4	4

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Anoxic Basin Diversion Structure
No issues require special attention.

Anoxic Basin
No issues require special attention.

Activated Sludge System
There are multiple broken air diffuser panels throughout the aeration basin system. Panels are isolated locally, and the isolation has drastically reduced the air flow through the system, negatively effecting treatment. PA15006 is a planned Agency-wide project that will replace the panels throughout the system.

The higher-pressure rated Kawasaki and Turblex blowers are inefficient. The Kawasaki blower is rated for a higher pressure than the two Turblex blowers and cannot run with the lower-rated blowers without failing when in auto. Therefore the Kawasaki can only run as a standalone blower, eliminating the reliable redundancy of the aeration blowers. A potential project will replace the Kawasaki blower.

Mixed Liquor Diversion Structure
No issues require special attention.

Secondary Clarifier
The secondary clarifier effluent launders and trough grow large amounts of algae, requiring manual removal. Clarifier No.1 valve has failed and has been replaced with a plug, and the other two clarifiers are assumed to be in the similar condition. A potential project will address these issues.

RAS Pumping System
The RAS wasting valve can only waste to the lagoon; excess solids in the lagoon create a septic environment and increased odors. The wasted RAS flow should be discharged directly to the sewer. The wasted flow meter reads erratically. A potential project will address these issues.

WAS Station
The flow meter is erratic when the valve is partially opened. The flow meter may not be full at all times. A potential project will address these issues.

Emergency Lagoon
The lagoon recovery pump station equipment is unreliable and has approached the end of its service life, due to the following reasons: the discharge Victaulic fittings leak, the air-reliefs plug, and pumps have difficulty priming. The flow meter is not connected to SCADA. The flow meter is dated and only reads as a percentage (i.e. 0 to 100%) on a local display. A potential project will address the pump station issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Anoxic Basin Diversion Structure	2009	
Anoxic Basin	1997 2009	Complete 2014 (Waiting on Report)
Activated Sludge System	1997 2003 2009	Complete 2014 (Waiting on Report)
Mixed Liquor Diversion Structure	2009	
Secondary Clarifiers	2009	Planned 15/16
RAS Pumping System	2009	
WAS Station	2009	
Emergency Lagoon	1997	

Table 4 Potential Projects

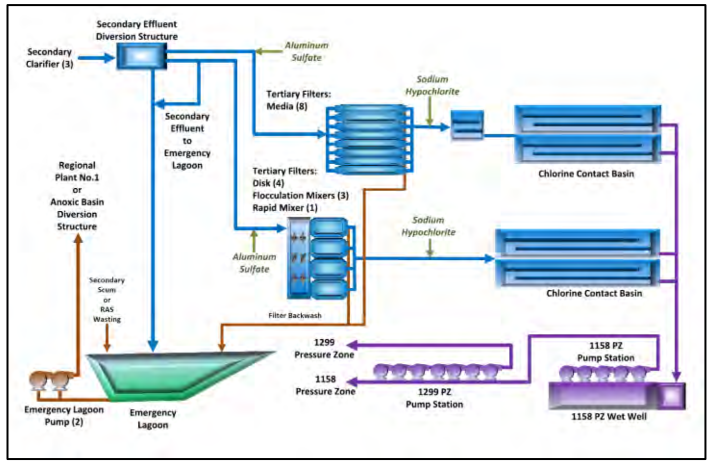
System	Project Name	Project Description
Activated Sludge System	RP-4 Process Improvements Phase II	Replace the Kawasaki blower.
Secondary Clarifier	RP-4 Process Improvements Phase II	Install weir washing units and replace drain valves on the secondary clarifiers.
RAS Pumping System	RP-4 Process Improvements Phase II	Retrofit the piping to flood the flow meter and wasted flows shall be diverted directly to the sewer.
WAS Station Pumping System	RP-4 Process Improvements Phase II	Retrofit the piping to flood the flow meter and wasted flows shall be diverted directly to the sewer.
Emergency Lagoon	RP-4 Process Improvements Phase II	Replace the lagoon recovery pump station pumps and ancillary equipment.

System Summary Continued on Next Page

Asset Management System Summary – RP-4

Tertiary Treatment Process

1. Asset Profile



Secondary Effluent Diversion Structure
The secondary effluent structure is fed through the bottom by a 66-inch pipe. Flow can be diverted to three different locations: the Trident media filters, Aqua-Aerobics Disk filters, or the emergency lagoon. The media filters are fed by a 36-inch pipe, the cloth filters are fed by a 48-inch pipe, and a 48-inch pipe is used to bypass flow to the emergency lagoon. A 30-inch pipe connects the Aqua-Aerobics system to the 48-inch bypass pipe.

Aluminum Sulfate (Alum) System
Chemicals can be added to the secondary effluent that is feeding either filtration system for the purpose of coagulation or pre-filter disinfection. Alum is stored in the maintenance building in two bulk storage tanks and at the trident filter building in two smaller transfer tanks. Bleach is stored in three bulk storage tanks in the maintenance building and is typically applied to the chlorine contact basin

Filters (Trident and Aqua-Aerobics)
The filtration systems consist of two different technologies: the Trident Anthracite Media Filters and the Aqua-Aerobics Disk Filters. Both technologies filter solids from the secondary effluent before undergoing their separate disinfection systems. The Trident filter must not exceed a filter loading rate of five gallons per minute per square foot (gpm/ft^2), and the Aqua-Aerobics filter cannot exceed a filter loading rate of six gallons per minute per square foot (gpm/ft^2). The Trident-filtered effluent feeds Chlorine Contact Basin 1A through a 36-inch pipe, and the Aqua-Aerobics-filtered effluent feeds Chlorine Contact Basin 2 through a 48-inch pipe.

Chlorination System
Disinfectant chemical, in the form of 12.5 percent solution sodium hypochlorite (bleach), is dosed to the filtered effluent at both locations: Chlorine Contact Basin 1A and Chlorine Contact Basin 2. The chlorine dose typically ranges from 5 to 15 milligrams per liter. The bleach is intimately mixed into solution using a mixer at the influent of both chlorine contact basins. Bleach is stored in three bulk storage tanks in the maintenance building.

Chlorine Contact Basins (CCB)
The facility is equipped with two chlorine contact basin systems. The Trident-filtered effluent feeds into a coupled chlorine contact basin consisting of Chlorine Contact Basin 1A and 1B, and Aqua-Aerobics-filtered effluent feeds into Chlorine Contact Basin 2. The chlorine contact basin effluent is required to meet California Department of Public Health's Title 22-approved disinfection contact time of 450 milligrams-minutes per liter and a modal contact time of 90 minutes to discharge into the recycled water distribution system. The final effluent is pumped into the recycled water distribution system; therefore, the final effluent does not need to be dechlorinated at RP-4.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	14.0 MGD	
Secondary Effluent Diversion Structure Gates	3 units	
Alum System		
Tank	2 @ 2,200 gallons	Per unit
Transfer Tank	2 @ 400 gallons	Per unit
Transfer Pump	2 @ 90 gph 1 @ 124 gph	Per unit
Pump		
Trident Filters	2 @ 34.5 gph	Per unit
Aqua Filters	2 @ 12.5 gph	Per unit
Trident Filters		
Absorption Clarifier	8 @ 11 gpm/ft^2 140 ft^2	Per unit
Media Filter	8 @ 5 gpm/ft^2 313 ft^2	Per unit
Backwash Pump	2 @ 4,200 gpm 100 hp	Per unit
Backwash Blower	2 @ 1120 scfm 30 hp	Per unit
Valves	16 units	> 18-inch
Aqua Disk Filters	4 @ 5.8 gpm/ft^2 646 ft^2	Per unit
Rapid Mixer	1 @ 5 hp	
Flocculation Mixer	3 @ 1 hp	Per unit
Backwash Pump	8 @ 1,760 gpm 3 hp	Per unit
Helical Gear Drive	4 @ 15,597 lb.-inch ¾ hp	Per unit
Gates	3 units	
Valves	4 units	> 18-inch
Chlorination System		
Tank	3 @ 2,200 gallons	Per unit
Pump		
Trident Filters	1 @ 77 gph 1 @ 22.5 gph	
RAS Pipeline	1 @ 90 gph	
CCB1A	2 @ 180 gph	
CCB2	2 @ 124 gph	Per unit
SBS (O/S)	2 @ 46.9 gph	Per unit
Water champ Mixer	2 @ 30 gpm 7.5 hp	Per unit
Chlorine Contact Basin		
CCB1A & 1B	7.0 MGD 1.15 MG	T22 Report
CCB2	7.0 MGD 1.01 MG	T22 Report
Gates		
CCB1A	1 units	
CCB1B	2 units	
CCB2	2 units	
Valves		
CCB1B	1 units	> 18-inch

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Secondary Effluent Diversion Structure	3	3	3	3
Alum System	3	3	3	3
Trident Filters	4	3	4	4
Aqua-Aerobics Disk Filters	3	3	3	3
Chlorination System	4	4	4	4
Chlorine Contact Basin	4	3	3	4
Effluent Diversion Structure	3	3	3	3

* These ratings are defined in Appendix A

4. Key Issues for Further Investigation

Secondary Effluent Diversion Structure
No issues require special attention.

Alum System
No issues require special attention.

Trident Filters
The absorption media and filter media are routinely replaced by maintenance staff.

Multiple backwash, effluent, and waste valves do not isolate completely, flow is wasted to the lagoon and recirculated within the plant. Also, many actuators leak air or are no longer utilized. A potential project will replace the worn equipment.

Aqua-Aerobics Disk Filters
No issues require special attention.

Chlorination System
The bleach containment area is not coated, and the concrete tank pads, metal supports, and the containment walls are showing signs of corrosion. In addition, bleach has seeped past the containment area to damage a door and walls outside of the containment area. The leaking bleach wears the ancillary equipment prematurely.

The three bleach storage tanks are 2,200 gallons each, but due to the overflow penetration location on each tank, the storage capacity has been reduced to 2,000 gallons. The total storage capacity of 6,000 gallons leaves limited flexibility to receive full load deliveries of 4,800 gallons. In addition, the east alum tank and ancillary equipment located directly across from the bleach containment are abandoned.

The bleach metering pumps are diaphragm technology. These pumps lose suction prime when offline and require manual operation to degas the suction pipeline. Although all the pumps are diaphragm, there is no standardized pump manufacturer. In addition, the maintenance on the diaphragm is time consuming and expensive.

The chlorine dosing system is currently operating without backup injection pipelines. CCB1A does not have an operational backup bleach injection pipeline. Both CCB2 injection pipelines are offline due to leaks; the locations of the leaks are unknown due to the pipeline being buried under asphalt. Finally, the Aqua Disk Filters do not have a bleach injection pipeline for pre-filter chlorination. Algae will blind the filter media, resulting in more frequent backwashes.

Project EN14018 will address issues within the chlorination system.

Chlorine Contact Basin (CCB)
There are gaps on the chlorine contact basin covers, and sand and debris infiltrate the structure. The basins have not been inspected since construction.

The CCB1A effluent gate needs to be repaired, replaced, or removed from operation. Controls for the gate are outdated and approaching the end of its service life. A potential project will replace the gate and controls.

Effluent Splitter Box
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Secondary Effluent Diversion Structure	2009	
Alum System	1997 2009	
Trident Filters	1997	Planned 15/16
Aqua-Aerobics Disk Filters	2009	
Chlorination System	2003 2009	
Chlorine Contact Basin	2003 2009	Planned 15/16
Effluent Splitter Box	2003	

Table 4 Potential Projects

System	Project Name	Project Description
Trident Filters	RP-4 Process Improvements Phase II	Replace worn filter ancillary equipment.
Chlorine Contact Basin	RP-4 Process Improvements Phase II	Replace gate and controls on CCB1A.

System Summary Continued on Next Page

Asset Management System Summary – RP-4

Auxiliary Systems

1. Asset Profile

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The wind asset is owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. One outside generator is located in the northern portion of the facility and supplies power to the preliminary, primary, secondary, and tertiary sections.

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the 1158-foot pressure zone pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied by three connections on 6th Street from the Cucamonga County Water Department. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-4. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to the main control centers.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Electrical System		
Utility Voltage	1 @ 12 kV	
Transformers	8 @ 12 kV to 480 V	
Switchgear	10 @ 12 kV	
Distribution	5 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,847 Bhp	
Wind Turbine	1 @ 1 MW	
Mounted Lighting	> 50 units	
Utility Water System		
Pipelines	Various sizes	
Pump Station	See *1158 Pressure Zone*	
Valves	2 units	6-inch
Potable Water System		
Backflow Devices	5 units	>2-inch
Valves	10 units	>2-inch
Instrumentation and Control System		
HMI Workstation	8 units	
PLC	7 units	
I/O Hub	5 units	
Radio Transmitter	1 unit	
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Electrical System	3	3	3	3
Utility Water System	3	3	4	4
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Electrical System
No issues require special attention.

Utility Water System
The plant utility water is not monitored from the 1299 recycled water pump station.

There are very few recycled water connections greater than 1 ½" around the plant. The ½" recycled water connections throughout the plant do not provide sufficient pressure or flow for cleaning large tanks.

If the plant's tertiary treated wastewater does not meet recycled water compliance standards, the 1158 and 1299 recycled water pump stations are taken offline. Unfortunately, noncompliant water is left within the contact basins and has to be pumped to the lagoon through the 1158 recycled water pump station which requires manually manipulating three large valves. Manipulating large valves is time consuming and increases the amount of time to start producing compliant recycled water again through the plant.

A potential project will address the system issues.

Potable Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Electrical System	1993 1995 2001 2005	
Utility Water System	2002	
Potable Water System	1993 2003	
Instrumentation and Control System	1995 2001 2003 2005	
Yard Piping	1993 1995 2001 2005	

Table 4 Potential Projects

System	Project Name	Project Description
Utility Water System	RP-4 Process Improvements Phase II	Install a utility water flow meter with manual bypass, install additional 1 ½" utility water connections, and install actuators to automate recycled water valves.

End of System Summary

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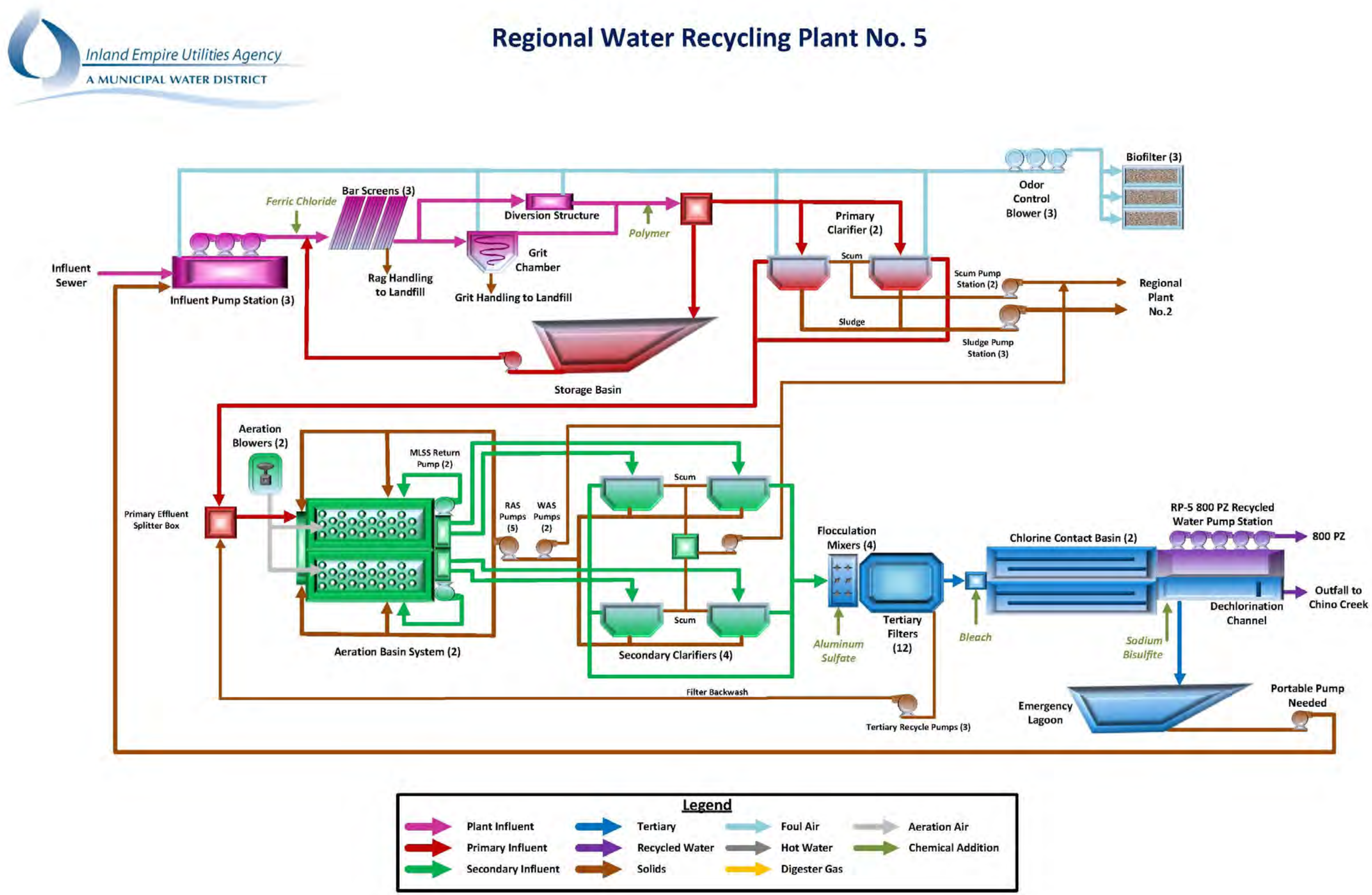

Figure 7-5: Regional Water Recycling Plant No. 5 (RP-5) – Schematic

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Table 7-6: Regional Water Recycling Plant No.5 – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN09023	RP-5 SHF/REEP Independent Evaluation	Provide technical support to Inland Bioenergy (Lessee of RP-5 SHF/REEP)	RC	CC	25,000										25,000
2	EN11031	RP-5 Flow Equalization and Effluent Monitoring	The RP-5 Flow Equalization and Effluent Monitoring consist of modifications in the primary effluent splitter box. The 12' weir gate and automation of the slide gate to allow flow to the aeration basin will better optimize the flow equalization of plant treatment process.	RC	CC	1,200,000	0	0	0	0	0	0	0	0	0	1,200,000
3	EN19001	RP-5 Liquid Treatment Expansion	Expand existing RP-5 liquid treatment capacity from 15 to 22.5 mgd. Project cost estimated at $75M. (include RP-5 satellite warehouse & MM shop)	RC	CC	0	0	2,000,000	10,000,000	19,000,000	29,000,000	29,000,000	29,000,000	7,000,000	0	125,000,000
4	EN19006	RP-5 Solids Treatment Facility - RC	Construct new solids handling facility at RP-5 to decommission RP-2.	RC	CC	0	2,000,000	5,000,000	18,000,000	18,000,000	17,000,000	8,000,000	0	0	0	68,000,000
5	TBD	RP-5 Process Improvements	Project to provide various process improvements that couldn't be addressed under EN11031 (e.g., secondary effluent diversion to lagoon, headworks fine screens, grit piping modifications, lagoon pump station, weir washers, influent wet well cleaning.)	RC	CC	0	0	0	0	300,000	3,500,000	2,500,000	0	0	0	6,300,000
6	TBD	RP-5 Expansion PDR	As defined by WWFMP, includes both solids and liquids facilities	RC	CC	1,000,000	500,000	0	0	0	0	0	0	0	0	1,500,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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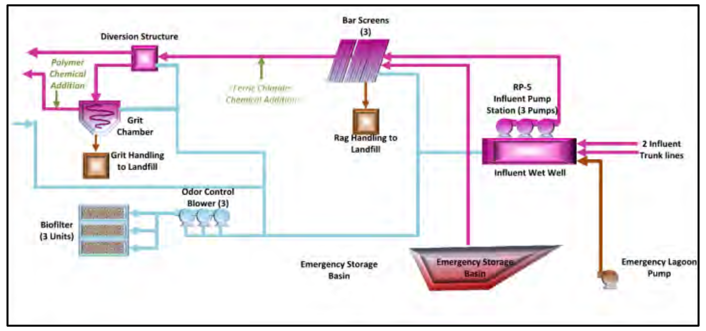
Asset Management System Summary – RP-5

Preliminary Treatment Process

1. Asset Profile



Influent Trunk Lines
Raw wastewater enters RP-5 through the 42-inch Chino interceptor diversion and 66-inch Kimball interceptor.

Influent Pump Station (IPS)
The influent pump station collects raw sewage from the 42-inch Chino interceptor diversion and 66-inch Kimball interceptor. The streams enter the influent junction box and flow through manually-operated isolation gates into two separate wet wells. The RP-5 influent pump station conveys plant influent flow to the headworks. Once lifted to the headworks, flow proceeds through the entire plant by gravity. Three VFD-controlled, wet-pit submersible, non-clogging, centrifugal pumps located in the IPS wet wells lift the combined flow and convey the raw sewage to the headworks through a 42-inch diameter discharge line. The west wet well holds two pumps, while the east wet well holds the third pump, with space for one future pump. A 36-inch-diameter magnetic flow meter in the combined discharge line measures the flow.

Screening Equipment
The headworks consist of bar screens with screenings washers and compactors and also grit basins with grit washers. Two mechanical climber-type bar screens are installed along with a screw conveyor and screenings washer/compactor. One manual bar screen is also installed as a standby unit.

Vortex Grit Chamber
When wastewater leaves the bar screen channels, it enters a mechanically induced vortex grit basin, which separates the heavier grit particles from the lighter organics. The heavier particles settle to the bottom of the chamber from where they are removed from the basin by the constant-speed recessed impeller grit pumps.

Grit Washing/Disposal System
The grit removal system separates grit, sand, and other heavy particles from lighter organics in the influent wastewater flow, removing this material to protect downstream equipment and processes. The fluidized grit is pumped to the grit washers, where it is dewatered before being discharged into disposal bins. The grit washers include a cyclone separator to remove additional water and concentrate the solids. They also contain a classifier mechanism that accepts the underflow from the cyclone unit. This classifier further separates the solids using a screw mechanism to transport the grit upward out of a settling tank.

The grit removal system includes manually operated gates and valves to allow for bypassing each component of the facility. The duty pump and duty grit washer are selected by opening the appropriate manually operated plug valves. There are provisions to accommodate the expansion of the grit removal system if needed. A second grit basin could replace the existing grit basin bypass pipeline, and a third pump can be added to the grit pumping station.

The excess liquid spills out of the grit classifiers and is directed back to the bar screen structure effluent channel.

Screening Conveyance/Disposal System
Screening collected by the bar screens is transported by a conveyor and dropped into a hydraulic washer-compactor. The compactor compresses the collected rags, squeezing out excess water, and pushes the rags to the roll-off bin.

Ferric Chloride System
Ferric chloride is added to the liquid flow after grit removal to increase solids capture during primary treatment and to control odors caused by hydrogen sulfides.

The ferric station consists of a truck filling station, 9,600-gallon storage tank, three chemical metering pumps and associated piping.

Polymer System
Polymer is added to the liquid flow before grit removal to enhance primary treatment. The polymer system includes two 500-gallon tote stands, chemical metering pumps, mixing chamber, and associated piping. The anionic polymer system is located in the same area as the ferric chloride system. The polymer system consists of two polymer storage totes and two polymer blenders. Anionic polymer is drawn from the storage totes, mixed and diluted with potable water, and delivered to the primary clarifier splitter box. Space and connections for future polymer blenders are provided to accommodate future plant flows.

Biofilter
Odors collected in the preliminary and primary treatment processes are forced through three biofilter media cells, where hydrogen sulfide gas is removed through biological processes.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Preliminary Treatment Process	16.3 MGD	
Influent Trunk Sewer Kimball Interceptor Chino Interceptor	 66-inch 42-inch	
Influent Pump Station Valves	3 @ 8,333 gpm 200 hp 7 units	Per Unit > 18-inch
Screening Equipment Mechanical Screen Manual Screens	 2 @ 30 MGD each 1 @ 30 MGD	Per Unit
Vortex Grit Basin Chamber Pump Gates	 1 unit @ 30 MGD 2 @ 250 gpm 25 hp 2 units	Per Unit
Grit Washing/Disposal Classifiers	 2 @ 13 ft^3/hr	Per Unit
Screening Conveyance & Disposal System Conveyor Washer Compactor	 1 @ 5.0 hp 1 @ 32 ft^3/hr	
Ferric Chloride System Tank Pumps	 9,600 gallons 2 @ 53 gph	Per Unit
Polymer System Pump	 2 @ 4.5 gph	Per Unit
Biofilter Cells	 3 @ 667 ft^3	Per Unit
Blowers	3 @ 13,200 scfm 30 hp	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Influent Trunk Sewer	3	3	3	3
Influent Pump Station	3	3	3	3
Screening Equipment	3	3	3	3
Vortex Grit System	3	3	3	3
Grit Washing/ Disposal System	3	3	3	3
Screening Conveyance/Disposal System	3	3	3	3
Ferric Chloride System	3	3	3	3
Polymer System	3	3	3	3
Headworks Splitter Box	3	3	3	3
Biofilter	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Influent Trunk Sewer
No issues require special attention.

Influent Pump Station
The influent pump station wet well accumulates floating debris which does not get pumped by the submersible pumps. The wet well needs routine Vactor cleaning, which is tedious and inefficient.

Screening Equipment
Fine screens are being considered to replace the current bar screens. The new fine screens will screen out smaller unwanted inorganics to pass through into the system, allowing for better and more efficient process treatment.

Vortex Grit System
No issues require special attention

Grit Washing/Disposal System
No issues require special attention

Screening Conveyance/Disposal
No issues require special attention

Ferric Chloride System
No issues require special attention.

Polymer System
No issues require special attention.

Biofilter
No issues require special attention, but routine media replacement is required to maintain facility air-quality compliance. A more efficient system should be installed to reduce frequent re-occurring media replacement.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Influent Trunk Sewer	2004	
Influent Pump Station	2004	Planned 2015
Screening Equipment	2004	Planned 2015
Vortex Grit Basin	2004	Planned 2015
Grit Washing/Disposal	2004	Maintenance Inspection 2014
Screening Conveyance & Disposal System	2014	Planned 2015
Ferric Chloride System	2004	
Polymer System	2004	
Biofilter	2004	Maintenance Inspection 2014

Table 4 Potential Projects

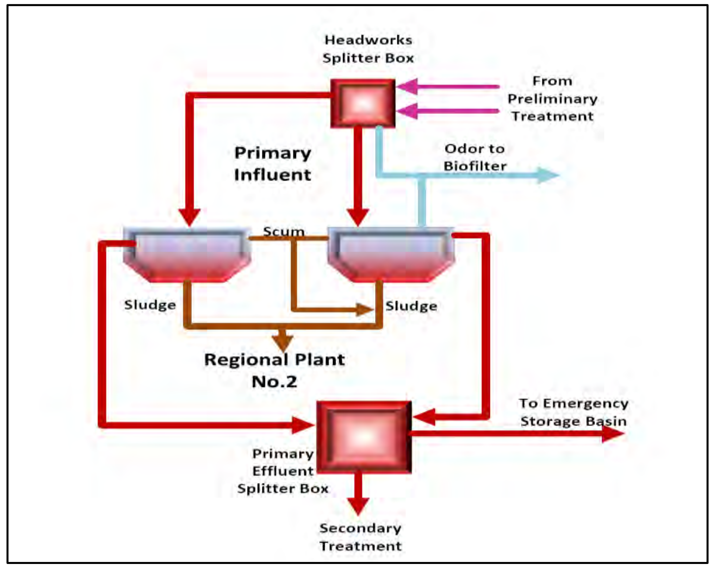
System	Project Name	Project Description
Influent Pump Station	RP-5 IPS Wetwell Self Cleaning Automation	Automatically clean the RP-5 IPS wet-well by installing new equipment.
Screening Equipment	RP-5 Headworks Screening Replacement	Install fine screens to replace the current bar screens. The new fine screens will screen out smaller unwanted inorganics to pass through into the system, allowing for better and more efficient process treatment.
Biofilter	RP-5 Odor Control Modifications	Modify existing biofilters to new bio-scrubbers or more efficient means of odor control.

System Summary Continued on Next Page

Asset Management System Summary – RP-5

Primary Treatment Process

1. Asset Profile



Headworks Splitter Box
The headworks splitter box receives flow from the grit systems, bar screen channel, and the bar screens structure bypass. Distribution valves in this area direct the wastewater flow to Primary Clarifiers 3 and 4.

Primary Clarifiers
There are two circular primary clarifiers located north of the aeration basins at RP-5. Each covered clarifier is 100 feet in diameter, with a sidewall depth of 12 feet. The average surface overflow rate for each clarifier is 8.3 MGD, with a maximum of 15 MGD. The solids that settle out in the clarifiers are pumped to RP-2 for treatment. The clarified flow passes over a weir and into the aeration basins.

Primary Effluent Splitter Box
The primary effluent from the clarifiers flows into the primary effluent splitter box. The purpose of the splitter box is to allow diversion of the primary clarifier effluent to either the aeration basin or the emergency storage basin. The amount of flow directed to either structure can be adjusted from slide gates.

Sludge Pumping System
The primary sludge pump station pumps settled sludge from the primary clarifiers sludge hoppers to the solids handling facilities at RP-2. There are three primary sludge pumps: one dedicated to each primary clarifier and one that serves as a common standby. Each pump suction line contains a sludge grinder (Muffin Monster) to reduce the size of the pumped solids and help prevent plugging. Sludge withdrawal from each clarifier is controlled by adjustable pumping cycles to maintain a constant sludge blanket level within the clarifier.

Scum Pumping System
Scum arms with a skimmer mechanism remove scum from the clarifier water surface. Scum deposits into the scum beach and then flows by gravity into a main scum wet well that receives scum from both primary clarifiers. The scum well has a mixer to help ensure that the scum does not thicken and result in pumping difficulties.

Emergency Overflow Pond
The unlined 17 MG emergency storage basin (located downstream of the dechlorination basin at the end of the plant) can be used to store final plant effluent if the effluent does not meet the permit requirements. The basin does not have a permanent pumping facility, but it has the capability to return flow to the headworks through a 16-inch line with the use of temporary pumps. This same line can be used to divert flow (by gravity) from the influent pump station wet well to the emergency overflow pond in an emergency situation.

Emergency Storage Basin (ESB) System
Downstream of the primary clarifiers, there is a primary effluent box with an adjustable weir gate that can be used to divert flow to the 6.8 MG emergency storage pond. The weir gate is manually set such that primary effluent in excess of a selected flow rate goes over the weir gate into the lagoon. The effluent is then pumped back to the headworks when the influent rate is low enough to allow all flow to continue to downstream processes.

The Emergency Storage Basin Pump Station returns diverted primary effluent to the headworks-structure bar-screen influent channel. Three VFD-controlled, wet-pit submersible, non-clog, centrifugal pumps located in the wet well lift the diverted primary effluent and transmit it to the headworks through a 20-inch-diameter transmission line.

A variety of instruments is installed at the ESB pump station to collect data and control operation of the pumps. A 20-inch-diameter magnetic flow meter in the combined discharge line measures the combined discharge flow and transmits the information to the Supervisory Control and Data Acquisition (SCADA) control system. A level transmitter and high- and low-low level switches monitor the liquid level in the wet wells and provide information to control the pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Primary Treatment Process	16.3 MGD	
Headworks Splitter Box Gates	3 units	
Primary Clarifiers Drive Gates	2 @ 2,075 gpd/ft^2 7,854 ft^2 1 @ ¾ hp 2 units	Per Unit
Primary Effluent Splitter Box Gates	2 units	
Sludge Pumping System Pumps	3 @ 230 gpm 30 hp	Per Unit
Scum Pumping System Pump	2 @ 230 gpm 15 hp	Per Unit
Emergency Overflow Pond	1 @ 17 MG	Unlined
ESB System Basin VFD Pumps	1 @ 6.8 MG 3 @ 3,000 gpm 60 hp	Per Unit

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Headworks Splitter Box	3	3	3	3
Primary Clarifiers	4	3	3	3
Primary Effluent Splitter Box	3	3	4	3
Sludge Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3
Emergency Overflow Pond	4	3	4	3
ESB System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Headworks Splitter Box
No issues require special attention.

Primary Clarifiers
Condition assessment of the East primary clarifier revealed significant coating failure of metallic surfaces. It is recommended to repair the severely corroded areas on the skimmer arms and steel in the vapor space as soon as possible or the next maintenance interval.

Primary Effluent Splitter Box
Modifications to the 12-foot weir gate and automation of the slide gate to allow flow to the aeration basin will better optimize the flow equalization of plant treatment process. Project EN11031 will address this issue.

Sludge Pumping System
No issues require special attention.

Scum Pumping System
No issues require special attention.

Emergency Overflow Pond
Temporary pumps must be used to pump flows from the pond to the headworks. There are no operational impacts at this time, and will likely be addressed when a new RP-5 solids handling facility is built.

It is unknown whether the pond is intended as a containment system. A survey of historical record does not reveal whether compacted clay liner or geomembrane was used. The pond has 6 feet of accumulated solids. There are no operational impacts at this time, and will likely be addressed in the RP-5 Expansion.

ESB System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Headworks Splitter Box	2004	Planned 2015
Primary Clarifiers	2004	East 3A – 2013 West 4A – 2015 Planned
Primary Effluent Splitter Box	2004	Planned 2015
Sludge Pumping System	2004	
Scum Pumping System	2004	
Emergency Storage Basin	2004	
ESB System	2004	

Table 4 Potential Projects

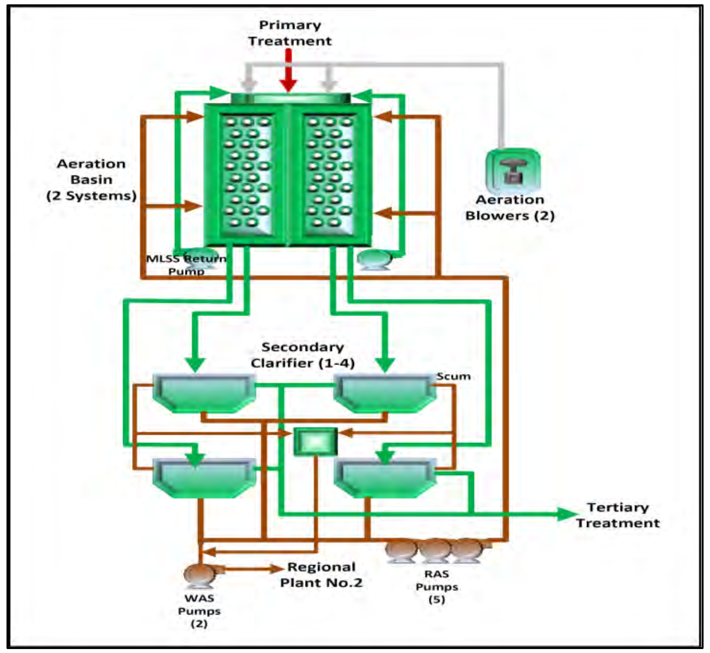
System	Project Name	Project Description
Emergency Overflow Pond	RP-5 Emergency Overflow Pond Pumps Station	Install permanent pump station to return flows from the EOP to the headworks. Concrete line the Emergency Overflow Pond.

System Summary Continued on Next Page

Asset Management System Summary – RP-5

Secondary Treatment Process

1. Asset Profile



Activated Sludge System
The activated sludge system is two-stage biological-nutrient-removal suspended-growth system that provides biological treatment to convert soluble BOD to biomass able to settle. The activated sludge consists of biological processes that use dissolved oxygen to promote the growth of biological flocculation, which then removes organic material. The process converts ammonia to nitrites, nitrates, and ultimately nitrogen gas. There are two aeration basins (four trains) located south of the primary clarifiers. Each aeration basin contains eleven zones. Four zones in each basin are dedicated anoxic zones, and seven zones are available aeration zones.

The aeration zones are aerated via the Parkson air membrane system supplied by two single-stage centrifugal blowers with inlet/variable diffuser guide vanes and motorized butterfly control valves that control dissolved oxygen concentrations. Each aeration basin contains up to eight pairs of anoxic mixers to minimize solids settlement in anoxic zones. Influent gates divert a combined flow of primary effluent and return activated sludge available to feed three zones on each aeration basin. Each aeration basin contains a mixed liquor return pump in the effluent channel, which can be used to pump nitrate-rich mixed liquor back to the aeration basin, where denitrification can occur.

Secondary Clarifiers
Effluent flow from the aeration basins is transferred through 36-inch gravity pipelines into the secondary clarifiers (four in total) through the bottom of the center column. The flow then travels up into a feed well that contains a flocculation zone. The flow passes through diffusers in the side of the feed well and is directed toward the bottom of the clarifier by a baffle. Each clarifier has a rotating sludge and ducking skimmer arm to collect scum off the surface. The solids settle to the bottom of the clarifier and are either returned to the aeration basin or wasted to RP-2. The overflow effluent is directed through a 54-inch pipeline to the tertiary filters.

Return Activated Sludge (RAS) Pumping System
Some of the settled sludge in the secondary clarifiers is pumped back to the influent of the aeration system as return activated sludge (RAS) to mix with primary effluent, called mixed liquor suspended solids (MLSS). The RAS is returned to the aeration basin by the 5 RAS pumps to maintain the biological process.

Waste Activated Sludge (WAS) Pumping System
To control the excess biological concentrations in the aeration system, the settled solids from the secondary clarifiers are "wasted" and pumped out of the secondary system to solids processing as waste activated sludge (WAS). WAS is pumped to and treated at RP-2.

Scum Pumping System
Scum collected from the skimmer arm of the secondary clarifiers is routed to a scum well, where it is pumped out of the system to solids processing at RP-2.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Secondary Treatment Process	17.1 MGD	
Activated Sludge System Blowers Trains Panels Depth Mixers Gates Valve MLR Pumps	 2 @ 17.1 MGD 2 @ 7,500 scfm 500 HP 11.5 psig 2 @ 5.16 MG 195 19 ft 20 @ 7.5 hp 32 units 1 unit 2 @ 6,300 gpm	 Per Unit Per Unit Per System Per System Per System
Secondary Clarifiers Gates	4 @ 356 gpd/ft^2 13,273 ft^2 4 units	Per Unit
RAS Pumping System Valves	5 @ 2,500 gpm 3 - 20-inch units	Per Unit
WAS Pumping System	2 @ 100 gpm 7.5 hp	
Scum Pumping System	2 @ 600 gpm 15 hp	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Activated Sludge System	3	2	2	2
Secondary Clarifiers	3	3	3	3
RAS Pumping System	3	3	3	3
WAS Pumping System	3	3	3	3
Scum Pumping System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Activated Sludge System
No issues require special attention.

Secondary Clarifiers
Algae control in the launders is a challenge. Automated weir-washing systems may be installed during future clarifier rehab work. A conditions assessment is planned for FY 2015/16 for all four clarifiers.

RAS Pumping System
No issues require special attention.

WAS Pumping System
No issues require special attention.

Scum Pumping System
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Activated Sludge System	2004	
Secondary Clarifiers	2004	Planned 15/16
RAS Pumping System	2004	
WAS Pumping System	2004	
Scum Pumping System	2004	

Table 4 Potential Projects

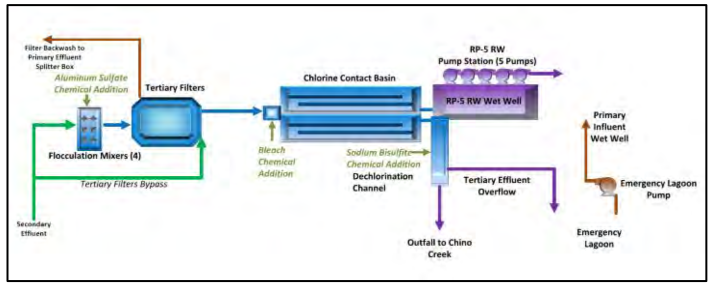
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RP-5

Tertiary Treatment Process

1. Asset Profile



Aluminum Sulfate (Alum) System
Alum is used with cationic polymer to provide flocculation upstream of the tertiary filters. The addition of these two chemicals should result in an increase in floc size, which will increase particulate removal by the filters. The alum system consists of a storage tank and two chemical metering pumps in a duty/standby mode of operation. Alum is drawn from the storage tank and pumped to the influent channel to the tertiary filters. Space and connections for an additional future tank and chemical pumps are provided to accommodate future plant flows.

Flocculation Tank
To provide optimum removal of particulates during the filtration process, chemicals are added at the flocculation tank at the influent side of the filters. There is one rapid mixer and four VFD-controlled flocculators at this site.

Filters
The Parkson continuous backwash tertiary filters provide physical treatment to remove suspended solids and lower the turbidity of the secondary effluent. There are twelve tertiary filters and a filter recycle pump station with three submersible pumps that return filter backwash to the primary effluent splitter box. The tertiary filters are located south of the secondary clarifiers. Each tertiary filter contains six 50-square-foot modules. Flow that enters the tertiary filters comes from the secondary clarifiers. Secondary effluent is injected with chemicals to aid with filtration in the rapid mix and flocculation basin. The effluent travels through three pipes, each of which provides influent to a group of four filters. Filter influent then travels through the filter feed valves and into each filter influent manifold, where it is distributed to the bottom of each module.

Chlorination System
The sodium hypochlorite system has multiple applications throughout the plant. The main purpose of the system is to provide disinfection of the plant effluent before final discharge. Hypochlorite (bleach) may also be used for housekeeping purposes. It can be added to the return activated sludge (RAS) to prevent the growth of filamentous organisms, which inhibit good settling in the secondary clarifiers. It can also be added to the secondary clarifier weirs and to the tertiary filter influent channel to prevent the growth of algae in these areas.

The sodium hypochlorite system consists of four storage tanks and three sets of chemical metering pumps. One set, consisting of five pumps, is used for disinfection. This set pumps hypochlorite to the chlorine mixer at the beginning of the chlorine contact basin. The second set of two pumps is used for RAS dosing and sends hypochlorite to the RAS line before the aeration basin. The third set of two pumps is used for algae control. This set pumps hypochlorite into a dilution water line and the mixture is sent to the secondary clarifier weirs and filter influent channel. Space and connections for future RAS and algae control chemical pumps are provided to accommodate future plant flows.

The filter recycle pump station consists of three submersible pumps, which return tertiary filter backwash to the primary effluent splitter box.

Chlorine Contact Basins
After flow passes through the tertiary filters, it enters the chlorine contact channels, where the water is chlorinated and then mixed to improve disinfectant contact and obtain the necessary compliance concentration and detention times. The chlorinated water then travels through a serpentine pattern of channels to recycled water demand or the dechlorination channel, where the chlorine is removed from the water before discharge to the outfall.

Dechlorination System
Flow entering the dechlorination structure is injected with sodium bisulfite (SBS) and travels through a serpentine flow path, allowing SBS to neutralize any chlorine residual before flowing into Chino Creek through a 48-inch effluent flow meter and out through an outfall 60-inch pipeline. SBS is stored in two large chemical tanks and is metered into the system via four chemical metering pumps.

The dechlorination basin final effluent gate is used to stop plant effluent flow to the outfall, if the final effluent flow does not meet water quality standards. The dechlorination basin final effluent gate is a motorized sluice gate. When it is closed, flow is diverted over a 23-foot-long, fixed, broad-crested weir and through a pipeline into the adjacent emergency lagoon.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Tertiary Treatment Process	16.3 MGD	
Alum System Tank Pumps	 560 gallons 2 @ 14 gph	 Per Unit
Flocculation Tank Rapid Mixer Mixer	 1@ 30 hp 1@ 3 hp 1@ 2 hp 1 @ 1.5 hp 1@ 1 hp	
Filters Filter Loading Recycle Pumps Gates	12 @ 300 ft^2 5 gpm/ft^2 3 @ 420 gpm 7.5 hp 1 units	Per Unit Per Unit
Chlorination System Tanks Pumps Water Champ Mixer	 4 @ 10,500 gallons 9 @ 77 gph 1 @ 20 hp 1 @ 30 hp	 Per Unit Per Unit
Chlorine Contact Basins Gates	2 @ 0.9 MG 4 units	Per Unit
Dechlorination System Tanks Pumps Gates	 2 @ 5,100 gallons 4 @ 53 gph 3 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Alum System	3	3	3	3
Flocculation Tank	3	3	3	3
Filters	4	3	4	4
Chlorination System	4	3	3	3
Chlorine Contact Basins	3	3	3	3
Dechlorination System	4	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Alum System
No issues require special attention. .

Flocculation Tank
No issues require special attention.

Filters
The filters require significant maintenance. The continuous and abrasive sand-washing action damages OEM stainless-steel air-lift pumps, which need to be replaced routinely with PVC air-lift pumps. Sand gets carried to the backwash water-wet well and then is pumped to the primary effluent splitter box. The performance of the sand-washing system is difficult to maintain. These issues will be addressed in future rehab work.

Chlorination System
The current sodium hypochlorite (bleach) dosing system requires significant maintenance as a result of leaking pumps. The pumps are located outdoors and have no protection against the elements. Crystallization of the bleach at the discharge of the pipe has caused issues. Chemical flow metering is being considered for chlorine dosing. Project EN11031 is expected to address these issues.

Chlorine Contact Basins (CCB)
The chlorine contact basin does not have a flow meter at the influent. Flow into the CCB influent is back-calculated, which causes delayed bleach-dosing issues. The mixing of bleach at the CCB is not optimal. Project EN11031 is expected to address these issues.

Dechlorination System
The sodium bisulfite (SBS) pumps are near the end of their useful life, and the pumps don't have the operating range to meet the variations in dechlorination needs resulting from variable recycled water demands. Project EN11031 is expected to address these issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Filters	2004 2009	
Alum System	2004	
Flocculation Tank	2004	
Chlorination System	2004 2010	
Chlorine Contact Basins	2004	
Dechlorination System	2004 2010	

Table 4 Potential Projects

System	Project Name	Project Description
Filters	RP-5 Tertiary Filters Modifications	Install new tertiary filter system with less maintenance and better performance.

System Summary Continued on Next Page

Asset Management System Summary – RP-5

Auxiliary Systems

1. Asset Profile

Plant Drain
The plant drain collects surface storm runoff, excess irrigation, and wash-down water collected in submersible drains located throughout the facility. The drain system receives gravity flows to a wet well, where the flow is then pumped and recycled toward the head of the treatment process.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switchgear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-5 electrical system is shown in Appendix B.

Diesel emergency generators are used in the event of a power failure. Two generators are located at the south section and supply power to the preliminary, primary, secondary, tertiary sections, and headquarters

An extensive lighting system is needed to illuminate the facility during dark hours. Most lighting fixtures are equipped with light sensors to turn off when sufficient lighting is provided from the sun. Lighting units are inside each of the process buildings, on equipment walls, and along the roadways for safety.

Utility Water System
Utility water is used throughout the facility to clean, supply pump seal water, cool, dilute, flush clogged pipes, irrigate, and more. The system is supplied by the RP-5 RW pump station. The piping consists of several isolation valves and point-of-use connections.

Potable Water System
Potable water is used throughout the plant for restrooms, cooling, odor scrubber dilution water, fire suppression, and more. The system is supplied from a 6-inch W1 line off Kimball Ave. from the City of Chino. The system has several backflow devices to protect the drinking water system.

Instrumentation and Control System
An extensive array of instruments is used to monitor and control the processes at RP-5. Nearly all the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to the main control terminals.

Yard Piping
A substantial network of pipes is used to convey flows between unit processes. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.
.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 1 @ 12 kV 6 @ 12 kV to 480 V 8 @ 12 kV 3 @ 480 V 2 @ 1,000 kW > 50 units	MCCs
Utility Water System Pipelines Pump Station Valves	 Various sizes 2 @ 1,925 gpm 3 @ 1,925 gpm 30 units	
Potable Water System Backflow Devices Valves	 >25 units >25 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub Radio Transmitter	 1	
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	3	3	3
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	2	2	2	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Plant Drain
No issues require special attention.

Electrical System
No issues require special attention.

Utility Water System
Some of the UW isolation valves do no seal and need to be replaced. Replaced valves should be exercised routinely. The IEUA RW valve exercise program will address this issue.

Potable Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Yard Piping
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	2004	
Electrical System	2004	
Utility Water System	2004	
Potable Water System	2004	
Instrumentation and Control System	2004	
Yard Piping	2004	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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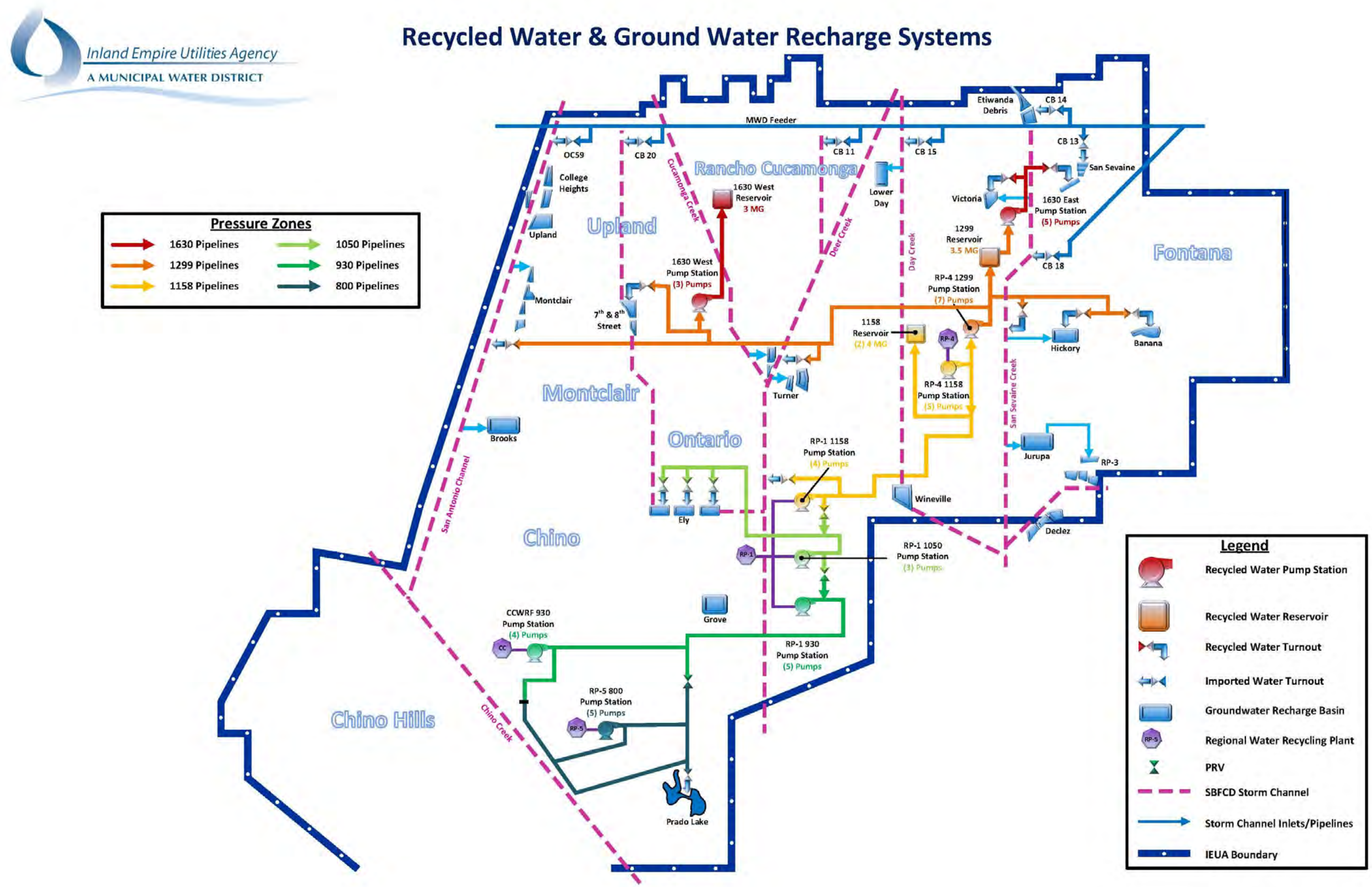

Figure 7-6: Recycled Water Distribution (RW) & Ground Water Recharge Systems (GWR) – Schematic

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Table 7-7: Recycled Water Distribution and Ground Water Recharge Systems – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	TBD	WC OE Projects	The project establishes an annual budget for applying the labor hours for project evaluation, design review, permit issuance, inspection, and closeout for office engineering projects related to recycled water connections and modifications.	WC	OM	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	500,000
2	EN06025	Wineville Extension Pipeline Segment A	A new 24" recycled water pipeline along Wineville Ave. from Airport Dr. to Jurupa St. continuing with a new 36" recycled water pipeline to RP-3 Groundwater Recharge Basin. The project includes a recycled water turnout to feed RP-3 Basin and a turnout to feed Declez Basin.	WC	CC	2,100,000	50,000	0	0	0	0	0	0	0	0	2,150,000
3	EN12016	North CIM Lateral	Construct recycled water lateral to the north side of CIM.	WC	CC	0	0	0	0	210,000	0	0	0	0	0	210,000
4	EN12019	GWR & RW SCADA Communication System Upgrades	This project will upgrade the SCADA communication system for all GWR and RW facilities.	WC	EQ	465,000	0	0	0	0	0	0	0	0	0	465,000
5	EN13001	San Sevaine Improvements	Project will modify the San Sevaine Basin Turnout to extend the discharge location from San Sevaine Cell No. 5 to the furthest north Cell No. 1.	WC	CC	3,500,000	3,000,000		0	0	0	0	0	0	0	6,500,000
6	EN13022	930 RW Reservoir		WC	CC	0	0	0	0	0	0	0	0	0	0	0
7	EN13023	930 Pressure Zone Pipeline	Approximately 18,000 LF of 30" pipeline connects the CCWRF System Pipeline to the new 930 Reservoir.	WC	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
8	EN13041	RP-5 RW PS Process Control Sys Migration	Project to migrate the RP-5 RW PS to a Rockwell based system.	WC	CC	0	280,000	0	0	0	0	0	0	0	0	280,000
9	EN13045	Wineville Extension Pipeline Segment B	A new 24" recycled water pipeline along Wineville Ave. from Airport Dr. to Jurupa St. continuing with a new 36" recycled water pipeline to RP-3 Groundwater Recharge Basin. The project includes a recycled water turnout to feed RP-3 Basin and a turnout to feed Declez Basin.	WC	CC	1,600,000	50,000	0	0	0	0	0	0	0	0	1,650,000
10	EN13048	Second 12kV Feeder to TP-1	Potential Engineering project to provide a second 12kV feeder to TP-1 to support the RP-1 1158 PS Upgrades. RP-1 electrical PDR.	WC	CC	1,000,000	500,000	0	0	0	0	0	0	0	0	1,500,000

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
11	EN14042	RP-1 1158 Pump Station Improvements	Pump station improvements to increase capacity.	WC	CC	0	500,000	3,000,000	400,000	0	0	0	0	0	0	3,900,000
12	EN14043	800 Zone Capacity Implementation	Evaluation of additional recycled water pipeline leaving RP-5 to allow more recycled water to be delivered from this facility into the 800 Pressure Zone.	WC	CC	300,000	600,000	100,000	0	0	0	0	0	0	0	1,000,000
13	EN14044	RW Hydraulic Modeling for FY 14/15	RW Hydraulic Modeling	WC	OM	50,000	0	0	0	0	0	0	0	0	0	50,000
14	TBD	RW Hydraulic Modeling	Ongoing RW hydraulic modeling needs.	WC	OM	0	25,000	25,000	25,000	100,000	25,000	25,000	25,000	25,000	25,000	300,000
15	TBD	RW Program Strategy		WC	OM	0	0	0	0	250,000	0	0	0	0	250,000	500,000
16	EN15002	1158 Reservoir Site Cleanup Project	Cleanup associated with old piping and associated material.	WC	CC	0	500,000	0	0	0	0	0	0	0	0	500,000
17	EN15050	1630 W PS Improvements (Surge Protection & VFD Replacement)	Design and construction of a surge tank to dampen the surges in the 1299 Recycled water pipeline. Surge protection on the suction side of the 1630 Pump Station. Replace constant speed pumps with VFD.	WC	CC	400,000	650,000	350,000	0	0	0	0	0	0	0	1,400,000
18	EN19003	RP-1 Parallel Outfall Pipeline from RP-1 to Riverside Dr	This project will provide for a parallel pipeline following the TP-1 Out fall Pipeline from RP-1 to Edison Ave. to address the existing pipeline capacity issues.	WC	CC	0	1,000,000	2,000,000	2,000,000	0	0	0	0	0	0	5,000,000
19	RW15003	RMPU Soft Costs	Address the design for the RMPU	RW	OM/CC	820,000	1,600,000	1,200,000	0	0	0	0	0	0	0	3,620,000
20	RW15004	Lower Day RMPU Project	Address the design and construction of the lower day recharge master plan update	RW	CC	215,000	1,300,000	910,000	0	0	0	0	0	0	0	2,425,000
21	WR15019	RP-3 Basin Improvements	Groundwater Recharge Master Plan Update 2013 project #11. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion	WC	CC	0	0	650,000	2,650,000	0	0	0	0	0	0	3,300,000
22	WR15020	Victoria Basin Improvements	Groundwater Recharge Master Plan Update 2013 project #22a. IEUA cost share= 50% total cost (committee approved 10/9/13; to board 10/16). Construction portion.	WC	CC	0	0	65,000	65,000	0	0	0	0	0	0	130,000
23	WR15021	Napa Lateral/SB Speedway	Napa Lateral	WC	CC	200,000	1,000,000	2,800,000	2,000,000	0	0	0	0	0		6,000,000

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
24	TBD	Agencywide GWR Environmental Permits		RW	OM	25,000	0	0	0	0	0	0	0	0	0	25,000
25	TBD	Mag Channel Spillway Improvement	Address the required repairs and improvements. Spillway repair and sediment cleanup. ACOE Permit required.	RO	CC	350,000	0	0	0	0	0	0	0	0	0	350,000
26	TBD	RMPU Construction Costs	Construction cost for the remaining RMPU projects.	RW	CC	0	0	5,000,000	15,000,000	5,000,000	0	0	0	0	0	25,000,000
27	TBD	RP-1 Utility Water Flow Meter	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.	WC	CC	300,000	0	0	0	0	0	0	0	0	0	300,000
28	TBD	Ely Basin Turnout Remote Control Upgrades	Upgrade remote control capability at the Ely Basin turnout. Possible addition of monopole.	RW	CC	200,000	400,000	0	0	0	0	0	0	0	0	600,000
29	TBD	930 to 800 West CCWRF PRV	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF	WC	CC	0	100,000	500,000	0	0	0	0	0	0	0	600,000
30	TBD	1299 pressure zone pipeline surge tank	Install a surge tank on the 1299 pressure zone pipeline. To be located at the 1630 west pump station.	WC	CC	0	0	0	0	0	0	0	0	0	0	0
31	TBD	Energy Management system EMP	Install energy management system integrating though SCADA to monitor and optimize RW equipment	WC	CC	0	0	0	0	300,000	0	0	0	0	0	300,000
32	TBD	RW Pressure Sustaining Valve		WC	CC	350,000	500,000	0	0	0	0	0	0	0	0	850,000
33	TBD	Prado Basin Adaptive Management Plan Monitoring & Report		RW	OM	150,000	150,000	150,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	975,000
34	TBD	WC Planning Documents		WC	OM	500,000	500,000	0	0	0	0	0	0	0	0	1,000,000
35	TBD	RW Asset Management		RW	OM	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	1,250,000
36	TBD	RC Planning Documents	Planning efforts	RC	OM	1,000,000	1,000,000	0	0	0	0	0	0	0	0	2,000,000
37	TBD	WC Asset Management		WC	OM	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	2,500,000
38	TBD	RW Injection Pilot Study		WC	OM	200,000	300,000	0	0	0	0	0	0	0	0	500,000

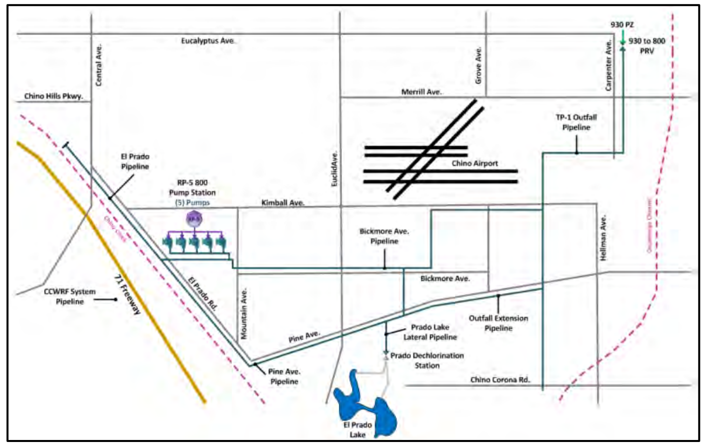
#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
39	TBD	WRCWRA	As defined by the PDR and the MOU with JCSD/WMWD	WC	OM	500,000	500,000	0	0	0						1,000,000
40	TBD	UWMP		WW	OM	500,000	500,000	0	0	0	0	0	0	0	0	1,000,000
41	TBD	Conservation Programing		WW	OM	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	3,000,000	30,000,000
42	TBD	WW Planning Documents		WW	OM	500,000	500,000	0	0	0	0	0	0	0	0	1,000,000
43	TBD	Drought Proofing Projects		WW	OM	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	25,000,000	250,000,000
44	TBD	RW AMP		WC	OM	0	0	0	0	0	5,000,000	5,000,000	5,000,000	5,000,000	5,000,000	25,000,000
45	TBD	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generators at the RW pump stations to meet load at high demand (RP-1 930 Pump Station, CCWRF 930 Pump Station, RP-1 1050 Pump Station, RP-4 1158 Pump Station, RP-1 1158 Pump Station, RP-4 1299 Pump Station)	WC	CC	0	0	0	0	0	0	2,000,000	2,000,000	2,000,000	0	6,000,000
46	TBD	Wineville Basin Pipeline	Construction of a pipeline to provide recycled water to Wineville Basin	WC	CC	0	0	0	0	0	0	0	0	100,000	900,000	1,000,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – RW/GWR

800 Pressure Zone

1. Asset Profile



RP-5 800 Pump Station
The RP-5 800 pump station provides recycled water to the 800 pressure zone for direct use by agricultural customers, the City of Chino, and San Bernardino County for feed water to El Prado Lake. The pump station is composed of five pumps:

- Two 150 hp vertical-turbine, VFD-driven, 1,925 gpm pumps
- Three 150 hp vertical-turbine, constant-speed, 1,925 gpm pumps

The RP5 800 pump station has two selectable automatic control philosophies:

- Wet Well Level Control – the pumps will be modulated to maintain an operator-adjustable wet-well level set point normally set at 14 feet.
- Pressure Control – the pumps will be modulated to maintain an operator-adjustable discharge-pressure set point normally set at 120 psi.

800 Pipelines

- *TP-1 Outfall Pipeline* – 15,700 linear feet (LF) of 30-inch pipeline from the 930 to 800 pressure reducing valve (PRV) to Chino Corona Rd.
- *Outfall Extension Pipeline* – 6,600 LF of 30-inch pipeline along Pine Ave. from the TP-1 outfall pipeline to the Prado Lake lateral, continuing with an additional 6,700 LF of 14-inch pipeline from the Prado Lake lateral to El Prado Golf Course.
- *Prado Lake Lateral Pipeline* – 535 LF of 30-inch pipeline from the outfall extension pipeline continuing with an additional 2,100 LF of 24-inch pipeline to the Prado Lake dechlorination station.
- *Pine Ave. Pipeline* – 2,200 LF of 16-inch pipeline from the El Prado Golf Course to RP-2.
- *El Prado Pipeline* – 12,800 LF of 10-inch pipeline from RP-2 to the Carbon Canyon Water Recycling Facility (CCWRF).
- *Bickmore Pipeline* – Consists of multiple pipeline segments including:
  - 5,500 LF of 18-inch pipeline along Kimball Ave. from the TP-1 outfall pipeline to Rincon Meadows Rd.
  - 5,600 LF of 18-inch pipeline along Rincon Meadows Rd. from Kimball Ave. to Bickmore Ave., continuing with an additional 1,550 LF of 12-inch pipeline from Bickmore Ave. to Pine Ave.
  - 6,300 LF of 30-inch pipeline along Bickmore Ave. from Rincon Meadows Rd. to San Antonio Ave.
  - 2,700 LF of 18-inch pipeline along Bickmore Ave. from San Antonio Ave. to Mountain Ave.
  - 2,500 LF of 18-inch pipeline from the intersection of Mountain Ave. and Bickmore Ave. to RP-5.
  - 1,000 LF of 10-inch pipeline from RP-5 to the El Prado pipeline.

Prado Dechlorination Station
The Prado dechlorination station provides dechlorinated recycled water to El Prado Lake. The station is composed of the following main components:

- A 12-inch flow-control sleeve valve with 14-inch magnetic flow meter and pressure transmitter.
- Two 5 gph sodium-bisulfite chemical metering pumps.
- Three 20 gph sodium-bisulfite chemical metering pumps.
- Two upstream chlorine analyzers.
- Two downstream chlorine analyzers biased to measure sodium bisulfite.

The flow control is automatically controlled to maintain either a flow control set point or an upstream pressure set point. The sodium-bisulfite chemical metering pumps are controlled to maintain a downstream sodium-bisulfite residual.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-5 800 Pumps	2 @ 1,925 gpm 3 @ 1,925 gpm	VFD Constant
TP-1 Outfall Pipeline	30-inch – 13,200 gpm	6.0 ft/s max velocity (mv)
Outfall Extension Pipeline	30-inch – 13,200 gpm 14-inch – 2,875 gpm	6.0 ft/s mv
Prado Lake Lateral Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
Pine Ave. Pipeline	16-inch – 3,755 gpm	6.0 ft/s mv
El Prado Pipeline	10-inch – 1,500 gpm	6.0 ft/s mv
Bickmore Pipeline	30-inch – 13,200 gpm 18-inch – 4,750 gpm 10-inch – 1,500 gpm	6.0 ft/s mv
Prado Sleeve Valve	300 – 14,000 gpm	
Prado DECH Station	2 @ 0.5 – 5 gph 3 @ 2 – 20 gph	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-5 800 Pumps	1	3	3	2
TP-1 Outfall Pipeline	3	3	3	2
Outfall Extension Pipeline	3	3	3	3
Prado Lake Lateral Pipeline	2	3	3	3
Pine Ave. Pipeline	3	3	3	3
El Prado Pipeline	2	3	3	3
Bickmore Pipeline	1	4	5	2
Prado Sleeve Valve	1	2	2	1
Prado Dechlorination Station	4	2	4	1

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-5 800 Pumps
No issues requiring immediate attention.

TP-1 Outfall Pipeline
No issues requiring immediate attention.

Outfall Extension Pipeline
No issues requiring immediate attention.

Prado Lake Lateral Pipeline
No issues requiring immediate attention.

Pine Ave. Pipeline
30" valve on west leg after lateral to old outfall and 14" valve on west side of lateral to Prado are out of service. Equipment should be replaced by the Maintenance Department.

El Prado Pipeline
No issues requiring immediate attention.

Bickmore Pipeline
At a maximum velocity of 6 ft/s, the 18-inch-diameter sections of the Bickmore pipeline have a capacity of 4,750 gpm. All recycled water supply from RP-5 is conveyed through the Bickmore pipeline; therefore, the current average daily RP-5 recycled water supply of 7,000 gpm exceeds the recommended capacity. In addition, when the RP-5 pump station is discharging 7,000 gpm, the discharge pressure at the pump station exceeds the pressure setting of the emergency pressure relief valve and discharges recycled water back into the RP-5 wet well. A potential project will address the system's issues. Project EN14043 will hydraulically model critical areas of the RW distribution system to prioritize capacity improvements.

The condition assessment concluded that the cathodic protection on this segment of pipeline was sufficient.

Prado Sleeve Valve
No issues requiring immediate attention.

Prado Dechlorination Station
Flow Meter is out of service and needs to be replaced. Equipment should be replaced by the Maintenance Department.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-5 800 Pumps	2011	
TP-1 Outfall Pipeline	1976	
Outfall Extension Pipeline	1977	
Prado Lake Lateral Pipeline	1977	
Pine Ave. Pipeline	2004	
El Prado Pipeline	1993	
Bickmore Pipeline	2006	Complete - 2014
Prado Sleeve Valve	2011	
Prado Dechlorination Station	2011 1996	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

Auxiliary Systems – 800 Pressure Zone

1. Asset Profile

RP-5 800 Pump Station

- *Electrical System – The electrical energy to power the RP-5 800 pump station is obtained from the RP-5 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, biogas internal combustion engines, and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The biogas internal combustion engines are owned by the Agency, but leased to a private firm producing biogas at the RP-5 solids handling facility. The electrical feed from the grid is composed of two 12 kV feeders through the RP-5 treatment facility to Power Center 3, where transformers and switchgear are located to distribute electrical energy to the RP-5 800 pump station. A single line diagram of the RP-5 800 pump station electrical system is shown in Appendix B. Diesel emergency generators are used in the event of a power failure. Two 1.0 MW generators are located south of Power Center 3 and supply power to the RP-5 treatment facility including the RP-5 800 pump station.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-5 800 pump station. All the processes of the pump station are observed and controlled by the RP-5 treatment facility SCADA system. Local control wiring is fed from the individual pieces of equipment to MCCs and input/output (I/O) hubs in Power Center 3. The I/O hubs then transmit the control data by fiber optic cable to the Foxboro SCADA servers.*

Prado Dechlorination Station

- *Electrical System – The electrical energy to power the Prado dechlorination station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 480 V feeder, a main power switch, and an automatic transfer switch before terminating in MCC-1. A single line diagram of the Prado dechlorination station electrical system is shown in Appendix B. A recently upgraded 27 kW Kohler diesel generator is located in the Prado sodium bisulfite pump room for use in a power failure.*
- *Utility Water System – The utility water system is supplied using recycled water from upstream of the sleeve valve and is used mainly for wash-down water in the pump and analyzer buildings. The piping consists of several isolation valves and point-of-use connections.*
- *Potable Water System – The potable water system is used throughout the Prado dechlorination station for restrooms, sinks, and eye-wash stations. The system is supplied from a service on Johnson Ave. from the City of Chino. The utility water system is supplied using recycled water from upstream of the sleeve valve and is used mainly for wash-down water in the pump and analyzer buildings. The piping consists of several isolation valves and point-of-use connections.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the Prado dechlorination station. All the processes of the dechlorination station are observed and controlled by the local programmable logic controller (PLC) system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and local PLC located in Control Panel 3300. Control data is then sent to RP-5 and RP-1 through a radio transmitter for remote access to the control system.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-5 800 Pump Station		
Electrical System		
Utility Voltage	12 kV	2 Feeders
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	2 @ 480 V	MCCs
Generator	2 @ 1,100 kW 1,490 Bhp	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	N/A	
I/O Hub	3 units	
Radio Transmitter	1 unit	RP-5
Prado Dechlorination Station		
Electrical System		
Utility Voltage	480 V	2 Feeders
Transformers	NA	
Switchgear	1 @ 480 V	ATS
Distribution	1 @ 480 V	MCCs
Generator	1 @ 27 kW 36 Bhp	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	CP 3300
I/O Hub	1 unit	CP 3300
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-5 800 Pump Station				
Electrical System	1	2	2	2
Instrumentation and Control System	2	3	2	3
Prado Dechlorination Station				
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	2	1	2	1

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-5 800 Pump Station:
No issues requiring immediate attention.

Prado Dechlorination Station:
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-5 800 Pump Station		
Electrical System	2004 2010	
Instrumentation and Control System	2004 2010	
Prado Dechlorination Station		
Electrical System	1990	
Utility Water System	1990	
Potable Water System	1990	
Instrumentation and Control System	1990 2011	

Table 4 Potential Projects

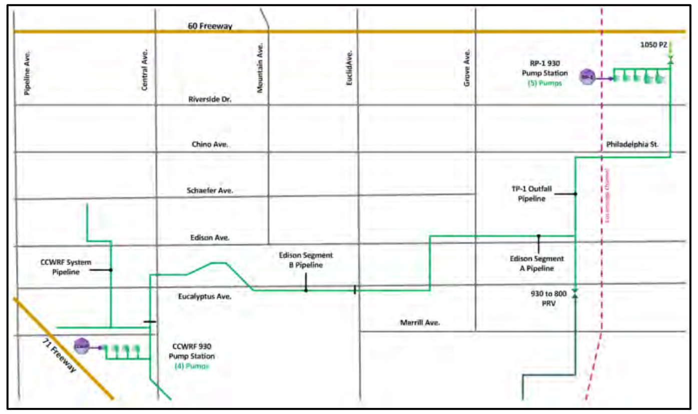
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

930 Pressure Zone

1. Asset Profile



RP-1 930 Pump Station
The RP-1 930 pump station provides recycled water to the 930 pressure zone for direct use by agricultural customers, the City of Chino, and the City of Chino Hills. The pump station is composed of five pumps:

- Three 150 hp vertical-turbine, VFD-driven, 2,790 gpm pumps
- Two 500 hp vertical-turbine, VFD-driven, 9,330 gpm pumps

The RP-1 930 pump station is automatically controlled to maintain a discharge-pressure set point of about 55 psi.

CCWRF 930 Pump Station
The CCWRF 930 pump station provides recycled water to the 930 pressure zone for direct use by agricultural customers, the City of Chino, and the City of Chino Hills. The pump station is composed of (2) 300 hp vertical-turbine, VFD-driven, 2,585 gpm pumps, and (3) 300 hp vertical turbine, constant, 2,585 gpm pumps. The CCWRF 930 pump station is automatically controlled to cycle pumps on and off based on level set points of the RP-1 recycled water wet well.

930 Pipelines

- *CCWRF System Pipeline* – 2,300 LF of 30-inch pipeline from CCWRF to the intersection of Monte Vista Ave. and Chino Hills Parkway, continuing with an additional 5,200 LF of 20-inch pipeline along Monte Vista Ave. between Chino Hills Parkway and Edison Ave.
- *Edison Segment A Pipeline* – 18,500 LF of 30-inch pipeline from the intersection of Chino Hills Parkway and Telephone Ave. to the intersection of Euclid Ave. and Eucalyptus Ave.
- *Edison Segment B Pipeline* – 15,900 LF of 30-inch from the intersection of Euclid Ave. and Eucalyptus Ave. to the TP-1 outfall pipeline.
- *TP-1 Outfall Pipeline* – 12,800 LF of 30-inch pipeline from RP-1 to the 930 to 800 pressure reducing valve (PRV).

930 to 800 Pressure Reducing Valve (PRV)
The 930 to 800 PRV is located at the intersection of Eucalyptus Ave. and Carpenter Ave. and is used to maintain the downstream pressure in the 800 pressure zone. The system includes a 16-inch Cla-Val PRV, flow meter, and pressure transmitter. The system has a design flow range of 200 gpm to 14,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 930 Pumps	3 @ 2,790 gpm 2 @ 9,330 gpm	VFD VFD
CCWRF 930 Pumps	2 @ 2,585 gpm 3 @ 2,585 gpm	VFD Constant
CCWRF System Pipeline	30 -inch – 13,200 gpm 20-inch – 5,900 gpm	6.0 ft/s max velocity(mv)
Edison Segment A Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
Edison Segment B Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
TP-1 Outfall Pipeline	30-inch – 13,200 gpm	6.0 ft/s mv
930 to 800 PRV	200 – 14,000 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 930 Pumps	2	3	2	3
CCWRF 930 Pumps	1	2	2	3
CCWRF System Pipeline	3	3	4	3
Edison Segment A Pipeline	2	3	3	1
Edison Segment B Pipeline	2	3	3	1
TP-1 Outfall Pipeline	4	5	4	1
930 to 800 PRV	1	3	2	1

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-1 930 Pumps
No issues requiring immediate attention

CCWRF 930 Pumps
No issues requiring immediate attention

CCWRF System Pipeline
Flexibility is needed to supply recycled water from the 930-foot pressure zone to the 800-foot pressure zone. In addition, allow CCWRF 930 pumps to distribute more recycled water. A potential project will construct a PRV to address this issue.

Condition assessment performed in 2014 identified that the pipeline was not installed with either a corrosion monitoring or cathodic protection system. Therefore, the condition of the pipeline is unknown at this time. A potential project is needed to address this issue.

Edison Segment A Pipeline
No issues requiring immediate attention.

Condition assessment performed in 2014 identified that the pipeline is electrically shorted to a bare metallic casing installed below the stormwater channel and is unlikely to be receiving any cathodic protection. In addition, the pipeline is not electrically isolated at the point of connection with CCWRF System Pipeline or Edison Segment B Pipeline, which link both cathodic protection systems. A potential project is needed to address these issues.

Edison Segment B Pipeline
There is no valve at Eucalyptus Ave. and Central Ave to isolate the west side of the system.

Condition assessment performed in 2014 identified that there is no cathodic protection taking place on the pipeline and the inspection locations have been paved over. A potential project is needed to address these issues.

TP-1 Outfall Pipeline
During high recycled-water-demand periods, it has been common to flow more than 18,000 gpm through this pipeline to maintain system pressures. This equates to a flow velocity of more than 8 ft/s, which is not recommended for long-term operation. Because of the age of the pipeline and the operational requirements placed on the pipeline, condition assessment should be performed. A condition assessment should be scheduled in 2015 to assess any potential project requirements.

930 to 800 PRV
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 930 Pumps	2007 2012	
CCWRF 930 Pumps	2000	
CCWRF System Pipeline	2000	2014 Report
Edison Segment A Pipeline	2006	2014 Report
Edison Segment B Pipeline	2006	2014 Report
TP-1 Outfall Pipeline	1976	Scheduled 2015
930 to 800 PRV	2007 2013	

Table 4 Potential Projects

System	Project Name	Project Description
CCWRF System Pipeline	930 to 800 West CCWRF PRV	Construct a PRV to send water from the 930 pressure zone to the 800 pressure zone for CCWRF
CCWRF System Pipeline	930 Pressure Zone Pipeline Cathodic Protection	Install cathodic protection on the CCWRF RW pipeline and Edison Segment B pipeline, and repair cathodic protection on Edison Segment A Pipeline.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR
Auxiliary Systems – 930 Pressure Zone
1. Asset Profile

RP-1 930 Pump Station

- *Electrical System – The electrical energy to power the RP-1 930 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 930 pump station are powered through the H9 breaker. A single line diagram of the RP-1 930 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 930 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to I/O hub and PLC in the RP-1 930 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

CCWRF 930 Pump Station

- *Electrical System – The electrical energy to power the CCWRF 930 pump station is obtained from the CCWRF treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar and emergency generators). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the CCWRF electrical room, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the CCWRF 930 pump station electrical system is shown in Appendix B. The CCWRF treatment facility has one 1.50 MW diesel generator located in the main electrical room; however, this generator was not designed to maintain operation of the recycled water pump station during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the CCWRF 930 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the CCWRF recycled-water pump-station control room. Fiber optic cable is then used to connect the local PLC to the CCWRF radio transmitter to send the signal to the new recycled-water master server located at RP-1.*

930 to 800 Pressure Reducing Valve (PRV)

- *Electrical System – The electrical energy to power the 930 to 800 PRV station is obtained from onsite energy generation located in the PRV and stored in onsite 12 V batteries. There is no electrical feed from the grid. A single line diagram of the 930 to 800 PRV station electrical system is shown in Appendix B. There is no emergency generation for this site.*
- *Instrumentation and Control System – Control of the PRV is maintained hydraulically and does not require an automated control system. System flow and pressure are monitored at the 930 to 800 PRV. Local wiring is fed from the individual pieces of equipment to a local PLC. The PLC is connected to a remote telemetry unit, which transmits the signals back to RP-1 over a 4G data network to the GWR PLC.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 930 Pump Station		
Electrical System		
Utility Voltage	12 kV	2 Feeders
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
		RP-1
CCWRF 930 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V	
Switchgear	N/A	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	LCP 1200
I/O Hub	1 unit	LCP 1200
Radio Transmitter	1 unit	CCWRF
930 to 800 PRV Station		
Electrical System		
Utility Voltage	12 V DC	Onsite
Transformers	N/A	Generation
Switchgear	N/A	
Distribution	N/A	
Generator		
Instrumentation and Control System	N/A	
HMI Workstation		
RTU		
PLC	N/A	
I/O Hub	1 unit	4G
Radio Transmitter	1 unit	
	N/A	
	N/A	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 930 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
CCWRF 930 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
930 to 800 PRV Station				
Electrical System	1	3	3	3
Instrumentation and Control System	1	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-1 930 Pump Station:

- **Electrical System**
  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand, ranging from 3.0 MW to as high as 4.8 MW depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. The Agency would not be able to maintain the operation of the recycled water system if a sustained loss of utility power were to occur. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.
  No issues require specific attention.

CCWRF 930 Pump Station:

- **Electrical System**
  CCWRF has one emergency diesel generator rated to produce an electrical load of 1.5 MW. CCWRF has a base electrical demand, without recycled water pumping, ranging from 600 kW to 800 kW. The expansion of the CCWRF recycled water pump station will provide five 300 hp pumps for a total power demand of about 1,100 kW. Therefore, the CCWRF emergency diesel generator will not be able to provide the required electrical load for CCWRF and the maximum production of the recycled water pump station. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

930 to 800 PRV Station:
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 930 Pump Station		
Electrical System	2007	
Instrumentation and Control System	2007 2012	
CCWRF 930 Pump Station		
Electrical System	2000 2014	
Instrumentation and Control System	2000 2014	
930 to 800 PRV Station		
Electrical System	2013	
Instrumentation and Control System	2013	

Table 4 Potential Projects

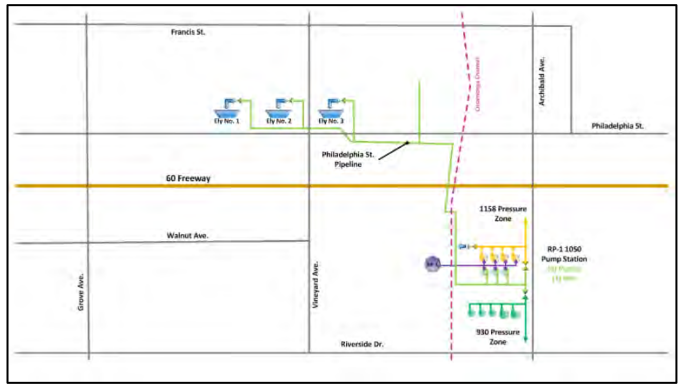
System	Project Name	Project Description
RP-1 930 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.
CCWRF 930 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

1050 Pressure Zone

1. Asset Profile



RP-1 1050 Pump Station
The RP-1 1050 pump station provides recycled water to the RP-1 utility water system, the 1050 pressure zone for direct use by the City of Ontario, and to Ely Basin for groundwater recharge. The pump station is composed of three 350 hp vertical-turbine pumps, VFD-driven, 3,750 gpm pumps. The 1050 pump station is automatically controlled to maintain a discharge-pressure set point of about 115 psi.

1050 Pipelines
Philadelphia Street Pipeline – 2,650 LF of 30-inch pipeline from the 1050 pump station to the 60 freeway, continuing with an additional 6,950 LF of 24-inch pipeline to Ely Basin No. 1.

1050 to 930 Pressure Reducing Valve (PRV)
The 1050 to 930 PRV is located at RP-1 and is used to transfer excess recycled water from the 1050 pressure zone to the 930 pressure zone when low pressures are experienced in the 930 pressure zone. The system includes a 24-inch Cla-Val PRV and 24-inch magnetic flow meter. The system has an operating flow range from 700 gpm to 20,000 gpm.

Ely Basin Turnouts
This system is composed of three separate turnouts, each including a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to Ely Basin Nos. 1, 2, and 3. Each turnout is designed for flow rates ranging from 700 gpm to 3,100 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 1050 Pumps	3 @ 3,750 gpm	VFD
Philadelphia St. Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
1050 to 930 PRV	700 – 20,000 gpm	
Ely Basin Turnouts	3 @ 700 – 3,100 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 1050 Pumps	3	3	3	4
Philadelphia St. Pipeline	2	2	2	1
1050 to 930 PRV	2	3	2	2
Ely Basin Turnouts	3	3	4	4

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-1 1050 Pumps
The VFD manufacturer no longer supports this equipment. A potential project is needed to address the system's issue.

Philadelphia St. Pipeline
The utility water for RP-1 is supplied by the RP-1 1050 pumps, but the usage cannot be directly measured because there is no flow meter. A potential project will address this issue.

Condition assessment performed in 2014 identified that the cathodic protection was functioning properly and the pipeline was installed in soil with "Negligible Corrosivity."

1050 to 930 PRV
No issues requiring special attention.

Ely Basin Turnouts
Remote control of the Ely basin turnouts have been lost, preventing shutdown of recycled water to these basins during low-supply events. Currently, the valves have to be opened and closed locally in the field. Valves need to be repaired to allow remote operation. A potential project is needed to address the system issues.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 1050 Pumps	2004	
Philadelphia St. Pipeline	2005	2014 Report
1050 to 930 PRV	2011	
Ely Basin Turnouts	2005	

Table 4 Potential Projects

System	Project Name	Project Description
RP1 1050 Pumps	RW VFD Replacement	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station
Philadelphia St. Pipeline	RP-1 Utility Water Flow Meter	Construct a flow meter w/bypass to measure internal recycled water at RP-1 from the 1050 pressure zone pipeline.
Ely Basin Turnouts	Ely Basin Turnout Remote Control Upgrades	Upgrade remote control capability at the turnout.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1050 Pressure Zone

1. Asset Profile

RP-1 1050 Pump Station

- *Electrical System – The electrical energy to power the RP-1 1050 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 1050 pump station are powered through the H9 breaker. A single line diagram of the RP-1 1050 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 1050 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-1 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

1050 to 930 PRV

- *Electrical System – The electrical energy to power the 1050 to 930 PRV is looped powered through the RP-1 1158 and 1050 pump station PLC. A single line diagram of the 1050 to 930 PRV electrical system is shown in Appendix B. Since the power draw to operate this system is negligible, the 670 kW TP-1 diesel generator will power the 1158 and 1050 pump station PLC during a power failure.*
- *Instrumentation and Control System – The 1050 to 930 PRV consists of a 24-inch Cla-Val PRV with position indication and control and a 24-inch flow meter. All of the processes of the PRV are observed and controlled by the 1158 and 1050 pump station PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

Ely Basin Turnouts

- *Electrical System – The electrical energy to power the three Ely Basin recycled water turnouts is provided by three independent solar panels. A single line diagram of the Ely basin turnouts is shown in Appendix B. The turnouts do not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Each of the three Ely Basin recycled water turnouts has a 10dB yagi antenna that transmits control data to a PLC located at Ely Basin No. 1. The PLC at Ely Basin No. 1 then transmits control data back to the GWR workstation server located at RP-1 for remote access.*

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2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-1 1050 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	2 @ 480 V	MCCs
Distribution	1 @ 480 V	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
1050 to 930 PRV		
Electrical System		
Utility Voltage	120 V	PLC Loop
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	1 @ 670 kW 896 Bhp	TP-1
Instrumentation and Control System		
HMI Workstation		
RTU	1 unit	
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
	1 unit	
Ely Basin Turnouts		
Electrical System		
Utility Voltage	24 VDC	Solar
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation		
RTU		
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
	1 unit	
	4 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-1 1050 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
1050 to 930 PRV				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
Ely Basin Turnouts				
Electrical System	3	4	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-1 1050 Pump Station:

- **Electrical System**
  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand ranging from 3.0 MW to as high as 4.8 MW, depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. Normally, the 1050 pump station supplies utility water for RP-1. Utility water is critical to maintain operation of the facility. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

1050 to 930 PRV Station:
No issues requiring immediate attention

Ely Basin Turnout:
No issues requiring immediate attention

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-1 1050 Pump Station		
Electrical System	2004	
Instrumentation and Control System	2004 2008	
1050 to 930 PRV		
Electrical System	2011	
Instrumentation and Control System	2011	
Ely Basin Turnouts		
Electrical System	2005	
Instrumentation and Control System	2005	

Table 4 Potential Projects

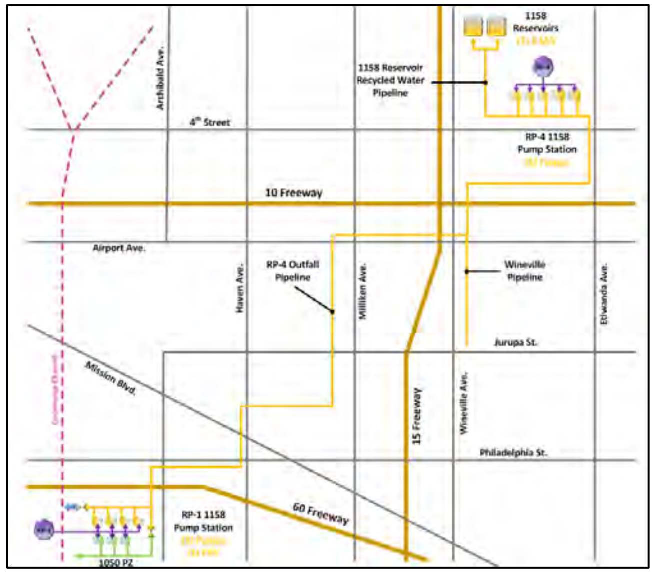
System	Project Name	Project Description
RP-1 1050 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

1158 Pressure Zone

1. Asset Profile



1158 Reservoirs
The 1158 reservoirs provide recycled water supply to the 1299 pump station suction header and the 1158 pressure zone. The 1158 reservoirs are located at the intersection of Etiwanda Ave. and 6th St. in the City of Rancho Cucamonga within the GenON Power Generation Facility. Each 1158 reservoir has a design capacity of 4 million gallons (MG), a diameter of 145 feet, and a maximum water surface level of 34 feet, and each is equipped with a level transmitter, flow meter, and altitude valve. The 1158 reservoirs are normally operated between 4 feet and 32 feet, providing an operational capacity of 3.5 MG.

RP-4 1158 Pump Station
The RP-4 1158 pump station provides recycled water to the 1299 pump station suction header, to 1158 reservoirs, and to the 1158 pressure zone for direct use by the City of Fontana and the City of Ontario. The pump station is composed of five pumps:

- Three 200 hp vertical-turbine, VFD-driven, 2,500 gpm pumps
- Two 300 hp vertical-turbine, VFD-driven, 7,200 gpm pumps

The RP-4 1158 pump station is automatically controlled to maintain the level in the RP-4 effluent wet well structure.

RP-1 1158 Pump Station
The RP-1 1158 pump station provides recycled water to the 1299 pump station suction header, to 1158 reservoirs, and to the 1158 pressure zone for direct use by the City of Fontana and the City of Ontario. The pump station is composed of four 400 hp vertical-turbine, VFD-driven, 2,700 gpm pumps.

The RP-1 1158 pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1158 reservoirs. In addition, the pumps can automatically be switched to VFD control to maintain the RP-1 effluent wet well level when a low level setting is reached.

1158 Pipelines

- *RP-4 Outfall Pipeline* – 25,200 LF of 42-inch pipeline from RP-4 to the intersection of DuPont Ave. and Jurupa St., 15,000 LF of 36-inch pipeline from DuPont Ave. and Jurupa St. to the intersection of Archibald Ave. and Philadelphia Ave., and 4,200 LF of 42-inch pipeline from Archibald Ave. and Philadelphia Ave. to RP-1.
- *1158 Reservoir Pipeline* – 4,200 LF of 48-inch pipeline from RP-4 to the 1158 Reservoirs.
- *Wineville Pipeline* – 5,400 LF of 24-inch pipeline along Wineville Ave. from Airport Dr. to Jurupa St.

1158 to 1050 Pressure Reducing Valve (PRV)
The 1158 to 1050 PRV is located at RP-1 and used to transfer excess recycled water from the 1158 pressure zone to the 1050 pressure zone when the 1158 reservoirs reach a high level set point. The system includes a 16-inch Cla-Val PRV and 24-inch magnetic flow meter. The system has an operating flow range from 300 gpm to 17,000 gpm.

RP-4 Energy Displacement Valves (EDV)
The RP-4 EDVs are located at RP-1 and used to discharge excess recycled water when the 1158 reservoirs reach a high level set point. The excess recycled water is treated through the RP-1 north dechlorination structure before being discharged to the Cucamonga Channel. The turnout includes two 16-inch motor-operated globe-style EDVs, flow meter, and bypass pipeline. Each EDV has an operating flow range from 500 gpm to 11,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1158 Reservoirs	2 @ 4 MG	3.5 MG (Op. Cap.)
RP-4 1158 Pumps	3 @ 2,500 gpm 2 @ 7,200 gpm	VFD VFD
RP-1 1158 Pumps	4 @ 2,700 gpm	VFD
RP-4 Outfall Pipeline	42-inch – 25,900 gpm 36-inch – 19,000 gpm	6.0 ft/s mv
1158 Reservoir Pipeline	33,800 gpm	6.0 ft/s mv
Wineville Pipeline	8,500 gpm	6.0 ft/s mv
1158 to 1050 PRV	300 – 17,000 gpm	
RP-4 EDVs	2 @ 500–11,000 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1158 Reservoirs	1	3	3	1
RP-4 1158 Pumps	3	3	3	4
RP-1 1158 Pumps	3	3	3	4
RP-4 Outfall Pipeline	3	3	3	4
1158 Reservoir Pipeline	2	2	2	2
Wineville Pipeline	2	3	3	2
1158 to 1050 PRV	2	2	2	3
RP-4 EDVs	3	2	2	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

1158 Reservoirs
No issues requiring immediate attention.

A condition assessment was performed in August 2014. It is recommended that the annual monitoring testing is performed at the reservoirs highest operating level. It is also recommended that the mechanical connection between the copper cable pigtails and the reservoirs be removed; should only be connected through the solid state decouplers. Maintenance will address removing the connection.

RP-4 1158 Pumps
No issues requiring immediate attention.

RP-1 1158 Pumps
The VFD manufacturer no longer supports this equipment. A potential project is needed to address the system's issue.

RP-4 Outfall Pipeline
In 2004, the RP-4 outfall pipeline was converted from a gravity pipeline to a pressure pipeline to create the 1270 recycled water pressure zone. Pressure at RP-1 was normally in excess of 200 psi, which is within the pressure class of the pipeline; however, multiple joint failures of the 42-inch pipeline have occurred, requiring emergency repairs to the system. In late 2008, the pipeline was converted to the 1158 recycled water pressure zone. A condition assessment may be warranted as a result of the number of pipeline failures. A condition assessment should be scheduled in 2015 to assess any potential project requirements.

1158 Reservoir Pipeline
A condition assessment in 2014 identified that one of the three test stations functioning and there was uncertainty determining if there were any signs of corrosion. It was also identified that soil is "Negligible Corrosivity." A potential project is needed to repair these issues.

Wineville Pipeline
No issues requiring immediate attention.

1158 to 1050 PRV
No issues requiring immediate attention.

RP-4 EDVs
No issues requiring immediate attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1158 Reservoirs	2008	2014 Report
RP-4 1158 Pumps	2004 2008	
RP-1 1158 Pumps	2004 2006 2008	
RP-4 Outfall Pipeline	1998	Schedule for 2015
1158 Reservoir Pipeline	2004	2014 Report
Wineville Pipeline	2004	
1158 to 1050 PRV	2011	
RP-4 EDVs	1998 2005	

Table 4 Potential Projects

System	Project Name	Project Description
RP1 1158 Pumps	RW VFD Replacement	This project will replace the obsolete VFDs that are no longer supported by the manufacturer at the pump station
1158 Reservoir Pipeline	1158 Reservoir Pipeline Cathodic Protection	Repair 1158 reservoir pipeline cathodic protection test stations.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1158 Pressure Zone

1. Asset Profile

RP-4 1158 Pump Station

- *Electrical System – The electrical energy to power the RP-4 1158 pump station is obtained from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The solar and wind assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B. The RP-4 treatment facility has one 2.0 MW diesel generator located in the northern portion of the facility; however, the generator was not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-4 1158 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-4 1158 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.*

RP-1 1158 Pump Station

- *Electrical System – The electrical energy to power the RP-1 1158 pump station is obtained from the RP-1 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (solar, fuel cell, and emergency generators). The solar and fuel cell assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the RP-1 power reliability building (PRB), where transformers and switchgear are located to distribute electrical energy throughout the facility. TP-1 and the RP-1 1158 pump station are powered through the H9 breaker. A single line diagram of the RP-1 1158 pump station electrical system is shown in Appendix B. The RP-1 treatment facility has three 1.25 MW diesel generators located in the PRB, and TP-1 has one 670 kW diesel generator; however, these generators were not designed to maintain operation of the recycled water pump stations during a power failure.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the RP-1 1158 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

1158 Reservoirs

- *Electrical System – The electrical energy to power the 1158 reservoirs is obtained from the local electrical grid (SCE), which is composed of a 120 V feeder to a local control panel on 6th Street. A single line diagram of the RP-1 1158 pump station electrical system is shown in Appendix B. The 1158 reservoirs do not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Level, flow, and valve position are monitored at the 1158 reservoirs. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 reservoir local control panel. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.*

1158 to 1050 PRV

- *Electrical System – The electrical energy to power the 1158 to 1050 PRV is looped powered through the 1158 and 1050 pump station PLC. A single line diagram of the 1158 to 1050 PRV electrical system is shown in Appendix B. The 670 kW TP-1 diesel generator will power the 1158 pump station and 1050 pump station PLC during a power failure, since the power draw to operate this system is negligible.*
- *Instrumentation and Control System – The 1158 to 1050 PRV consists of a 16-inch Cla-Val PRV with position indication and control and a 24-inch flow meter. All of the processes of the PRV are observed and controlled by the 1158 and 1050 pump station PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1158 and 1050 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-1 server workstation for remote access and transition of control data into the RP-1 SCADA system.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-4 1158 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	4 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	2 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,847 Bhp	Small Pumps
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	PLC 5
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-4
RP-1 1158 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	2 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1
1158 Reservoirs		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	PLC 5C
Radio Transmitter	1 unit	RP-4
1158 to 1050 PRV		
Electrical System		
Utility Voltage	120 V	PLC Loop
Transformers	N/A	
Switchgear	N/A	
Distribution	N/A	
Generator	1 @ 670 kW 896 Bhp	TP-1
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-1

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-4 1158 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
RP-1 1158 Pump Station				
Electrical System	3	3	3	4
Instrumentation and Control System	3	3	3	3
1158 Reservoirs				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
1158 to 1050 PRV				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-4 1158 Pump Station:

- **Electrical System**
  RP-4 has one 2.0 MW emergency diesel generator. The generator can produce only enough power to reliably power the RP-4 1158 small pumps, reducing the overall capacity of the pump station. The RP-4 1158 pump station is the only discharge location for the facility; therefore, a utility power failure will reduce the discharge capacity for the facility. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

RP-1 1158 Pump Station

- **Electrical System**
  RP-1 has three emergency diesel generators, and TP-1 has one emergency diesel generator to produce an effective electrical load of 3.5 MW. RP-1 has a varying electrical demand, ranging from 3.0 MW to as high as 4.8 MW depending on the amount of recycled water pumped. Therefore, RP-1 typically does not have the emergency generation capability to power the three recycled water pump stations located at the facility. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.
  Project EN13048 will provide a second 12kV feeder to TP-1 to support the RP-1 1158 pump station.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-4 1158 Pump Station		
Electrical System	2004 2008	
Instrumentation and Control System	2004 2008	
RP-1 1158 Pump Station		
Electrical System	2004 2006	
Instrumentation and Control System	2004 2008	
1158 Reservoirs		
Electrical System	2008	
Instrumentation and Control System	2008	
1158 to 1050 PRV		
Electrical System	2011	
Instrumentation and Control System	2011	

Table 4 Potential Projects

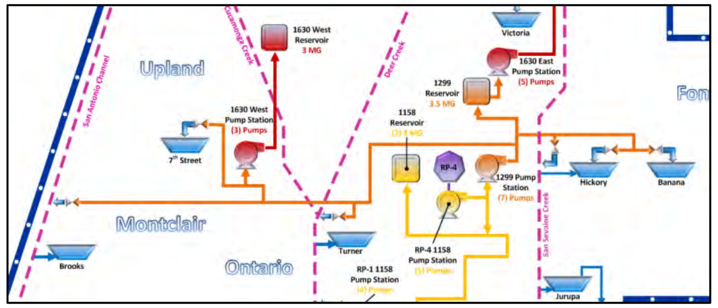
System	Project Name	Project Description
RP-4 1158 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.
RP-1 1158 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

1299 Pressure Zone

1. Asset Profile



1299 Reservoir
The 1299 reservoir provides recycled water supply to the 1630 east pump station suction header and the 1299 pressure zone. The 1299 reservoir is located at the intersection of East Ave. and Baseline Ave. in the City of Rancho Cucamonga on an existing Cucamonga Valley Water District (CVWD) potable water reservoir site. The 1299 reservoir has a design capacity of 3.5 million gallons (MG), a diameter of 165 feet, and a maximum water surface level of 22 feet, and is equipped with a level transmitter. The 1299 reservoir is normally operated between 4 feet and 20 feet, providing an operational capacity of 2.6 MG.

RP-4 1299 Pump Station
The RP-4 1299 pump station provides recycled water to the 1299 pressure zone for direct use by CVWD, Monte Vista Water District (MVWD), the City of Fontana, the City of Ontario, and the City of Upland, and for groundwater recharge at Brooks Basin, 8th St. Basin, Turner Basin, Hickory Basin, Banana Basin, Jurupa Basin, and RP-3 Basin. The pump station is composed of seven pumps:

- Two 350 hp horizontal-split case, VFD-driven, 4,185 gpm pumps
- Five 350 hp horizontal-split case, VFD-driven, 4,600 gpm pumps

The 1299 pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1299 reservoir.

1299 Pipelines

- *Etiwanda Pipeline* – 4,100 LF of 36-inch pipeline along Etiwanda Ave. from RP-4 to Whittram Ave.
- *North Etiwanda Pipeline* – 1,800 LF of 42-inch pipeline along Etiwanda Ave. from Whittram Ave. to Arrow Route.
- *Whittram Avenue Pipeline* – 7,500 LF of 16-inch along Whittram Ave. from Etiwanda Ave. to Banana Basin.
- *1299 Zone Recycled Water Pipeline* – 12,500 LF of 36-inch pipeline from the termination of the North Etiwanda Pipeline to the 1299 Reservoir.
- *RP-4 West Extension Phase I Pipeline* – 14,200 LF of 30-inch pipeline along 6th St. from Etiwanda Ave. to Cleveland Ave.
- *RP-4 West Extension Phase II Pipeline* – 10,400 LF of 30-inch pipeline from the termination of the RP-4 West Extension Phase I Pipeline at 6th St. and Cleveland Ave. to Archibald Ave. and 4th St., continuing with an additional 2,200 LF of 24-inch pipeline to 4th St. and Cucamonga Creek.
- *San Antonio Channel Segment A Pipeline* – 14,900 LF of 24-inch pipeline from the termination of the RP-4 West Extension Phase II pipeline at 4th St. and Cucamonga Creek to I St. and Sultana Ave.
- *San Antonio Channel Segment B Pipeline* – 12,200 LF of 30-inch pipeline from the termination of the San Antonio Channel Segment A Pipeline at I St. and Sultana Ave. to San Bernardino Ave. and Benson Ave., continuing with an additional 11,250 LF of 24-inch pipeline to Orchard St. Turnout.
- *7th and 8th St. Pipeline* – 10,500 LF of 16-inch pipeline from 4th St. and Corona Ave. to 8th St. Basin turnout.

Force Main Manifold (FMM) Turnout
The turnout includes two 12-inch motor-operated butterfly valves, a flow meter, and a pressure transmitter to provide recycled water to Hickory Basin and Banana Basin. The turnout is designed for flow rates ranging from 200 gpm to 6,000 gpm.

San Sevaine Channel Turnout
The turnout includes a 10-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to San Sevaine Channel. Recycled water discharged in the channel can then be conveyed to Hickory Basin or to Jurupa Basin for groundwater recharge. The turnout is designed for flow rates ranging from 200 gpm to 2,200 gpm.

Turner Basin Turnout
The turnout includes a 10-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to Deer Creek. Recycled water discharged in the lined creek can then be conveyed to Turner Basin Nos. 3 and 4 for groundwater recharge. The turnout is designed for flow rates ranging from 300 gpm to 3,500 gpm.

8th St. Basin Turnout
The turnout includes a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to 8th St. Basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

Orchard Turnout
The turnout includes a 16-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to San Antonio Channel. Recycled water discharged in the channel can then be conveyed to Brooks Basin for groundwater recharge. The turnout is designed for flow rates ranging from 1,000 gpm to 10,000 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1299 Reservoir	3.5 MG	2.6 MG
RP-4 1299 Pumps	2 @ 4,185 gpm 5 @ 4,600 gpm	
Etiwanda Pipeline	19,000 gpm	6.0 ft/s mv
North Etiwanda Pipeline	25,900 gpm	6.0 ft/s mv
Whittram Ave. Pipeline	3,750 gpm	6.0 ft/s mv
1299 Zone Recycled Water Pipeline	19,000 gpm	6.0 ft/s mv
RP-4 West Extension Phase I Pipeline	13,200 gpm	6.0 ft/s mv
RP-4 West Extension Phase II Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
San Antonio Channel Segment A Pipeline	8,500 gpm	6.0 ft/s mv
San Antonio Channel Segment B Pipeline	30-inch – 13,200 gpm 24-inch – 8,500 gpm	6.0 ft/s mv
7th & 8th St. Pipeline	3,750 gpm	6.0 ft/s mv
FMM Turnout	200 – 6,000 gpm	Hist. Data
San Sevaine Channel Turnout	200 – 2,200 gpm	Hist. Data
Turner Basin Turnout	300 – 3,500 gpm	Hist. Data
8th St. Basin Turnout	200 – 3,000 gpm	Des. Spec.
Orchard Turnout	1,000 – 10,000 gpm	Des. Spec.

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1299 Reservoir	1	2	3	2
RP-4 1299 Pumps	2	1	1	3
Etiwanda Pipeline	2	3	2	2
North Etiwanda Pipeline	2	2	2	2
Whittram Ave. Pipeline	2	4	2	2
1299 Zone Recycled Water Pipeline	2	2	2	2
RP-4 West Ext. Phase I Pipeline	2	3	2	2
RP-4 West Ext. Phase II Pipeline	2	3	2	2
San Antonio Channel Segment A	2	3	2	2
San Antonio Channel Segment B	3	3	2	2
7th & 8th St. Pipeline	3	4	3	3
FMM Turnout	3	3	2	3
San Sevaine Channel Turnout	1	1	1	3
Turner Basin Turnout	1	3	3	3
8th St. Basin Turnout	3	3	3	3
Orchard Turnout	1	2	2	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

1299 Reservoir
There is only one level transmitter for the reservoir. If the level transmitter fails, it shuts down the entire system. A redundant level transmitter should be installed on the reservoir. These issues should be addressed by the Maintenance Department.

RP-4 1299 Pumps
The motors may not be rated for outdoor installation. If not, the motors will need to be covered. Further evaluation is needed to determine if a potential project is needed.

Whittram Ave. Pipeline Capacity
At a max velocity of 6 ft/s, the Whittram Ave. pipeline has a capacity of 3,750 gpm. The San Sevaine Channel turnout has a max flow of 2,200 gpm, and the FMM turnout has a maximum flow of 6,000 gpm, which exceeds the Whittram Ave. pipeline max recommended velocity.

7th and 8th St. Pipeline Capacity
At a maximum velocity of 6 ft/s, the 7th and 8th St. pipeline has a capacity of 3,750 gpm. The 8th St. basin turnout has a maximum flow of 3,000 gpm, and the 1630 west recycled water pump station has a maximum flow of 4,000 gpm. Therefore, the 1630 west recycled water pump station and 8th St. basin turnout cannot be operated simultaneously without exceeding the maximum recommended velocity of the pipeline.

San Sevaine Channel Turnout
Condition assessment in 2014 identified the force main, extending from the Jurupa Basin along Mulberry Ave to the RP-3 Basin near Hemlock Ave, has at least two electrical discontinuities between stations 06050 and 07060, and between 10090 and 12120. This needs to be addressed by a potential project to ensure adequate cathodic protection.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1299 Reservoir	2011	
RP-4 1299 Pumps	2008	
Etiwanda Pipeline	2003	2014 Report
North Etiwanda Pipeline	2008	2014 Report
Whittram Ave. Pipeline	2004	2014 Report
1299 Zone RW Pipeline	2011	2014 Report
RP-4 West Ext. Phase I	2005	2014 Report
RP-4 West Ext. Phase II	C2006	2014 Report
San Antonio Channel Segment A Pipeline	2007	2014 Report
San Antonio Channel Segment B Pipeline	2007	
7th & 8th St. Pipeline	2007	
FMM Turnout	2006	
San Sevaine Channel	2006	2014 Report
Turner Basin Turnout	2006	
8th St. Basin Turnout	2007	
Orchard Turnout	2007	

Table 4 Potential Projects

System	Project Name	Project Description
1299 Pressure Zone	1299 Pressure Zone Cathodic Protection	Per 2014 Corrpro Report: Repair electrical discontinuities on Jurupa force main, and repair test stations on the North Etiwanda pipeline, Antonio Channel Seg A, RP4 Western Extension Phase 1 and Phase 2.
7th & 8th St. Pipeline Capacity	1299 Pressure Zone Pipeline Capacity Upgrades	Upgrade 7th & 8th street pipeline to provide sufficient capacity to not exceed the recommended velocity of the pipeline during peak demand.
Whittram Ave. Pipeline Capacity	1299 Pressure Zone Capacity Upgrades	Upgrade Whittram avenue pipeline to provide sufficient capacity to not exceed the recommended velocity of the pipeline during peak demand.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1299 Pressure Zone

1. Asset Profile

RP-4 1299 Pump Station

- *Electrical System* – The electrical energy to power the RP-4 1299 pump station is obtained from the RP-4 treatment facility, which receives power from the local electrical grid (SCE) and from onsite energy generation (wind and emergency generators). The wind assets are owned and operated by a private firm as part of power purchase agreements. The electrical feed from the grid is composed of a 12 kV feeder to the power panel switch gear, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the RP-4 electrical system is shown in Appendix B. The RP-4 treatment facility has one 2.0 MW diesel generator located in the northern portion of the facility; however, the generator was not designed to maintain operation of the recycled water pump stations during a power failure.
- *Instrumentation and Control System* – An extensive array of instruments is used to monitor and control the processes for the RP-4 1299 pump station. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the RP-4 1299 pump station electrical room. Fiber optic cable is then used to connect the local PLC to the RP-4 server workstation for remote access.

1299 Reservoir

See 1630 East Auxiliary System Summary Sheet.

FMM Turnout

- *Electrical System* – The electrical energy to power the FMM Turnout is obtained from the local electrical grid (SCE). A single line diagram of the FMM Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position for the both Hickory and Banana basins is fed back to the remote telemetry unit. The turnout has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

San Sevaine Channel Turnout

- *Electrical System – The electrical energy to power the San Sevaine Turnout is obtained from the Hickory Basin Rubber Dam Control House, which receives power from the local electrical grid (SCE). A single line diagram of the San Sevaine Channel Turnout and Hickory Basin Rubber Dam Control House is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to the local valve control panel, which then directs the information to a local control panel in the Hickory Basin Rubber Dam Control House. The Control House has a 10dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.*

Turner Basin Turnout

- *Electrical System* – The electrical energy to power the Turner Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Turner Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position is fed back to a local control panel and PLC. The turnout has a 9dB yagi antenna that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.

8th Street Basin Turnout

- *Electrical System* – The electrical energy to power the 8th Street Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Turner Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position is fed back to a local PLC. The turnout has a 9dB yagi antenna that transmits control data to an additional local PLC panel for 8th Street Basin before being transmitted by radio to RP-1 to the GWR workstation server for control and remote access.

Orchard Turnout

- *Electrical System* – The electrical energy to power the Orchard Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Orchard Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.
- *Instrumentation and Control System* – Local control wiring for flow and valve position as well as pressure are fed back to a local control panel and PLC. The data is transmitted by phone line to the GWR workstation server at RP-1 for control and remote access.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-4 1299 Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	2 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	MCCs
Distribution	1 @ 480 V	
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	PLC 5B
I/O Hub	1 unit	
Radio Transmitter	1 unit	RP-4
FMM Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
San Sevaine Turnout		
Electrical System		
Utility Voltage	480 V	
Transformers	1 @ 480 V to 120 V	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	N/A	
PLC	N/A	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
Turner Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
8th Street Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	2 units	
RTU	N/A	
PLC	2 units	
I/O Hub	1 unit	
Radio Transmitter	3 units	
Orchard Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	N/A	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
RP-4 1299 Pump Station				
Electrical System	2	3	3	4
Instrumentation and Control System	2	3	3	3
FMM Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
San Sevaine Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Turner Basin Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
8th Street Basin Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Orchard Turnout				
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

RP-4 1299 Pump Station Emergency Generation

RP-4 has one 2.0 MW emergency diesel generator. The generator can produce only enough power to reliably power the RP-4 1158 small pumps; therefore, it cannot maintain the operation of the 1299 pump station during a power failure. A potential project is needed to address the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
RP-4 1299 Pump Station		
Electrical and I&C	2008	
FMM Turnout		
Electrical and I&C	2006	
San Sevaine Turnout		
Electrical and I&C	2006	
Turner Basin Turnout		
Electrical and I&C	2006	
8th Street Basin Turnout		
Electrical and I&C	2007	
Orchard Turnout		
Electrical and I&C	2007	

Table 4 Potential Projects

System	Project Name	Project Description
RP-4 1299 Pump Station Electrical System	Recycled Water Pump Station Emergency Generation Upgrade	Upgrade the emergency generator system to provide sufficient power during peak recycled water pump station electrical demand.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

1630 East Pressure Zone

1. Asset Profile

1630 East Pump Station
The 1630 east pump station provides recycled water to the 1630 east pressure zone for direct use by CVWD and the City of Fontana and for groundwater recharge at Victoria and San Sevaine basins. The pump station is composed of five pumps:

- Two 100 hp vertical-turbine, VFD-driven, 750 gpm pumps
- One 200 hp vertical-turbine, constant speed, 1,500 gpm pump
- Two 400 hp vertical-turbine, constant speed, 3,000 gpm pumps

The 1630 east pump station is automatically controlled using a proportional-integral-derivative controller (PID) to maintain a discharge-pressure set point of 150 psi. In addition, the pump station has two 12-inch pressure-reducing valves (PRV) to transfer recycled water from the 1630 east pressure zone back to the 1299 pressure zone to be used with the future 1630 east reservoir.

1630 East Pipelines

- *Segment A Pipeline* – 11,300 LF of 36-inch pipeline from the 1630 East Pump Station to San Sevaine Turnout.
- *Baseline Pipeline* – 1,650 LF of 24-inch and 30-inch pipeline along Baseline Ave. from Etiwanda Ave. to Heritage Circle.
- *Church Street Lateral* – 2,350 LF of 12-inch pipeline along Etiwanda Ave. from Baseline Ave. to Church St.

Victoria Basin Turnout
The turnout includes an 8-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 200 gpm to 3,000 gpm.

San Sevaine Basin Turnout
The turnout includes a 12-inch Cla-Val flow control valve, a flow meter, and a pressure transmitter to provide recycled water to the groundwater recharge basin. The turnout is designed for flow rates ranging from 400 gpm to 6,700 gpm.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 East Pumps	2 @ 750 gpm 1 @ 1,500 gpm 2 @ 3,000 gpm	VFD Constant Constant
1630 East PRVs	2 @ 10,000 gpm	Need to verify in field
Segment A Pipeline	19,000 gpm	6.0 ft/s max velocity
Baseline Pipeline	13,000 gpm	6.0 ft/s max velocity
Church Street Lateral	2,000 gpm	6.0 ft/s max velocity
Victoria Basin Turnout	200 – 3,000 gpm	
San Sevaine Basin Turnout	400 – 6,700 gpm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 East Pumps	2	2	3	2
1630 East PRVs	1	1	2	2
Segment A Pipeline	1	2	1	1
Baseline Pipeline	1	2	2	1
Church Street Lateral	1	2	2	1
Victoria Basin Turnout	1	2	2	2
San Sevaine Basin Turnout	1	1	2	2

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

1630 East Pumps
When both Victoria and San Sevaine basins are not receiving recycled water, the minimum 1630 east pressure zone flow is causing the small 100 hp pumps to operate continuously at minimum speed with zero measurable flow. Further investigation is needed to determine whether programming changes can resolve the issue or whether a small jockey pump may be required. Further internal investigation needs to take place to determine if a potential project is needed.

The existing surge tank compressor does not have the capacity to effectively displace the water in the tank after surge events. Multiple failures of the surge tank compressor have been documented and reported to Engineering. Project EN13051 will address these issues.

1630 East PRVs
No issues requiring immediate attention

Segment A Pipeline
No issues requiring immediate attention

A condition assessment in 2014 that the test stations were functioning as intended, but an electrical discontinuity was detected between stations 07010 and 09020, but the soil has "Negligible Corrosivity."

Baseline Pipeline
No issues requiring immediate attention

Church Street Lateral
No issues requiring immediate attention

Victoria Basin Turnout
No issues requiring immediate attention

San Sevaine Basin Turnout
No issues requiring immediate attention

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 East Pumps	2011	
1630 East PRVs	2011	
Segment A Pipeline	2011	2014 Report
Baseline Pipeline	2011	
Church Street Lateral	2011	
Victoria Basin Turnout	2011	
San Sevaine Basin Turnout	2011	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR
Auxiliary Systems – 1630 East Pressure Zone
1. Asset Profile

1630 East Pump Station and 1299 Reservoir

- *Electrical System – The electrical energy to power the 1630 east pump station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the 1630 east pump station electrical room, where transformers and switchgear are located to distribute electrical energy throughout the pump station. A single line diagram of the 1630 east pump station electrical system is shown in Appendix B. The 1630 east pump station does not have emergency power generation in case of power failure; however, it does have a generator termination cabinet to allow for quick connection of a portable generator.*
- *Instrumentation and Control System – An extensive array of instruments is used to monitor and control the processes for the 1630 east pump station and 1299 reservoir. All the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1630 east pump station electrical room. Radio is then used to connect the local PLC to the RP-4 server workstation for remote access.*

Victoria Basin Turnout

- *Electrical System – The electrical energy to power the Victoria Basin Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Victoria Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to a local control panel and PLC, which transmits control data to the Victoria Basin Main remote terminal unit (RTU). The Victoria Basin Main RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access.*

San Sevaine Basin Turnout

- *Electrical System –* The electrical energy to power the Victoria Basin *Turnout is obtained from the local electrical grid (SCE). A single line diagram of the Victoria Basin Turnout is shown in Appendix B. The turnout does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for flow and valve position is fed back to a remote I/O hub, which radios control data to the San Sevaine Basin No. 3 RTU. The San Sevaine Basin No. 3 RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 to the GWR workstation server for control and remote access. In addition, there is a San Sevaine Basin Turnout Main RTU that radios information back to RP-4.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 East Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	1 unit	
PLC	2 units	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
Victoria Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	1 unit	
PLC	1 unit	
I/O Hub	2 units	
Radio Transmitter	3 units	
San Sevaine Basin Turnout		
Electrical System		
Utility Voltage	120 V	
Transformers	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	2 units	
PLC	2 units	
I/O Hub	3 units	
Radio Transmitter	4 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 East Pump Station				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
Victoria Basin Turnout				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
San Sevaine Basin Turnout				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Electrical System
No issues require specific attention.

Instrumentation and Control System
No issues require specific attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 East Pump Station		
Electrical System	2011	
Instrumentation and Control System	2011	
Victoria Basin Turnout		
Electrical System	2011	
Instrumentation and Control System	2011	
San Sevaine Channel Turnout		
Electrical System	2011	
Instrumentation and Control System	2011	

Table 4 Potential Projects

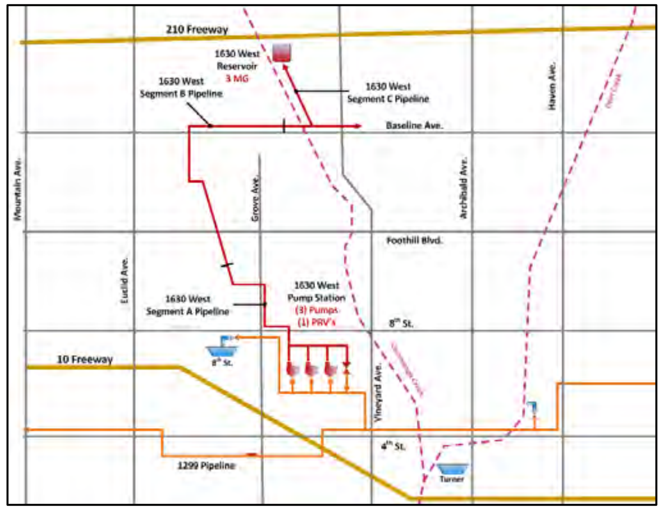
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

1630 West Pressure Zone

1. Asset Profile



1630 West Reservoir
The 1630 west reservoir provides recycled water storage for the 1630 west pressure zone. The 1630 west reservoir is located at the intersection of 19th St. and Cucamonga Creek in the City of Rancho Cucamonga on an existing Cucamonga Valley Water District (CVWD) pump station site. The 1630 east reservoir has a design capacity of 3 million gallons (MG), a diameter of 130 feet, and a maximum water surface level of 32 feet, and is equipped with a level transmitter. The 1630 west reservoir is normally operated between 4 feet and 28 feet, providing an operational capacity of 2.4 MG.

1630 West Pump Station
The 1630 west pump station provides recycled water to the 1630 west pressure zone for direct use by CVWD and the City of Upland. The pump station is composed of three 250 hp vertical-turbine, constant-speed, and 2,000 gpm pumps. The 1630 east pump station is automatically controlled to cycle pumps on and off to maintain a time-of-day level set point of the 1630 west reservoir. In addition, the pump station has one 10-inch pressure reducing valve (PRV) to transfer recycled water from the 1630 west pressure zone back to the 1299 pressure zone.

1630 West Pipelines
- *Segment A Pipeline* – 10,500 LF of 24-inch pipeline from the 1630 West Pump Station to Upland Memorial Park.
- *Segment B Pipeline* – 13,000 LF of 24-inch pipeline from Upland Memorial Park to the intersection of 16th St. (Baseline Rd.) and Tanglewood Ave.
- *Segment C Pipeline* – 800 LF of 24-inch pipeline and 3,100 LF of 30-inch pipeline along Baseline Rd. from Tanglewood Ave. to Vineyard Ave. Segment C Pipeline includes an additional 4,400 LF of 30-inch pipeline along Cucamonga Creek from Baseline Rd. to the 1630 west reservoir.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 West Reservoir	3 MG	2.4 MG (Op. Cap.)
1630 West Pumps	3 @ 2,000 gpm	Constant
1630 West PRV	300 – 3,000 gpm	Need to verify in field
Segment A Pipeline	8,500 gpm	6.0 ft/s max velocity
Segment B Pipeline	8,500 gpm	6.0 ft/s max velocity
Segment C Pipeline	24-inch – 8,500 gpm 30-inch – 13,200 gpm	6.0 ft/s max velocity

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 West Reservoir	1	1	1	1
1630 West Pumps	1	1	2	2
1630 West PRV	1	3	3	2
Segment A Pipeline	1	1	1	1
Segment B Pipeline	1	1	1	1
Segment C Pipeline	1	1	1	1

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

1630 West Pumps
Operations has noticed surge in both the 1299 and 1630 pressure zones when the 1630 west pumps are started or stopped. The surge can be in excess of 40 psi from standard operating conditions. The 1630 west surge tank and pump start controls are being reviewed to see if this condition can be eliminated with existing equipment. Project EN15050 will perform a surge analysis and manage the risks of the 1299 pressure zone and will install a surge tank on the suction side of the 1630 West Pumps.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 West Reservoir	2012	
1630 West Pumps	2012	
1630 West PRV	2012	
Segment A Pipeline	2012	
Segment B Pipeline	2012	
Segment C Pipeline	2012	

Table 4 Potential Projects

System	Project Name	Project Description
1630 West Pumps	1299 pressure zone pipeline surge tank	Install a surge tank on the 1299 pressure zone pipeline. To be located at the 1630 west pump station.

System Summary Continued on Next Page

Asset Management System Summary – RW/GWR

Auxiliary Systems – 1630 West Pressure Zone

1. Asset Profile

1630 West Pump Station

- *Electrical System* – The electrical energy to power the 1630 west pump station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the 1630 east pump station electrical room, where transformers and switchgear are located to distribute electrical energy throughout the pump station. A single line diagram of the 1630 west pump station electrical system is shown in Appendix B. The 1630 west pump station does not have emergency power generation in case of power failure; however, it does have a generator termination location in the MCC to allow for quick connection of a portable generator.
- *Instrumentation and Control System* – An extensive array of instruments is used to monitor and control the processes for the 1630 west pump station. All of the processes of the pump station are observed and controlled by a local PLC system. Local control wiring is fed from the individual pieces of equipment to an I/O hub and PLC in the 1630 west pump station electrical room. Radio is then used to connect the local PLC to the RP-4 server workstation for remote access.

1630 West Reservoir

- *Electrical System – The electrical energy to power the 1630 west reservoir is obtained from the local electrical grid (SCE). A single line diagram of the 1630 west reservoir is shown in Appendix B. The reservoir does not have emergency power generation in case of power failure.*
- *Instrumentation and Control System – Local control wiring for level and valve position are fed back to a local control panel and PLC. The RTU has a radio that transmits control data to RP-4, which routes the information to RP-1 for control and remote access.*

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
1630 West Pump Station		
Electrical System		
Utility Voltage	12 kV	
Transformers	1 @ 12 kV to 480 V 1 @ 12 kV to 120 V	
Switchgear	1 @ 480 V	
Distribution	1 @ 480 V	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	1 unit	
RTU	N/A	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	
1630 West Reservoir		
Electrical System		
Utility Voltage	480	
Transformers	1 @ 480 V to 120 V	
Switchgear	N/A	
Distribution	N/A	MCCs
Generator	N/A	
Instrumentation and Control System		
HMI Workstation	N/A	
RTU	1 unit	
PLC	1 unit	
I/O Hub	1 unit	
Radio Transmitter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
1630 West Pump Station				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3
1630 West Reservoir				
Electrical System	2	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Electrical System

No issues require specific attention.

Instrumentation and Control System

No issues require specific attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
1630 West Pump Station		
Electrical System	2012	
Instrumentation and Control System	2012	
1630 West Reservoir		
Electrical System	2012	
Instrumentation and Control System	2012	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

<u>End of System Summary</u>

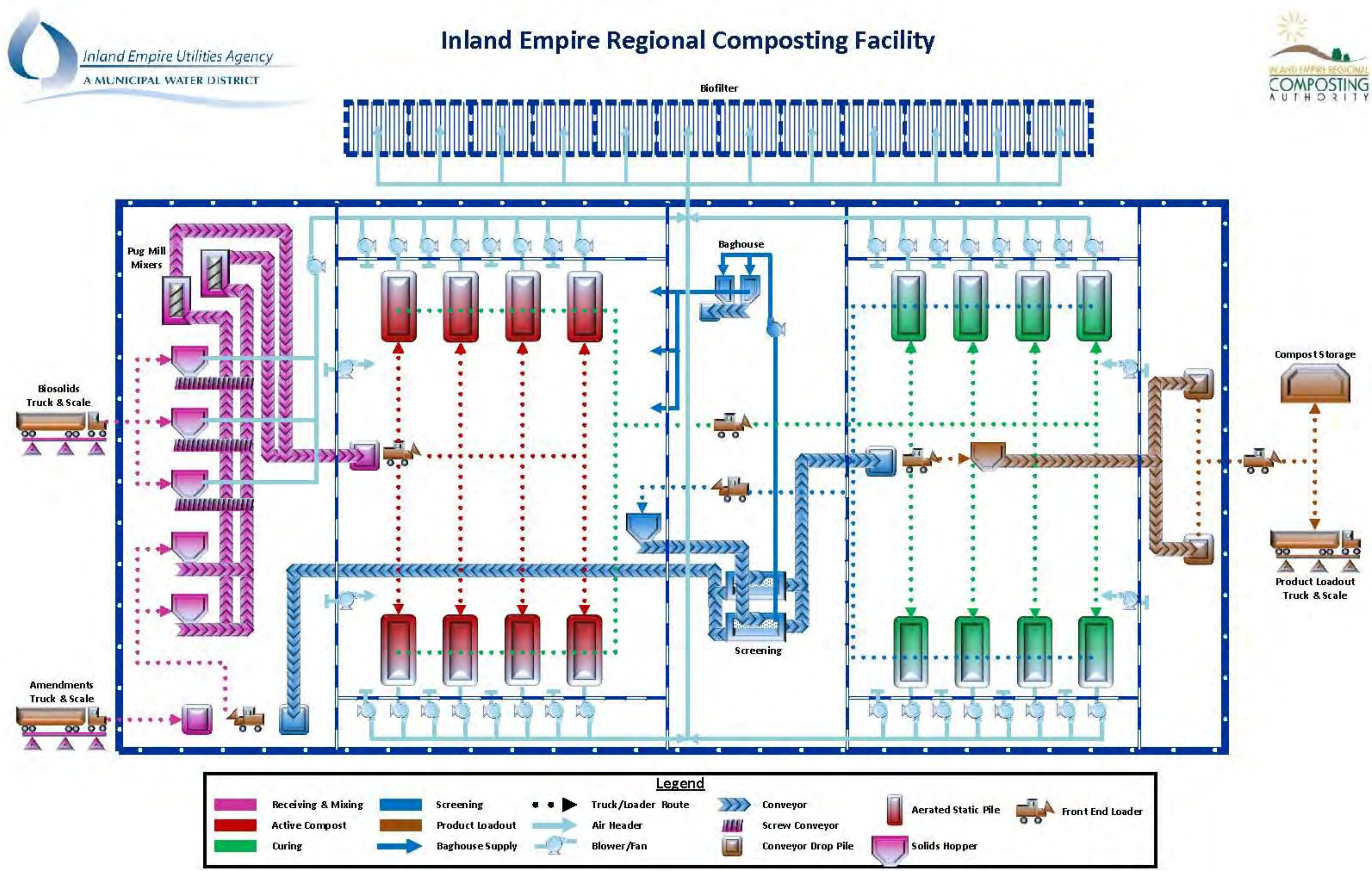


Figure 7-7: Inland Empire Regional Composting Facility (IERCF) – Schematic

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Table 7-8: Inland Empire Regional Composting Facility – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	RA11001	IERCF Capital Replacement	General project for facility/equipment repair and replacement, including replacement of front end loaders, and evaluation of the Baghouse.	RM	RP	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	5,000,000
2	RA11004	IERCF Process Improvements	The belt conveyance system will be modified to transfer material from Active to Curing, then from Curing to Screening. Currently, the system transfers material from Active to Screening and then Screening to Curing.	RM	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
3	RA12009	IERCF Structure Protection	Column protection and repair.	RM	OM	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	250,000
4	RA12011	IERCF Lighting Improvements	Additional lighting is going to be installed in all process areas to increase visibility for front end loader operators.	RM	OM	200,000	0	0	0	0	0	0	0	0	0	200,000
5	RA14003	IERCF Receiving Pit & Fan Corridor Drains	Installation of drains in the receiving pit and fan corridors for housekeeping purposes.	RM	CC	200,000	0	0	0	0	0	0	0	0	0	200,000
6	RA15001	IERCF Baghouse Improvements	Based upon system evaluation, this project is to improve the existing Baghouse, install new blowers downstream of the Baghouse structure, and install a foam fire suppression system.	RM	RP	50,000	0	0	0	0	0	0	0	0		50,000
7	TBD	IERCF Trommel Screen Improvements	Retrofit existing trommel screen equipment	RM	OM	0	0	0	300,000	0	0	0	0	0	0	300,000
8	TBD	IERCF Fire Sprinkler Improvements	Retrofit the fire sprinkler system pipelines and Victaulic fittings.	RM	CC	75,000	200,000	200,000	0	0	0	0	0	0	0	475,000
9	TBD	IERCF Transition Air Duct Improvements	Upgrade the foul-air rectangular transition air duct running north/south through the active curing screening.	RM	CC	0	500,000	0	0	0	0	0	0	0	0	500,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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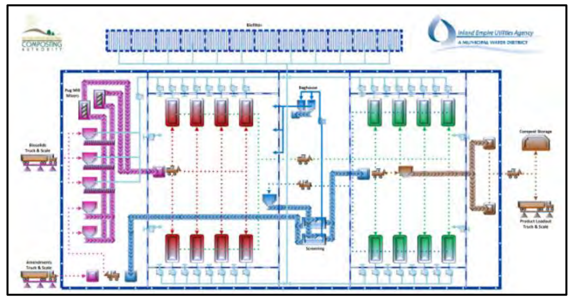
Asset Management System Summary – IERCF
Treatment Process
1. Asset Profile



Biosolids Hoppers
Biosolids from Los Angeles County Sanitation District (LACSD), Inland Empire Utilities Agency, and third-party sources are transported by trucks to the Inland Empire Regional Composting Facility (IERCF). After being weighed, the trucks offload the biosolids into three biosolids hoppers. Each biosolids hopper has a capacity of 55 cubic yards, five 3 hp live-bottom screws, and one 25 hp screw conveyor.

Amendment Hoppers
Amendments from outside sources are transported to IERCF by truck and stored along the western wall of the active compost process area. These amendments are mixed with recycled screening material (overs) to produce specific amendment blends. Front end loaders (FEL) mix the material and load it into two amendment hoppers. Each amendment hopper has a 200-ton capacity, five 3 hp live-bottom screws, and one 33-foot, 110-ton-per-hour belt conveyor powered by a 15 hp motor.

Pug Mill Mixers
Material from the biosolids hoppers and the amendment hoppers is conveyed by belt conveyors to two redundant pug mill mixers. The pug mill mixers blend the biosolids and amendments together to create an appropriate blend of material to begin the active compost process. Each pug mill mixer has a capacity of 225 tons per hour and is powered by a 75 hp motor.

Belt Conveyors
Belt conveyors are used to move material throughout IERCF. Nine belt conveyors allow material to be moved from receiving and mixing to active compost. Seven belt conveyors allow material to be moved from active compost through screening to curing. An additional four belt conveyors return the overs from screening to receiving and mixing. Two belt conveyors allow material to be moved from curing to product loadout.

Active Compost HVAC
Supply air into the active compost process area is provided by the following:

- Seven 20 hp, 18,250 cfm fans pulling from receiving and mixing
- Nine 20 hp, 23,000 cfm roof fans
- Five 75 hp, 25,650 cfm fans pulling from screening/Baghouse

Air is exhausted from the active compost area to the biofilter by:

- Four 125 hp, VFD-driven, 35,500 cfm exhaust fans
- Twelve 125 hp, 28,400 cfm exhaust fans
- Twenty-two 30 hp, VFD-driven, 4,500 cfm process fans

Curing HVAC
Supply air into the curing process area is provided by:

- Four 25 hp, 20,500 cfm fans pulling from product loadout
- Five 10 hp, 18,000 cfm roof fans
- Fourteen 20 hp, 2,850 cfm process fans

Air is exhausted from the active compost area to the biofilter by:

- Four 150 hp, VFD-driven, 42,250 cfm exhaust fans
- Two 125 hp, 35,000 cfm exhaust fans

Trommel Screens
After the material has been treated in the active compost and curing processes, it is placed into a hopper and conveyed to two Trommel screens to remove the overs. The fine material is conveyed to product loadout as the final compost product and the overs are conveyed back to receiving and mixing to be recycled back into the amendments. Each Trommel screen has 3/8-inch spacing and a 400-cubic-yard-per-hour production capacity and is powered by a 150 hp motor.

Baghouse
The Baghouse filters the air from the Trommel screens and the screenings process area and returns filtered air back to the active compost process area. The Baghouse is supplied by five 75 hp, 25,650 cfm fans and removes particulate matter from the air and conveys it to a storage area located in the screenings process area.

Biofilter
The biofilter is required to treat all air leaving IERCF to remove ammonia and VOCs. The biofilter is sized to treat 813,200 cfm of air, consists of twelve 135' x 87' cells, an irrigation system, and an inlet air humidification system.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Facility Biosolids Amendment	 600 wet tons per day 160 wet tons per day	
Biosolids Hoppers	3 @ 55 cy 5 @ 3 hp live bottom 1 @ 25 hp sc. conv.	 ea. hop. ea. hop.
Amendment Hoppers	2 @ 200 tons 5 @ 3 hp live bottom 1 @ 15 hp belt conv.	 ea. hop. ea. hop.
Pug Mill Mixers	2 @ 75 hp, 225 tph	
Receiving & Mixing Belt Conveyors	1 @ 20 hp, 162 ft 1 @ 20 hp, 144 ft 1 @ 25 hp, 70 ft 1 @ 25 hp, 91 ft 1 @ 25 hp, 80 ft 1 @ 25 hp, 75 ft 1 @ 30 hp, 215 ft 1 @ 30 hp, 219 ft 1 @ 30 hp, 258 ft	All units are 225 tons per hour (tph)
Screening Belt Conveyors	2 @ 20 hp, 91', 150 tph 1 @ 15 hp, 133', 150 tph 2 @ 15 hp, 27', 150 tph 1 @ 25 hp,157', 190 tph 1 @ 25 hp, 136', 190 tph 1 @ 15 hp, 32', 110 tph 1 @ 15 hp, 77', 110 tph 1 @ 20 hp, 172', 110 tph 1 @ 30 hp, 537', 110 tph	
Product Loadout Belt Conveyors	1 @ 20 hp, 135', 145 tph 1 @ 15 hp, 113', 145 tph	
Active Compost HVAC	7 @ 20 hp, 18,250 cfm 9 @ 20 hp, 23,000 cfm 5 @ 75 hp, 25,650 cfm 4 @ 125 hp, 35,500 cfm 12 @ 125 hp, 28,400 cfm 22 @ 30 hp, 4,500 cfm	R&M Fan Roof Fan BH Fan Ex. Fan Ex. Fan Pr. Fan
Curing HVAC	4 @ 25 hp, 20,500 cfm 5 @ 10 hp, 18,000 cfm 14 @ 20 hp, 2,850 cfm 4 @ 150 hp, 42,250 cfm 2 @ 125 hp, 35,000 cfm	PL Fan Roof Fan Pr. Fan Ex. Fan Ex. Fan
Trommel Screens	2 @ 3/8-inch, 150 hp, 400 cyh	
Baghouse	2 @ 65,000 cfm 5 @ 75 hp, 25,650 cfm	Filters Fans
Biofilter	813,200 cfm	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Biosolids Hoppers	2	3	2	2
Amendment Hoppers	2	3	2	2
Pug Mill Mixers	3	2	2	3
Receiving & Mixing Belt Conveyors	2	2	2	3
Screening Belt Conveyors	4	3	3	3
Product Loadout Belt Conveyors	4	3	3	3
Active Compost HVAC	2	3	3	2
Curing HVAC	4	3	3	2
Trommel Screens	3	3	4	4
Baghouse	5	4	4	4
Biofilter	4	2	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Screening Belt Conveyors
Project RA11004 will modify the belt conveyance system to transfer material from Active to Curing, then from Curing to Screening. Currently, the system transfers material from Active to Screening and then Screening to Curing.

Curing HVAC
A potential project will modify the foul-air-rectangular-transition air duct running north/south through screenings has multiple air leaks at the joints. This project will improve the system to prevent such leaks in the future.

Trommel Screen Operation
The Trommel screens have required monthly maintenance because of parts failures resulting in extended equipment downtime. IERCF is currently running a pilot study of a shaker screen to gather operational data on the effectiveness of this type of equipment. A potential project will address this issue.

Baghouse Operation
The Baghouse operation has been ineffective in removing particulate matter from the Trommel screens and screenings process area. IERCF had to construct a temporary cover around the exhaust of the Trommel screens to allow adequate supply air flow to the Baghouse. In addition, concerns have been raised about the applicability of an indoor Baghouse as it relates to OSHA requirements. Project RA15001 will install blowers downstream of the Baghouse structure and install a foam fire suppression system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Biosolids Hoppers	2007	
Amendment Hoppers	2007	
Pug Mill Mixers	2007	
Receiving & Mixing Belt Conveyors	2007	
Screening Belt Conveyors	2007	
Product Loadout Belt Conveyors	2007	
Active Compost HVAC	2007	
Curing HVAC	2007	
Trommel Screens	2007 2013	
Baghouse	2007	
Biofilter	2007	

Table 4 Potential Projects

System	Project Name	Project Description
Trommel Screens	IERCF Trommel Screen Improvements	Retrofit existing trommel screen equipment
Active Curing Screening	IERCF Transition Air Duct Improvements	Upgrade the foul-air rectangular transition air duct running north/south through the active curing screening.
Biofilter	IERCF Biofilter Media Replacement	Full replacement of the biofilter media in all 12 cells, recurring every 5 years. Turnover of existing biofilter media and replenishment of material as necessary, annually. This will not be conducted on years of a full media replacement.

System Summary Continued on Next Page

Asset Management System Summary – IERCF

Auxiliary Systems

1. Asset Profile

Plant Drain

The plant drain collects sewer from the truck scale house and administration building, wash-down water from the truck cleaning area and process areas, and excess irrigation and condensate from the biofilter system. The plant drain system consists of five submersible pump stations: north process area, south process area, biofilter west, biofilter east, and center aisle duct. These five pump stations pump to the plant drain pump station. The plant drain pump station pumps to either the inlet of RP-4 or to the Non-Reclaimable Waste System (NRWS). Currently, the system is being pumped to the NRWS.

Electrical System

The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE) and from onsite energy generation (solar and an emergency generator). The solar assets are owned and operated by private firms as part of power purchase agreements. The electrical feed from the grid is composed of dual 12 kV feeders from RP-4 to the IERCF north and south electrical rooms, where transformers and switchgear are located to distribute electrical energy throughout the facility. A single line diagram of the IERCF electrical system is shown in Appendix B.

A diesel emergency generator is used in the event of a power failure. A 2.0 MW generator is located on the southeast corner of the IERCF property and can supply power to meet maximum daytime production of the facility.

An extensive lighting system is needed to illuminate the indoor facility. Lighting units are located in each of the process areas, on equipment walls, and on the building support columns.

Utility Water System

Utility water is used throughout the facility for irrigation, biofilter irrigation and humidification, truck wash-down, and general cleaning purposes. The system is supplied by the 1299 pressure zone from a connection on 6th Street. The piping consists of several isolation valves and point-of-use connections.

Potable Water System

Potable water is used throughout the plant for restrooms, cooling, and more. The system is supplied from two service connections on 6th Street from the City of Rancho Cucamonga. IERCF also has an independent fire suppression system with two connections on 6th Street.

Instrumentation and Control System

An extensive array of instruments is used to monitor and control the processes at IERCF. Nearly all of the processes at the plant are observed and controlled from a centralized SCADA system. Control wiring and local panels are provided at individual pieces of equipment, and control wiring transmits data to a redundant PLC system located in the main control building. Fiber optic cable is then run to RP-4 for remote access.

Yard Piping

A substantial network of pipes exists mainly for the auxiliary systems. The material, sizes, and service conditions of these pipes vary widely. A yard piping diagram is show in Appendix C.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Plant Drain	3 @ 620 gpm 20 hp	VFD
Electrical System		
Utility Voltage	12 kV	
Transformers	4 @ 12 kV to 480 V 5 @ 480 V to 120 V	
Switchgear	4 @ 12 kV 2 @ 12 kV	
Distribution	8 @ 480 V	MCCs
Generator	1 @ 2,000 kW 2,937 Bhp	
Mounted Lighting	345 units	Process
Utility Water System		
Pipelines	8-inch PVC @ 3,750 gpm	
Valves	6-inch PVC @ 2,100 gpm 5 units	Main Line
Potable Water System		
Pipelines	2 @ 2.5-inch DI @ 350 gpm 10-inch DI @ 5,800 gpm	Potable Fire
Instrumentation and Control System		
HMI Workstation	4 units	
RTU	N/A	
PLC	4 units	
I/O Hub	6 units	
Radio Transmitter	1 unit	RP-4
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Plant Drain	3	2	2	2
Electrical System	2	2	3	3
Utility Water System	3	3	3	3
Potable Water System	4	3	3	3
Instrumentation and Control System	3	2	3	3
Yard Piping	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Plant Drain

No issues require specific attention.

Electrical System

No issues require specific attention.

Utility Water System

No issues require specific attention.

Potable Water System

A potential project will retrofit the fire sprinkler system pipelines and Victaulic fittings.

Instrumentation and Control System

No issues require specific attention.

Yard Piping

No issues require specific attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Plant Drain	2007	
Electrical System	2007 2011	
Utility Water System	2007	
Potable Water System	2007	
Instrumentation and Control System	2007	
Yard Piping	2007	

Table 4 Potential Projects

System	Project Name	Project Description
Potable Water System	IERCF Fire Sprinkler Improvements	Retrofit the fire sprinkler system pipelines and Victaulic fittings.

End of System Summary

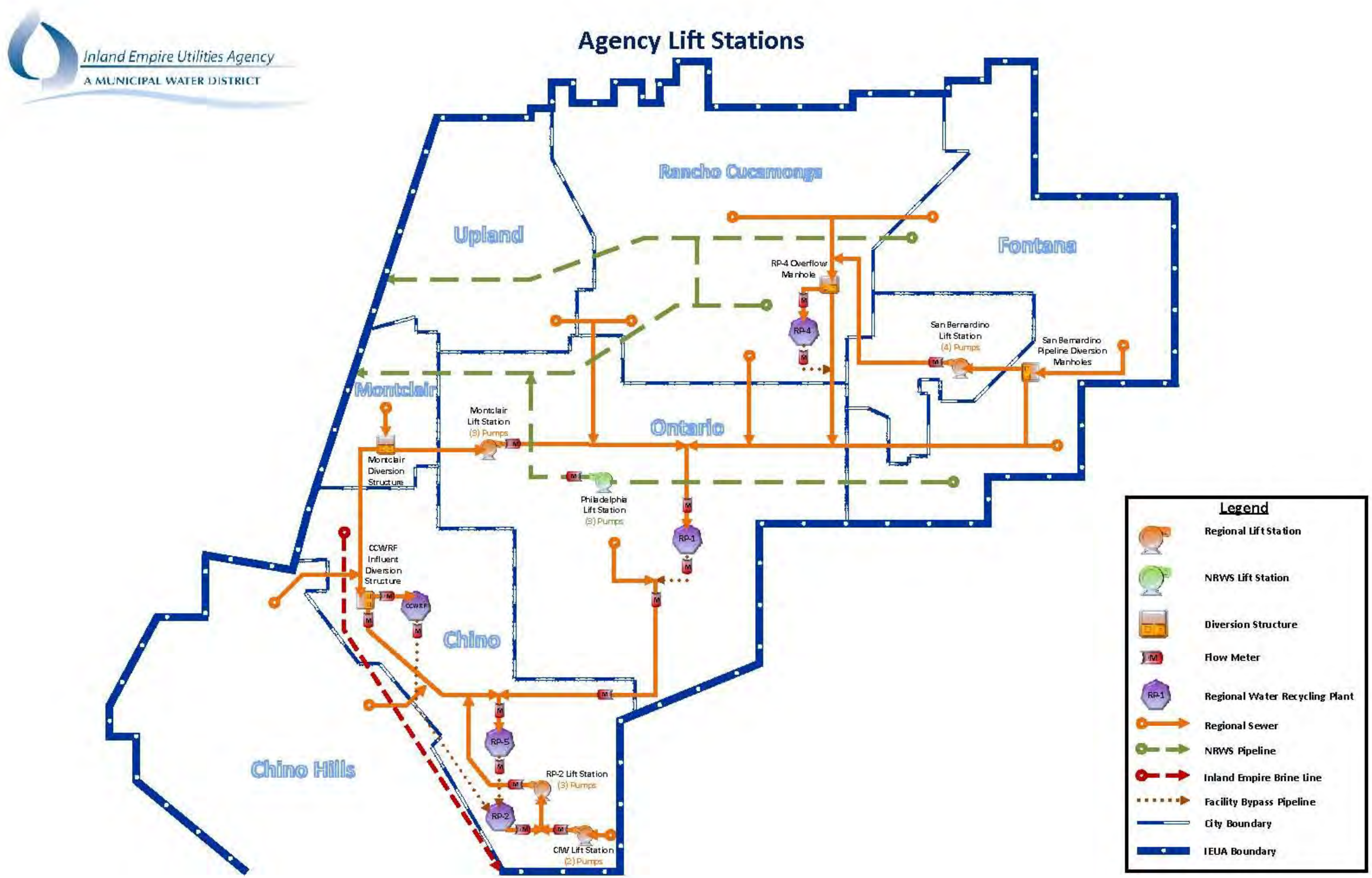


Figure 7-8: Agency Lift Stations (LS) – Schematic

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Table 7-9: Agency Lift Stations – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN11035	Philadelphia Pump Station Upgrades	Repair and replacement of section of the force mains in the pump dry sump. Miscellaneous instrumentation and facility improvements will be made. A redundant PLC will also be supplied to provide control system reliability.	NC	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
2	EN13028	Preserve Lift Station	A sewer lift station design prepared by the City of Chino will be reviewed by IEUA. The SCADA system will be connected to IEUA's system; therefore, the lift station SCADA components will be reviewed for conformance to our system.	RC	OM	100,000	100,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	2,600,000
3	EN13054	Montclair Lift Station Upgrades	Replacement of all three lift pumps as well as replacement and improvements of the control and instrumentation system and the electrical distribution system.	RO	CC	50,000	0	0	0	0	0	0	0	0	0	50,000
4	EN16011	Whispering Lakes LS Improvements	Complete rehab of lift station. Replacement of all equipment, replacement of all electrical systems, replacement of control system, and rehab of gates and structures.	RC	CC	0	0	0	0	0	0	0	500,000	2,500,000	2,000,000	5,000,000
5	EN19005	Haven LS Improvements	Connect to the SCADA enterprise system and potential sewer force main line added/construction.	RC	CC	0	0	0	300,000	500,000	200,000	0	0	0	0	1,000,000
6	TBD	Philadelphia Lift Station Force Main Improvements	Replace the force mains, as well as provide inspection manholes for future condition assessment on the entire length along Philadelphia. Replace 12" line with a new 18" line and add cleanouts every 500 ft.	NC	RP	0	0	0	0	0	0	0	500,000	2,500,000	3,000,000	6,000,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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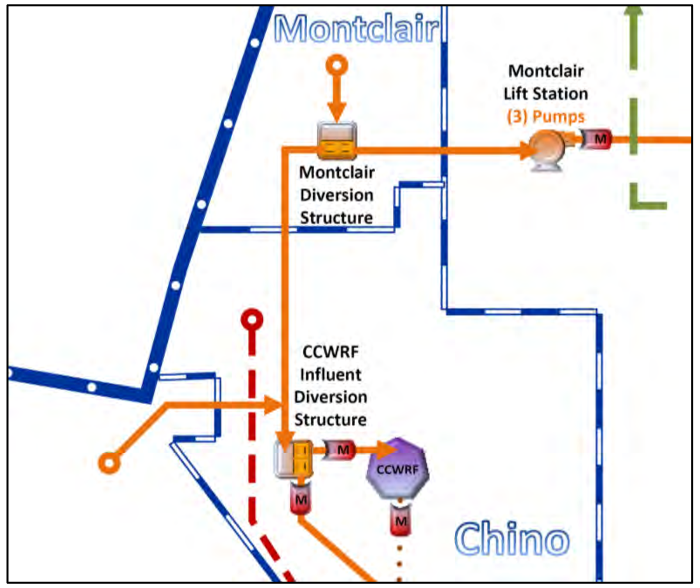
Asset Management System Summary – LS
Montclair Lift Station

1. Asset Profile



Pump System
The Montclair lift station conveys flows collected from the Montclair service area as well as a portion of Ontario. The pump station consists of a small circular wet well and three lift pumps.

Electrical System
The electrical energy to power the lift station is obtained from the local electrical grid (SCE). The electrical feed from the grid is composed of a 12 kV feeder to the transformer and switchgear. A single line diagram of the Montclair lift station electrical system is shown in Appendix B.

A diesel emergency generator is used in the event of a power failure. One generator is located inside the pump station and supplies power to the facility in the event of a utility outage.

Potable Water System
Potable water is supplied to the station for supply at several hose bibs. The water system formerly supplied seal water to the old pumps.

Instrumentation and Control System
All aspects of the pump station operations are monitored and controlled by the instrumentation and control system. The control system includes a redundant PLC and communication modules for maximum reliability.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Montclair Lift Station	5.69 MGD	
Pump System Pipelines Pump Station Valves	 18-inch 3,950 gpm 3 @ 2,990 gpm 85 hp 7 units	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 480 V 480 V 1 @ 250 kW 398 Bhp 17 units	
Potable Water System Backflow Devices Valves	 1 units 2 units @ 2-inch	
Instrumentation and Control System HMI Workstation PLC I/O Hub Radio Transmitter	 1 Ea. 2 Ea. (Redundant Pair) 1 Ea. 1 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	4	4	4	4
Electrical System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Pump System
Project EN13054 will address replacing the lift station pumps to reduce ragging and maintenance labor. The pumps were selected for their ability to resist clogging from rags and other large objects. The project will be completed early 2015.

If continued ragging of pumps is experienced upon starting up the new pumping system, grinders will be installed ahead of the pumps to prevent further clogging of the pumps, and a potential project will need to be created.

Electrical System
After the lift station upgrade, the backup generator capacity no longer matches the capacity of the utility service and can only support two pumps in service. The backup generator may need to be upgraded to a unit with a higher capacity if it is determined that it is necessary to accommodate a scenario where all three lift pumps are in operation.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1978 2014	
Electrical System	1978 2014	
Potable Water System	1978	
Instrumentation and Control System	1978 2014	

Table 4 Potential Projects

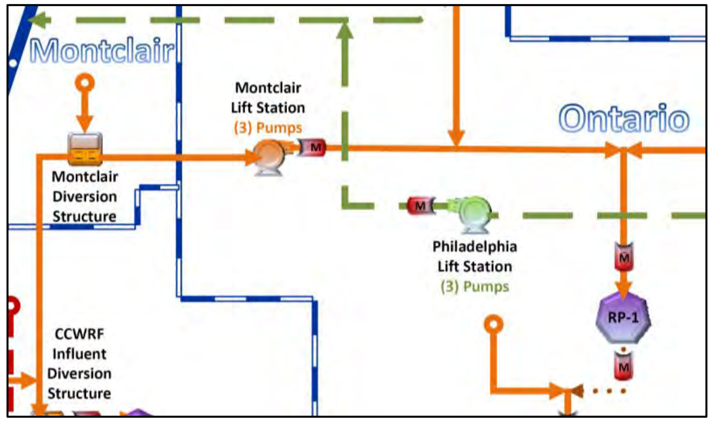
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – LS

Philadelphia Lift Station

1. Asset Profile



Pump System
The Philadelphia lift station conveys non-reclaimable waste (NRW) That is collected from the northern half of the Agency service area to Los Angeles County. The lift station includes three pumps: two of which are variable speed and one that is constant speed. Flows are conveyed through two parallel force mains that are about 2.6 miles long, with a total head increase of about 110 feet.

In case of emergency and to accommodate maintenance and construction activity, an engine-driven pump is also available. The pump connections are located outdoors, and the pump can be trailered away off-site when it is not needed.

Electrical System
The electrical energy to power the treatment facility is obtained from the local electrical grid (SCE). The electrical feed from the grid is 480 V. A single line diagram of the electrical system is shown in Appendix B.

A diesel emergency generator is used in a power failure. The generator is located in the pump station and supplies power to all the pump station systems.

Utility Water System
Utility water is used for pump seal water. The water is delivered by the 1050 zone recycled water pipeline in Philadelphia Avenue.

Potable Water System
Potable water is supplied to the lift station for the restroom. Potable water can also be used as a backup for pump seal water in a recycled-water outage. The potable and recycled water is isolated by use of a removable pipe spool to prevent cross connections.

Instrumentation and Control System
The lift station is fully automated and monitored. Wet well level, force main discharge pressures, force main flows, and pump speeds are all controlled and monitored by a PLC. The lift station can also be monitored and controlled remotely.

Chemical Injection System
The lift station includes storage and injection systems for ferric chloride. The chemical can be injected to both force mains. Ferric chloride is used to control sulfides in the sewer system, reducing the effects of corrosion and odors. The injection pumps are started and stopped automatically.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Philadelphia Lift Station	5.2 MGD	
Pump System		
Pipelines	12-inch 1,150 gpm 18-inch 2,800 gpm	
Pump Station	3 @ 1,800 gpm 100 hp	
Wet Well	80,000 Gallons	
Emergency Lagoon	1 @ 5 MG unlined	
Valves	13 units	
Electrical System		
Utility Voltage	480 V	
Switchgear	480 V	
Distribution	480 V	
Generator	1 @ 250 kW 335 Bhp	
Mounted Lighting	19 units	
Utility Water System		
Pipelines	< 2 in. diameter	
Valves	1 units	
Potable Water System		
Backflow Devices	1 units	
Valves	3 units	
Instrumentation and Control System		
HMI Workstation	1 units	
PLC	1 units	
I/O Hub	1 units	
Radio Transmitter	1 units	
Chemical Injection		
Chemical Pumps	2 units	Diaphragm
Storage Tank	1 @ 13,000 Gallons	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Force Mains	4	4	4	4
Electrical System	3	3	3	3
Utility Water System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3
Chemical Injection	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Pump System
No issues require special attention.

Force Mains
The condition of the 12-inch and 18-inch force mains has not been inspected for the entire length of pipe. Both force mains are approaching 50 years in age and approaching the end of its service life. A potential project is required to replace the force mains, as well as provide inspection manholes for future condition assessment.

Electrical System
No issues require special attention.

Utility Water System
No issues require special attention.

Instrumentation and Control System
No issues require special attention.

Chemical Injection
No issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1968	2013
Electrical System	1968 2007	
Utility Water System	2011	
Potable Water System	1968	
Instrumentation and Control System	2007	
Chemical Injection	1993	

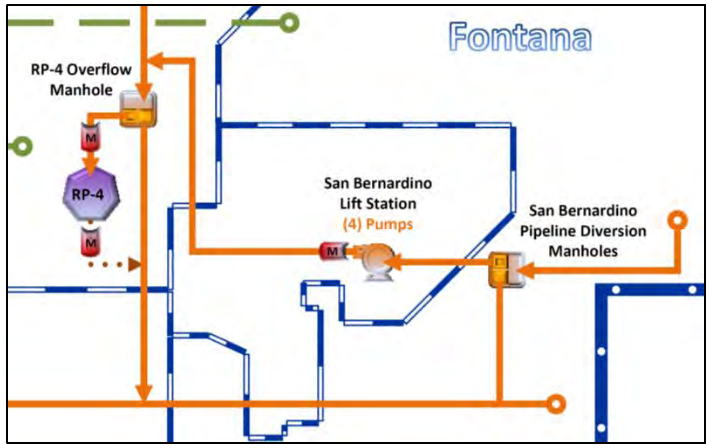
Table 4 Potential Projects

System	Project Name	Project Description
Force Mains	Philadelphia Lift Station Force Main improvements	Replace the force mains, as well as provide inspection manholes for future condition assessment

System Summary Continued on Next Page

Asset Management System Summary – LS
San Bernardino Avenue Lift Station

1. Asset Profile



Pump System
The San Bernardino Avenue lift station conveys flows from the Fontana area to Regional Plant No. 4. The flows are lifted about 60 feet through about 1.4 miles of force main. To maintain acceptable flow velocities, two force mains of different diameters were provided. Four vertical-turbine pumps are provided with provisions for a future pump to be added to the wet well.

Electrical System
The electrical energy to power the lift station is obtained from the local electrical grid (SCE) and from onsite energy generation (emergency generator). The electrical feed from the grid is composed of a 12 kV feeder to a transformer and switchgear to distribute electrical energy throughout the facility. A single line diagram of the electrical system is shown in Appendix B.

A diesel emergency generator is used in a power failure. The generator is located adjacent to the electrical room for the lift station.

Potable Water System
Potable water is supplied to the site to be used as seal water for the lift pumps. The water is supplied to a storage tank by an air gap, and the tank in turn supplies the seal-water pump system.

Instrumentation and Control System
The lift station includes enough instrumentation and a PLC to allow for full control of the lift station remotely. The PLC and I/O include full redundancy for added reliability.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
San Bernardino Lift Station	7 MGD	
Pump System Pipelines Pump Station Valves Seal Water Tank Seal Water Pumps	 30-inch 5,902 gpm 24-inch 13,890 gpm 2 @ 3,300 gpm 50 hp 2 @ 6,945 gpm 125 hp 7 units 1 @ 2,900 Gal. 1 @ 50 Gal. 2 Ea.	 Secondary Primary
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 480 V 480 V 1 @ 500 kW 757 Bhp 19 units	
Potable Water System Backflow Devices Valves	 1 units 2 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub	 1 Ea. 2 Ea. 2 Ea. 2 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Electrical System	3	3	3	3
Potable Water System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Pump System
Currently no issues require special attention.

Electrical System
Currently no issues require special attention.

Potable Water System
Currently no issues require special attention.

Instrumentation and Control System
Currently no issues require special attention.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	2007	
Electrical System	2007	
Potable Water System	2007 2013	
Instrumentation and Control System	2007 2012	

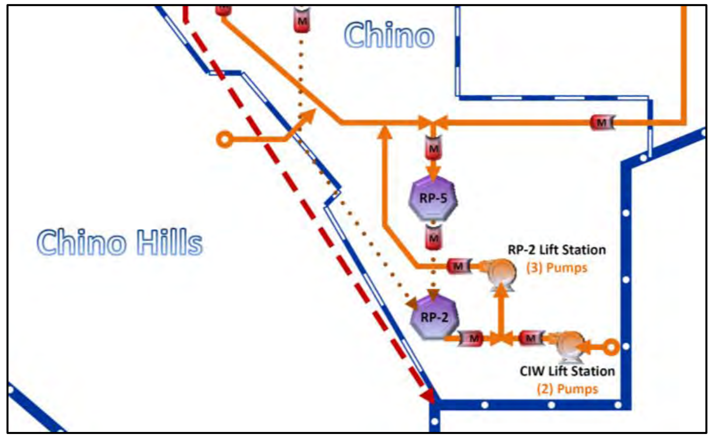
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Regional Plant No.2 (RP-2) Lift Station

1. Asset Profile



Pump System
The RP-2 lift station collects raw sewage from the Mountain Avenue interceptor, CIW sewer, Butterfield force main, and the recycle flows from the solids treatment facilities at RP-2, and discharges through a 24-inch pipeline to the RP-5 headworks. The lift station is located on the RP-2 treatment plant site.

Electrical System
The electrical energy to power the lift station is fed from the RP-2 treatment plant distribution system. A separate backup generator for the lift station has been provided if utility power or the RP-2 distribution systems fail.

Instrumentation and Control System
The lift station includes instrumentation and automation to allow full remote control of the facility.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
RP-2 Lift Station	9.5 MGD	
Pump System Pipelines Pump Station Valves	 24-inch 6,600 gpm 3 @ 3,300 gpm 100 hp 6 units	
Electrical System Utility Voltage Transformers Switchgear Distribution Generator Mounted Lighting	 12 kV 12 kV to 480 V 480 V 480 V 1 @ 300 kW 443 Bhp > 2 units	
Instrumentation and Control System HMI Workstation RTU PLC I/O Hub	 1 Ea. 1 Ea. 1 Ea. 1 Ea.	
Yard Piping	See Appendix C	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	3	3	3	3
Electrical System	3	3	3	3
Instrumentation and Control System	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Pump System
Due to the location and elevation of the RP-2 Lift Station, it will need to be relocated when the RP-5 Solids Treatment Facility is constructed to replace the RP-2 Solids Treatment Facility. The new lift station will be addressed by project EN19006.

Electrical System
Currently no issues require special attention.

Instrumentation and Control System
Currently no issues require investigation.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	2000	
Electrical System	2000	
Instrumentation and Control System	2000	

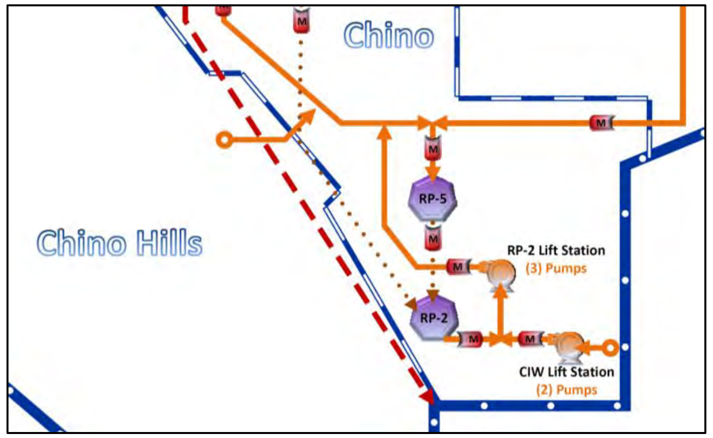
Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – LS
Chino Institute for Woman (CIW)

1. Asset Profile



Pump System
The CIW (or Prado) lift station serves the Chino Institute for Women Correctional Facility as well as Prado Park. The lift station consists of a small circular wet well with two submersible chopper pumps and a sewage grinder.

The area surrounding the CIW lift station has recently undergone development. The area, known as the Preserve, is currently bypassing sewage to the Inland Empire Brine Line and conveying it to Orange County. The City of Chino is designing and will construct a new lift station to convey the Preserve area flows to RP-5. The new lift station will also handle the flows lifted by the CIW, and the CIW lift station will be abandoned. The City of Chino will own the new lift station and reimburse the Agency for the operation and maintenance of the facility.

Instrumentation and Control System
The lift station is provided with local controls only. A control panel is tied to float switches and a sonic level transmitter to locally start and stop the pumps.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
CIW Lift Station	1 MGD	
Pump System Pipelines Pump Station Sewage Grinder	 8-inch 1,300 gpm 2 @ 650gpm 30 hp 1 Ea.	
Electrical System Utility Voltage Transformers Distribution	 4,160 V 4,160 V to 480 V 480 V	
Instrumentation and Control System Control Panel	 1 Ea.	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Pump System	4	4	3	4
Electrical System	4	4	3	4
Instrumentation and Control System	4	4	4	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Pump System
The pump system is undersized and is out of date. The City of Chino plans to replace the pump station to accommodate flows from the recently developed area known as the Preserve. This lift station would be abandoned upon completion of the new lift station and would be operated by IEUA. Project EN13028 will address these issues.

Electrical System
Currently no issues require special attention.

Instrumentation and Control System
The control system allows for only local control and has no alarm capabilities.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Pump System	1976 1993	
Electrical System	1976 1993	
Instrumentation and Control System	1976 1993	

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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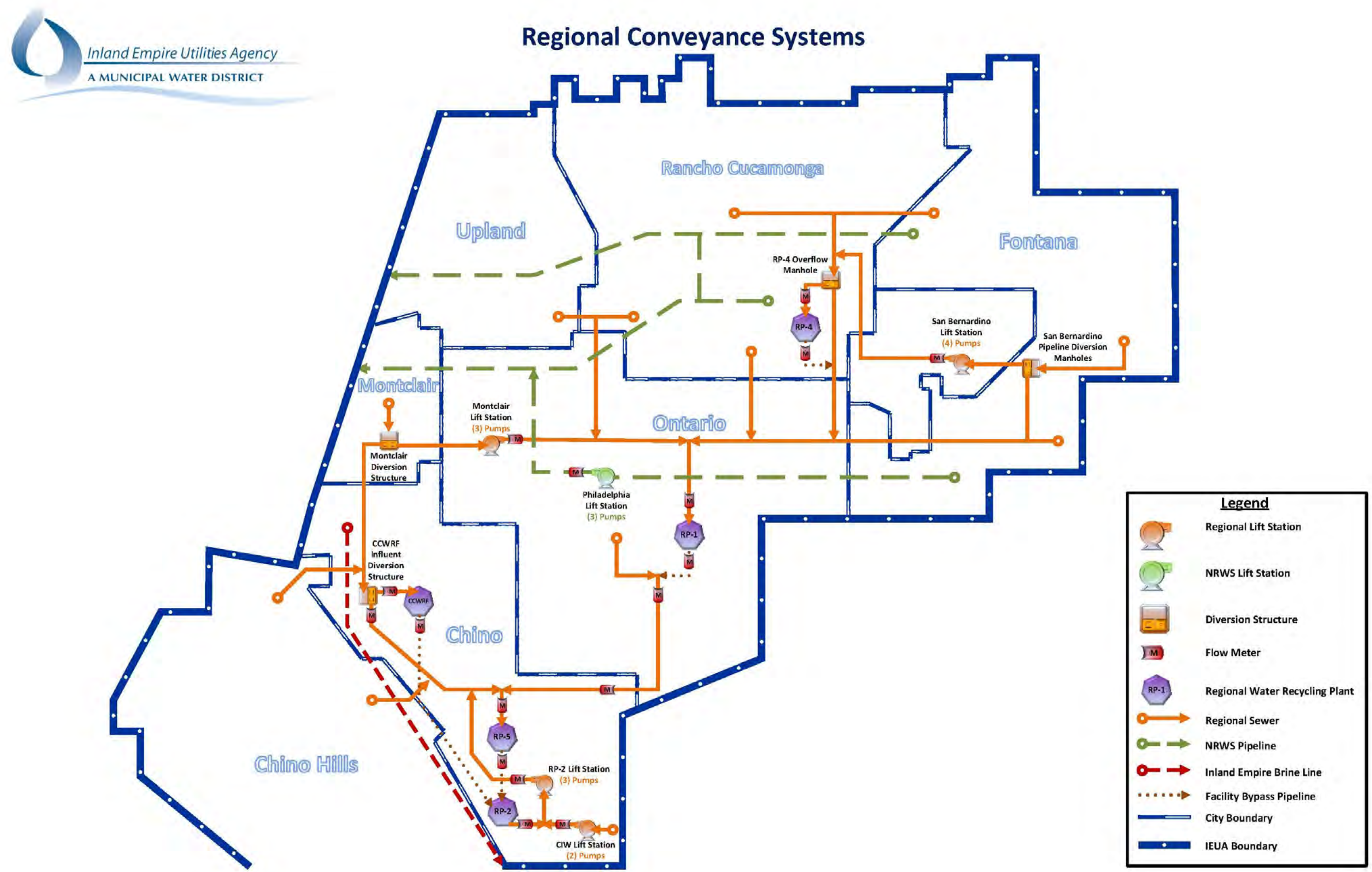

Figure 7-9: Regional Conveyance System (RC) – Schematic

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Table 7-10: Regional Conveyance System – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN13018	Montclair Diversion Structure Rehabilitation	The project entails retrofitting the diversion structure and overcome safety issues.	RC	OM	850,000	0	0	0	0	0	0	0	0	0	850,000
2	EN15045	Collection System Manhole Upgrades FY 15/16	Repair and replace a total of twenty-two (22) sewer collection system manhole frames and covers.	RC	RP	500,000	0	0	0	0	0	0	0	0	0	500,000
3	EN15046	NRW Manhole Upgrades FY 15/16	Repair eight (8) NRW collection system manholes.	NC	CC	350,000	0	0	0	0	0	0	0	0	0	350,000
4	TBD	NRWS Manhole Upgrades	Repair NRW Manholes and lines as determined by Maintenance.	NC	RP	0	350,000	200,000	1,500,000	200,000	200,000	200,000	200,000	200,000	1,500,000	4,550,000
5	EN22002	NRW East End Flowmeter Replacement	Flowmeter replacement required by NRWS Agreement.	NC	RP	0	0	0	0	0	0	0	45,000	255,000	0	300,000
6	TBD	Collection System Upgrades	Repair and replace sewer collection system manhole frames and covers.	RC	RP	0	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	500,000	4,500,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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Asset Management System Summary – RC

Northern Regional Sewer System

1. Asset Profile

The Agency's regional wastewater treatment provides domestic and industrial disposal systems across a 242-square-mile service area to eight contracting agencies. These contracting agencies include the City of Chino, Chino Hills, Cucamonga Valley Water District, Fontana, Montclair, Ontario, Upland, and Monte Vista Water District.

The Regional Sewer System (RSS) conveys primarily domestic wastewater to IEUA's four regional water recycling facilities. The RSS has been separated into two systems and will be referred to in the system summary sheets as the Northern Regional Sewer System and Southern Regional Sewer System. The operation and maintenance of the RSS systems are the responsibility of the IEUA's Pretreatment and Source Control (PT&SC) Department's Collections System Group.

Northern Regional Sewer System

The Northern Regional Sewer System consists of sewer pipelines north of the 60 freeway terminating into RP-1.

Gravity Sewer System:

- Archibald Trunk – 18,776 LF of pipeline from Archibald Ave. and Inland Empire Blvd. to Haven Ave. and Francis St, consisting of 742 LF of 54-inch piping, 2,549 LF of 36-inch piping, 5,000 LF of 30-inch piping, 1,707 LF of 24-inch piping, 917 LF of 20-inch piping, and 7,860 LF of 18-inch piping.
- Cucamonga Interceptor Relief – 10,043 LF of RCP pipeline from Haven Ave. to RP-1 on Cedar Ave, consisting of 786 LF of 81-inch piping, 7,203 LF of 72-inch piping, 843 LF of 60-inch piping, and 1,210 LF of 54-inch piping.
- Cucamonga Interceptor – 11,382 LF of RCP pipeline from Haven Ave. to RP-1 on Cedar Ave, consisting of 208 LF of 84-inch piping, 1,310 LF of 72-inch piping, 8,255 LF of 42-inch piping, and 1,609 LF of 27-inch piping.
- Cucamonga Trunk Relief - 12,398 LF of RCP pipeline from 10 Fwy. to Francis St. on Hermosa Ave and Haven Ave.
- Etiwanda Trunk – 29,542 LF of VCP pipeline from Eastend Ave. to Jurupa Ave. on Etiwanda Ave, consisting of 3,596 LF of 42-inch piping, 4,882 LF of 36-inch piping, 2,056 LF of 30-inch piping, 3,049 LF of 27-inch piping, 12,157 LF of 24-inch piping, 1,761 LF of 21-inch piping, 968 LF of 15-inch piping, and 2042 LF of 12-inch piping.
- Fontana Interceptor – 40,691 LF: 33,128 LF of pipeline from Live Oak Ave. to Haven Ave. on Marlay St. and Francis St., consisting of 5,396 LF of 39-inch piping, 7,657 LF of 36-inch piping, 13,138 LF of 33-inch piping, 4,915 LF of 21-inch piping, and 393 LF of 18-inch piping.
- Fontana Interceptor Relief – 36,119 LF of pipeline from Beech Ave. to Milliken Ave on Jurupa Ave, consisting of 5,187 LF of 78-inch piping, 508 LF of 72-inch piping, 12,105 LF of 66-inch piping, 3,925 LF of 54-inch piping, 1,804 LF of 48-inch piping, 977 LF of 42-inch piping, 260 LF of 36-inch piping, 5,595 LF of 30-inch piping, 2,415 LF of 27-inch piping, 260 LF of 24-inch piping, and 3,080 LF of 21-inch piping.
- Freeway Trunk – 6,076 LF of VCP pipeline along 10 Fwy. from 6th St. to 4th St., consisting of 74 LF of 39-inch piping, 208 LF of 33-inch piping, 2,219 LF of 27-inch piping, 3,169 LF of 18-inch piping, 166 LF of 15-inch piping, and 166 LF of 12-inch piping.
- Grove Avenue Outfall – 22,888 LF of VCP piping from Grove Ave. and 8th St. to Cucamonga Ave. and Mission Ave. to Carlos Ave., consisting of 270 LF of 42-inch piping, 8,917 LF of 36-inch piping, 8,060 LF of 30-inch piping, 1,395 LF of 27-inch piping, 236 LF of 24-inch, 689 LF of 21-inch, and 3,318 LF of 18-inch piping.
- Grove Interceptor – 4,042 LF: 3,964 LF of VCP pipeline from 8th St. to 5th St. on Grove Ave, consisting of 465 LF of 36-inch piping and 3,508 LF of 30-inch piping.
- Montclair Interceptor – 41,197 LF: 37,432 LF of VCP pipeline from Roswell Ave. and Grand Ave. to RP-1 on Philadelphia St., consisting of 720 LF of 67-inch piping, 1,510 LF of 60-inch piping, 31,349 LF of 30-inch piping, 494 LF of 27-inch, 392 LF of 24-inch, 2,658 LF of 21-inch and 308 LF of 12-inch piping.
- Turner Trunk – 2,562 LF of 24-inch VCP pipeline from 4th St. to 10 Fwy. on Turner St.
- Upland Interceptor – 10,870 LF of 30-inch VCP pipeline from Imperial Ave. and Mission Ave. to Carlos Ave. and Philadelphia Ave.
- Upland Interceptor Relief – 19,623 LF of VCP pipeline from 4th St. to Mission Ave. on Imperial St, consisting of 2,525 Lf of 36-inch piping, 2,325 LF of 30-inch, 1,205 LF of 27-inch, 749 LF of 24-inch, 7,422 LF of 21-inch, 3,295 LF of 18-inch, and 2,044 LF of 15-inch piping.

Force Main System:

- Montclair Lift Force Main – 4,366 LF of ductile iron pipeline from Montclair Lift Station to Euclid Ave.
- San Bernardino Lift Force Main

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Archibald Trunk	54-inch – 62 MGD 36-inch – 18.1 MGD 30-inch – 21.5 MGD 24-inch – 11.9 MGD 20-inch – 8.3 MGD 18-inch – 7.4 MGD	3.1 ft/s 2.9 ft/s 2.0 ft/s 2.3 ft/s 6.0 ft/s 6.0 ft/s
Cucamonga Interceptor Relief	81-inch – 254 MGD 72-inch – 105 MGD 60-inch – 214 MGD 54-inch – 71.8 MGD	6.2 ft/s 4.0 ft/s 6.0 ft/s 5.6 ft/s
Cucamonga Interceptor	84-inch – 238 MGD 72-inch – 158 MGD 42-inch – 21.2 MGD 27-inch – 15.3 MGD	6.0 ft/s 5.6 ft/s 2.0 ft/s 6.0 ft/s
Cucamonga Trunk Relief	39-inch – 29.5 MGD 36-inch – 34.6 MGD 33-inch – 34.0 MGD 30-inch – 29.9 MGD 27-inch – 30.4 MGD 24-inch – 23.4 MGD	4.4 ft/s 5.8 ft/s 6.0 ft/s 5.6 ft/s 6.0 ft/s 5.2 ft/s
Etiwanda Trunk	42-inch – 41 MGD 36-inch – 45 MGD 30-inch – 28 MGD 27-inch – 14 MGD 24-inch – 18 MGD 21-inch – 14 MGD 18-inch – 6 MGD	3.0 ft/s 7.0 ft/s 5.0 ft/s 5.0 ft/s 7.0 ft/s 6.0 ft/s 6.0 ft/s
Fontana Interceptor	39-inch – 15.9 MGD 36-inch – 19.4 MGD 33-inch – 11.1 MGD 21-inch – 10.8 MGD 18-inch – 12.7 MGD	1.7 ft/s 2.1 ft/s
Fontana Interceptor Relief	78-inch – 98.4 MGD 72-inch – 79.8 MGD 66-inch – 83.5 MGD 54-inch – 67.4 MGD 48-inch – 79.5 MGD 42-inch – 18.6 MGD 36-inch – 17.6 MGD 30-inch – 18.3 MGD 27-inch – 23.2 MGD 21-inch – 12.3 MGD	
Freeway Trunk	39-inch – 20.6 MGD 33-inch – 18.4 MGD 27-inch – 23.6 MGD 18-inch – 8.0 MGD 15-inch – 14.7 MGD 12-inch – 8 MGD	
Grove Avenue Outfall	42-inch – 21 MGD 36-inch – 34 MGD 30-inch – 31.8 MGD 27-inch – 29 MGD 24-inch – 23.6 MGD 21-inch – 9.7 MGD 18-inch – 10.4 MGD	
Grove Interceptor	36-inch – 36.9 MGD 30-inch – 42.1 MGD	
Montclair Interceptor	67-inch – 149 MGD 60-inch – 58 MGD 30-inch – 7 MGD 27-inch – 6.7 MGD 24-inch – 9 MGD 21-inch – 8.5 MGD	5.8 ft/s 3.6 ft/s 1.2 ft/s 1.2 ft/s 2.0 ft/s 2.5 ft/s
Turner Trunk	24-inch – 16 MGD	6 ft/s
Upland Interceptor	30-inch – 25.9 MGD	5.5 ft/s
Upland Interceptor Relief	36-inch – 31.6 MGD 30-inch – 31.5 MGD 27-inch – 16.1 MGD 24-inch – 13.1 MGD 21-inch – 15.9 MGD 18-inch – 7.4 MGD 15-inch – 5.2 MGD	5.4 ft/s 7.8 ft/s 5.9 ft/s 5.7 ft/s 7.0 ft/s 3.6 ft/s 4.3 ft/s
Montclair Lift Force Main	18-inch	
San Bernardino Lift Force Main		

3. Asset Ratings *(to be developed in future updates)*

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Archibald Trunk				
Cucamonga Interceptor Relief				
Cucamonga Interceptor				
Cucamonga Relief				
Etiwanda Trunk				
Fontana Interceptor				
Fontana Interceptor Relief				
Freeway Trunk				
Grove Avenue Outfall				
Montclair Interceptor				
Turner Trunk				
Upland Interceptor				
Upland Interceptor Relief				
Montclair Lift Force Main				
San Bernardino Lift Force Main				

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation *(to be developed in future updates)*

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Archibald Trunk	1963	
Cucamonga Interceptor	1973	
Cucamonga Inter. Relief	1987	
Cucamonga Trunk Relief	1983	
Etiwanda Trunk	1986	
Fontana Interceptor		
Fontana Interceptor Relief		
Freeway Trunk	1961	
Grove Avenue Outfall	1961, 2006, 2010	
Grove Interceptor	1961, 2006	
Montclair Interceptor	1975	
Turner Trunk	1969	
Upland Interceptor	1956	
Upland Interceptor Relief	1956, 1991	
Montclair Lift Force Main	1978	
San Bernardino Lift Force Main		

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RC

Southern Regional Sewer System

1. Asset Profile

The Agency's regional wastewater treatment provides domestic and industrial disposal systems across a 242-square-mile service area to eight contracting agencies. These contracting agencies include the City of Chino, Chino Hills, Cucamonga Valley Water District, Fontana, Montclair, Ontario, Upland, and Monte Vista Water District.

The Regional Sewer System (RSS) conveys primarily domestic wastewater to IEUA's four regional water recycling facilities. The RSS has been separated into two systems and will be referred to in the system summary sheets as the Northern Regional Sewer System and Southern Regional Sewer System. The operation and maintenance of the RSS systems are the responsibility of the IEUA's Pretreatment and Source Control (PT&SC) Department's Collections System Group.

Southern Regional Sewer System

The Southern Regional Sewer System consists of sewer pipelines south of the 60 freeway and RP-1.

Gravity Sewer System:

- Chino Interceptor – 16,059 LF of pipeline from CCWRF to RP-5 and RP-2, consisting of 150 LF of 54-inch piping, 1,933 LF of 42-inch piping, 6,212 LF of 30-inch piping, 1,645 LF of 27-inch piping, and 6,118 LF of 24 piping.
- Eastern Trunk Sewer – 29,321 LF of pipeline from RP-1 connecting to the Kimball Interceptor at Hellman Ave., consisting of 41 LF of 81-inch piping, 30 LF of 67-inch piping, 4,964 LF of 48-inch piping, 10,766 LF of 42-inch piping, 2,246 LF of 39-inch piping, 6,387 LF of 36-inch piping, 4,783 LF of 33-inch piping, and 100 LF of 27-inch piping.
- Kimball Interceptor – 18,923 LF of pipeline from RP-5 east to Hellman Ave., consisting of 2,137 LF of 66-inch piping, 4,809 LF of 60-inch piping, 10,889 of 54-inch piping, and 1,087 LF of 48" piping.
- Los Serranos Trunk – 2,807 LF of pipeline from Pomona Rincon Rd. to El Prado Rd. There are 52 LF of 36" piping and 2,755 LF of 30" piping.
- Westside Interceptor – 23,806 LF of pipeline from Walnut Ave. and Eastend Ave. to Chino Ave. along Pipeline and ending in CCWRF, consisting of 1,297 LF of 24" piping, 10,473 LF of 21" piping, 7,391 LF of 18" piping, 2,719 LF of 15" piping, 1358 LF of 12" piping, and 565 LF of 10" piping.
- Westside Interceptor Relief Sewer – 40,715 LF of pipeline from Montclair diversion structure along Eastend Ave. to Chino Ave, Ramona Ave., Eucalyptus Ave., and Monte Vista Ave. to CCWRF, consisting of 2,575 LF of 54" piping, 4,948 LF of 42" piping, 1,623 LF of 36" piping, 8,803 LF of 33" piping, 1,358 LF of 30" piping, 18,300 of 27" piping, 866 LF of 24" piping, 1,773 LF of 21" piping, and 445 LF of 15" piping.
- CIW/Prado Park Lift Force Main
- RP-2 Lift Station Force Main

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Chino Interceptor	54" – 67.0 MGD 42" – 21.0 MGD 30" – 13.0 MGD 27" – 14.3 MGD 24" – 12.0 MGD	6.0 ft/s 1.8 ft/s 2.3 ft/s 3.3 ft/s 4.0 ft/s
Eastern Trunk Sewer	81" – 194 MGD 67" – X MGD 48" – 47 MGD 42" – 60.3 MGD 39" – 18.4 MGD 36" – 61.7 MGD 33" – 28.8 MGD 27" – 78.4 MGD	6.0 ft/s 6.3 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s 6.0 ft/s
Kimball Interceptor	66" – 70.5 MGD 60" – 83.8 MGD 54" – 52.1 MGD 48" – 39.7 MGD	4.7 ft/s 6.3 ft/s 5.2 ft/s 5.6 ft/s
Los Serranos Trunk	36" – 17.9 MGD 30" – 28 MGD	
Westside Interceptor	24" – 7.2 MGD 21" – 7.7 MGD 18" – 5.8 MGD 15" – 4.9 MGD 12" – 1.8 MGD 10" – 2.0 MGD	2.3 ft/s 3.1 ft/s 3.8 ft/s
Westside Interceptor Relief Sewer	54" – 31.9 MGD 42" – 21.7 MGD 36" – 26.6 MGD 33" – 30.2 MGD 30" – 13.6 MGD 27" – 21.0 MGD 24" – 28.2 MGD 21" – 31.6 MGD	2.3 ft/s 2.4 ft/s 3.2 ft/s 4.8 ft/s 2.0 ft/s 3.5 ft/s 6.2 ft/s 2.2 ft/s
CIW/Prado Park Lift		
RP-2 Lift Station Force Main		

3. Asset Ratings *(to be developed in future updates)*

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Chino Interceptor				
Eastern Trunk Sewer				
Kimball Interceptor				
Los Serranos Trunk				
Westside Interceptor				
Westside Interceptor Relief Sewer				
CIW/Prado Park Lift				
RP-2 Lift Station Force Main				

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation *(to be developed in future updates)*

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Chino Interceptor		
Eastern Trunk Sewer		
Kimball Interceptor	1999	
Los Serranos Trunk		
Westside Interceptor		
Westside Interceptor Relief Sewer		
CIW/Prado Park Lift	1964, 1976, 1991, 1998, 2010	
RP-2 Lift Station Force Main		

Table 4 Potential Projects

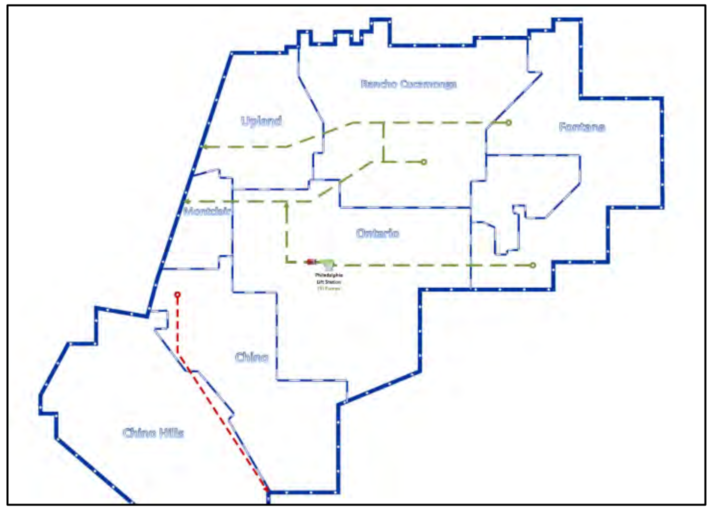
System	Project Name	Project Description
NA	NA	NA

System Summary Continued on Next Page

Asset Management System Summary – RC

Non-Reclaimable Wastewater System

1. Asset Profile



The Agency operates the Non-Reclaimable Wastewater System (NRWS), which provides the disposal means for discharges of high-salt-content industrial wastewater. This wastewater is not suitable to be treated at the Agency's treatment plants. The NRWS transports non-reclaimable, salt-laden, industrial wastewater out of the Agency's service area to other treatment facilities in Los Angeles and Orange counties and to eventual discharge to the Pacific Ocean.

Northern Non-Reclaimable Waste System

- The North NRWS consists of five major trunk lines: the North, Central, and South trunk lines, the Edison Waste Line, and the Cucamonga Creek Trunk. The trunk lines collect industrial waste and convey the combined discharge to the County sanitation districts of Los Angeles County's sewer system.
- North System North Trunk – 22,887 LF of VCP pipeline in Rancho Cucamonga from Day Creek St. and Arrow St. along 8th St. to Hellman Ave.
- North System Center Trunk – 71,343 LF of VCP pipeline starting on Etiwanda Ave. and RP-4 in the City of Ontario running south to Ontario Mills Pkwy., west to Hellman Ave., southwest to Phillips Ave., and west to LACSD.
- North System South Trunk – 65,720 LF of VCP pipeline from Sierra Ave. and Slover Ave. in the City of Fontana to Jurupa Ave., west to Mulberry Ave, south on to Francis St., south on to Etiwanda Ave., and west to Philadelphia Ave to the Philadelphia pump station, where it is connected to the North System Center Trunk by the Philadelphia lift station force main.
- Edison Waste Line – 33,757 LF VCP of pipeline starting from Helms Ave. and 9th St. in Rancho Cucamonga, running south on Hellman Ave., and turning southwest to 5th Ave. in the City of Ontario, and running west along 5th St. to LACSD pipelines.
- Cucamonga Creek Trunk – 8,659 LF VCP of pipeline connecting the Edison Waste Line to the North System Center Trunk along Hellman Ave.
- Philadelphia Lift Force Main – 26,452 LF of two parallel force mains 12-inch and 18-inch VCP pipeline from the Philadelphia Pump Station west on Philadelphia Ave. and north on Bon View Ave. to the North System Center Trunk.

Southern Non-Reclaimable Waste System

The South NRWS serves industries in the south service area of the Agency, and the combined discharge is conveyed to Inland Empire Brine Line (IEBL) and ultimately to the sewer system of the Orange County Sanitation District.

Inland Empire Brine Line – 25,948 LF VCP and RCP of pipeline from Yorba Ave. and Edison Ave. to Monte Vista Ave., with a connection at CCWRF along Chino Creek to El Prado Rd. at Kimball Ave., extending southeast to Euclid Ave. and ultimately to OCSD. There are 15-inch VCP pipelines on Edison Ave., 15-inch VCP on Yorba Ave., 12-inch VCP on Monte Vista St., 27-inch RCP Central Ave/Easement, and 27-inch RCP along El Prado Rd.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
North System North Trunk		
North System Center Trunk		
North System South Trunk	24-inch VCP 8-inch VCP	
Edison Waste Line		
Cucamonga Creek Trunk		
Philadelphia Lift Force Main	18-inch 12-inch	
Inland Empire Brine Line		

3. Asset Ratings *(to be developed in future updates)*

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
North System North Trunk	3	2	2	2
North System Center Trunk				
North System South Trunk				
Edison Waste Line				
Cucamonga Creek Trunk				
Philadelphia Lift Force Main	2	2	2	2
Inland Empire Brine Line	3	3	3	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation *(to be developed in future updates)*

Inland Empire Brine Line

According to the 2006 PBS&J condition assessment report of the IEBL line, 1/3 of the entire pipeline required rehabilitation/replacement, and 1/3 required re-inspection because of inaccessibility. The segments recommended for attention require considerable cleaning to remove debris, which has accumulated within the pipes and may contain hazardous constituents. Inspections were severely hampered by the debris accumulation. Additional inspection for many of the segments is recommended after the cleaning is complete.

Several manholes were found to be surcharged, while the manholes located at the southern-most end of the trunk sewer were inaccessible because of pressure lids.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
North System North Trunk		2006
North System Center Trunk		2006
North System South Trunk		2006
Edison Waste Line		2006
Cucamonga Creek Trunk		2006
Philadelphia Lift Force Main		2006
Inland Empire Brine Line		2006

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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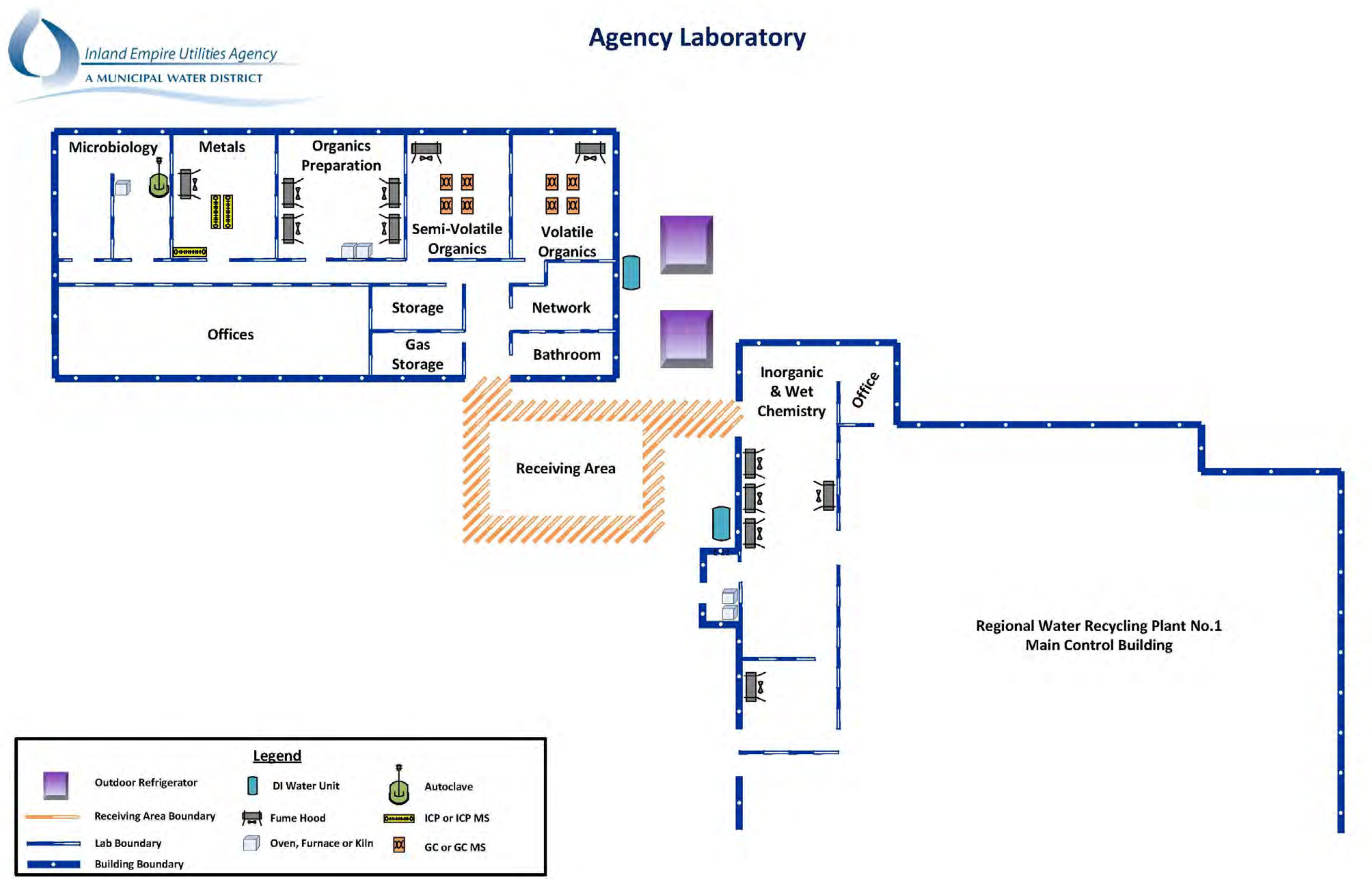

Figure 7-10: Agency Laboratory (Lab) – Schematic

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Table 7-11: Agency Laboratory – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN15008	New Water Quality Laboratory	This project will replace the existing operation laboratory at RP-1. A possible site location will be south of Headquarters at RP-5.	RO	CC	1,530,000	5,950,000	5,950,000	4,250,000	85,000	0	0	0	0	0	17,765,000
2	EN15008	New Water Quality Laboratory (Equipment)	This project will replace the existing operation laboratory at RP-1. A possible site location will be south of Headquarters at RP-5. (Note: new lab equipment LCMS, GCMS, fume hood, Low level Hex. Chromium, perchlorate), additional receiving area for efficiency and chemical storage)	RC	CC	270,000	1,050,000	1,050,000	750,000	15,000	0	0	0	0	0	3,135,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014

(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)

(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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Asset Management System Summary – Lab

Agency Laboratory

1. Asset Profile

Agency Laboratory (Lab)
The Agency Laboratory (Lab) is located at Regional Water Recycling Plant No.1 in Ontario. The Lab is certified by the California Department of Public Health Environmental Laboratory Accreditation Program (ELAP) to perform 12 fields of testing and 35 specific approved methods. The lab was constructed in two phases: Phase 1 included a 1,900-square-foot laboratory space, and Phase 2 included a 4,300 square-foot-building. The Lab performs more than 80,000 analyses annually and sends out another 5,000 samples for analysis by a contracted laboratory. The Lab is broken into three groups: Wet Chemistry, Metals & Organic Chemistry, and Bioassay & Microbiology. The Lab analyzes samples from the Agency's wastewater plants, pretreatment and source control programs, desalination facility, and ground water recharge basins.

Metals & Organic Chemistry
The Metals & Organic Chemistry section is located in the expanded Phase 2 building. This type of chemistry uses specialized equipment to analyze a sample extract's makeup. Organic Chemistry specifically analyzes substances containing a carbon molecule. Metals/Inorganic Chemistry specifically analyzes substances that don't contain a carbon molecule. Some common analyses include mercury, metal salts, heavy metals, pesticides, and volatile and semi-volatile organics. Key pieces of equipment used are the Inductively Coupled Plasma Spectrometer (ICP), the ICP Mass Spectrometer (ICP MS), the Gas Chromatograph (GC), and GC Mass Spectrometer (GC MS).

Inorganic & Wet Chemistry
The Inorganic and Wet Chemistry section is located in the original Phase 1 building. This type of chemistry includes analyses performed in a liquid phase with beakers, test tubes and solvents. Some common analyses include TOC, BOC, COD, solids (total, dissolved, suspended, and volatile), ammonia, alkalinity, cyanide, and anions.

Microbiology
Microbiology is located in the expanded Phase 2 building. Microbiology is the study of microscopic organisms. Some common analyses include total and fecal coliform and bioassay. Bioassay is a specific scientific experiment that measures the effects of a substance on a living organism (Ceriodaphnia dubia; specie of water flea).

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Average)	Notes
Metals & Organic Chemistry		
Metals:		
Fume Hood	1 @ 100 fpm	Min
ICP	2 @ 157 sample batch	Max
ICP MS	1 unit	
Mercury Analyzer	1 @ 62 sample batch	Max
Auto Block Digester	1 @ 54 sample batch	Max
Peristaltic Pump	2 units	
Organics Preparation:		
Fume Hood	4 @ 100 fpm	Min
Extractor System	3 units; 1 controller	
Kiln	1 @ 450°C	
Oven	1 @ 300°C	
Evaporator	3 @ 300 ml 2 @ 50 or 200 ml	
Dishwasher	2 units	
Semi-Volatile Organics:		
Fume Hood	1 @ 100 fpm	Min
GC	2 @ 25 min per sample	Max
GC MS	2 @ 25 min per sample	Max
Volatile Organics:		
Fume Hood	2 @ 100 fpm	Min
GC	2 units	
Concentrator	2 @ 51 sample batch	Max
Auto Sampler	2 units	
Refrigerator	1 unit	
Gas System:		
Argon	160 liters	
Helium	300 ft^3	
Nitrogen	200 ft^3	
DI Purification	1 unit	
Refrigerator	1 @ 960 ft^3 13 to 41°F	
Inorganic & Wet Chemistry		
Fume Hood	6 @ 100 fpm	Min
Oven	2 @ 180°C 2 @ 104°C	
Furnace	2 @ 550°C	
Incubator	2 @ 20°C	
TOC Analyzer	1 @ 70 sample batch 1 @ 75 sample batch	Max Max
Ion Chromatograph	2 @ 49 sample batch	Max
Colorimeter	1 @ 120 sample batch	Max
Auto Colorimeter	2 unit	
Auto Sampler	2 @ 120 sample batch	Max
Auto Titrator	1 @ 36 sample batch	Max
Nano Pure Filter	1 unit	
Dishwasher	2 units	
Gas System:		
Helium	2 @ 200 ft^3 2 @ 300 ft^3	
Nitrogen	2 @ 300 ft^3	
DI Purification	1 unit	
Refrigerator	1 @ 960 ft^3 13 to 41°F	
Microbiology		
Autoclave	1 @ 35°C 1 @ 120°C	
Incubator	2 @ 35°C	
Water Bath	1 @ 44.5°C	
Oven	2 @ 180°C	
Temp. Control	1 unit	
Nano Pure Filter	1 unit	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Metals & Organic Chemistry	4	4	3	4
Inorganic & Wet Chemistry	4	4	3	4
Microbiology	4	4	3	4

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Metals & Organic Chemistry
The building has ventilation problems and roof leaks. A black dusty and gritty substance covers the counters and expensive lab equipment through all areas. The temperature controls for the building, which are crucial for sensitive lab equipment, fail regularly. The outdoor refrigerator requires routine spare parts, but the structure is sound. Because of constant upgrades of equipment, spare parts become unavailable through the manufacturers. The GC is currently being operated until failure.

The Lab Department will budget for routine replacement of equipment.

Project EN15008 will replace the existing laboratory at RP-1 and replace new lab equipment once the new lab is constructed.

Inorganic & Wet Chemistry
The building has a lack of storage space and problems with roof leaks, and a portion is inadequately protected from weather elements. In addition, there is concern about the effectiveness of the fume hoods. The outdoor refrigerator requires routine spare parts, but the structure is sound (same equipment as above). Because of constant upgrades of equipment, spare parts become unavailable through the manufacturers.

The Lab Department will budget for routine replacement of equipment.

Project EN15008 will replace the existing operation laboratory at RP-1.

Microbiology
Please refer to the Metals & Organic Chemistry discussion under Key Issues related to the building, as Microbiology shares the same building. The autoclave should be replaced every five to ten years; spare parts are used between replacements to ensure continuous operation.

The Lab Department will budget for routine replacement of equipment.

Project EN15008 will replace the existing operation laboratory at RP-1.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Metals & Organic Chemistry	1997	2005
Inorganic & Wet Chemistry	1979	2005
Microbiology	1997	2005

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

Agency Headquarters

Figure 7-11: Agency Headquarters – Schematic

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Table 7-12: Agency Headquarters – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN13012	Magnolia Channel Monitoring & Maintenance	The Mag Channel will need to be weeded of invasive plant species, and maintain natural native habitat per the Habitat Mitigation and Monitoring Plan (HMMP) for the project. A certified biologist needs to oversee the work, monitor the progress and complete quarterly reports which are then submitted to the regulatory agencies for compliance. Water quality monitoring will also be performed to demonstrate project effectiveness and meet conditions of the grant.	RO	OM	10,000	10,000	10,000	0	0	0	0	0			30,000
2	EN14002	CIPO Enhancements	Construction Management tracking software upgrades.	GG	EQ	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	150,000
3	EN21002	Chino Creek Wetlands and Educational Park Upgrades	Grant dependent project to facilitate the education program and increase community involvement the Park needs three ramadas (pavilions) with educational signage, a restroom/storage facility and the construction of a pervious parking lot with additional signage.	RO	CC	0	0	0	0	0	900,000	958,000	0	0	0	1,858,000
4	TBD	HQ Parking Lot	FY15/16-Remove and Replace 26 concrete stalls, remove and replace trees, and install root barriers.	GG	OM	300,000	0	0	0	250,000	0	0	0	250,000		800,000
5	EN15052	Upgrades to Existing P6 Application	Implementation of P6 ERP Portfolio: Which will include a Management Plan, a step by step procedure to implement the EPS Portfolio, assist agency in EPS Portfolio Implementation, train staff in building project schedules, review schedules against baseline; Train Analyst and Supervisor Staff in maintaining ERP system including EPS security levels, and monthly updates of rolled up individual portfolios into a master portfolio and report writing. Create training materials including step by step contractor schedule review procedures. Project will also include 1 x/month 1 hour training sessions for 12 months and a 2 hour claims management workshop.	GG	CC	100,000	0	0	0	0	0	0	0	0	0	100,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

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Asset Management System Summary – HQ

Agency Headquarters and Park

1. Asset Profile

Headquarters

Structures

Two 33,000-square-foot tilt-up-construction single stores contain office space, conference rooms, a board room, and key information system equipment used for agency business functions. Most of the non-wastewater treatment staff uses these two buildings for day-to-day business. The buildings were built to LEED Platinum 2004 certifications by incorporating several eco-friendly sustainable components.

Heating Ventilation and Air Conditioning (HVAC)

The Central Energy Plant serves headquarters buildings A, B, and the RP-5 REEP control room. Each building is air conditioned with a single variable air volume (VAV) air handler with chilled and heated water coils. VAV and VAV with reheat (VAV/R) terminals are pressure independent. Heating is provided by hot water preheat coils in the air handlers and hot water reheat coils in the VAV/R terminals. The REEP control and electrical rooms are air conditioned with constant-volume chilled-water fan coils. There are a total of four chilled water nodes with a connected cooling load of 144.5 tons cooling. Space heating connected load is 590,000 btuh. Hot water is also used for radiant floor heating in the main entrances and locker rooms.

Plumbing

The headquarters facility has traditional plumbing to bathroom fixtures including sinks, showers, toilets, and flushless urinals. Other fixtures include custodian closets and various outdoor hose bibs. Main lines feed hot water from the central plant to the building, where the hot water is used in various heating and cooling aspects of the building. The building is also equipped with a fire suppression system.

Chino Creek Wetlands and Educational Park

The 22-acre park was designed to restore native habitat and natural drainage that feeds into Chino Creek Reach I, showcasing the environmental values of this ecologically rich region of Southern California.

Water Ponds

An aesthetic water feature receives flow from a recycled water service. The ponds hold water and can recirculate for a waterfall feature between the two ponds. The overflow of the ponds flows down a stream to the extended detention basin.

Extended Detention Basin

The detention pond provides initial storage and detention for storm flows. It also serves as a preliminary settling pond for sediments, potentially reducing total suspended solids, and provides the primary storage pool, where flows are conveyed to one of three flow paths: the Surface Flow Wetlands and the Subsurface Flow Wetlands via two stop-log structures. A concrete/rip rap spillway is provided for the 100-year-storm event that would overflow the stop-log structures. The spillway feeds the surface bioswale system.

Surface Wetlands

The Surface Wetlands is a series of several deep water ponds that provide traditional natural system nutrient removal. A combination of emergent vegetation bands and deep and shallow zones provides higher retention time and less hydraulic short-circuiting and supports the microbial processes that result in water quality improvement. The final pond/habitat lake includes dense patches of emergent marsh and open water to provide suitable foraging habitat for water birds. Flow from the habitat lake exits a stop-log structure and flows to the effluent structure.

Subsurface Wetlands

Flow from the detention basin stop-log structure enters three engineered wetland cells. Each cell has a loose pea-gravel soil mixture that supports the root structure of nutrient-removal plant species. The configuration provides high surface area of water flows to the plant root structure for nutrient removal, low potential for hydraulic short-circuiting, and the most potential for highly efficient nutrient removal. Each cell controls the water level via a stop-log structure.

Bioswale

The bioswale system receives overflow from the extended detention basin and directs flow to the effluent structure. The bioswale has several energy-dissipation and soil-stabilization components, including planted willows, mulefat, geotextile soil fabric, rip rap, and a large stabilized tree root bole.

Intermittent Stream

The intermittent stream on the west side of the site conveys infrequent storm flows, providing preliminary water quality treatment, and consists of drier riparian habitats. Upland woodland and grassland areas provide aesthetically pleasing areas for visitors to walk through and picnic, while demonstrating upland habitats historically common in many hillsides and valleys. The effluent flow from this system flows into the effluent structure.

Effluent Structure

The concrete effluent structure receives surface flow from the intermittent-stream and swale system and bioswale system and receives piped flow from the Habitat Lake. The combined flow then flows south to the RP-5 Santa Ana River Outfall, where it follows the existing waterways.

Education

The purposes of the wetlands are to demonstrate natural-water treatment and upland habitats. The Agency encourages educational awareness through interactive trails with informational signage throughout the park, an information center, scheduled tours, the distribution of educational pamphlets and materials, and presentations to local/regional schools The education and informational stations focus on different water and wetlands themes. Station examples include water testing, microscopic pond life viewing, and bird watching. Some stations consist of large obsolete wastewater treatment plant equipment that has been modified and placed in the park to serve as an elevated lookout platform; visual volume references; and shade structure. There is appropriate signage for each station.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Dry Weather Average)	Notes
Headquarters	14 acres	
Structures	2 at 33,000 sq ft ea. 194 Office spaces 11 Conference Rooms 7 kitchens	
HVAC	144.5 cooling tons 590,000 btuh space heating	
Plumbing	35 toilets 12 urinals 33 sinks 9 showers	
Chino Creek Park	22 acres	
Water Ponds	2 pumps @ 350 gpm	
Extended Detention Basin	3.1 acre-ft	Volume
Surface Wetlands	7.3 acre-ft	Volume
Subsurface Wetlands Pea Gravel	3 cells Approx. 170 ft by 40 ft 2.5 ft depth	Each
Bio swale	700 LF	
Intermittent Stream	1300LF	
Effluent Structure	20 ft x 8 ft x 6 ft	Vault
Education Stations Trails	 11 stations 1.7 miles	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
Headquarters				
Structures	4	3	3	3
HVAC	4	3	3	4
Plumbing	3	3	3	3
Chino Creek Park				
Water Ponds	3	3	3	3
Extended Detention Basin	4	3	3	4
Surface Wetlands	3	3	3	3
Subsurface Wetlands	4	3	3	3
Bioswale	2	3	3	3
Intermittent Stream	3	3	3	3
Effluent Structure	2	3	3	3
Education	3	3	4	3

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

Headquarters

Structures

Cracks have been observed on the walls and parking spaces, indicating differential settling of the ground under the headquarters complex. A potential project will evaluate the extent of the settling to address its impacts.

Heating Ventilation and Air Conditioning (HVAC)

The Central Energy Plant has limited backup equipment and is undersized for future expected uses, specifically the future Central Lab project. Since the recent rehab, the Central Plant is still having issues, so a condition assessment is needed to identify potential solutions.

A potential project is needed upgrade controls, add backup equipment and expand process required for future uses.

Plumbing

Last year the fire-suppression-system piping broke, flooding a large portion of the headquarters office space. The failure was caused by excessive corrosion. Maintenance has a project to evaluate the condition of all the piping at the headquarters complex. Recent vandalism and theft has resulted in equipment being stolen from the Agency property.

Chino Creek Wetlands and Educational Park

Extended Detention Basin

Soil erosion has been observed on several slopes of the extended detention basin from storm water runoff. Engineering is working on projects to protect the slopes from further erosion.

Education

The park currently has limited use for school field trips and outreach because of the lack of shaded areas and permanent restroom facilities.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
Headquarters		
Structures	2003	2013
HVAC	2003	Planned 2015
Plumbing	2003	
Chino Creek Park		
Water Ponds	2003	
Extended Detention Basin	2007	
Surface Wetlands	2007	
Subsurface Wetlands	2007	
Bioswale	2007	
Intermittent Stream	2007	
Effluent Structure	2007	
Education	2007	

Table 4 Potential Projects

System	Project Name	Project Description
HQ Structures	HQ Parking Lot	Remove and Replace 26 concrete stalls, remove and replace trees, and install root barriers.
HQ HVAC	Central Energy Plant HVAC	Upgrade controls, add backup equipment and expand process required for future uses
HQ Plumbing	HQ Vandalism and Theft Deterrent Improvements	Provide cages, additional lighting and upgrades to discourage vandalism and theft of the external fixtures at the Agency Headquarters.

End of System Summary

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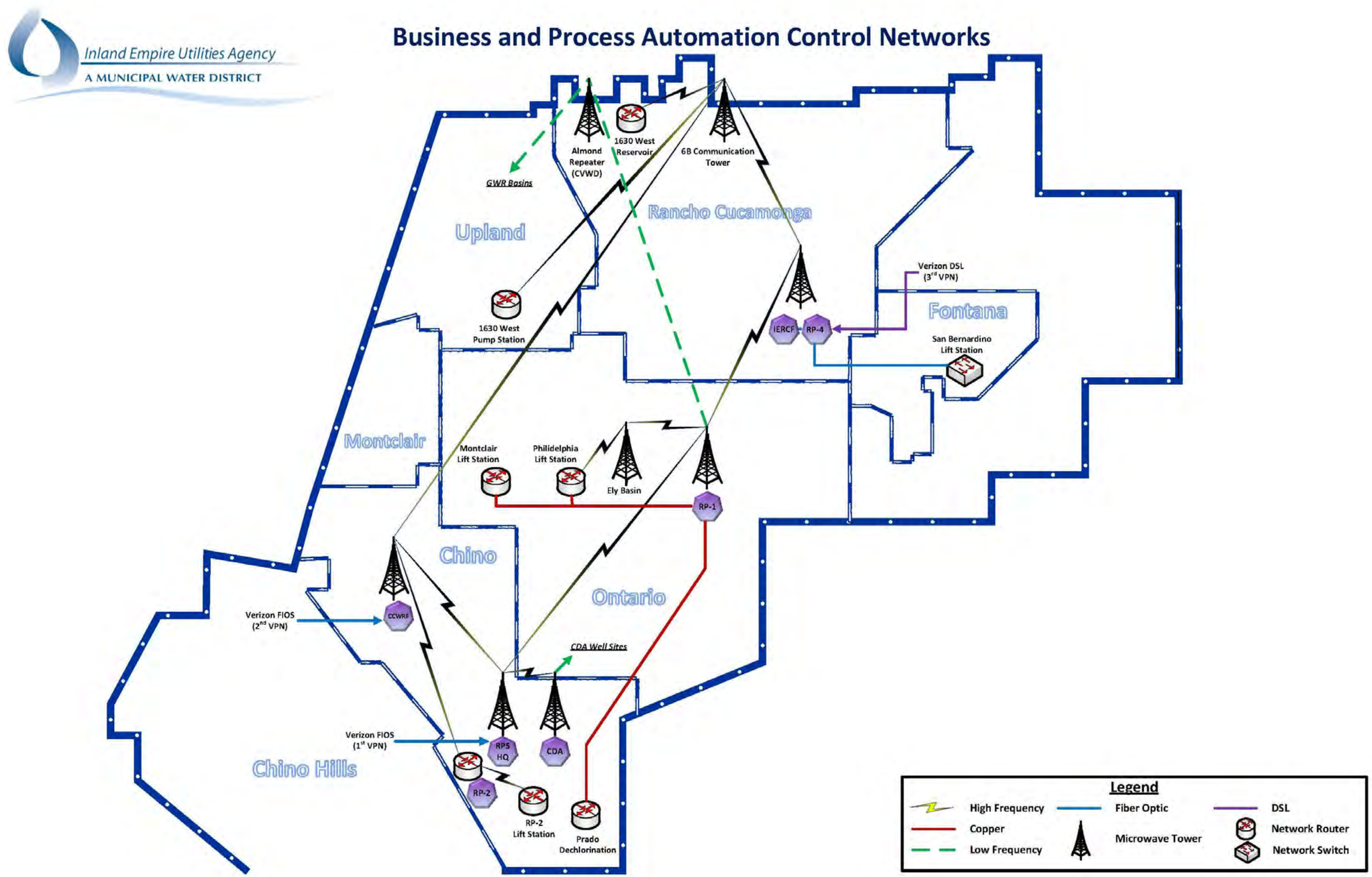

Figure 7-12: Business (BIZ) & Process Automation Control (PAC) Networks – Schematic

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Table 7-13: Business Network and Process Automation Control Network – Project Summary

#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
1	EN13016	SCADA Enterprise System	SCADA Enterprise System. Replacing the DCS over the next five years.	RO	CC	4,200,000	1,000,000	3,000,000	500,000	0	0	0	0	0	0	8,700,000
2	EN13040	Prado Dechlor Communication System	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	WC	CC	181,735	0	0	0	0	0	0	0	0	0	181,735
3	EN13042	Philadelphia Pump Station Communication System	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	NC	CC	200,000	0	0	0	0	0	0	0	0	0	200,000
4	EN13043	Montclair Lift Station Communication System	Installation of a monopole, radios, microwave dishes, communications panel and other equipment to allow the station to effectively communicate with the rest of the IEUA network.	RC	CC	165,000	370,000	0	0	0	0	0	0	0	0	535,000
5	IS15001	HCM Phase 2 HR Process & Automation & ESS/MSS Enhancements	HCM Phase 2 HR Process & Automation & ESS/MSS Enhancements	GG	EQ	50,000	50,000	100,000	0	0	0	0	0	0	0	200,000
6	IS15003	Document Management System - Implementation	Document Management System - Implementation	GG	EQ	250,000	100,000	50,000	0	0	0	0	0	0	0	400,000
7	IS15012	Business Network IT Improvements (TMP)	Annual business network improvements	GG	RP	1,100,000	100,000	100,000	100,000	200,000	200,000	200,000	200,000	200,000	200,000	2,600,000
8	IS15015	PAC- L55 Processor Replacement / Redundancy Modules	Replace ethernet (EN2T) North/South (2 year project)	RO	RP	45,000	0	0	0	0	0	0	0	0	0	45,000
9	IS15020	Process Automation Controls IT Improvements	Annual PAC network improvements.	RO	RP	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	3,000,000
10	IS16001	HCM Phase 2 Position Budgeting & Control	HCM Phase 2 Position Budgeting & Control	GG	EQ	0		206,000	0	0	0	0	0	0	0	206,000
11	IS16003	SAP Archiving	SAP Archiving	GG	EQ	0	0	50,000	0	0	0	0	0	0	0	50,000
12	TBD	SAP User Interface Improvement	Implementation of User Interface (UI) technologies that address the ease-of-use and mobility needs (e.g., FIORI and Persona)	GG	CC	125,000	100,000	0	0	0	0	0	0	0	0	225,000

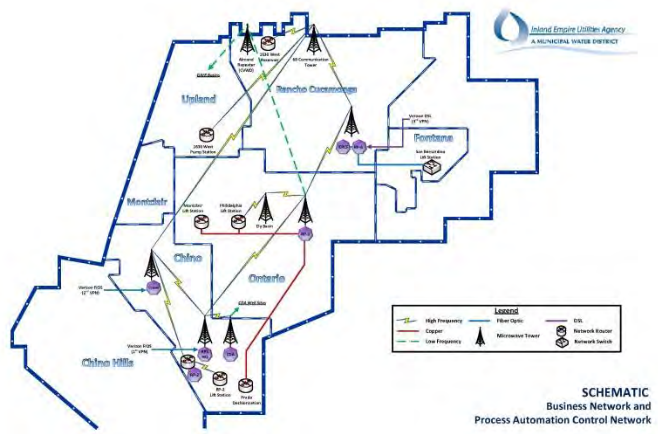
#	Project Number[1]	Project Name	Project Description	Fund[2]	Project Type[3]	Fiscal Year Budget (Dollars)										
						15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	Ten-Year Total
13	TBD	GIS Master Plan (TMP)		GG	OM	0	50,000	0	0	0	0	0	0	0	0	50,000
14	TBD	SAP Strategy and Roadmap (TMP)	For various enterprise systems improvements (SAP HANA in FY19, SAP Cloud in FY18) From TMP	GG	CC	300,000	300,000	300,000	300,000	400,000	250,000	250,000	250,000	250,000	250,000	2,850,000
15	TBD	Conference Rooms AV (Agencywide)	Upgrade the Audio/Video equipment in the conference rooms.	GG	RP	100,000	100,000	100,000	100,000	0	0	0	0	0	0	400,000
16	TBD	IS Improvement Projects (TMP)	Placeholder for SAP projects as identified through TMP process	GG	RP	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	2,000,000

(1) Project Number – from Ten-Year Capital Improvement Project; Final Capital Project List 03-17-2014
(2) Project Fund – Administrative Services (GG), Non-Reclaimed Water (NC), Regional Composting Authority (RM), Ground Water Recharge (RW), Recycled Water (WC), Regional Capital (RC), Regional O&M (RO), or Water Fund (WW)
(3) Project Type – Capital Construction Project (CC), Capital Major Equipment Project (EQ), Operations & Maintenance Project (OM), Reimbursable Project (RE), or Capital Replacement Project (RP)

Asset Management System Summary – BIZ/PAC

Business & Process Automation Control Networks

1. Asset Profile



Business Network
The Business Network (BIZ) is an Agency network that connects local area business networks throughout the Agency together through the use of a wireless Wide Area Network (WAN) and provides access to the internet. Communication within the network is transmitted through cable media and wireless media. The wireless media communication supports the BIZ and Process Automation & Control (PAC) systems. BIZ provides the shared use of business-related resources, such as storage servers, printers, email, and interpersonal communications. The BIZ is composed of servers located at the Headquarters Buildings, RP-1, and RP-5. Network switches connect each networked asset to the BIZ network. There are two sets of assets included in the BIZ: productivity tools and fixed assets.

Process Automation & Control (PAC)
The Process Automation & Control System (PAC) is an Agency network that connects local area process automation networks together through a wireless Wide Area Network (WAN). The communications within the networks are transmitted through cable media and wireless media. A series of microwave transmitting towers creates a loop of wireless communication linking all the facilities. The primary communication towers are located at RP-1, CCWRF, RP-4, RP-5, and the Northwest 6B Tower. Cucamonga Valley Water District's Almond Street Repeater provides communication and control of the ground water recharge basins. Network switches connect PLCs, operator work stations, and other network devices connected to the PAC network. An operator is able to log on the PAC network to control and monitor a facility using the Supervisory Control and Data Acquisition (SCADA) system or Distributed Control System (DCS) system.

The SCADA systems are composed of Rockwell Automation software and Allen Bradley PLCs. The DCS systems use the Foxboro DCS system from Invensys and a combination of Invensys Control Processors and Allen Bradley PLCs. Field output data is transmitted to either a PLC or a centralized control processor, and the SCADA/DCS systems provide a single platform to monitor all the field data, make set point changes, establish/monitor alarm conditions, and control equipment within an entire facility. Field data is also transmitted to a historian, that is, a storage server, to allow trending or analytical analysis in the future.

There are two sets of assets included in the PAC: productivity tools and other fixed assets.

2. Capacity Profile

Table 1 Capacity by System

System Subsystem(s)	Design Capacity (Average)	Notes
BIZ – Productivity Tools		
A/V Equipment	14 units	
Cell Phone	76 units	
Camera	18 units	
Mobile Hot Spot	55 units	
Monitor	660 units	
Printer	125 units	
Scanner	21 units	
Tablet	23 units	
Workstation	300 units	
BIZ – Fixed Assets		
Server		
HyperV	12 units	
Server	50 units	
VMware	11 units	
UPS	4 units	
Network Switch	90 units	
PAC – Productivity Tools		
Tablet	25 units	
Workstation	50 units	
PAC – Fixed Assets		
Microwave		
IEUA	5 units	
CVWD	1 unit	
DCS System	4 units	
SCADA System	4 units	
Server		
HyperV	3 units	
Server	49 units	
VMware	15 units	
UPS	88 units	
Network Switch	120 units	
PLC	250 units	
OIT	140 units	

3. Asset Ratings

Table 2 Asset Ratings

System	Rating Scale* 1 = Excellent; 5 = Poor			
	Condition	Redundancy	Function	Reliability
BIZ – Productivity Tools	3	3	3	3
BIZ – Fixed Assets	3	3	3	3
PAC – Productivity Tools	3	3	3	3
PAC – Fixed Assets	4	4	3	4

* Ratings as defined in Appendix A

4. Key Issues for Further Investigation

BIZ and PAC Networks
Assets are replaced based on product lifecycle. A technology consultant is evaluating the BIZ and PAC networks to analyze potential hardware and software upgrades; Project IS15012.

Equipment replacement lifecycle: PLC (12 years), UPS (10 years), Workstation (4 years), OIT (10 years), server (5 years), I/O (15 years), Printer (10 years), network switches (10 years), and software licenses are typically renewed annually.

BIZ – Productivity Tools
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

BIZ – Fixed Assets
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets.

PAC – Productivity Tools
Maintenance will be budgeted in the Department's budget for routine replacement and rehab of assets.

PAC – Fixed Assets
Maintenance projects related to equipment replacement based on the product's lifecycle will be budgeted in the Department's budget for routine replacement and rehab of assets. Project IS15020 will improve the network annually.

To improve communication new monopoles, radios, and microwaves are being installed under Project EN13040, EN13042, and EN13043.

DCS software and associated hardware need to be updated. Currently the Agency operates two different SCADA systems; it is the Agency's goal to transition to Allen Bradley PLC driven control. Project EN13016 will replace the current DCS system.

Table 3 History of Select Assets

System	Capital Improvement Project Activity	Condition Assessment Report
BIZ – Productivity Tools		
BIZ – Fixed Assets		
PAC – Microwave Towers		
PAC – Fixed Assets		

Table 4 Potential Projects

System	Project Name	Project Description
NA	NA	NA

End of System Summary

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Appendix A: Asset Ratings

Definitions of the ratings for each of the Failure Modes

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Table A-1 Condition Rating

Rating	Description
1	New or Excellent Condition
2	Minor Defects Only
3	Moderate Deterioration (Does not require immediate action)
4	Significant Deterioration
5	Virtually Unserviceable

The rating is intended to show the degree of deterioration to structures and equipment.

Table A-2 Redundancy Rating

Rating	Description
1	High level of redundancy – treatment process is not impacted by multiple units being out of service
2	Significant level of redundancy – treatment process is not impacted by one unit being out of service for an extended period of time
3	Adequate level of redundancy – treatment process is not impacted by one unit being out of service
4	Inadequate level of redundancy – treatment process is negatively impacted by one unit being out of service
5	No redundancy – intended process function cannot be achieved when asset is out of service

The rating is intended to show the impact to the treatment process when the asset in question is out of service.

Table A-3 Function Rating

Rating	Description
1	Exceeds all Functional Requirements
2	Exceeds some Functional Requirements
3	Meets all Functional Requirements
4	Fails some Functional Requirements
5	Fails all Functional Requirements

The rating is the ability for the asset to meet the functional requirements that allow performance targets to be met.

Table A-4 Reliability Rating

Rating	Description
1	Frequency of failure is significantly lower than expected
2	Frequency of failure is lower than expected
3	Frequency of failure is consistent with design expectations
4	Frequency of failure is higher than expected
5	Frequency of failure is significantly higher than expected

The rating is intended to show the tendency for the asset to experience a failure.

Appendix B: Electrical Single Line Diagrams

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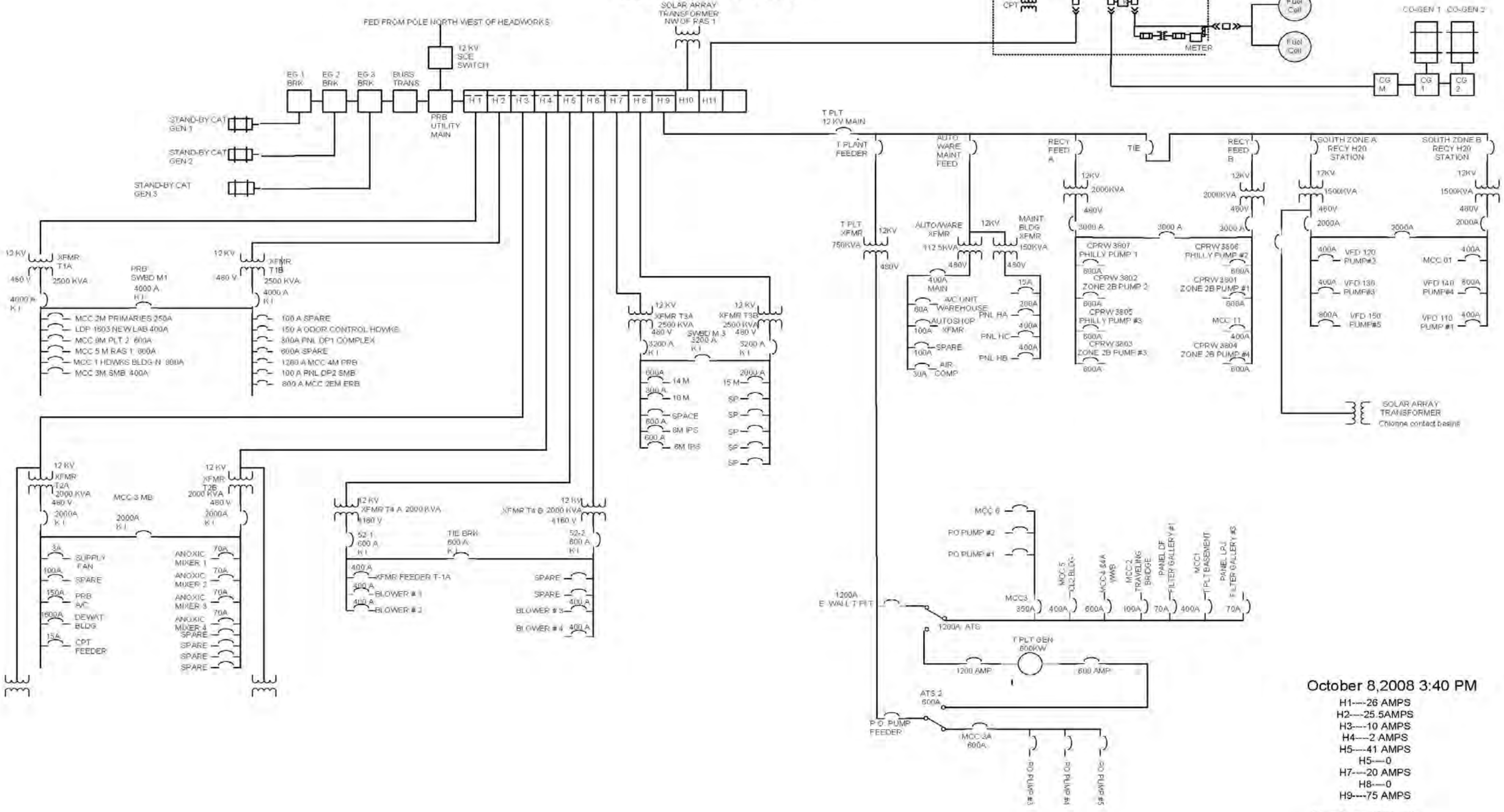
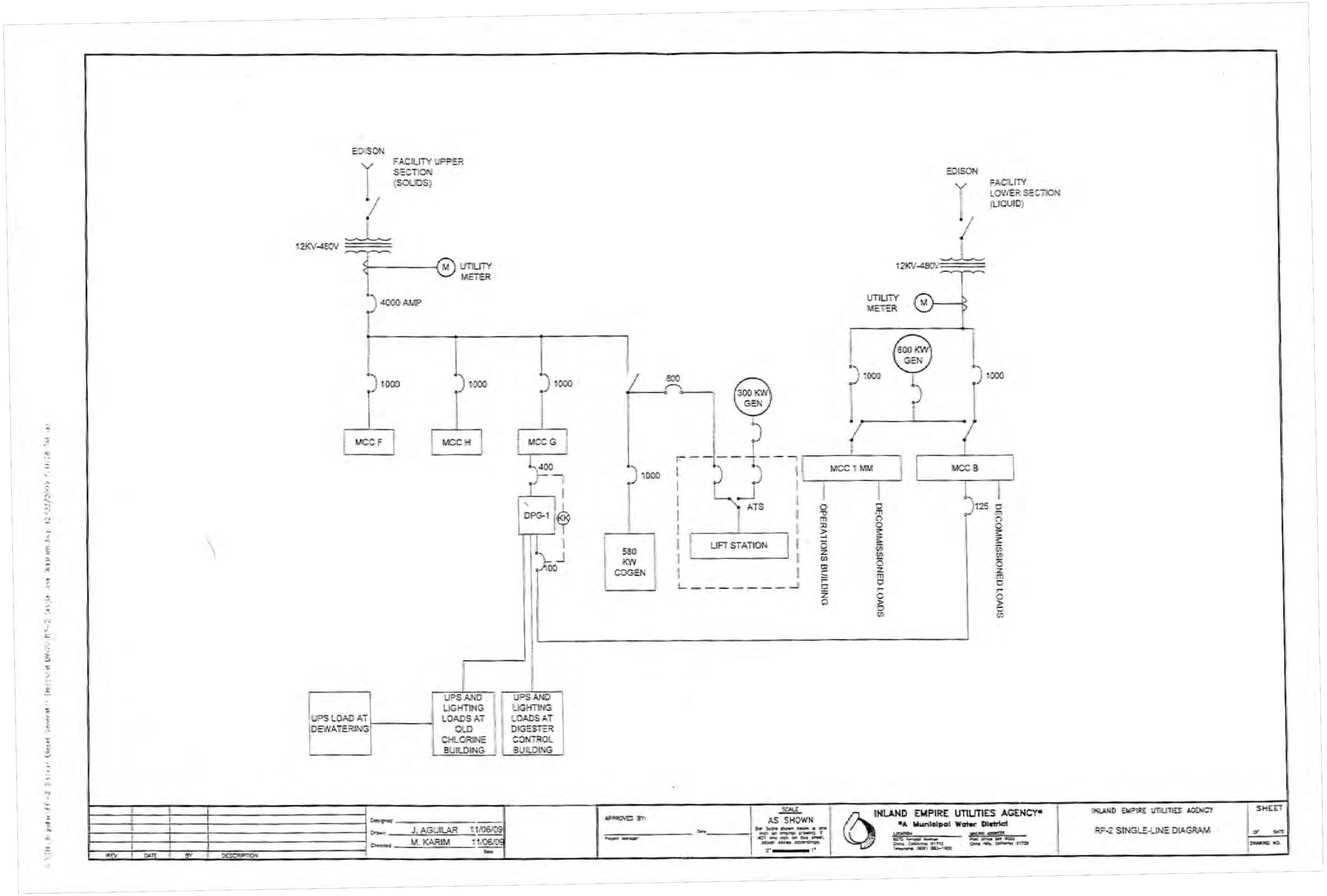
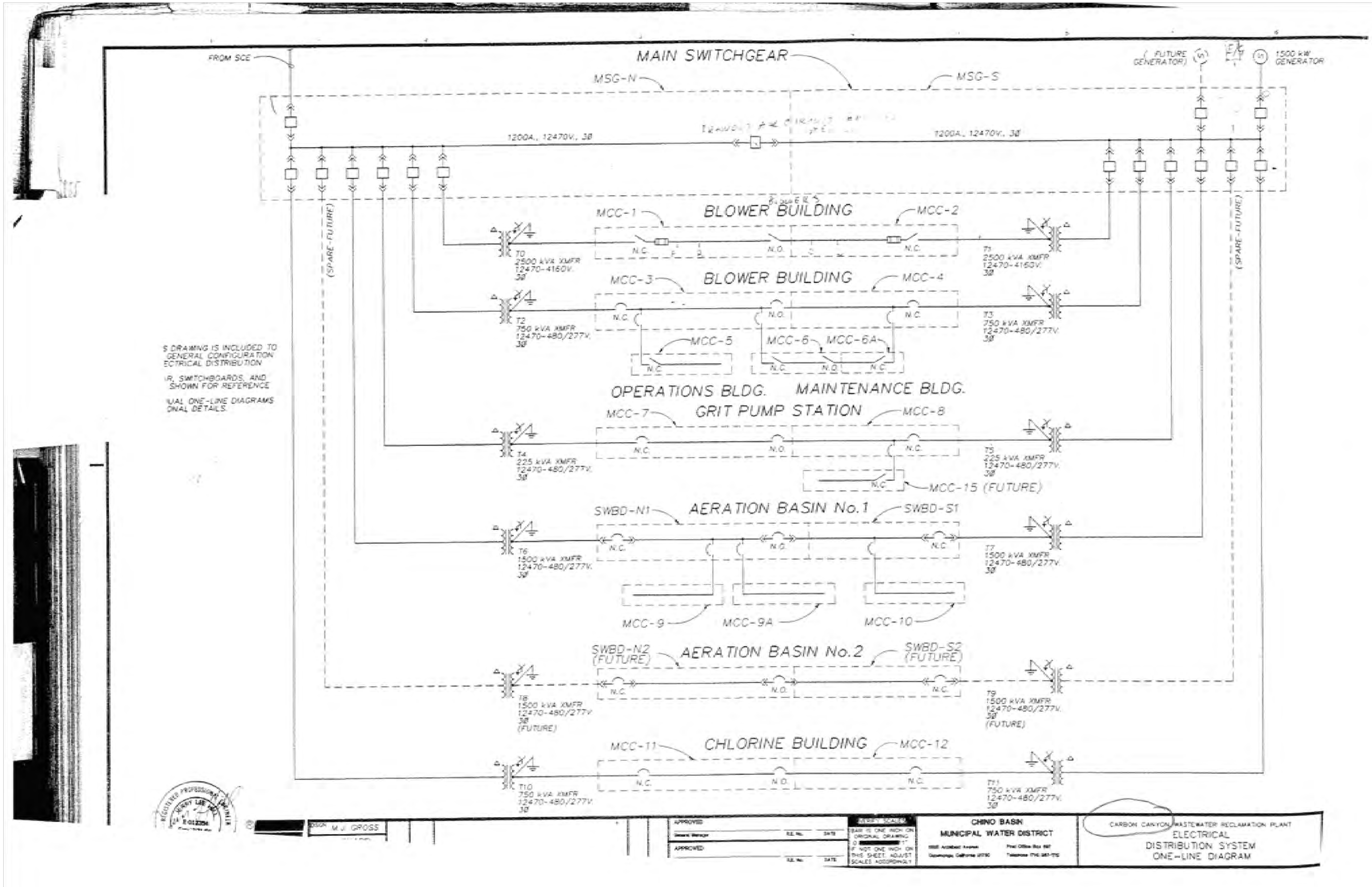
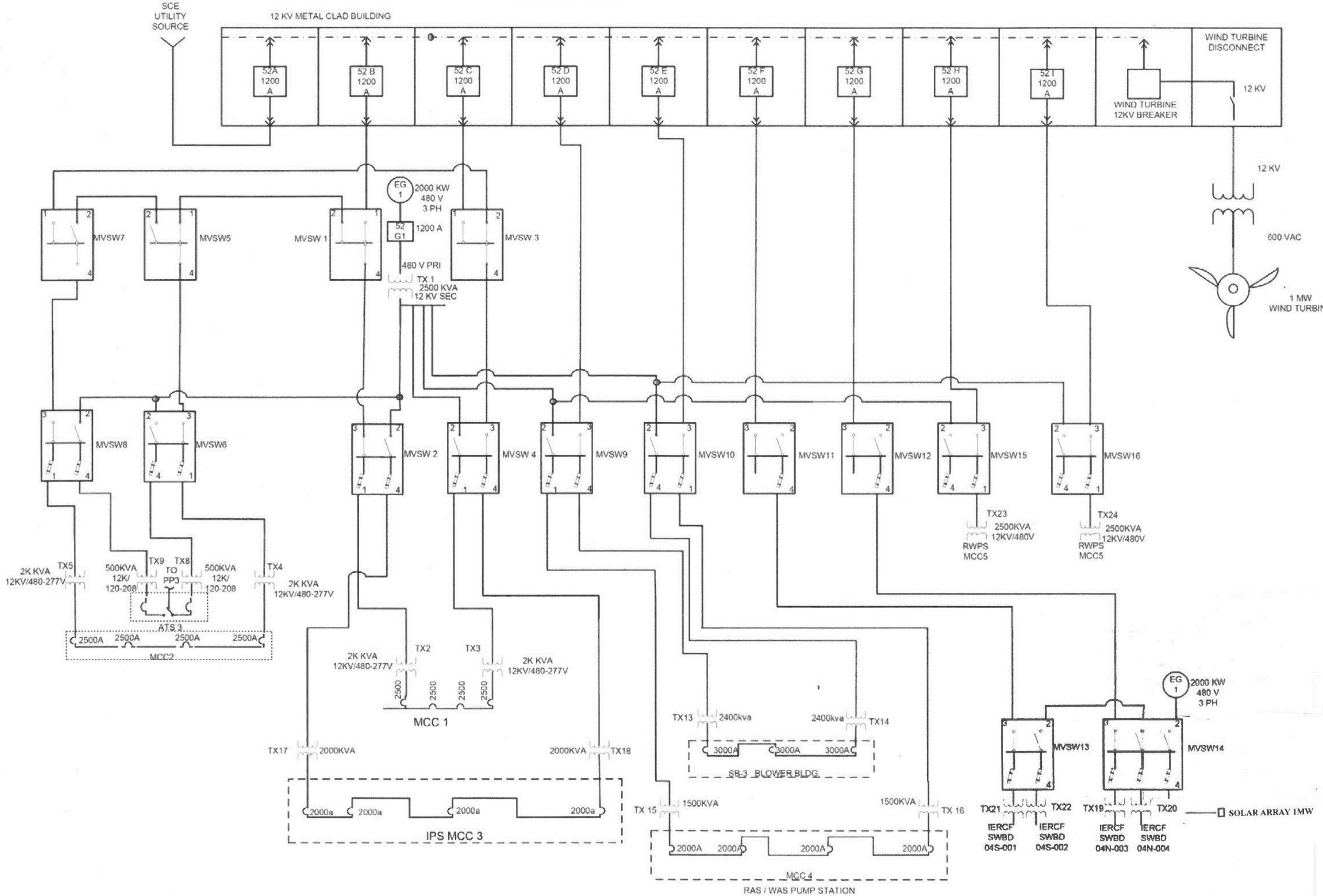
RP 1 PRIMARY FEED LAYOUT AS OF DECEMBER 2012

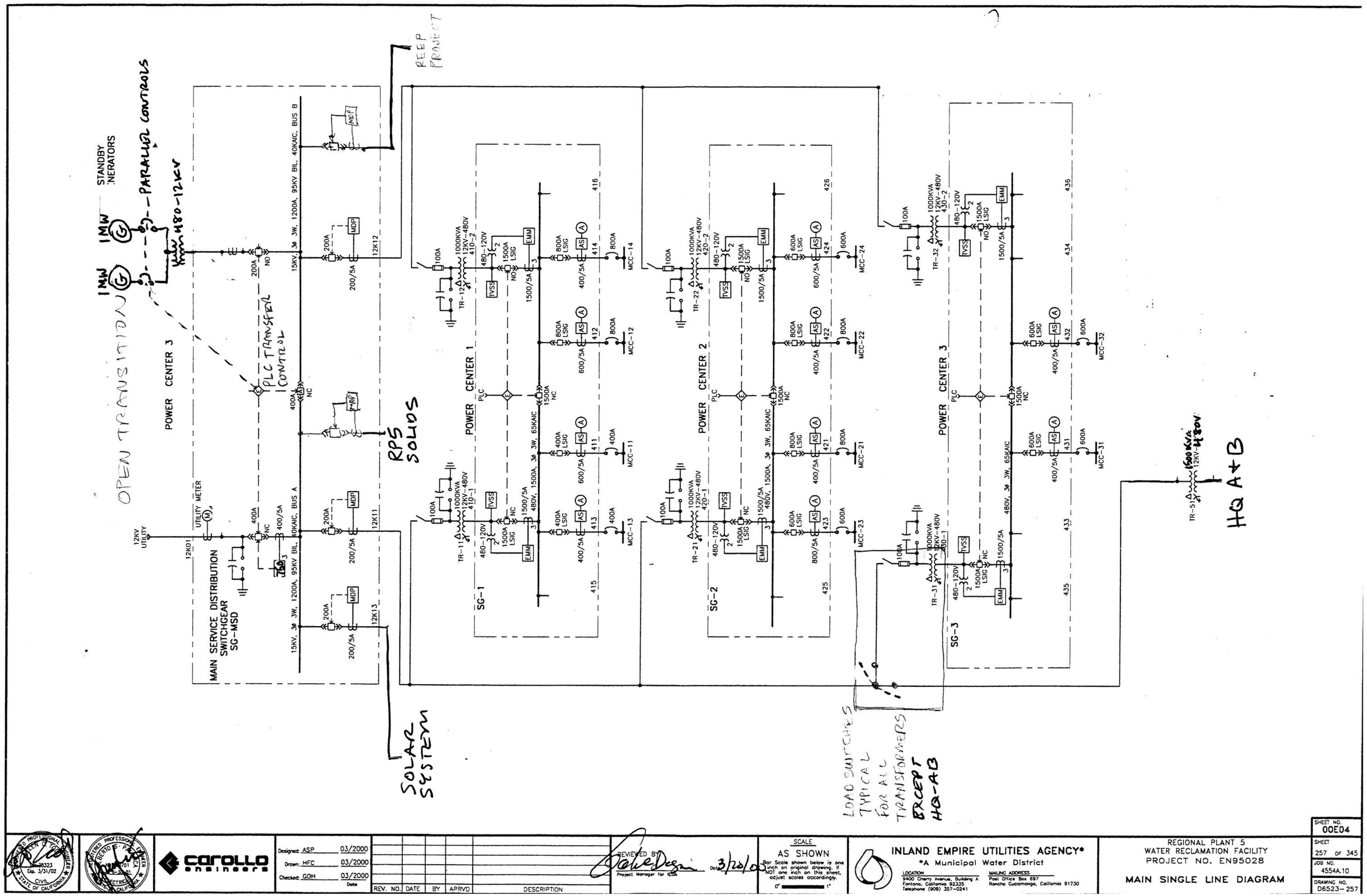



EDISON
FACILITY UPPER SECTION (SOLIDS)
12KV-480V
UTILITY METER
4000 AMP
1000
1000
1000
MCC F
MCC H
MCC G
400
DPG-1
KK
100
800
1000
580 KW COGEN
300 KW GEN
ATS
LIFT STATION
EDISON
FACILITY LOWER SECTION (LIQUID)
12KV-480V
UTILITY METER
600 KW GEN
1000
1000
MCC 1 MM
MCC B
125
OPERATIONS BUILDING
DECOMMISSIONED LOADS
DECOMMISSIONED LOADS
UPS LOAD AT DEWATERING
UPS AND LIGHTING LOADS AT OLD CHLORINE BUILDING
UPS AND LIGHTING LOADS AT DIGESTER CONTROL BUILDING
J. AGUILAR 11/06/09
M. KARIM 11/06/09
REV DATE BY DESCRIPTION
APPROVED BY:
AS SHOWN
INLAND EMPIRE UTILITIES AGENCY*
"A Municipal Water District"
INLAND EMPIRE UTILITIES AGENCY
RP-2 SINGLE-LINE DIAGRAM
SHEET

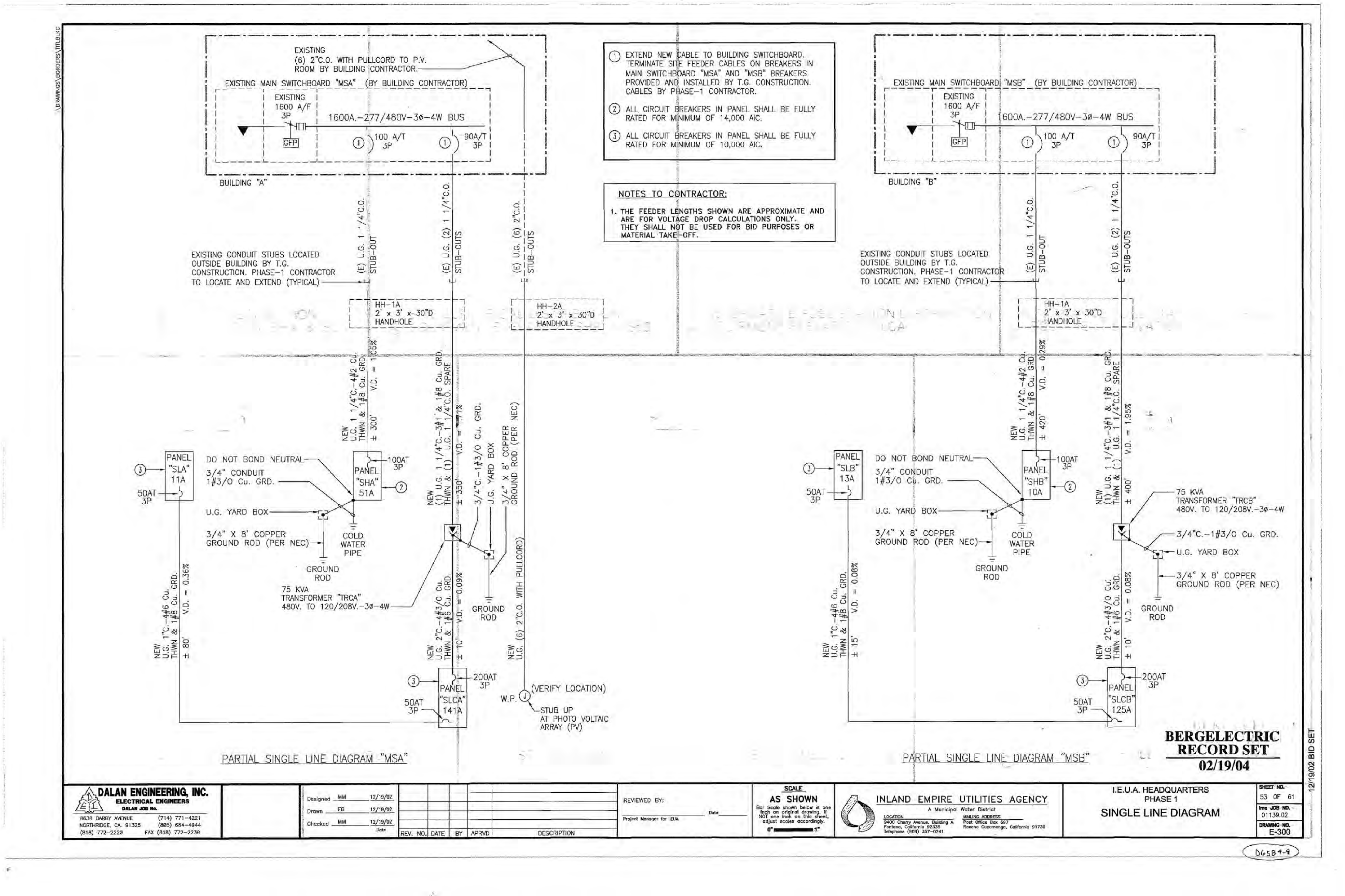

MAIN SWITCHGEAR
FROM SCE
MSG-N
MSG-S
FUTURE GENERATOR
1500 kW GENERATOR
1200A., 12470V., 3Ø
BLOWER BUILDING
MCC-1
MCC-2
T0 2500 kVA XMFR 12470-4160V. 3Ø
T1 2500 kVA XMFR 12470-4160V. 3Ø
MCC-3
MCC-4
T2 750 kVA XMFR 12470-480/277V. 3Ø
T3 750 kVA XMFR 12470-480/277V. 3Ø
MCC-5
MCC-6
MCC-6A
OPERATIONS BLDG.
MAINTENANCE BLDG.
GRIT PUMP STATION
MCC-7
MCC-8
T4 225 kVA XMFR 12470-480/277V. 3Ø
T5 225 kVA XMFR 12470-480/277V. 3Ø
MCC-15 (FUTURE)
AERATION BASIN No.1
SWBD-N1
SWBD-S1
T6 1500 kVA XMFR 12470-480/277V. 3Ø
T7 1500 kVA XMFR 12470-480/277V. 3Ø
MCC-9
MCC-9A
MCC-10
AERATION BASIN No.2
SWBD-N2 (FUTURE)
SWBD-S2 (FUTURE)
T8 1500 kVA XMFR 12470-480/277V 3Ø (FUTURE)
T9 1500 kVA XMFR 12470-480/277V. 3Ø (FUTURE)
CHLORINE BUILDING
MCC-11
MCC-12
T10 750 kVA XMFR 12470-480/277V. 3Ø
T11 750 kVA XMFR 12470-480/277V. 3Ø
(SPARE-FUTURE)
N.C.
N.O.
M.J. GROSS
CHINO BASIN MUNICIPAL WATER DISTRICT
CARBON CANYON WASTEWATER RECLAMATION PLANT
ELECTRICAL DISTRIBUTION SYSTEM ONE-LINE DIAGRAM

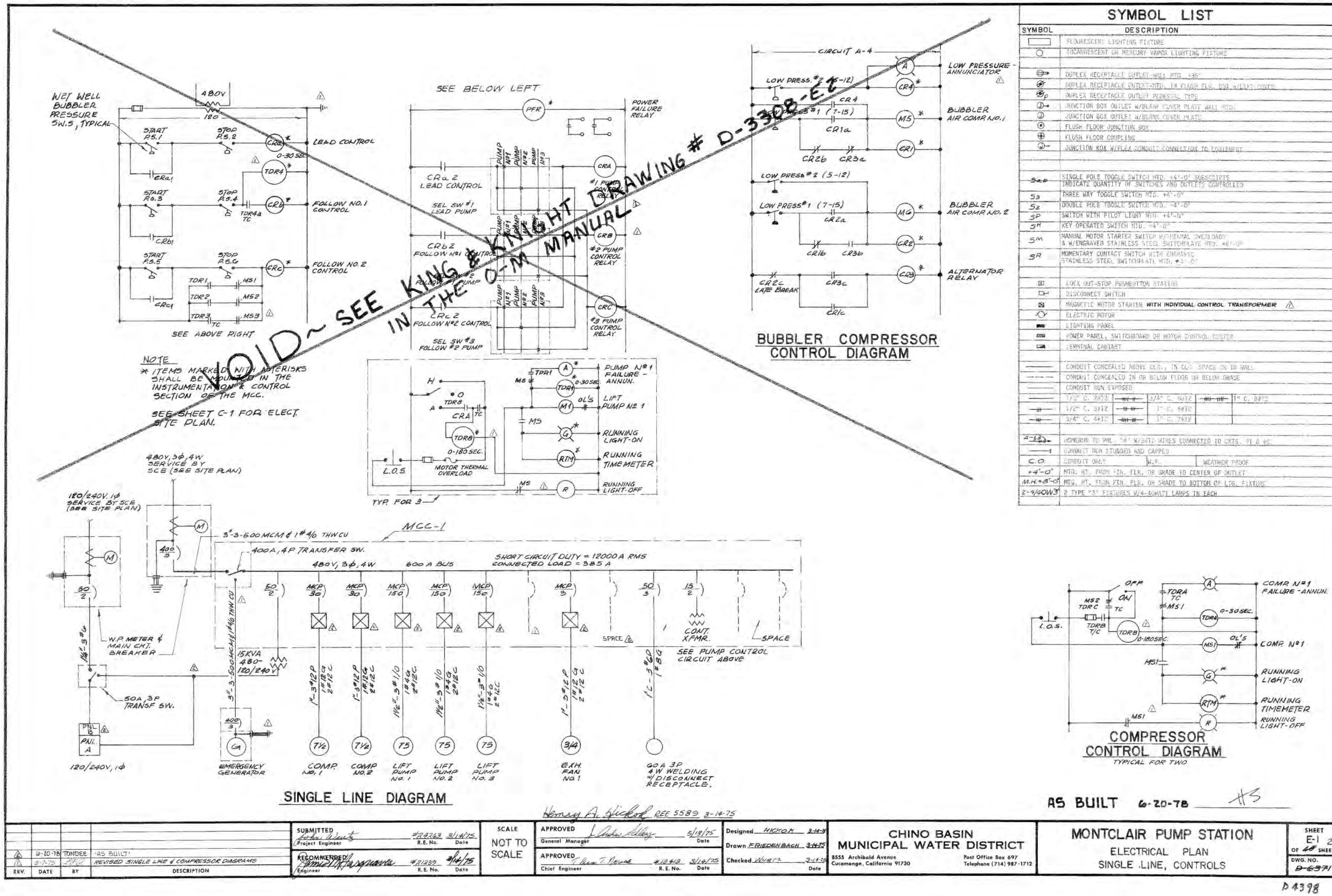
RP 4 12 KV SINGLE LINE



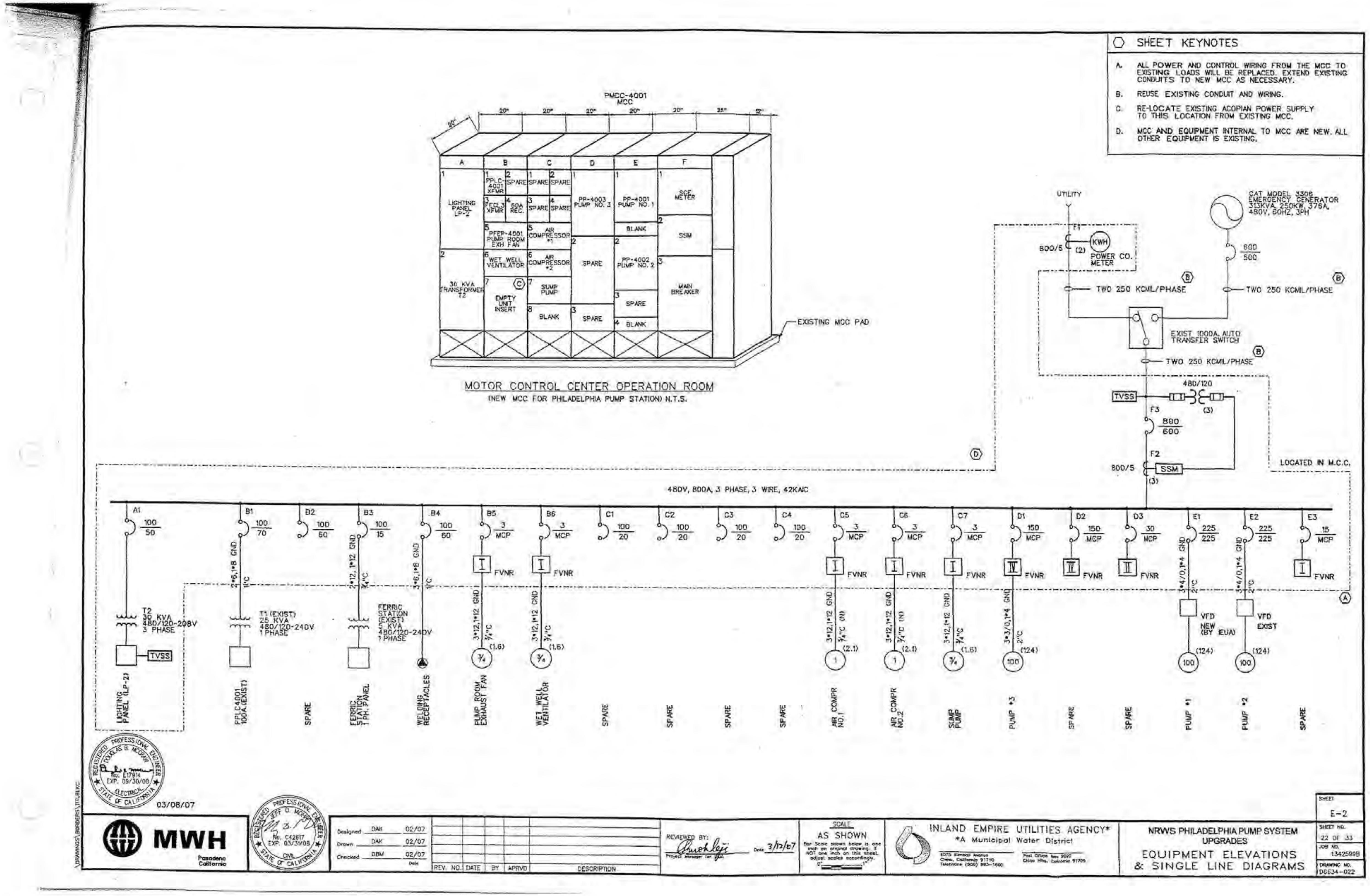


carollo engineers
Designed: ASP 03/2000
Drawn: HFC 03/2000
Checked: GOH 03/2000
REV. NO. DATE BY APRVD DESCRIPTION
SCALE
AS SHOWN
INLAND EMPIRE UTILITIES AGENCY*
*A Municipal Water District
REGIONAL PLANT 5
WATER RECLAMATION FACILITY
PROJECT NO. EN95028
MAIN SINGLE LINE DIAGRAM
SHEET NO. 00E04
SHEET 257 OF 345
JOB NO. 4554A.10
DRAWING NO. D6523-257

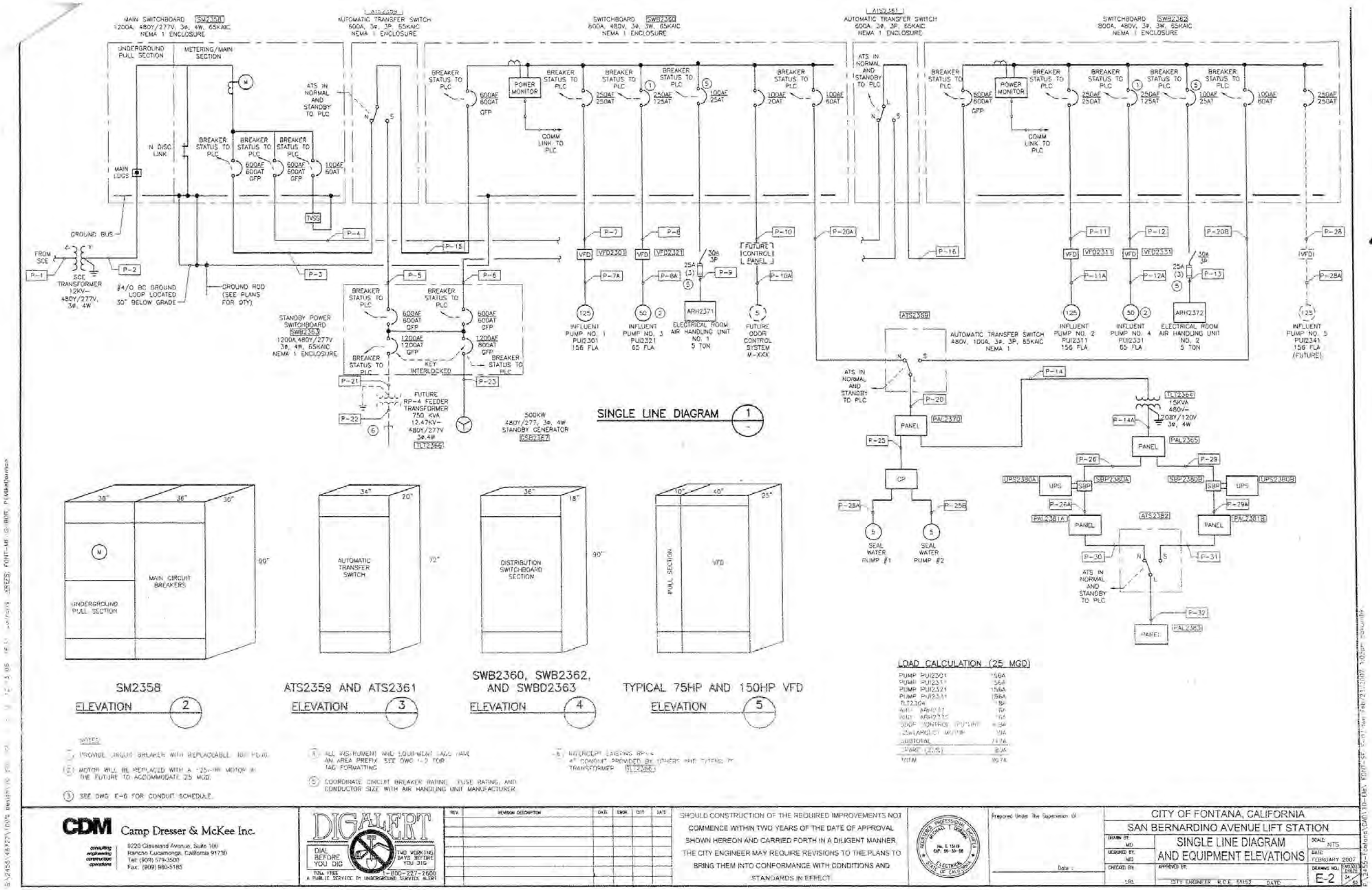

EXISTING (6) 2"C.O. WITH PULLCORD TO P.V. ROOM BY BUILDING CONTRACTOR.
EXISTING MAIN SWITCHBOARD "MSA" (BY BUILDING CONTRACTOR)
EXISTING 1600 A/F 3P
1600A.-277/480V-3ø-4W BUS
GFP
100 A/T 3P
90A/T 3P
BUILDING "A"
① EXTEND NEW CABLE TO BUILDING SWITCHBOARD. TERMINATE SITE FEEDER CABLES ON BREAKERS IN MAIN SWITCHBOARD "MSA" AND "MSB" BREAKERS PROVIDED AND INSTALLED BY T.G. CONSTRUCTION. CABLES BY PHASE-1 CONTRACTOR.
② ALL CIRCUIT BREAKERS IN PANEL SHALL BE FULLY RATED FOR MINIMUM OF 14,000 AIC.
③ ALL CIRCUIT BREAKERS IN PANEL SHALL BE FULLY RATED FOR MINIMUM OF 10,000 AIC.
NOTES TO CONTRACTOR:
1. THE FEEDER LENGTHS SHOWN ARE APPROXIMATE AND ARE FOR VOLTAGE DROP CALCULATIONS ONLY. THEY SHALL NOT BE USED FOR BID PURPOSES OR MATERIAL TAKE-OFF.
EXISTING MAIN SWITCHBOARD "MSB" (BY BUILDING CONTRACTOR)
BUILDING "B"
EXISTING CONDUIT STUBS LOCATED OUTSIDE BUILDING BY T.G. CONSTRUCTION. PHASE-1 CONTRACTOR TO LOCATE AND EXTEND (TYPICAL)
(E) U.G. 1 1/4"C.O. STUB-OUT
(E) U.G. (2) 1 1/4"C.O. STUB-OUTS
(E) U.G. (6) 2"C.O. STUB-OUTS
HH-1A 2' x 3' x 30"D HANDHOLE
HH-2A 2' x 3' x 30"D HANDHOLE
NEW U.G. 1 1/4"C.-4#2 Cu. THWN & 1#8 Cu. GRD. ± 300' V.D. = 1.05%
NEW (1) U.G. 1 1/4"C.-3#1 & 1#8 Cu. GRD. THWN & (1) U.G. 1 1/4"C.O. SPARE ± 350' V.D. = 1.71%
3/4"C.-1#3/0 Cu. GRD.
U.G. YARD BOX
3/4" X 8' COPPER GROUND ROD (PER NEC)
PANEL "SLA" 11A
50AT 3P
DO NOT BOND NEUTRAL
3/4" CONDUIT 1#3/0 Cu. GRD.
PANEL "SHA" 51A
100AT 3P
U.G. YARD BOX
3/4" X 8' COPPER GROUND ROD (PER NEC)
COLD WATER PIPE
GROUND ROD
75 KVA TRANSFORMER "TRCA" 480V. TO 120/208V.-3ø-4W
NEW U.G. 1"C.-4#6 Cu. THWN & 1#8 Cu. GRD. ± 80' V.D. = 0.36%
NEW U.G. 2"C.-4#3/0 Cu. THWN & 1#6 Cu. GRD. ± 10' V.D. = 0.09%
NEW U.G. (6) 2"C.O. WITH PULLCORD
PANEL "SLCA" 141A
200AT 3P
50AT 3P
W.P.
(VERIFY LOCATION)
STUB UP AT PHOTO VOLTAIC ARRAY (PV)
PARTIAL SINGLE LINE DIAGRAM "MSA"
NEW U.G. 1 1/4"C.-4#2 Cu. THWN & 1#8 Cu. GRD. ± 420' V.D. = 0.29%
NEW (1) U.G. 1 1/4"C.-3#1 & 1#8 Cu. GRD. THWN & (1) U.G. 1 1/4"C.O. SPARE ± 400' V.D. = 1.95%
PANEL "SLB" 13A
PANEL "SHB" 10A
75 KVA TRANSFORMER "TRCB" 480V. TO 120/208V.-3ø-4W
NEW U.G. 1"C.-4#6 Cu. THWN & 1#8 Cu. GRD. ± 15' V.D. = 0.08%
NEW U.G. 2"C.-4#3/0 Cu. THWN & 1#6 Cu. GRD. ± 10' V.D. = 0.08%
PANEL "SLCB" 125A
PARTIAL SINGLE LINE DIAGRAM "MSB"
BERGELECTRIC RECORD SET 02/19/04
12/19/02 BID SET
DALAN ENGINEERING, INC. ELECTRICAL ENGINEERS
8638 DARBY AVENUE NORTHRIDGE, CA. 91325
(714) 771-4221 (805) 684-4944 (818) 772-2220 FAX (818) 772-2239
Designed MM 12/19/02
Drawn FG 12/19/02
Checked MM 12/19/02
REV. NO. DATE BY APRVD DESCRIPTION
REVIEWED BY:
Project Manager for IEUA
SCALE AS SHOWN
INLAND EMPIRE UTILITIES AGENCY
A Municipal Water District
I.E.U.A. HEADQUARTERS PHASE 1
SINGLE LINE DIAGRAM
SHEET NO. 53 OF 61
01139.02
DRAWING NO. E-300



SYMBOL LIST
SYMBOL
DESCRIPTION
VOID ~ SEE KING & KNIGHT DRAWING # D-3308-E
IN THE O-M MANUAL
WET WELL BUBBLER PRESSURE SW.S, TYPICAL
LEAD CONTROL
FOLLOW NO. 1 CONTROL
FOLLOW NO. 2 CONTROL
SEE ABOVE RIGHT
SEE BELOW LEFT
POWER FAILURE RELAY
#1 PUMP CONTROL RELAY
#2 PUMP CONTROL RELAY
#3 PUMP CONTROL RELAY
LOW PRESSURE ANNUNCIATOR
BUBBLER AIR COMP. NO. 1
BUBBLER AIR COMP. NO. 2
ALTERNATOR RELAY
BUBBLER COMPRESSOR CONTROL DIAGRAM
NOTE
* ITEMS MARKED WITH ASTERISKS SHALL BE MOUNTED IN THE INSTRUMENTATION & CONTROL SECTION OF THE MCC.
SEE SHEET C-1 FOR ELECT. SITE PLAN.
PUMP Nº 1 FAILURE - ANNUN.
LIFT PUMP Nº 1
RUNNING LIGHT-ON
RUNNING TIMEMETER
RUNNING LIGHT-OFF
MOTOR THERMAL OVERLOAD
TYP. FOR 3
480V, 3φ, 4W SERVICE BY SCE (SEE SITE PLAN)
120/240V, 1φ SERVICE BY SCE (SEE SITE PLAN)
MCC-1
400A, 4P TRANSFER SW.
480V, 3φ, 4W
600 A BUS
SHORT CIRCUIT DUTY = 12000 A RMS
CONNECTED LOAD = 385 A
W.P. METER & MAIN CKT. BREAKER
50A, 3P TRANSF. SW.
15KVA 480-120/240V
SPACE
CONT. XFMR.
SEE PUMP CONTROL CIRCUIT ABOVE
120/240V, 1φ
EMERGENCY GENERATOR
COMP. NO. 1
COMP. NO. 2
LIFT PUMP NO. 1
LIFT PUMP NO. 2
LIFT PUMP NO. 3
EXH. FAN NO. 1
60A 3P 4W WELDING W/ DISCONNECT RECEPTACLE
SINGLE LINE DIAGRAM
COMP. Nº 1 FAILURE - ANNUN.
COMP. Nº 1
COMPRESSOR CONTROL DIAGRAM
TYPICAL FOR TWO
AS BUILT 6-20-78
REVISED SINGLE LINE & COMPRESSOR DIAGRAMS
"AS BUILT"
REV. DATE BY DESCRIPTION
SCALE
NOT TO SCALE
CHINO BASIN MUNICIPAL WATER DISTRICT
8555 Archibald Avenue Cucamonga, California 91730
Post Office Box 697 Telephone (714) 987-1712
MONTCLAIR PUMP STATION
ELECTRICAL PLAN
SINGLE LINE, CONTROLS
SHEET E-1
DWG. NO.
D 4398



SHEET KEYNOTES
A. ALL POWER AND CONTROL WIRING FROM THE MCC TO EXISTING LOADS WILL BE REPLACED. EXTEND EXISTING CONDUITS TO NEW MCC AS NECESSARY.
B. REUSE EXISTING CONDUIT AND WIRING.
C. RE-LOCATE EXISTING ACOPIAN POWER SUPPLY TO THIS LOCATION FROM EXISTING MCC.
D. MCC AND EQUIPMENT INTERNAL TO MCC ARE NEW. ALL OTHER EQUIPMENT IS EXISTING.
PMCC-4001 MCC
MOTOR CONTROL CENTER OPERATION ROOM
(NEW MCC FOR PHILADELPHIA PUMP STATION) N.T.S.
EXISTING MCC PAD
UTILITY
POWER CO. METER
CAT MODEL 3306 EMERGENCY GENERATOR 313KVA, 250KW, 376A, 480V, 60HZ, 3PH
TWO 250 KCMIL/PHASE
EXIST 1000A AUTO TRANSFER SWITCH
LOCATED IN M.C.C.
480V, 800A, 3 PHASE, 3 WIRE, 42KAIC
LIGHTING PANEL (LP-2)
PPLC4001 100A (EXIST)
FERRIC STATION 1 PH. PANEL
WELDING RECEPTACLES
PUMP ROOM EXHAUST FAN
WET WELL VENTILATOR
AIR COMPR NO.1
AIR COMPR NO.2
SUMP PUMP
PUMP #3
PUMP #1
PUMP #2
SPARE
03/08/07
MWH Pasadena California
INLAND EMPIRE UTILITIES AGENCY* *A Municipal Water District
NRWS PHILADELPHIA PUMP SYSTEM UPGRADES
EQUIPMENT ELEVATIONS & SINGLE LINE DIAGRAMS
SCALE AS SHOWN
E-2
22 OF 33


SINGLE LINE DIAGRAM
SM2358 ELEVATION
ATS2359 AND ATS2361 ELEVATION
SWB2360, SWB2362, AND SWBD2363 ELEVATION
TYPICAL 75HP AND 150HP VFD ELEVATION
LOAD CALCULATION (25 MGD)
CDM Camp Dresser & McKee Inc.
CITY OF FONTANA, CALIFORNIA
SAN BERNARDINO AVENUE LIFT STATION
SINGLE LINE DIAGRAM AND EQUIPMENT ELEVATIONS
E-2

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Appendix C: Yard Piping

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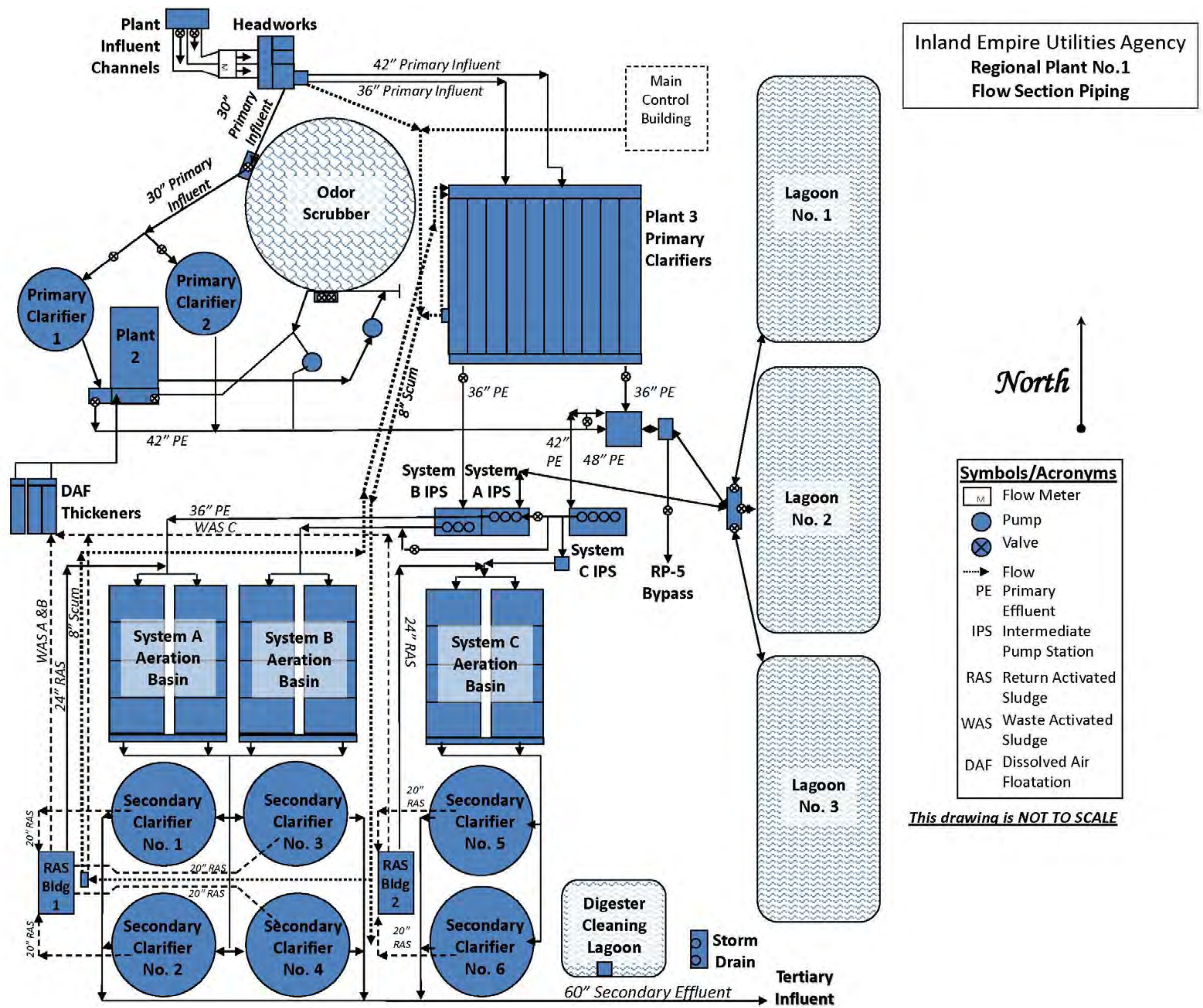
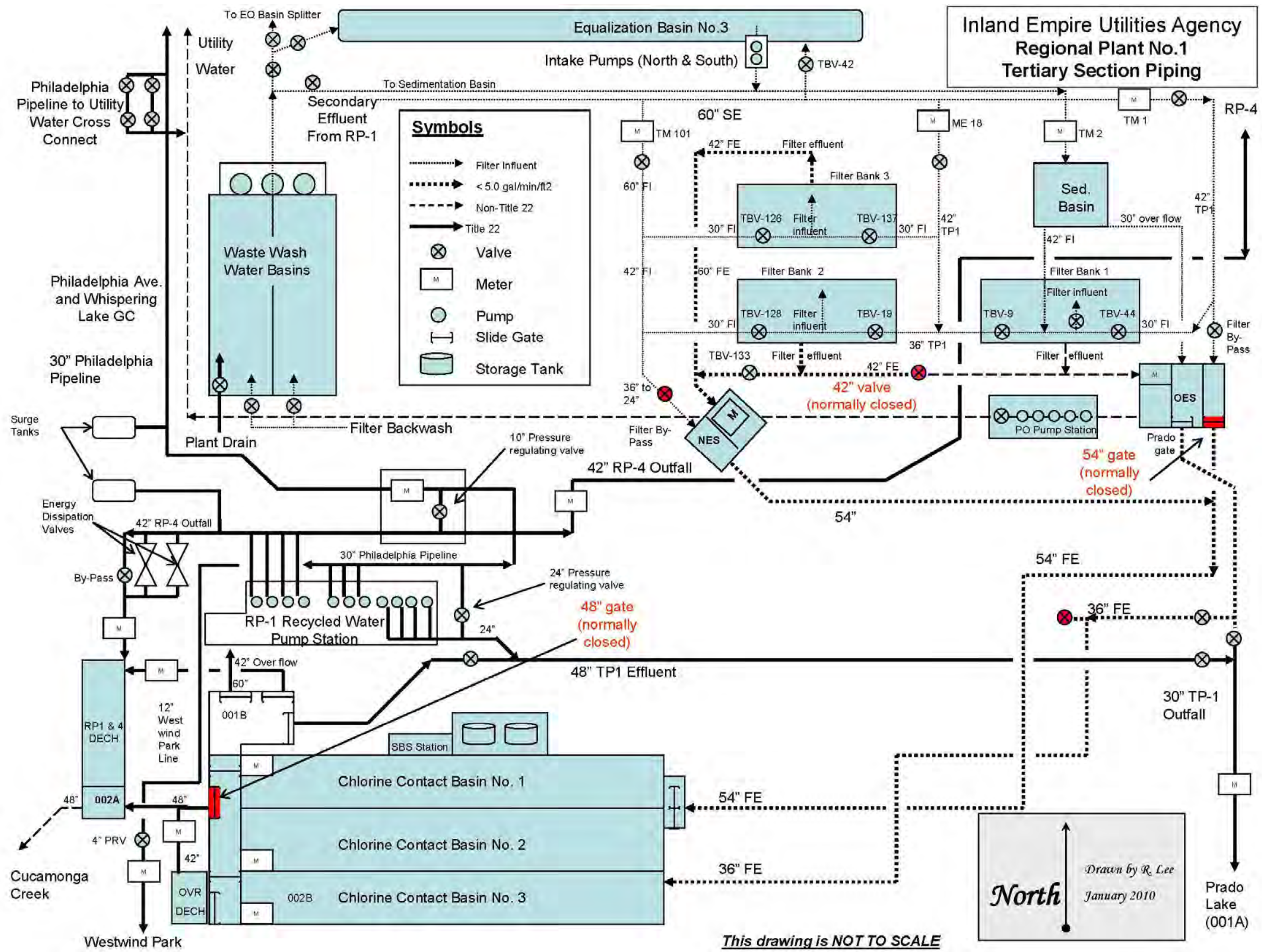
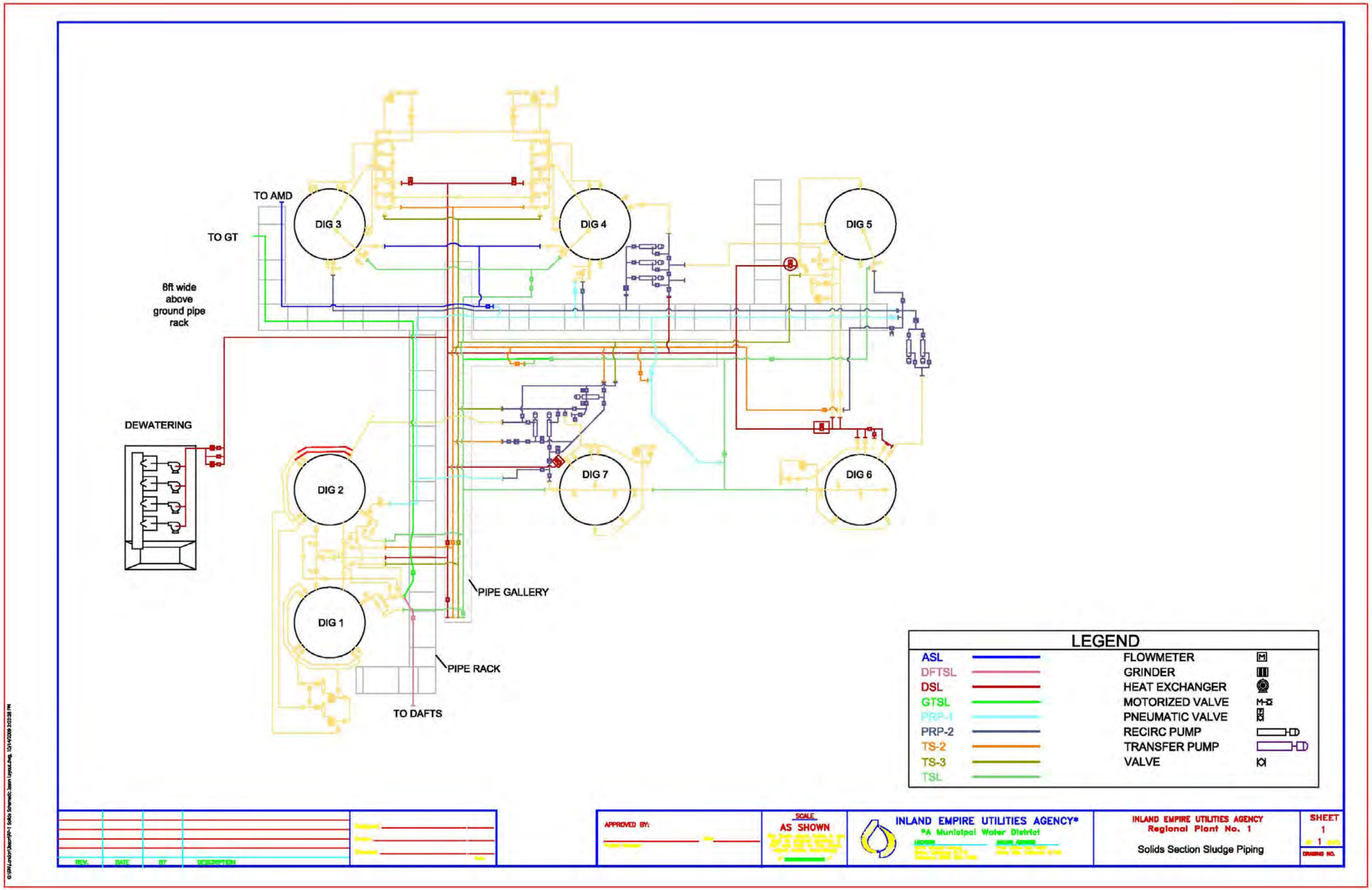

Inland Empire Utilities Agency
Regional Plant No.1
Flow Section Piping
Plant Influent Channels
Headworks
42" Primary Influent
36" Primary Influent
Main Control Building
30" Primary Influent
30" Primary Influent
Odor Scrubber
Plant 3 Primary Clarifiers
Lagoon No. 1
Lagoon No. 2
Lagoon No. 3
Primary Clarifier 1
Primary Clarifier 2
Plant 2
8" Scum
36" PE
36" PE
42" PE
42" PE
48" PE
North
System B IPS
System A IPS
System C IPS
RP-5 Bypass
DAF Thickeners
36" PE
WAS C
WAS A &B
8" Scum
24" RAS
24" RAS
System A Aeration Basin
System B Aeration Basin
System C Aeration Basin
Symbols/Acronyms
Flow Meter
Pump
Valve
Flow
PE Primary Effluent
IPS Intermediate Pump Station
RAS Return Activated Sludge
WAS Waste Activated Sludge
DAF Dissolved Air Floatation
This drawing is NOT TO SCALE
Secondary Clarifier No. 1
Secondary Clarifier No. 3
Secondary Clarifier No. 5
Secondary Clarifier No. 2
Secondary Clarifier No. 4
Secondary Clarifier No. 6
RAS Bldg 1
RAS Bldg 2
20" RAS
20" RAS
20" RAS
20" RAS
20" RAS
20" RAS
Digester Cleaning Lagoon
Storm Drain
60" Secondary Effluent
Tertiary Influent



Inland Empire Utilities Agency
Regional Plant No.1
Tertiary Section Piping
Equalization Basin No.3
To EQ Basin Splitter
Utility
Water
Intake Pumps (North & South)
TBV-42
To Sedimentation Basin
RP-4
Philadelphia Pipeline to Utility Water Cross Connect
Secondary Effluent From RP-1
Symbols
Filter Influent
< 5.0 gal/min/ft2
Non-Title 22
Title 22
Valve
Meter
Pump
Slide Gate
Storage Tank
Waste Wash Water Basins
Philadelphia Ave. and Whispering Lake GC
30" Philadelphia Pipeline
Surge Tanks
Plant Drain
Filter Backwash
60" SE
TM 101
ME 18
TM 2
TM 1
42" FE
Filter effluent
Filter Bank 3
60" FI
Sed. Basin
30" FI
TBV-126
Filter influent
TBV-137
42" TP1
30" over flow
42" TP1
42" FI
60" FE
Filter Bank 2
Filter Bank 1
TBV-128
TBV-19
TBV-9
TBV-44
Filter By-Pass
36" TP1
TBV-133
42" valve (normally closed)
36" to 24"
Filter By-Pass
NES
OES
PO Pump Station
Prado gate
54" gate (normally closed)
10" Pressure regulating valve
42" RP-4 Outfall
54"
Energy Dissipation Valves
By-Pass
30" Philadelphia Pipeline
54" FE
24" Pressure regulating valve
48" gate (normally closed)
36" FE
RP-1 Recycled Water Pump Station
24"
42" Over flow
60"
48" TP1 Effluent
30" TP-1 Outfall
001B
RP1 & 4 DECH
12" West wind Park Line
SBS Station
Chlorine Contact Basin No. 1
Chlorine Contact Basin No. 2
Chlorine Contact Basin No. 3
002A
002B
48"
4" PRV
42"
OVR DECH
Cucamonga Creek
Westwind Park
North
Drawn by R. Lee
January 2010
Prado Lake (001A)
This drawing is NOT TO SCALE


TO AMD
TO GT
DIG 3
DIG 4
DIG 5
8ft wide
above
ground pipe
rack
DEWATERING
DIG 2
DIG 7
DIG 6
DIG 1
PIPE GALLERY
PIPE RACK
TO DAFTS
LEGEND
ASL
DFTSL
DSL
GTSL
PRP-1
PRP-2
TS-2
TS-3
TSL
FLOWMETER
GRINDER
HEAT EXCHANGER
MOTORIZED VALVE
PNEUMATIC VALVE
RECIRC PUMP
TRANSFER PUMP
VALVE
APPROVED BY:
SCALE
AS SHOWN
INLAND EMPIRE UTILITIES AGENCY*
*A Municipal Water District
INLAND EMPIRE UTILITIES AGENCY
Regional Plant No. 1
Solids Section Sludge Piping
SHEET
1
OF 1
DRAWING NO.
REV.
DATE
BY
DESCRIPTION

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Appendix G

Recycled Water Program Strategy and Recycled Water Policy Principles

ESA

RECYCLED WATER POLICY PRINCIPLES

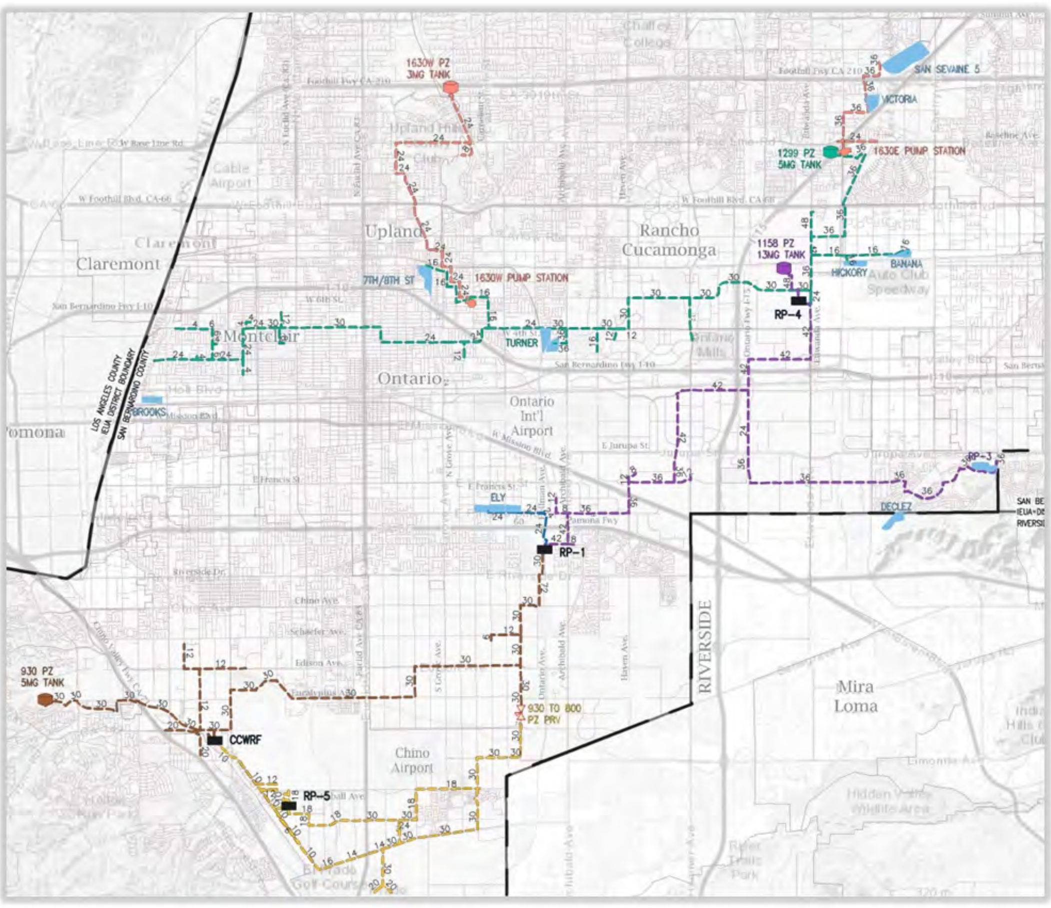
Adopted March 2016

Since the completion of the Recycled Water Program Strategy in 2015, the priorities of the Regional Recycled Water System were negotiated with the IEUA Member Agencies, and adopted in March 2016. The Recycled Water Policy Principles are to be used for developing operational priorities of the RW system, and should supersede other references in the 2015 Recycled Water Program Strategy. To reflect this, the Recycled Water Policy Principles were included with the Recycled Water Program Strategy in Appendix G of the Draft PEIR.

Recycled Water Program Strategy

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

RECYCLED WATER PROGRAM STRATEGY



Inland Empire Utilities Agency

October 2015

Stantec

Recycled Water Program Strategy

Facility Master Planning Study

Prepared for:

Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

Prepared by:

Stantec Consulting Services Inc.
38 Technology Drive, Suite 100
Irvine, CA 92618

October 28, 2015

Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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
EPS	Extend Period Simulation
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 or "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
SARBF	Santa Ana River Base Flow
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 Agency and its member agencies have developed a successful regional Recycled Water Program (RW Program) for both direct use and GWR. In 2000, the region identified that recycled water use was a critical component in drought-proofing and maintaining its economic growth. With imported water rates increasing and long-term imported supply reliability in decline, the region committed to aggressively and proactively develop local water supplies to offset these impacts. This set the path for the development of a regional recycled water distribution system and a Recycled Water Implementation Plan.

As the Program continues to advance, it is important to reevaluate capital improvement needs as changes in the region's water resource priorities occur. The purpose of the 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 identify improvements to maximize the use of recycled water throughout the year. This approach is consistent with prior commitments of the region by:

- Maximize the beneficial use of recycled water to enhance local water resource availability and reduce reliance on imported water, and
- Continuing the development of the Regional Recycled Water infrastructure to achieve delivery of 50,000 AF/year of recycled water by 2025.

The RW Program is operated based on the following priorities for recycled water deliveries:

1) Regional discharge obligations (Santa Ana Judgment, environmental obligations, etc.),
2) Member agency direct use demands
3) Regional GWR

In addition to meeting the direct use demands, the RWPS also investigated the impacts of increasing deliveries to the GWR basins. This approach raised the priority for GWR to 9 months out of the year between March through November. The RWPS evaluated the need for additional GWR basins, beyond what was committed through the CBWM 2013 RMPU to identify if and when any new basins will be needed. The 9-month operational recharge period was selected for delivery of recycled water to the GWR basins to avoid conflicts with the capture of storm water during the winter months.

This approach is also consistent with the current multi-party agreement between SBCFCD, CBWM, CBWCD and IEUA.

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 GWR. The first step in determining the best approach for maximizing the beneficial use of recycled water was to identify what the remaining supply (reuse supply) would be after direct use demands and the SARBF at Prado discharge obligation have been met. This is the quantity of recycled water available for GWR or another reuse strategy. Modeling was performed on a range of available reuse supply, which could be from reduced outdoor irrigation and increased direct use efficiency or if an external supply is provided into the region. To achieve a greater annual yield from the RW Program, GWR was maximized to utilize the reuse supply when available. This modeling approach was necessary to determine if and when new facilities will be needed to maximize the beneficial use of all available reuse supply.

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 projects recommended by the RWPS address improvements necessary to achieve the goal of maximizing beneficial use of RW throughout the year. The majority of the projects proposed focus on relieving existing capacity constraints in order to meet the demand (direct and GWR) forecast, or increasing the ability to deliver reuse supply for GWR.

ES.1 - Projected Recycled Water Demands and Supplies

The analyses and facility recommendations for the RWPS are based on the RW demands and wastewater supplies provided by the Agency and their member agencies as shown in Table ES.1. The estimated reuse supply is defined as the amount of recycled water effluent available to be used for the SARBF Discharge Obligation, direct use demands, and GWR as also shown in Table ES.1. The total annual GWR projection for the basins is based on a 9-month operating period between March through November. It should be noted that the SARBF Discharge Obligation and RW direct use demands are based on a 12-month annual total as opposed to the 9-month annual total for GWR.

Table ES.1 Summary of Recycled Water Use and Supplies

	Year 2015	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
RW Reuse Supply[1]	61,944	66,312	71,913	77,514	82,330
SARBF Discharge Obligation[2]	17,000	17,000	17,000	17,000	17,000
Direct Use Demand Forecast	24,655	30,757	36,507	40,320	43,019
Available GWR Supply[3]	20,289	18,555	18,406	20,194	22,311
RWPS GWR Basin Deliveries[4]	16,095	13,977	13,027	13,707	14,871
Remaining Reuse Supply	4,194	4,578	5,379	6,487	7,440

1 Total RW Reuse Supply does not include any wastewater treatment losses generated at the Regional Recycling Plants.

2 Minimum discharge required by SAR obligation is 16,850 AFY. For purposes of the RWPS, discharge obligation was assumed to be 17,000 AFY.

3 Total supply available for GWR is the remaining supply after direct use demands and the SARBF discharge obligation are met. The supply shown is a 12-month total annual supply.

4 Based on a 9-month operating GWR basin program between March through November. Deliveries are limited by available reuse supply after the SARBF Discharge Obligation and direct use demands are met.

As shown in Table ES.1, the total annual GWR basin deliveries are less than the total annual available supply to the GWR basins. This is due to the GWR basin deliveries assumed to be for only a 9-month annual recharge operation. Supplies are available for all 12-months. If the GWR operation were to be extended for the entire 12-months, then the remaining reuse supply would be able to be delivered to the basins for recharge.

ES.2 - Summary of Remaining Reuse Supply and GWR Basin Capacity

Table ES.2 is provided below to illustrate the amount of reuse supply available to the groundwater basins for recharge as compared with the basins' recharge capacity for the existing and 2013 RMPU basins. The table illustrates that the amount of reuse supply that can be recharged in the basins is limited by the available supply and duration of recharge operations throughout the year. The capacity of the basins may be greater and total GWR may be higher if additional supply were available, or if direct use demands were less. Therefore, an analysis was performed to determine the appropriate facilities to accommodate potential increase in supplies or changes in direct use demands, both annually and seasonally. The seasonal analysis was performed to determine basin capacities on a monthly basis to verify if additional basins are required beyond those identified in the RMPU.

The seasonal, or monthly, analysis approach provided the opportunity to determine if additional facilities or potential GWR basins would need to be added to recharge any additional supply that may become available both during the peak summer direct use demand periods as well in the lower demand spring and fall periods. As described in Chapter 7, the analysis identifies if additional GWR basins or distribution facilities are needed to deliver additional reuse supply. Appropriately identifying and sizing these system conveyance improvements was the goal of the RWPS.

Table ES.2 Summary of Remaining Reuse Supply and GWR Basin Capacity

	Year 2015	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Available Supply to GWR[1]	20,289	18,555	18,406	20,194	22,311
RWPS GWR Basin Deliveries[2]	16,095	13,977	13,027	13,707	14,871
GWR Basin Capacity[3]	25,600	37,300	37,300	37,300	37,300

[1] Quantity of reuse supply available for recharge to the basins after the SARBF discharge obligation and direct use demands are met. Values per Table ES.1.

[2] Per RWPS, based on a 9-month operating GWR basin program between March through November. Deliveries limited by available reuse supply. Values per Table ES.1.

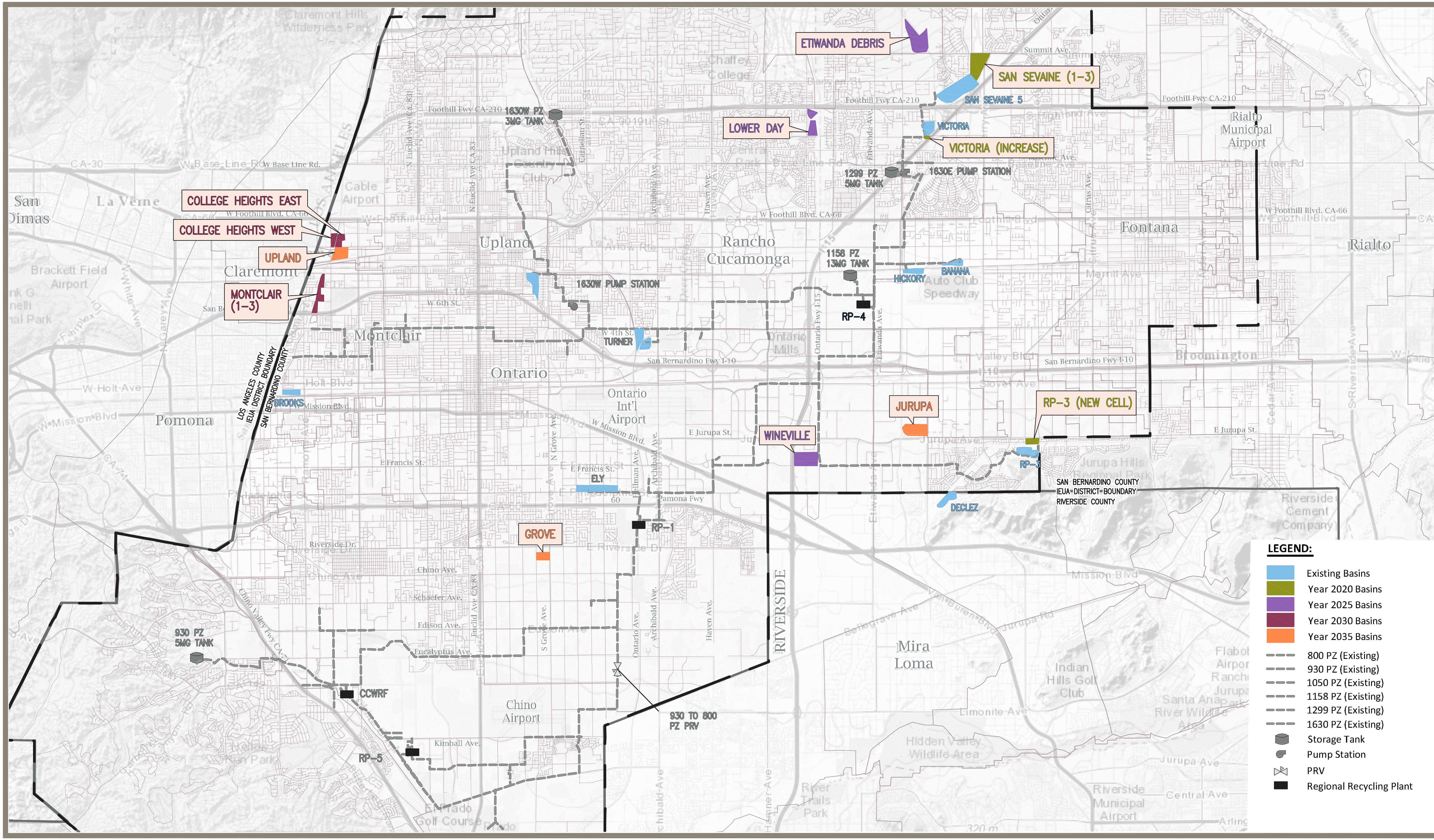
[3] Range of potential annual deliveries to the existing and 2013 RMPU GWR basins only, based on operating time of GWR program and basin capacity estimated at 9-months per year. Values assume all basins operating at average annual infiltration without reuse supply limitations for duration specified. Constraints or limitations of the underlying groundwater basin are not the RWPS scope.

ES.3 - Potential GWR Basin Implementation

The proposed RW implementation strategy is consistent with the Agency's goal to increase GWR to utilize all of the remaining reuse supply once demands for the direct uses and SARBF at Prado Obligation are met. The strategy analyzed by this RWPS has a 20-year planning horizon to Year 2035, which was analyzed and planned in 5-year increments. The RWPS identified if and when additional GWR basins should be connected to the RW system. The RWPS evaluated the capacity of the conveyance facilities to maximize delivery of available reuse supply to the basins.

The Agency operates 11 existing GWR basins that are currently connected to the RW system (i.e., currently receiving RW for GWR). The Agency operates several other GWR basins that are currently configured to only accept storm water, local runoff, and/or imported MWD water. This RPWS investigates the potential for each of these GWR basins to be connected to the RW system and acceptable to receiving RW.

Table ES.3 provides a list of all GWR basins that could be added to the RW Program. Figure ES-1 identifies the location of each of these GWR basins within the RW Program.
Identfying basin constraints or infiltration limitations due to the underlying groundwater basin was this RWPS scope. The RWPS evaluated the RW conveyance facilities and improvements to deliver the potential reuse supply to GWR, not evaluate basin performance. Additional studies may be recommended to determine basin performance.



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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.3 Potential GWR Basins to Receive Recycled Water

Basin/Site	Basin Status	Size (acres)	Storage Volume (AF)
Lower Day	RW Connection[1]	15.0	179
Etiwanda Debris	RW Connection[1]	14.6	73
San Sevaine (1-3)	RW Connection[1]	21.4	99
Victoria (Increase)	N/A[3]	17.4	237
Lower San Sevaine	New[2]	23.0	230
Wineville	New[2]	30.0	240
RP-3 (New Cell)	New[2]	3.5	35
Vulcan	New[2]	30.0	450
College Heights East	RW Connection[1]	6.2	112
College Heights West	RW Connection[1]	5.8	110
Grove	RW Connection[1]	10.0	114
Jurupa	RW Connection[1]	17.0	249
Montclair (1-3)	RW Connection[1]	22.5	518
Montclair 4	RW Connection[1]	5.8	139
Upland	RW Connection[1]	16.6	392
	Total	**238.8**	**3,177**

[1] "RW Connection" implies that the basin is currently operating as part of the GWR program for storm water/local runoff and imported water. These basins will require modifications and facilities to connect to the RW system.

[2] "New" is a new basin that is currently not in the GWR program.

[3] Existing Basin and no RW improvements will be required. Existing RW turnout structure is adequate for the proposed basin improvements.

For purposes of this RWPS, the GWR basins identified in Table ES.3 were prioritized to determine the schedule of which GWR basins to implement for each of the planning years to Year 2035. Based on the ranking criteria and corresponding priority, Table ES.4 identifies the recommended implementation schedule for new GWR basins.

Table ES.4 Potential GWR Basins
RWPS Implementation Strategy and Flows

Planning Year	Basin/Site	Monthly Flows (AF per Month)	Daily Demand[1] (MGD)	Flow Rate[2] (gpm)
Year 2020	RP-3 (New Cell)	1,366	0.8	1,111
	Victoria (increase)	212	5.5	7,639
	San Sevaine (1-3)	1,508	3.1	4,306
Year 2025	Wineville	117	2.8	3,889
	Lower Day	340	5.0	6,944
	Etiwanda Debris	263	1.7	2,361
Year 2030	Montclair (1-3)	1,107	4.0	5,556
	College Heights East	302	2.6	3,611
	College Heights West	155	2.5	3,472
Year 2035	Upland	370	6.8	9,444
	Jurupa	233	8.9	12,361
	Grove	75	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 the daily demand for a 12-hour per day operation, with the fill period occurring during the day outside the peak irrigation direct use demand period.

ES.4 - Summary of System Facilities Analysis

Hydraulic model analyses were performed for several demand and operational scenarios as described in Chapters 6 and 7 of the RWPS.

A total of five (5) demand and operational scenarios were analyzed as described below.

Table ES.5 Description of Hydraulic Analysis Scenarios

Scenario	Description
Direct Use Demands	Maximum Day Direct Use Demands anticipated during the Summer
Base GWR Basin Implementation	Assumes all GWR Basins listed in Table ES.3 are converted and connected to the RW system and that the Agency meets the SARBF at Prado Obligation from their RW effluent.
Sensitivity Analysis – Scenario A – Base GWR Basin Implementation with 10,000 AFY External Supply	Assumes all GWR Basins listed in Table ES.3 are converted and connected to the RW and that the Agency obtains an external supply of approximately 10,000 AFY to supplement the SARBF at Prado Obligation.
Sensitivity Analysis – Scenario B – Existing/2013	Assumes only existing GWR basins and committed 2013 RMPU Basins are connected to the RW system and that the Agency

Table ES.5 Description of Hydraulic Analysis Scenarios

Scenario	Description
RMPU Basins (No External Supply)	meets the SARBF at Prado Obligation from their RW effluent.
Sensitivity Analysis – Scenario C – Existing/ 2013 RMPU Basins with 5,000 AFY External Supply	Assumes only existing GWR basins and committed 2013 RMPU Basins are connected to the RW system and that the Agency obtains an external supply of approximately 5,000 AFY to supplement the Southern Area supply deficit.

ES.5 – Summary of Scenario and Project Cost Analysis

A comparison of the total estimated project costs was performed for each scenario. The Base GWR Basin implementation project recommendations were then compared with the project improvements recommended for 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 Scenario are listed along with the corresponding total annual GWR benefit.

Based on the total project costs for the different operational conditions, Scenario B of the Sensitivity Analysis herein will provide the Agency the lowest total capital improvement costs. This scenario assumes that the Agency will continue to meet SARBF at Prado Obligation from their RW effluent.

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 Basins 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 Basins plus External Supply										
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										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	17,982	$ 20,000,000	42,637
2020	$20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 3,740,000	$ -	$ 23,740,000	15,702	$ 9,960,000	46,459
2025	$29,960,000	$ 5,120,000	$ 11,340,000	36,507	$ -	$ -	$ 23,740,000	14,458	$ 35,080,000	50,965
2030	$35,080,000	$ 41,110,000	$ 52,450,000	40,320	$ 33,310,000	$ 7,610,000	$ 64,660,000	15,834	$117,110,000	56,154
2035	$117,110,000	$ 3,460,000	$ 55,910,000	43,019	$ -	$ -	$ 64,660,000	**17,242**	**$120,570,000**	60,261

ES.6 – Summary of Project Recommendations for the RWPS

Based on the sensitivity analysis performed and comparison of project costs and benefits for each scenario, the proposed projects recommended by the RWPS are those identified in Scenario B.

Based on the overall goals of the RWPS, this recommendation will allow the Agency to meet the projected direct use demand forecast and maximize the available reuse supply to the GWR basins in the most cost effective manner. While there are plans to recommend additional GWR basins in the long-term, the basins that have prior commitment have adequate capacity for the available reuse supply forecast. This provides the opportunity to reevaluate the RW Program after performance metrics are obtained from prior project commitments. Additional GWR basins and other reuse methods will be evaluated as changes in direct use demand occur, of if more reuse supply is identified. This could either be from reduced direct use demands caused by changes in landscape irrigation or if an external supply is provided into the Region.

Additionally, it should be noted that the basins included for Existing/RMPU scenarios will have the ability to recharge the total available reuse supply. Therefore, the cost of GWR is much less than the program required for implementing all of the GWR basins included in the Base scenario.

However, other considerations should be given to utilizing only the Existing/2013 RMPU GWR basins:

- Using only the Existing/RMPU GWR basins limits basins to be down for maintenance, leaving no operational redundancy or flexibility for under-performing basins.
- If reductions in the direct use demand projections occur, the additional reuse supply that would become available would be limited to the capacity of the existing/2013 RMPU GWR basins. The need to evaluate other basins and reuse opportunities may be required as changes in direct use demands occur.
- If the Agency decides to secure an additional external supply source greater than 5,000 AFY, additional basins may need to be considered for connection to the RW system.

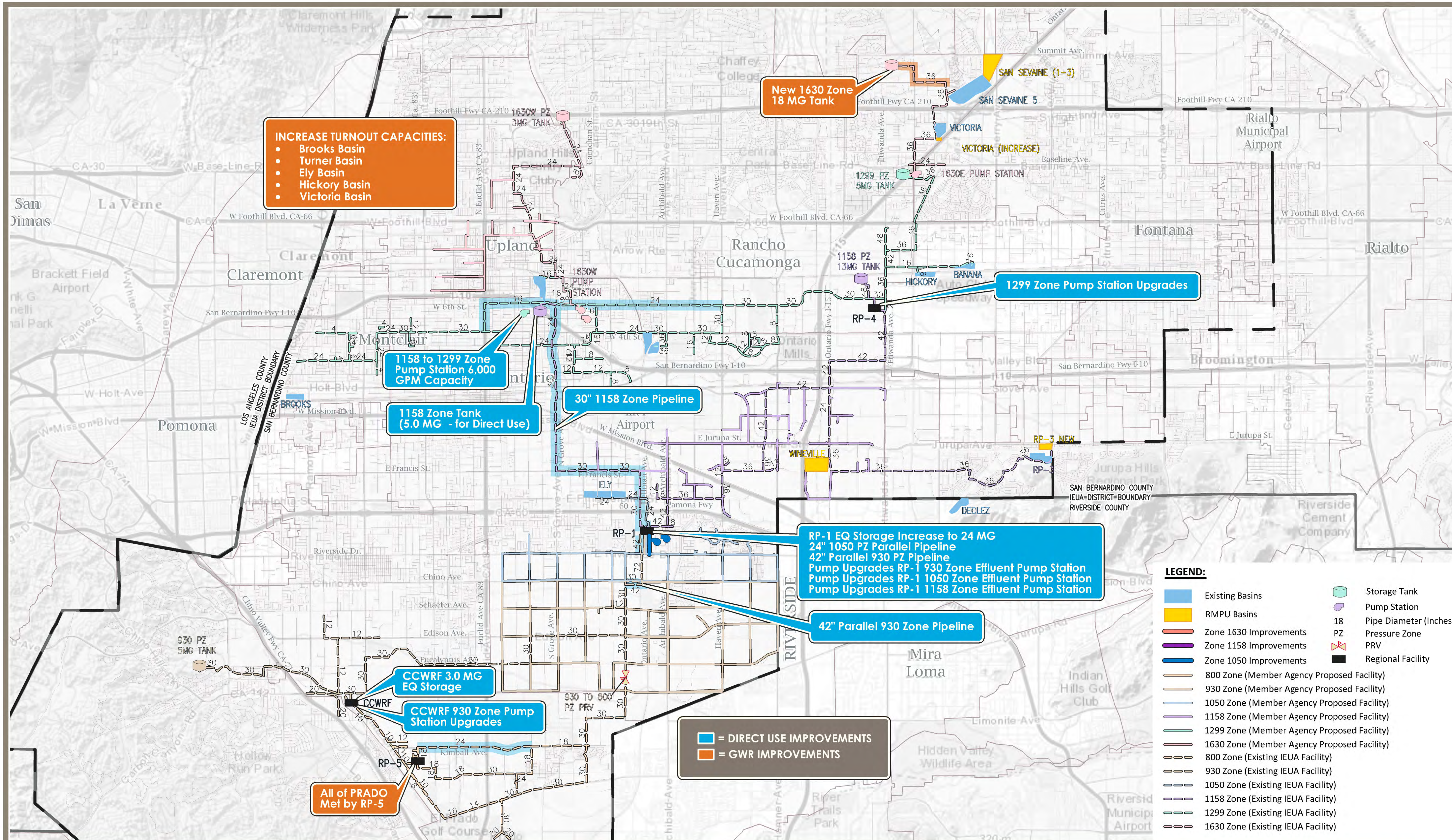
Table ES.6 identifies the comprehensive list of projects and corresponding project costs for each planning year. Since the improvements recommended are to either meet direct use demands or maximize GWR to the basins, a description of the demand condition that triggers the need for the project as well as the type of deficiency that the project is intended to mitigate has been included. 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.

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.	42-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 PS Capacity 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 Direct Use demand projections and changes to the Agency's GWR program contained in the 2005 Recycled Water Implementation Plan. The Agency has also requested that the RWPS investigate operational changes to the RW conveyance system as a result of increasing reuse of the RW supply availability to the GWR.

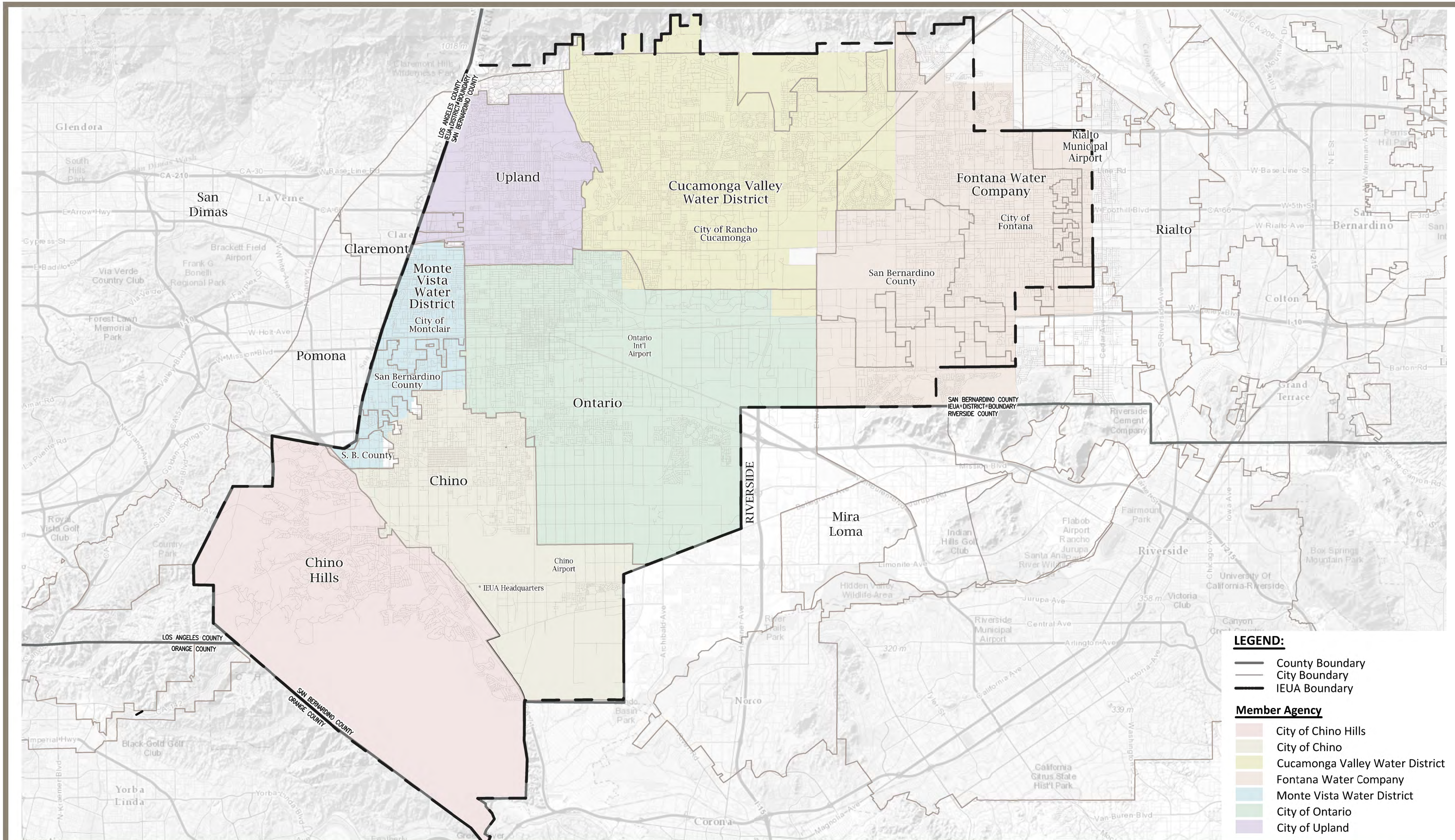
Although this RWPS does not change the priority of reuse supply (SARBF Obligation is first, direct use demands are second, and GWR is third), it does define a delivery strategy in order to maximize all of the reuse supply available to the GWR basins. Reuse supply to the GWR basins is defined to be a 9-month operation between the months of March and November. The remaining winter months of December, January and February are defined as the wet winter months and no reuse supply is planned for basin recharge during this time to allow for maximum storm water capture.

This RWPS is intended to analyze the reuse demands and supplies over the next 20 years to Year 2035, with implementation strategies for every 5 year incremental period.

1.1 STUDY AREA

The Agency's 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.

As a regional wastewater treatment agency, the Agency provides sewage utility services to the seven contracting agencies under the Chino Basin Regional Sewage Service Contract. All the wastewater collected is treated at the Agency's regional wastewater recycling plants (RP's). The regional wastewater recycling plants provide recycled water supply to the Agency's RW program.



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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

The Agency's wholesales disinfected tertiary RW to its seven (7) member agencies. With the exception of Reliant Energy, located in the City of Rancho Cucamonga, the majority of the current RW users are located in the Agency's Southern Service Area. The following are the IEUA's member agencies:

- City of Chino
- City of Chino Hills
- Cucamonga Valley Water District
- Fontana Water Company
- Monte Vista Water District
- 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 operation of the Chino Basin RW Groundwater Recharge Program. This recharge program is part of a comprehensive program to enhance water supply reliability and to improve groundwater quality throughout Agency's service area. The GWR program includes capturing and recharge of storm water, imported water, and RW.

The Agency operates several GWR basin sites as shown Table 1-1.

Historical GWR was evaluated for the twelve months prior to the time of the RWPS. Based on the Agency's GWR Quarterly Reports, between April 2013 and March 2104, approximately 16,373 AF of water was recharged in the Chino Basin. This includes 13,237 AF of RW, 2,780 AF of storm water and local runoff, and 356 AF of imported water. It should be noted that this historical reuse supply to GWR occurred over a twelve (12) month period due to the dry winter season and that the basins did not need to remain available for storm water capture.

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 RW direct use demands, as reported by each of the IEUA member agencies. Direct use demands were provided according to pressure zone as well as by member agency for each of the 5-year planning period increments.

2.1 DIRECT USE DEMANDS

The direct use demands include uses for irrigation of golf courses, landscaping, parks, school yards, agricultural uses, 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. For purposes of the RWPS, the demands provided by the Agency for the Year 2015 are assumed to be existing demand conditions. The direct use demands were collected by the Agency from each of their member agencies.

Table 2.1 Existing and Projected Direct Use Demands by Member Agency

Member Agency	Demand Year (AFY)					
	Year 2015	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.

[2] The direct use demand projections were provided by member agencies

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)					
	Year 2015	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.

[2] The direct use demand projections are the member agency projections that were provided to IEUA.

2.2 EXISTING GWR BASIN DEMANDS

As described in Chapter 1, the Agency operates several GWR recharge basins. Not all of the basins are permitted, or have connections to receive reuse supply. The existing GWR basins that currently receive RW are listed in Table 2.3.

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 IEUA GWR Quarterly Reports , between April 2013 and March 2104,

It should be noted that RW recharge to the existing GWR basins shown in Table 2.3 occurred over 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 RW is used for recharge to allow the basins to fully capture the potential storm water and local runoff. However, during dry conditions when no potential storm water capture is anticipated, the Agency will be able to deliver RW to the GWR basins during these months.

3.0 RECYCLED WATER SYSTEM AND SUPPLY

This section provides a description of the reuse supply and existing distribution facilities for the RW Program operated by the Agency. Distribution facilities include items such as pipelines, reservoirs, booster pump stations, and pressure regulating valves that are used to deliver RW.

3.1 RECYCLED WATER SUPPLY

The Agency's reuse supply is generated from tertiary treated wastewater effluent meeting Title 22 unrestricted use standards from their regional wastewater recycling plants. The Agency recently prepared a Wastewater Facilities Master Plan (WFMP) that developed wastewater flow projections and addressed facility improvements. Descriptions of the facilities herein are based on the current published information, and do not necessarily reflect the latest facility updates and planning from the WFMP. Wastewater flow 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 (RP's). This information is provided in Table 3.1 and will be used as the reuse supply projections available to the RW Program.

Table 3.1 Recycled Water Supply Projections

Facility	Year 2015	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 RW 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

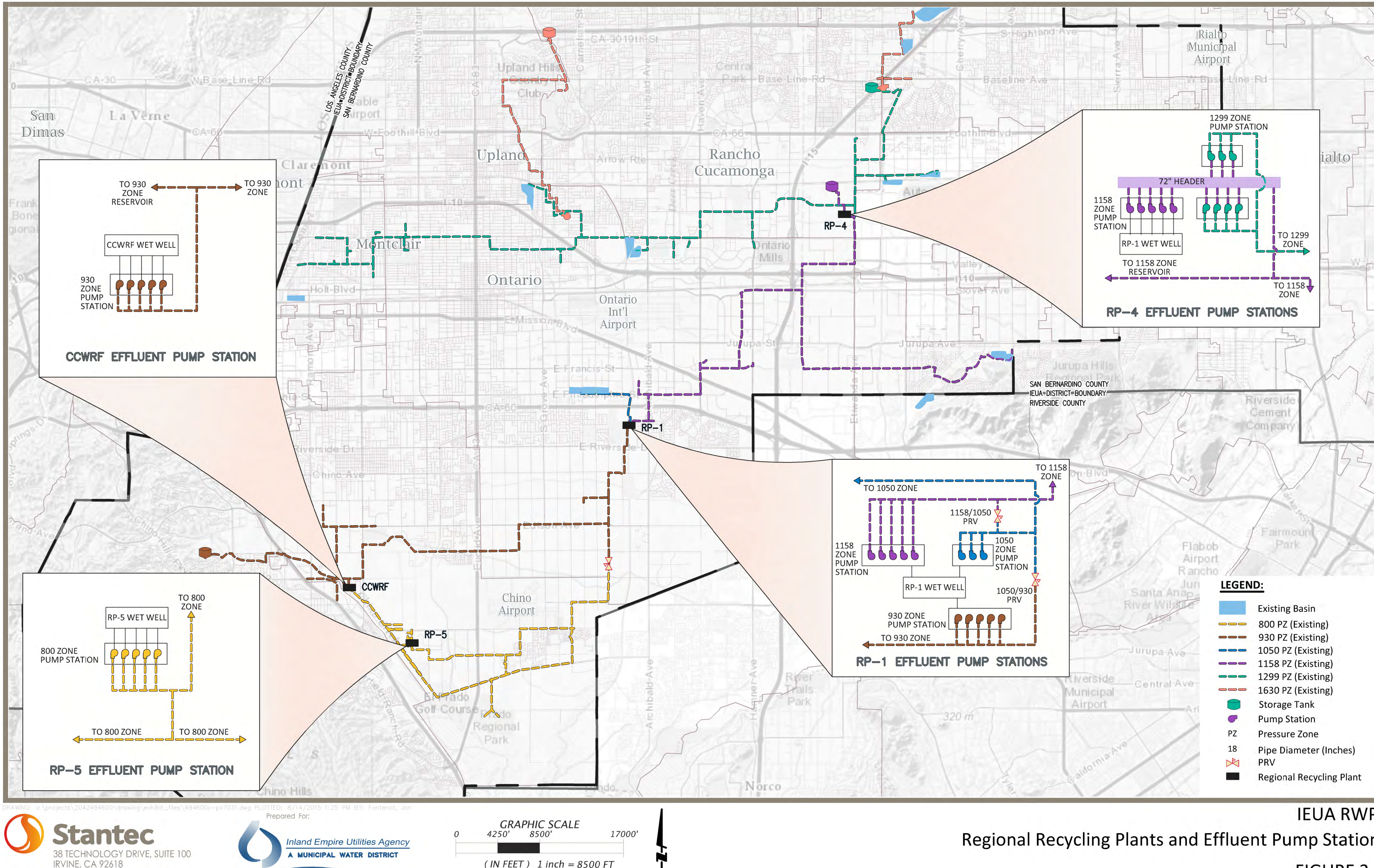
Regional Water Recycling Plant No. 1 (RP-1) is located in the City of Ontario near the intersection of State Highway 60 and Archibald Avenue. This facility was originally commissioned in1948 and has undergone several expansions to increase the design wastewater treatment capacity to the current 44.0 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 GWR 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 RW flows by gravity from the chlorine contact tanks to the RW pumping stations at RP-1. From these pumping facilities, the water is pumped into the RW distribution system.

There are three (3) sets of RW effluent pump stations that pump from RP-1 and supply three different pressure zones; the 930, 1050, and 1158 Pressure Zones.



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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 separate 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 motor. 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 RW since 1997. RP-4 treats an average flow of 10 MGD. 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 RW 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 RW 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 into the RW distribution system.

When the demand for utility water or RW is less than the amount of water being produced, the excess RW 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 motor. The pumps are controlled by maintaining the RP-4 wet well 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 Agency's Administrative Headquarters in the City of Chino, began operation in March 2004. The first phase of RP-5 was 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 the Agency's Carbon Canyon Waste Recycling Facility (CCWRF).

RP-5 includes several treatment processes that contribute to providing quality RW 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 RW 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 RW 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-5 wet well level at 13 feet.

Supply from RP-5 into the 800 Zone has different 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 start when the 930/800 PRV cannot maintain pressure. The 800 Zone Effluent Pump Station will start 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 RW flows by gravity from the chlorine contact tanks to the RW pumping station at CCWRF. From those pumping facilities, the water is pumped into the RW 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 CCWRF wet level at 13 feet.

Supply from CCWRF into the 930 Zone has different 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 wastewater effluent from the regional wastewater recycling plants deliver the reuse supply to the member agencies and customers via six pressures zones, several hundred miles of pipelines, three booster pump stations, three storage reservoirs, and four pressure regulating stations. These facilities are shown in Figure 3-2.

3.3.1 Pressure Zones

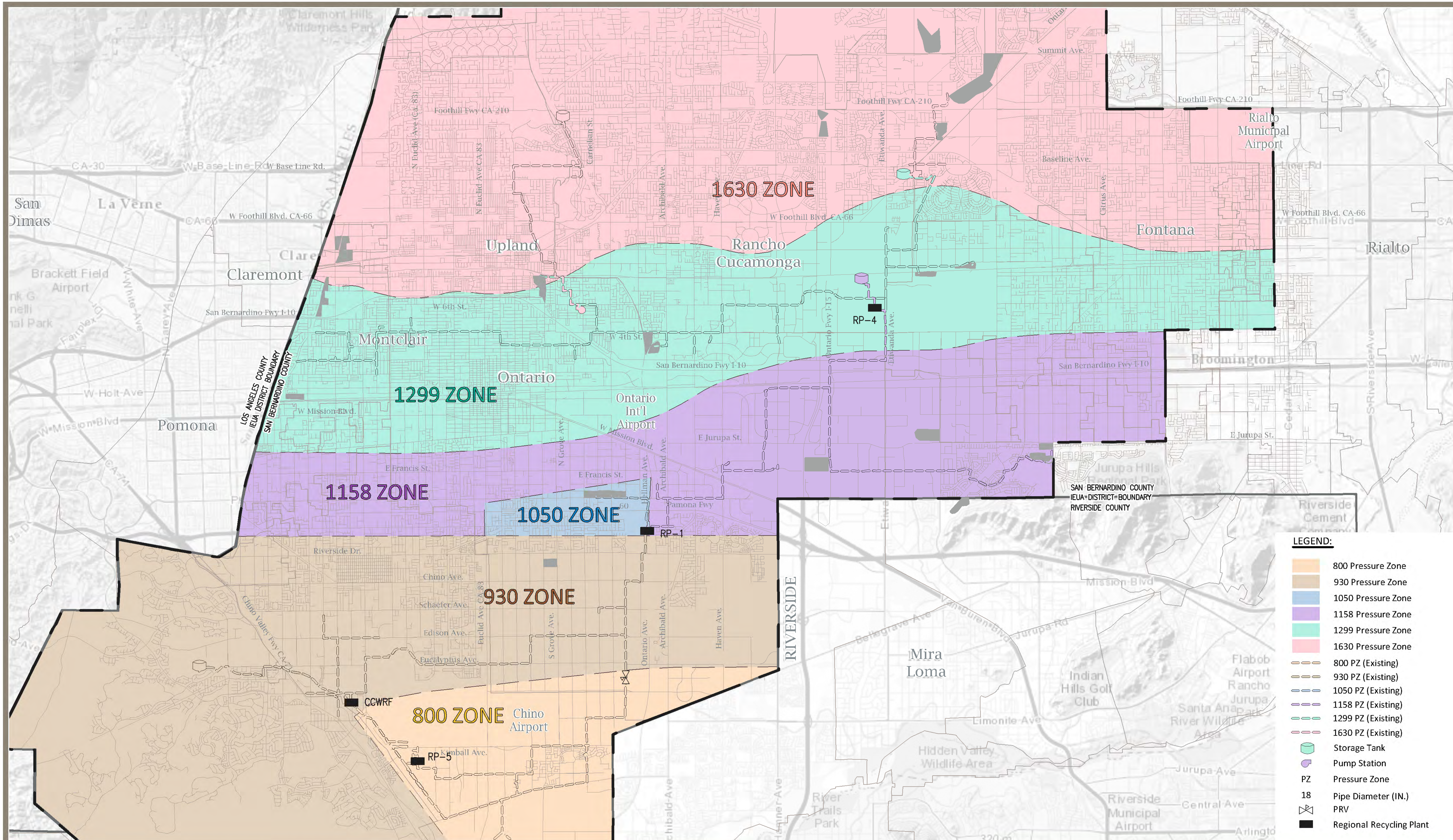
Six (6) pressure zones are utilized to deliver the reuse supply to the Agency's customers with the appropriate service pressures as shown below. These pressure zones are listed in Table 3.6 and illustrated in Figure 3-2. The pressure zones are established based on the following set of design criteria:

- Minimum regional service pressure = 50 psi
- Maximum regional system pressure = 150 psi
- Minimum Basin service pressure = 25 psi (assumes losses through metering/inlet control structure facility are accounted for)

The regional system pressures listed above are used to establish the pressure zones for the RW Program. Localized pressures near reservoirs, regulating valves, and pump stations may vary from those listed.

Table 3.6 Pressure Zone Characteristics

Pressure Zone/HGL	Minimum Service Elevation	Maximum Service 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
0 4250' 8500' 17000'
(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 RW system. The storage tanks provide equalization storage for the RW system beyond the delivery capacities of the supply sources due to peak demand characteristics. 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 RW distribution system from the four RP's, there are three (3) booster pump stations used to boost water from one pressure zone 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

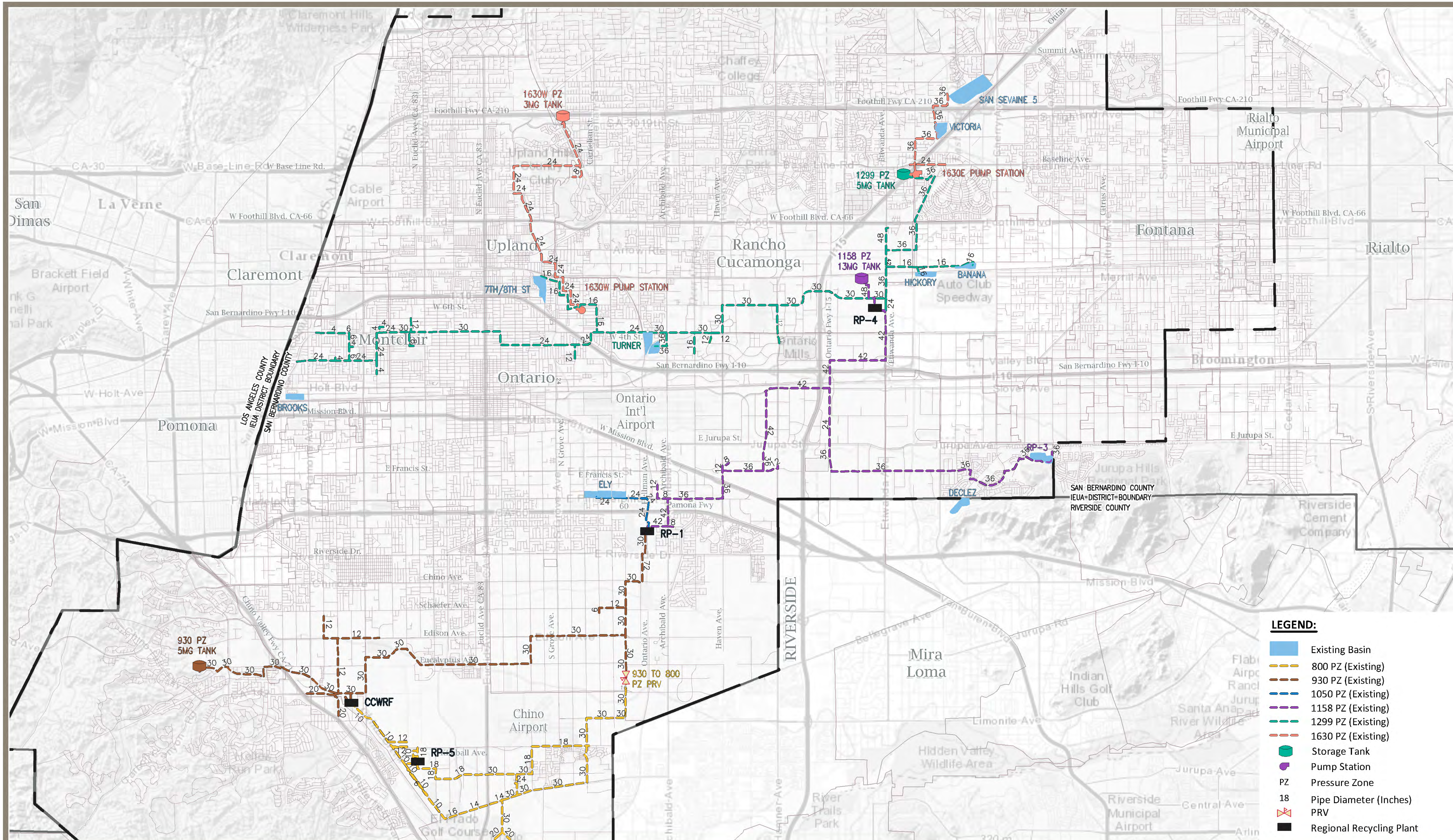
There are three (3) pressure reducing stations that allow RW to flow from a higher pressure zone down to a lower pressure zone. These pressure reducing stations are equipped with a PRV designed to open and supplement the lower pressure zone with RW when the downstream system pressure drops below a defined set point. Table 3.5 identifies the characteristics for each pressure reducing 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
0 4250' 8500' 17000'
(IN FEET) 1 inch = 8500 FT

IEUA RWPS
Existing Recycled Water System Conveyance Facilities

FIGURE 3-3

4.0 IMPLEMENTATION OF PROPOSED GWR BASINS

This section describes the proposed implementation strategy associated with the RWPS goal to increase GWR by maximizing RW recharge to the basins. The strategy proposed has a 20-year planning horizon, which is analyzed and planned in 5-year increments to Year 2035. The following will describe the process of selecting when GWR basins are to be connected to the RW system.

4.1 PROPOSED GWR BASINS

Section 2.2 in this report identified the existing GWR basins that are currently connected to the RW system and receive RW for recharge. The Agency operates several other basins that are currently configured only to recharge storm water, local runoff, and/or imported water. The new RW program assumes that each of these basins will be connected to the RW system and receive RW 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 currently operating as part of the GWR program for storm water/local runoff and imported water, and will require modifications and facilities to connect to the RW system to receive RW for recharge.

In addition to the existing basins that will be connected to the RW system, several other sites have been identified by the Agency as new basins that could come online in the future. These GWR 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 available GWR basins, with corresponding performance criteria that could be added to the RW GWR program. Figure 4-1 is a map identifying the location of each of these GWR basins.

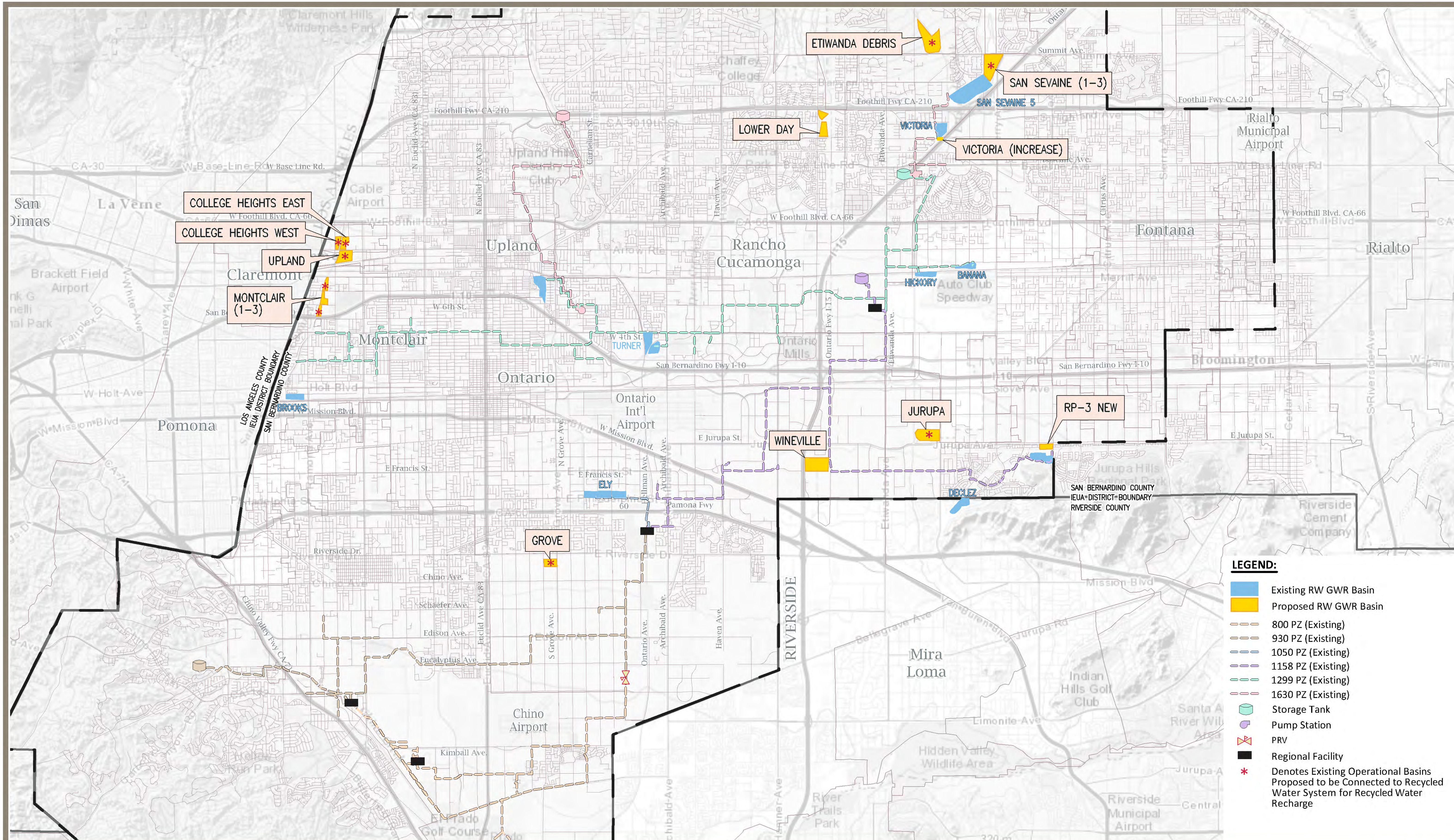
Table 4.1 Proposed GWR Basins to Receive Recycled Water

Basin/Site	Basin Status	Size (acres)	Storage Volume (AF)
Lower Day	RW Connection[1]	15.0	179
Etiwanda Debris	RW Connection[1]	14.6	73
San Sevaine (1-3)	RW Connection[1]	21.4	99
Victoria (Increase)	N/A[3]	17.4	237
Lower San Sevaine	New[2]	23.0	230
Wineville	New[2]	30.0	240
RP-3 (New Cell)	New[2]	3.5	35
Vulcan	New[2]	30.0	450
College Heights East	RW Connection[1]	6.2	112
College Heights West	RW Connection[1]	5.8	110
Grove	RW Connection[1]	10.0	114
Jurupa	RW Connection[1]	17.0	249
Montclair (1-3)	RW Connection[1]	22.5	518
Montclair 4	RW Connection[1]	5.8	139
Upland	RW Connection[1]	16.6	392
	Total	**238.8**	**3,177**

[1] "RW Connection" implies that the basin is currently operating as part of the GWR program for storm water/local runoff and imported water, These basins will require modifications and facilities to connect to the recycled water system to receive RW recharge.

[2] "New" is a new basin that is currently not in the GWR program.

[3] Existing Basin and no RW improvements will be required. Existing RW turnout structure is adequate for the proposed basin improvements.



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Inland Empire Utilities Agency
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GRAPHIC SCALE
0 4250' 8500' 17000'
(IN FEET) 1 inch = 8500 FT

IEUA RWPS
Existing and Proposed Recycled Water GWR Basins

FIGURE 4-1

4.2 GWR BASIN IMPLEMENTATION

The strategy for implementing the proposed GWR basins listed in Table 4.1 is based on the basins coming online in the next 20 years, with a subset of GWR 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 while minimizing facility improvements and permitting requirements.

Identifying GWR basins in each 5-year increment was performed by rating the basins against a set of criteria. A benefit score, or weighting factor, was then determined for each basin based on the criteria below. The following sub-sections briefly describe the evaluation criteria and methodology used for this analysis.

The proposed criteria, definitions and weighting factors for evaluating each of the GWR basins in the RWPS are provided in Section 4.2.1 below.

The evaluation criteria described below are grouped into two major categories, as they will either have impacts related to infrastructure costs, or readiness to proceed due to scheduling constraints and implementation ability.

4.2.1 Evaluation 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.

Costs Related Criteria

- *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 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 basins located within pressure zones with the most available capacity. The weighting factor assigned to each pressure zone are as follows:

Pressure Zone Service Area	Weighting Factor
1050	1 pt
1158	5 pts
1299 West Area	1 pt
1299 East Area	5 pts
1630 West	1 pt
1630 East	10 pts

The table above does include 800 and 930 Pressure Zones since these pressure zones do not include a recharge basin.

- *Infiltration Rate* – the average infiltration rate for each basin was utilized in determining the total GWR demand for the pressure zones. The basins were ranked from 1 to 15 depending on the basin's infiltration rate, in acre-feet per month (AFM). The higher the infiltration rate, the higher the ranking and corresponding weight assigned. The weighting factor assigned to each basin based on its infiltration rate are as follows:

GWR Basin	Average Infiltration Rate (AFM)	Weighting Factor
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

- *Basin Fill Rate* – basin fill rate was established by a 14-day fill rate for each basin in order to allow the basins a complete fill cycle in the spring and fall seasons to maximize the recharge capabilities of the GWR program. The fill rate was determined by the basin storage volume divided by 14 days. Basin fill rates are listed in Table 4.4. Similar to infiltration rate, the basins are ranked from 1 to 15 depending on the basins fill rate. Basin having the highest required fill rate ranked with the lowest weight. This implies that a basin requiring a higher flow rate will have the most impact to the existing system and will require increased costs for system upgrades and improvements.

GWR Basin	14-Day Fill Rate (MGD)	Weighting Factor
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 weights each basin based on its location relative to existing RW system facilities. For example, a basin that is immediately adjacent to an existing transmission main would have a higher weight to come online sooner than a basin that is further away, as it would require additional pipelines to receive RW. The weighting factor assigned to each basin based on its location to existing RW facilities are as follows:

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 storm water, local runoff, and/or imported water. These basins are identified as "RW Connection", since they will only require the modifications necessary for them to be connected to the RW system. All other basins are being assigned as "New" and will have a higher weighting factor due to increased costs associated with basin improvements. The weighting factor assigned to each basin based on its connection status is as follows:

Basin Status	Weighting Factor
RW Connection	10 pts
New	1 pt

- *Permitted* – basins are weighted based on whether or not they are already permitted. Some existing basins may not be permitted for RW recharge. Basins already permitted were assigned a higher weight than those not, as it may be easier to commence RW recharge. The weighting factor assigned to each basin based on its permit status is as follows:

Permit Status	Weighting Factor
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 the Agency to recharge the basin with RW. Basins located on property owned by IEUA or SBCFCD were given higher weight because of current agreements already in place for RW recharge. The weighting factors assigned to each basin based on the property owner are as follows:

Property Owner	Weighting Factor
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 and committed through the 2013 CBWM RMPU. Basins identified in the 2013 CBWM RMPU will receive a higher weight. The weighting factor assigned to each basin based on 2013 RMPU status is as follows:

Planned in RMPU	Weighting Factor
No Yes	1 pt 10 pts

- *Production Wells* – some basins have potable production wells nearby for the recovery of groundwater. Basins that have production wells within a 500-ft radius and/or less than a 6-month travel time were given a lower weight due to increased permitting requirements. The weighting factor assigned to each basin based on the location of existing or planned production wells is as follows:

Production Wells	Weighting Factor
No Existing Wells Existing Wells	10 pts 1 pt

4.2.2 Proposed Basin Implementation Strategy

For Years 2020, 2025, 2030, 2035, and Ultimate analysis scenarios, it was assumed that three (3) basins would come online in each 5-year planning period. This provided for an even and balanced distribution of RW to GWR basins while maintaining the goal to maximize the amount of GWR in the near-term with minimal investment.

The evaluation criteria and corresponding weighting factors described in Section 4.2.1 were used to prioritize which of the basins are to be implemented within each 5-year planning period.

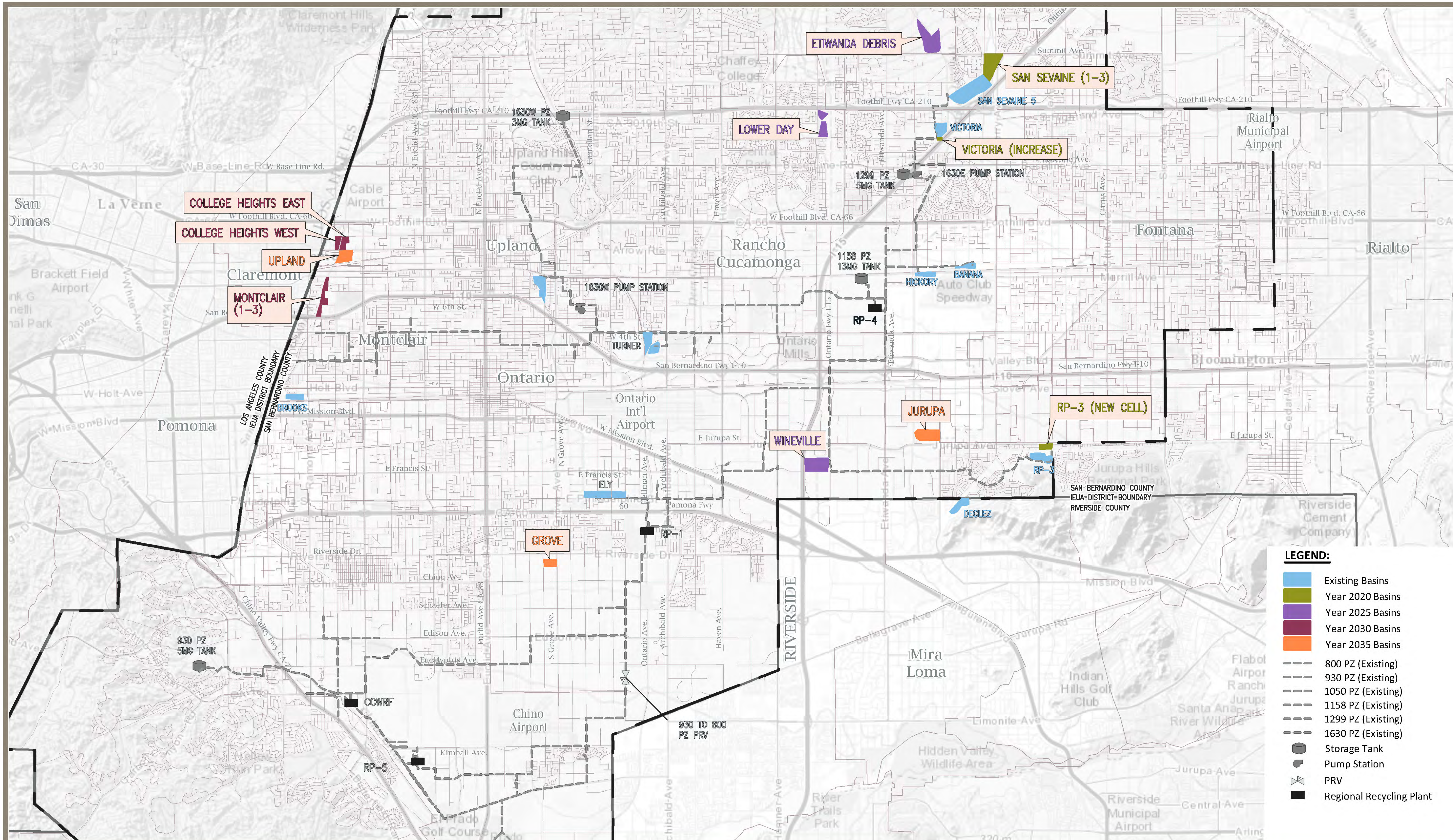
It should be noted that the priority order in which the basins were grouped and implemented also included consideration for total GWR demand. The implementation order of the GWR basins was modified as necessary to balance the GWR demand as evenly as possibly throughout the entire 20 year RWPS planning horizon.

The proposed GWR Basin implementation schedule is shown in Table 4.2. Basins with the highest points were identified and ranked as the highest priority, or first to implement. The GWR basins shown for Year 2020 and 2025 are located in pressure zones near existing infrastructure that has sufficient capacity to supply the additional GWR demand without significant improvement costs. It should also be noted that majority of these GWR basins are already permitted and acceptable to receive RW.

The GWR Basin implementation schedule is 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	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	RP-3 (New Cell)	1	14	15	10	1	10	10	10	10	**81**	**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	Wineville	10	4	10	5	1	10	10	10	10	**70**	**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	1	1	4	1	1	**24**	**13**
	Lower San Sevaine	5	6	13	1	10	10	2	10	10	**67**	**14**
	Montclair 4	1	3	8	5	10	1	6	1	1	**36**	**15**



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GRAPHIC SCALE
0 4250' 8500' 17000'
(IN FEET) 1 inch = 8500 FT

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 the reuse supply and direct use demands to determine the amount of reuse supply that will be available for GWR recharge into the existing and proposed GWR basins.

5.1 EXISTING AND PROJECTED ANNUAL DEMANDS

The annual demand projections provided by the Agency 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				
	Year 2015	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[1]	**37,289**	**35,555**	**35,406**	**37,194**	**39,311**

[1] The Surplus shown in this table is a gross annual surplus total and does not consider monthly supply deficits due to maximum month or peak direct use demand periods.

5.1.1 Monthly Demands

Direct use demands for existing Year 2013 conditions were obtained from the 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 period. 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 period.

5.1.1.1 Santa Ana River Base Flow (SARBF) at Prado Obligation

In addition to the current direct use demands, the Agency maintains an annual base flow obligation to the Santa Ana River at Prado Dam. The Agency typically meets the SARBF at Prado Obligation through effluent discharge from each of the RPs.

The SARBF at Prado 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 in the RWPS for facility sizing purposes. Approximately 2.0 MGD of the 12.5 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 and CCWRF or RP-1. This study assumes that the SARBF at Prado Obligation is met by RP-5 and CCWRF first, as it is the Agency's desire to keep as much RW at RP-1 as possibly for GWR. Therefore, RP-1 was assumed to be supplementary supply as necessary for meeting the SARBF at Prado obligation.

The supply priority assumed in the RWPS was to first meet the SARBF at Prado Obligation than direct use demands. Based on historical data, the SARBF at Prado Obligation demand is assumed to be approximately 40% of the total annual obligation during the winter months of December, January, and February to be in compliance with the obligation agreement. For the purposes of the RWPS, the SARBF at Prado demand obligation was limited to 40% of the annual obligation even if there was additional reuse supply available for contribution. Meeting the SARBF at Prado obligation during the winter months is advantageous due to the reduced direct use demands, but there are limitations per the obligation agreement. The minimum flow rate to SARBF at Prado Obligation in any one month is 3.5 MGD, or approximately 5.4 CFS on average. This constraint is primarily due to the RP's ability to turndown de-chlorination facilities.

5.1.1.2 Existing and Projected Wastewater Supply

The wastewater flow projections were provided by the Agency 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

As shown in Table 5.2, 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 direct use demands scenario, the existing GWR Basins were assigned a GWR demand which corresponds to its 14-day fill rate. 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 reuse supply delivered to the GWR Basins was assumed to flow daily for a 12-hour period outside the normal peak irrigation period during the night; therefore, the instantaneous flow rate is twice the daily average flow rate. Reducing daily operation of the GWR basins to 12-hours during the day was done due to low availability of reuse supply during the night time hours. During the night time hours, the wastewater flows are low and reuse supply from each RP is limited. Additionally, the peak irrigation demands occur during the night which utilizes much of the reuse supply available during this period. Typically, more reuse supply is available from each RP during the day, outside the peak irrigation demand period.

This operational strategy to deliver GWR during a 12-hour day time period allows the Agency to increase the GWR priority and maximize the available reuse supply. Distribution facilities and basin turnout capacities will need to be sized accordingly to accommodate these higher flow rates.

The 14-day fill cycle repeats every 6-week period for each basin when possible. Some of the basins with large storage volumes and reduced infiltration rates required additional time between filling cycles. For the analysis in section 5.1.3, the GWR basin demands are limited by the supply of RW from the regional recycling plants.

It should be noted that all of the existing and proposed basins are located in 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 or reuse 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 RW 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 RW 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 reuse 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)[1]	-	-	-	-	-
Northern Service Area Supply/(Deficit)[2]	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[3]	7,194	7,579	8,379	9,487	10,440

[1] Southern Service Area has a deficit that is supplemented from the surplus from RP-1 of the Northern Service Area.

[2] The Northern Service Area surplus shown accounts for the supplemental supply delivered to the Southern Service Area via RP-1. This surplus is available to GWR program.

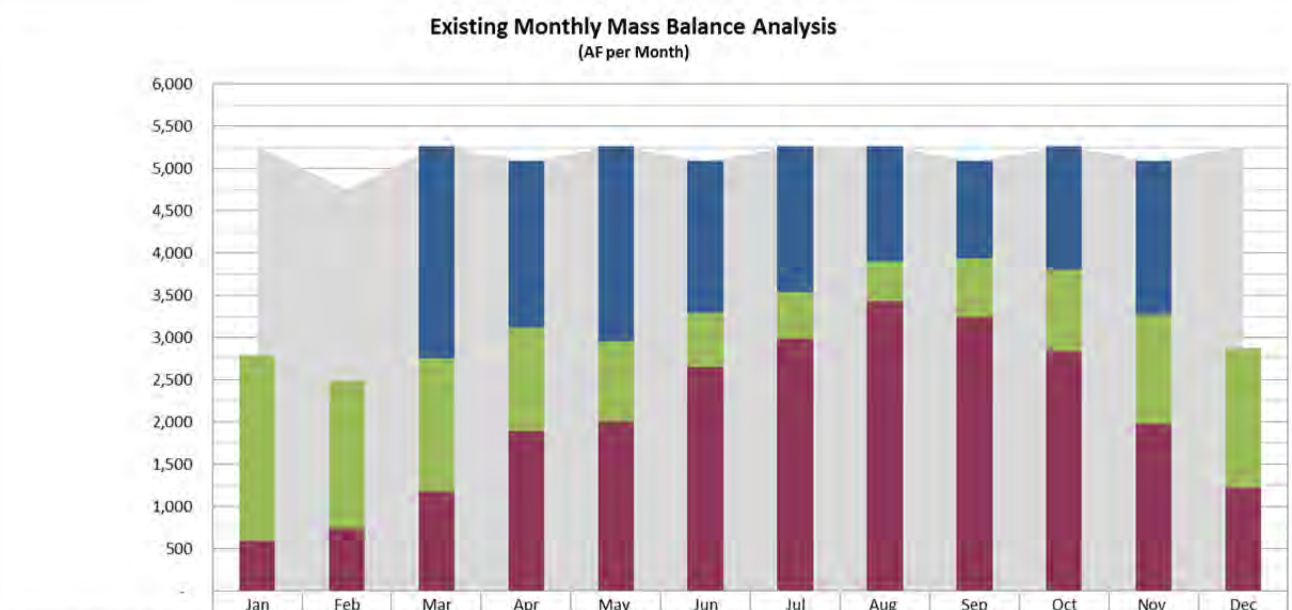
[3] The Un-Used Winter Months RW Surplus could be utilized in dry years for GWR if no storm water or local runoff water needs are to be captured.

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 RW Program as a whole. The monthly mass balance assumes a 9-month GWR operation. However, it should be noted that the un-used surplus RW during the winter months could be utilized during dry years while no storm water or local runoff is to be captured.

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

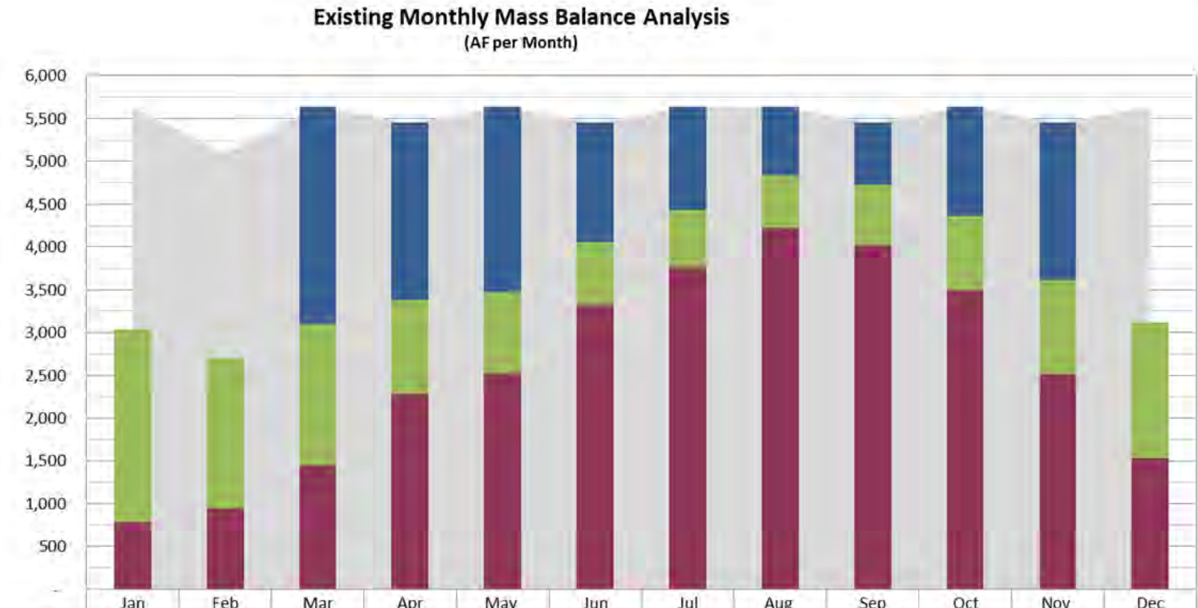


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,261	4,752	5,261	5,091	5,261	5,091	5,261	5,261	5,091	5,261	5,091	5,261
Groundwater Recharge	-	-	2,506	1,979	2,309	1,797	1,720	1,355	1,157	1,457	1,817	-
SARB at Prado Obligation	2,201	1,746	1,581	1,224	951	644	555	485	690	970	1,298	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

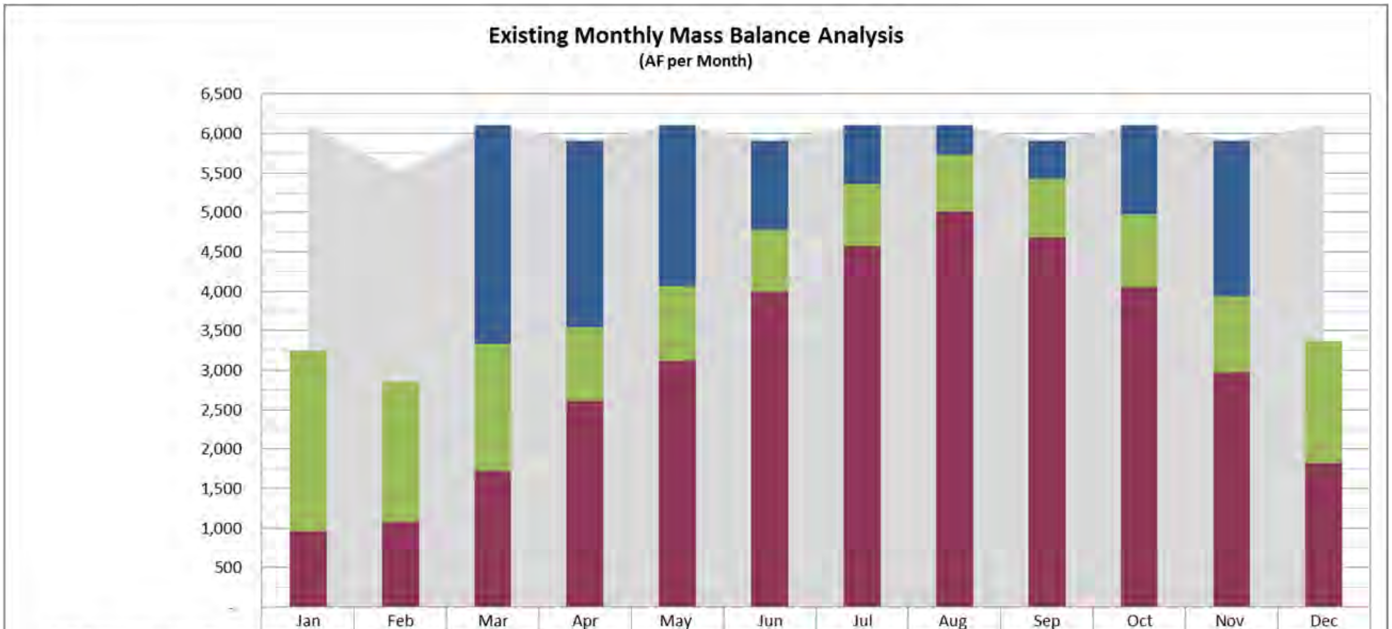


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,632	5,087	5,632	5,450	5,632	5,450	5,632	5,632	5,450	5,632	5,450	5,632
Groundwater Recharge	-	-	2,529	2,073	2,165	1,389	1,196	797	726	1,267	1,835	-
SARB at Prado Obligation	2,255	1,753	1,649	1,100	942	737	666	618	709	875	1,105	1,591
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

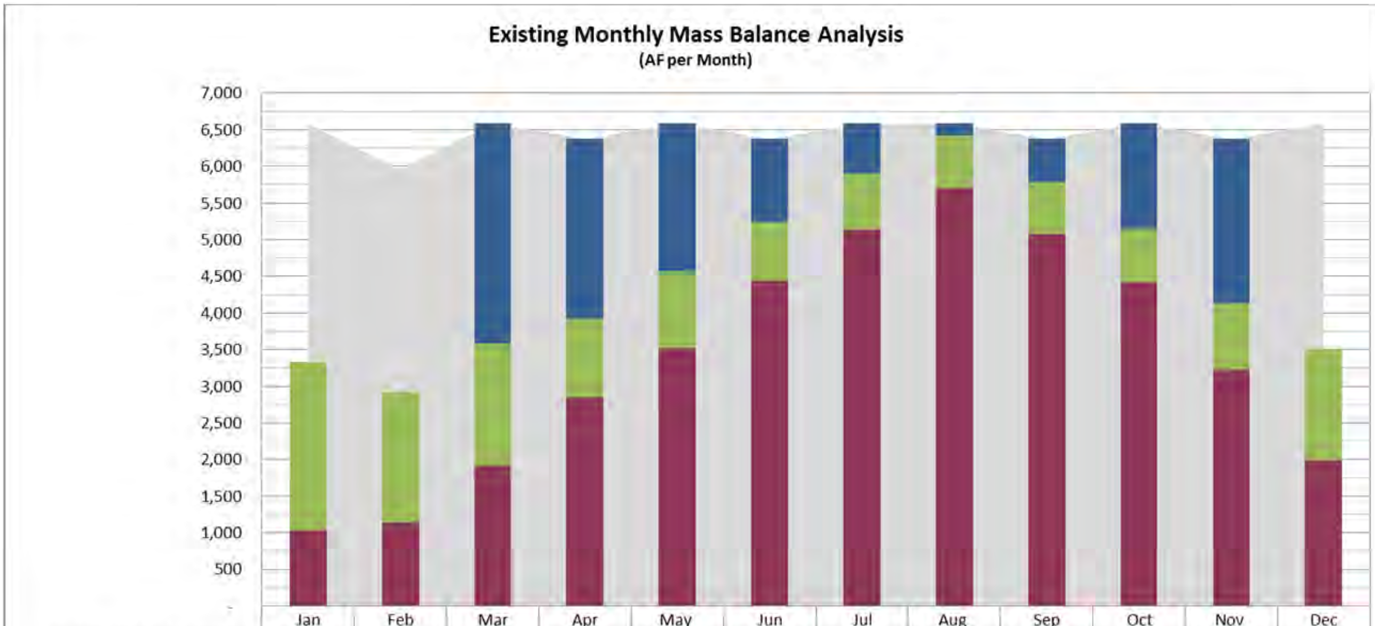


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,108	5,517	6,108	5,911	6,108	5,911	6,108	6,108	5,911	6,108	5,911	6,108
Groundwater Recharge	-	-	2,777	2,373	2,042	1,131	742	374	485	1,132	1,970	-
SARB at Prado Obligation	2,289	1,767	1,605	924	946	783	790	723	743	923	967	1,542
Direct 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

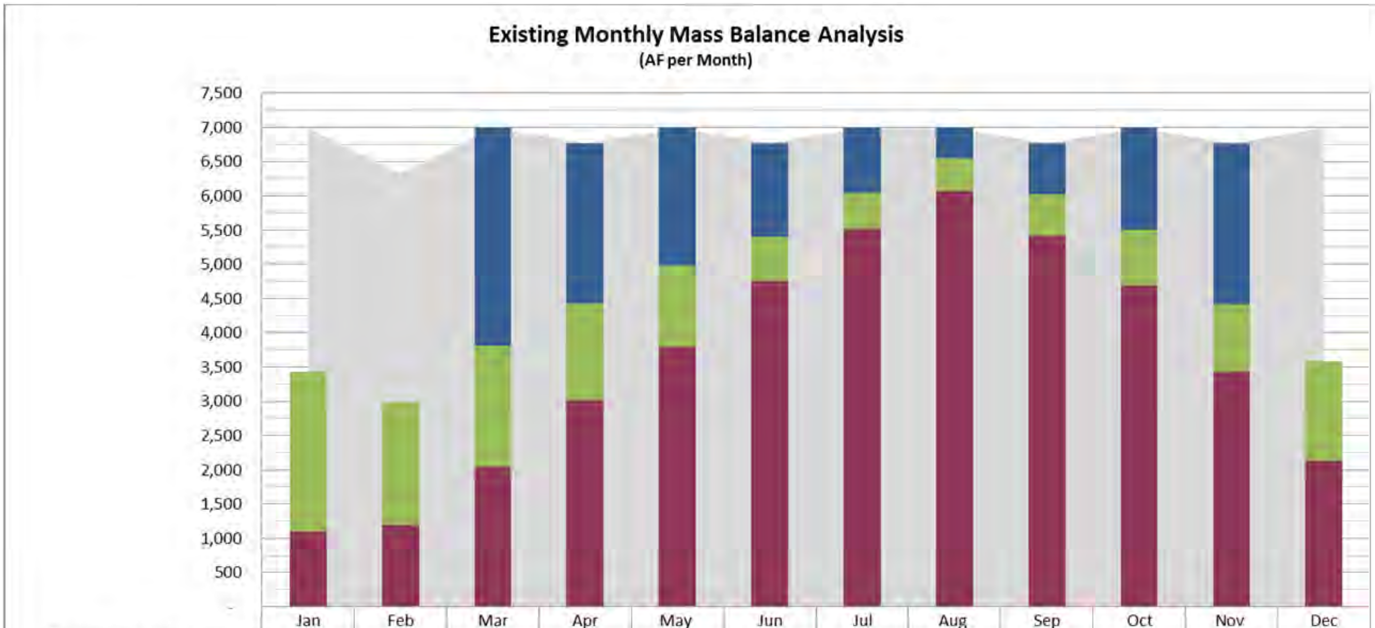


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,583	5,946	6,583	6,371	6,583	6,371	6,583	6,583	6,371	6,583	6,371	6,583
Groundwater Recharge	-	-	2,999	2,452	2,011	1,128	686	166	589	1,433	2,243	-
SARB at Prado Obligation	2,297	1,782	1,667	1,073	1,053	799	761	714	700	733	904	1,517
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.	Annual
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(MGD)	(AFY)
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 annual volume of additional reuse 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 volume of water available to the GWR could be increased if additional external supply is provided to supplement the Southern Service Area. Alternatively, the Southern Service Area deficit could also be eliminated if either a change in direct use demand occurs from increased irrigation efficiency or a non-potable water source is connected into the RW system. For the purposes of the RWPS, the additional supply could be from either of these or other sources. This analysis will only identify the quantity of supply needed to eliminate the Southern Service Area deficit.

Table 5.11 is provided to identify the additional supply for each planning year that would be required for the Southern Service Area.

Table 5.11 Additional Supply Needs to the Southern Service Area

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area RW 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 Additional External Supply Needed for Southern Service Area	**6,056**	**5,865**	**4,919**	**3,484**	**3,028**

[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 available water from RP-5 and CCWRF after the direct use demands and Min. Base Flow to SARBF at Prado Obligation are used. This supply is typically only available during the winter or low direct use demand months.

As shown in Table 5.11, approximately 5,000 AFY of additional supply would be needed to supplement the 800 and/or 930 Pressure Zones. With the growth anticipated in the 930 Pressure Zone, it would be recommended to connect an external supply into the 930 Pressure Zone. The additional supply could then be pressure reduced through the existing 930/800 PRV if supplemental supply to the 800 Pressure Zone if needed without additional pumping facilities.

5.1.5 Supply Needs to Maximize GWR

This section investigates the maximum potential of GWR assuming additional RW supplies would be acquired. Similar to Section 5.1.4, the supply could either be from an external RW intertie, such as the one currently being studied with Western Riverside County Regional Wastewater Authority, reductions in direct use demands or other non-potable supply connected to the RW system.

The GWR maximum potential was previously investigated in a separate study for the Agency and addressed in the Technical Memorandum, dated December 13, 2013, entitled "Recycled Water System Hydraulic Analysis for the Enhanced GWR Program." The Technical Memorandum assumed that supply was unlimited and identified system improvements needed to deliver the maximum RW to the GWR facilities. The GWR flows from the December 2013 TM established GWR basin demands based on the 14-day fill period cycle throughout the 9-month operation period, as described in Section 4.2.1. The analysis assumed no RW system supply limitations or constraints on the capacity or performance of the GWR basins.

In order for the GWR program to operate in this fashion, additional supplies would need to be acquired. Table 5.12 shows the volume of additional supply that would be needed for each planning year.

Table 5.12 External Supply Needs to Maximize GWR

Description	Planning Year				
	Year 2015	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Maximum 9-Month GWR Program[1]	33,776	33,776	33,776	33,776	33,776
Proposed RWPS 9-Month GWR Program[2]	16,095	13,977	13,027	13,707	14,871
GWR Program Difference	17,681	19,799	20,749	20,069	18,905
Total External Supply Needed for Maximum GWR	**17,681**	**19,799**	**20,749**	**20,069**	**18,905**

[1] 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*". This Maximum GWR Program assumes no limitations as to recycled water supply or groundwater basin capacity.

[2] The Proposed 9-Month GWR Program flows are based on the net available recycled water supply as shown in Table 5.4 herein.

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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. The GWR goals for the hydraulic model analysis were previously presented in Section 5.1.2, Table 5.3.

6.1 HYDRAULIC MODEL ANALYSIS

The Agency's hydraulic model of the RW system was created using InfoWater modeling software. The Agency's existing model was updated and the revised version was utilized for the RWPS 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 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 reuse supply, after direct use demands were met. The remaining reuse supply available after direct use demands and SARBF at Prado Obligation are met is available for GWR.

Table 6.1 shows the demand conditions used for the hydraulic model analysis. The average demands (AD) for the direct use, Prado, and GWR shown in the table are the AD for the months of March, April, May and November. The maximum demand conditions (MD) are the maximum day direct use demand conditions. The values for SARBF at Prado Obligation and GWR are based on the average monthly demand between June through 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.

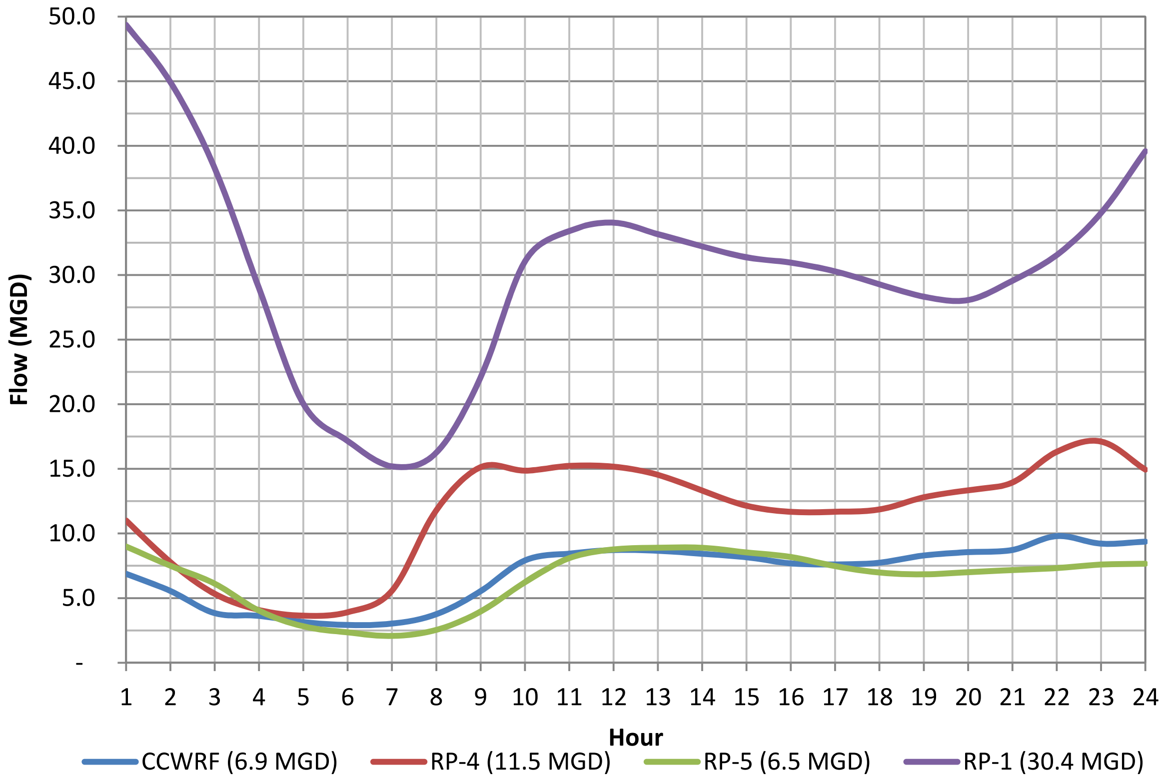
6.1.1 Summary of Model Analysis Assumptions

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. (No GWR is assumed during the wet winter months.) 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. Average day demand conditions are assumed to be approximately the spring and fall months. Maximum day demands occur the summer months, in particular August and September. Appendix B provides the information regarding the basins volumes and infiltration data, as well as which basins will be supplied by RW.

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 the Agency 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 RW 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 RW.

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 investigated the RW system's ability to meet the projected direct use demands, without any flow to the GWR basins. This analysis is intended to produce a set of recommendations that are directly related to meeting maximum day direct use demands as shown in Tables 2.2 and 6.1. Only the summer maximum day demand conditions were analyzed in this analysis.

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 12,620 lf. An alignment study is recommended prior to final design to verify alignment in Kimball Avenue is feasible. The second improvement area is the RP-1 1158 Zone Recycled Water Effluent Pump Station. This pump station operates too far to the right 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 pumps.

6.2.3 Year 2025 Direct Use Demands Analysis

The Year 2025 analysis showed deficiencies in the 1299 Zone, 930 Zone and in several RW 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 pumps 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 high 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 meet 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.

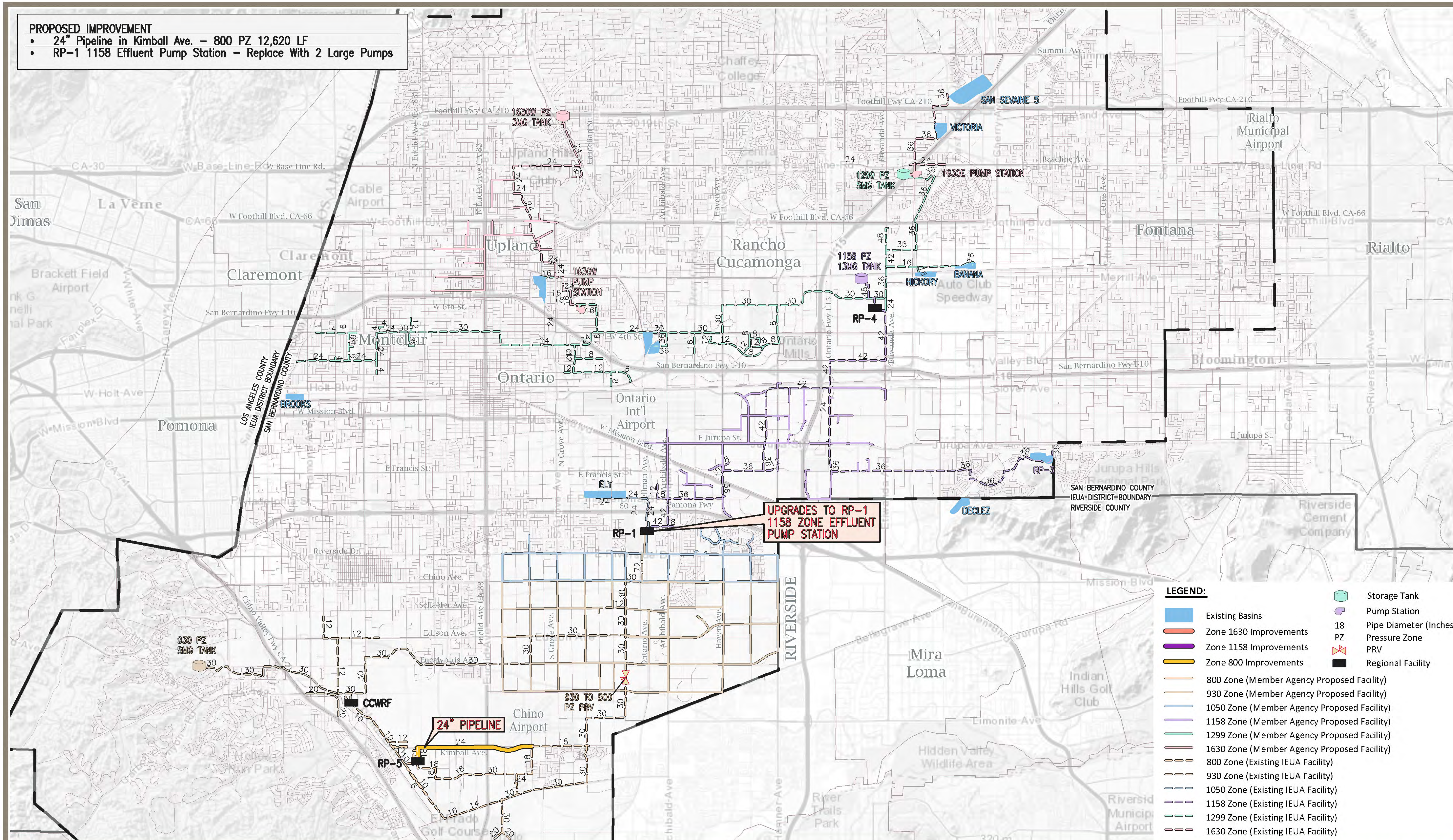


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FIGURE 6-3

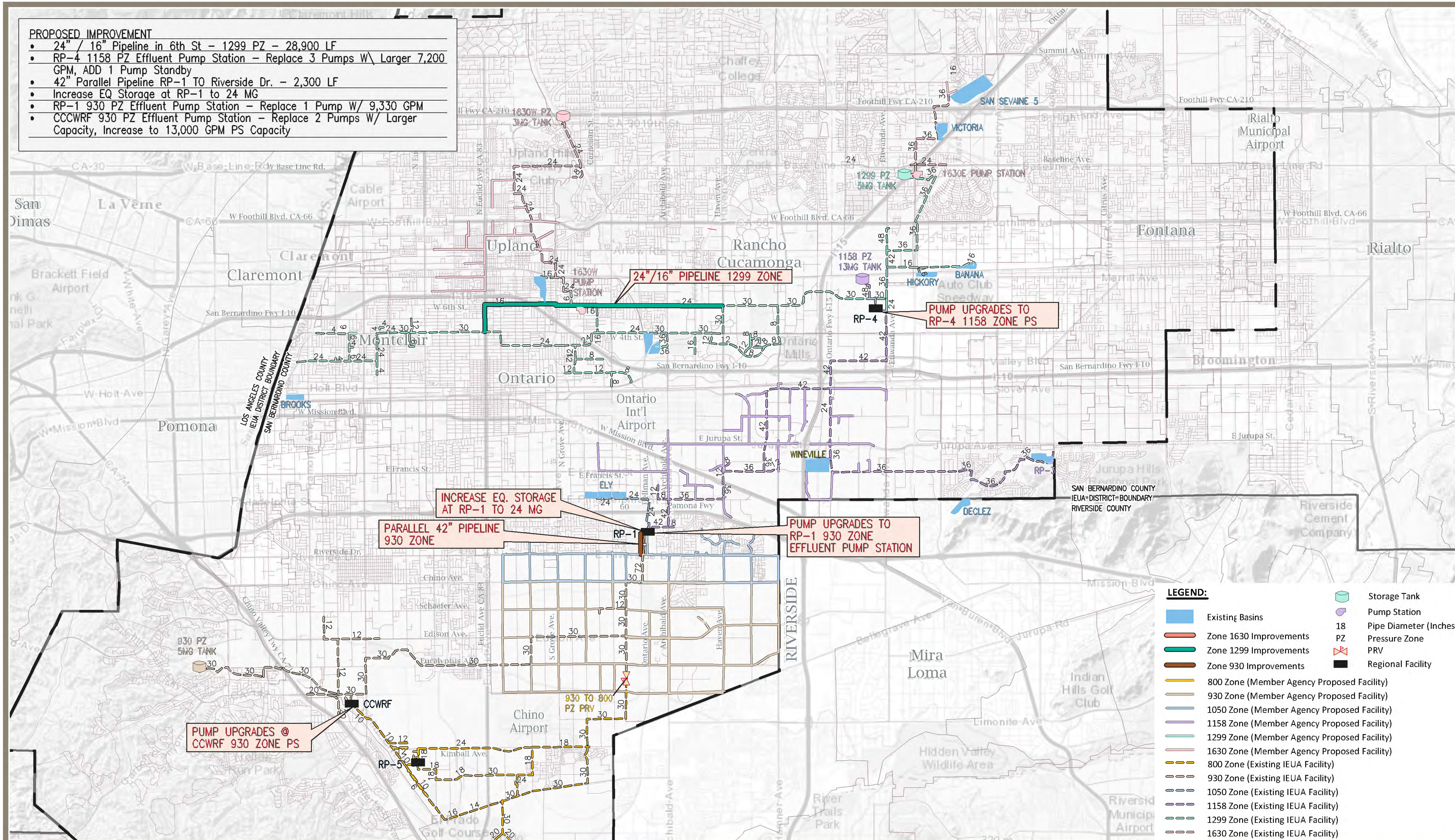

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FIGURE 6-4

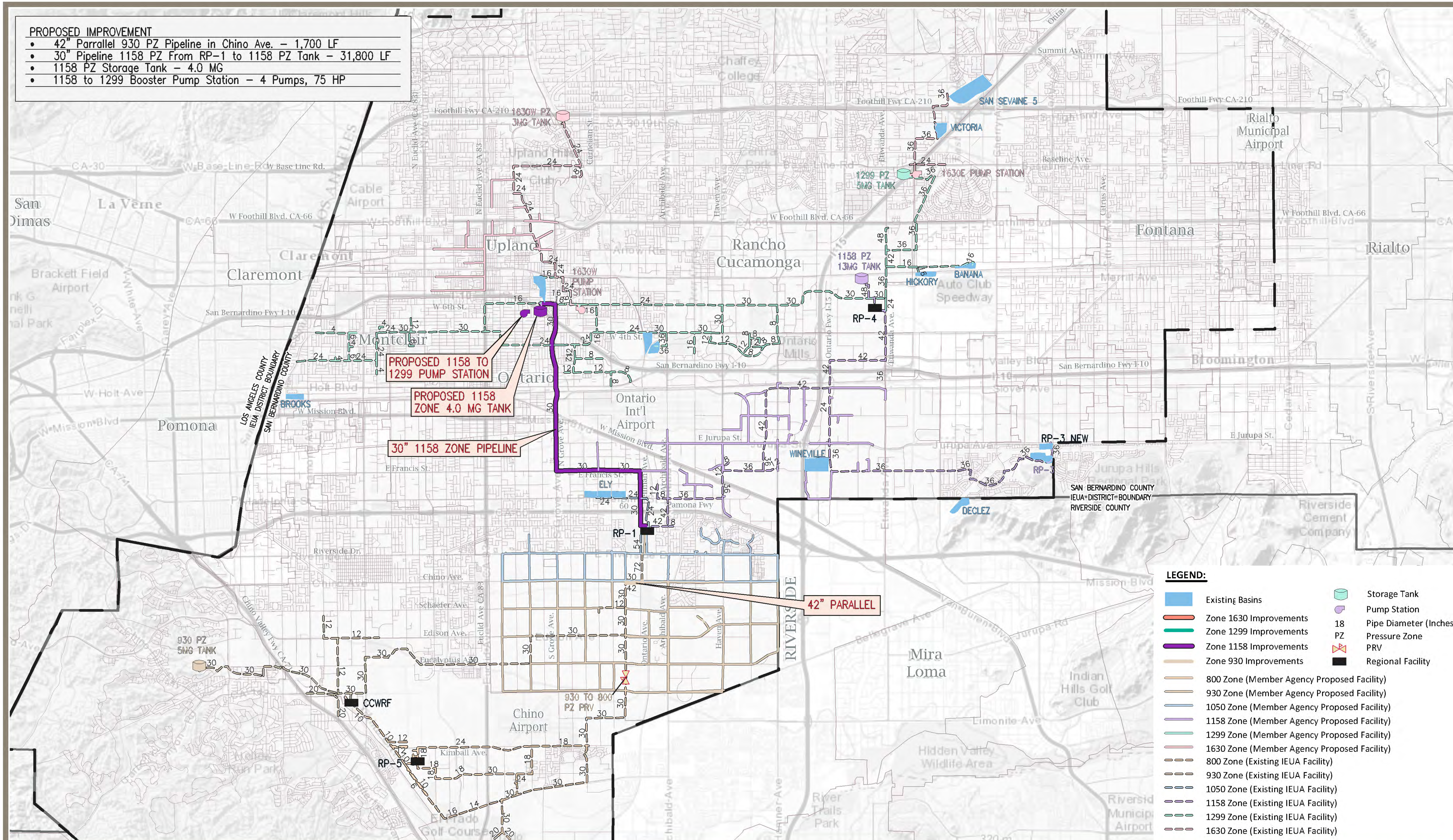

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FIGURE 6-5

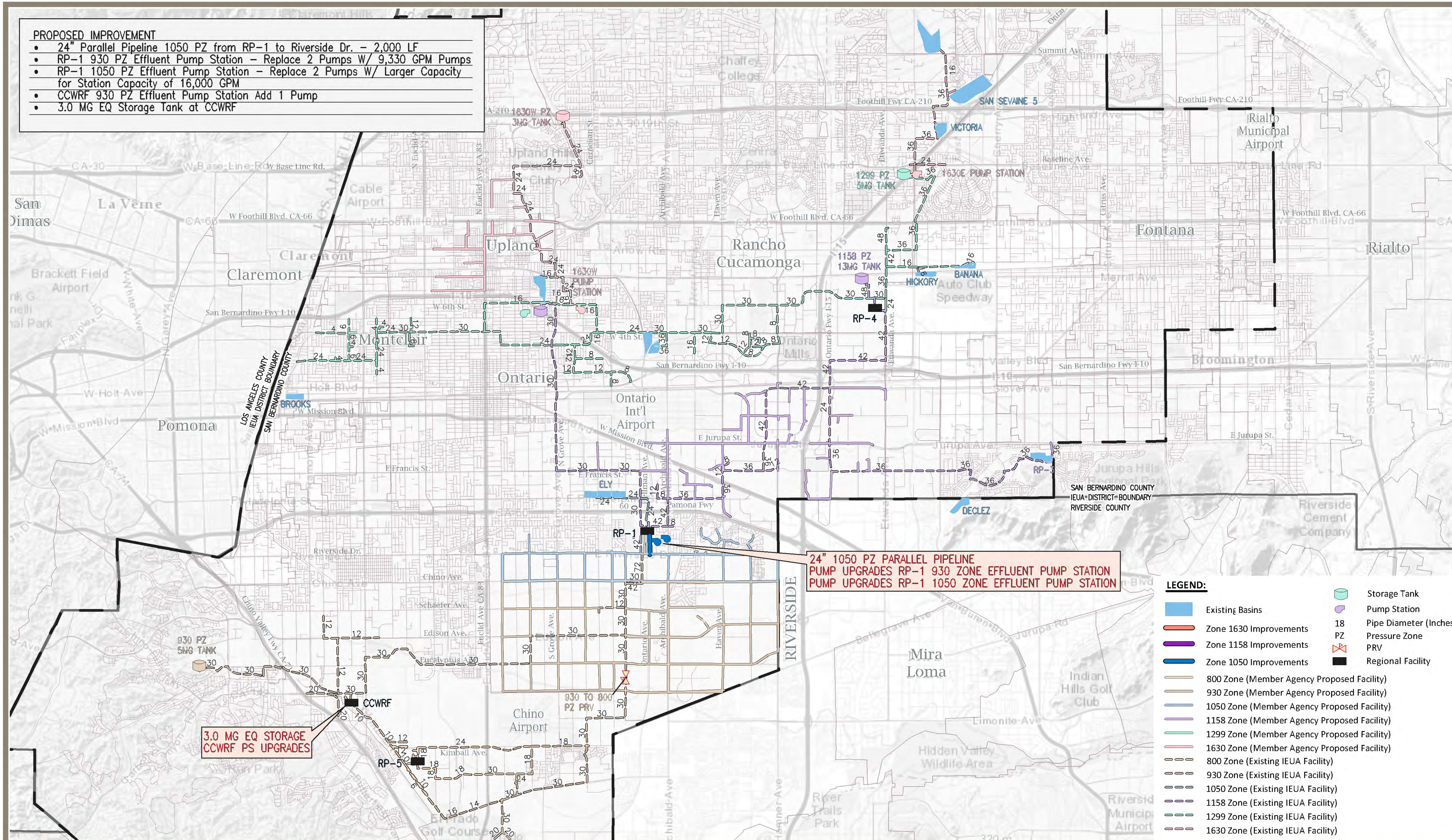

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FIGURE 6-6

6.3 GWR IMPLEMENTATION ANALYSIS AND IMPROVEMENTS

6.3.1 Existing GWR Conditions and Improvements

Existing GWR 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. For both average and maximum demand, the results of the model show that no system improvements are needed other than to increase turnout capacities at some of the basins. The turnout capacity upgrades are required since the GWR Implementation program of the proposed 9-month period while flowing 12-hour daily operations results in recharging more reuse supply in a shorter period of time than under current operations. 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 Capacity (cfs)	Proposed Turnout Capacity (cfs)
Ely (1-3)	6.00	6.2
Hickory	4.00	4.6
Turner	8.00	9.3
Victoria	8.00	10.5

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 RP-3 (New Cell), 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 flow rate 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 low 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 Agency's RW system and 1630E pressure zone.

Before adding any proposed improvements, 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 provide suction pressure for 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 filling, 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 Pumps

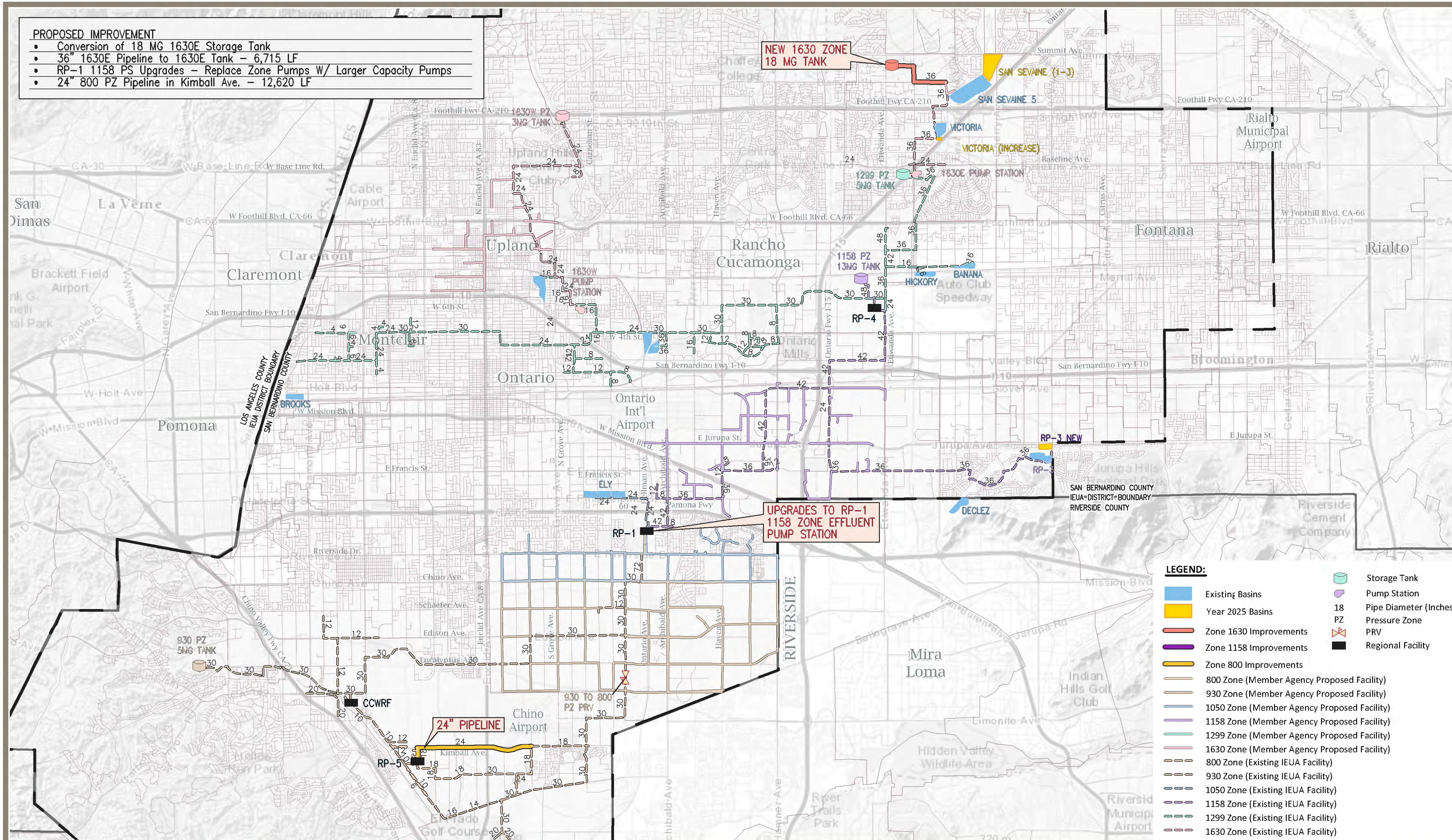

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FIGURE 6-7

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: Wineville, 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 the far right side of the pump curve. Therefore, for reliability it is recommended to add two new pumps of equal size to the existing pumps or replace a minimum of two 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 be 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

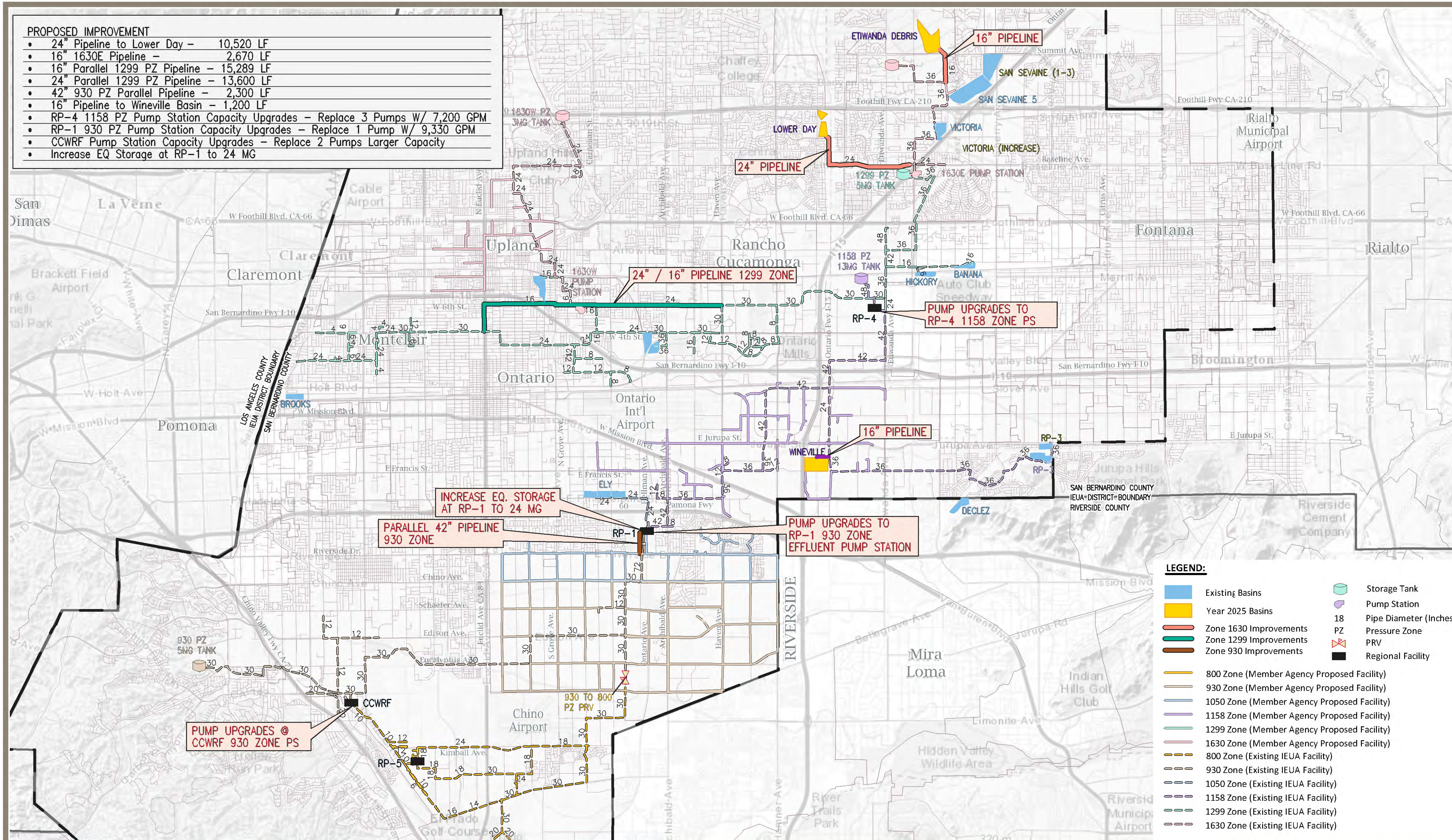

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FIGURE 6-8

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 RW 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 is 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)

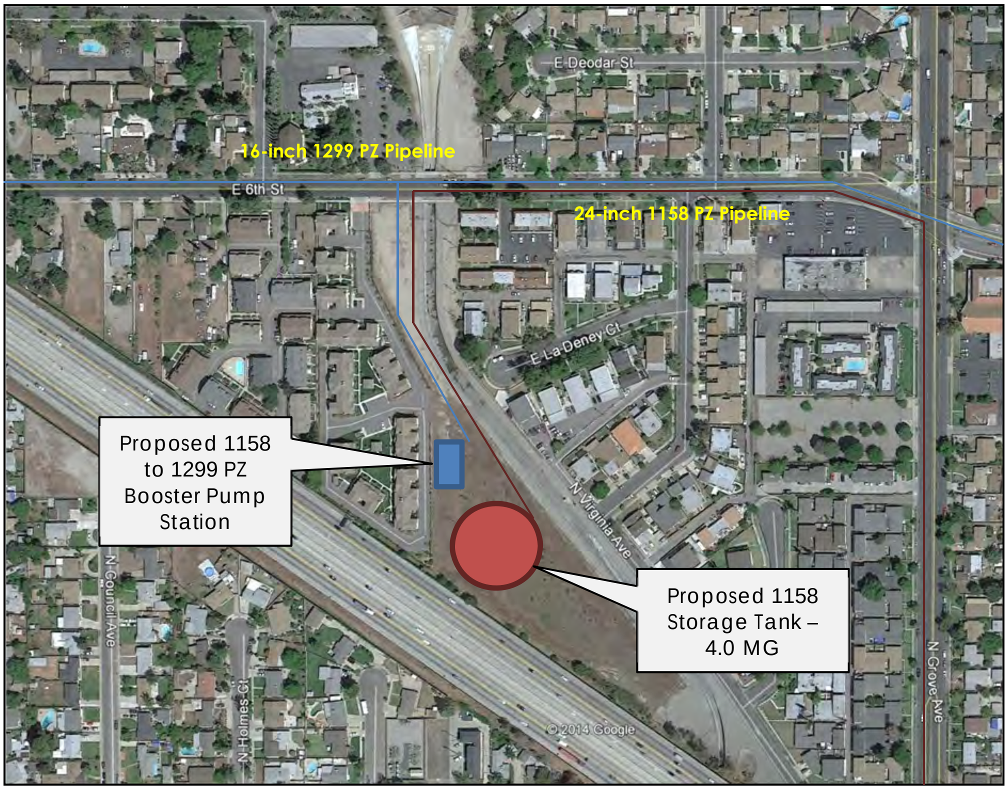
The same GWR Basins were analyzed as was for the Year 2030 Average Demand Conditions; however, due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 1.7 MGD from 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 a 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.

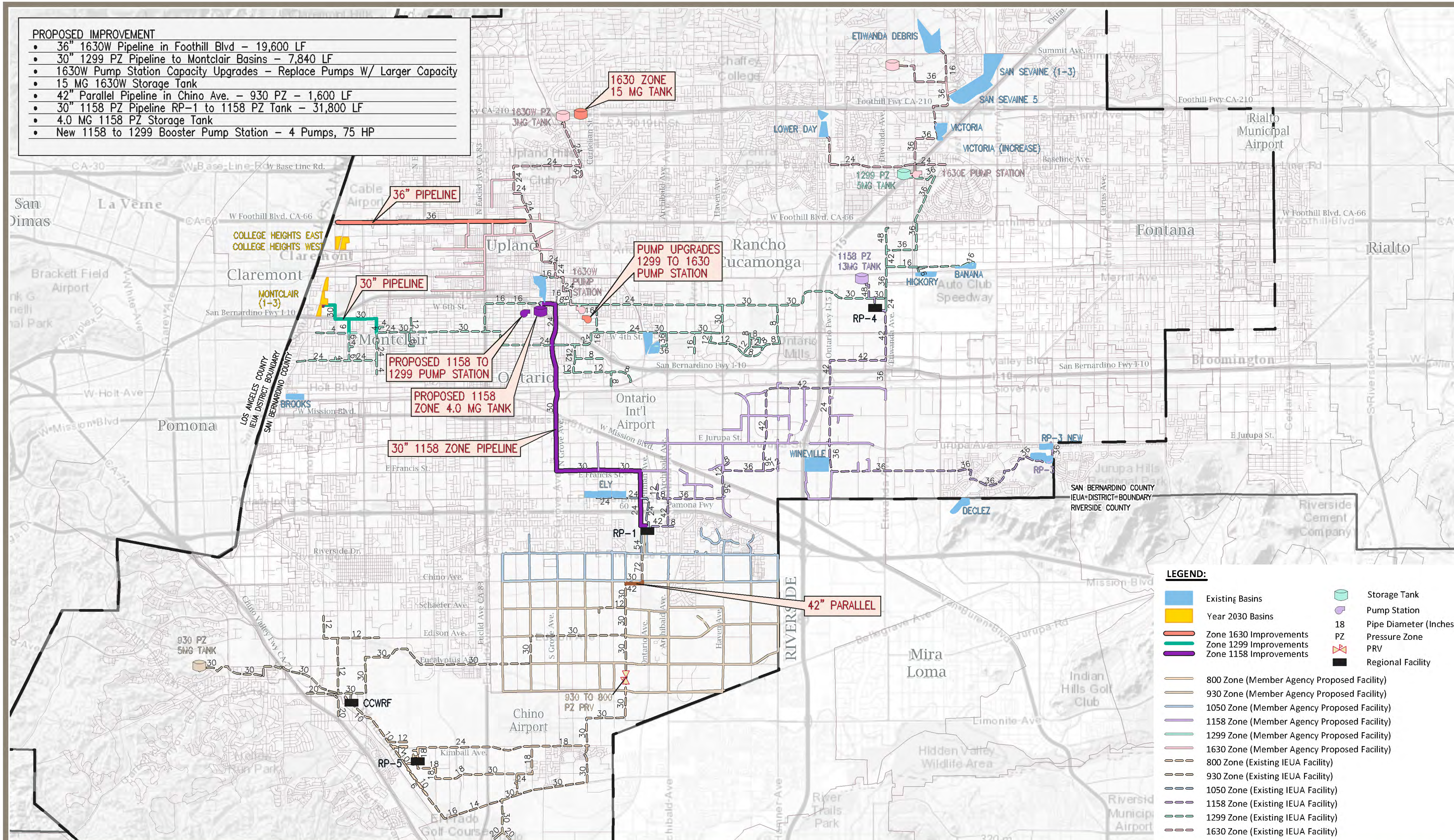


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FIGURE 6-10

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 meet 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.

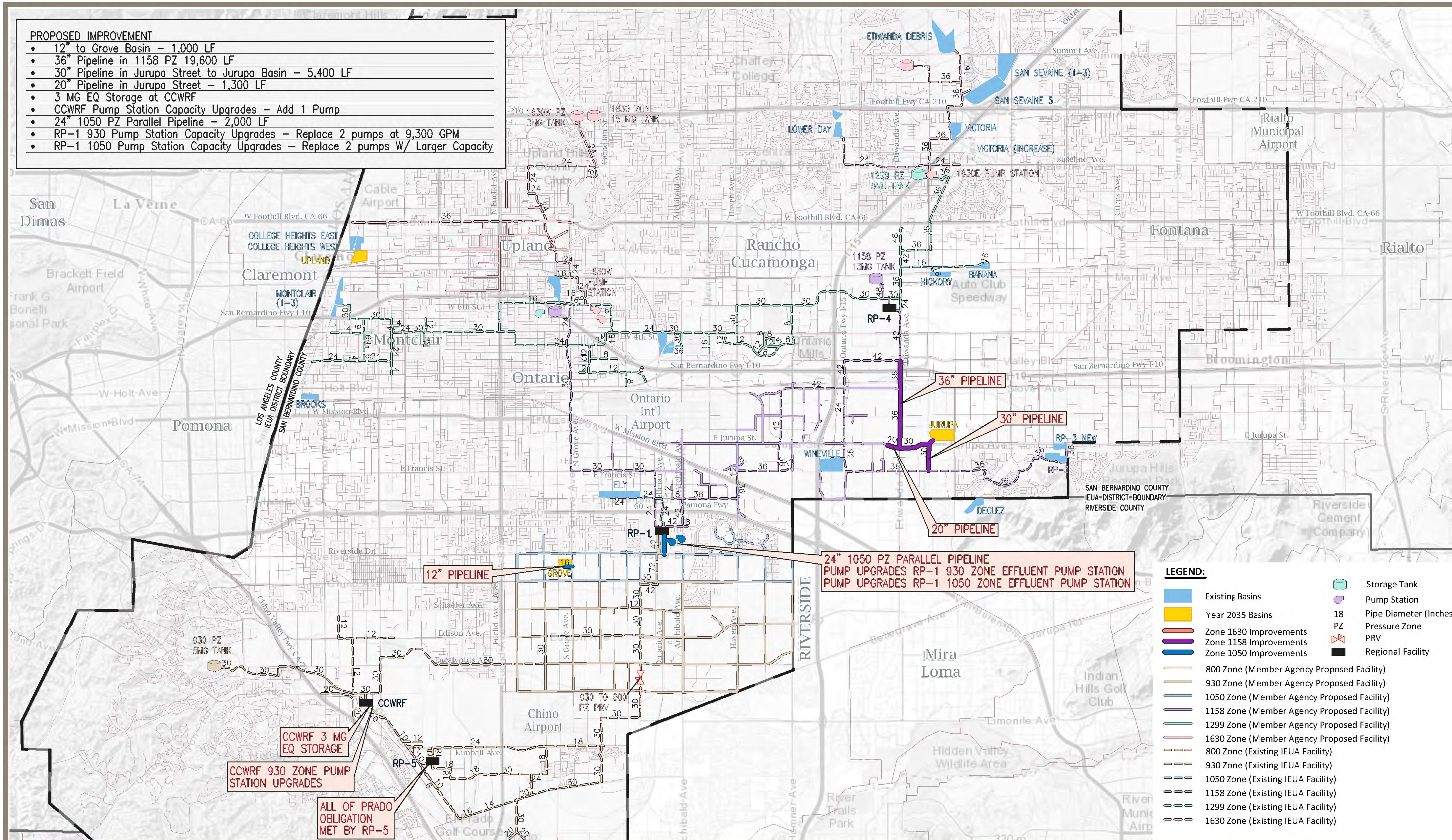
For the Year 2035 analysis, two existing pump stations are proposed to require upgrades, the RP-1 930 Zone Effluent Pump Station and the RP-1 1050 Zone Effluent Pump Station. The current design capacity and proposed pump station capacities are shown below. Other Year 2035 facility improvements are shown 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 scenario was analyzed 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 water level. Approximately 7.7 MGD was able to be supplied into the system. This supply resulted in the CCWRF supply to the 930 PZ 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 is also required to be controlled by the 930 West Reservoir water 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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Scale: 0 8500 Ft

IEUA RWPS
Proposed Recycled Water System Improvements
YEAR 2035 - Base GWR Implementation
FIGURE 6-11

7.0 PROGRAM SENSITIVITY ANALYSIS

Section 6 analyzed the RW system assuming the GWR program will include all potential basins listed and implemented as shown in Table 4.2. This section analyzes various operational scenarios to understand the needs and impacts on the RW system by determining the number of groundwater basins to be connected to the RW program as changes in reuse supply occur. The minimum number of basins included in the analysis includes only the existing basins and those committed in the 2013 RMPU. Additionally, an analysis was conducted to estimate when additional RMPU basins would be appropriate to 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 RW system and recharge capacities, as described below:

Scenario A – All GWR Basins with Approximately 10,000 AFY of External Supply

This scenario assumes all of the GWR basins are able to be recharged with RW as shown in Tables 4.2 and 5.3 in the previous sections. However, rather than the Agency meeting their entire SARBF at Prado Obligation directly from treated effluent, the SARBF at Prado Obligation is met by a portion of an external supply. The source of this external supply is unknown at this time, but it is assumed to be able to replace the Agency's current Obligation met directly from RP-5, CCWRF, and RP-1. The external supply is assumed to be approximately 10,000 AFY.

Scenario B – Existing and 2013 RMPU Basins (No External Supply)

This scenario assumes that the number of GWR basins to be converted and receive reuse supply for recharge is limited to the current 2013 RMPU. The analysis assumes all of the existing basins will remain operational plus the following RMPU basins:

- RP-3 (New Cell)
- Victoria (Increase)
- San Sevaine (1-3)

Also, under this scenario, the Agency will continue to fulfill the SARBF at Prado Obligation directly from the treated effluent as is done for current operations.

Scenario C – Existing and 2013 RMPU Basins with Approximately 5,000 AFY of External Supply

This scenario assumes that the number of GWR basins to be converted and receive reuse supply for recharge is limited to the 2013 RMPU. The analysis assumes all of the existing basins will remain operational plus the following RMPU basins:

- RP-3 New Cell
- Victoria (Increase)
- San Sevaine (1-3)

However, rather than the Agency meeting their entire SARBF at Prado Obligation directly from treated effluent, the SARBF at Prado Obligation is met by a portion of an external supply. The source of this external supply is currently unknown, but it is assumed will reduce the Southern Area supply deficit shown in Table 5.11.

7.2 SENSITIVITY ANALYSIS - MASS BALANCE

Scenarios A and C as described above assume an external supply will be able to eliminate the Southern Area supply deficit and meet portions of the Agency's SARBF at Prado Obligation. Therefore, a mass balance analyzing the proposed direct use demands versus the new supply availability was performed that removed a portion of the Prado Obligation annual demand in accordance with the amount of external supply.

A summary of the Scenario A annual supply availability to the GWR program is provided in Table 7.1.

Table 7.1 Sensitivity Analysis Supply versus Demands Mass Balance – Scenario A

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area					
Southern Area RW Supply (RP-5, CCWRF)	15,010	19,154	22,459	25,763	28,788
External Supply	10,000	10,000	10,000	10,000	10,000
Southern Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Total to SARBF at Prado Obligation[1]	14,000	14,000	14,000	14,000	14,000
Southern Area Annual Months of (Deficit)[2]	(5,595)	(4,482)	(3,193)	(1,643)	(1,193)
Southern Area Annual Months of Surplus[3]	-	-	757	2,269	3,548
Northern Service Area					
Northern Area RW 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 [2]	(5,595)	(4,482)	(3,193)	(1,643)	(1,193)
Surplus Available from the Southern Area[3]	-	-	757	2,269	3,548
Total to SARBF at Prado from North[1]	-	-	-	-	-
Northern Area Supply Surplus/(Deficit)	33,252	31,510	31,380	33,168	35,248
Scenario A GWR 9-Month Operation RW Availability[4]	**23,645**	**21,528**	**20,579**	**21,261**	**22,428**
3-Month Un-Used Winter Surplus	9,575	9,942	10,718	11,801	12,741

[1] The SARBF at Prado Obligation is assumed to be met by the surplus available from RP-5 and CCWRF plus the external supply source. The entire 10,000 AFY external supply is assumed to be used in the Southern Service Area and no supply is available SARBF at Prado Obligation is from RP-1. 14,000 AFY is assumed to conservatively increase the available GWR potential for purposes of analysis of the RW system facilities.

[2] The monthly mass balance shows a deficit due to no seasonal storage availability and the maximum demand months in the summer exceeding the supplies even with the additional 10,000 AFY external supply. The 10,000 AFY external supply was assumed to be a constant supply for each month with an average of 8.9 MGD entering the Southern Service Area. The deficit during the maximum demand months in the summer is assumed to be made up from the Northern Service Area.

[3] The remaining months outside the summer maximum demand months show a surplus, which are assumed to be available to the Northern Service Area.

[4] 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 monthly mass balance and large amount of surplus supply that is un-used during the winter months indicates that an external supply received during these winter months is not beneficial to the GWR program or to meet maximum day direct use demand periods.

The reuse supply availability to GWR shows an overall net increase assuming Scenario A conditions. This is shown in Table 7.2.

Table 7.2 Comparison of Recycled Water Supply Availability – Scenario A

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Scenario A GWR 9-Month Operation RW Availability (10,000 AFY External Supply) –	23,645	21,528	20,579	21,261	22,428
GWR 9-Month Operation RW Availability – *Without* External Supply	16,095	13,977	13,027	13,707	14,871
Scenario A Difference in GWR Availability	7,550	7,551	7,552	7,554	7,557

A summary of the Scenario C annual supply (additional 5,000 AFY) availability to the GWR program is provided in Table 7.3.

Table 7.3 Sensitivity Analysis Supply versus Demands Mass Balance – Scenario C

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Southern Service Area					
Southern Area RW Supply (RP-5, CCWRF)	15,010	19,154	22,459	25,763	28,788
External Supply	5,000	5,000	5,000	5,000	5,000
Southern Area Direct Use Demands	16,568	19,591	20,865	21,080	22,369
Total to SARBF at Prado Obligation[1]	14,000	14,000	14,000	14,000	14,000
Southern Area Annual Months of (Deficit)[2]	(10,595)	(9,482)	(7,432)	(4,692)	(3,607)
Southern Area Annual Months of Surplus[3]	-	-	-	350	962
Northern Service Area					
Northern Area RW 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 [2]	(10,595)	(9,482)	(7,432)	(4,692)	(3,607)
Surplus Available from the Southern Area[3]	-	-	-	350	962
Total to SARBF at Prado from North[1]	-	-	-	-	-
Northern Area Supply Surplus/(Deficit)	28,252	26,510	26,380	28,168	30,248
Scenario C GWR 9-Month Operation RW Availability[4]	**19,878**	**17,761**	**16,812**	**17,494**	**18,661**
3-Month Un-Used Winter Surplus	8,342	8,709	9,485	10,568	11,508

[1] The SARBF at Prado Obligation is assumed to be met by the surplus available from RP-5 and CCWRF plus the external supply source. The entire 5,000 AFY external supply is assumed to be used in the Southern Service Area and no supply is available SARBF at Prado Obligation is from RP-1. 14,000 AFY is assumed to conservatively increase the available GWR potential for purposes of analysis of the RW system facilities.

[2] The monthly mass balance shows a deficit due to no seasonal storage availability and the maximum demand summer months exceeding the supplies even with the additional 10,000 AFY external supply. The 5,000 AFY external supply was assumed to be a constant supply for each month with an average of 4.5 MGD entering the Southern Service Area. The deficit during the maximum demand months in the summer is assumed to be made up from the Northern Service Area.

[3] The remaining months outside the summer maximum demand months show a surplus, which are assumed to be available to the Northern Service Area.

[4] 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.

Table 7.4 shows the net increase in RW basin recharge availability based on Scenario C assumptions.

Table 7.4 Comparison of Recycled Water Supply Availability – Scenario C

Description	Planning Year				
	Existing	Year 2020	Year 2025	Year 2030	Year 2035
	AFY				
Scenario C GWR 9-Month Operation RW Availability – with 5,000 AFY External Supply	19,878	17,761	16,812	17,494	18,661
GWR 9-Month Operation RW Availability – *Without* External Supply	16,095	13,977	13,027	13,707	14,871
Scenario C Difference in GWR Availability	3,783	3,784	3,785	3,787	3,790

7.3 SENSITIVITY ANALYSIS - HYDRAULIC DEMANDS

The demands used for the sensitivity analysis used the same direct use demands described in Section 6. However, the model was updated with increased flows to the groundwater basins. The scenarios that include additional supply, assume that the supply will be used to meet the SARBF at Prado Obligation and therefore, increases the reuse supply available to the groundwater basins.

Table 7.5 Sensitivity Analysis Demands Used for Hydraulic Analysis – Scenario A

	Existing		Year 2020		Year 2025		Year 2030		Year 2035	
	AD	MD	AD	MD	AD	MD	AD	MD	AD	MD
	MGD									
Reuse 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
SABRF at Prado Obligation[2]	3.6	2.6	3.6	2.6	3.6	2.6	3.6	2.6	3.6	2.6
Sensitivity Analysis GWR Available Flows[3]	**29.7**	**16.7**	**28.1**	**12.2**	**28.0**	**8.9**	**29.6**	**6.6**	**31.5**	**7.0**
Total Reuse Supply Used	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
Base Analysis GWR Available Flows [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	8.9	2.5	8.9	3.9	8.9	5.0	8.9	4.9	8.9	2.4

[1] The Direct Use Demands for the "AD" condition are the average daily 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 the Southern Service Area RP effluent and external supply source. The Southern Service Area will meet approximately 4,000 AFY of the total obligation.
[3] The GWR Available Flows are the average monthly flow available for the appropriate demand period described in Footnote 1 above. The Sensitivity Analysis for GWR available flows assumes the additional supply will meet a portion of the Prado Obligation demand.
[4] See Table 6.1. The Base Analysis for GWR Available Flows assumes with additional supply if provided.

Table 7.6 Sensitivity Analysis Demands Used for Hydraulic Analysis – Scenario C

	Existing		Year 2020		Year 2025		Year 2030		Year 2035	
	AD	MD	AD	MD	AD	MD	AD	MD	AD	MD
	MGD									
Reuse Supply	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
Direct Use Demands	22.0	36.0	27.5	44.4	32.6	52.7	36.0	60.0	38.4	63.9
SABRF at Prado Obligation[2]	8.0	3.5	8.0	3.5	8.0	3.5	8.0	3.5	8.0	3.5
Sensitivity Analysis GWR Available Flows[1]	**25.3**	**15.8**	**23.7**	**11.3**	**23.6**	**8.0**	**25.2**	**5.7**	**27.1**	**6.1**
Total Reuse Supply Used	55.3	55.3	59.2	59.2	64.2	64.2	69.2	69.2	73.5	73.5
Base Analysis GWR Available Flows [2]	**20.8**	**14.2**	**19.2**	**8.3**	**19.1**	**3.9**	**20.7**	**1.7**	**22.6**	**4.6**
Net Increase to GWR	4.5	1.6	4.5	3.0	4.5	4.1	4.5	4.0	4.5	1.5

[1] The GWR Available Flows are the average monthly flow available for the appropriate demand period described in Footnote 1 above. The Sensitivity Analysis GWR Available Flows assumes an external supply will meet the Prado Obligation demand.

[2] See Table 6.1. The Base Analysis GWR Available Flows assumes only RW Effluent supply with no external supply.

7.4 SENSITIVITY ANALYSIS - HYDRAULIC MODEL ANALYSIS

This Section summarizes the results of the computer model analyses conducted for the three (3) sensitivity analyses to the Year 2035. The following is a brief description of the analysis and resulting improvements proposed.

7.4.1 Scenario A – Hydraulic Analysis with All Basins and 10,000 AFY Additional Supply

This scenario assumes that the Agency will obtain an external supply source to meet a portion of the SRBF at Prado Obligation and that all proposed GWR basins will be implemented for RW recharge as described in Section 7.1. The recommended improvements for this scenario are summarized in Table 7.6. The sections below describe in detail improvements needed for each 5-year planning period.

7.4.1.1 Scenario A - Existing Conditions Analysis

As a result of the increased flow to the GWR program, some of the basins would require upgrades to their turnout and delivery structures to accommodate the higher flow rates. The following is a preliminary list of the basins that are proposed to require upgrades along with capacity requirements.

Table 7.4 Scenario A Proposed Basin Turnout Upgrades

Basin	Existing Turnout Capacity (cfs)	Proposed Turnout Capacity (cfs)
Brooks[1]	12.00	14
Ely (1-3)	6.00	12
Hickory	4.00	8
San Sevaine (5)[1]	24.00	29
Turner	8.00	12
Victoria	8.00	12

[1] Additional basin requiring upgrades beyond those identified in the based GWR Implementation analysis.

Other system improvements were required for this scenario and have been summarized in Table 7.6.

7.4.1.2 Scenario A - Year 2020 Analysis

The Year 2020 analysis showed upgrades to the 1630 East Recycled Water Pump Station and a parallel 16-inch 1299 Zone pipeline are required. These improvements are summarized in 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 those already proposed to meet direct use and GWR demands per Section 6.

7.4.1.4 Scenario A - Year 2030 Analysis

Significant system facility improvements are required to meet the Year 2030 conditions. 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 summarized in Table 7.6.

7.4.1.5 Scenario A - Year 2035 Analysis

The Year 2035 analysis shows that no additional facility improvements are required other than those already proposed to meet direct use and GWR demands per Section 6.

See Figure 7-1 for the proposed facilities related to Scenario A through Year 2035.

7.4.2 Scenario B – Hydraulic Analysis with Existing/2013 RMPU Basins (No Additional Supply)

This scenario assumes that the Agency will continue to meet SARBF at Prado Obligation and that the proposed basins to be implemented for RW recharge are only the 2013 RMPU basins as described in Section 7.1. The recommended improvements for this scenario are summarized in Table 7.7. The sections below describe in detail the improvements needed for each 5-year planning period.

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

The Year 2020 analysis shows 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.

7.4.2.3 Scenario B - Year 2025 Analysis

The Year 2025 analysis shows 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.

7.4.2.4 Scenario B - Year 2030 Analysis

The Year 2030 analysis shows upgrades to increase the capacity of the proposed 1158 Zone Storage Tank from 4.0 MG to 5.0 MG. These improvements are summarized in Table 7.7.

7.4.2.5 Scenario B - Year 2035 Analysis

The Year 2025 analysis shows 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.

See Figure 7-2 for an illustration of the proposed facilities related to Scenario B for Year 2020 through Year 2035.

7.4.3 Scenario C – Hydraulic Analysis with Existing/ 2013 RMPU Basins and 5,000 AFY of Additional Supply

This scenario assumes that the Agency will obtain an external supply source to meet a portion of the SARBF at Prado Obligation and that the proposed GWR basins to be implemented for RW recharge are only the RMPU basins as described in Section 7.1. The recommended improvements for this scenario are summarized in Table 7.8. The sections below describe in detail the improvements needed for each 5-year planning period.

7.4.3.1 Scenario C - Existing Conditions Analysis

As a result of the increased flow to the GWR program, some of the basins would require upgrades to the turnout and delivery structures to accommodate the higher flow rates. The following is a preliminary list of the basins that are proposed to require upgrades along with capacity requirements. It should be noted that the turnout capacities shown in Table 7.5 are the same as those required for Scenario A conditions per Table 7.4.

Table 7.5 Scenario C Proposed Basin Turnout Upgrades

Basin	Existing Turnout Flow Capacity (cfs)	Proposed Flow/Turnout Capacity (cfs)
Brooks[1]	12.00	14
Ely (1-3)	6.00	12
Hickory	4.00	8
San Sevaine (5)[1]	24.00	29
Turner	8.00	12
Victoria	8.00	12

[1] Additional basin requiring upgrades beyond those identified in the based GWR Implementation analysis.

Other system improvements were required for this existing condition demands 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 shows 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.

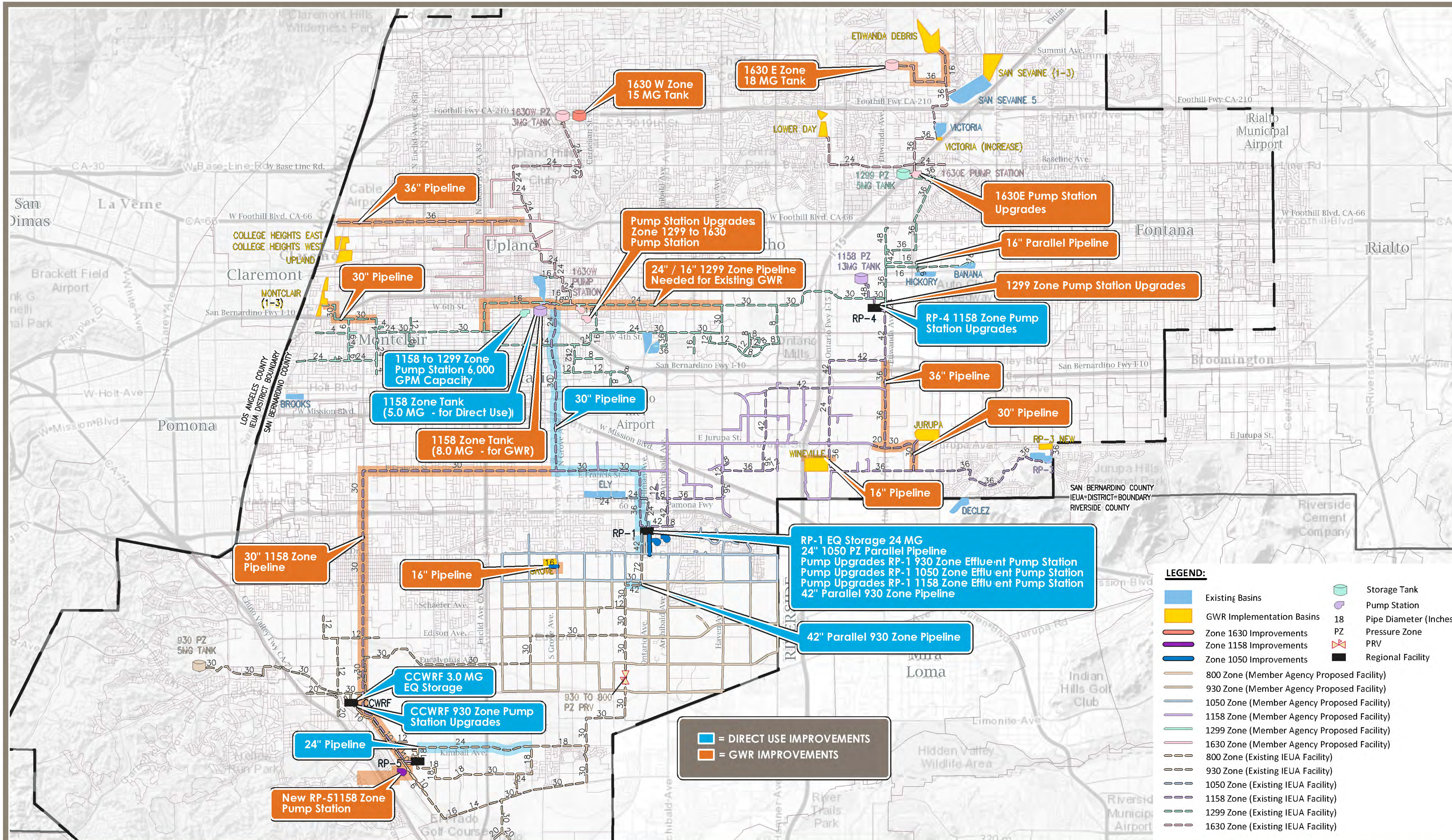
See Figure 7-3 for an illustration of the proposed facilities related to Scenario C for Year 2020 through Year 2035.

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.	42-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 RP-5 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 RP-5	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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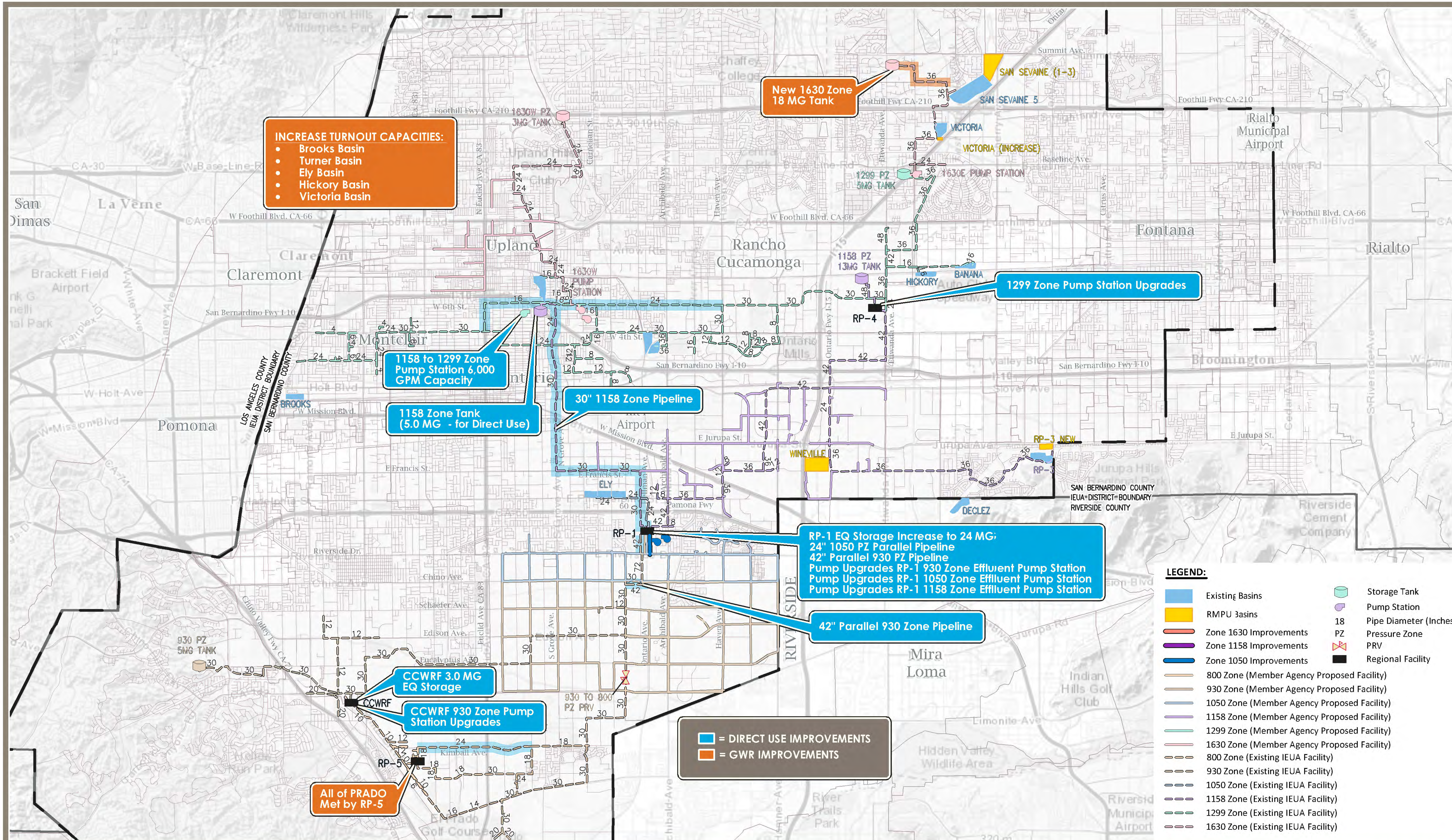
Sensitivity Analysis - Scenario A
FIGURE 7-1

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.	42-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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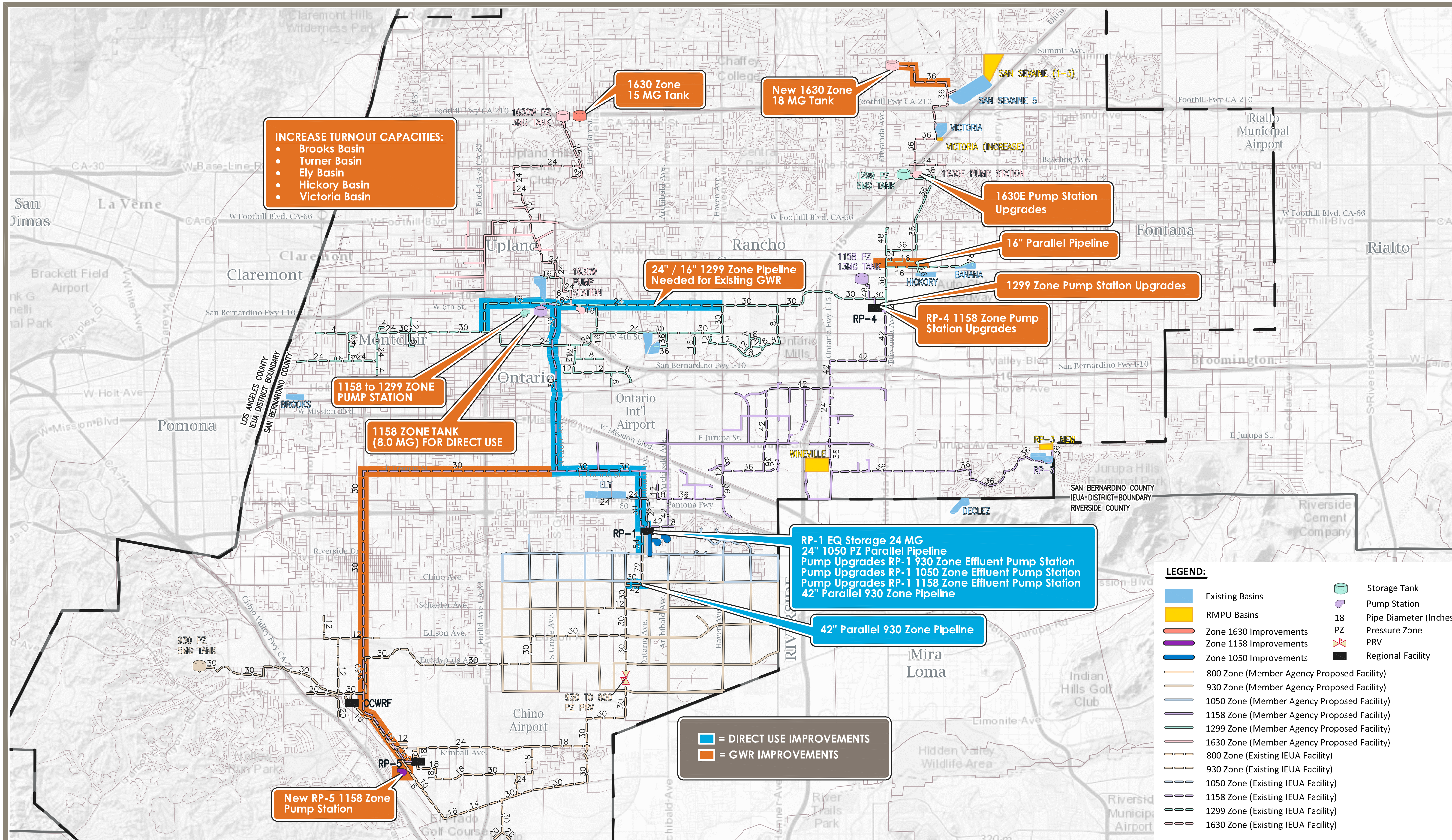
Sensitivity Analysis - Scenario B
FIGURE 7-2

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.	42-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 RP-5 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 COST EVALUATIONS

A comparison of total estimated project costs was performed to analyze and develop an overall recommendation for an implementation strategy. The GWR 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 capital cost summary analysis that was performed. The overall projects' capital costs for each of the implementation scenarios are listed with the total estimated annual reuse supply recharge benefit for that scenario.

Based on the total project capital costs for the different operational conditions, Scenario B of the Sensitivity Analysis herein shows the lowest total project capital costs. It also shows to be the lowest cost per annual acre-feet of RW recharge to the basins. This scenario assumes that the Agency will continue to meet SARBF at Prado Obligation as it currently does from the effluent supply from RP-5, CCRWF and RP-1.

Additionally, it should be noted that the basins assumed for Existing/RMPU scenarios will have the ability to recharge the total annual reuse supply available for GWR. Therefore, the cost to recharge per annual acre-feet of RW is much less than the Base GWR program required for implementing all of the GWR proposed basins.

However, other considerations should be given if only the Existing and 2013 RMPU GWR basins are connected to the RW system:

- Using only the Existing/RMPU basins limit the ability to take a basin down for maintenance. This leaves no operational redundancy or flexibility for under-performing basins or those needed to be taken out of service.
- If actual direct use demands do not meet the projections assumed in the RWPS, the additional reuse supply that would become available for GWR could be limited based on the capacity of the existing/2013 RMPU basins. The theoretical monthly recharge capacity for the Existing/2013 RMPU basins is approximately 4,100 AF per month. Depending on quantity and availability of the additional supply, there could be a need to evaluate adding additional GWR basins or investigating other reuse opportunities to maximize the available reuse supply.

Based on the overall goals of the RWPS to meet the projected direct use demands and to maximize the remaining reuse supply for GWR to the basins, Scenario B of the Sensitivity Analysis is recommended. Based on the total project capital costs for the different operational conditions, Scenario B will also provide the Agency the lowest total capital improvement costs.

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 Implementation Basins (No External Supply)										
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 10,000 AFY External Supply										
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/2013 RMPU Basins (No External Supply)										
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/2013 RMPU Basins plus 5,000 AFY External Supply										
Existing	$ -	$ -	$ -	24,655	$ 20,000,000	$ -	$ 20,000,000	17,982	$ 20,000,000	42,637
2020	$20,000,000	$ 6,220,000	$ 6,220,000	30,757	$ 3,740,000	$ -	$ 23,740,000	15,702	$ 9,960,000	46,459
2025	$29,960,000	$ 5,120,000	$ 11,340,000	36,507	$ -	$ -	$ 23,740,000	14,458	$ 35,080,000	50,965
2030	$35,080,000	$ 41,110,000	$ 52,450,000	40,320	$ 33,310,000	$ 7,610,000	$ 64,660,000	15,834	$117,110,000	56,154
2035	$117,110,000	$ 3,460,000	$ 55,910,000	43,019	$ -	$ -	$ 64,660,000	**17,242**	**$120,570,000**	60,261

8.0 RWPS RECOMMENDED PROJECTS

This section provides a list of the recommended projects to meet the Agency's projected direct use demands while maximizing the use of the available reuse 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.

8.1 PROPOSED PROJECTS

Table 8.1 provides a 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 GWR 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 for future expenditures.

The location of 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.	42-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 PS Capacity 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

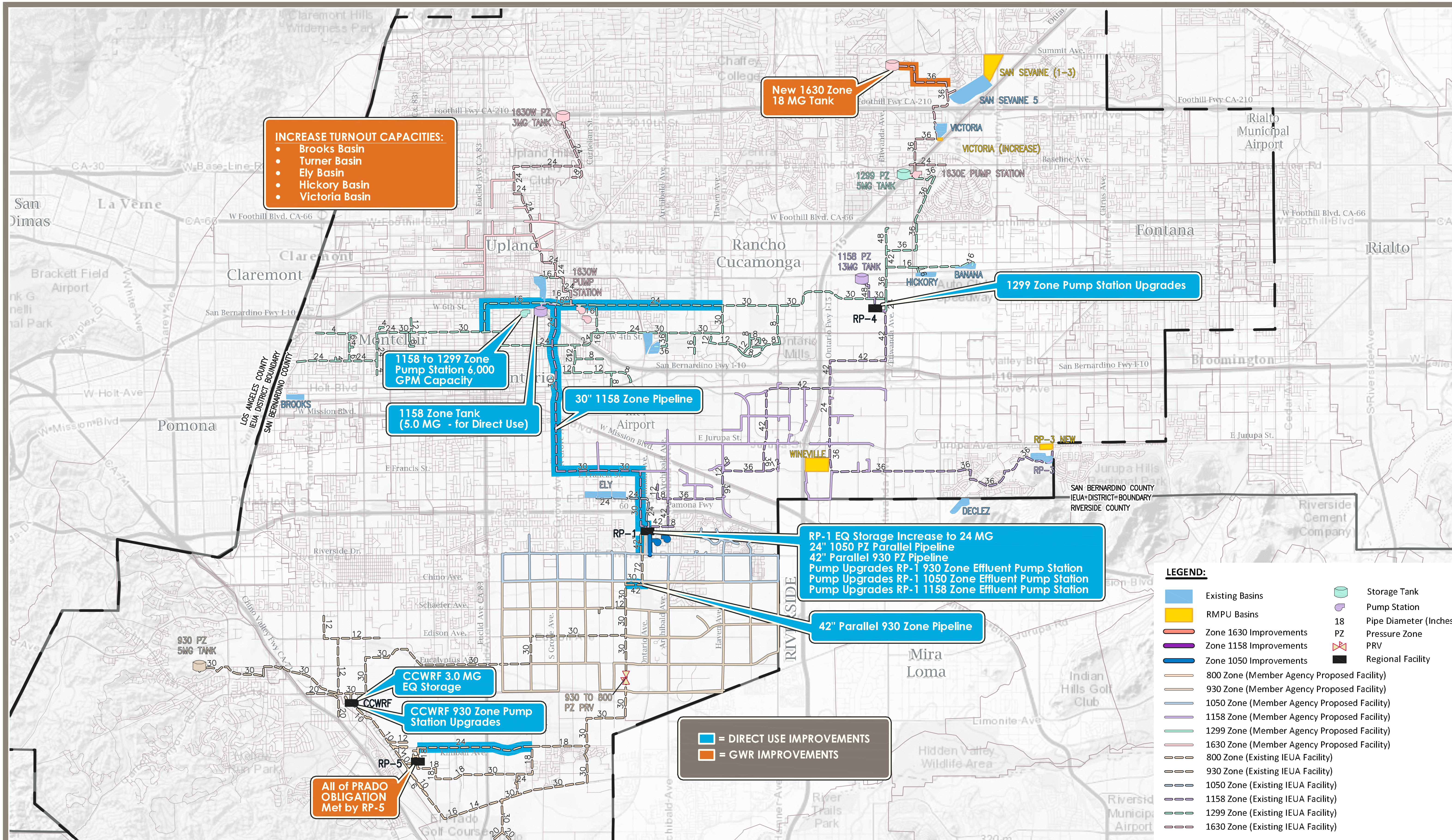

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FIGURE 8-1

8.2 SUMMARY OF RECOMMENDED PROJECT COSTS

Table 8.3 summarizes the project costs estimated for each planning year horizon based on the recommended improvements.

Table 8.3 Total Project Cost Summary

Planning Year	Construction Costs	Contingency/ Admin/Eng.[1]	Total 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**

[1] The Contingency/Administration/Engineering costs associated with each of the improvement construction costs is assumed to be 45% of the estimated construction costs.

9.0 OPERATIONAL CONTROL STRATEGY

This section provides a description of a proposed general RW program operational control strategy. The general control philosophy provided below can be used as a guidance document to allow the RW program to operate effectively throughout the various seasonal supply and demand fluctuations experience by the RW system. A general control philosophy is provided for each of the 5-year planning periods for the winter, spring/fall, and summer direct use demands and GWR conditions.

9.1 WINTER DEMAND CONDITIONS

The winter demand conditions are considered to be the months of December, January, and February.

In general, for each of the planning years, during the winter demand months the RW system will be operated to meet only the direct use demands and the SARBF at Prado Obligation demand. No GWR will occur during these months, as noted previously in this report. If weather conditions are acceptable for GWR during these months, the RW program can be operated to deliver GWR to the basins as determined by the operator.

To maximize the GWR during non-winter months of the year, reuse supply should be used as much as possible to meet the SARBF at Prado Obligation demands as allowed by agreement. For purposes of this study, a maximum of 40% of the annual SARBF at Prado Obligation demand should be met during the winter months.

Winter program operational strategy will be 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 PZ demands will be met by RP-1 930 PS as the first priority and RP-4 will provide primary reuse supply to the upper RW 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 include the months of March, April, May, and November.

In general for each of the planning years, the SARBF at Prado Obligation will be met first and then the direct use demands. 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 RP-5 and CCWRF should be the first priority to meet the SARBF at Prado Obligation demands. RP-1 should be last priority to maximize reuse supply available to the GWR basins.

The surplus from the RP-1 and RP-4 facilities, after meeting the direct use demands, should be used to supply RW for GWR.

Due to the low reuse supply availability during the night from reduced wastewater flows and the peak direct use demand period, limited reuse supply will be available for GWR. This typically occurs during a 12 hour nighttime period from 9 pm to 9 am. Therefore, GWR flows to the basin should be met during the 12-hour period outside of peak direct use demands.

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 the months between June and October.

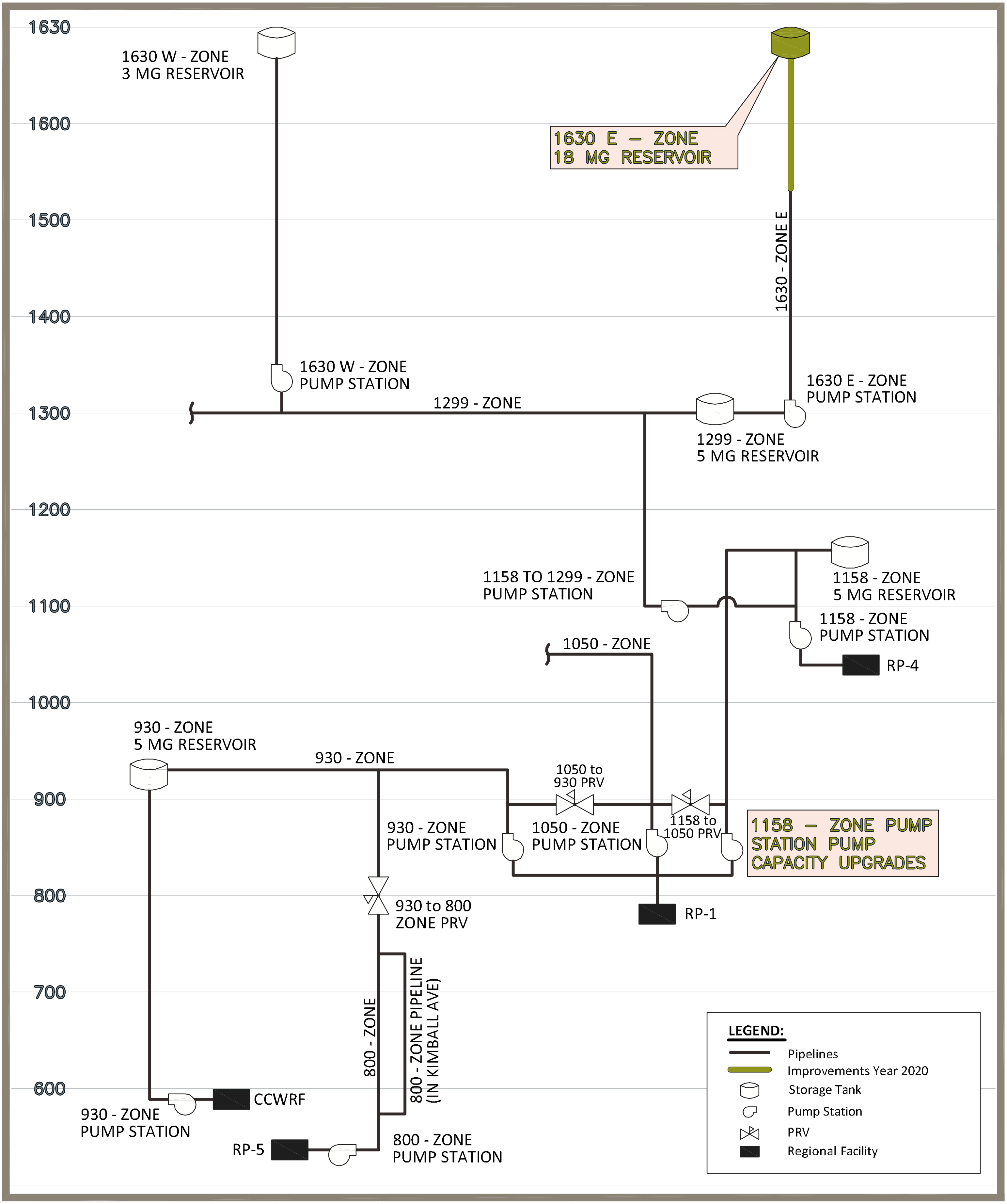
For each of the planning years, the direct use demands will be met first. For purposes of this study, approximately 25% of the total annual SARBF at Prado Obligation demand should be met during the summer months.

The surplus supply from the Southern Service Area from RP-5 and CCWRF will be 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 GWR to the existing and proposed groundwater basins. Due to the increase in direct use demands during the summer months, the GWR flows are reduced so that the reuse supply available from the treatment facilities is not exceeded.

Due to the low flow periods during the night from the wastewater supply, and the peak direct use demands during this same period, the GWR 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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A MUNICIPAL WATER DISTRICT

IEUA RWPS
Year 2020 System Profile

FIGURE 9-1

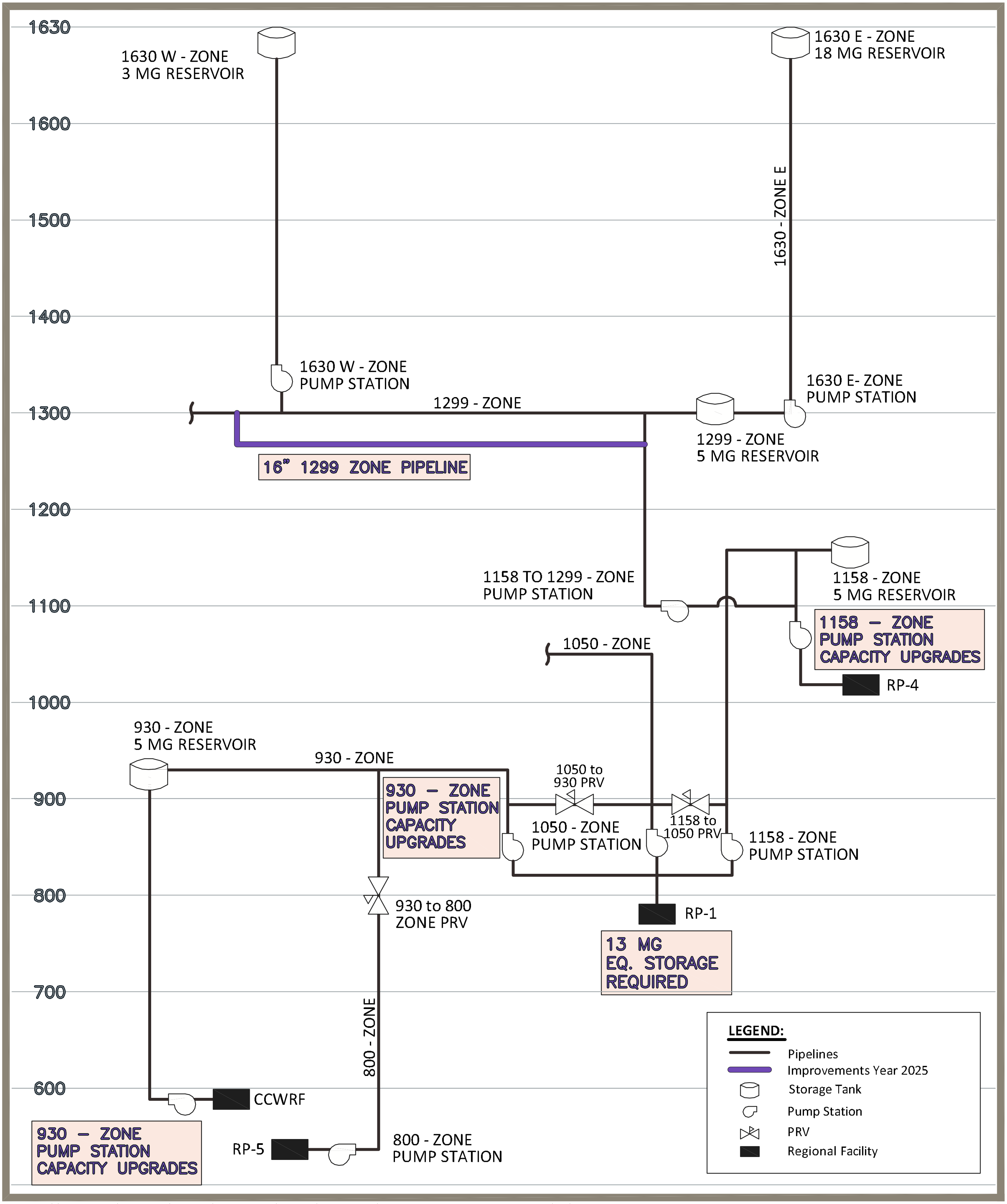

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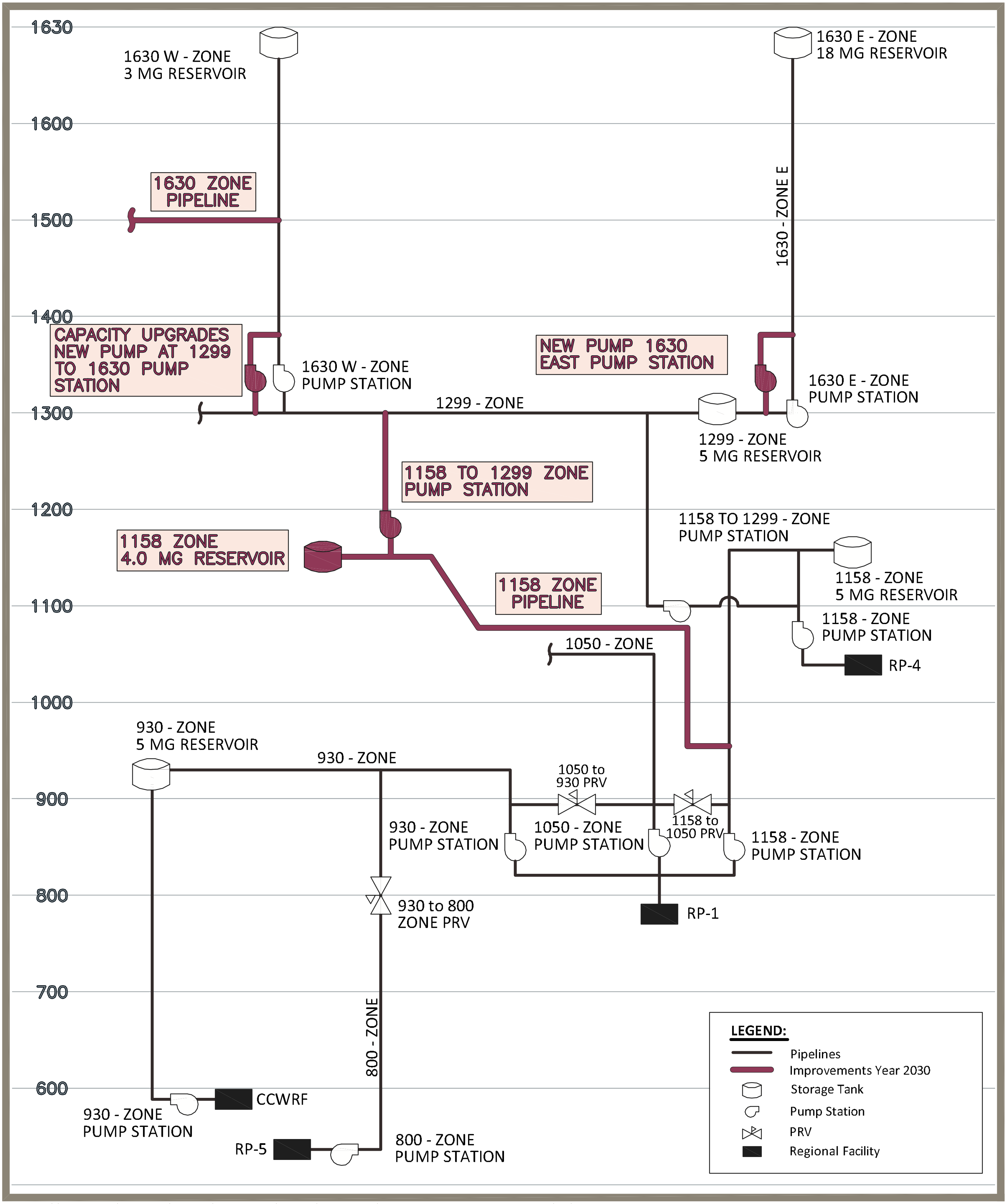
FIGURE 9-2



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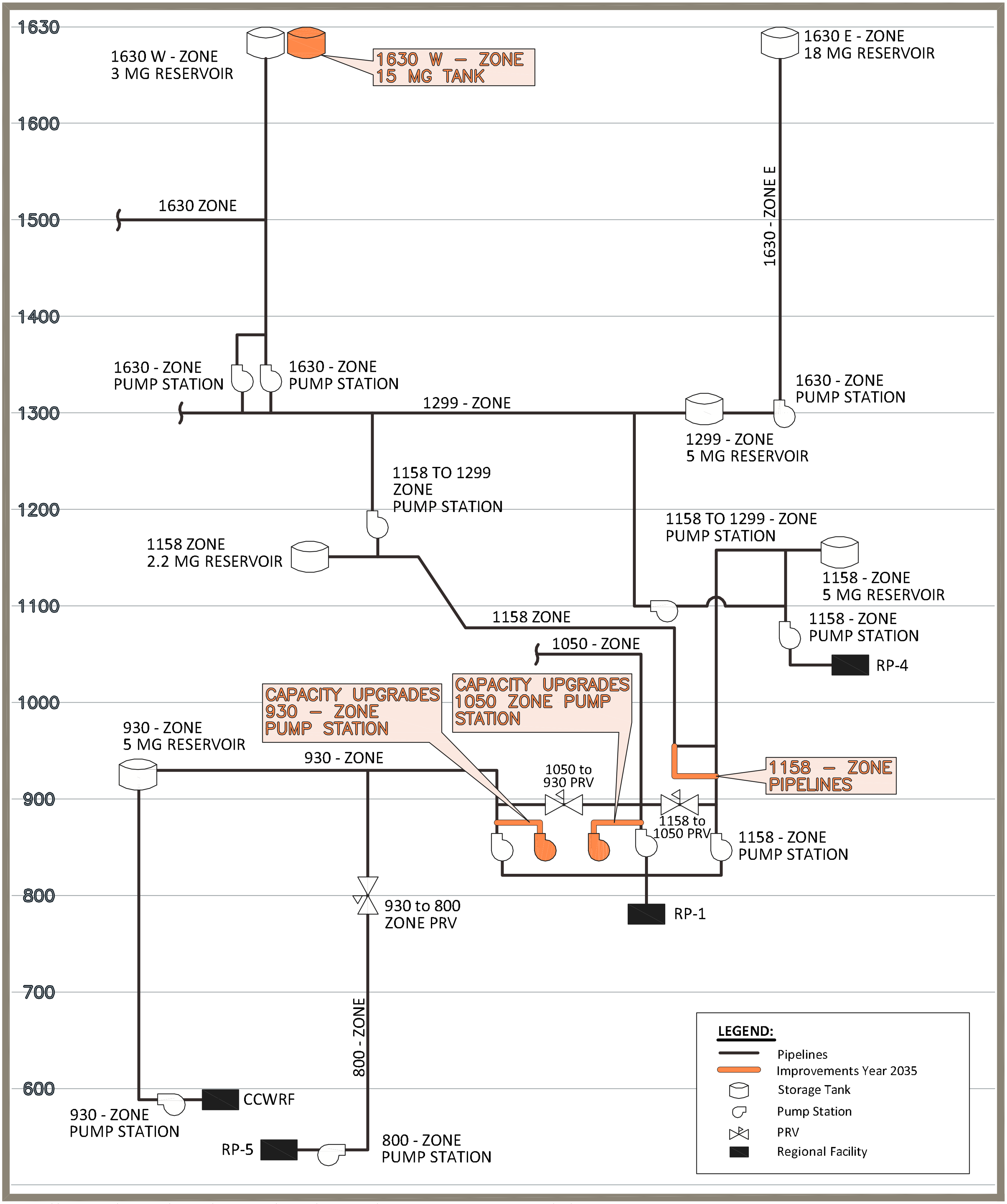
IEUA RWPS
Year 2030 System Profile

FIGURE 9-3



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IEUA RWPS
Year 2035 System Profile

FIGURE 9-4

Recycled Water Policy Principles

RECYCLED WATER POLICY PRINCIPLES

Introduction

The Inland Empire Utilities Agency (IEUA) and its contracting agencies have developed a successful regional Recycled Water Program for both direct use and groundwater recharge. As the Program continues to advance, it is important to summarize and update the history, operating philosophies, and policy principles on which the Program was founded.

In 2000, the region identified that recycled water use was a critical component in drought-proofing and maintaining its economic growth. With imported water rates increasing and long-term imported supply reliability in decline, the region committed to aggressively and proactively develop local water supplies to offset these impacts. This set the path for the development of a regional recycled water distribution system and a Recycled Water Implementation Plan.

The use of recycled water presented several advantages to the region: it is one of the most significant and underutilized sources of local water supply; it is reliable during drought and climate change conditions; and it requires significantly less energy than imported water to deliver to customers thus reduces greenhouse gas emissions. The development of recycled water is the cornerstone of a larger regional initiative to improve water supply reliability through enhanced local supplies. IEUA, in partnership with its contracting agencies and Chino Basin Watermaster (CBWM), invested over $600 million over the last fifteen years in water recycling, conservation, recharge improvements, the MWD groundwater storage and recovery project, the Chino Desalter, and other water management programs. These programs collectively reduce the region's need for imported water especially during drought or conditions when imported water supplies are not available. In addition to the region switching large potable water users to recycled water, IEUA and CBWM obtained a landmark permit in 2005 for groundwater recharge using IEUA's high-quality recycled water.

By 2007, Southern California was experiencing one of its driest years with the potential for entering an extended drought period. The State of California subsequently made water recycling an important element of California's water supply policy and adopted a statewide goal of achieving 1,000,000 acre-feet (AF) of reuse by 2010. In response, in November 2007 IEUA and its contracting agencies unanimously adopted and committed to implement the Three Year Recycled Water Business Plan which laid out a focused and cost-effective approach to rapidly expand the availability and use of recycled water within IEUA's service area.

By 2014, over $250 million had been invested into the implementation of a robust Recycled Water Program. The region has achieved Program success by leveraging heavily on grant funding and loans. With unanimous regional support, annual recycled water use grew from approximately 5,000 AF in FY 04/05 to over 38,500 AF in FY 13/14. Critical to the economical and efficient operation of the system, each contracting agency made commitments to complete initiatives with the goal to increase direct reuse within their service areas. While some contracting agencies accomplished or far exceeded their local goals, some contracting agencies have not been able to fully achieve their original commitments.

The region's goal to maximize the beneficial use of recycled water has not changed. However, the commitment to connect additional recycled water users has stagnated over the past few years. At this time, several contracting agencies are struggling with the inherent conflict between use in excess of "base entitlement" (as defined by the Regional Sewage Service Contract) and the prioritization of direct use over groundwater recharge. The struggle has led some contracting agencies to be concerned about their local benefit and perceived inequities.

In order to move forward together as a region, it is appropriate that we reevaluate and affirm the regional Recycled Water Policy Principles, in order to guide the updates to the Regional Sewer Service Contract, prior to implementing any remaining significant system improvements to the Recycled Water Program and to clarify how these principles will govern the future benefits received by all IEUA contracting agencies.

These principles are not binding. These principles are intended to be a framework for the development of regional contract amendment.

Recycled Water Policy Principles

1. **Maximize the beneficial use of recycled water to enhance local water resource availability and reduce reliance on imported water.**
    1. IEUA will continue the development of the Regional Recycled Water infrastructure by providing equitable access for the contracting agencies to achieve reuse of 50,000 AF/year by 2025.
    2. IEUA will pursue the long term acquisition of recycled water from out of service area sources to supplement the regional supply.
    3. IEUA will pursue the long term transfer of recycled water from IEUA service area in exchange for supplemental water supply.
    4. The parties acknowledge that IEUA is currently meeting the SAR Judgment obligation with recycled water.
2. **Promote efficient application and use of recycled water as a reliable and fundamental component of drought-proofing the IEUA service area.**
    1. Ensure efficient use of recycled water at the point of use, consistent with rules and expectations of responsible potable water use and laws governing the use of recycled water.
3. **The regional recycled water entitlement will be based on the following:**
    1. Contracting agency entitlement based on wastewater contribution, future external supplies and any acquisition of another contracting agency's unused entitlement.
        i. This entitlement may be used for Santa Ana River discharge obligations, direct use or regional recharge.

2. Contracting agency use above entitlement, as described in 3.1, will require replacement water (i.e., Stored water, surcharge, etc., acquisition of another contracting agency's unused entitlement, etc.), collected by IEUA, and passed on to contracting agencies with surplus entitlement.

    i. This entitlement may be used for Santa Ana River discharge obligations, direct use or regional recharge.

    ii. If a contracting agency's current direct use exceeds entitlement, current direct use corresponding to existing customers will be temporarily substituted for entitlement until June 30, 2023, as defined in section 3.1. In addition, groundwater recharge allocations will be curtailed and redistributed to the other agencies under entitlement during the temporary period. Any new connections that require additional supplies above an agency's entitlement and the current grandfathered amount will require replacement water.

4. The regional recycled water system will be operated based on the following priorities for recycled water deliveries:

1. Minimal operational discharges (instrumentation, environmental obligations, etc.)
2. Contracting agency deliveries
3. Regional groundwater recharge

5. Meet peak recycled water direct demands through coordinated demand management of recycled water deliveries.

1. Large users will have pressure sustaining valves to ensure that overall regional demands are reliably met.

6. Maintain a financially viable recycled water program with rates that incentivize use of all available recycled water and that provides funding to achieve full cost-of-service for the recycled water program.

1. Set recycled water rates that cover the full cost of Operations & Maintenance (O&M) and Rehabilitation & Replacement (R&R) for the system.

7. **Maximize the use of recycled water capital investments made by IEUA and its contracting agencies with recycled water use within the region.**

1. Retail contracting agencies shall substantially fulfill prior recycled water connection commitments for all existing infrastructure.
2. Firm contracting agency commitments for recycled water use will drive new regional investments.

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

REVISED 3/15/16

Date: March 16, 2016

To: The Honorable Board of Directors

Through: Public, Legislative Affairs, and Water Resources Committee (*03/09/16*)
Finance, Legal & Administration Committee *(03/09/16)*

From: P. Joseph Grindstaff
General Manager

Submitted by: Chris Berch
Executive Manager of Engineering/Assistant General Manager

Sylvie Lee
Manager of Planning and Environmental Resources

Subject: Recycled Water Policy Principles

RECOMMENDATION

It is recommended that the Board of Directors:

1. Adopt the Recycled Water Policy Principles; and

2. Initiate development of a Regional Contract amendment based on the Recycled Water Policy Principles.

BACKGROUND

The Inland Empire Utilities Agency (IEUA) and its contracting agencies have developed a successful regional Recycled Water Program for both direct use and groundwater recharge. In 2000, the region identified that recycled water use was a critical component in drought-proofing and maintaining its economic growth. With imported water rates increasing and long-term imported supply reliability in decline, the region committed to aggressively and proactively develop local water supplies to offset these impacts. This set the path for the development of a regional recycled water distribution system.

While the foundational commitment to beneficial reuse of recycled water has remained unchanged, some fundamental concepts have been questioned over the past few years, particularly since 2011. This has resulted in the region working together to develop Recycled Water Policy Principles to address the changes since the inception of the program. The region's goal to maximize the beneficial use of recycled water has not changed. However, the commitment to connect additional recycled water users has stagnated over the past few years. At this time, several contracting agencies are struggling with the inherent conflict between use in excess of "base entitlement" (as defined by the Regional Sewage Service Contract) and the prioritization of direct use over groundwater recharge. The struggle has led some contracting agencies to be concerned about their local benefit and perceived inequities.

In order to move forward together as a region, it is appropriate to reevaluate and affirm the regional Recycled Water (RW) Policy Principles prior to implementing any remaining significant system improvements to the Recycled Water Program and to clarify how these principles will govern the future benefits received by all IEUA contracting agencies.

IEUA has been meeting with the contracting agencies for the last few years to develop modifications to the foundational principles. Subsequent to the Regional Technical Committee Meetings and Special Technical Committee Workshops held between July 2015 and January 2016, the agencies collectively provided input and guidance to finalize recommendations on the RW Policy Principles.

The proposed RW Policy Principles resulting from these discussions are summarized below and provided in the attachment in detail.

Recycled Water Policy Principles

1. **Maximize the beneficial use of recycled water to enhance local water resource availability and reduce reliance on imported water.**
    1. IEUA will continue the development of the Regional Recycled Water infrastructure by providing equitable access for the contracting agencies to achieve reuse of 50,000 AF/year by 2025.
    2. IEUA will pursue the long term acquisition of recycled water from out of service area sources to supplement the regional supply.
    3. IEUA will pursue the long term transfer of recycled water from IEUA service area in exchange for supplemental water supply.
    4. The parties acknowledge that IEUA is currently meeting the SAR Judgment obligation with recycled water.
2. **Promote efficient application and use of recycled water as a reliable and fundamental component of drought-proofing the IEUA service area.**
    1. Ensure efficient use of recycled water at the point of use, consistent with rules and expectations of responsible potable water use and laws governing the use of recycled water.

3. **The regional recycled water entitlement will be based on the following:**

    1. Contracting agency entitlement based on wastewater contribution, future external supplies and any acquisition of another contracting agency's unused entitlement.

        i. This entitlement may be used for Santa Ana River discharge obligations, direct use or regional recharge.

    2. Contracting agency use above entitlement, as described in 3.1, will require replacement water (i.e., Stored water, surcharge, etc., acquisition of another contracting agency's unused entitlement, etc.), collected by IEUA, and passed on to contracting agencies with surplus entitlement.

        i. This entitlement may be used for Santa Ana River discharge obligations, direct use or regional recharge.

        ii. If a contracting agency's current direct use exceeds entitlement, current direct use corresponding to existing customers will be temporarily substituted for entitlement until June 30, 2023, as defined in section 3.1. In addition, groundwater recharge allocations will be curtailed and redistributed to the other agencies under entitlement during the temporary period. Any new connections that require additional supplies above an agency's entitlement and the current grandfathered amount will require replacement water.

4. **The regional recycled water system will be operated based on the following priorities for recycled water deliveries:**

    1. Minimal operational discharges (instrumentation, environmental obligations, etc.)

    2. Contracting agency deliveries

    3. Regional groundwater recharge

5. **Meet peak recycled water direct demands through coordinated demand management of recycled water deliveries.**

    1. Large users will have pressure sustaining valves to ensure that overall regional demands are reliably met.

6. **Maintain a financially viable recycled water program with rates that incentivize use of all available recycled water and that provides funding to achieve full cost-of-service for the recycled water program.**

    1. Set recycled water rates that cover the full cost of Operations & Maintenance (O&M) and Rehabilitation & Replacement (R&R) for the system.

7. **Maximize the use of recycled water capital investments made by IEUA and its contracting agencies with recycled water use within the region.**
    1. Retail contracting agencies shall substantially fulfill prior recycled water connection commitments for all existing infrastructure.
    2. Firm contracting agency commitments for recycled water use will drive new regional investments.

The item was unanimously approved by the Regional Technical Committee on February 25, 2016, and will be presented to the Regional Policy Committee on March 3, 2016, for their consideration and recommendation to the IEUA Board.

Once direction from the IEUA Board on the RW Policy Principles is received, staff will work towards amending the sections of the Regional Contract consistent with the adopted RW Policy Principles. In addition to the RW Policy Principles, changes that were approved in the past, such as the agreement between Jurupa Community Services District and IEUA on the recycled water groundwater recharge allocation from Management Zone 3, will also be memorialized in the contract amendment language for clarity. It is anticipated that a Notice of Resolution for Contract Amendment will be presented to the IEUA Board in April 2016 for consideration, with a final action to be taken by June 2016.

The development of the Recycled Water Policy Principles is consistent with the *Agency's Business Goal* of increasing *Water Reliability* by meeting the region's need to develop reliable, drought-proof and diverse local water resources in order to reduce dependence on imported water supplies.

PRIOR BOARD ACTION

None.

IMPACT ON BUDGET

There is no direct impact on the budget as a result of the adoption of the Recycled Water Policy Principles.

Attachments: RW Policy Principles

Appendix H

2013 Amendment to the 2010 Recharge Master Plan Update

ESA





2013 Amendment to the 2010 Recharge Master Plan Update

Prepared for:

Chino Basin Watermaster
Inland Empire Utilities Agency

September 2013

WILDERMUTH™
ENVIRONMENTAL INC.

2013 Amendment to the
2010 Recharge Master Plan Update

Prepared for

Chino Basin Watermaster **Inland Empire Utilities Agency**

Prepared by

Wildermuth Environmental, Inc.

September 2013

Table of Contents

List of Tables

List of Tables

List of Figures

List of Figures

Acronyms, Abbreviations, and Initialisms

acre-ft/yr	acre-feet per year
ASR	Aquifer Storage and Recovery
Basin Plan	Santa Ana Regional Water Quality Control Plan
BMP	Best Management Practice
CDPH	California Department of Public Health
CEQA	California Environmental Quality Act
CBFIP	Chino Basin Facilities Improvement Program
CBWCD	Chino Basin Water Conservation District
CDA	Chino Desalter Authority
CDFM	cumulative departure from mean
cfs	cubic feet per second
CRA	Colorado River Aqueduct
CVWD	Cucamonga Valley Water District
DYYP	Dry Year Yield Program
DWR	CA Department of Water Resources
EPA	US Environmental Protection Agency
ft-bgs	Feet below ground surface
FWC	Fontana Water Company
GE	General Electric
HCMP	Hydraulic Control Monitoring Program
IEUA	Inland Empire Utilities Agency
JCSD	Jurupa Community Services District
MCL	maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California

Acronyms, Abbreviations, and Initialisms

MWDSC	Metropolitan Water District of Southern California
MPI	Material Physical Injury
MEP	maximum extent possible
MS4	Municipal Separate Storm Sewer System
msl	mean sea level
MVWD	Monte Vista Water District
MZ1	Management Zone 1
MZ2	Management Zone 2
MZ3	Management Zone 3
MZ4	Management Zone 4 – Chino East
MZ5	Management Zone 5 – Chino South
NPDES	National Pollutant Discharge Elimination System
ORGP	Ontario Groundwater Recovery Project
OBMP	Optimum Basin Management Plan
O&M	operations and maintenance
PRPs	Potentially Responsible Parties
PID	Project Identification Number
PEIR	Programmatic Environmental Impact Report
R4	Rainfall, Runoff, Router, and Rootzone Model
RWC	Recycled Water Contribution
RWQCB	Regional Water Quality Control Board
RIX	Rapid Infiltration Extraction Treatment Plant
RMPU	2010 Recharge Master Plan Update
SARWC	Santa Ana River Water Company

Acronyms, Abbreviations, and Initialisms

SBCFCD	San Bernardino County Flood Control District
SCADA	Supervisory Control and Data Acquisition
SWP	State Water Project
TYCIP	Ten-Year Capital Improvement Program
TVMWD	Three Valleys Municipal Water District
TDS	total dissolved solids
UWMP	Urban Water Management Plan
USGS	United States Geological Survey
VOC	Volatile Organic Compound
Watermaster	Chino Basin Watermaster
WLAM	WasteLoad Allocation Model
WEI	Wildermuth Environmental, Inc.
WMWD	Western Municipal Water District
WQMP	Water Quality Management Plan
WRCRWAP	Western Riverside County Regional Wastewater Authority Plant

Section 1 – Introduction

This report documents the investigation that was conducted pursuant to the direction of the Court and the Chino Basin Watermaster (Watermaster) to amend its 2010 Recharge Master Plan Update (RMPU) (WEI, et al, 2010). The 2010 RMPU was prepared consistent with the requirements of the Peace II Agreement and the December 2007 Court Order[1] that approved and directed Watermaster to implement the Peace II Agreement. The 2010 RMPU was a condition subsequent to the December 2007 Court order that mandated completion of the 2010 RMPU and submittal to the Court by July 1, 2010. The 2010 RMPU was completed on time and submitted to the Court in June 2010.

1.1 Scope and Content of the 2010 RMPU

The minimum scope and content of the 2010 RMPU work was contained in the December 2007 Court Order and included the following.

1.1.1 Peace Agreement

Section 5.1 (e) of the Peace Agreement contains Watermaster's commitments regarding the recharge of supplemental water in the Chino Basin. The 2010 RMPU focused on Watermaster's implementation of Peace Agreement Section 5.1 (e) items (i), (iii), (v), (vii), and (viii), which are stated as follows (see Peace Agreement, pages 20 and 21):

"Watermaster shall exercise Best Efforts to:

(i) protect and enhance the safe yield of the Chino Basin through Replenishment and Recharge; […]

(iii) direct Recharge relative to Production in each area and sub-area of the Basin to achieve long term balance and to promote the goal of equal access to groundwater in all areas and sub-areas of the Chino Basin; […]

(v) establish and periodically update criteria for the use of water from different sources for Replenishment purposes; […]

(vii) recharge the Chino Basin with water in any area where groundwater levels have declined to such an extent that there is an imminent threat of Material Physical Injury to any party to the Judgment;

(viii) maintain long-term hydrologic balance between total Recharge and discharge in all areas and sub-areas; […]."

[1] The Court orders discussed in this section are available on Watermaster's ftp site.

The OBMP Implementation Plan (Exhibit B of the Peace Agreement) contains language identical to that in Peace Agreement Section 5.1 (e), but it is mostly silent as to the schedule for implementing the specific commitments listed above (see OBMP Exhibit B, paragraph 11 on page 20 and the implementation schedule on pages 22 and 23). Paragraph 9 of page 20 of the Implementation Plan includes additional recharge guidelines that Watermaster must consider:

> "9. When locating and directing physical recharge, Watermaster shall consider the following guidelines:
>
> (i) provide long-term hydrologic balance within the areas and sub-areas of the basin
>
> (ii) protect and enhance water quality
>
> (iii) improve water levels
>
> (iv) the cost of recharge water
>
> (v) any other relevant factors"

Section 7 of the Rules and Regulations repeats the commitments of Section 5.1 (e) of the Peace Agreement and adds (see Rules and Regulations, page 37, 7.1 [b] [iv]):

> "(b) Watermaster shall exercise Best Efforts to: […]
>
> (iv) Make its initial report on the then existing state of Hydrologic Balance by July 1, 2003, including any recommendations on Recharge actions which may be necessary under the OBMP. Thereafter, Watermaster shall make written reports on the long term Balance in the Chino Basin every two years; […]."

1.1.2 Peace II Agreement

The Peace II Agreement states that Watermaster will update the Recharge Master Plan and obtain Court approval of that update to address how the Chino Basin will be managed to secure and maintain hydraulic control and operated at a new equilibrium at the conclusion of the period of reoperation. This plan must reflect an appropriate schedule for planning, design, and physical improvements—as required—to provide reasonable assurance that, following the full beneficial use of groundwater withdrawn in accordance with basin reoperation and authorized controlled overdraft, sufficient replenishment capability exists to meet the reasonable projections of the Desalter replenishment obligations. With the concurrence of the IEUA and Watermaster, the Recharge Master Plan is to be updated and amended as frequently as necessary with Court approval and no less than every five (5) years.

Peace II Article 8.4 summarizes recharge in Management Zone 1 (MZ1)—specifically the 6,500 acre-ft/yr supplemental recharge to MZ1. Moreover, the Parties make the following acknowledgments regarding the 6,500 acre-ft/yr supplemental recharge:

(a) A fundamental premise of the Physical Solution is that all water users dependent upon Chino Basin will be allowed to pump sufficient waters from the Basin to meet their requirements. To promote the goal of equal access to groundwater within all areas and sub-areas of the Chino Basin, Watermaster has committed to use its best efforts to direct recharge relative to production in each area and subarea of the Basin and to achieve long-term balance between total recharge and discharge. The Parties acknowledge that to assist Watermaster in providing for recharge, the Peace Agreement sets forth a requirement for Appropriative Pool purchase of 6,500 acre-ft/yr of Supplemental Water for recharge in Management Zone 1 (MZ1). The purchases have been credited as an addition to Appropriative Pool storage accounts. The water recharged under this program has not been accounted for as Replenishment water.

(b) Watermaster was required to evaluate the continuance of this requirement in 2005 by taking into account provisions of the Judgment, Peace Agreement and OBMP, among all other relevant factors. It has been determined that other obligations in the Judgment and Peace Agreement, including the requirement of hydrologic balance and projected replenishment obligations, will provide for sufficient wet water recharge to make the separate commitment of Appropriative Pool purchase of 6,500 acre-ft unnecessary. Therefore, because the recharge target as described in the Peace Agreement has been achieved, further purchases under the program will cease and Watermaster will proceed with operations in accordance with the provisions of paragraphs (c), (d) and (e) below.

(c) The parties acknowledge that, regardless of Replenishment obligations, Watermaster will independently determine whether to require wet-water recharge within MZ1 to maintain hydrologic balance and to provide equal access to groundwater in accordance with the provisions of this Section 8.4 and in a manner consistent with the Peace Agreement, OBMP and the Long Term Plan for Subsidence." Watermaster will conduct its recharge in a manner to provide hydrologic balance within, and will emphasize recharge in MZ1. Accordingly, the Parties acknowledge and agree that each year Watermaster shall continue to be guided in the exercise of its discretion concerning recharge by the principles of hydrologic balance. (d) Consistent with its overall obligations to manage the Chino Basin to ensure hydrologic balance within each management zone, for the duration of the Peace Agreement (until June of 2030), Watermaster will ensure that a minimum of 6,500 acre-ft of wet water recharge occurs within MZ1 on an annual basis. However, to the extent that water is unavailable for recharge or there is no replenishment obligation in any year, the obligation to recharge 6,500 acre-ft will accrue and be satisfied in subsequent years.

1. Watermaster will implement this measure in a coordinated manner so as to facilitate compliance with other agreements among the parties, including but not limited to the Dry-Year Yield Agreements.

2. In preparation of the Recharge Master Plan, Watermaster will consider whether existing groundwater production facilities owned or controlled by

producers within MZ1 may be used in connection with an aquifer storage and recovery ("ASR") project so as to enhance recharge in specific locations and to otherwise meet the objectives of the Recharge Master Plan.

(d) Five years from the effective date of the Peace II Measures, Watermaster will cause an evaluation of the minimum recharge quantity for MZ1. After consideration of the information developed in accordance with the studies conducted pursuant to paragraph 3 below, the observed experiences in complying with the Dry Year Yield Agreements as well as any other pertinent information, Watermaster may increase the minimum requirement for MZ1 to quantities greater than 6,500 acre-ft/yr. In no circumstance will the commitment to recharge 6,500 acre-ft be reduced for the duration of the Peace Agreement."

1.1.3 Special Referee's December 2007 Report, Sections VI (Assurances Regarding Recharge), VII (Declining Safe Yield), and VIII (New Equilibrium)

In the Final Report and Recommendations on Motion for Approval of Peace II Documents, the Special Referee stated that "A key element of the proposed Peace II Measures is that Watermaster must develop recharge capability throughout the Basin Reoperation period, to ensure that sufficient recharge capability exists at the end of the period" (Final Report, page 25, [Schneider, 2007]). The Special Referee recommended and the Court ultimately ordered that several elements be included within the updated Plan (Motion to Approve Watermaster's Filing in Satisfaction of Condition Subsequent 5; Watermaster Compliance with Condition Subsequent 6, August 21, 2008):

1. Baseline conditions must be clearly defined and supported by technical analysis. The baseline definition should encompass factors such as pumping, demand, recharge capacity, total Basin water demand, and availability of replenishment water.

2. Safe Yield should be estimated annually, though it is recognized that it is not to be formally recalculated until 2011. Watermaster should develop a technically defensible approach to estimating Safe Yield annually.

3. Measures should be evaluated to lessen or stop the projected Safe Yield decline. All practical measures should be evaluated in terms of their potential benefits and feasibility.

4. Evaluations and reporting of the impact of Basin Re-Operation on groundwater storage and water levels should be done on an annual basis.

5. Total demand for groundwater should be forecast for 2015, 2020, 2025, and 2030. The availability of imported water for supply and replenishment, and the availability of recycled water should be forecast on the same schedule. The schedules should be

refined in each Recharge Master Plan update. Projections should be supported by thorough technical analysis.

6. The Recharge Master Plan must include a detailed technical comparison of current and projected groundwater recharge capabilities and current and projected demands for groundwater. The Recharge Master Plan should provide guidance as to what should be done if recharge capacity cannot meet or is projected not to be able to meet replenishment needs. This guidance should detail how Watermaster will provide sufficient recharge capacity or undertake alternative measures so that Basin operation in accordance with the Judgment and the Physical Solution can be resumed at any time.

These recommendations are a reflection of the requirements described in the Peace II Measures. Peace Agreement II section 8.1 and the Amendment to Judgment Exhibit "I" section 2(b)(5) require that the updated Recharge Master Plan must:

- Address how the Basin will be contemporaneously managed to secure and maintain Hydraulic Control and subsequently operated at a new equilibrium at the conclusion of the period of Re-Operation.
- Contain recharge estimations and summaries of the projected water supply availability as well as the physical means to accomplish the recharge projections.
- Reflect an appropriate schedule for planning, design, and physical improvements as may be required to provide reasonable assurance that sufficient Replenishment capacity exists to meet the reasonable projections of Desalter Replenishment obligations following the implementation of Basin Re-Operation."

Peace Agreement II section 8.4(d)(2) further requires that the Recharge Master Plan:

> "Consider whether existing groundwater production facilities owned or controlled by producers within MZ1 may be used in connection with an aquifer storage and recovery ("ASR") project so as to further enhance recharge in specific locations and to otherwise meet the objectives of the Recharge Master Plan."

The Outline of the 2010 Recharge Master Plan Update report and the scope of work were designed to respond to the Special Referee's report, as ordered by the Court on December 21, 2007. The Court subsequently approved the outline, and the stakeholders reviewed and approved the scope of work.

1.2 2010 RMPU Implementation

In its October 2010 Court order, the Court accepted the 2010 RMPU as satisfying Condition Subsequent Number 8 and ordered that certain recommendations of the 2010 RMPU be implemented. Specifically, the Court ordered:

"(3) Watermaster is hereby ordered to convene the committee described in item 3 of section 7.1 of the updated RMP to develop the monitoring, reporting, and accounting practices that will be required to estimate local project stormwater recharge and new yield.

(4) Watermaster is hereby ordered to conduct further analyses as described in section 7.2 of the updated RMP of the Phase I through III projects to refine the projects, to develop a financing plan, and to develop an implementation plan.

(5) By December 17, 2011, six months following completion of the parties UWMPs, Watermaster will report to the Court on any changes to the 2010 RMP necessitated by information received through the UWMPs. In this report Watermaster will also report on progress made under items (3) and (4) above, and will report on the status of IEUA's approval of the RMP."

Item 3 of Section 7.1 of the 2010 RMPU reads as follows:

"3. In implementing the above, Watermaster should form a committee—consisting of itself, the landuse control entities, the County Flood Control Districts, the CBWCD, the IEUA, and others—to develop the monitoring, reporting, and accounting practices that will be required to estimate local project stormwater recharge and new yield. This committee should be formed immediately, and the monitoring, reporting, and accounting practices should be developed as soon as possible."

The operable section of Section 7.2 of the 2010 RMPU reads as follows:

"Watermaster should conduct further analyses of the Phase I through III projects to refine the projects, to develop a financing plan, and to develop an implementation plan. This planning work should begin as soon as practical and could be accomplished within three years. The schedule to implement the Phase I through III projects would be developed during the proposed planning work, and the construction of these projects could be completed within five years of completing the proposed planning work."

Interpreted literally, the Court currently expects that the Planning for the Phase I through III projects to be done by October 2013 and that construction be completed by October 2018. This does not mean that all the projects contained within the 2010 RMPU will be constructed by October 2018. Watermaster needs to determine which of the recharge projects identified in the 2010 RMPU, and perhaps other recharge projects, need to be implemented based on current projected needs and have the planning for these projects done at an appropriate level that they may be constructed by October 2018.

In November 2011, Watermaster reported its progress pursuant to the October 2010 Court Order; after which, in December 2011, the Court issued an order directing Watermaster to continue with its implementation of the 2010 RMPU per its October 2010 order but with a revised schedule.

And, on December 15, 2011, the Watermaster Board:

> "Moved to approve that within the next year there will be the completion of Recharge Master Plan Update, there will be the development of an Implementation Plan to address balance issues within the Chino Basin subzones, and the development of a Funding Plan, as presented."[2]

This report is in response to the October 2010 and December 2011 Court Orders and the December 2011 Board direction. An update was filed with the court in May 2012 and in December 2012 a new schedule was adopted.

1.3 Production Sustainability

The term sustainability is used throughout this report and refers specifically to the ability to produce water from a specific well at a desired production rate, given the groundwater level at that well and its specific well construction and equipment details. It has no nexus to the Judgment or Peace Agreements. Groundwater production at a well is presumed to be sustainable if the groundwater level at that well is greater than the sustainability metric. Sustainability metrics are defined for each well by well owner. If the groundwater level falls below the sustainability metric, the owner will either lower their pumping equipment in their well or have to reduce production.

1.4 Organization of this Report

This report is organized around a set of questions that were developed to respond to the Court, the Watermaster Board, and the Parties. The table below lists these questions, the order in which they are answered, and the sections in which the answers are provided.

Section	Questions Addressed
Section 2 – Changed Conditions	1. What are the regulatory and institutional issues that have occurred since the 2010 RMPU was prepared? 2. How have groundwater levels changed since the OBMP was approved in 2000? 3. How have groundwater and replenishment projections changed since the 2010 RMPU was prepared? 4. How much water has been stored by the Parties and what is the potential for additional storage in the future? 5. What are the replenishment sources available to the Watermaster and what are their reliability and cost?

[2] From the minutes of the December 15, 2011 Watermaster Board meeting.

Section	Questions Addressed
Section 3 – Impacts of Revised Groundwater Production and Replenishment Projections	1. How are groundwater levels projected to change with the revised projections? 2. What areas in the basin are facing sustainability challenges?
Section 4 – Inventory of Existing Recharge Facilities and Their Capabilities	1. What are the existing recharge facilities and what is their ability to recharge storm and supplemental waters? 2. What physically/institutionally limits the ability to recharge storm water at existing facilities and what improvements could be made to these facilities to capture more stormwater? 3. What physically/institutionally limits the supplemental water recharge capacity of the existing recharge facilities? 4. What are the implications of the most recent draft recycled water recharge regulations for the Chino Basin? 5. What is the recharge capacity of existing ASR facilities in the Chino Basin? 6. What is the projected in-lieu recharge capacity in the Basin and what limits it?
Section 5 – Monitoring, Reporting, and Accounting Practices to Estimate Long-Term Average Annual Net New Stormwater Recharge	1. What policies and accounting procedures need to be developed to account for the New Yield created by MS4 compliance?
Section 6 – Recharge Options to Improve Yield and Assure Sustainability	1. What areas in the basin are likely to have future sustainability issues that can be addressed by increasing physical recharge? 2. What operational changes should be implemented to increase the recharge of storm and supplemental waters at existing basins to increase yield or to assure production sustainability? What are the costs and impediments to implementations? 3. What new recharge facilities should be constructed to increase yield or to assure production sustainability? What are the costs and impediments to implementation? 4. What changes in production patterns (location and magnitude) could be implemented to increase yield or to assure production sustainability? What are the costs and impediments to implementations?
Section 7 – Evaluation Criteria	1. What criteria should be used to evaluate the recharge options identified in Section 6?

Section	Questions Addressed
	2. What are the criteria for ranking the options?
Section 8 – Recommended 2013 Recharge Master Plan Update	1. Applying the criteria and ranking scheme from Section 7, what operational and facilities improvements (projects) should be implemented to increase yield and assure sustainable production? 2. What is the recommended implementation and financing plan?

The objectives of this section are to describe changed conditions from what was assumed in the 2010 RMPU and to update information that was included in the 2010 RMPU. Specifically this section answers the following questions:

- What are the regulatory and institutional issues that have occurred since the 2010 RMPU was prepared?
- How have groundwater levels changed since the OBMP was approved in 2000?
- How have groundwater and replenishment projections changed since the 2010 RMPU was prepared?
- How much water has been stored by the Parties and what is the potential for additional storage in the future?
- What are the replenishment sources available to the Watermaster and what is their reliability and cost?

2.1 Legislative and Regulatory

There has been one significant legislative change and one regulatory change since the 2010 RMPU. The legislative change is the implementation of SBX7-7, the so-called "20 percent by 2020 law." Under this legislation, potable water demands are to be reduced by 10 percent by 2015 and 20 percent by 2020.[3] The municipal water suppliers have incorporated this requirement into their 2010 Urban Water Management Plans. This information was not available during the preparation of the 2010 RMPU. The implications of the implementation of this law on groundwater production and replenishment are discussed in further detail in the section below entitled Revised Groundwater Production and Replenishment Projections.

Currently, Watermaster and the IEUA recharge recycled water in the Chino Basin under a permit issued by the Regional Water Quality Control Board (Regional Board). The California Department of Public Health (DPH) has draft regulations for the planned recharge of recycled water into a potable water supply aquifer. The DPH recently updated its draft regulations. The DPH uses the draft regulations as guidance in the regulation of recycled water recharge and issues permit conditions that are incorporated by the Regional Board into permits for planned recycled water recharge projects. The implications of the new draft regulations on recycled water are discussed in Section 4 of this report.

[3] The actual law and implementation are more complicated than just the stated reductions in potable water demand. The law also has an agricultural water demand reduction mandate. For more information, go to http://www.water.ca.gov/wateruseefficiency/sb7/docs/20x2020plan.pdf.

2.2 Groundwater Level Changes

This section analyzes groundwater level changes in the Basin and groundwater level changes at representative wells since the implementation of the OBMP in 2000. Groundwater level changes are characterized in groundwater level contour maps, a groundwater level change contour map, cross-sections that illustrate changes in saturated thickness, and time histories of groundwater levels at selected wells through 2011. The data used in the subsequent figures are contained in a relational database and were accessed through HydroDaVE™.

2.2.1 Groundwater Level Changes Across the Basin

Figures 2-1a and 2-1b are groundwater elevation contour maps for spring of 2000 and the spring of 2010. These maps were included in the recent 2010 State of the Basin Report (WEI, 2012). The following procedures were used in the creation of these maps:

- Extract the entire time history of groundwater level data from Watermaster's groundwater level database for all wells in the Chino Basin.
- Plot and explore groundwater elevation time histories for all wells.
- Choose one "static" groundwater level elevation data point per well that is representative of the spring 2000 and spring 2010 periods.
- Plot groundwater level elevation data on maps with background geologic/hydrologic features.
- Contour and digitize groundwater elevation data.

The direction of groundwater flow is perpendicular to these contours in the direction of decreasing elevation. These maps show that groundwater generally flows in a south-southwest direction from the primary areas of recharge in the northern parts of the basin toward the Prado Flood Control Basin in the south. There are notable pumping depressions in the groundwater level surface that interrupt the general flow patterns in the northern portion of MZ1 (Montclair and Pomona areas) and directly southwest of the Jurupa Hills. There is an extensive groundwater level depression surrounding the Chino I and Chino II Desalter well fields in the spring of 2010.[4]

Figure 2-2 shows the difference in groundwater elevation between the spring of 2010 and the spring of 2000. This map was composed by subtracting the groundwater elevations for the year 2000 from the groundwater elevations for 2010. The change in groundwater elevation is

[4] The Chino I desalter started producing groundwater in 2001, and the groundwater depression surrounding wells CDA I-5 through CDA I-12 quickly developed. The Chino I desalter expansion and the Chino Desalter II started up in 2007, and the groundwater depression surrounding CDA I-13 through CDA I-15 and the Chino Desalter II wells quickly developed.

shown by contours of equal change and by a color ramp of yellow-to-green for increasing groundwater elevations and yellow-to-red for decreasing groundwater elevations. These groundwater-level changes are for the shallow unconfined aquifer, where most of the storage change occurs.

Groundwater levels have declined across the central and eastern portions of the Basin. This decline is attributed to groundwater production in MZ2 and MZ3 during the period and the implementation of "basin re-operation." Groundwater levels declined significantly in most of the areas around the Chino Desalter well fields. Pumping began in 2001 and progressively increased as the well field and the desalter facilities expanded. The drawdown associated with the desalter well field has achieved hydraulic control in most of this area and has increased the hydraulic gradient from the Santa Ana River toward the desalter well field. Hydraulic Control is one of several commitments made by the IEUA and Watermaster to the Regional Board (RWQCB) as part of the maximum benefit commitments incorporated in the Santa Ana Regional Water Quality Control Plan (Basin Plan) in 2004 and the Peace II Agreement in 2007. Watermaster conducts monitoring and prepares an annual report to the RWQCB to document the state of hydraulic control.

Groundwater levels have risen in the western part of the Basin. In the northwest part of the Basin this is attributed to a decrease in production associated with in-lieu and wet water recharge for the MWDSC Dry-Year Yield Program (DYYP). In the southwest, water levels have increased where there is decreased pumping associated with the land subsidence investigation and the resulting MZ1 Subsidence Management Plan (WEI, 2007b). In the south near Prado Basin, water levels have risen due to decreased agricultural pumping and, more recently, the agricultural use of recycled water in lieu of groundwater production.

Figure 2-3 illustrates the groundwater production time history for fiscal years 1999-2000 through 2010-11[5] by pool, DYYP take, and for the Chino Desalter Authority (CDA). During this period total groundwater production oscillated between 160,000 to 180,000 acre-ft/yr except for 2006 and 2011. Aggregate production by the Overlying Agricultural and Overlying Non-agricultural pools declined from about 50,000 acre-ft/yr to about 22,000 acre-ft/yr. These declines were offset by production from the appropriative pool, DYYP takes in 2008, 2009, and 2010, and by increases in production from the Chino Basin desalters. Production by the Appropriative pool generally increased through 2007 and then declined to less than 100,000 acre-ft/yr after 2007.

2.2.2 Changes in Saturated Thickness

Figure 2-4 shows the locations of flow-lined based cross-section profiles through each of the management zones, through a part of the Chino II Desalter well field, and through part of the Jurupa Community Services District (JCSD) well field. These flow-line based cross-sections are shown in figures 2-5a through 2-5f. The intent of these cross-sections is to show the

[5] Hereafter, all years in which production, replenishment, and recharge are discussed will be fiscal years, and they will be referred to as the trail year. For example, fiscal 1999-2000 will be referred to as 2000.

saturated thickness through these cross-sections for 2000 and 2010 and wells located on or near these cross-sections. The horizontal red bar shown at most wells are sustainability metrics that have been provided by the well owners. Groundwater production at wells is presumed to be sustainable if the groundwater level at the well is greater than the sustainability metric. If the groundwater level falls below the sustainability metric, the owner will either lower their pumping equipment in their well or will have to reduce production. These metrics will be described in more detail in Section 3.

Cross-sections A-A' (Figure 2-5a), B-B' (Figure 2-5b), and C-C' (Figure 2-5c) are laid out in a generally north to south alignment through MZ1, MZ2, and MZ3, respectively. The saturated thickness through most of these cross-sections ranges from about 400 feet to over 1,000 feet with two notable exceptions: the northern end of A-A' and the JCSD well field in cross-section C-C'. Groundwater levels are seen to be slightly higher in MZ1 in 2010 relative to 2000, and this increase is relatively small compared the saturated thickness and the depth of wells. Groundwater levels are generally 20 to 50 feet lower in MZ2 and MZ3 in 2010 relative to 2000; as with MZ1, this change is relatively small compared to the saturated thickness and depth of wells except where cross-section C-C' passes through the JCSD well field and the Chino desalter wells, where the saturated thickness is much smaller due to an increase in the elevation of the effective base of the aquifer.

Cross-sections D-D' (Figure 2-4d) and E-E' (Figure 2-4e) are laid out in a generally east to west alignment through MZ4 and MZ5, respectively. The saturated thickness throughout most of these cross-sections ranges from about 100 feet to 300 feet and in some places less. The saturated thickness near JCSD well 24 appears to be slightly greater than 100 feet in 2010. Groundwater levels are generally 0 to 30 feet lower in MZ4 and MZ5 in 2010 relative to 2000 with the decrease in MZ5 less than MZ4.

2.2.3 Historical Groundwater Level Trends

Figure 2-1a shows the locations of wells with groundwater level time histories discussed herein and the Chino Basin management zone boundaries. Wells were selected based on length of record, density of data points, quality of data, geographical distribution, and aquifer system. Wells are identified by their local name (usually owner abbreviation and well number) or their Watermaster identification number (Watermaster ID) if privately owned.

Figures 2-6a through 2-6e are groundwater level time history charts for the wells shown in Figure 2-1a, for MZ1 through MZ5, respectively. Some of the short-term groundwater level fluctuations shown in these figures result from the inclusion of static and dynamic observations. Below, by management zone, the behavior of groundwater levels at specific wells is compared to climate, groundwater production, wet water recharge activities, and other factors as appropriate.

To compare groundwater levels to climate, a cumulative departure from mean precipitation (CDFM) curve has been plotted on the groundwater level time history charts. Positive sloping lines on the CDFM curve show wet years or wet periods, whereas negatively sloping lines show dry years or dry periods. For example, the period from 1978 to 1983 was an extremely wet period, and it is represented by a positively sloping line. To compare groundwater levels to pumping and recharge activities, bar charts that show groundwater production and wet water recharge by management zone have been superimposed on the groundwater level time history charts. These charts are detailed and somewhat complicated tools that provide insight into the complicated response of groundwater levels to several stressors.

2.2.3.1 Management Zone 1

MZ1 is an elongate region, running generally north-south, and comprises the westernmost area of the Chino Basin. It is bounded by MZ2 to the east, various basin-boundary faults to the north, and sedimentary bedrock outcrops to the west and south.

Figure 2-6a shows groundwater level time histories for the following wells: Monte Vista Water District Well 10 (MVWD-10), City of Pomona Well 11 (P-11), City of Chino Well 10 (C-10), and Chino Hills Wells 15A and 16 (CH-15A and CH-16). The Montclair, College Heights, Upland, and Brooks Street Basins are located in the northern portion of MZ1 and are the primary sites for artificial recharge. Careful inspection of Figure 2-6a indicates that the groundwater level response to precipitation is minimal, as evidenced by comparison of the CDFM to groundwater level time series, and that groundwater levels are most significantly influenced by groundwater production and artificial recharge.

Wells MVWD-10 and P-11 exhibit representative groundwater levels for the northern portion of MZ1. An analysis of static groundwater levels at these wells shows a decline from 1995 to 2001, a period of increased groundwater production in MZ1. Since 2001, water levels have risen by about 100 feet at MVWD-10 and by about 45 feet at P-11. This increase is attributed to a decrease in local production and an increase in wet water recharge in MZ1 since 2001.

Well C-10 is located in central MZ1. Water levels at C-10 peaked in the mid-1990s and declined by about 20 feet from 1995 to 2000. Unlike other wells in MZ1 that experienced significant water level recovery from 2000 to 2006, the water levels at C-10 remained essentially unchanged. Since 2006, water levels have risen by approximately 20 feet. This increase is due to a decrease in local production and an increase in wet water recharge.

Water levels measured at CH-15A are representative of the shallow aquifer system in the southern portion of MZ1. The recent land subsidence investigation has shown that in southern MZ1, the aquifer system is hydrologically stratified. The shallow aquifer system is unconfined to semi-confined while the deep aquifer system is confined. Water levels in CH-15A have historically been stable at around 80-90 ft-bgs and have experienced small variations in response to nearby pumping. Since 2000, water levels have risen by about 10 feet. This is primarily due to the decrease in local production associated with the MZ1 Interim Management Plan.

CH-16 is perforated in the confined deep aquifer system, which is characterized by large changes in piezometric pressure due to nearby pumping. In 2003 and 2004, during a series of pumping tests conducted by Watermaster in southern MZ1, water levels in CH-16 dropped by approximately 100 feet, and the period of recovery lasted several months. These tests demonstrated that piezometric levels in CH-16 (and the deep aquifer system in general) are heavily influenced by changes in pumping from local wells screened within the deep aquifer system. The static water levels at CH-16 declined by about 100 feet from 1995 to 2000 and subsequently recovered by about 140 feet from 2000 to 2006. At the end of 2008, static water levels had declined by about 30 feet from the 2006 highs with a maximum drawdown of about 60 feet observed in the summer of 2008.

2.2.3.2 Management Zone 2

Management Zone 2 (MZ2) is a large, central, elongate area of the Chino Basin. Figure 2-6b shows groundwater level time histories for Cucamonga Valley Water District (CVWD) Wells CB-3 and CB-5 (CVWD CB-3 and CVWD CB-5), City of Ontario Well 16 (O-16), Watermaster ID 600394, and Hydraulic Control Monitoring Program Wells 2/1 and 2/2 (HCMP-2/1, and HCMP-2/2). These wells are aligned north to south, approximately along a groundwater flow line. The San Sevaine, Etiwanda, Lower Day, Victoria, Turner, and Ely Basins are located in the northern and central regions of MZ2 and are the primary sites for artificial recharge. Careful inspection of Figure 2-6b indicates that the groundwater level response to precipitation and artificial recharge is minimal, as evidenced by comparison of the CDFM and artificial recharge time history to groundwater level time histories, and that groundwater level time histories are most significantly influenced by groundwater production.

The groundwater level time histories for the northernmost wells—CVWD CB-3 and CB-5 and O-16—show a general water level increase following 1978, which is likely due to a combination of the 1978 to 1983 wet period, the reduction in overdraft following the implementation of the Chino Basin Judgment, and the start of artificial replenishment with imported water in the San Sevaine and Etiwanda Basins. Following the early 1990s, water levels at these wells began to decrease and have continued to decrease to present. The static water levels at CB-3 and CB-5 decreased by approximately 30 feet between 2003 and 2006. Long-term water level decreases in this area of MZ2 are likely due to decreased wet water recharge from 1996 to 2003 and increased groundwater production from 1995 to present.

Well Watermaster ID X-Ref 404 is located in the central portion of MZ2, north of the Chino I Desalter well field. Water levels at this well have decreased by about 15 feet since 2000.

Wells HCMP 2/1 and HCMP 2/2 are located at the southern end of MZ2 near the Chino I Desalter well field. These wells were completed and the first measurements were recorded in early 2005. HCMP 2/1 is perforated in the shallow aquifer system, and HCMP 2/2 is perforated in the deep aquifer system. Contrary to that of MZ1, the deeper aquifer in this MZ behaves much more like the shallow, unconfined aquifer, which is indicative of a greater degree of hydraulic communication between the two aquifer systems. Both wells exhibited similar groundwater level increases (15-20 feet) from 2005 to 2006. It is likely that this was due to changes in local production—especially at some of the nearby Chino I Desalter wells, which experienced production decreases in 2005 and 2006. Since 2006, water levels have decreased by 5-10 feet in both wells.

2.2.3.3 Management Zone 3

Management Zone 3 (MZ3) consists of the area along the eastern boundary of the Chino Basin. It is bounded by MZ2 to the west, Chino-East (MZ4) and Chino-South (MZ5) to the south, and the Rialto-Colton Fault to the east. Figure 2-6c shows water level time histories for Fontana Water Company Wells F30A and F35A (F30A and F35A), Milliken Landfill Well M-3 (M-3), County of San Bernardino MIL M-06B, Watermaster ID 3602468, and HCMP Well 7/1 (HCMP 7/1). These wells are aligned northeast to southwest, approximately along a groundwater flow line. The RP-3 and Declez Basins are located in the central region of MZ3 and are the primary sites for artificial recharge. Careful inspection of Figure 2-6c indicates that, like MZ2, the groundwater level response to precipitation and artificial recharge is minimal, as evidenced by comparison of the CDFM and artificial recharge time history to groundwater level time histories, and that groundwater level time histories are most significantly influenced by groundwater production.

Wells F30A and F35A are located in the northeastern portion of MZ3. The groundwater level time histories of these two wells show relatively stable water levels from 1978 until the late 1990s. From 2000 to 2006, the wells experienced a progressive decline in water levels of about 25 feet. This decline is due to increased production in MZ3. Since 2006, water levels at F35A have remained relatively unchanged, and water levels at F30A have fluctuated ±5 to 10 feet.

Wells M-3, M-06B, and Watermaster ID Xref 425 are located in the central portion of MZ3. From 2000 to 2006, a groundwater decline of about 30 feet was observed at these wells.

The southernmost well, HCMP-7/1, experienced a groundwater level decline of about 20 feet from 2005 to the end of 2008. Similar water level declines can be observed in most wells throughout MZ3. This regional drawdown in MZ3 is due to the steady increase in production within MZ3 over the past 20 years and a lack of artificial recharge.

2.2.3.4 Management Zone 4

MZ4, also known as Chino-East, is bounded by the Jurupa Hills to the north, the Pedley Hills to the east, MZ5 to the south, and MZ3 to the west. Figure 2-6d shows groundwater level time histories for HCMP Well 9/1 (HCMP-9/1), Jurupa Community Services District Well 10 (JCSD-10), Watermaster ID 4503, and FC932A2. There are no recharge basins in MZ4, and very little groundwater production occurs in this area.

Groundwater levels at these wells decreased by about 20 to 40 feet between 2000 and 2008. These declines are due to groundwater production at wells in the management zone and at nearby wells in MZ3, including the Chino II desalter well field, which is located near the western boundary of the MZ4.

2.2.3.5 Management Zone 5

MZ5, also known as Chino-South, is bounded by MZ4 to the north, MZ3 to the west, the Riverside Narrows to the east, and various unnamed hills to the south. Figure 2-6e shows groundwater level time histories for USGS Well Archibald-1, HCMP Well 8/1 (HCMP 8/1), and Santa Ana River Water Company Well 07 (SARWC-07). There are no groundwater recharge basins in MZ5, but the Santa Ana River is a major source of groundwater recharge. In place of artificial recharge, Figure 2-6e shows the total Santa Ana River discharge measured at the MWD crossing where the Santa Ana River enters the Chino Basin. Santa Ana River discharge in the lower Chino Basin is the source of recharge to wells producing in that area, including the Chino desalters.

These wells exhibit very little groundwater level variation due to the stabilizing effects of Santa Ana River discharge and, more particularly, dry-weather discharge that consists of recycled water and rising water discharge, originating above the MWD crossing and the City of Riverside recycled water discharge just downstream of the MWD crossing. Production in MZ5 decreased steadily from 1978 to 2008 due to a reduction in agricultural production, as the overlying land was converted from agricultural to urban uses. Groundwater levels in HCMP-8/1 and SARWC-07 have declined about 10 to 15 feet since 2006. This decline is due to the onset of pumping at nearby Chino II Desalter wells.

2.2.4 Focused Groundwater Level Time Histories in the Southern End of MZ3

The discussion of Figures 2-5a through 2-5g indicated that groundwater levels were close or had fallen below sustainability metrics for the some wells in the southern end of MZ3. In this section, we examine the time history of selected wells in this part of the Basin. Figures 2-7a and 2-7b are groundwater level time history charts for the wells shown in Figure 2-1a: for the eastern Desalter II well field and for selected JCSD wells in the JCSD well field, respectively. Static and dynamic water level observations have been included to show the trend in groundwater levels in these areas and the amount of drawdown incurred at these wells when operating. Below, the behavior of groundwater levels at specific wells is compared to climate, groundwater production, wet water recharge activities, and other factors as appropriate.

Figure 2-7a illustrates the groundwater level time histories and stressors for the eastern wells of the Desalter II well field. The water level time history starts in 2007 and continues into 2012, a period of just under five years. These data are collected at high frequency using integrated pressure transducers with data loggers. The static and dynamic levels are easily identifiable. Static groundwater levels at wells CDA II-7 and CDA II-8 decreased about 20 feet by mid-2009 and have remained steady since that time. Static groundwater levels at wells CDA II-6 and CDA II-9a decreased about 30 feet by mid-2009 and have remained steady since that time. Desalter II production declined after 2009, and artificial recharge in MZ3 at the RP3 and Declez Basins increased. Based on the groundwater modeling work discussed in Section 3, it is likely that the reduction in Desalter II production contributed to the stabilization of groundwater levels at these wells.

Figure 2-7b illustrates the groundwater level time histories and stressors for selected JCSD wells. The locations of these wells are shown in Figure 2-1a. The water level time histories for JCSD 12 and JCSD 17 start before 2000. The irregularity of the data makes the interpretation of the water level time histories less clear than that of the desalter wells discussed above. Water levels at JCSD 12 appear to decline about 10 feet through 2005, decrease another 30 feet after Desalter II started up in 2007, and stabilize in 2009. The water level time history for JCSD 17 is more difficult to interpret, but the trend in the data suggests that the static level may have decreased 10 feet.

The water level record at JCSD 22 starts in 2004 with irregular observations through 2008 and more frequent observations thereafter. Static groundwater levels at JCSD 22 vary somewhat between 2004 and 2007 with no discernible trend. After the startup of Desalter II, groundwater levels appear to decrease about 20 feet by mid-2009, remaining steady since that time. Static groundwater levels at wells CDA II-6 and CDA II-9a appear to decrease about 30 feet by mid-2009, remaining steady since that time. Desalter II production declined after 2009 and artificial recharge in MZ3 at the RP3 and Declez Basins increased. Based on the groundwater modeling work discussed in Section 3, it is likely that the reduction in Desalter II production contributed to the stabilization of groundwater levels at these wells.

2.3 Water Stored in the Basin

Members of the Overlying Non-agricultural and appropriative pools can store water in the Chino Basin for subsequent use and transfer among parties to Judgment. Storage is regulated pursuant to the Judgment and Watermaster rules and regulations. Classifications of water in storage include:

- Carryover water – unproduced water in any year that may accrue to a member of the Overlying Non-agricultural and appropriative pools and that is produced first each subsequent fiscal year or accounted for as excess carryover water;

- Excess carryover water – carryover water which in aggregate quantities exceeds a party's share of the safe yield in the case of the Overlying Non-agricultural pool or the assigned share of operating safe yield in the case of the appropriative pool in any year; and

- Supplemental water – water imported to the Chino Basin from outside of the Chino Basin watershed and recycled water.

Table 2-1 shows the time history of the aggregate water in storage for all parties in the Overlying Non-agricultural and Appropriative pools by storage type for the period July 1, 2001 through June 30, 2011. This time history is shown graphically in Figure 2-8. Aggregate storage by the Overlying Non-agricultural pool increased from about 38,000 acre-ft in July of 2001 to about 56,000 acre-ft in July of 2011. Aggregate storage by the Appropriative pool increased from about 154,000 acre-ft in July of 2001 to about 286,000 acre-ft in July of 2011. In total, storage increased from about 192,000 acre-ft in 2001 to about 342,000 acre-ft by July 2011, with most of the increase occurring after 2004. Table 2-2 shows the distribution of storage by individual members of the Overlying Non-agricultural and Appropriative pools.

2.4 Revised Groundwater Production and Replenishment Projections

The 2010 RMPU (WEI, et al., 2010) contained a recommendation to update the groundwater production and replenishment obligations to reflect the water purveyor plans being developed to comply with SBX7-7 (20 percent reduction in per capita potable demands by 2020) and the

2010 Urban Water Management Plans (UWMPs) that were due in June 2011. Some stakeholders in the 2010 RMPU process noted that water purveyors may have overestimated groundwater production projections, which would lead to an overestimate of future replenishment obligations and potentially investments in new recharge facilities that may not be required if more recent future groundwater production estimates were used.

The Court accepted this recommendation and included it in its October 8, 2010 Court Order, directing Watermaster and the IEUA to prepare updated groundwater production and replenishment obligation projections and to submit them to the Court by December 17, 2011. This section complies with the October 8, 2010 Court Order and to support the ongoing Watermaster planning process, wherein Watermaster is updating and using its groundwater models to predict basin responses to future planning scenarios. One of the goals of modeling the future planning scenarios is to estimate the safe yield of the Chino Basin.

It is important to note that this report is focused on production and replenishment. The term replenishment, as used herein, refers to the mitigation of overproduction pursuant to the physical solution specified in the Judgment through either wet-water or in-lieu means. Recharge and replenishment water are defined in the Peace Agreement as: "[…] the introduction of water into the Basin, directly or indirectly, through injection, percolation, delivering water for use in–lieu of Production or other method. Recharge references the physical act of introducing water into the Basin. Recharge includes Replenishment Water but not all Recharge is Replenishment Water."

The distinction between recharge and replenishment is important. There may be reasons to recharge other than replenishment, such as mitigating excessive groundwater level declines. Watermaster's recharge obligations related to excessive groundwater level decline and/or the need to balance recharge and discharge are contained in 5.1 (e) of the Peace Agreement.

2.4.1 Groundwater Production Projections

WEI collected available UWMPs from the Chino Basin Parties, including the Cities of Chino, Ontario, Pomona, and Upland; the Golden State Water Company; the San Antonio Water Company; the Monte Vista Water District; the Cucamonga Valley Water District; the Fontana Water Company; the Jurupa Community Services District; the Chino Desalter Authority; the Inland Empire Utilities Agency; the Three Valleys Municipal Water District; the Western Municipal Water District; and the Metropolitan Water District of Southern California. In addition to these plans, WEI contacted the City of Chino Hills to informally obtain their water demands and supply plans. For those retail water agencies that are not required to prepare UWMPs, WEI conducted interviews or reviewed other planning information to estimate water demands and to establish water supply plans.

WEI reviewed this planning information, and where parties' water supply plans showed more water supply than demand, WEI conducted additional discussions to distinguish their Chino Basin groundwater production projections and was able to establish priorities of the various supplies and adjust their water supply plans.

The Metropolitan Water District of Southern California (Metropolitan) has indicated that it will discontinue Replenishment Service water deliveries and replace those deliveries with some other program that will be developed in the future. Seemingly, Watermaster will likely be required to purchase untreated water from Metropolitan at Tier 1, Tier 2, or melded Tier 1/Tier 2 rates for future replenishment. Several Appropriators have demonstrated that, given increased replenishment, power, and assessment costs, it is currently or will soon be more economical to purchase Metropolitan water directly than to produce groundwater in excess of their production rights.

The production projection for agricultural producers has not changed in concept from the 2010 RMPU. Agricultural groundwater production was assumed to decrease linearly from about 21,000 acre-ft/yr in 2009-10 to about 5,000 acre-ft/yr by 2019-20. The sensitivity of this assumption on projected production and replenishment will be described later in this report. In the last few years, recycled water has been supplied for agricultural uses and has resulted in a decline in agricultural groundwater use. The land remaining in agricultural land use is mostly within the sphere of influence of the Cities of Chino and Ontario. The decline in agricultural groundwater use, as shown in Table 2-3, is consistent with the growth in water demand by the Cities of Chino and Ontario.

The production projections for individual Overlying Non-agricultural producers were based on the following:

- For active producers where planning information was unavailable, production was assumed to be their maximum annual production from the five prior years (2006-07 through 2010-11).
- For General Electric (GE), production was assumed to be zero; GE now injects all of its produced groundwater back into the Chino Basin.
- For all other producers, planning estimates were provided.

Table 2-3 shows the projected time history of groundwater production for the 2010 through 2035 period, based on the information collected from the water supply agencies. "Normal" water supply conditions were used when the 2010 UWMPs were available. Under normal supply conditions, total annual groundwater production is projected to decrease from about 162,000 acre-ft/yr in 2010 to about 159,000 acre-ft/yr by 2020 and then gradually increase to about 191,000 acre-ft/yr by 2035. Projected annual groundwater production (in acre-ft/yr) is shown below.

Summary of Groundwater Production by Pool and the CDA
(acre-ft/yr)

Planning Year	Agricultural Pool Production	Overlying Non-Agricultural Pool Production	Appropriative Pool and CDA Projection	Total Production
2010	21,000	2,343	138,320	161,662
2015	13,000	3,387	142,987	159,374
2020	5,000	3,667	150,356	159,023
2025	5,000	3,667	161,356	170,023
2030	5,000	3,667	171,969	180,636
2035	5,000	3,667	181,875	190,542

Municipal and private water purveyors as well as private users in the Chino Basin area depend in part or completely on Chino Basin groundwater. The table below contains aggregate water supply projections (in acre-ft/yr), based on the UWMPs and other information obtained for this investigation.

Macro Water Supply Plan for Watermaster Parties and the CDA
(acre-ft/yr)

Water Source	2010	2015	2020	2025	2030	2035
Chino Basin Groundwater	161,662	159,374	159,023	170,023	180,636	190,542
Non-Chino Basin Groundwater	49,718	57,463	57,463	57,463	57,463	57,463
Local Surface Water	26,017	18,869	18,869	18,869	18,869	18,869
Imported Water From Metropolitan	57,434	87,558	95,521	98,448	101,327	105,768
Other Imported Water	766	3,500	3,500	3,500	3,500	3,500
Recycled Water for Direct Reuse	13,516	21,393	26,393	30,993	35,593	40,694
Total	309,113	348,157	360,769	379,296	397,388	416,836

The total water demand is projected to grow from about 309,000 acre-ft/yr in 2010 to about 417,000 acre-ft/yr by 2035. As stated above, Chino Basin groundwater production is projected to decrease from about 162,000 acre-ft/yr in 2010 to about 159,000 acre-ft/yr by 2020 and then increase gradually to about 191,000 acre-ft/yr in 2035. Recycled water for direct reuse is projected to increase from about 14,000 acre-ft/yr in 2010 to about 41,000 acre-ft/yr by 2035. The amount of imported water supplied by Metropolitan is projected to increase from about 57,000 acre-ft/yr in 2010 to about 106,000 acre-ft/yr by 2035, an increase of 86 percent.

2.4.2 Replenishment Obligation Projections

Watermaster recharges supplemental water into the Chino Basin pursuant to the Judgment and the Peace Agreement. Total annual replenishment is calculated herein based on projected groundwater production and production rights. Production rights are based on the following assumptions:

- The safe yield is 140,000 acre-ft/yr through 2011 and, thereafter, the safe yield estimate presented in 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009). The safe yield is projected to decline to about 129,000 acre-ft/yr by 2035.

- The Judgment allows 5,000 acre-ft/yr of controlled overdraft of the Chino Basin through 2017.

- Reoperation water is allocated to the replenishment of CDA desalter production, as provided for in the Peace II Agreement, updated in the report prepared to satisfy Condition Subsequent No. 7 (WEI, 2008), and updated thereafter based on actual CDA production. Reoperation water is completely used up by 2030.

- The 6,500 acre-ft/yr supplemental water recharge commitment to Management Zone 1 (MZ1) pursuant to the Peace II Agreement.

- Recycled water recharge was assumed to occur as projected by the IEUA in its February 10, 2012 email to Ken Jeske.

Recycled water recharge is used in MZ1 to partially meet the 6,500 acre-ft/yr supplemental water recharge obligation. Therefore, some of the recycled water recharge that has historically occurred in MZ1 and is planned to occur in the future is credited to meet the 6,500 acre-ft/yr supplemental water recharge obligation.

2.4.3 Groundwater Production and Replenishment Scenarios

Four groundwater production and replenishment scenarios were developed in this investigation.

2.4.3.1 Scenario 1 – Baseline Scenario – Projected Groundwater Production and Production Rights and Efficient Market Assumption

Table 2-4 contains the projected groundwater production from Table 2-3, the various components of production rights and total production rights, the projected replenishment obligation, and the cumulative replenishment obligation (the baseline projection). The sudden decrease in production rights in 2014 is caused by the exhaustion of the first tranche of reoperation water by the existing desalters. The increase in production rights in 2015 is caused by the startup in use of the second tranche of reoperation water by the CDA expansion and the projected increase in recycled water recharge. The decrease in production rights over the period of 2019 through 2030 is due to the elimination of 5,000 acre-ft/yr of controlled overdraft after 2017 and the gradual decrease of safe yield. The sudden decrease in production rights that occurs in 2031 is due to the assumed ending of the 6,500 acre-ft/yr recharge obligation in MZ1 and the exhaustion of the second tranche of reoperation water.

Watermaster's replenishment obligation was estimated using the following assumptions:

- The water in storage accounts at the start of fiscal year 2010 is not used to meet future replenishment obligations. This is a conservative assumption that reserves discretion regarding the use of this water to individual storing parties.

- On a go-forward basis, under-producers will transfer un-pumped rights to overproducers each year; that is, there is an efficient market that moves unused production rights from under-producers to overproducers (hereafter, the efficient market assumption).

For this investigation, the net annual replenishment obligation was assumed to be equal to the greater of zero and the difference between actual production and production rights. The net replenishment obligation—assuming normal water supply years and the adjusted groundwater production projection from the UWMPs scenario—is projected to be zero in 2010 through 2023 (with a one-year exception in 2014), increase to about 1,600 acre-ft/yr in 2024, increase gradually to about 25,000 acre-ft/yr in 2030, jump to about 34,000 acre-ft/yr by 2031, and increase gradually thereafter to 43,000 acre-ft/yr in 2035. As noted above, this assumes that under-producers will transfer un-used production rights to overproducers each year; that is, there is an efficient market that moves unexercised rights from under-producers to overproducers. This assumption may underestimate the replenishment obligation for some years if water cannot be acquired in those years. Though, over the long term, this assumption is valid because the Appropriator parties cannot store unused production rights indefinitely, and the demand for replenishment water will provide financial incentives for unused production rights to be sold to overproducers. The efficient market assumption has been vetted with the Watermaster and the Judgment parties throughout the post Peace Agreement period and more recently in the RMPU Steering Committee process in 2012.

The last column in Table 2-4 shows the cumulative replenishment obligation from July 1, 2009 forward. Negative values indicate that cumulative production rights through that year exceed the cumulative production and that the volume of water in storage accounts will have increased by the negative of that value. For example, by the end of 2023, the cumulative replenishment obligation is estimated to be about -144,000 acre-ft. During the period of 2010 through 2023, the cumulative production rights are about 144,000 acre-ft greater than the cumulative production, and the volume of water in storage accounts will have increased by about 144,000 acre-ft.

After 2023, the net replenishment obligation becomes positive and grows as the annual production rights are less than the annual production. That said, the volume of water accumulating in storage accounts through 2023 is greater than the cumulative positive net replenishment obligation projected to occur from 2024 through 2032. In theory, this means that Watermaster may not have to purchase water from Metropolitan for replenishment until 2033. Though, Watermaster will still need to acquire and recharge supplemental water to meet its 6,500 acre-ft/yr MZ1 recharge obligation through 2030. There may also be a need to recharge imported water to dilute recycled water recharge. The maximum replenishment obligation would reach about 43,000 acre-ft/yr in 2035 which is substantially less than the projected supplemental recharge capacity available to Watermaster.

2.4.3.2 Scenario 2 – Projected Groundwater Production and Production Rights per Table 2-4 with a Delay in the Decline of Agricultural Pool Production, and Efficient Market Assumption

Table 2-5 is identical to Table 2-4 except that the projected decline in Agricultural pool production is deferred until after 2020 and is assumed to decline to 5,000 acre-ft/yr by 2025 (hereafter Scenario 2). This was done to test the sensitivity of the projected replenishment obligation to the projected Overlying Agricultural pool production shown in Table 2-3. This results in greater projected groundwater production through 2024 than the production projection used in Scenario 1, the Baseline Scenario. The resulting net replenishment obligation projection with this assumed, delayed decline in Agricultural pool production looks similar to the prior projection with the cumulative replenishment obligation being negative through 2026, reaching a value of about -65,000 acre-ft in 2016, and gradually increasing thereafter to about +240,000 by 2035. The maximum replenishment obligation would reach about 43,000 acre-ft/yr in 2035 which is substantially less than the projected supplemental recharge capacity available to Watermaster.

2.4.3.3 Scenario 3 – Projected Groundwater Production and Production Rights per Table 2-4 with Appropriative Pool Production Increased by 10 Percent, and Efficient Market Assumption

Table 2-6 is identical to Table 2-4 except that the Appropriative pool contribution to groundwater production was increased by ten percent (hereafter Scenario 3). This was done to test the sensitivity of the projected replenishment obligation to the projected Appropriative pool production shown in Tables 2-3 and 2-4. This results in greater projected groundwater production throughout the planning period than was seen in Scenarios 1 and 2. The resulting net replenishment obligation projection with this assumed increase in Appropriative pool production looks similar to the prior projections with the cumulative replenishment obligation being negative through 2022, reaching a value of -39,000 acre-ft in 2013 and gradually increasing thereafter to about +430,000 by 2035. The maximum replenishment obligation would reach about 57,000 acre-ft/yr in 2035, which is substantially less than the projected supplemental recharge capacity available to Watermaster.

2.4.3.4 Scenario 4 – Projected Groundwater Production and Production Rights per Table 2-4 with Appropriative Pool Production Increased by 10 Percent, with a Delay in the Decline of Agricultural Pool Production, and Efficient Market Assumption

Table 2-7 is identical to Table 2-4 except that the Appropriative pool contribution to groundwater production was increased by ten percent, and the projected decline in agricultural pool production is deferred until after 2020 and is assumed to decline to 5,000 acre-ft/yr by 2024-25 (hereafter Scenario 4). This was done to test the sensitivity of the projected replenishment obligation to the projected Overlying Agricultural and Appropriative pools production shown in Table 2-3. This results in greater projected groundwater production throughout the planning period than was seen in Scenarios 1, 2, and 3. The resulting net replenishment obligation projection with this assumed increase in Appropriative pool production looks similar to the prior projections with the cumulative replenishment obligation being negative for most of the planning period, reaching a value of -78,000 acre-ft in 2021-22 and gradually increasing thereafter to about +228,000 by 2034-35. The maximum replenishment obligation would reach about 46,000 acre-ft/yr in 2034-35, which is substantially less than the projected supplemental recharge capacity available to Watermaster.

2.4.4 Projected Time History of Water in Storage

Figure 2-9 shows the projected time history of water in storage accounts and, more specifically, the buildup in storage due to production rights exceeding groundwater production throughout most of the planning period for the four planning scenarios shown in Tables 2-4, 2-5, 2-6, and 2-7. The amount of water in storage includes 283,000 acre-ft of water, which is in storage as of July 1, 2009, plus the projected increase in storage for each planning scenario. The projected time history shown in Figure 2-9 assumes that replenishment will come from storage when the production exceeds production rights. The intent of this figure is to illustrate the impact of the groundwater production projections on storage and to illustrate the amount of water in storage that could be available to offset future replenishment obligations. For Scenario 1, the volume of water in storage is projected to reach about 427,000 acre-ft in 2023 and declines thereafter but never reaches zero. This means that in theory, Watermaster could purchase replenishment water from storing parties (provided that there are willing sellers) and never have to purchase water from Metropolitan for replenishment. This holds true for Scenario 2. Watermaster would have to purchase replenishment water from Metropolitan for replenishment by 2033 for Scenario 3 and 2030 for Scenario 4.

2.4.5 Supplemental Water Recharge Capacity and Requirements to Meet Replenishment Obligations

The 2010 RMPU stated that: "The supplemental water recharge capacity of the spreading basins available to Watermaster and the existing ASR wells is about 88,700 acre-ft/yr. With in-lieu recharge, the supplemental water recharge capacity ranges from 113,700 to 128,700 acre-ft/yr." The supplemental water recharge capacity dedicated to recycled water recharge and the 6,500 acre-ft/yr MZ1 obligation is about 25,200 acre-ft//yr. This leaves about 89,000 to

103,000 acre-ft/yr of supplemental water recharge capacity for replenishment purposes.[6] The maximum supplemental water recharge requirement estimated in the production scenarios described above was 46,000 acre-ft/yr and assumes that the replenishment obligation will be met with imported water recharge and not storage. Given what is known today and anticipated groundwater production, there is no need to construct additional supplemental water recharge capacity to meet future replenishment obligations through 2035.

2.4.6 Conclusions Regarding Groundwater Production and Replenishment Projections

The following conclusions are evident from the discussion above:

- The groundwater production projections for 2012 are substantially less than assumed in the 2010 RMPU. The groundwater production projections presented herein are based, in part, on the 2010 UWMPs and a projected decline in agricultural water use. The reduction in projected groundwater production has been largely offset by an increase in the direct use of imported water, which appears to be driven, in part, by the changing economics of groundwater production. The Watermaster parties participating in the RMPU Steering Committee have reviewed the production projections and have accepted them as the best current estimates

- No new recharge facilities or new sources of replenishment water will be required to meet future replenishment obligations, as required by the Judgment. There may be other reasons to construct new recharge facilities, such as to mitigate excessive groundwater level declines. Watermaster's recharge obligations related to excessive groundwater level decline and/or the need to balance recharge and discharge are contained in Section 5.1 (e) of the Peace Agreement.

- Watermaster and the parties should consider reviewing the storage management plan currently in use to determine if changes should be made to improve storage management in general and more specifically to accommodate the probable increases in storage that will occur in the future.

2.5 Replenishment Sources, Availability and Cost

Watermaster has historically met its replenishment obligations through the purchase of State Water Project (SWP) water from the IEUA who in turn obtains this water from the Metropolitan Water District of Southern California (Metropolitan) and through the purchase of water from members of the Appropriative pool. The 2010 RMPU contains a detailed

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[6] As part of the current RMPU steering committee process, the supplemental water recharge capacity was reduced about 2,000 acre-ft/yr (see Section 4) however there is more than adequate supplemental water recharge capacity to meet future replenishment obligations.

description of sources of supplemental water that could be used for replenishment or other recharge programs. These sources include:

- Metropolitan's SWP and Colorado River Aqueduct supplies delivered through Metropolitan facilities;
- groundwater and surface water supplies in the Santa Ana Watershed that can be supplied to the Chino Basin directly through existing or new conveyance facilities or by exchange;
- surplus groundwater from the Six Basins area;
- recycled water from the Western Riverside County Regional Wastewater Authority Plant located in the Chino Basin;
- recycled water from the Rapid Infiltration Extraction Treatment Plant (RIX) in Colton, from the City of Rialto, from the City of Riverside, and from others;
- groundwater and surface water supplies from the Central Valley, conveyed to the Chino Basin through SWP and Metropolitan facilities, San Bernardino Valley Municipal Water District facilities, and San Gabriel Municipal Water District facilities; and
- groundwater and surface water supplies from the Colorado River Basin conveyed to the Chino Basin through Metropolitan facilities.

The 2010 RMPU report documents the availability of these sources and includes cost estimates for some. With the exception of the Metropolitan's SWP water, the availability and cost of all other supplemental water sources are unknown at this time.

2.5.1 SWP Water Supplied by Metropolitan

The 2010 RMPU contained an analysis of the availability of Metropolitan's SWP water. Since the 2010 RMPU was completed, Metropolitan has completed its 2010 Integrated Resources Plan (IRP) Update (Metropolitan, 2010). Metropolitan's core resources strategy, if implemented, will result in Metropolitan being able to meet all its demands at all times with the exceptions of potential shortages as the strategy is being implemented in the current decade.[7] Metropolitan is currently implementing its core resource strategy. Based on this finding, it is assumed herein that Watermaster will be able to purchase SWP water from Metropolitan when needed.

[7] Based on the 2010 Update, Integrated Regional Plan (Metropolitan, 2010) and personal discussion with Brandon Goshi of Metropolitan.

Historically, Watermaster has purchased almost all of its replenishment water at rates that were discounted relative to water served by Metropolitan for direct use. Metropolitan has eliminated its replenishment service for 2013 and likely thereafter, which means that Watermaster will be required to purchase more expensive untreated Tier 1 and Tier 2 water for replenishment purposes. Table 2-8a shows the historical recharge of Metropolitan SWP water in the Chino Basin. Figure 2-10 shows the location of Metropolitans pipelines and turnouts and the recharge basins used to recharge imported water.

Since 2002, Metropolitan's average water rates have increased about 6 percent per year, and during the period 2007 through 2012, rates have increased about 11 percent per year. The Metropolitan Board recently approved its fiscal 2012/13 and 2013/14 budgets and water sales rates. Metropolitan's average water rates will increase 5 percent in 2012/13 and 5 percent in 2013/14 and are projected to increase between 3 and 5 percent for the following five years (Metropolitan, 2012). Table 2-9 lists the historical water rates for replenishment, untreated Tier 1 and untreated Tier 2 services, and a range of future rate projections based on sustained rate increases of 4 percent (Metropolitan's five-year average rate), 6.18 percent (low rate based on the observed compound rate 2003 through 2012), and 10.92 percent (high rate based on the observed compound rate 2007 through 2012). The current cost of imported water from Metropolitan for replenishment purposes is about $593 per acre-ft and is projected to rise by 2020 to somewhere in the range of $750 to $1,100 per acre-ft.

2.5.2 Recycled Water for Recharge and Its Availability and Cost

In the last decade IEUA has constructed improvements at its treatment plants and conveyance facilities that have made recycled water available for direct reuse and groundwater recharge. The conveyance improvements and recharge basins use to recharge recycled water are shown in Figure 2-11. IEUA has conducted planning investigations to project the amount of recycled water available for recharge[8]. The key factors used to develop the recycled water recharge projections below are: basin/turnout capacities, infiltration rates, basin maintenance, recycled water contribution limitations, dry vs. wet year, capital projects and annual O&M. The specific assumptions for the recycled water recharge projections are listed below. The projections are included in Table 2-10.

- Mid-Range (Average Year) Recycled Water Recharge Assumptions:

    1. Recycled water recharge occurs 7 months of the year for Basins with infiltration rates $\geq$ 0.5 ft/day.

    2. Recycled water recharge occurs 5 months of the year for Basins with infiltration rates $\leq$ 0.5 ft/day.

    3. Recycled water turnout capacity limitations were considered.

[8] IEUA Memorandum, Groundwater Recharge Master Plan Update, Recycled Water Assumptions, February 14, 2012.

4. Recycled water contribution (RWC) limitations were considered.

5. Basin maintenance is assumed to be at a frequency that would ensure that 50percent of post cleaning infiltration rate[9] at all times.

6. Basin maintenance occurs every two-to three years for each basin.

7. Includes approved projects from the 2012/13 Ten-Year Capital Improvement Program (TYCIP):

   a. Turner Basin – Recycled water conveyance enhancements completed by October 2013, and beneficial use is realized in FY 2013/14. Assumes permitting of Turner Basin 5 and 8 are completed and operational to maximize use.

   b. RP-3 & Declez Basin – Recycled water conveyance enhancements completed by December 2013, and beneficial use is realized in FY 2014/15.

   c. Lower Day, Etiwanda Debris Basin & Etiwanda Conservation Basin – Currently, these projects are not in in the TYCIP; however, Lower Day can be implemented by FY 2017/18 and Etiwanda Debris Basin by FY 2021/22.

   d. Infiltration rates based on historical storm flow and imported water flow to these basins. Actual infiltration rates may be lower when the basin is used on a long term basis.

   e. No RWC limitations, since there is no history of underflow/storm flow diluent calculations or basin performance history.

- Low-Range (Wet Year) Recycled Water Recharge Assumptions, same as Mid-Range except:

  1. Recycled water recharge occurs 4 months of the year for Basins with infiltration rates $\geq$ 0.5 ft/day.

  2. Recycled water recharge occurs 2 months of the year for Basins with infiltration rates $\leq$ 0.5 ft/day.

  3. Imported water is not competing with recycled water for groundwater recharge.

- High-Range (Dry Year) Recycled Water Recharge Assumptions, same as Mid-Range except:

  1. Recycled water recharge occurs 10 months of the year due to limited storm water recharge for Basins with infiltration rates $\geq$ 0.5 ft/day.

[9] The "post-cleaning infiltration rate" is the maximum infiltration rate achievable in the basin.

2. Recycled water recharge occurs 7 months of the year due to limited storm water recharge for Basins with infiltration rates $\leq$ 0.5 ft/day.

The IEUA has also prepared cost projections for recycled water recharge. These go through 2015 and included in Table 2-9. The historical and projected recycled water recharge rate ranges about $300 to $400 per acre-ft less than the cost of imported water from Metropolitan over the 2010 through 2015 period.

Table 2-1
Time History of Water in Storage in the Chino Basin Exclusive of the Dry-Year Yield Activities
(acre-ft)

Account Balance July 1	Appropriative Pool (Pool 3)				Overlying Non-Ag (Pool 2)			Total
	Carryover	Excess Carryover (ECO)	Supplemental	Total	Carryover	Excess Carryover (ECO)	Total	
2001	15,940	45,281	92,813	154,034	5,301	32,330	37,631	191,665
2002	13,521	42,205	87,801	143,527	5,285	34,767	40,052	183,579
2003	18,656	48,651	81,180	148,487	6,743	36,850	43,593	192,080
2004	19,676	53,127	80,963	153,766	7,177	40,881	48,058	201,824
2005	54,834	63,631	88,849	207,314	7,227	45,888	53,115	260,429
2006	32,062	55,442	86,170	173,674	7,227	49,178	56,405	230,079
2007	34,552	50,895	83,184	168,631	7,084	51,476	58,560	227,191
2008	41,625	83,962	81,520	207,107	6,819	45,248	52,067	259,174
2009	42,795	101,907	84,867	229,569	6,672	46,600	53,272	282,841
2010	41,263	120,897	90,133	252,293	6,934	47,731	54,665	306,958
2011	41,412	146,074	98,079	285,565	6,959	49,343	56,302	341,867

Table 2-2
Groundwater in Storage in the Chino Basin by Party as of July 1, 2011
(acre-ft)

Producer	Carryover[1,4]	Excess Carryover[2,5]	Supplemental[3]	Total
Overlying Non-Agricultural Pool				
Ameron	98	2,110	na	2,208
Angelica Textile Service[3]	-	-	na	0
Agua Capital Management	948	11,309	na	12,257
Auto Club Speedway[3]	1,000	2,731	na	3,731
California Steel Industries Inc.[5]	1,154	2,916	na	4,070
CCG Ontario, LLC	-	-	na	0
General Electric Company[6]	-	-	na	0
GenOn West, LP (Formerly RRI Etiwanda)[7]	955	7,238	na	8,193
Kaiser Ventures Inc.	-	-	na	0
KCO, LLC/ The Koll Company (City of Ontario)	-	-	na	0
Loving Savior of the Hills	-	-	na	0
Ontario City Non-Ag	2,328	15,067	na	17,395
Praxair Inc. (City of Ontario)	1	4,375	na	4,376
San Antonio Winery[3]	-	-	na	0
San Bernardino County (Chino Airport)	11	170	na	181
Southern California Edison Company (City of Ontario)	-	196	na	196
Space Center Mira Loma Inc.	0.003	-	na	0
Sunkist Growers Inc. (City of Ontario)	-	-	na	0
Swan Lake Mobile Home Park	464	3,226	na	3,690
Vulcan Materials Company	-	5	na	5
West Venture Development	-	-	na	0
Subtotal Overlying Non-Agricultural Pool Production	*6,959*	*49,343*		56,302
Appropriative Pool				
Arrowhead Mountain Spring Water Company	-	-	-	0
City of Chino	4,034	29,840	5,271	39,145
City of Chino Hills	2,111	8,934	7,022	18,067
City of Norco	202	2,212	106	2,520
City of Ontario	11,374	18,542	22,147	52,063
City of Pomona	11,216	13,046	13,724	37,986
City of Upland	1,183	6,325	8,331	15,839
Cucamonga Valley Water District	294	42,002	18,673	60,969
Fontana Union Water Company	-	-	-	0
Fontana Water Company	-	-	0.031	0
Jurupa Community Services District	2,061	6,704	2,093	10,858
Inland Empire Utilities Agency				0
Marygold Mutual Water Company	567	657	1,785	3,009
Metropolitan Water District of Southern California				0
Monte Vista Irrigation Company	677	1,964	6,570	9,211
Monte Vista Water District	4,590	652	6,886	12,128
Niagara	-	-	1,422	1,422
San Antonio Water Company	929	8,109	1,092	10,130
San Bernardino County (Olympic Facility)	-	-	-	0
Santa Ana River Water Company	170	210	529	909
Golden State Water Company	411	1,053	1,591	3,055
West End Consolidated Water Company	948	1,876	498	3,322
West Valley Water District	644	3,948	339	4,931
Subtotal Appropriative Pool Production	*41,411*	*146,074*	*98,079*	285,565
Total in Storage	48,370	195,417	98,079	341,867

na = Not Applicable

[1] Pool 3 data from CBWM FY 2011-2012 Assessment Package page 2A, Under Production Balances, Carryover: Next Year Beginning Balance column.

[2] Pool 3 data from CBWM FY 2011-2012 Assessment Package page 3A, Ending Balance column.

[3] Pool 3 data from CBWM FY 2011-2012 Assessment Package page 4A, total of Ending Balance column of recharge, quantified, and new accounts.

[4] Pool 2 data from CBWM FY 2011-12 Assessment Package page 14A, Carryover: Next Year Begin Bal column.

[5] From CBWM FY 2011-2012 Assessment Package page 15A, Ending Balance column.

Table 2-3
Projected Groundwater Production for the Chino Basin
Normal Year Projection
(acre-ft)

Producer	Historical Production by Fiscal Year							Production Projection[1]					
	2006-07	2007-08	2008-09	2009-10	2010-11	Maximum	Average	2009-10	2014-15	2019-20	2024-25	2029-30	2034-35
Overlying Agricultural Pool													
Aggregate Agricultural Pool Production [2]	*29,649*	*23,530*	*23,277*	*21,043*	*21,030*	*29,649*	*23,706*	*21,000*	*13,000*	*5,000*	*5,000*	*5,000*	*5,000*
Overlying Non-Agricultural Pool													
Ameron	-	-	-	5	28	28	7	28	28	28	28	28	28
Angelica Textile Service[3]	29	23	31	41	54	54	36	54	54	54	54	54	54
Agua Capital Management	-	-	-	-	-	-	-	-	-	-	-	-	-
Auto Club Speedway[3]	621	601	505	496	449	621	534	621	621	621	621	621	621
California Steel Industries Inc.[5]	1,284	1,331	1,126	1,059	1,085	1,331	1,177	1,126	2,170	2,450	2,450	2,450	2,450
CCG Ontario, LLC	-	-	-	-	-	-	-	-	-	-	-	-	-
General Electric Company[6]	461	538	344	287	31	538	332	-	-	-	-	-	-
GenOn West, LP (Formerly RRI Etiwanda)[7]	705	793	536	138	328	793	500	500	500	500	500	500	500
Kaiser Ventures Inc.	-	-	-	-	-	-	-	-	-	-	-	-	-
KCO, LLC/ The Koll Company (City of Ontario)	-	-	-	-	-	-	-	-	-	-	-	-	-
Loving Savior of the Hills	-	-	-	-	-	-	-	-	-	-	-	-	-
Ontario City Non-Ag	-	-	-	-	-	-	-	-	-	-	-	-	-
Praxair Inc. (City of Ontario)	-	-	-	-	-	-	-	-	-	-	-	-	-
San Antonio Winery[3]	-	-	1	13	11	13	5	13	13	13	13	13	13
San Bernardino County (Chino Airport)	-	-	-	-	-	-	-	-	-	-	-	-	-
Southern California Edison Company (City of Ontario)	-	-	-	-	-	-	-	-	-	-	-	-	-
Space Center Mira Loma Inc.	-	-	-	-	-	-	-	-	-	-	-	-	-
Sunkist Growers Inc. (City of Ontario)	147	130	29	-	-	147	61	-	-	-	-	-	-
Swan Lake Mobile Home Park	-	-	-	-	-	-	-	-	-	-	-	-	-
Vulcan Materials Company	5	5	4	0	-	5	3	-	-	-	-	-	-
West Venture Development	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Overlying Non-Agricultural Pool Production	*3,251*	*3,421*	*2,575*	*2,039*	*1,987*	na	*2,655*	2,343	3,387	3,667	3,667	3,667	3,667
Appropriative Pool													
Arrowhead Mountain Spring Water Company	392	366	350	374	408	408	378	374	378	378	378	378	378
City of Chino	8,877	7,608	8,939	7,808	7,304	8,939	8,107	7,441	8,574	9,526	11,278	12,563	13,796
City of Chino Hills	2,057	2,535	1,953	1,446	1,986	2,535	1,995	2,900	2,900	2,900	2,900	2,900	2,900
City of Norco	-	-	-	-	-	-	-	-	-	-	-	-	-
City of Ontario	28,010	26,027	30,080	25,269	19,010	30,080	25,679	20,955	20,373	24,242	29,631	35,049	39,383
City of Pomona	10,894	13,188	13,731	11,404	10,528	13,731	11,949	10,279	13,103	14,300	14,300	14,300	15,000
City of Upland[4]	1,521	3,064	3,724	3,410	734	3,724	2,490	3,342	250	250	250	250	250
Cucamonga Valley Water District	18,786	15,294	23,748	19,263	20,318	23,748	19,482	19,831	17,931	16,331	17,931	19,631	21,231
Fontana Union Water Company	-	-	-	-	-	-	-	-	-	-	-	-	-
Fontana Water Company	16,218	19,199	13,315	13,557	8,348	19,199	14,128	9,921	5,319	6,413	8,372	10,332	12,041
Jurupa Community Services District	18,213	17,160	20,096	15,979	14,642	20,096	17,218	15,000	16,900	18,800	18,800	18,800	18,800
Inland Empire Utilities Agency	-	-	-	-	-	-	-	-	-	-	-	-	-
Marygold Mutual Water Company	184	544	142	346	1,107	1,107	465	346	2,200	2,200	2,200	2,200	2,200
Metropolitan Water District of Southern California	-	-	-	-	-	-	-	-	-	-	-	-	-
Monte Vista Irrigation Company	-	-	-	-	-	-	-	-	-	-	-	-	-
Monte Vista Water District	11,621	14,250	15,574	15,803	12,264	15,803	13,902	15,774	12,191	11,231	11,531	11,781	12,111
Niagara	1,106	1,153	1,210	1,298	1,345	1,345	1,223	1,210	1,210	1,210	1,210	1,210	1,210
San Antonio Water Company	544	416	1,187	966	716	1,187	766	1,552	1,507	1,507	1,507	1,507	1,507
San Bernardino County (Olympic Facility)	16	16	22	16	18	22	18	22	22	22	22	22	22
Santa Ana River Water Company	-	-	-	-	-	-	-	160	318	335	335	335	335
Golden State Water Company	881	599	748	359	444	881	606	273	411	411	411	411	411
West End Consolidated Water Company	-	-	-	-	-	-	-	-	-	-	-	-	-
West Valley Water District	-	-	-	-	-	-	-	-	-	900	900	900	900
Subtotal Appropriative Pool Production	*119,321*	*121,418*	*134,817*	*117,299*	*99,172*	*na*	*118,405*	*109,380*	*103,587*	*110,956*	*121,956*	*132,569*	*142,475*
Chino Desalter Authority													
Total Desalter Production	*27,077*	*30,121*	*28,985*	*28,823*	*29,013*	*30,121*	*17,824*	*28,940*	*39,400*	*39,400*	*39,400*	*39,400*	*39,400*
Total Basin Production	179,298	178,491	189,654	169,204	151,201	na	162,590	161,662	159,374	159,023	170,023	180,636	190,542

1 -- The production projection for Overlying Ag Pool based on prior OBMP planning investigations. The production projection for the Appropriative Pool Parties is based on their UWMP's and may have been refined based on subsequent discussions. The production projection for the Overlying Non-ag Pool was estimated based on discussions with individual Parties or from historical data.

2 -- Ramp down in projected Overlying Ag Pool production mirrors the increase in total water demand projected by the Cities of Chino and Ontario.

3 -- Projected production is based on maximum annual production for the period 2006-07 through 2010-11. Brian Geye confirmed for the Auto Club Speedway.

4 -- Updated on February 1, 2012 by Rosemary Hoerning.

5 -- Projection provided by Ken Jeske via email on October 21, 2011.

6 -- Projection provided by Ken Jeske via email on October 21, 2011.

7 -- Confirmed by Len Moore at Genon.

Table 2-4

Scenario 1 -- Baseline Scenario -- Projected Groundwater Production and Production Rights and Efficient Market Assumption

(acre-ft)

Fiscal Year	Projected Groundwater Production per 2010 UWMP for Normal Year[1]	Production Rights							Net Replenishment Obligation[5]	Cumulative Replenishment Obligation from July 1, 2009
		Safe Yield[2]	Controlled Overdraft Pursuant to Judgment	Reoperation Water Offset to Desalter Production	6,500 acre-ft/yr Supplemental Water Recharge in MZ1 per Peace II	Mid-Range Recycled Water Recharge[3]	Credit Against 6,500 acre-ft/yr Obligation from Recycled Water Recharged in MZ1[4]	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (3)+(4)+(5)+(6)+(7)+(8)	(10) = min{0,(2)-(9)}	$(11)_t = [(2)_t-(9)_t] + (11)_{t-1}$
2009 - 2010	161,662	140,000	5,000	28,857	6,500	7,210	-2,762	184,805	0	-23,143
2010 - 2011	161,205	140,000	5,000	29,043	6,500	8,028	-3,244	185,327	0	-47,265
2011 - 2012	160,747	134,545	5,000	29,025	6,500	8,200	-3,200	180,071	0	-66,589
2012 - 2013	160,289	134,844	5,000	24,124	6,500	8,200	-3,200	175,468	0	-81,768
2013 - 2014	159,831	135,211	5,000	5,000	6,500	9,300	-3,200	157,811	2,021	-79,747
2014 - 2015	159,374	135,593	5,000	10,000	6,500	14,500	-3,200	168,393	0	-88,767
2015 - 2016	159,303	136,418	5,000	10,000	6,500	14,500	-3,200	169,218	0	-98,681
2016 - 2017	159,233	137,123	5,000	10,000	6,500	14,500	-3,200	169,923	0	-109,372
2017 - 2018	159,163	137,332	0	10,000	6,500	16,900	-3,200	167,532	0	-117,741
2018 - 2019	159,093	137,170	0	10,000	6,500	16,900	-3,200	167,370	0	-126,018
2019 - 2020	159,023	136,695	0	10,000	6,500	16,900	-3,200	166,895	0	-133,890
2020 - 2021	161,223	136,055	0	10,000	6,500	16,900	-3,200	166,255	0	-138,922
2021 - 2022	163,423	135,529	0	10,000	6,500	18,700	-3,200	167,529	0	-143,028
2022 - 2023	165,623	134,947	0	10,000	6,500	18,700	-3,200	166,947	0	-144,352
2023 - 2024	167,823	134,188	0	10,000	6,500	18,700	-3,200	166,188	1,635	-142,717
2024 - 2025	170,023	133,281	0	10,000	6,500	18,700	-3,200	165,281	4,742	-137,975
2025 - 2026	172,145	132,413	0	10,000	6,500	18,700	-3,200	164,413	7,733	-130,242
2026 - 2027	174,268	131,603	0	10,000	6,500	18,700	-3,200	163,603	10,665	-119,577
2027 - 2028	176,391	130,964	0	10,000	6,500	18,700	-3,200	162,964	13,427	-106,150
2028 - 2029	178,513	130,485	0	10,000	6,500	18,700	-3,200	162,485	16,029	-90,122
2029 - 2030	180,636	130,210	0	10,000	6,500	18,700	-3,200	162,210	18,426	-71,696
2030 - 2031	182,617	130,010	0	0	0	18,700	0	148,710	33,907	-37,788
2031 - 2032	184,598	129,810	0	0	0	18,700	0	148,510	36,088	-1,700
2032 - 2033	186,579	129,610	0	0	0	18,700	0	148,310	38,270	36,570
2033 - 2034	188,561	129,410	0	0	0	18,700	0	148,110	40,451	77,021
2034 - 2035	190,542	129,210	0	0	0	18,700	0	147,910	42,632	119,653
Total	4,401,886	3,482,652	40,000	276,049	136,500	413,838	-66,806	4,282,233	266,025	
Average	169,303	133,948	1,538	10,617	5,250	15,917	-2,569	164,701	10,232	

1 --Linearly interpolated between planning years.
2 -- Safe yield estimate from the 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009). Estimate includes new stormwater recharge from the
3 -- Based on Actual through 2010-11, IEUA 2010 Urban Water Management Plan starting in 2014-15 and thereafter, and linearly interpolated between 2010-11 and 2014-15.
4 -- Recycled water recharged in the Brooks Street Basin and the Seventh and Eighth Street Basins are actual through 2010-11 and planning estimates thereafter.
5 -- This is the net replenishment obligation based on the assumptions described in the text, negative values reported as zeros.

Table 2-5

Scenario 2 -- Projected Groundwater Production and Production Rights per Table 2-3 with a Delay in the Decline of Agricultural Pool Production, and Efficient Market Assumption

(acre-ft)

Fiscal Year	Projected Groundwater Production per 2010 UWMP for Normal Year[1]	Production Rights							Net Replenishment Obligation[5]	Cumulative Replenishment Obligation from July 1, 2009
		Safe Yield[2]	Controlled Overdraft Pursuant to Judgment	Reoperation Water Offset to Desalter Production	6,500 acre-ft/yr Supplemental Water Recharge in MZ1 per Peace II	Mid-Range Recycled Water Recharge[3]	Credit Against 6,500 acre-ft/yr Obligation from Recycled Water Recharged in MZ1[4]	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (3)+(4)+(5)+(6)+(7)+(8)	(10) = min{0,(2)-(9)}	$(11)_t = [(2)_t-(9)_t] + (11)_{t-1}$
2009 - 2010	161,662	140,000	5,000	28,857	6,500	7,210	-2,762	184,805	0	-23,143
2010 - 2011	162,805	140,000	5,000	29,043	6,500	8,028	-3,244	185,327	0	-45,665
2011 - 2012	163,947	134,545	5,000	29,025	6,500	8,200	-3,200	180,071	0	-61,789
2012 - 2013	165,089	134,844	5,000	24,124	6,500	8,200	-3,200	175,468	0	-72,168
2013 - 2014	166,231	135,211	5,000	5,000	6,500	9,300	-3,200	157,811	8,421	-63,747
2014 - 2015	167,374	135,593	5,000	10,000	6,500	14,500	-3,200	168,393	0	-64,767
2015 - 2016	168,903	136,418	5,000	10,000	6,500	14,500	-3,200	169,218	0	-65,081
2016 - 2017	170,433	137,123	5,000	10,000	6,500	14,500	-3,200	169,923	510	-64,572
2017 - 2018	171,963	137,332	0	10,000	6,500	16,900	-3,200	167,532	4,431	-60,141
2018 - 2019	173,493	137,170	0	10,000	6,500	16,900	-3,200	167,370	6,123	-54,018
2019 - 2020	175,023	136,695	0	10,000	6,500	16,900	-3,200	166,895	8,128	-45,890
2020 - 2021	174,023	136,055	0	10,000	6,500	16,900	-3,200	166,255	7,768	-38,122
2021 - 2022	173,023	135,529	0	10,000	6,500	18,700	-3,200	167,529	5,494	-32,628
2022 - 2023	172,023	134,947	0	10,000	6,500	18,700	-3,200	166,947	5,076	-27,552
2023 - 2024	171,023	134,188	0	10,000	6,500	18,700	-3,200	166,188	4,835	-22,717
2024 - 2025	170,023	133,281	0	10,000	6,500	18,700	-3,200	165,281	4,742	-17,975
2025 - 2026	172,145	132,413	0	10,000	6,500	18,700	-3,200	164,413	7,733	-10,242
2026 - 2027	174,268	131,603	0	10,000	6,500	18,700	-3,200	163,603	10,665	423
2027 - 2028	176,391	130,964	0	10,000	6,500	18,700	-3,200	162,964	13,427	13,850
2028 - 2029	178,513	130,485	0	10,000	6,500	18,700	-3,200	162,485	16,029	29,878
2029 - 2030	180,636	130,210	0	10,000	6,500	18,700	-3,200	162,210	18,426	48,304
2030 - 2031	182,617	130,010	0	0	0	18,700	0	148,710	33,907	82,212
2031 - 2032	184,598	129,810	0	0	0	18,700	0	148,510	36,088	118,300
2032 - 2033	186,579	129,610	0	0	0	18,700	0	148,310	38,270	156,570
2033 - 2034	188,561	129,410	0	0	0	18,700	0	148,110	40,451	197,021
2034 - 2035	190,542	129,210	0	0	0	18,700	0	147,910	42,632	239,653
Total	4,521,886	3,482,652	40,000	276,049	136,500	413,838	-66,806	4,282,233	313,155	
Average	173,919	133,948	1,538	10,617	5,250	15,917	-2,569	164,701	12,044	

1 --Linearly interpolated between planning years. No adjustment was made in Appropriate Pool production to account for increase ag production.

2 -- Safe yield estimate from the 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009). Estimate includes new stormwater recharge from the

3 -- Based on Actual through 2010-11, IEUA 2010 Urban Water Management Plan starting in 2014-15 and thereafter, and linearly interpolated between 2010-11 and 2014-15.

4 -- Recycled water recharged in the Brooks Street Basin and the Seventh and Eighth Street Basins are actual through 2010-11 and planning estimates thereafter.

5 -- This is the net replenishment obligation based on the assumptions described in the text, negative values reported as zeros.

Values in **red** indicate a change from the December 14, 2011 Draft Report

Table 2-6
Scenario 3 -- Projected Groundwater Production and Production Rights per Table 2-4 with Appropriative Pool Production Increased by 10 Percent, and Efficient Market Assumption
(acre-ft)

Fiscal Year	Projected Groundwater Production per 2010 UWMP for Normal Year[1]	Production Rights: Safe Yield[2]	Controlled Overdraft Pursuant to Judgment	Reoperation Water Offset to Desalter Production	6,500 acre-ft/yr Supplemental Water Recharge in MZ1 per Peace II	Mid-Range Recycled Water Recharge[3]	Credit Against 6,500 acre-ft/yr Obligation from Recycled Water Recharged in MZ1[4]	Total	Net Replenishment Obligation[5]	Cumulative Replenishment Obligation from July 1, 2009
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (3)+(4)+(5)+(6)+(7)+(8)	(10) = min{0,(2)-(9)}	$(11)_t = [(2)_t-(9)_t] + (11)_{t-1}$
2009 - 2010	172,600	140,000	5,000	28,857	6,500	7,210	-2,762	184,805	0	-12,205
2010 - 2011	172,027	140,000	5,000	29,043	6,500	8,028	-3,244	185,327	0	-25,505
2011 - 2012	171,453	134,545	5,000	29,025	6,500	8,200	-3,200	180,071	0	-34,123
2012 - 2013	170,879	134,844	5,000	24,124	6,500	8,200	-3,200	175,468	0	-38,711
2013 - 2014	170,306	135,211	5,000	5,000	6,500	9,300	-3,200	157,811	12,495	-26,216
2014 - 2015	169,732	135,593	5,000	10,000	6,500	14,500	-3,200	168,393	1,339	-24,877
2015 - 2016	169,809	136,418	5,000	10,000	6,500	14,500	-3,200	169,218	592	-24,285
2016 - 2017	169,887	137,123	5,000	10,000	6,500	14,500	-3,200	169,923	0	-24,322
2017 - 2018	169,964	137,332	0	10,000	6,500	16,900	-3,200	167,532	2,432	-21,890
2018 - 2019	170,041	137,170	0	10,000	6,500	16,900	-3,200	167,370	2,671	-19,219
2019 - 2020	170,118	136,695	0	10,000	6,500	16,900	-3,200	166,895	3,223	-15,996
2020 - 2021	172,538	136,055	0	10,000	6,500	16,900	-3,200	166,255	6,284	-9,712
2021 - 2022	174,958	135,529	0	10,000	6,500	18,700	-3,200	167,529	7,429	-2,283
2022 - 2023	177,378	134,947	0	10,000	6,500	18,700	-3,200	166,947	10,432	8,149
2023 - 2024	179,798	134,188	0	10,000	6,500	18,700	-3,200	166,188	13,611	21,760
2024 - 2025	182,218	133,281	0	10,000	6,500	18,700	-3,200	165,281	16,938	38,697
2025 - 2026	184,553	132,413	0	10,000	6,500	18,700	-3,200	164,413	20,141	58,838
2026 - 2027	186,888	131,603	0	10,000	6,500	18,700	-3,200	163,603	23,285	82,123
2027 - 2028	189,223	130,964	0	10,000	6,500	18,700	-3,200	162,964	26,259	108,382
2028 - 2029	191,558	130,485	0	10,000	6,500	18,700	-3,200	162,485	29,073	137,456
2029 - 2030	193,893	130,210	0	10,000	6,500	18,700	-3,200	162,210	31,683	169,139
2030 - 2031	196,072	130,010	0	0	0	18,700	0	148,710	47,362	216,501
2031 - 2032	198,251	129,810	0	0	0	18,700	0	148,510	49,742	266,243
2032 - 2033	200,431	129,610	0	0	0	18,700	0	148,310	52,121	318,364
2033 - 2034	202,610	129,410	0	0	0	18,700	0	148,110	54,500	372,864
2034 - 2035	204,789	129,210	0	0	0	18,700	0	147,910	56,880	429,744
Total	4,711,976	3,482,652	40,000	276,049	136,500	413,838	-66,806	4,282,233	468,492	
Average	181,230	133,948	1,538	10,617	5,250	15,917	-2,569	164,701	18,019	

1 --Linearly interpolated between planning years.
2 -- Safe yield estimate from the 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009). Estimate includes new stormwater recharge from the
3 -- Based on Actual through 2010-11, IEUA 2010 Urban Water Management Plan starting in 2014-15 and thereafter, and linearly interpolated between 2010-11 and 2014-15.
4 -- Recycled water recharged in the Brooks Street Basin and the Seventh and Eighth Street Basins are actual through 2010-11 and planning estimates thereafter.
5 -- This is the net replenishment obligation based on the assumptions described in the text, negative values reported as zeros.

WILDERMUTH ENVIRONMENTAL INC.

Table 2-7

Scenario 4 -- Projected Groundwater Production and Production Rights per Table 2-4 with Appropriative Pool Production Increased by 10 Percent, with a Delay in the Decline of Agricultural Pool Production, and Efficient Market Assumption

(acre-ft)

Fiscal Year	Projected Groundwater Production per 2010 UWMP for Normal Year[1]	Production Rights							Net Replenishment Obligation[5]	Cumulative Replenishment Obligation from July 1, 2009
		Safe Yield[2]	Controlled Overdraft Pursuant to Judgment	Reoperation Water Offset to Desalter Production	6,500 acre-ft/yr Supplemental Water Recharge in MZ1 per Peace II	Mid-Range Recycled Water Recharge[3]	Credit Against 6,500 acre-ft/yr Obligation from Recycled Water Recharged in MZ1[4]	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (3)+(4)+(5)+(6)+(7)+(8)	(10) = min{0,(2)-(9)}	$(11)_t = [(2)_t-(9)_t] + (11)_{t-1}$
2009 - 2010	172,600	140,000	5,000	28,857	6,500	7,210	-2,762	184,805	0	-12,205
2010 - 2011	173,627	140,000	5,000	29,043	6,500	8,028	-3,244	185,327	0	-23,905
2011 - 2012	174,653	134,545	5,000	29,025	6,500	8,200	-3,200	180,071	0	-29,323
2012 - 2013	175,679	134,844	5,000	24,124	6,500	8,200	-3,200	175,468	212	-29,111
2013 - 2014	176,706	135,211	5,000	5,000	6,500	9,300	-3,200	157,811	18,895	-10,216
2014 - 2015	177,732	135,593	5,000	10,000	6,500	14,500	-3,200	168,393	9,339	-877
2015 - 2016	179,409	136,418	5,000	10,000	6,500	14,500	-3,200	169,218	10,192	9,315
2016 - 2017	181,087	137,123	5,000	10,000	6,500	14,500	-3,200	169,923	11,163	20,478
2017 - 2018	182,764	137,332	0	10,000	6,500	16,900	-3,200	167,532	15,232	35,710
2018 - 2019	184,441	137,170	0	10,000	6,500	16,900	-3,200	167,370	17,071	52,781
2019 - 2020	186,118	136,695	0	10,000	6,500	16,900	-3,200	166,895	19,223	72,004
2020 - 2021	185,338	136,055	0	10,000	6,500	16,900	-3,200	166,255	19,084	91,088
2021 - 2022	184,558	135,529	0	10,000	6,500	18,700	-3,200	167,529	17,029	108,117
2022 - 2023	183,778	134,947	0	10,000	6,500	18,700	-3,200	166,947	16,832	124,949
2023 - 2024	182,998	134,188	0	10,000	6,500	18,700	-3,200	166,188	16,811	141,760
2024 - 2025	182,218	133,281	0	10,000	6,500	18,700	-3,200	165,281	16,938	158,697
2025 - 2026	184,553	132,413	0	10,000	6,500	18,700	-3,200	164,413	20,141	178,838
2026 - 2027	186,888	131,603	0	10,000	6,500	18,700	-3,200	163,603	23,285	202,123
2027 - 2028	189,223	130,964	0	10,000	6,500	18,700	-3,200	162,964	26,259	228,382
2028 - 2029	191,558	130,485	0	10,000	6,500	18,700	-3,200	162,485	29,073	257,456
2029 - 2030	193,893	130,210	0	10,000	6,500	18,700	-3,200	162,210	31,683	289,139
2030 - 2031	196,072	130,010	0	0	0	18,700	0	148,710	47,362	336,501
2031 - 2032	198,251	129,810	0	0	0	18,700	0	148,510	49,742	386,243
2032 - 2033	200,431	129,610	0	0	0	18,700	0	148,310	52,121	438,364
2033 - 2034	202,610	129,410	0	0	0	18,700	0	148,110	54,500	492,864
2034 - 2035	204,789	129,210	0	0	0	18,700	0	147,910	56,880	549,744
Total	4,831,976	3,482,652	40,000	276,049	136,500	413,838	-66,806	4,282,233	579,066	
Average	185,845	133,948	1,538	10,617	5,250	15,917	-2,569	164,701	22,272	

1 --Linearly interpolated between planning years. No adjustment was made in Appropriate Pool production to account for increase ag production.
2 -- Safe yield estimate from the 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009). Estimate includes new stormwater recharge from the
3 -- Based on Actual through 2010-11, IEUA 2010 Urban Water Management Plan starting in 2014-15 and thereafter, and linearly interpolated between 2010-11 and 2014-15.
4 -- Recycled water recharged in the Brooks Street Basin and the Seventh and Eighth Street Basins are actual through 2010-11 and planning estimates thereafter.
5 -- This is the net replenishment obligation based on the assumptions described in the text, negative values reported as zeros.

Table 2-8a
Historical Deliveries of Metropolitan's SWP Water to Recharge Basins - Fiscal Year 2000 to 2011
(acre-ft/yr)

Management Zone/Basin	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	Total
Recharge Basins in MZ 1													
College Heights East	0	0	0	0	0	0	1,798	1,337	0	0	0	0	3,135
College Heights West	0	0	0	0	0	0	3,528	1,788	0	0	382	559	6,257
Upland	0	0	0	0	0	0	5,986	7,068	0	0	0	899	13,953
Montclair 1, 2, 3, 4	1,001	6,530	6,500	6,499	7,582	7,887	5,579	10,681	0	0	4,593	3,672	60,524
Brooks	0	0	0	0	0	0	2,032	1,604	0	0	0	0	3,635
8th Street	0	0	0	0	0	0	0	0	0	0	3	448	451
7th Street	0	0	0	0	0	0	0	0	0	0	3	96	99
MZ 1 Total	1,001	6,530	6,500	6,499	7,582	7,887	18,923	22,477	0	0	4,981	5,674	88,055
Recharge Basins in MZ 2													
Ely 1-3	0	0	0	0	0	0	0	0	0	0	0	83	83
Turner 1& 2	0	0	0	0	0	310	151	243	0	0	0	0	704
Turner 3 & 4	0	0	0	0	0	0	195	70	0	0	0	0	265
Lower Day	0	0	0	0	0	107	2,810	2,266	0	0	3	893	6,079
Etiwanda Debris Basin	0	0	0	0	0	2,137	2,488	1,160	0	0	7	147	5,939
Victoria	0	0	0	0	0	0	0	0	0	0	2	69	71
San Sevaine 1	0	0	0	0	0	1,621	9,172	5,749	0	0	0	1,707	18,249
Hickory	0	0	0	0	0	197	636	212	0	0	7	10	1,062
MZ 2 Total	0	0	0	0	0	4,371	15,452	9,700	0	0	19	2,909	32,451
Recharge Basins in MZ 3													
Banana	0	0	0	0	0	0	193	783	0	0	0	0	976
RP3 Cell 1a	0	0	0	0	0	0	0	0	0	0	1	847	848
RP3 Cell 3b	0	0	0	0	0	0	0	0	0	0	0	36	36
MZ 3 Total	0	0	0	0	0	0	193	783	0	0	1	883	1,860
Fiscal Year Totals	1,001	6,530	6,500	6,499	7,582	12,259	34,567	32,960	0	0	5,001	9,466	122,365
Distribution by Management Zone													
MZ1	100%	100%	100%	100%	100%	64%	55%	68%	--	--	99.6%	60%	72%
MZ2	0%	0%	0%	0%	0%	36%	45%	29%	--	--	0.4%	31%	27%
MZ3	0%	0%	0%	0%	0%	0%	1%	2%	--	--	0.0%	9%	2%

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Table 2-8b
Recycled Recharge - Fiscal Year 2000 to 2011
(acre-ft/yr)

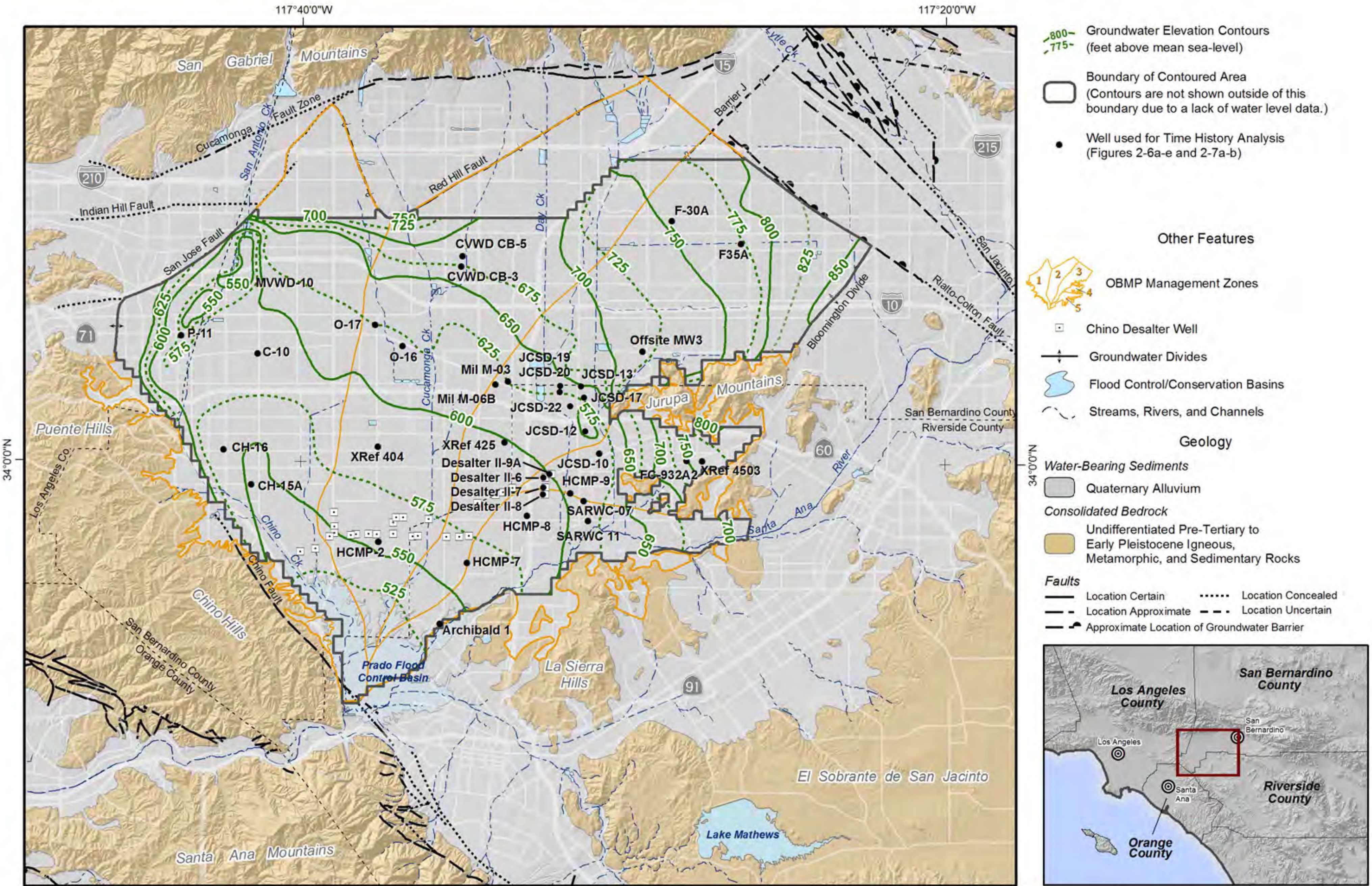
Management Zone/Basin	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	Total
Recharge Basins in MZ 1													
College Heights East	0	0	0	0	0	0	0	0	0	0	0	0	0
College Heights West	0	0	0	0	0	0	0	0	0	0	0	0	0
Upland	0	0	0	0	0	0	0	0	0	0	0	0	0
Montclair 1, 2, 3, 4	0	0	0	0	0	0	0	0	0	0	0	0	0
Brooks	0	0	0	0	0	0	0	0	0	1,605	1,695	1,373	4,673
8th Street	0	0	0	0	0	0	0	0	1,054	352	999	1,586	3,991
7th Street	0	0	0	0	0	0	0	0	0	0	68	285	353
MZ 1 Total	0	0	0	0	0	0	0	0	1,054	1,957	2,762	3,244	9,017
Recharge Basins in MZ 2													
Ely 1-3	507	500	505	185	49	158	188	466	562	364	246	757	4,486
Turner 1& 2	0	0	0	0	0	0	0	624	0	97	38	8	767
Turner 3 & 4	0	0	0	0	0	0	0	613	0	74	359	45	1,091
Lower Day	0	0	0	0	0	0	0	0	0	0	0	0	0
Etiwanda Debris Basin	0	0	0	0	0	0	0	0	0	0	0	0	0
Victoria	0	0	0	0	0	0	0	0	0	0	0	778	778
San Sevaine 4 & 5	0	0	0	0	0	0	0	0	0	0	0	378	378
Hickory	0	0	0	0	0	0	586	647	567	46	856	785	3,487
MZ 2 Total	507	500	505	185	49	158	774	2,350	1,129	581	1,499	2,751	10,987
Recharge Basins in MZ 3													
Banana	0	0	0	0	0	0	529	643	157	40	898	267	2,534
RP3 Cell 1a	0	0	0	0	0	0	0	0	0	106	1,934	1,560	3,600
RP3 Cell 3b	0	0	0	0	0	0	0	0	0	0	117	188	305
MZ 3 Total	0	0	0	0	0	0	529	643	157	146	2,949	2,015	6,439
Fiscal Year Totals	507	500	505	185	49	158	1,303	2,993	2,340	2,684	7,210	8,010	26,443
Distribution by Management Zone													
MZ1	0%	0%	0%	0%	0%	0%	0%	0%	--	--	38.3%	40%	34%
MZ2	100%	100%	100%	100%	100%	100%	59%	79%	--	--	20.8%	34%	42%
MZ3	0%	0%	0%	0%	0%	0%	41%	21%	--	--	40.9%	25%	24%

Table 2-9
Historical and Projected Metropolitan Water Rates and IEUA Recycled Water Recharge Rate

($/acre-ft)

Year	Historical and Projected MWDSC Water Rates							IEUA Recycled Water Recharge Rate
	Replenishment Service	Untreated Tier 1 Service			Untreated Tier 2 Service			
		MWDSC	Low	High	MWDSC	Low	High	
2002	$233	$349						--
2003	$233	$326			$407			--
2004	$233	$326			$407			--
2005	$238	$331			$412			--
2006	$238	$331			$427			--
2007	$238	$331			$427			--
2008	$258	$351			$449			--
1/1/2009	$294	$412			$528			--
9/1/2009	$366	$484			$564			--
2010	$366	$484			$594			$89
2011	$409	$527			$652			$97
2012	$442	$560			$686			$145
2013	**	$593			$743			$195
2014	**	$593			$735			$255
2015	**	$617	$630	$658	$780	$780	$815	$335
2016	**	$641	$669	$730	$829	$829	$904	--
2017	**	$667	$710	$809	$880	$880	$1,003	--
2018	**	$694	$754	$898	$934	$934	$1,113	--
2019	**	$721	$800	$996	$992	$992	$1,234	--
2020	**	$750	$850	$1,104	$1,053	$1,053	$1,369	--
2021	**	$780	$902	$1,225	$1,119	$1,119	$1,518	--
2022	**	$812	$958	$1,359	$1,188	$1,188	$1,684	--
2023	**	$844	$1,017	$1,507	$1,261	$1,261	$1,868	--
2024	**	$878	$1,080	$1,672	$1,339	$1,339	$2,072	--
2025	**	$913	$1,147	$1,854	$1,422	$1,422	$2,298	--
2026	**	$949	$1,218	$2,057	$1,510	$1,510	$2,549	--
2027	**	$987	$1,293	$2,281	$1,603	$1,603	$2,828	--
2028	**	$1,027	$1,373	$2,530	$1,702	$1,702	$3,136	--
2029	**	$1,068	$1,458	$2,807	$1,807	$1,807	$3,479	--
2030	**	$1,111	$1,548	$3,113	$1,919	$1,919	$3,859	--
2031	**	$1,155	$1,644	$3,453	$2,038	$2,038	$4,280	--
2032	**	$1,201	$1,746	$3,830	$2,164	$2,164	$4,747	--
2033	**	$1,249	$1,854	$4,249	$2,297	$2,297	$5,266	--
2034	**	$1,299	$1,968	$4,713	$2,440	$2,440	$5,841	--
2035	**	$1,351	$2,090	$5,227	$2,590	$2,590	$6,479	--
2036	**	$1,405	$2,219	$5,798	$2,750	$2,750	$7,186	--
2037	**	$1,462	$2,356	$6,431	$2,921	$2,921	$7,971	--
2038	**	$1,520	$2,502	$7,133	$3,101	$3,101	$8,841	--
2039	**	$1,581	$2,657	$7,912	$3,293	$3,293	$9,807	--
2040	**	$1,644	$2,821	$8,776	$3,496	$3,496	$10,878	--
2041	**	$1,710	$2,995	$9,735	$3,712	$3,712	$12,066	--
2042	**	$1,778	$3,180	$10,798	$3,942	$3,942	$13,383	--
2043	**	$1,849	$3,377	$11,977	$4,186	$4,186	$14,845	--
Present Value Cost, 2014 through 2043		$15,538	$21,024	$44,000	$19,259	$26,058	$54,536	--

6.18%	Low rate ensemble average (2003 - 2014)
10.92%	High rate ensemble average (2007 - 2012)
5.00%	Assumed bond rate
4.00%	MWDSC projected rate for 2013-2017 from page 27 of biennial budget report for fiscal years 12/13 and 13/14 and were obtained from http://www.mwdh2o.com/mwdh2o/pages/finance/finance01.html
**	Replenishment water service assumed not available.
--	Rate projection unavailable
(grey shading)	Grey shaded values are historical or MWDSC Board-approved rates and were obtained from http://www.mwdh2o.com/mwdh2o/pages/finance/finance01.html



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0 1 2 3 4 Miles
0 2 4 6 Kilometers

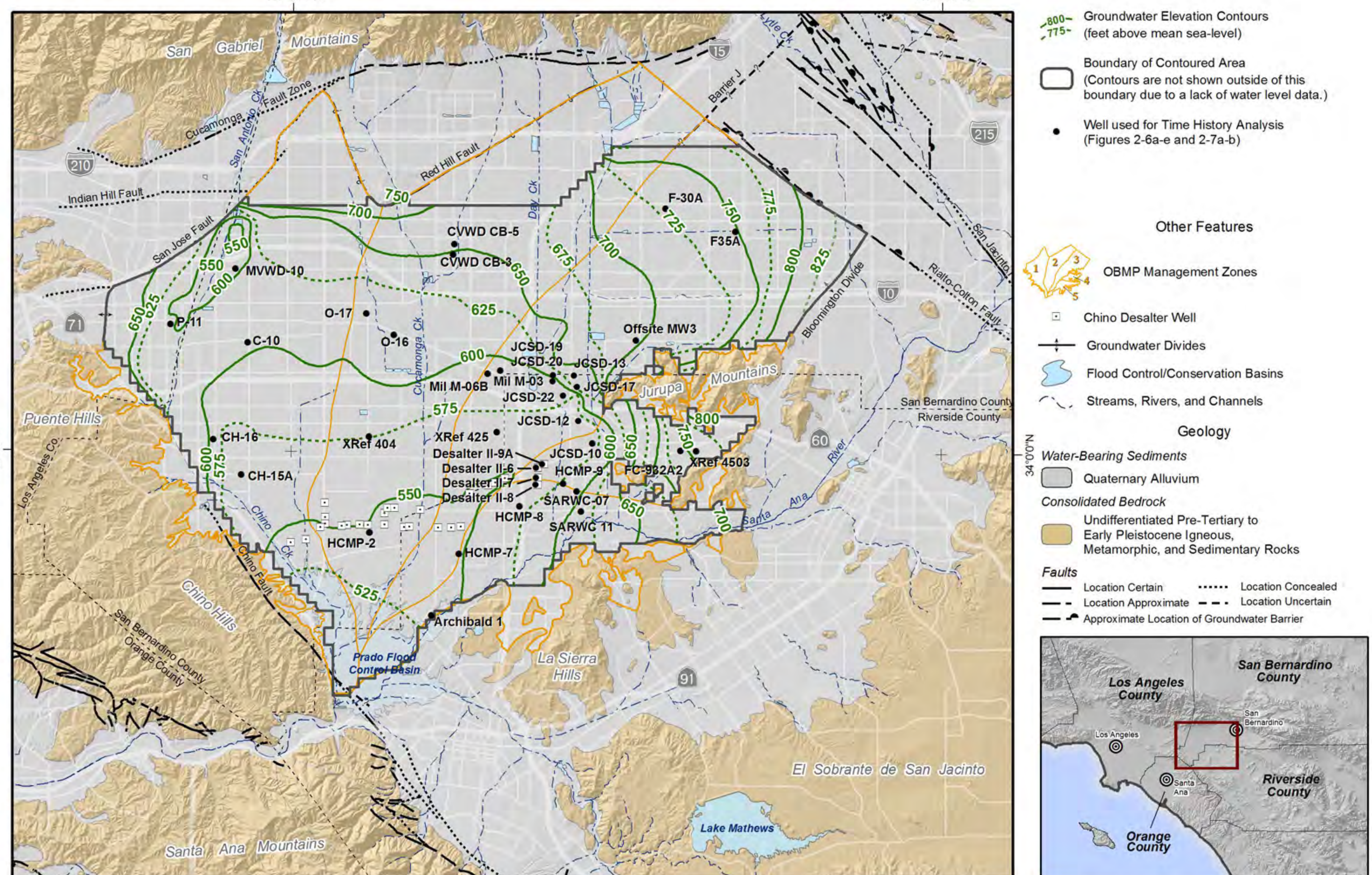
Chino Basin Watermaster — Partners in Basin Management

2013 Recharge Masterplan Update

Groundwater Elevation Contours for Layer 1

Spring 2000

Figure 2-1a



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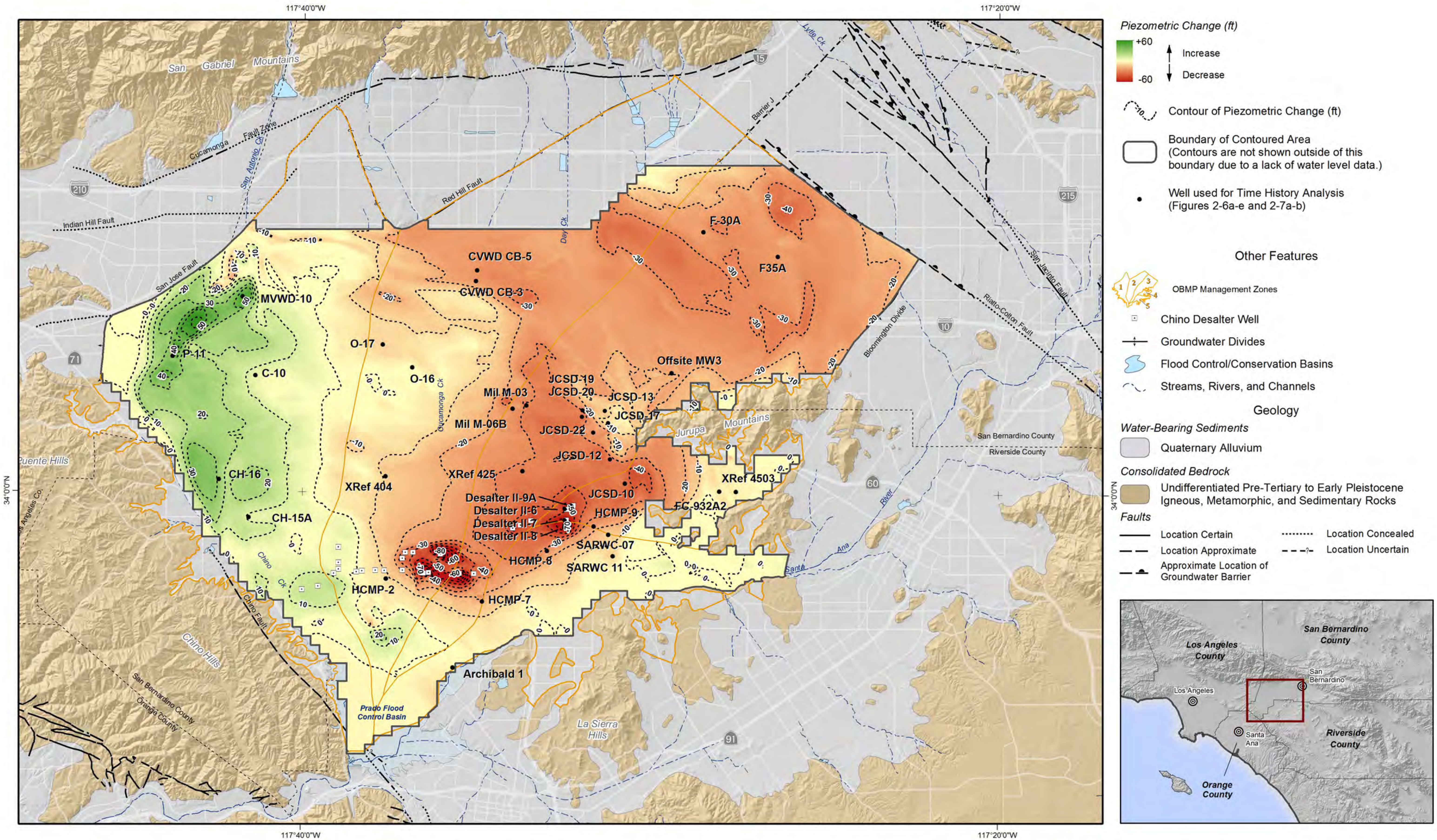
2013 Recharge Masterplan Update

Groundwater Elevation Contours for Layer 1
Spring 2010

Figure 2-1b



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2013 Recharge Masterplan Update

Groundwater Level Change for Layer 1

Spring 2000 to Spring 2010

Figure 2-2

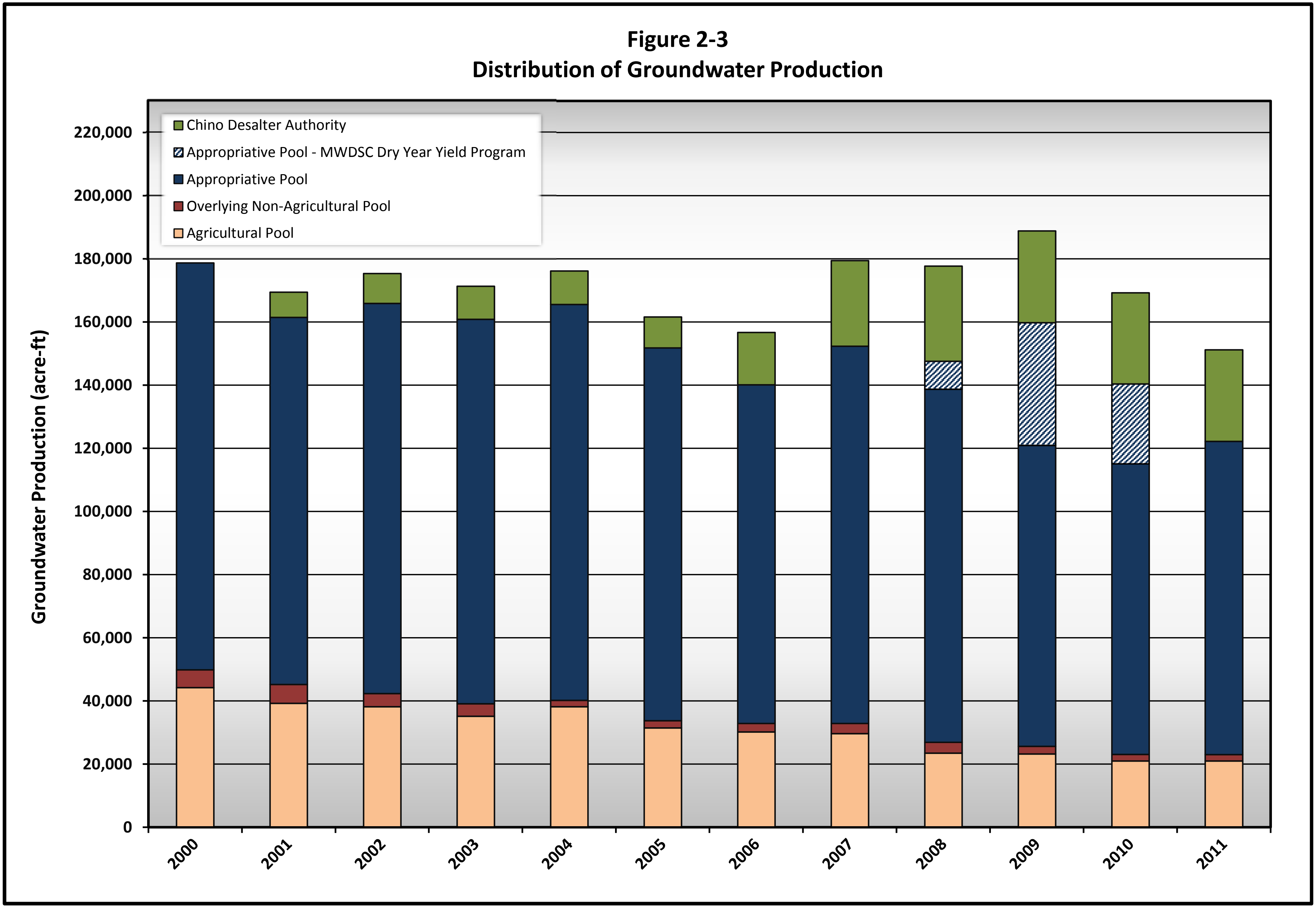
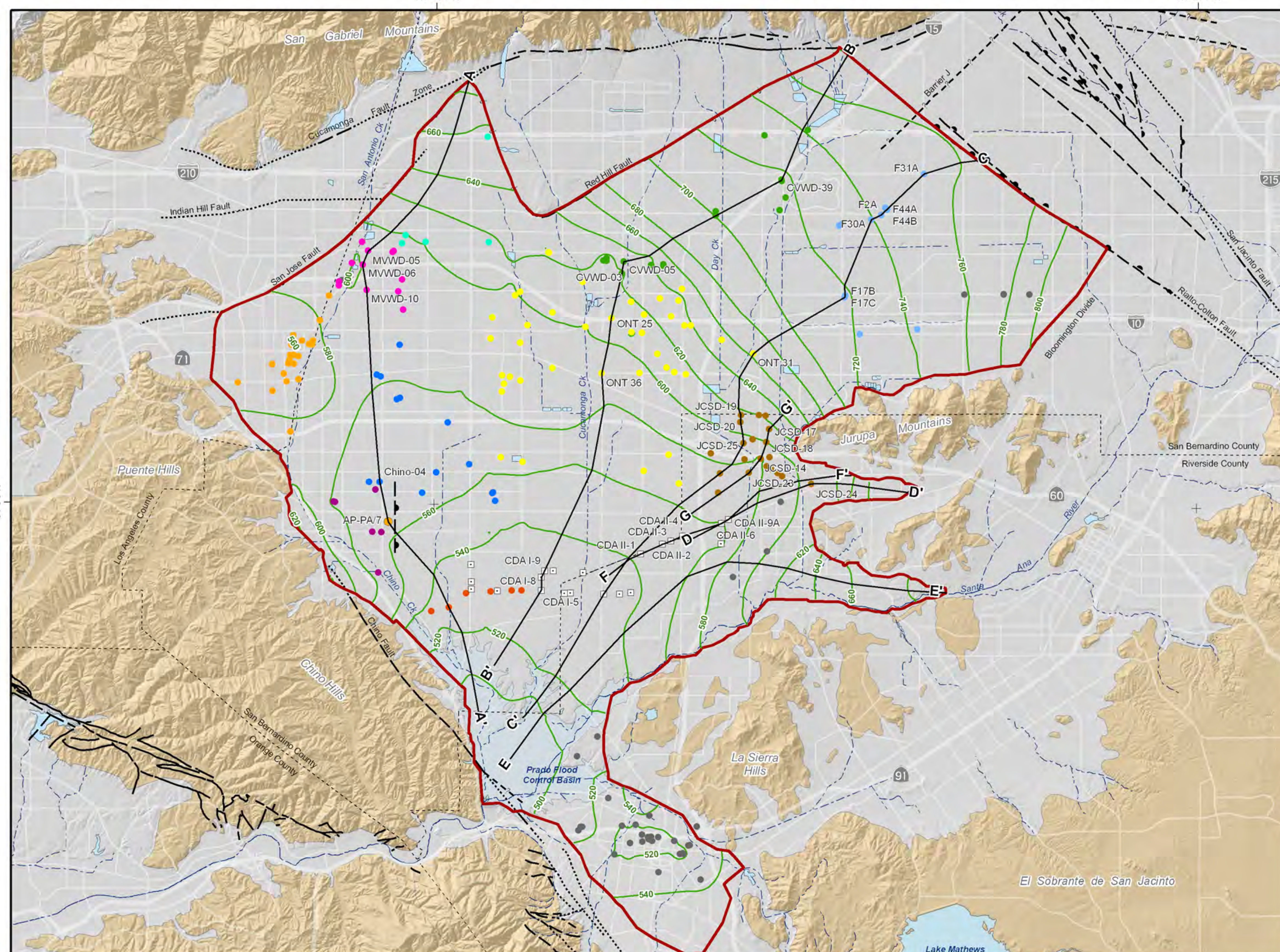


Figure2-3.xlsx -- Figure 2-3_RMPU_2000_11



Cross-section Profile

April 2010 Groundwater Elevation Contours *(feet above mean sea-level)*

Production Wells

- Chino Desalter Authority
- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Other Features

- Groundwater Flow Model Boundary
- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

0 1 2 3 4 Miles

0 2 4 6 Kilometers

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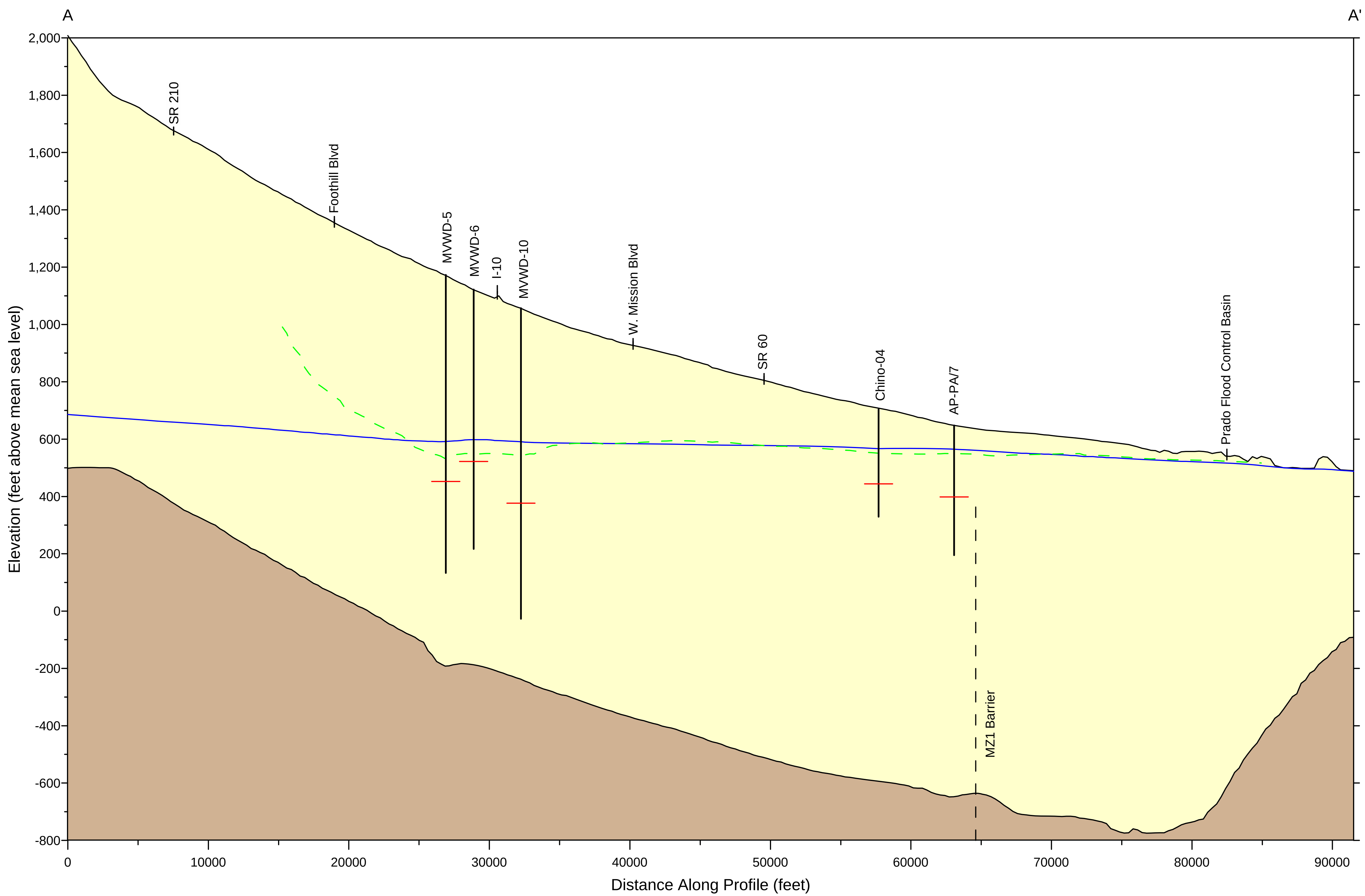
2013 Recharge Masterplan Update

Flow-line Based Cross-section Profiles
for the 2010 Initial Groundwater Condition

Figure 2-4



Vertical Exaggeration: 20x

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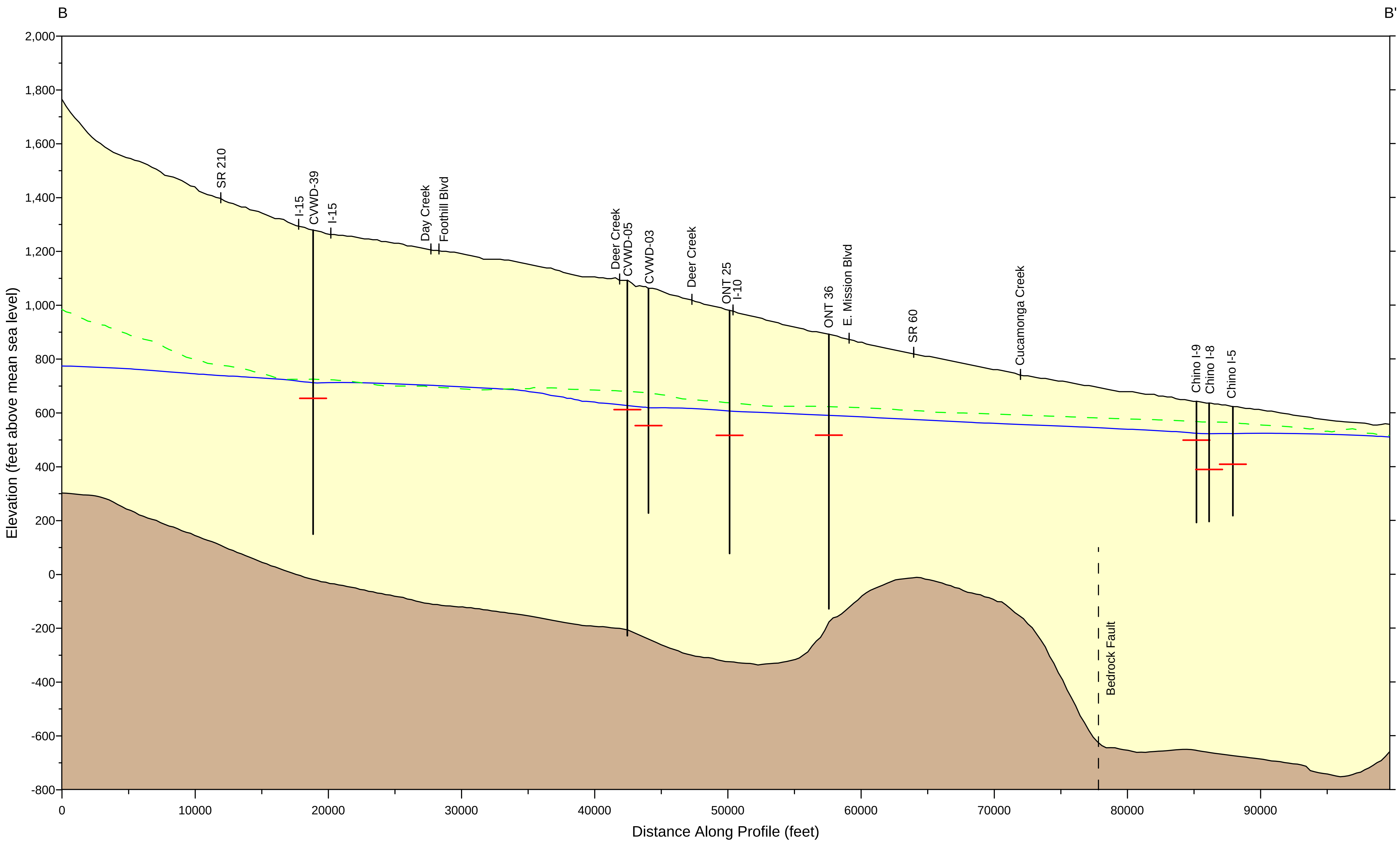
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (Spring 2000)
- Water Level (April 2010)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
MZ1

Figure 2-5a



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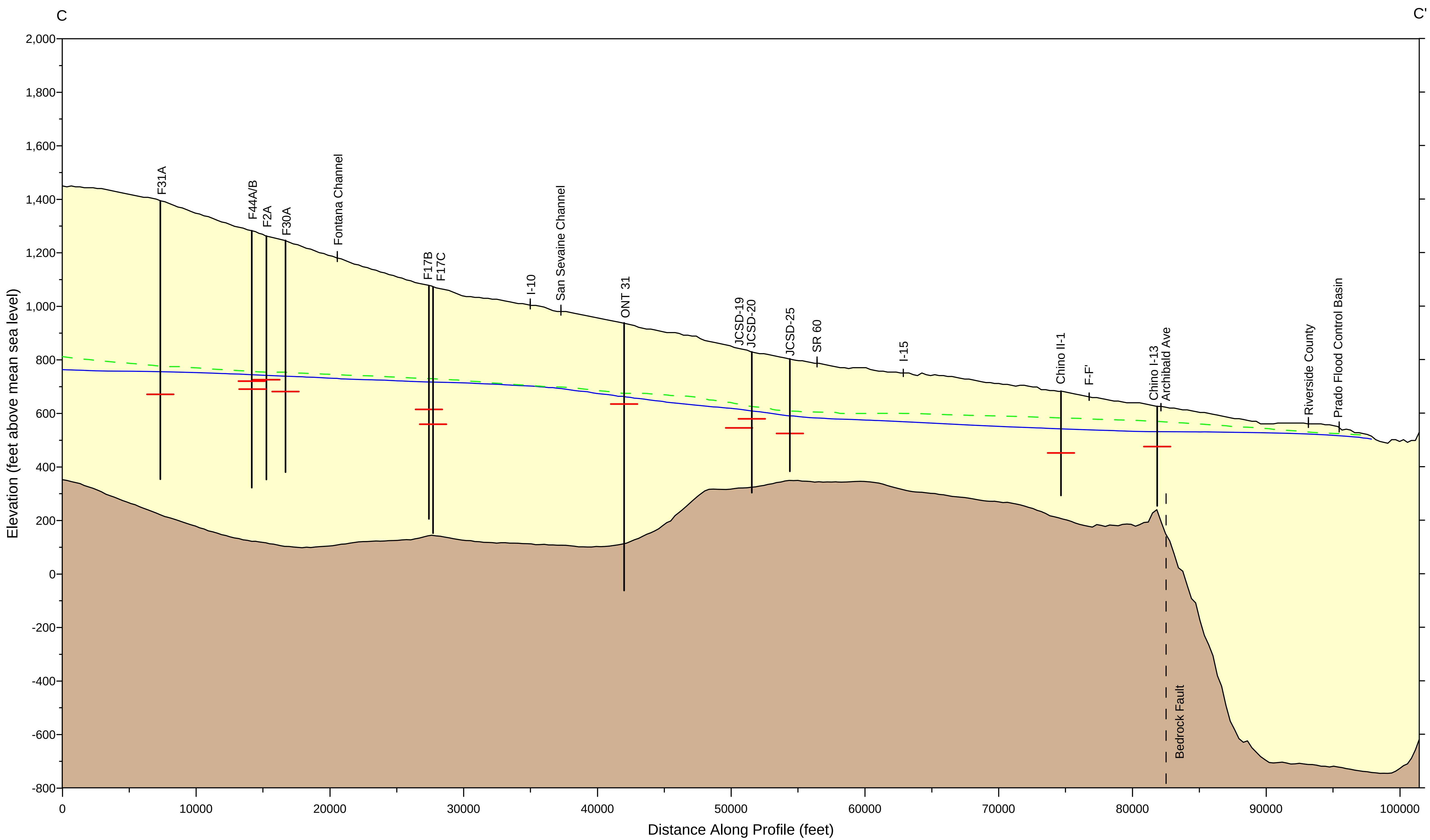
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (Spring 2000)
- Water Level (April 2010)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
MZ2

Figure 2-5b



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Explanation

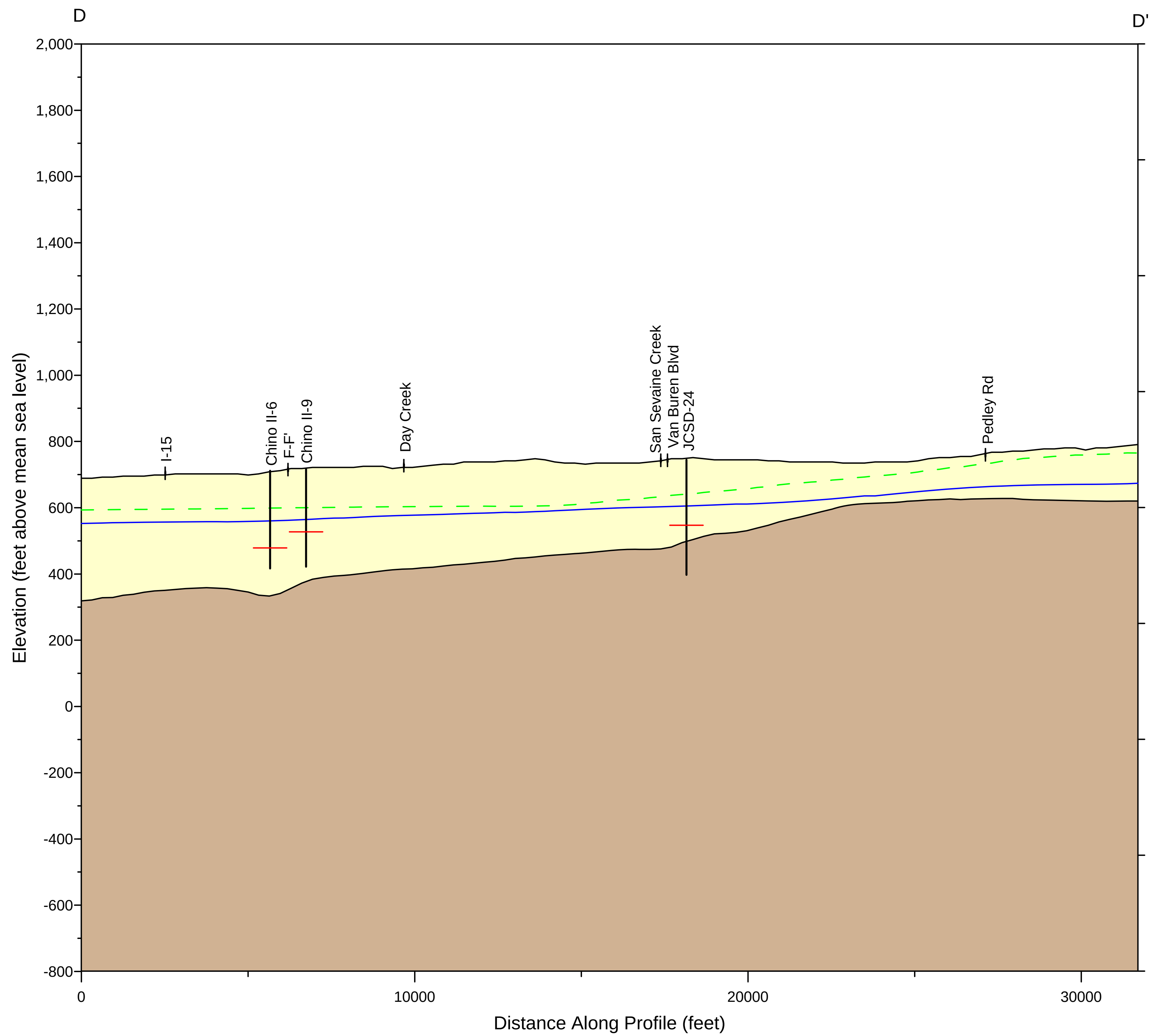
- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (Spring 2000)
- Water Level (April 2010)

CHINO BASIN WATERMASTER
Partners in Basin Management

2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
MZ3

Figure 2-5c



Vertical Exaggeration: 10x

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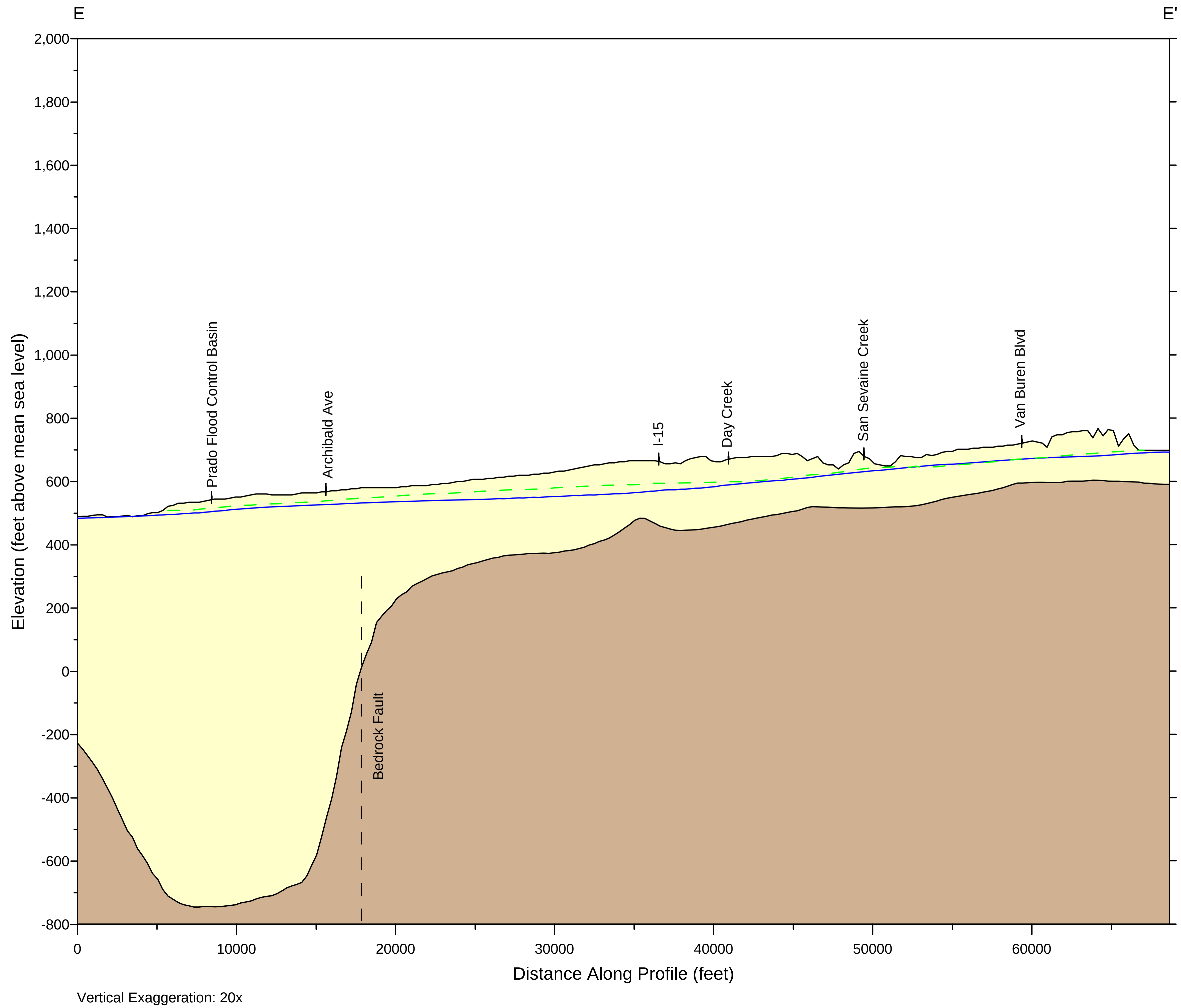
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (Spring 2000)
- Water Level (April 2010)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
MZ4

Figure 2-5d



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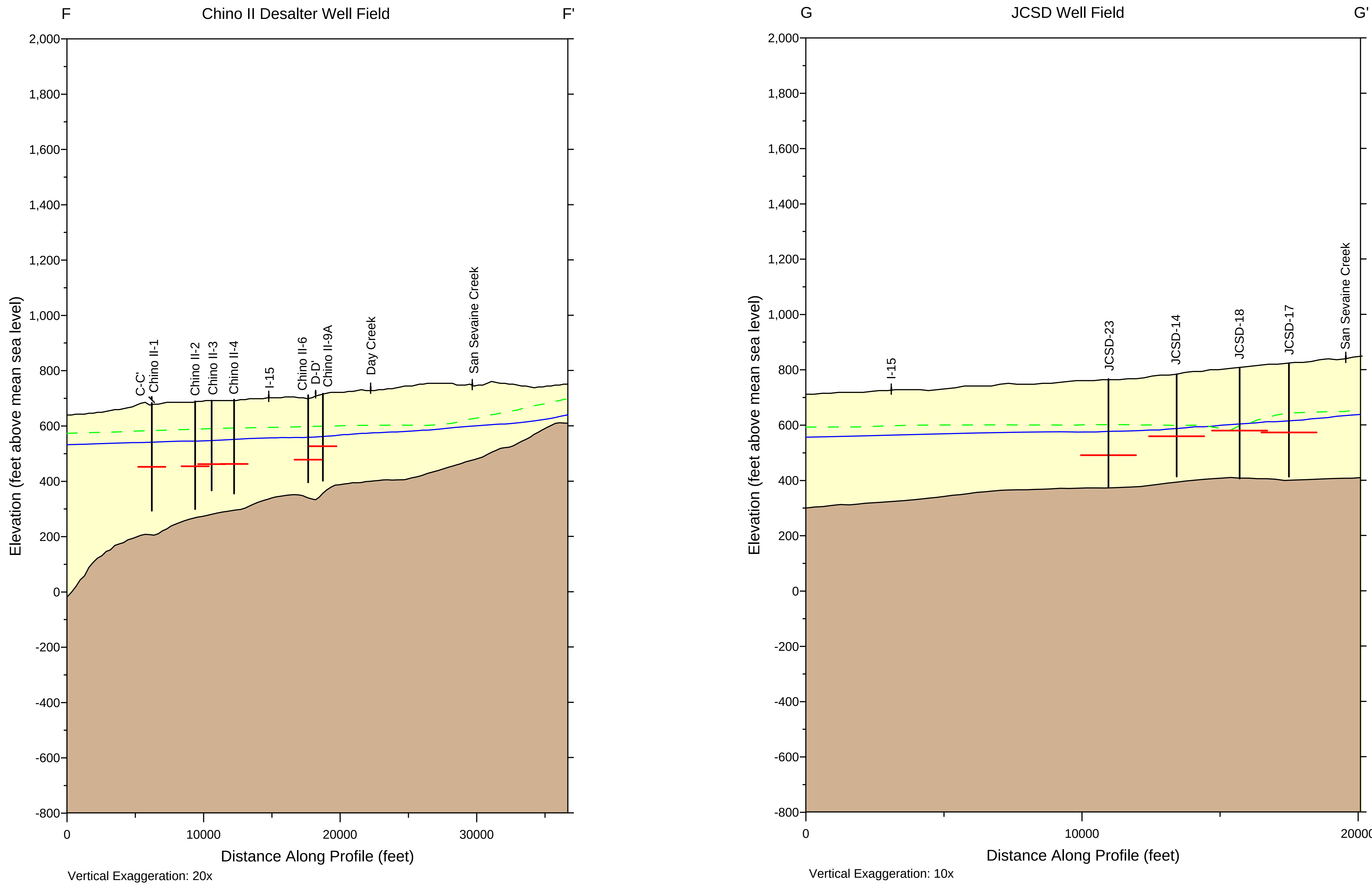
2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
MZ5

Figure 2-5e



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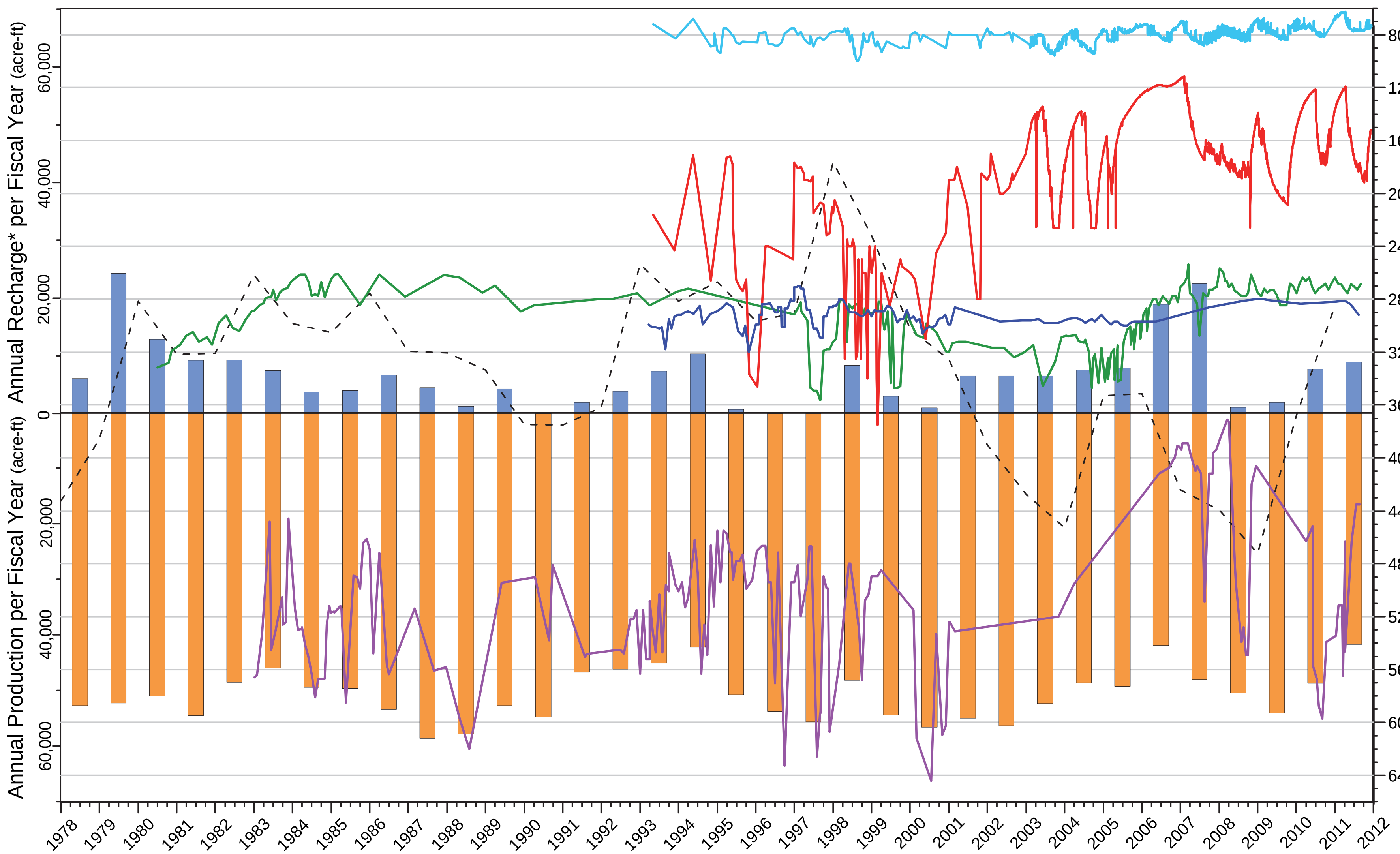
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (Spring 2000)
- Water Level (April 2010)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Groundwater Level Conditions in 2000 and 2010
Chino II Desalters and JCSD Wells

Figure 2-5f



* Recharge includes imported water and recycled water delivered to recharge basins; it does not include in-lieu replenishment water.

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Water Levels (top-bottom of well screen)

- MVWD-10 (540-1,084 ft-bgs)
- P-11 (168-550 ft-bgs)
- C-10 (350-1,090 ft-bgs)
- CH-16 (430-940 ft-bgs)
- CH-15A (190-310 ft-bgs)

Production and Recharge

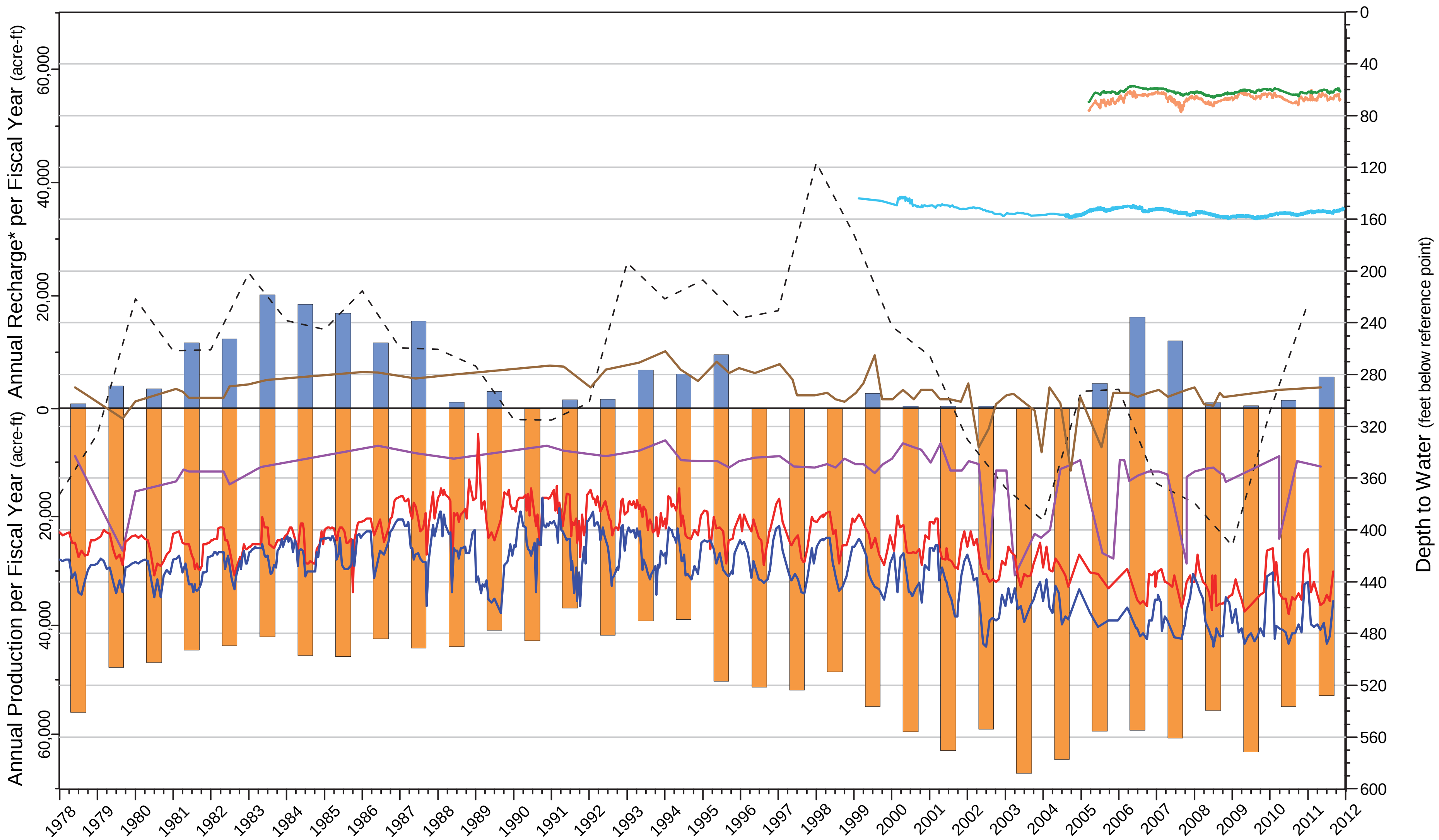
- Recharge*
- Groundwater Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *MZ1*

1978 to 2011

Figure 2-6a



* Recharge includes imported water and recycled water delivered to recharge basins; it does not include in-lieu replenishment water.

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File: Figure_2-6b.grf

Water Levels (top-bottom of well screen)

- CVWD CB-5 (538-1,238 ft-bgs)
- CVWD CB-3 (341-810 ft-bgs)
- O-17 (415-1,007 ft-bgs)
- O-16 (366-630 ft-bgs)
- X Ref 404 (274-354 ft-bgs)
- HCMP 2/1 (124-164 ft-bgs)
- HCMP 2/2 (296-316 ft-bgs)

Production and Recharge

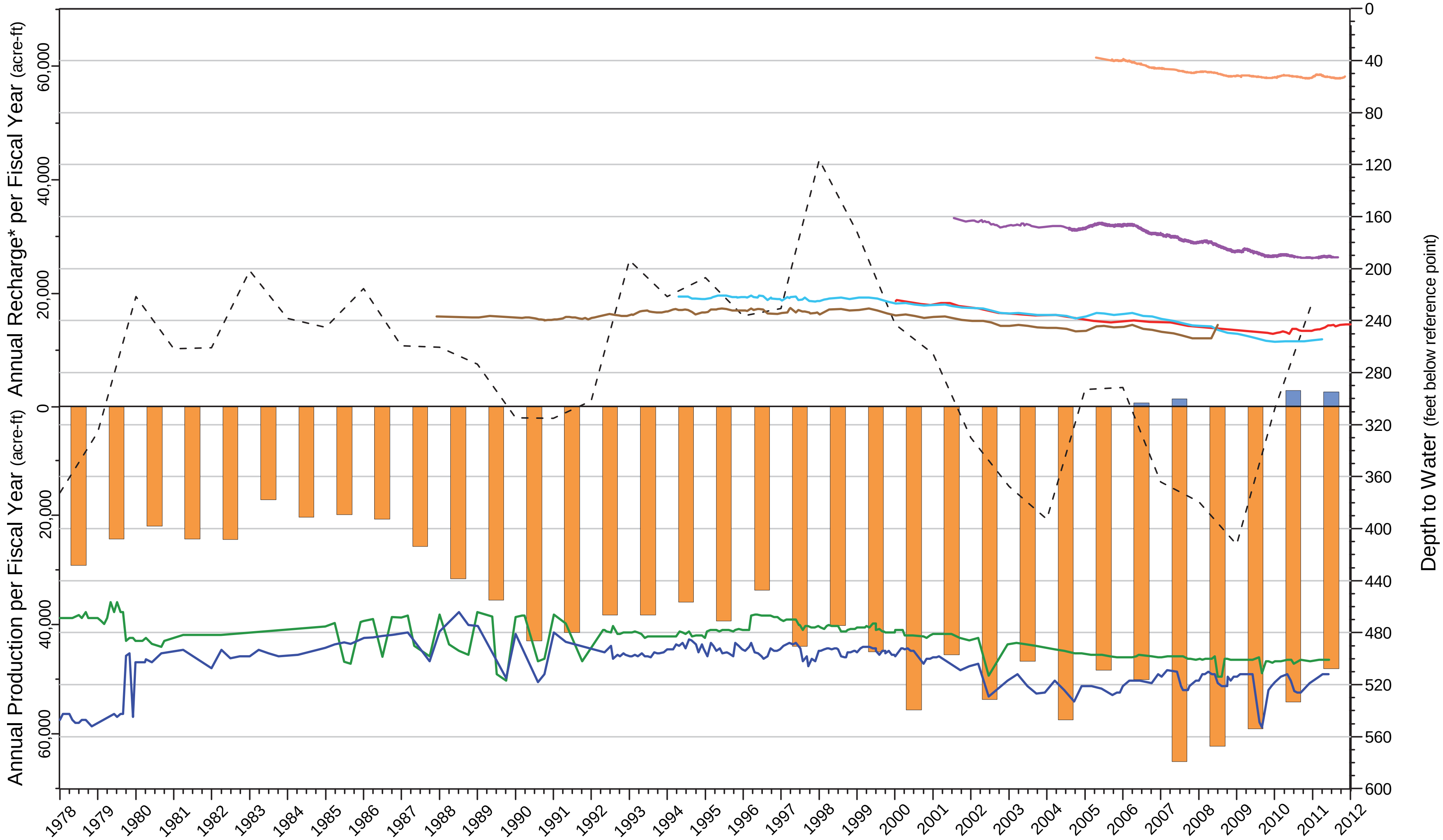
- Recharge*
- Groundwater Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *MZ2*

1978 to 2011

Figure 2-6b



* Recharge includes imported water and recycled water delivered to recharge basins; it does not include in-lieu replenishment water.

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Water Levels (top-bottom of well screen)

- F-30A (507-864 ft-bgs)
- F-35A (700-852 ft-bgs)
- Mil M-03 (244-262 ft-bgs)
- Mil M-06B (255-275 ft-bgs)
- Offsite MW3 (no perf data)
- XRef 425 (no perf data)
- HCMP-7/1 (70-110 ft-bgs)

Production and Recharge

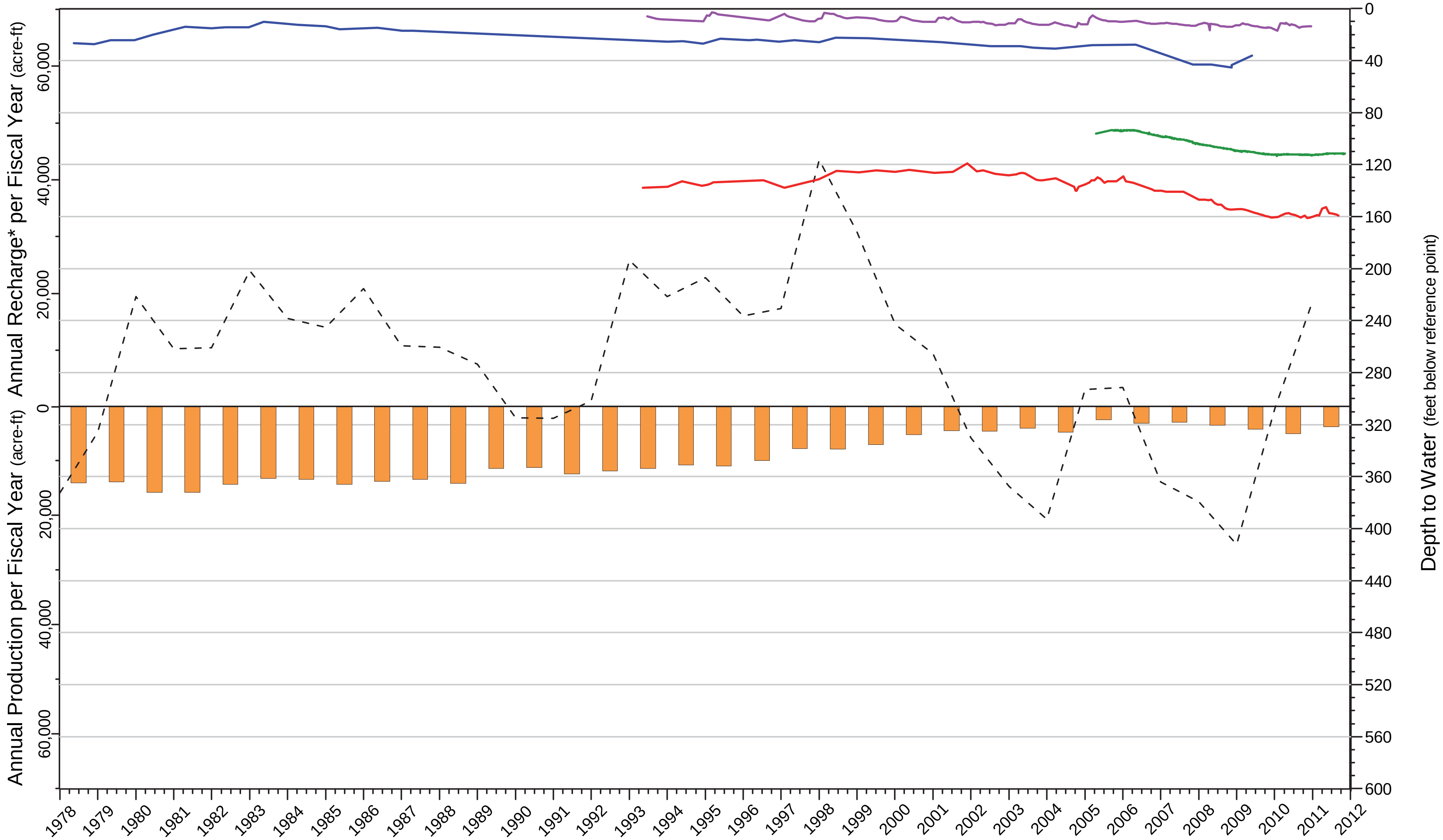
- Recharge*
- Groundwater Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *MZ3*

1978 to 2011

Figure 2-6c



* Recharge includes imported water and recycled water delivered to recharge basins; it does not include in-lieu replenishment water. No imported or recycled waters are delivered to basins within MZ4.

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Water Levels (top-bottom of well screen)

- JCSD-10 (no perf data)
- HCMP-9/1 (110-150 ft-bgs)
- X Ref 4503 (no perf data)
- FC-932A2 (no perf data)

Production and Recharge

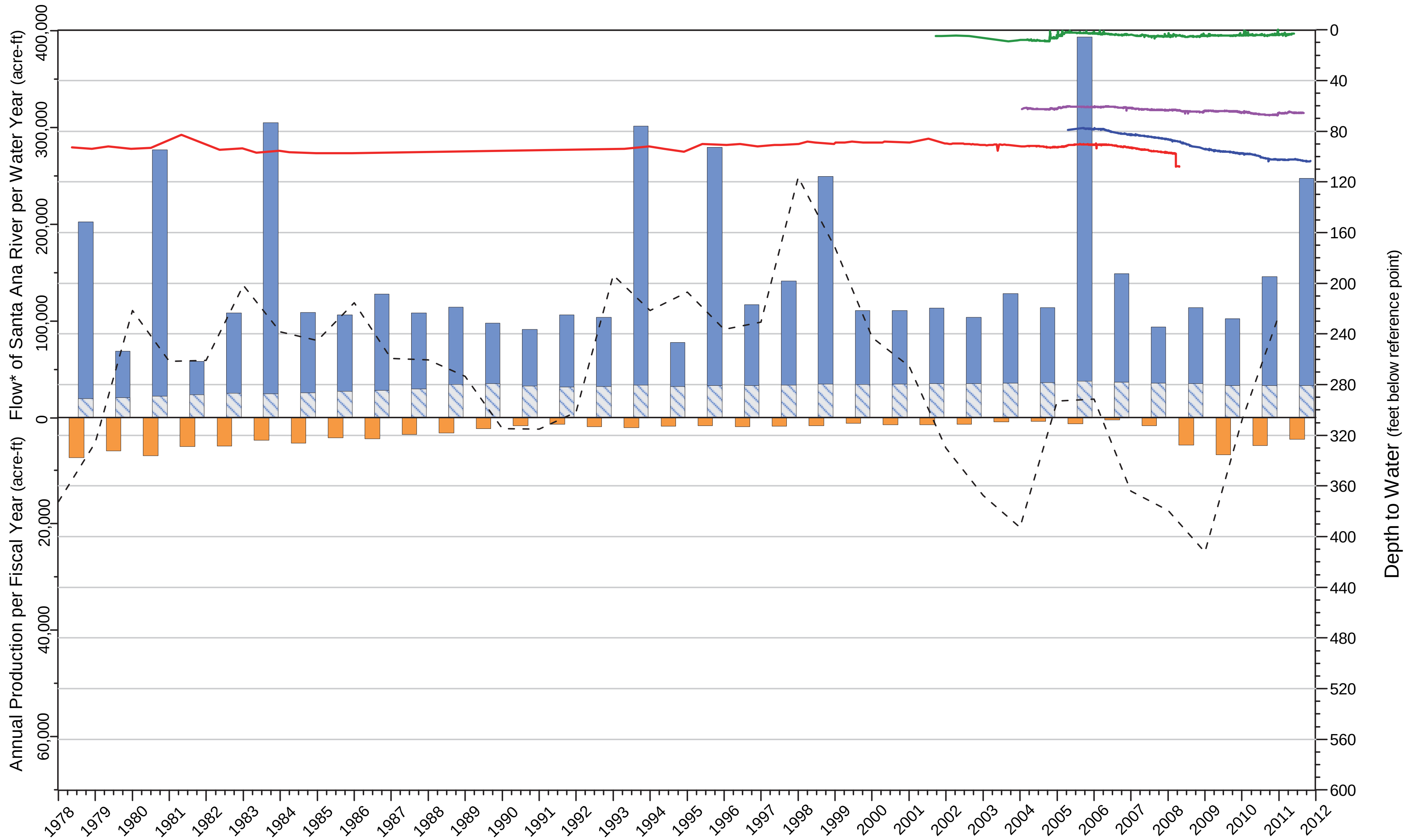
- Groundwater Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *MZ4*

1978 to 2011

Figure 2-6d



* Flow of the Santa Ana River through Management Zone 5 includes the flow measured at the USGS gauging station at Riverside Narrows plus effluent discharge from City of Riverside Wastewater Treatment Plant.

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Water Levels (top-bottom of well screen)

- SARWC-07 (100-172 ft-bgs)
- HCMP-8/1 (75-115 ft-bgs)
- SARWC-11 (75-230 ft-bgs)
- Archibald-1 (75-85 ft-bgs)

Production and Recharge

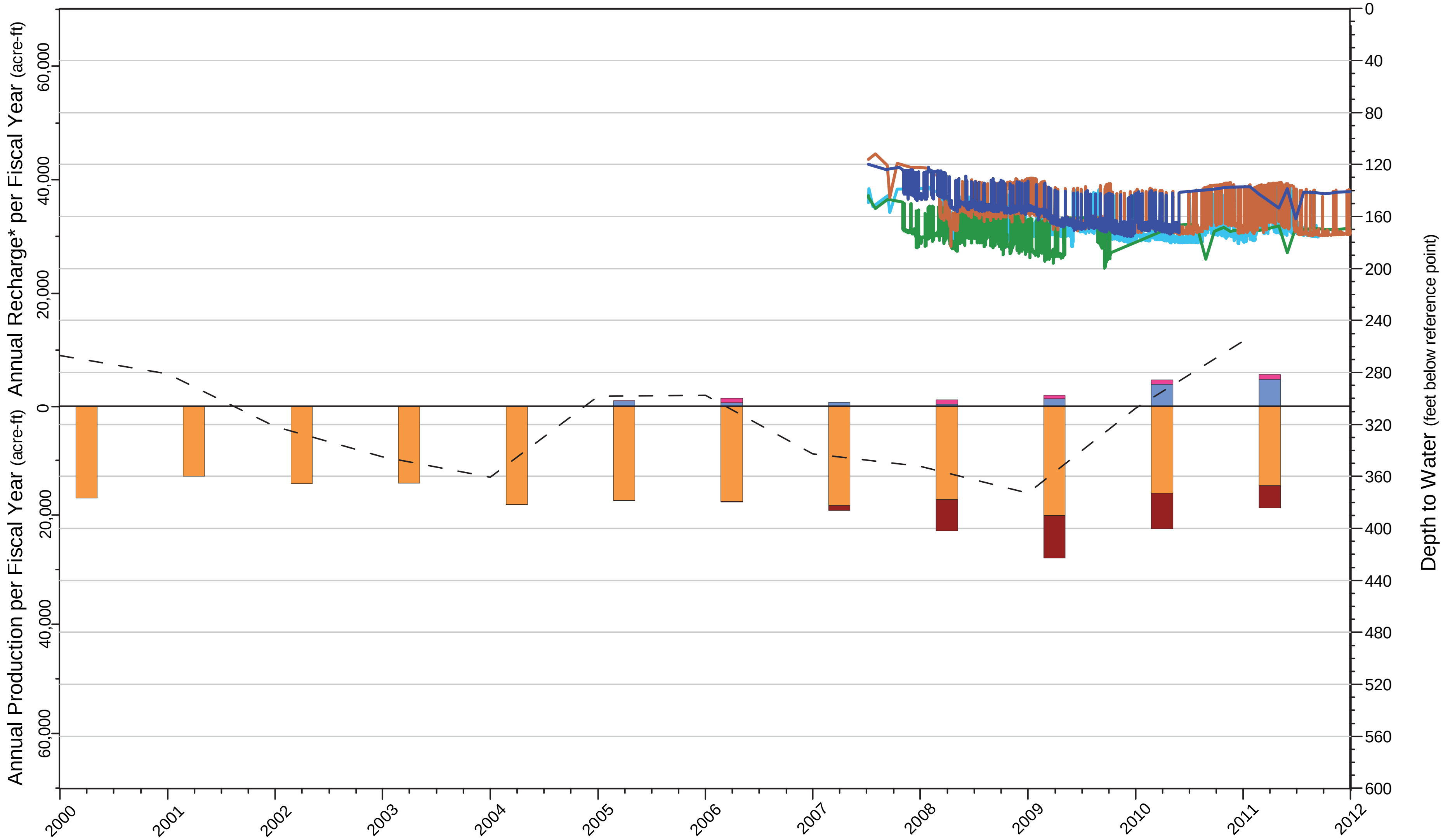
- City of Riverside WWTP
- Santa Ana River at Riverside Narrows
- Groundwater Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *MZ5*

1978 to 2011

Figure 2-6e



* Recharge includes imported water and recycled water delivered to recharge basins; it does not include in-lieu replenishment water.

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Water Levels (top-bottom of well screen)

- Desalter II-6 (150-295 ft-bgs)
- Desalter II-7 (140-245 ft-bgs)
- Desalter II-8 (130-230 ft-bgs)
- Desalter II-9A (160-295 ft-bgs)

Production and Recharge

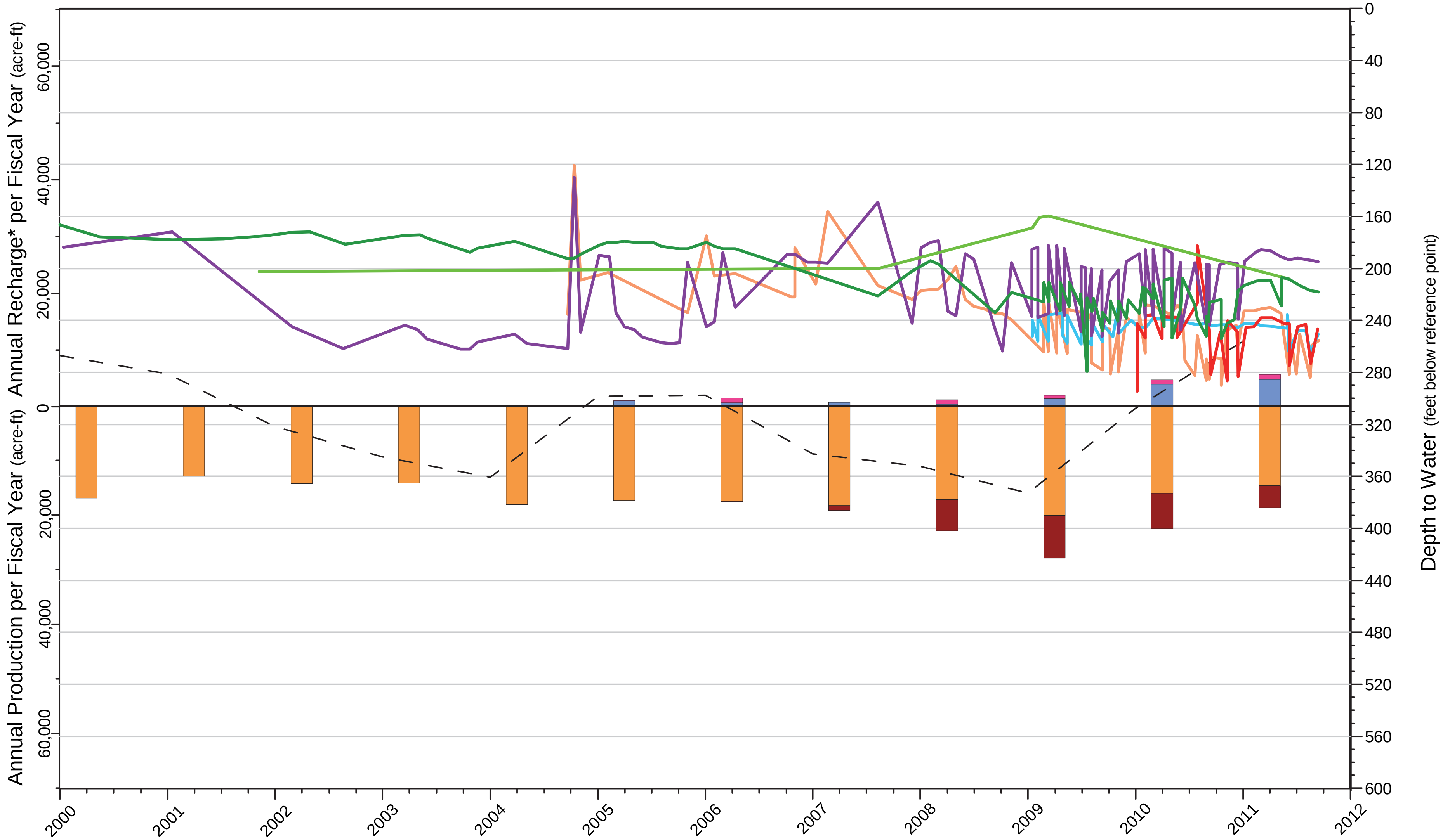
- Recharge to RP3 Basin*
- JCSD Production
- Recharge to Declez Basin*
- Desalter-II Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *Desalter-II Wells*

2000 to 2011

Figure 2-7a



* Recharge includes imported water and recycled water delivered to recharge basins, and does not include in-lieu replenishment water.

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Water Levels (top-bottom of well screen)

- JCSD 12 (215-330 ft-bgs)
- JCSD 13 (220-446 ft-bgs)
- JCSD 17 (250-400 ft-bgs)
- JCSD 19 (no perf data)
- JCSD 20 (170-406 ft-bgs)
- JCSD 22 (no perf data)

Production and Recharge

- Recharge to RP3 Basin*
- Recharge to Declez Basin*
- JCSD Production
- Desalter-II Production
- Cumulative Departure from Mean Precipitation

2013 Recharge Master Plan Update

Long-Term Trends in Groundwater Levels versus Climate, Production, and Recharge - *JCSD Wells*

2000 to 2011

Figure 2-7b

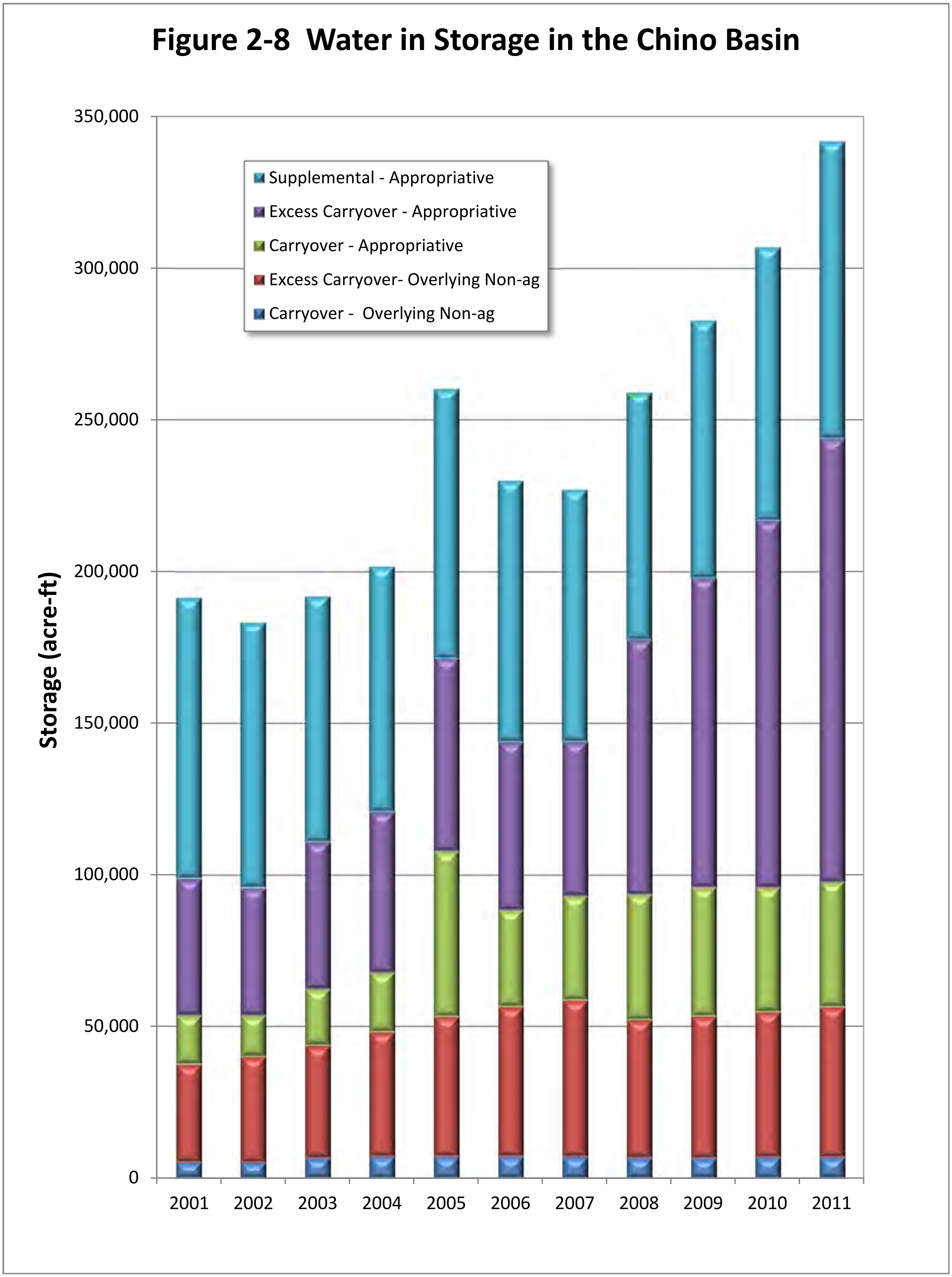
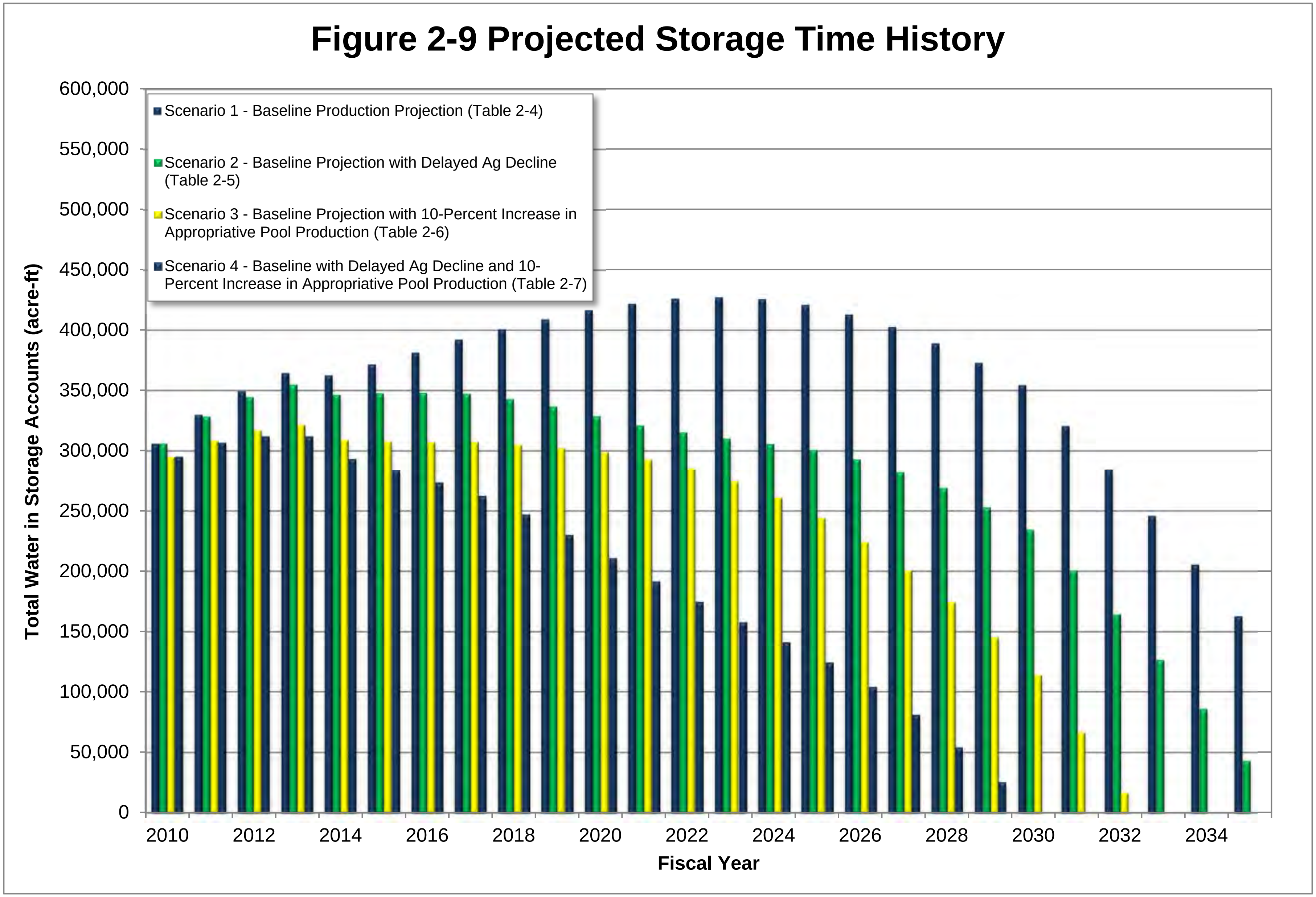
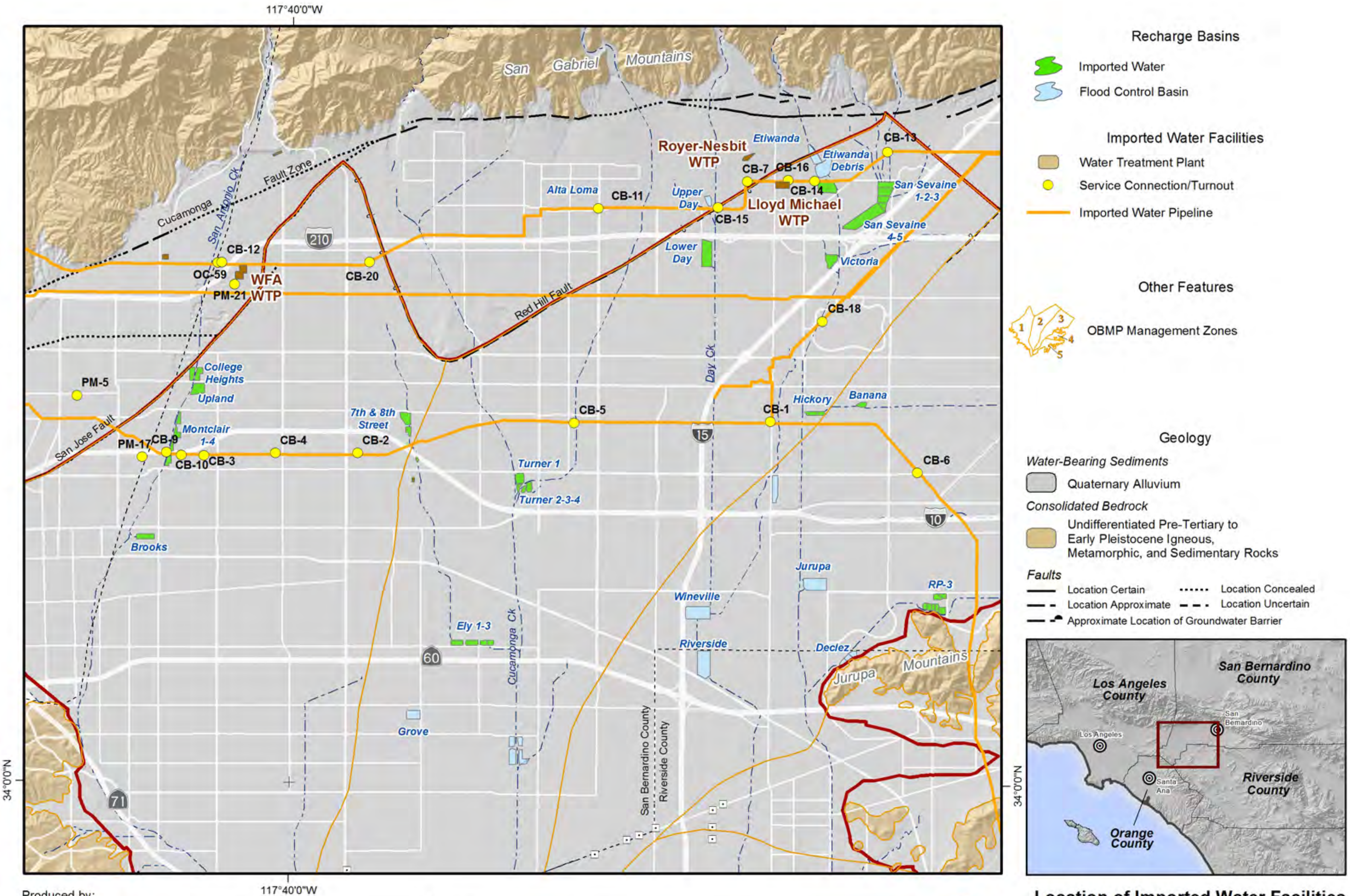


Figure 2-8 Water in Storage in the Chino Basin
Supplemental - Appropriative
Excess Carryover - Appropriative
Carryover - Appropriative
Excess Carryover- Overlying Non-ag
Carryover - Overlying Non-ag
Storage (acre-ft)
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011



20120501 Figure 2-9 Tables 2-3 through 2-7.xlsx -- Figure 2-9
Created on 5/2/2012
Printed on 5/2/2012



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Name: Figure_2-10

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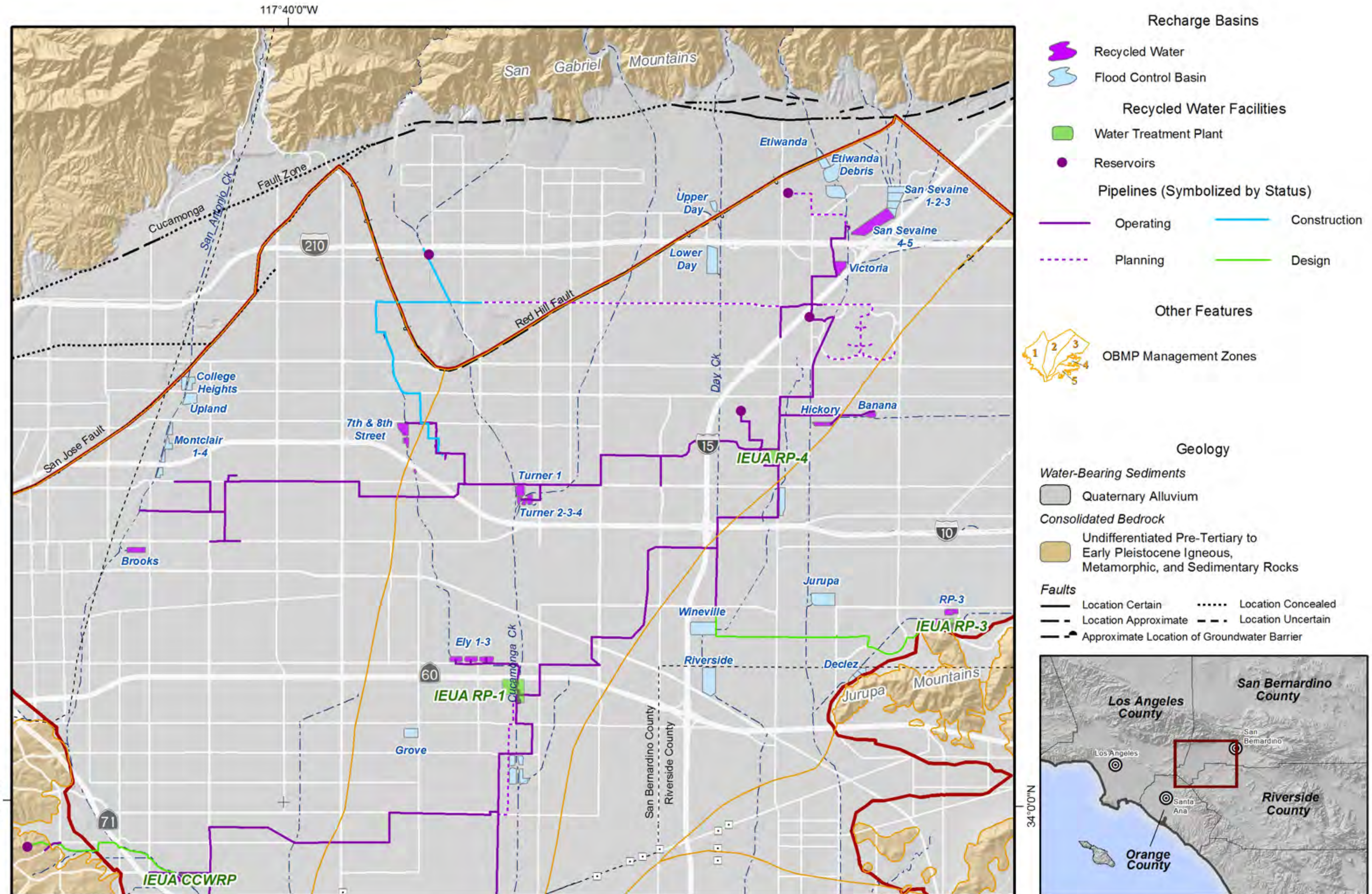
Location of Imported Water Facilities
Recharge Basins, Pipelines, Turnouts, and Treatment Plants

Figure 2-10



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Date: 4/18/2012
Name: Figure_2-11

0 1 2 Miles

Kilometers
0 2

CHINO BASIN WATERMASTER
Partners in Basin Management

2013 Recharge Master Plan Update

Location of Recycled Water Facilities
Recharge Basins, Pipelines, Reservoirs, and Wastewater Treatment Plants

Figure 2-11

Section 3 – Impacts of Revised Groundwater Production and Replenishment Projections

The objectives of this section are to describe changed conditions from what was assumed in the 2010 RMPU and to update the information included in the 2010 RMPU. Specifically this section answers the following questions:

1. How are groundwater levels projected to change with the revised projections?

2. What areas in the basin are facing sustainability challenges?

In 2006 and 2007, Watermaster conducted extensive hydrologic and modeling investigations in support of the development of the Peace II Agreement and the facilities and basin operating strategies that are contained in the Peace II Agreement. And, Watermaster developed a sophisticated suite of computer simulation tools that are collectively referred to as the 2007 Watermaster Model. Based on these investigations, Wildermuth Environmental Inc. (WEI), Watermaster's consultant, concluded that:

- the safe yield of the Basin would likely decline from about 140,000 acre-ft/yr in 2006 to about 130,000 acre-ft/yr in 2030;

- projected future production may not be sustainable for some Appropriators due to excessive drawdown; and

- given Watermaster's traditional approach to replenishment operations, future production may have to be limited by Watermaster's existing replenishment capacity (WEI, 2007).

In 2008, Watermaster conducted a material physical injury analysis of the proposed Dry-Year Yield Expansion—using updated groundwater production projections provided by the IEUA—and reached identical conclusions regarding production sustainability and replenishment limitations (WEI, 2008a). However, in this analysis, WEI recommended additional work to optimize the location and magnitude of groundwater production and replenishment in order to maximize groundwater production capabilities.

The sustainability issue identified in these reports occurs because the municipal groundwater producers had not coordinated their future groundwater production plans that include new wells and increased production. In early 2009, the preparation of an environmental impact report PEIR for the Peace II Agreement commenced. Prior to evaluating the hydrologic changes that are expected to occur through the implementation of the Peace II Project Description, Watermaster conducted an analysis of existing and future projected groundwater production patterns and developed new groundwater production patterns and supplemental water recharge plans that ensure sustainability. These new groundwater production and replenishment patterns are based on optimization studies that were constrained to meet projected production requirements, to use existing and master-planned well locations, to use existing spreading basins and planned injection wells, and to balance recharge and discharge in every area and subarea (a Peace Agreement requirement). Watermaster requested that each Appropriator party provide an elevation at each well for which if the model-projected groundwater elevation remained above that elevation, groundwater production sustainability at that well would be assured. These elevations were referred to as sustainability metrics. The groundwater production patterns developed in this investigation are voluntary. This work was documented in *2009 Production Optimization and Evaluation of the Peace II Project Description* (WEI, 2009).

A similar analysis was conducted by in the 2013 RMPU process that used the 2007 Watermaster Model with:

- updated groundwater production and replenishment projections for Scenario 1 and 3 (described in Section 2 herein),
- updated recycled water recharge projections,
- management zone specific supplemental water recharge plans, and
- updated sustainability metrics.

The Steering Committee stakeholders reviewed Scenarios 1 through 4 that are described in Section 2 and subsequently selected Scenarios 1 and 3 as the most representative scenarios to bookend the range of future groundwater production and replenishment.

Table 3-1 lists the location and magnitude of projected recycled water recharge, as provided by the IEUA.[10] Given the IEUA's recycled water recharge projection, supplemental water recharge was programmed for Scenarios 1 and 3 as follows:

- First priority – recycled water recharge in amounts and basins as projected by IEUA.
- Second priority – recycled and imported water were recharged in MZ1 at 6,500 acre-ft/yr.
- Third priority – if there was still a replenishment obligation after the recharge of imported water in MZ1, then imported water was recharged in the MZ3 spreading basins at a rate equal to the minimum of either the imported water recharge capacity or the remaining replenishment obligation.
- Fourth priority – if there was still a replenishment obligation after the recharge capacity of the first three priorities has been exhausted, then imported water was

[10] Mid-range estimate, email from Chris Berch, dated February 14, 2012

recharged in the MZ2 spreading basins at a rate equal to the minimum of either the imported water recharge capacity or the remaining replenishment obligation.

- Fifth priority – if there was still a replenishment obligation after the recharge capacity of the first four priorities has been exhausted, then imported water was recharged in the MZ1 spreading basins at a rate equal to the minimum of either the remaining imported water recharge capacity or the remaining replenishment obligation.

3.1 Summary of 2009 Peace II Modeling Results

Figure 3-1 illustrates the estimated groundwater elevation contours for July 2005 for model layer 1. This map shows the initial groundwater elevations throughout the basin and illustrates the initial groundwater levels for the planning period. Figures 3-2a and 3-2b show the projected groundwater elevations in June 2030, the end of the planning period, for model layer 1[11] for the Baseline (non-Peace II) alternative and the Peace II alternative respectively. And, Figures 3-3a and 3b show the change in groundwater levels across the basin for June 2030 for model layer 1 for the Baseline and Peace II alternatives. Figures 3-3a and 3-3b also show the Appropriators' water service area boundaries.

Review of Figures 3-1, 3-2a, and 3-2b indicates that the direction of groundwater flow in the Chino Basin is generally the same in 2005 and 2030 with groundwater flowing from the northeast and north to the southwest and south. A small area in the western part of the basin experiences slight groundwater elevation increases while the rest of the basin experiences declines. The 2030 groundwater level projections for both alternatives show a significant pumping depression around the desalter well field area. The 2009 report included comparisons of projected groundwater level time histories at selected wells to their respective sustainability constraints in an appendix and based on a review of these time-history charts concluded that:

"The groundwater elevation projections in Appendix B and in Figures 4-13a through 4-13j show that groundwater production is sustainable for the Baseline and Peace II Alternatives. At some wells, the groundwater elevation falls below constraints prescribed by the Appropriators. For these cases, it was assumed that the pumps would be lowered to maintain production."

3.2 Basin Response to Updated Groundwater Production and Replenishment

Figure 3-4 illustrates the estimated groundwater elevation contours for July 2010 for model layer 1. This map shows the initial groundwater elevations throughout the basin and illustrates the initial groundwater levels for the planning period used to evaluate Scenarios 1 and 3.

---

[11] The model consists of three layers with layer 1 being the uppermost layer. With the exception of the western part of the basin, the piezometric head in layers 2 and 3 correlate and lag slightly compared to the head changes in layer 1; as such, only layer 1 is discussed herein.

Figures 3-5a and 3-5b show the projected groundwater elevations in June 2030 (the end of the planning period) for model layer 1 for Scenarios 1 and 3, respectively. And, Figures 3-6a and 3-6b show the change in groundwater levels across the basin in June 2030 for model layer 1 for Scenarios 1 and 3, respectively. Figures 3-6a and 3-6b also show the appropriators' water service area boundaries.

The direction of groundwater flow in the Chino Basin in 2010 and 2030 is generally the same with groundwater flowing from the northeast and north to the southwest and south. Appendix A contains charts that illustrate the projected groundwater level time series for all the wells shown in Figures 3-6a and 3-6b along with their sustainability metrics. Appendix A also includes a table that lists these wells and their respective sustainability metrics. Table 3-2 characterizes the average, maximum, and minimum changes in groundwater elevations across the water service areas of appropriators that overlie the Chino Basin for Scenario 1 and 3 from 2010 through 2030.

The groundwater elevation projections shown in Appendix A indicate that production will be sustainable for most wells. At some wells, the groundwater elevation falls below the sustainability metric prescribed by the appropriators. For most of these cases, it was assumed that the pumps would be lowered to maintain production. The exception is the JCSD well field area. At some JCSD wells, the groundwater elevation falls below the sustainability metric provided by the JCSD, and the pumps cannot be lowered further because they are already at their lowest practical depths.

The maximum, minimum and average groundwater elevation changes, depicted in Table 3-2 for each municipal service area, were computed from all of the computed groundwater elevations at 200-foot by 200-foot model cells within each service area.

- Average change in groundwater level
  - For Scenario 1, the water service area average change groundwater level ranges from -11 feet for the Upland service area to -35 feet for the Ontario service area. Relative to the Peace II alternative, in 2030, the average change in groundwater elevation ranges from a low of +12 feet for the Upland service area to +34 feet for the Pomona service area.
  - For Scenario 3, the water service area average change groundwater level ranges from +3 feet for the Upland service area to -36 feet for the Ontario service area. Relative to the Peace II alternative, in 2030, the average change in groundwater elevation ranges from a low of +12 feet for the Upland service area to +34 feet for the Pomona service area.
  - The difference in the water service area average change groundwater level between Scenario 3 and Scenario 1 ranges from +4 feet for the Fontana Water Company service area to -14 feet for the City of Upland and Monte Vista Water District service areas.

- Maximum change in groundwater level
    - For Scenario 1, the maximum change in groundwater level at a model cell in a water service area[12] ranges from +4 feet for the City of Upland service area to -17 feet for the City of Pomona service area. Relative to the Peace II alternative, in 2030, the maximum change in groundwater elevation ranges from a low of +21 feet for the City of Upland service area to +44 feet for the Cities of Ontario and Pomona service areas.
    - For Scenario 3, the maximum change in groundwater level at a model cell in a water service area ranges from -6 feet for the Fontana Water Company service area to 39 feet for the City of Upland service area. Relative to the Peace II alternative, in 2030, the maximum change in groundwater elevation ranges from a low of +15 feet for the City of Upland service area to +49 feet for the City of Ontario service area.
    - The difference in the maximum change in groundwater level in a water service area average between Scenario 3 and Scenario 1 ranges from +2 feet for the City of Upland service area to +11 feet for the JCSD service area.
- Minimum change in groundwater level
    - For Scenario 1, the minimum change in groundwater level at a model cell in a water service area[13] ranges from -25 feet for the City of Upland service area to -54 feet for the City of Ontario service area. Relative to the Peace II alternative, in 2030, the minimum change in groundwater elevation ranges from a low of +7 feet for the Cucamonga Valley Water District service area to -24 feet for the City of Upland and Monte Vista Water District service areas.
    - For Scenario 3, the minimum change in groundwater level at a model cell in a water service area ranges from -25 feet for the City of Upland service area to -54 feet for the City of Ontario service area. Relative to the Peace II alternative, in 2030, the minimum change in groundwater elevation ranges from a low of -18 feet for the City of Upland service area to -61 feet for the JCSD service area.

---

[12] The maximum change is computed as the maximum change at a model cell and is not equal to the difference between the maximum elevations at a cell across scenarios unless the maximum occurs at the same model cell across the scenarios.

[13] The minimum change is computed as the minimum change at a model cell and is not equal to the difference between the minimum elevations at a cell across scenarios unless the minimum occurs at the same model cell across the scenarios.

- o The difference in the minimum change in groundwater level in a water service area average between Scenario 3 and Scenario 1 ranges from +2 feet for the Fontana Water Company service area to -36 feet for the City of Upland service area.

Figure 2-4 shows the locations of flow-line based cross-section profiles through each of the management zones, through a part of the Chino II Desalter well field, and through part of the JCSD well field. These flow-line based cross-sections are shown in Figures 3-7a through 3-7e for MZ1 through MZ5, respectively. These figures are identical to Figures 2-5a through 2-5e except that 3-7a through 3-7e contain the model-estimated groundwater levels for Scenarios 1 and 3. The intent of these cross-sections is to show the saturated thickness through these cross-sections for 2010, 2020 and 2030, and wells located on or near these cross-sections. The horizontal red bars shown at most wells are the sustainability metrics provided by the well owners. Groundwater production at wells is presumed to be sustainable if the groundwater level at the well is greater than the sustainability metric. If the groundwater level falls below the sustainability metric, the owner will either lower their pumping equipment in their well or will have to reduce production. Careful review of Appendix A and these cross-sections indicates that groundwater levels for some Fontana Water Company (FWC) wells and a CVWD well come close falling below their respective sustainability metrics (see Figures 3-7b and 3-7c). The pumping equipment in these wells will likely have to be lowered at some time in the future. Wells where pumping equipment may have to be lowered include the following:

- City of Chino – Well No. 5
- CVWD – Well No. CB-5
- FWC – Well Nos. F2A, F44A, F44B, F44C,
- City of Ontario – Well Nos. No. 24, 27, 31, 37, 38, 39, 44, 50
- CDA – Well Nos. CDA I-9, I-10, I-14, I-15, II-1

The groundwater levels at several JCSD wells are projected to be close to or fall below their respective sustainability metrics. Because the saturated thickness is thin in the JCSD well field and many of their pumps are already near the well bottoms, it would be difficult, and in some cases impossible, to lower the pumping equipment to assure sustainable production. This includes most of the wells used by the JCSD for potable water supply:

- JCSD – Well Nos. 6, 8, 11, 12, 13, 14, 15, 16, 17, 18, 20, 22, 25

3.3 Recharge and/or Forbearance Required to Achieve Sustainable Production

The sustainability challenge for the JCSD wells was hydrologically evaluated by conducting a sensitivity analysis to determine how sensitive groundwater levels at the JCSD wells were to new recharge at facilities near the JCSD wells and to reductions in production by the JCSD. The following scenarios were evaluated:

- Scenario 1A – Same as Scenario 1 except that the planned JCSD production was reduced by 20 percent starting in 2017 with the reductions spread among the JCSD wells on a pro rata basis.
- Scenario 1B – Same as Scenario 1 except that recharge totaling 20 percent of the JCSD annual production is assumed to occur at the Wineville Basin starting in 2017.
- Scenario 1C – Same as Scenario 1 except that the planned JCSD production was reduced by 50 percent starting in 2017 with the reductions spread among the JCSD wells on a pro rata basis.
- Scenario 1D – Same as Scenario 1 except that recharge totaling 50 percent of the JCSD annual production is assumed to occur at the Wineville Basin starting in 2017.
- Scenario 3A – Same as Scenario 3 except that the planned JCSD production was reduced by 20 percent starting in 2017 with the reductions spread among the JCSD wells on a pro rata basis.
- Scenario 3B – Same as Scenario 3 except that recharge totaling 20 percent of the JCSD annual production is assumed to occur at the Wineville Basin starting in 2017.
- Scenario 3C – Same as Scenario 3 except that the planned JCSD production was reduced by 50 percent starting in 2017 with the reductions spread among the JCSD wells on a pro rata basis.
- Scenario 3D – Same as Scenario 3 except that recharge totaling 50 percent of the JCSD annual production is assumed to occur at the Wineville Basin starting in 2017.

Table 3-3 lists the assumed JCSD production and recharge for each scenario. The intent of these scenarios is determine whether a reduction in JCSD production, an increase in near-field recharge, or both activities will ensure sustainable production in the JCSD well field. For scenarios with reduced groundwater production, the reduced production would be offset through either imported water served to the JCSD or by groundwater produced elsewhere in the Basin and conveyed to the JCSD. New recharge for Scenarios 1B, 1D, 3B, and 3D was assumed to occur at the Wineville Basin. The storm and supplemental water recharge capacity of the Wineville Basin is unknown. Recharge could be also be done by injection at JCSD wells.

These scenarios were simulated with the 2007 Watermaster model, and the results are summarized as time history charts in Appendix B and in tabular form in Table A-1 in Appendix A. Review of these charts indicates the following:

- Most of the JCSD wells that failed the sustainability test in Scenarios 1 and 3 failed the test for some or most the scenarios investigated above; although, the failures that did occur occurred later for some of the wells, and some failures were marginal.

- Production from three of the twelve wells that failed the sustainability tests for Scenario 1 and production from two of the thirteen wells that failed the sustainability tests for Scenario 3 was projected to be sustainable with a reduction in JCSD production of twenty percent.

- Production from two of the twelve wells that failed the sustainability tests for Scenario 1 and production from one of the thirteen wells that failed the sustainability tests for Scenario 3 was projected to be sustainable with an increase in recharge at the Wineville Basin equal to twenty percent of the JCSD's annual production.

- Production from four of the twelve wells that failed the sustainability tests for Scenario 1 and production from four of the thirteen wells that failed the sustainability tests for Scenario 3 was projected to be sustainable with a reduction in production of fifty percent.

- Production from four of the twelve wells that failed the sustainability tests for Scenario 1 and production from four of the thirteen wells that failed the sustainability tests for Scenario 3 was projected to be sustainable with an increase in recharge at the Wineville Basin equal to fifty percent of JCSD's annual production.

- Several wells that failed the sustainability test had projected groundwater levels from either decreased production or increased recharge that were close to passing the sustainability test.

- A twenty-percent and fifty-percent reduction in JCSD production are more hydraulically efficient at ensuring sustainability than increasing recharge at the Wineville Basin and not reducing production. In fact after 2017, the year that reductions in JCSD production was assumed to occur, production at almost all the wells that failed the sustainability test was projected to be sustainable or to marginally fail the test.

- The spatial and temporal production plans assumed in the sensitivity analysis were provided by the appropriator parties. These plans were not adjusted or optimized during the sensitivity analysis to improve sustainability and thus the sustainability challenges projected herein may be overstated.

This sensitivity analysis suggests that reducing production or relocating production away from the JCSD well field is more hydraulically efficient than recharge. There are unknowns that will need to be resolved before imported water can be recharged at the Wineville Basin or other stormwater management facilities in the area. The sensitivity analysis also suggests that aquifer storage and recovery with injection totals up to fifty percent of JCSD production could ensure sustainability. Watermaster and the IEUA are developing a proof-of-concept project to test the feasibility of large-scale recharge in the Wineville Basin. The Steering Committee investigated the means and methods to either relocate JCSD production or provide JSCD another supply that would enable JCSD to reduce its production from its existing well field. These concepts are articulated in Section 6 herein and evaluated in Section 8.

Table 3-1
IEUA Projected Recycled Water Recharge
(acre-ft/yr)

Basin	FY11/12	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18	FY18/19	FY19/20	FY20/21	FY21/22
7th Street	595	595	595	595	595	595	595	595	595	595	595
8th Street	595	595	595	595	595	595	595	595	595	595	595
Banana	816	816	816	816	816	816	816	816	816	816	816
Brooks	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314
Declez (2 & 3)	-	-	-	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057
Ely	964	964	964	964	964	964	964	964	964	964	964
Hickory	949	949	949	949	949	949	949	949	949	949	949
Lower Day	-	-	-		-	-	2,377	2,377	2,377	2,377	2,377
Etiwanda Debris Basin	-	-	-		-	-	-	-	-	-	1,840
RP-3	1,224	1,224	1,224	5,320	5,320	5,320	5,320	5,320	5,320	5,320	5,320
San Sevaine (1-3)	-	-	-	-	-	-	-	-	-	-	-
San Sevaine 5	540	540	540	540	540	540	540	540	540	540	540
Turner (1-4)	400	400	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540
Victoria	800	800	800	800	800	800	800	800	800	800	800
Total	8,197	8,197	9,337	14,490	14,490	14,490	16,867	16,867	16,867	16,867	18,706

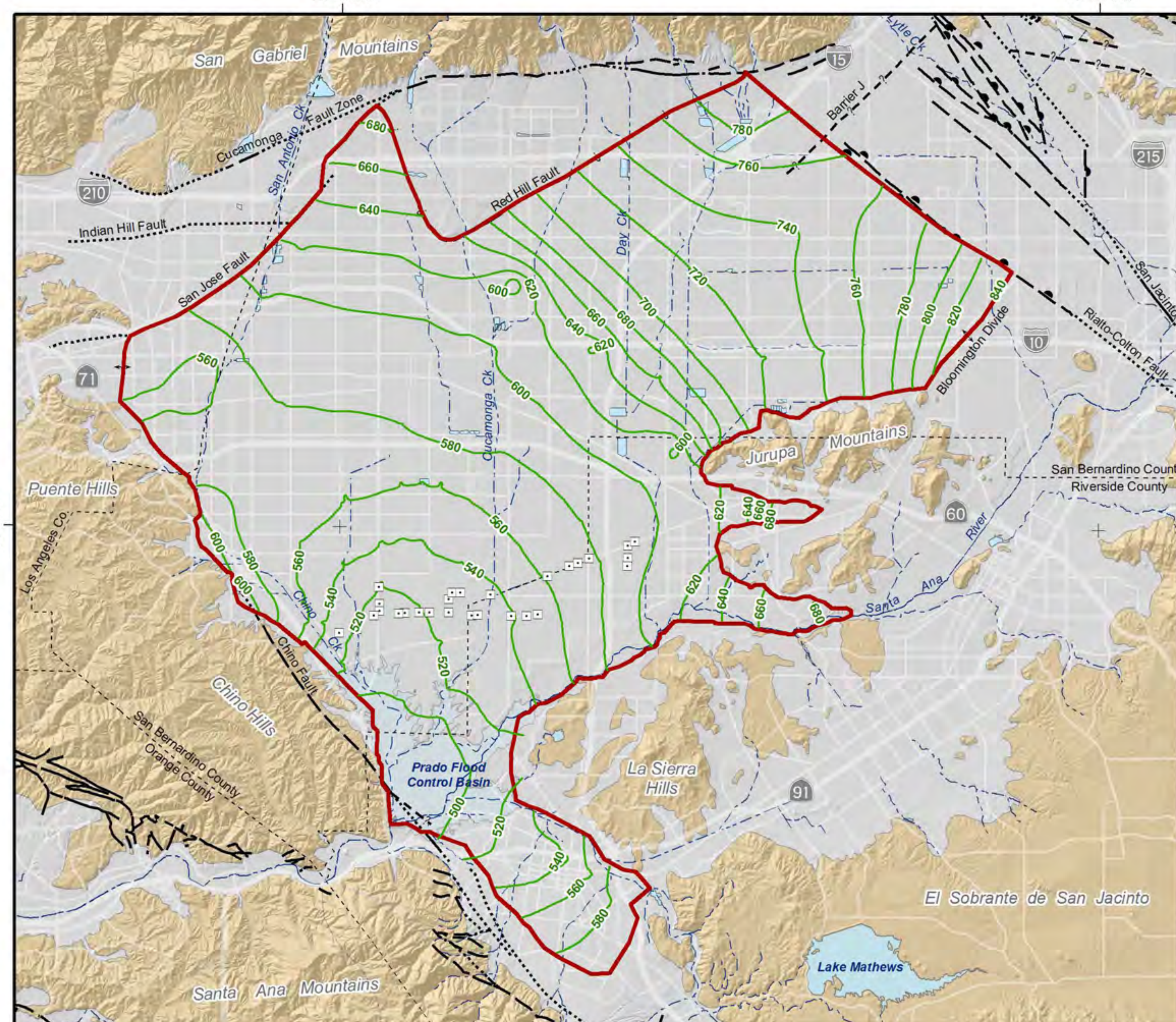
Table 3-2
Summary of Groundwater Level Changes by Water Service Area, 2010 through 2030
(feet)

Agency Service Area	Initial Groundwater Elevation 2010			Projected Scenario 1 Groundwater Elevation 2030			Projected Change in Groundwater Elevation Scenario 1 2030-2010			Projected Scenario 3 Groundwater Elevation 2030			Projected Change in Groundwater Elevation Scenario 3 2030-2010			Projected Difference in Groundwater Elevation Between Scenario 1 and Scenario 3 2030		
Layer 1	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
Cucamonga Valley Water District	612	775	695	577	771	671	-38	-2	-24	578	769	667	-44	-5	-27	-7	6	3
Fontana Water Company	625	800	738	587	772	710	-47	-3	-29	579	770	706	-53	-6	-33	2	8	4
City of Upland	591	681	630	582	674	619	-25	4	-11	597	681	633	-18	39	3	-36	-7	-14
City of Pomona	561	591	575	524	569	542	-41	-17	-33	531	595	551	-35	9	-24	-26	-1	-9
Monte Vista Water District	572	603	585	535	595	560	-37	0	-25	541	627	574	-34	34	-11	-34	1	-14
City of Ontario	530	685	586	504	654	551	-54	-10	-35	500	649	550	-59	10	-36	-20	8	1
City of Chino	489	613	551	477	590	525	-50	0	-26	474	587	523	-53	0	-28	-6	4	1
Jurupa Community Services District	500	693	575	499	693	554	-52	0	-21	499	693	551	-61	0	-24	0	11	3

Agency Service Area	Projected Peace II Baseline Alternative Groundwater Elevation 2030			Projected Difference in Groundwater Elevation Between Peace II Baseline Alternative and Scenario 1 2030			Projected Difference in Groundwater Elevation Between Peace II Baseline Alternative and Scenario 3 2030			Projected Peace II Alternative Groundwater Elevation 2030			Projected Difference in Groundwater Elevation Between Peace II Alternative and Scenario 1 2030			Projected Difference in Groundwater Elevation Between Peace II Alternative and Scenario 3 2030		
Layer 1	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
Cucamonga Valley Water District	601	793	690	7	32	19	10	35	22	575	781	670	-18	21	0	-15	23	3
Fontana Water Company	606	794	735	16	43	26	20	48	30	588	785	723	1	33	13	6	38	17
City of Upland	567	688	632	-24	21	12	-59	15	-1	539	671	609	-51	-2	-11	-85	-9	-24
City of Pomona	557	592	577	-3	44	34	-29	38	25	529	570	552	-29	19	10	-55	15	1
Monte Vista Water District	560	587	575	-24	37	15	-58	32	1	532	567	550	-51	13	-10	-85	10	-23
City of Ontario	518	678	576	-1	44	25	-20	49	26	507	662	556	-28	25	6	-46	30	7
City of Chino	486	601	540	-6	32	15	-6	35	16	478	589	527	-8	13	2	-7	16	4
Jurupa Community Services District	498	695	567	-3	36	14	-3	38	17	498	694	560	-4	31	6	-3	33	9

Table 3-3
Pumping and New Recharge for Sensitivity Analysis
(acre-ft)

Scenario	Year	JCSD Annual Pumping	New Recharge Near JCSD Well Field
1	2015	16,900	
	2020	18,800	
	2025	18,800	
	2030	18,800	
1A	2015	13,520	
	2020	15,040	
	2025	15,040	
	2030	15,040	
1B	2015	16,900	3,380
	2020	18,800	3,760
	2025	18,800	3,760
	2030	18,800	3,760
1C	2015	8,450	
	2020	9,400	
	2025	9,400	
	2030	9,400	
1D	2015	16,900	8,450
	2020	18,800	9,400
	2025	18,800	9,400
	2030	18,800	9,400
3	2015	18,590	
	2020	20,680	
	2025	20,680	
	2030	20,680	
3A	2015	14,872	
	2020	16,544	
	2025	16,544	
	2030	16,544	
3B	2015	18,590	3,718
	2020	20,680	4,136
	2025	20,680	4,136
	2030	20,680	4,136
3C	2015	9,295	
	2020	10,340	
	2025	10,340	
	2030	10,340	
3D	2015	18,590	9,295
	2020	20,680	10,340
	2025	20,680	10,340
	2030	20,680	10,340



Groundwater Elevation Contours (feet above mean sea-level)

Other Features

Chino Desalter Well
Groundwater Flow Model Boundary
Groundwater Divides
Flood Control/Conservation Basins
Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

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0 1 2 3 4 Miles

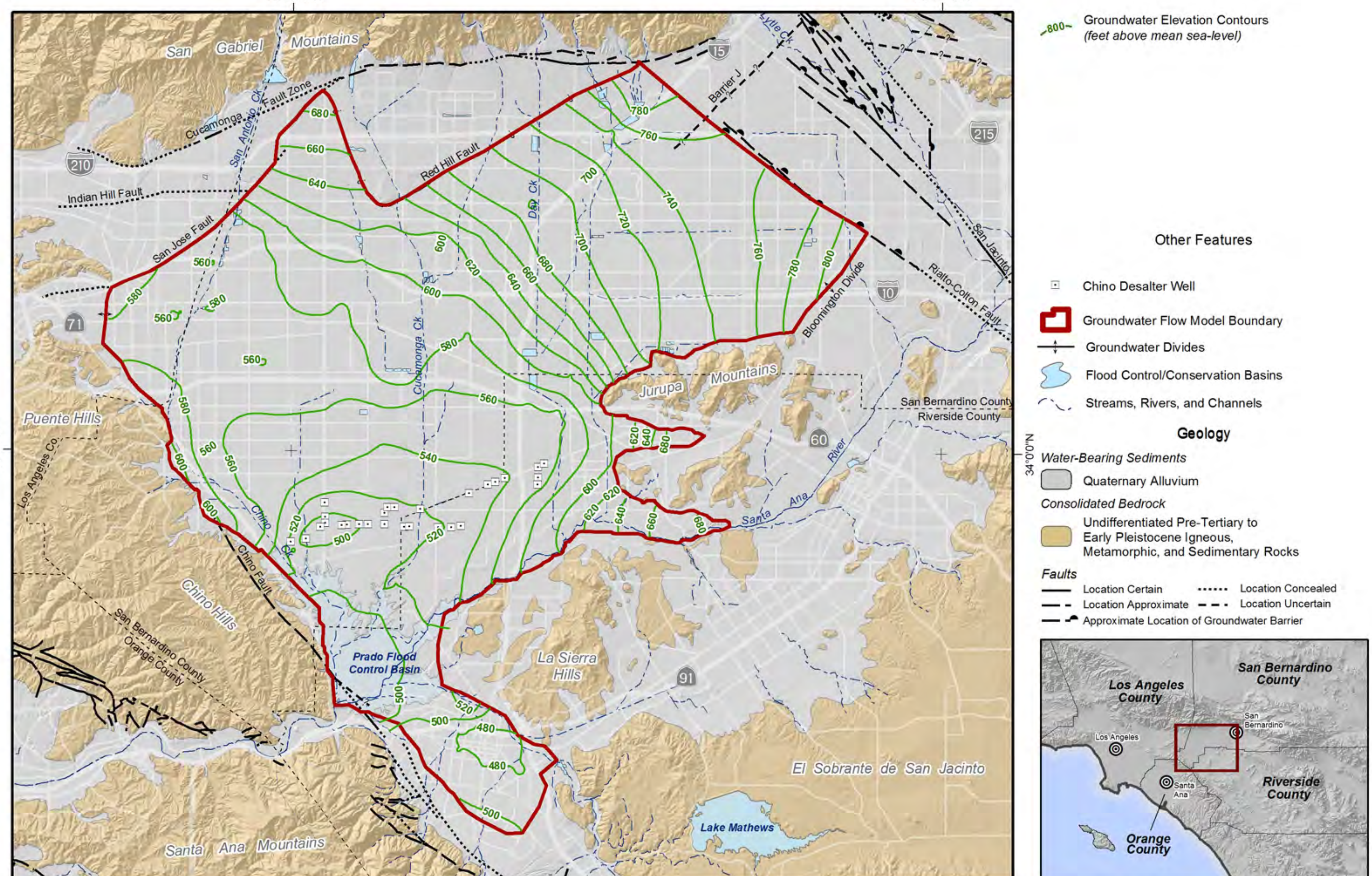
0 2 4 6 Kilometers

2013 Recharge Master Plan Update

Groundwater Elevation for Layer 1

July 2005

Figure 3-1



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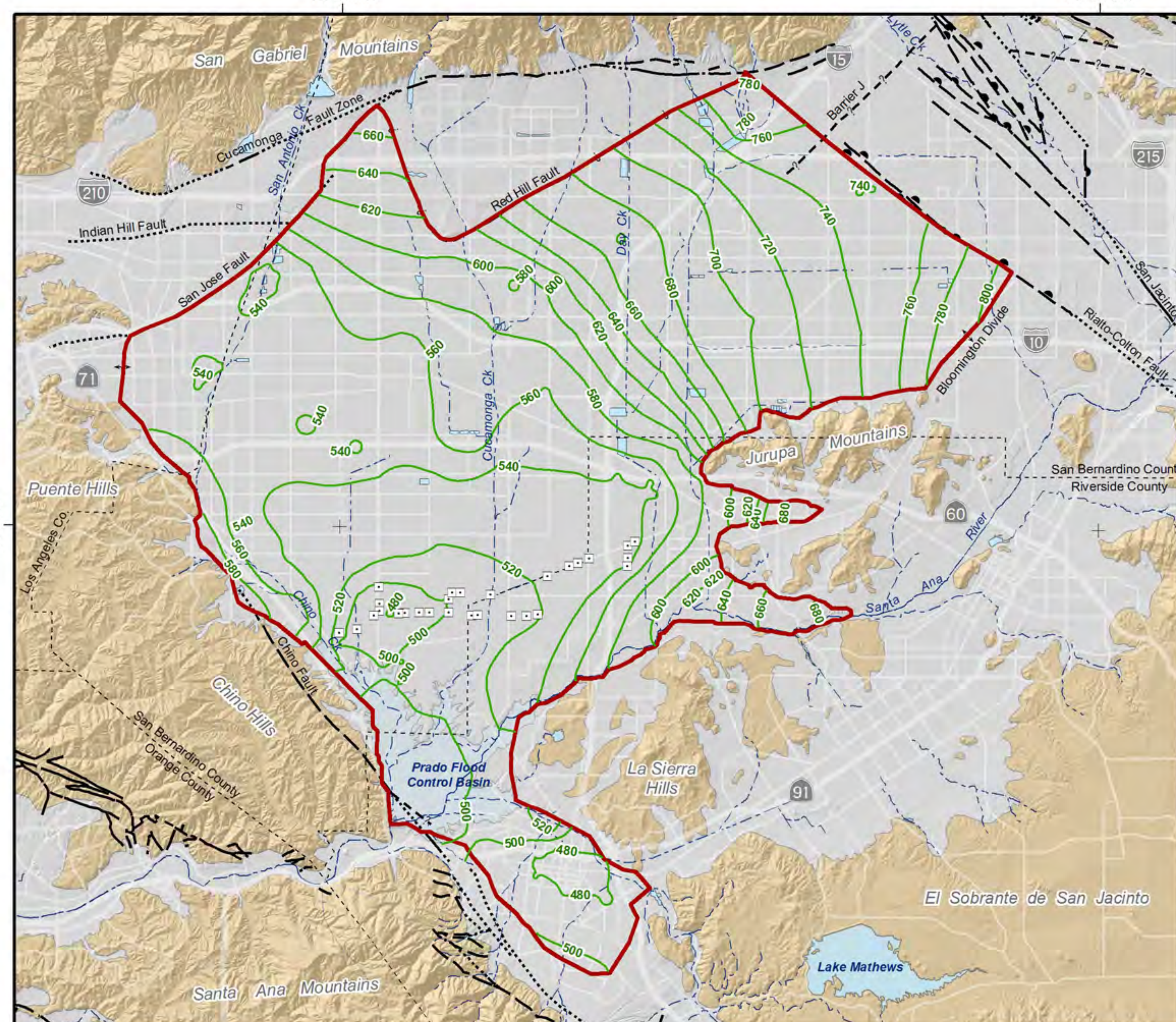
2013 Recharge Master Plan Update

Projected Peace II Baseline Alternative Groundwater Elevations for Layer 1
July 2030

Figure 3-2a



~800~ Groundwater Elevation Contours (feet above mean sea-level)

Other Features

- Chino Desalter Well
- Groundwater Flow Model Boundary
- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

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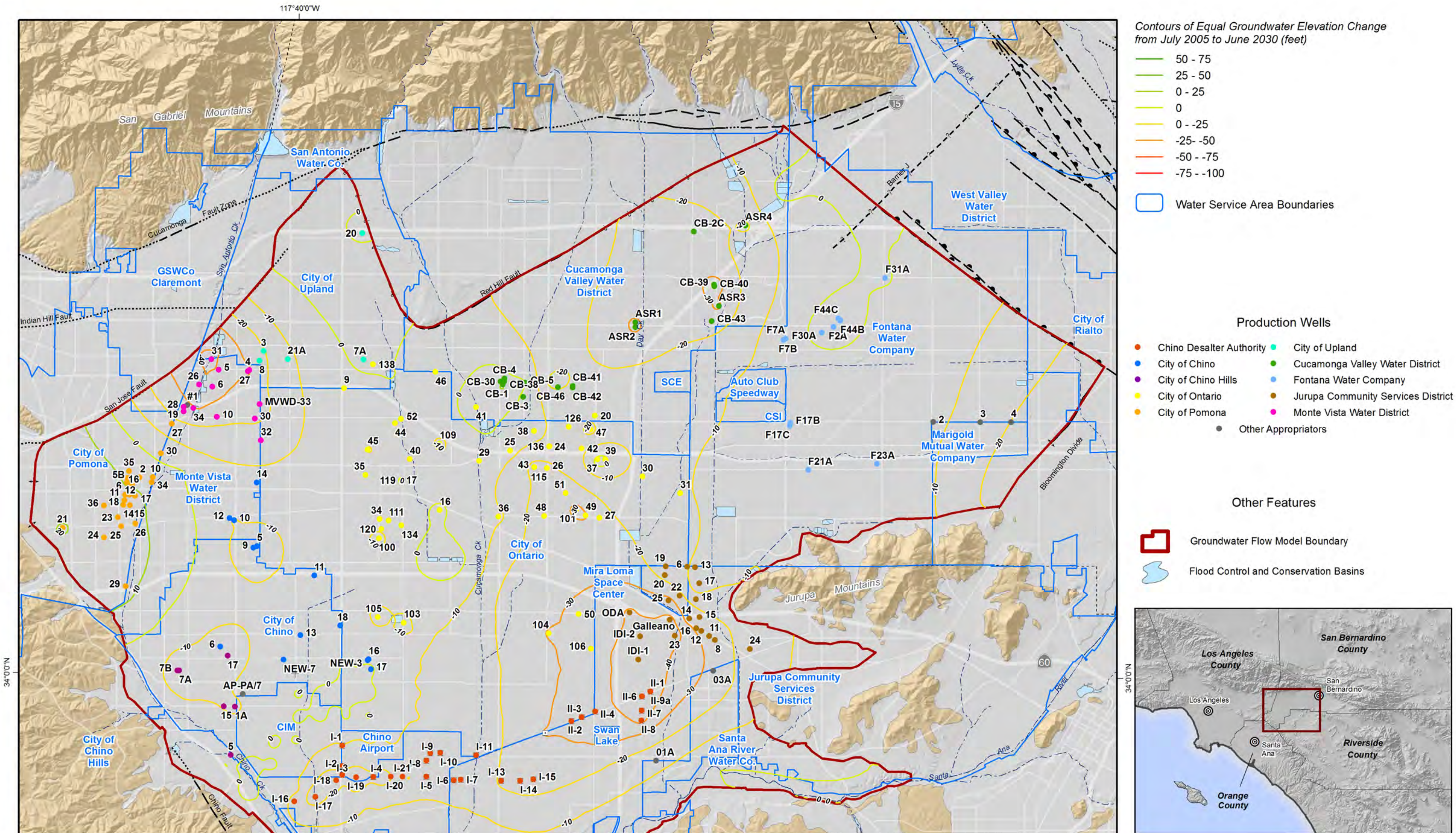
0 1 2 3 4 Miles
0 2 4 6 Kilometers

2013 Recharge Master Plan Update

Projected Peace II Alternative Groundwater Elevations for Layer 1
July 2030

Figure 3-2b



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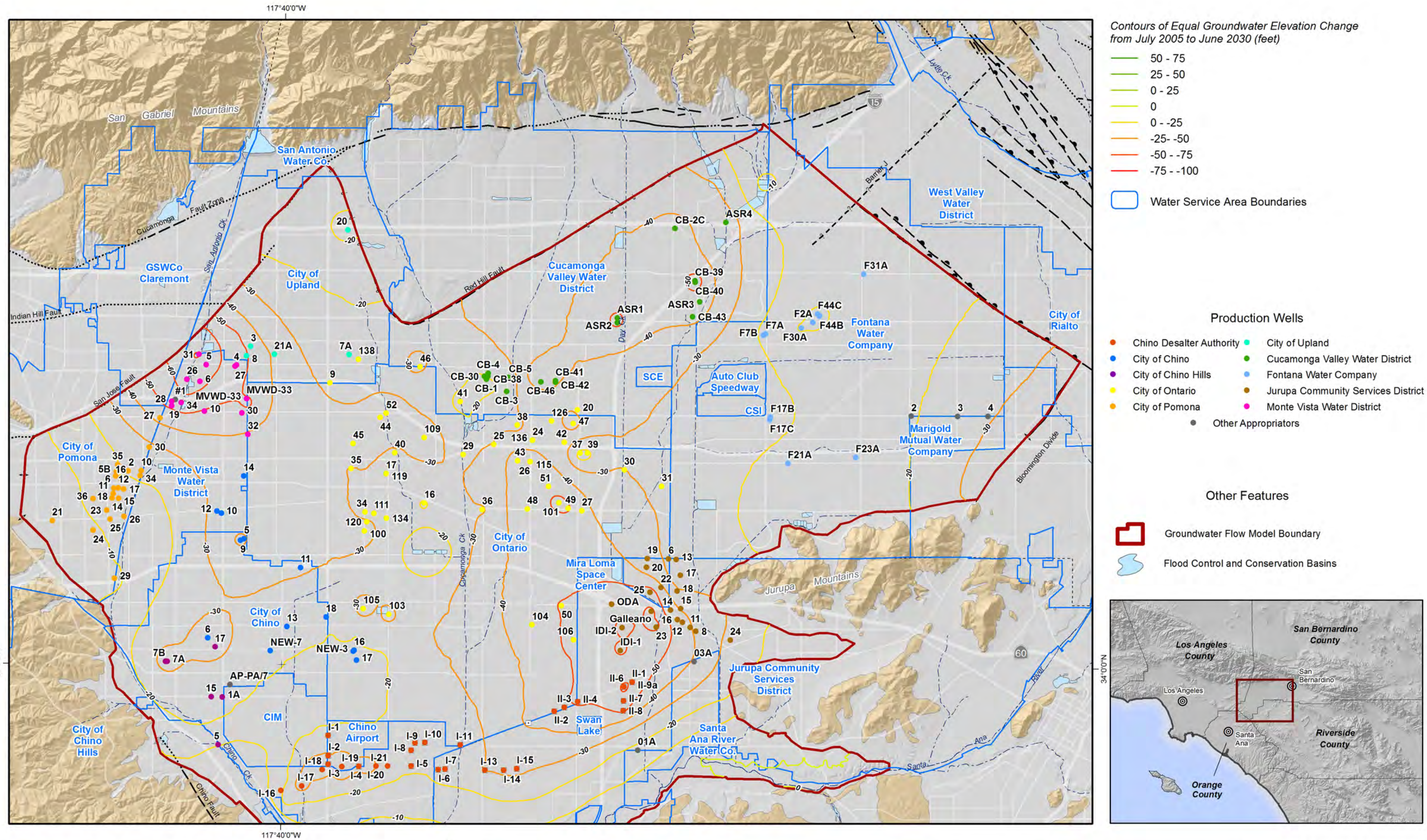
2013 Recharge Masterplan Update

Projected Peace II Baseline Alternative
Groundwater Elevation Change
for Layer 1 July 2005 to June 2030

Figure 3-3a



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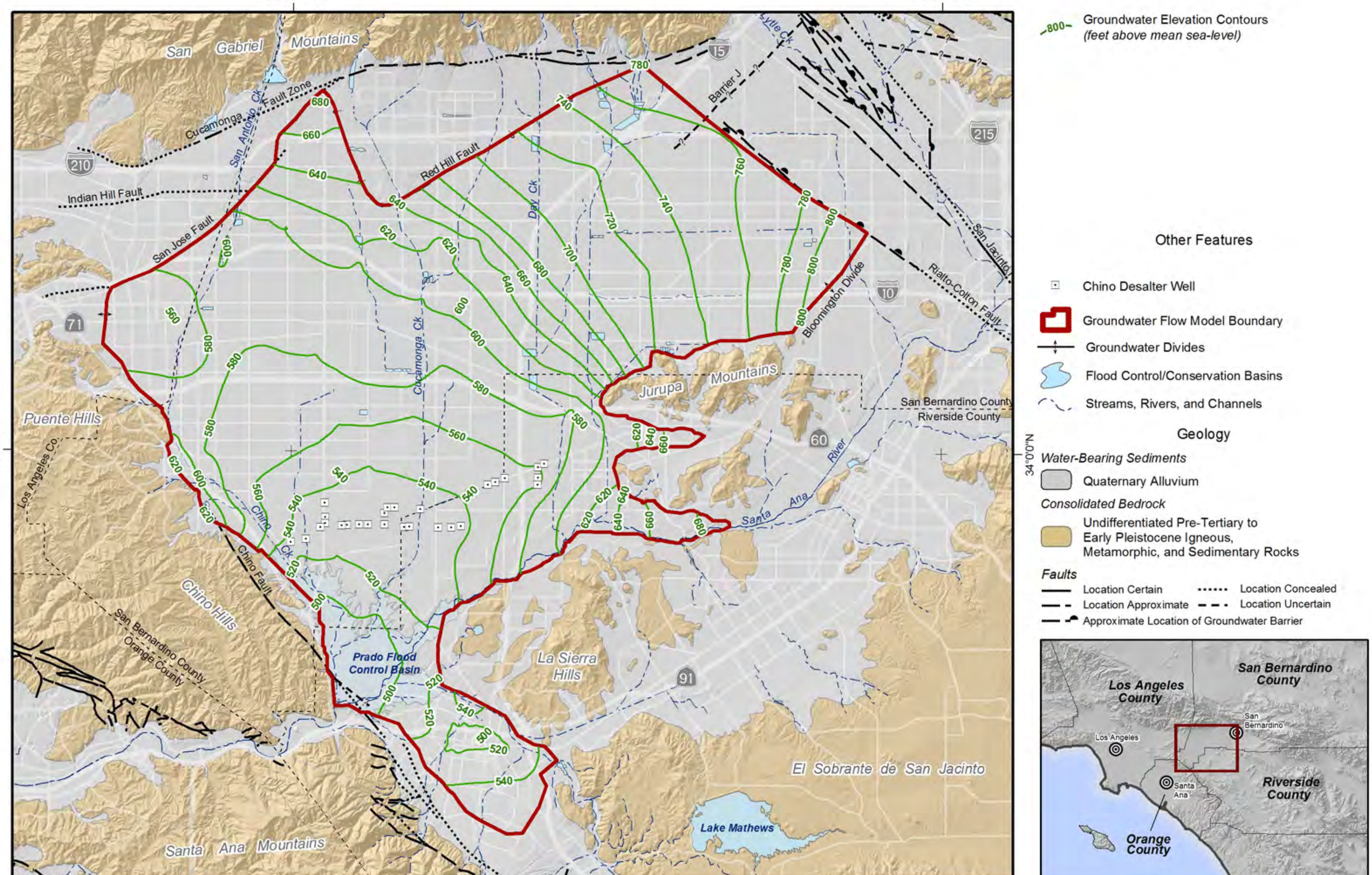
0 1 2 Miles

0 2 4 Kilometers

2013 Recharge Masterplan Update

Projected Peace II Alternative Groundwater Elevation Change
for Layer 1 July 2005 to June 2030

Figure 3-3b



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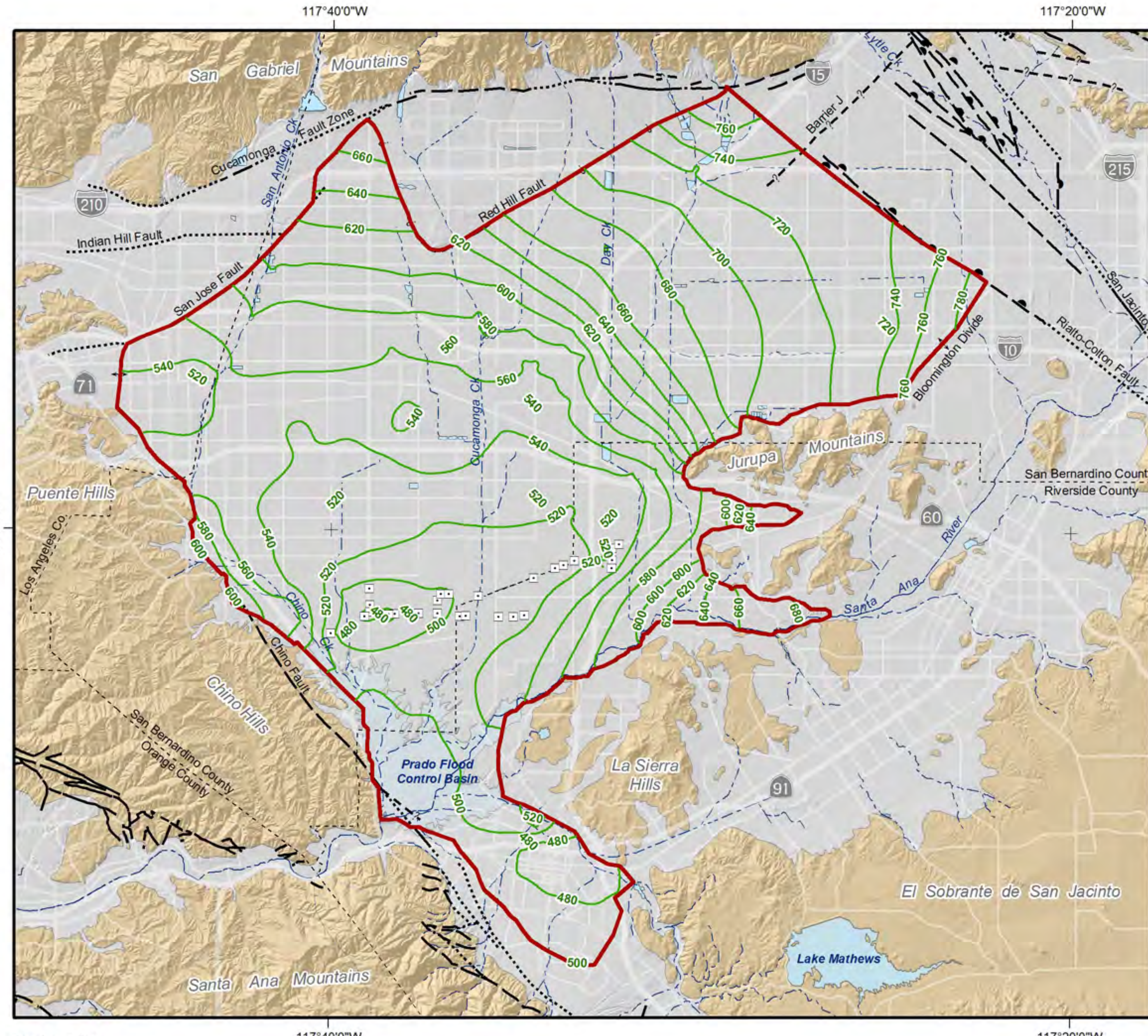
0 1 2 3 4 Miles
0 2 4 6 Kilometers

2013 Recharge Master Plan Update

Groundwater Elevation for Layer 1
Initial Condition -- April 2010

Figure 3-4



-800- Groundwater Elevation Contours (feet above mean sea-level)

Other Features

- Chino Desalter Well
- Groundwater Flow Model Boundary
- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

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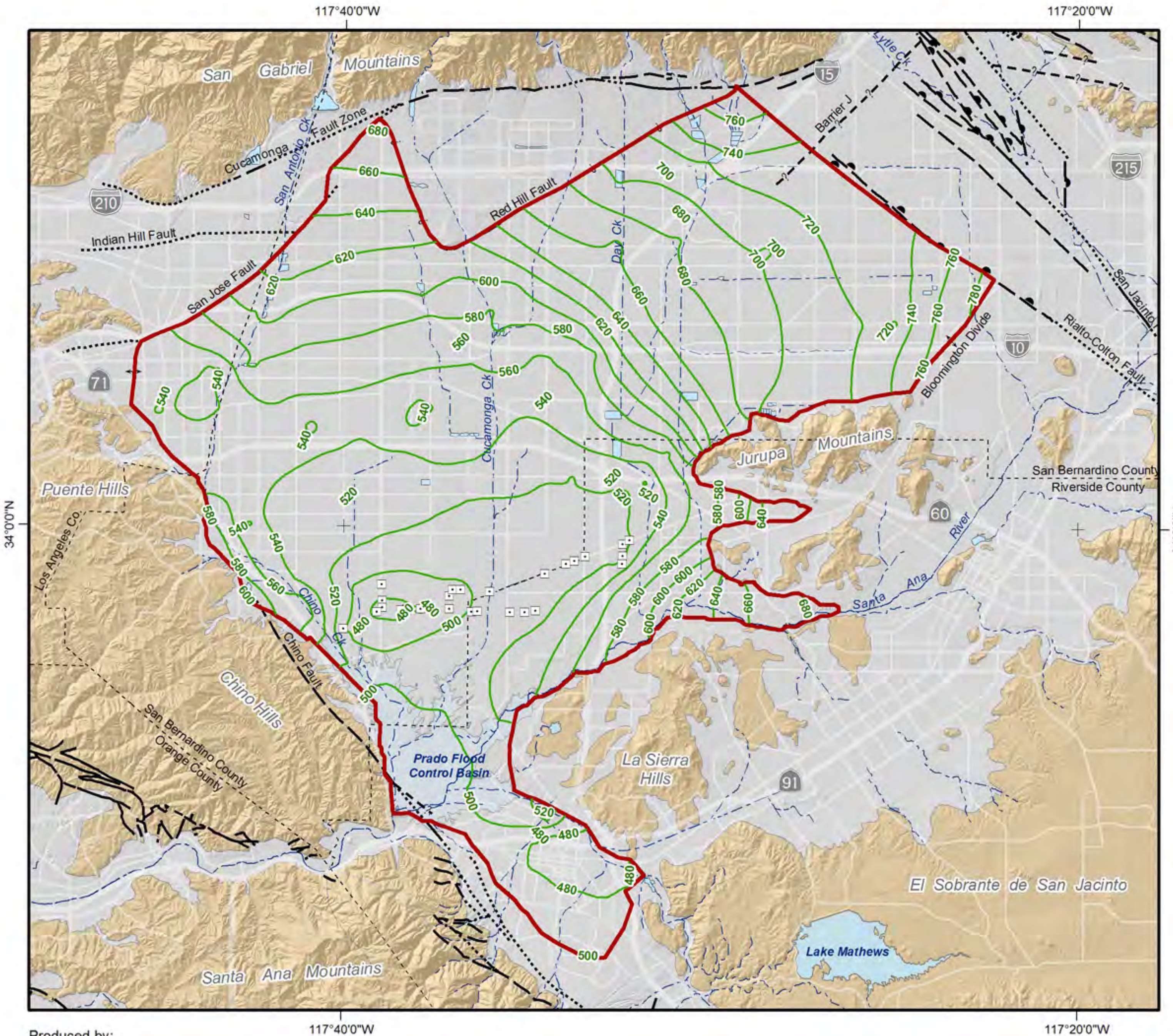
0 1 2 3 4 Miles
0 2 4 6 Kilometers

2013 Recharge Master Plan Update

Projected Scenario 1
Groundwater Elevations for Layer 1
April 2030

Figure 3-5a



Groundwater Elevation Contours (feet above mean sea-level)

Other Features

- Chino Desalter Well
- Groundwater Flow Model Boundary
- Groundwater Divides
- Flood Control/Conservation Basins
- Streams, Rivers, and Channels

Geology

Water-Bearing Sediments

- Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

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Date: 3/27/2012
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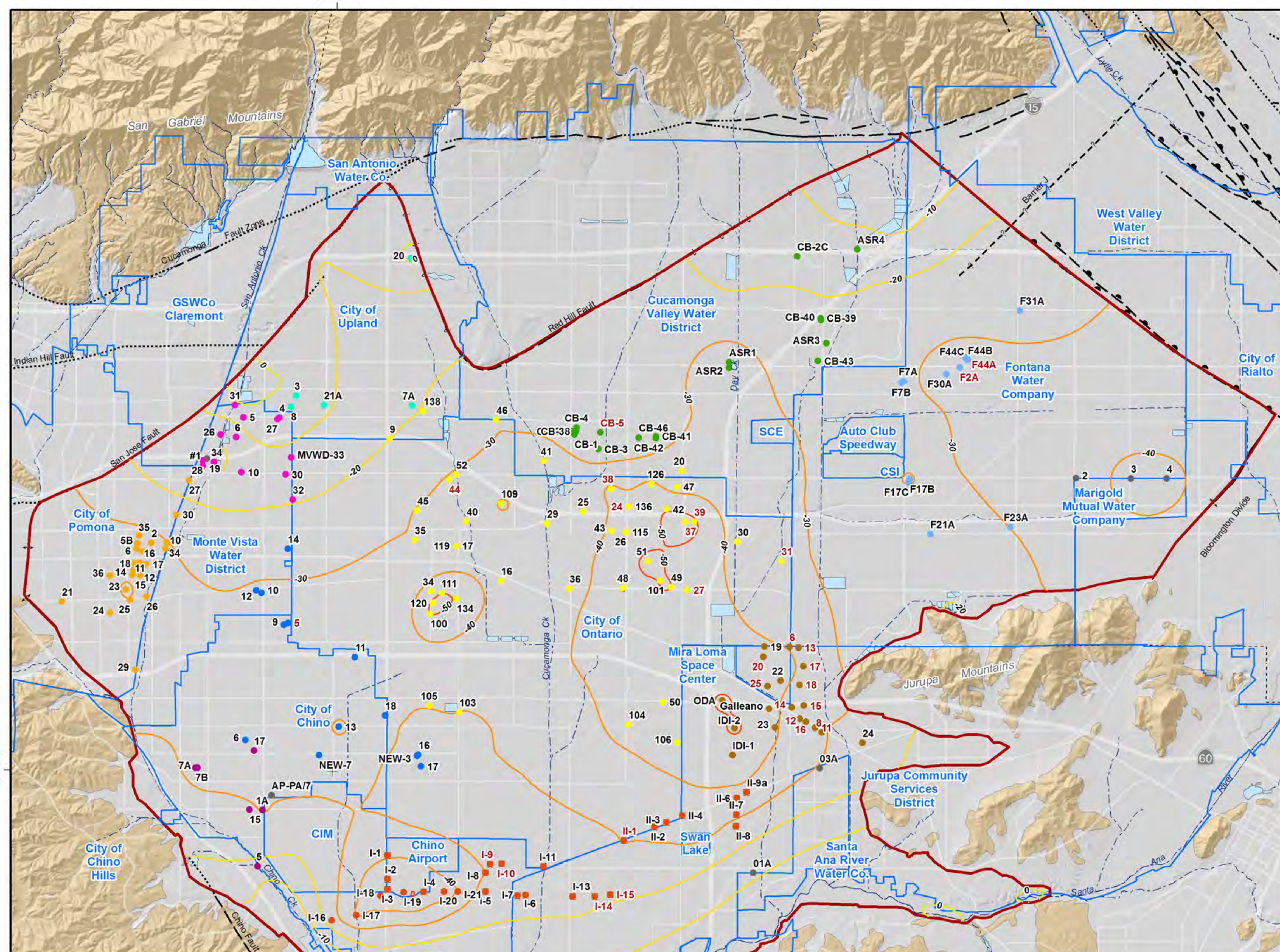
0 1 2 3 4 Miles
0 2 4 6 Kilometers

2013 Recharge Master Plan Update

Projected Scenario 3
Groundwater Elevations for Layer 1
April 2030

Figure 3-5b



Contours of Equal Groundwater Elevation Change from April 2010 to April 2030 (feet)

- 50 - 75
- 25 - 50
- 0 - 25
- 0
- 0 - -25
- -25- -50
- -50 - -75
- -75 - -100

Water Service Area Boundaries

F44C — Well with hydrograph plotted in Appendix A. If label is **black** then the groundwater levels are projected to stay above the drawdown constraint. If label is **red** then the groundwater levels are projected to fall below the drawdown constraint.

Production Wells

- Chino Desalter Authority
- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Other Features

- Groundwater Flow Model Boundary
- Flood Control and Conservation Basins

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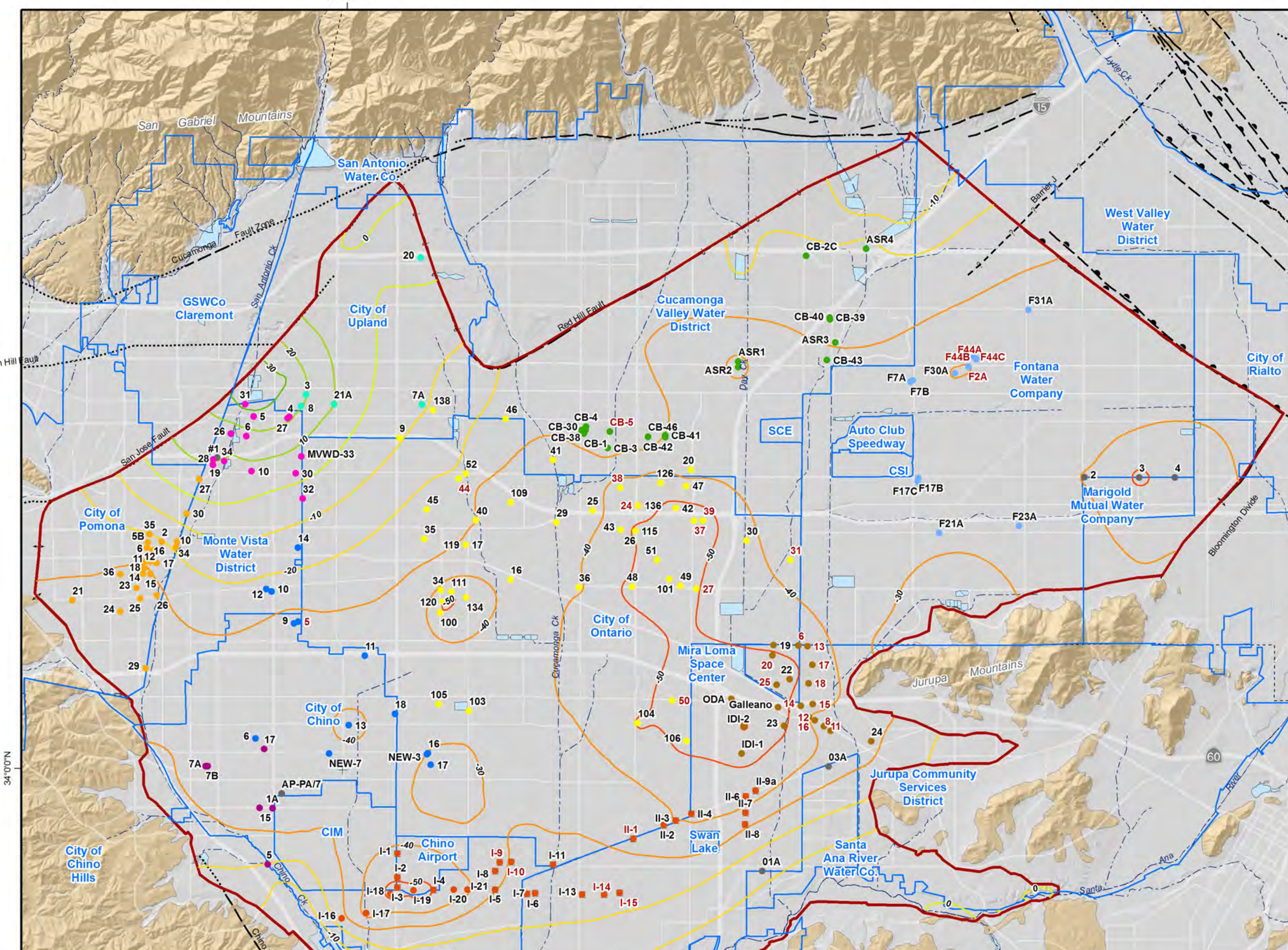
0 1 2 Miles
0 2 4 Kilometers

2013 Recharge Masterplan Update

Projected Scenario 1
Groundwater Elevation Change
for Layer 1 April 2010 to April 2030

Figure 3-6a



Contours of Equal Groundwater Elevation Change from April 2010 to April 2030 (feet)

- 50 - 75
- 25 - 50
- 0 - 25
- 0
- 0 - -25
- -25- -50
- -50 - -75
- -75 - -100

Water Service Area Boundaries

F44C — Well with hydrograph plotted in Appendix A. If label is **black** then the groundwater levels are projected to stay above the drawdown constraint. If label is **red** then the groundwater levels are projected to fall below the drawdown constraint.

Production Wells

- Chino Desalter Authority
- City of Chino
- City of Chino Hills
- City of Ontario
- City of Pomona
- City of Upland
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Monte Vista Water District
- Other Appropriators

Other Features

- Groundwater Flow Model Boundary
- Flood Control and Conservation Basins

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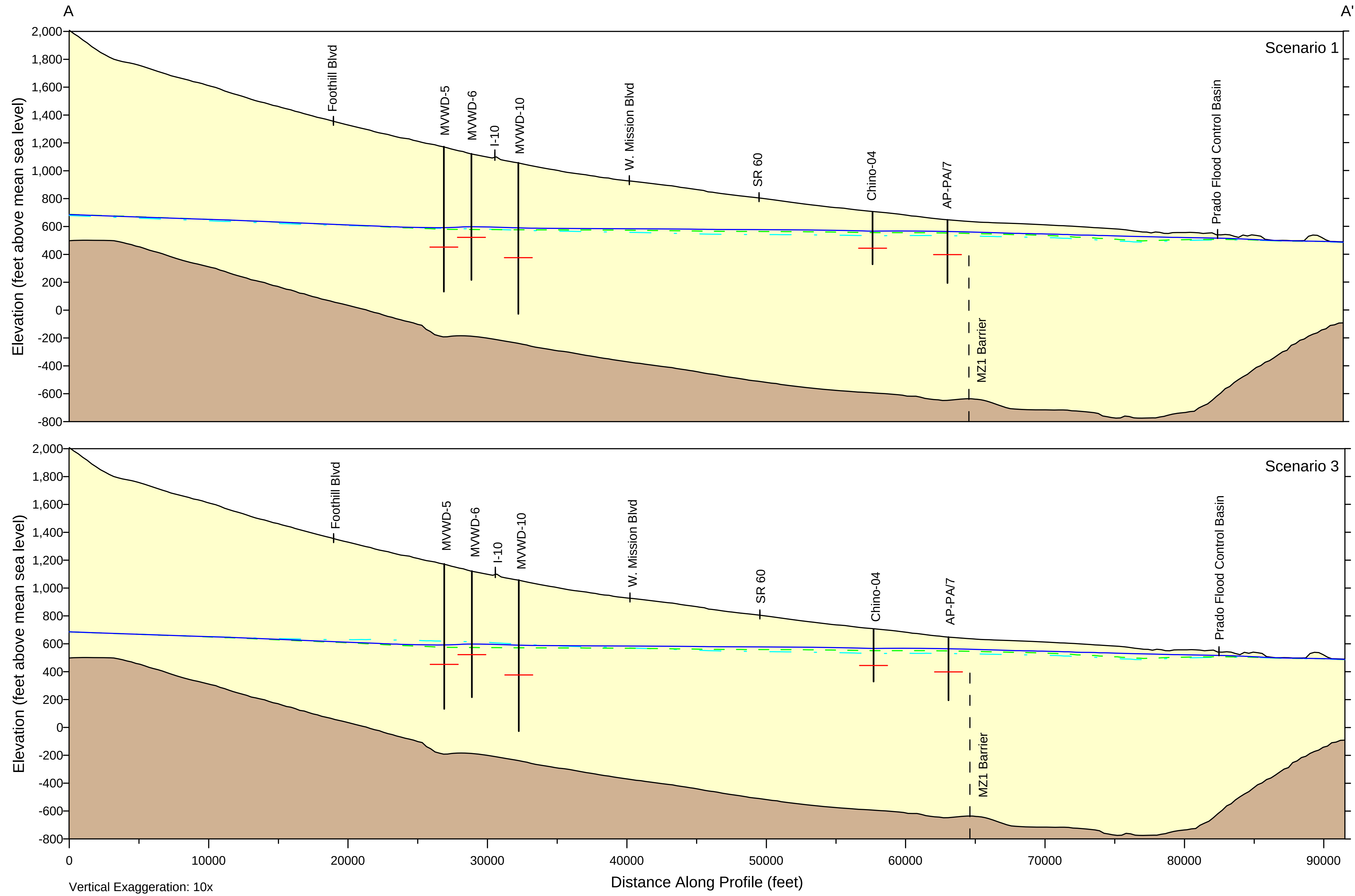
0 1 2 Miles
0 2 4 Kilometers

2013 Recharge Masterplan Update

Projected Scenario 3
Groundwater Elevation Change
for Layer 1 April 2010 to April 2030

Figure 3-6b



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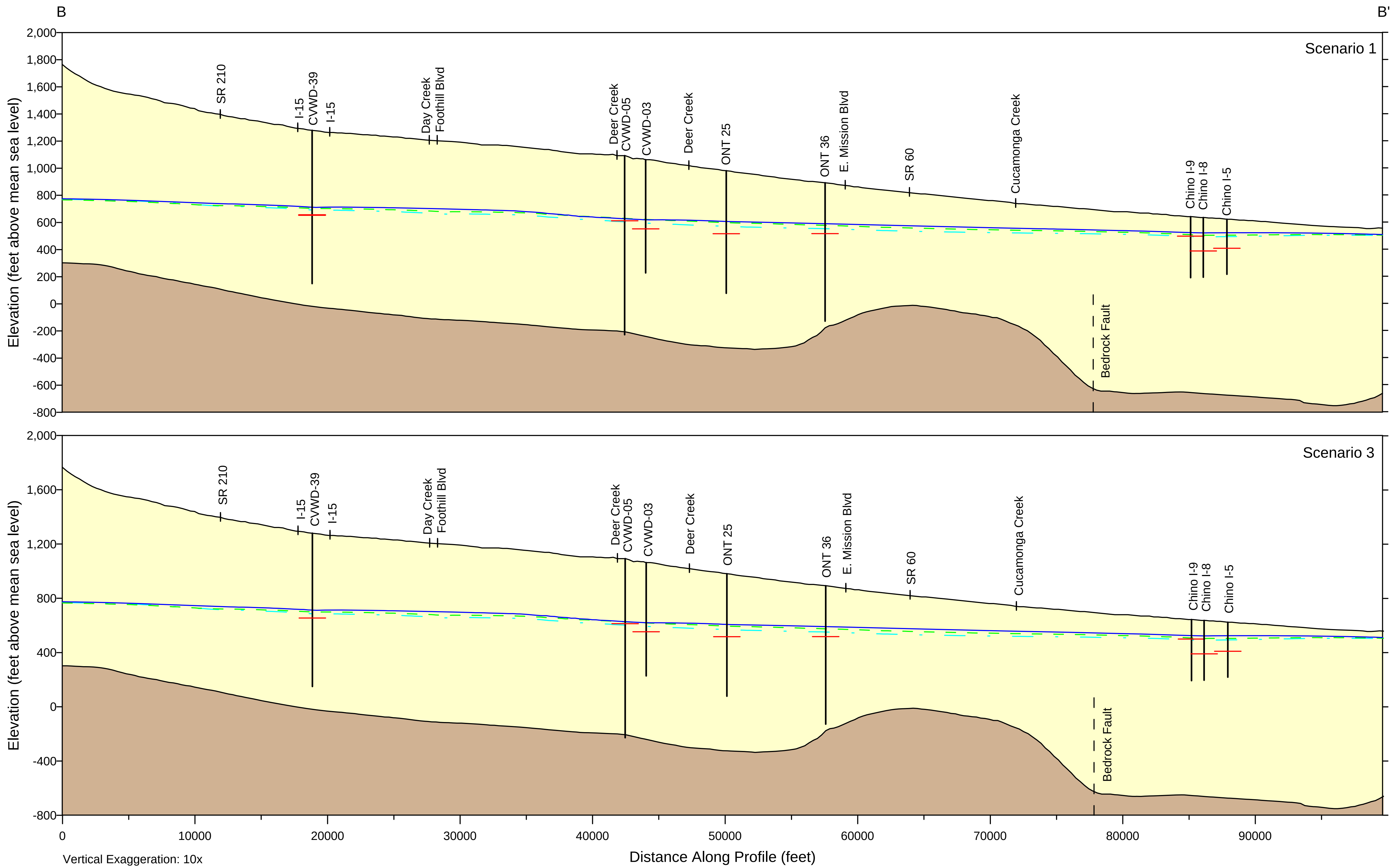
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (April 2010)
- Water Level (April 2020)
- Water Level (April 2030)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
MZ1

Figure 3-7a



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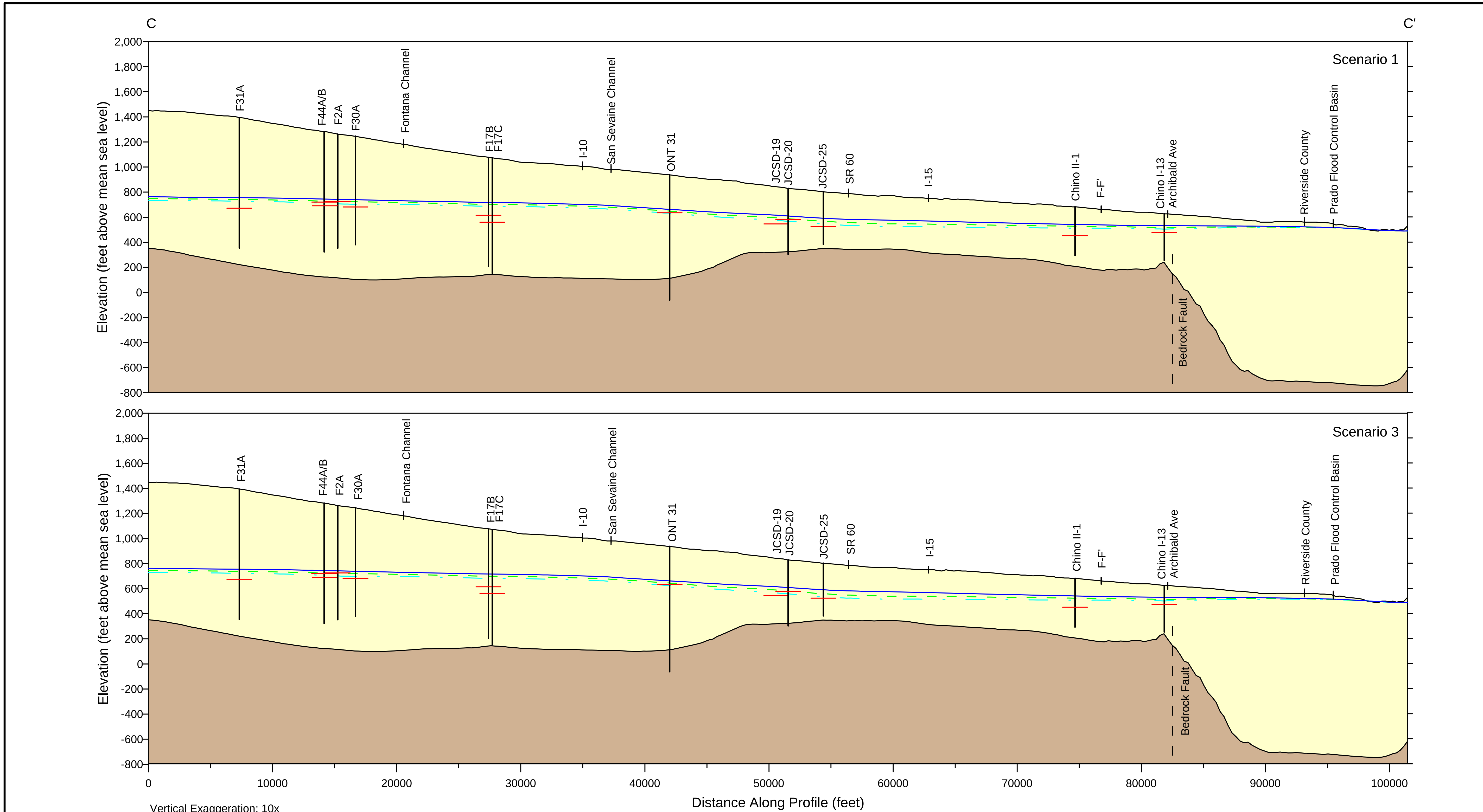
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (April 2010)
- Water Level (April 2020)
- Water Level (April 2030)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
MZ2

Figure 3-7b



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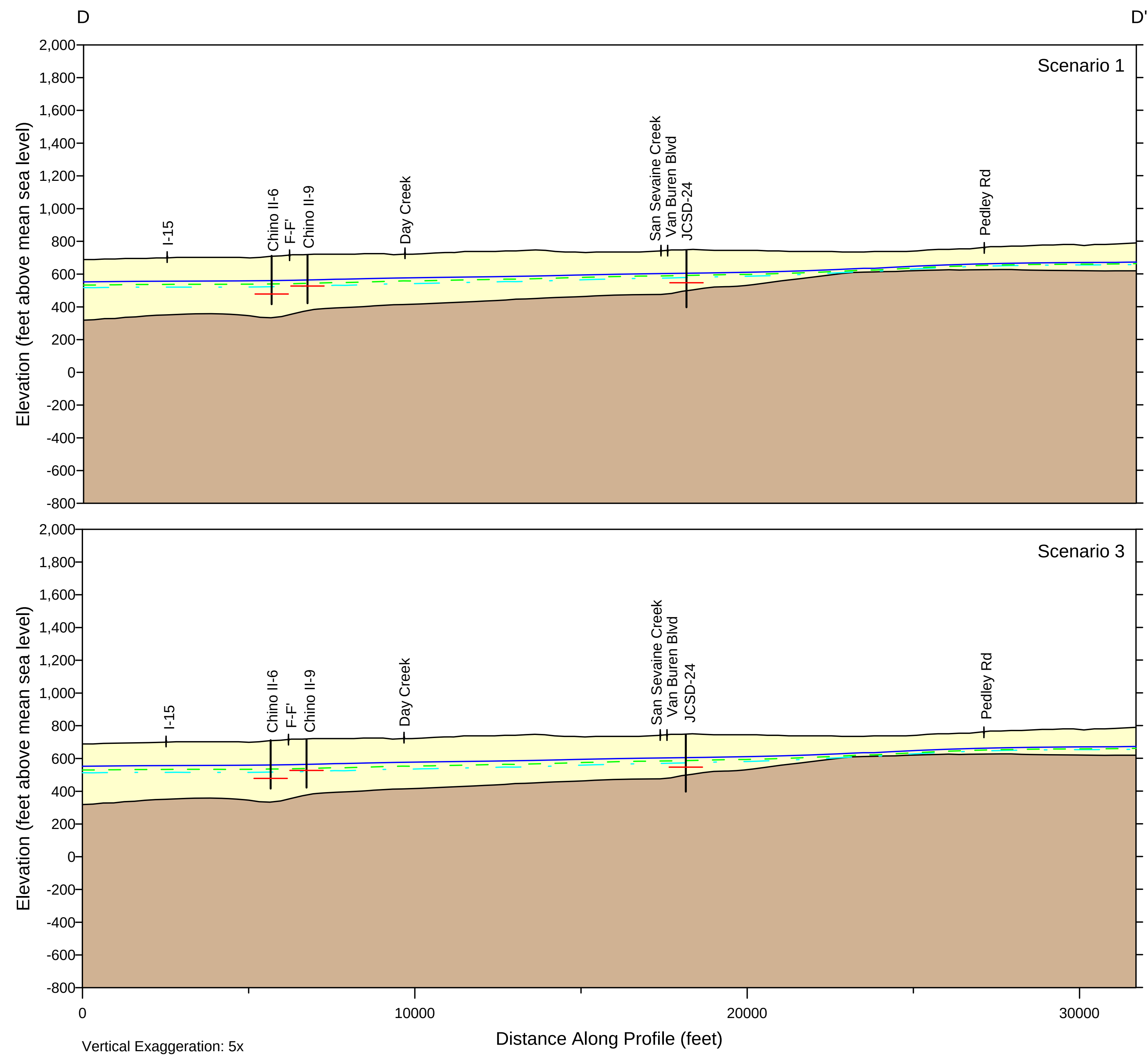
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (April 2010)
- Water Level (April 2020)
- Water Level (April 2030)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
MZ3

Figure 3-7c



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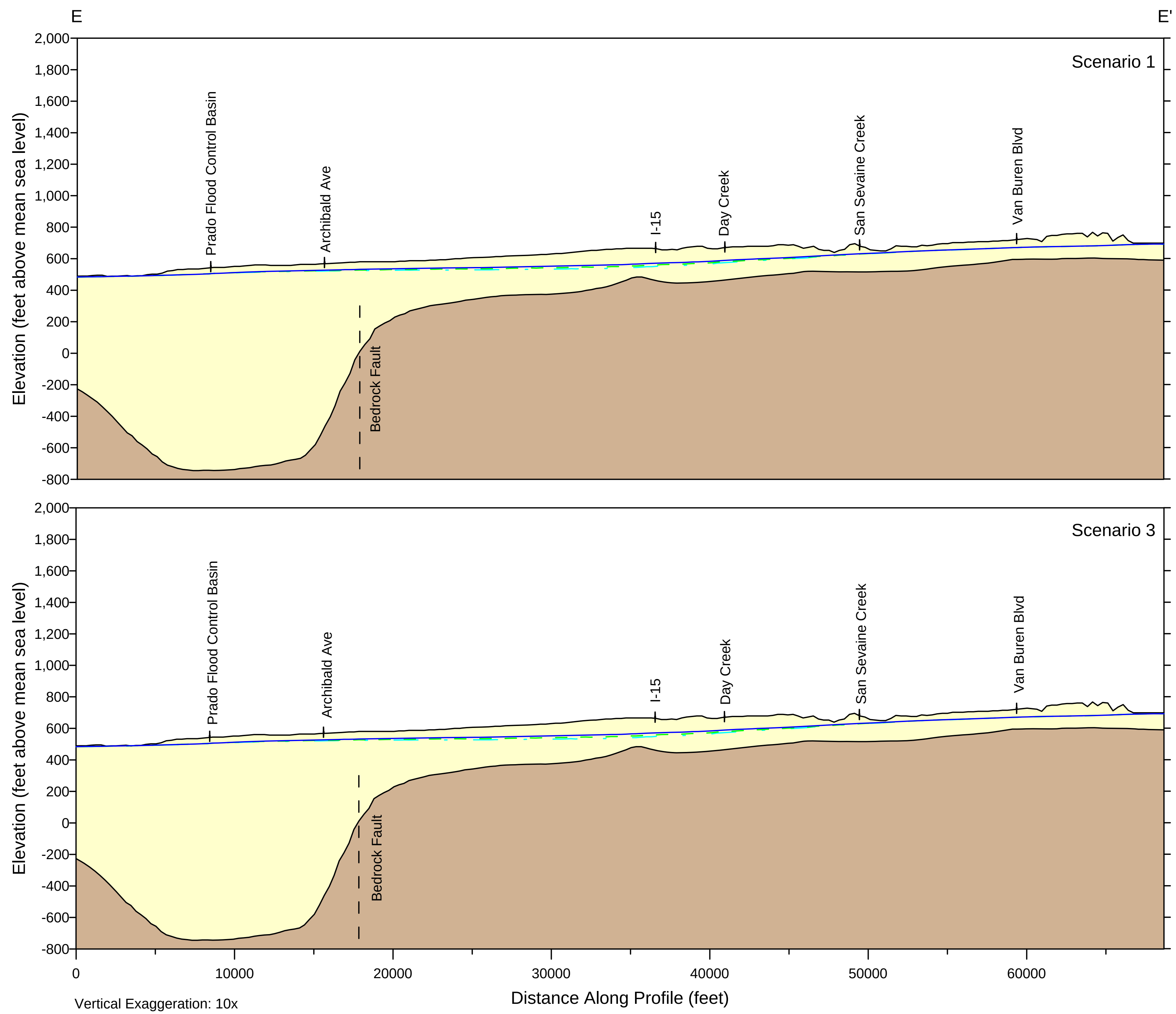
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (April 2010)
- Water Level (April 2020)
- Water Level (April 2030)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
MZ4

Figure 3-7d



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Date: 20120227
File: Figure3-7e.grf

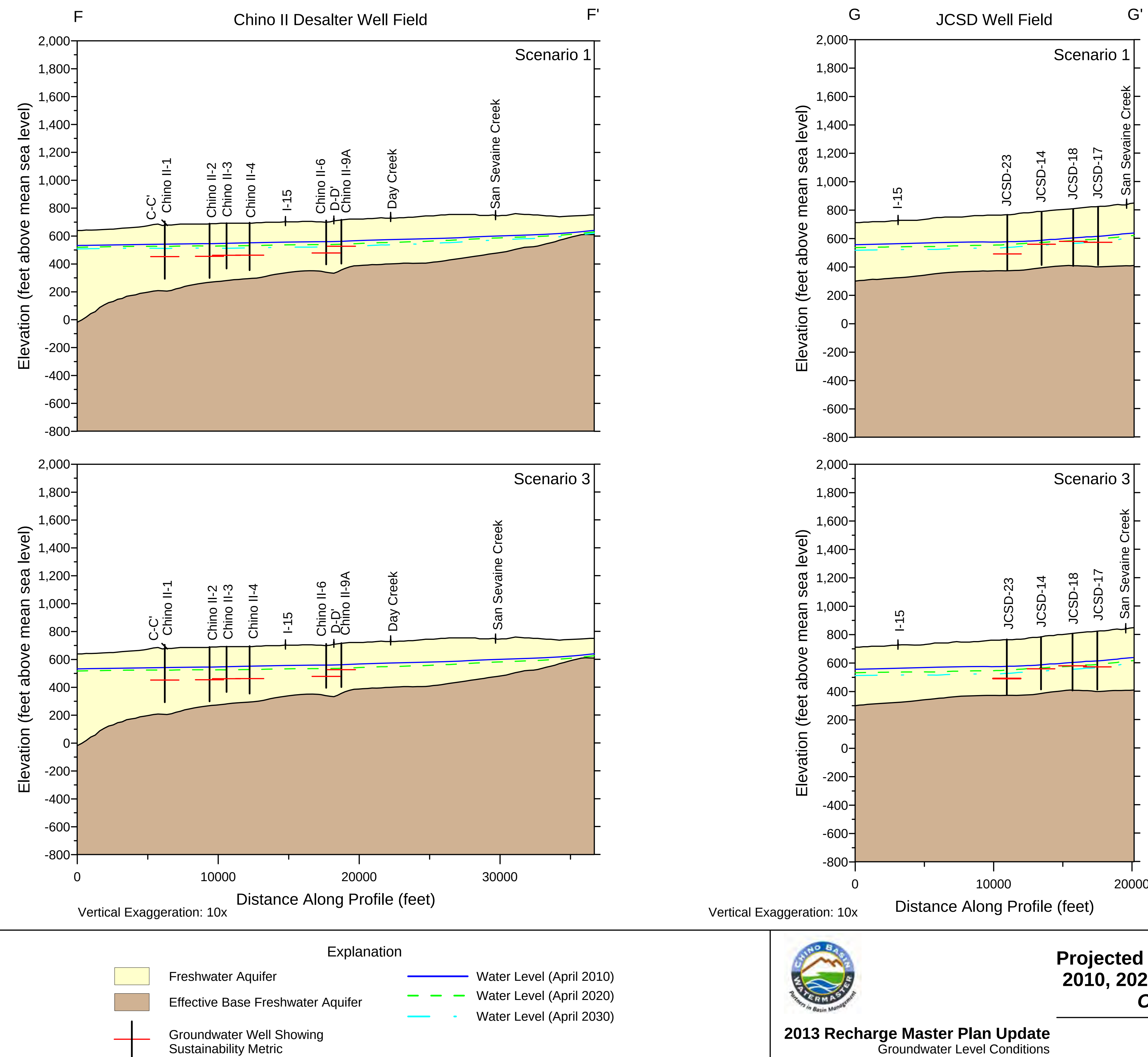
Explanation

- Freshwater Aquifer
- Effective Base Freshwater Aquifer
- Groundwater Well Showing Sustainability Metric
- Water Level (April 2010)
- Water Level (April 2020)
- Water Level (April 2030)

2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
MZ5

Figure 3-7e



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2013 Recharge Master Plan Update
Groundwater Level Conditions

Projected Groundwater Level Conditions in 2010, 2020, and 2030 for Scenarios 1 and 3
Chino II Desalters and JCSD Wells

Figure 3-8

Section 4 – Inventory of Existing Recharge Facilities and Their Capabilities

The objectives of this section are to describe existing recharge facilities and their capabilities and some new recharge concepts that were not included in the 2010 RMPU. Specifically this section answers the following questions:

1. What are the existing recharge facilities and what is their ability to recharge storm and supplemental waters?
2. What physically/institutionally limits the ability to recharge storm water at existing facilities and what improvements could be made to these facilities to capture more stormwater?
3. What physically/institutionally limits the supplemental water recharge capacity of the existing recharge facilities?
4. What are the implications of the most recent draft recycled water recharge regulations for the Chino Basin?
5. What is the recharge capacity of existing ASR facilities in the Chino Basin?
6. What is the projected in-lieu recharge capacity in the Basin and what limits it?

4.1 Existing Spreading Basins and Their Capacities

As outlined as one of the goals of the Optimum Basin Management Program (OBMP), Watermaster and the IEUA partnered with the San Bernardino County Flood Control District (SBCFCD) and Chino Basin Water Conservation District to construct and/or improve eighteen recharge sites. This project, known as the Chino Basin Facilities Improvement Project (CBFIP), anticipated a total potential recharge capacity of 130,000 acre-ft/yr. This value was derived from the original design infiltration estimates for each site, anticipated stormwater capture, reliable availability of imported water, and a recycled water contribution limit of 20 percent for each basin. The potential recharge capacity for each basin and each type of water supply, as developed as part of the CBFIP, is provided in Table 4-1 for further reference. As part of the CBFIP, significant improvements were made to each recharge site to enhance water conveyance, recharge capabilities, data collection, and monitoring.

Water conveyance improvements included various new water supply connections and diversions. Through the expansion of the IEUA recycled water distribution system, turnouts were connected to eleven of the eighteen sites. Similarly, as part of the CBFIP, several imported water turnouts were modified and/or constructed along Metropolitan's Rialto Feeder pipeline. Stormwater conveyance improvements were made through the installation of in-channel diversion structures, such as rubber dams and grated drop inlets.

Recharge capability improvements primarily consisted of removal of fine grained deposits from within the basin and the construction of internal levies. Many of these sites were not maintained for the purpose of recharge and were therefore sealed with fine grained sediments that were deposited at the bottom of the basins during the many years of stormwater retention and release operations. This project removed these sediments and restored the base and side slopes of the basins in a condition that best meets the recharge needs of the project. At several sites, internal levies were constructed to enhance the capture and storage capacity of the basin as well as to better manage the maintenance and recharge of each basin.

A key component to the CBFIP was the development of the Supervisory Control and Data Acquisition (SCADA) system. The existing SCADA system is comprised of a wide range of equipment that is located at various remote sites and facilities throughout the service area. The existing equipment has reached its end of useful life. A SCADA Master Plan was prepared with a thorough and comprehensive evaluation of the system. The Master Plan recommended upgrades to provide a robust, reliable and seamless SCADA system to sustain and support the growth of the program. Through the SCADA system, field instrumentation such as level sensors, automated gates, valves, pumps, and flow meters, staff can monitor and control field equipment remotely. The SCADA has also enabled Watermaster and the IEUA to conduct detailed reporting and analysis of recharge performance, and continue to optimize operations.

4.1.1 Spreading Facilities

The CBFIP sites are located primarily in the northern portion of the Chino Basin and are spread from the San Antonio channel on the west to the base of the Jurupa Mountains on the east. In addition to being tracked on a regional basis, recharge operations are tracked and managed within three distinct management zones. The locations of the eighteen sites within their corresponding management zones are shown in Figure 2-10. As water supplies can be preferentially delivered to recharge facilities located within a specific management zone, Watermaster will set priorities based on basin and sub-basin recharge needs.

There are two primary types of recharge basins within the CBFIP: conservation and multipurpose basins. Conservation basins are operated to recharge storm and supplemental water (ten sites). Multipurpose basins are operated primarily for flood peak discharge attenuation and secondarily for the recharge of storm and supplemental water (eight sites).

The CBFIP consisted of approximately $50M in improvements throughout the Chino Basin. Approximately 50 percent of these improvements were funded through grant proceeds from the State Water Resources Control Board. The remaining 50 percent was funded equally by the IEUA and Watermaster. Through the first seven years of operation, it is estimated that the project facilities have resulted in the recharge of nearly $52,000,000 of water into the Chino Basin. A summary of the value of water recharged by type and fiscal year is outlined in Table 4-2.

4.1.2 Spreading Basin Recharge Performance

Since initiation in 2005, data has been tracked closely for recharge of all types of water at each site. To date, the project has accounted for more than 200,000 AF of recharge into the Chino Basin. The historical recharge for each basin, in total and on average, is summarized in Tables 4-3 and 4-4, respectively.

During this same time frame (2005-2012), recharge by management zone has also been tracked. Recharge by management zone is part of the Peace Agreement and OBMP and a critical component when considering known concerns of pumping depressions, subsidence, water quality, and changing water levels throughout the Chino Basin. Figures 4-1 and 4-2 show average recharge by management zone and type from 2005 to the most recent full year of data (2011). As evident in these figures, the MZ1 recharge requirement of 6,500 acre-ft/yr has been met on an average if not annual basis, and in recent years, recharge within MZ3 has increased.

Through the evaluation of the collected recharge data, it was generally observed that the actual recharge rates have been lower than those planned during design of the CBFIP. The reduced recharge rates have been primarily attributed to reduced infiltration rates due to compaction or clogging of the basin surface with fine sediments or biological growth. A summary of the planned and actual infiltration rates, measured in feet per day, is shown in Figure 4-3.

The most effective way to keep infiltration rates maximized at each site is through a well-planned and managed maintenance program. The existing maintenance program is funded by Watermaster and the IEUA and is proposed in March of the year prior to the planned fiscal year. Contractually, Watermaster's share of funding is based on the actual storm and imported water recharged at each basin plus related turnout and habitat mitigation commitments, while the IEUA's share is based on recycled water recharge at each basin. In practice, Watermaster funding is typically based on what is available through Watermaster assessments, which is generally consistent with the prior year's budget. Basin maintenance is therefore prioritized based on available funds and has not been based on the economic merits of rehabilitated recharge potentials.

Through an evaluation of the historical recharge volumes and infiltration rates, several basins have been identified as impediments in meeting the original project potential capacity. A few of the key facilities are outlined below.

4.1.2.1 Banana & Hickory Basins

Although designated as separate basins, the Banana and Hickory Basins are within 1/2 mile and share various water supply sources, channels, and pipelines, and have similar geological characteristics. These basins were anticipated to have infiltration rates between 1.5 and 2.0 feet per day for a combined recharge volume of up to 11,600 acre-ft/yr. However, the historical infiltration rates have averaged approximately 0.5 feet per day for both sites with an average total recharge of 1,300 acre-ft/yr.

4.1.2.2 Etiwanda Debris Basin

The Etiwanda Debris Basin recently underwent a series of environmental restoration improvements by the SBCFCD. These improvements resulted in rerouting of native and imported water recharge areas. Although the average infiltration rate of 1 feet day is less than the planned 3 feet per day, post improvement infiltration rates are closer to 0.5 feet per day.

4.1.2.3 Upland Basin

The Upland Basin is a critical flood control facility for the City of Upland. As a required condition of the site development, a buttress was constructed on several sides of the basin. It is suspected that the recharge capacity of the basin was significantly affected by the depth of the basin and the compaction of the side wall sediments.

It is also important to note that the original potential capacities for these sites were based on modeled stormwater flows and the availability of imported water supplies.

Stormwater: As data has become available, the stormwater flow projections have been further refined. Based on the maximum recharge year for each basin, over 19,000 AF of stormwater was captured and recharged (92% of planned recharge capacity).

Imported Water: It is anticipated that nearly 70% of the total anticipated recharge was through the spreading of imported water purchased through Metropolitan. Historically, it was anticipated that this water would be available 7 out of every 10 years. Starting in 2008, it became apparent that imported water would be available much less often (less than 3 out of every 10 years) and that the focus of the CBFIP should be primarily on the recharge of stormwater and recycled water.

Within the Chino Basin, there are several channel drainage systems that feed various recharge sites. Evaluating the historical data and performance of each recharge site, each recharge drainage system was reviewed to determine if the capture and recharge of various types of water were maximized. Figures 4-4 through 4-13 (attached) summarize the findings of recharge performance/limitations for each drainage system.

Watermaster has an existing appropriative water right permit from the State Water Resources Control Board, Division of Water Rights. Permit No. 21225 was issued on October 9, 2008 in response to Application No. 31369. The permit allows the diversion of surface water flowing in a channel for purposes of groundwater recharge within the boundaries of the area administered by Watermaster. The water appropriated is limited to the quantity that can be beneficially used for purposes of industrial, irrigation, stock watering (dairy use), or municipal use. The total combined amount taken by direct diversion and storage during any one year is 68,500 acre-feet. The permit lists 29 intended points of diversion into recharge basins from the various Chino Basin creek systems.

The permit requires that 68,500 acre-ft/yr of stormwater be put to beneficial use by December 31, 2075. Water which is not put to beneficial use by that date is no longer authorized to be diverted. Waste or unreasonable use of water or unreasonable method of diversion and use of the water is not allowed. Over the past six years (July 2005 to June 2011), an average of approximately 11,000 acre-ft/yr of stormwater has been diverted for recharge. The minimum and maximum amounts diverted were 4,734 acre-ft/yr and 17,051 acre-ft/yr, respectively.

4.1.3 Historical Spreading of Supplemental Water

Supplemental water recharge in the Chino Basin can either be imported water or recycled water. Imported water is used for replenishment purposes to offset overproduction of the basin, and recycled water is assigned (pro-rata) to the IEUA agencies that provide wastewater. Imported water comes from the State Water Project (SWP) via Metropolitan/the IEUA, and recycled water is delivered by the IEUA. This imported and recycled water is delivered to the recharge basins through several locations, as shown in Figure 2-10 and 2-11.

4.1.3.1 Imported Water

Historically, Watermaster purchases replenishment water when one or more of the parties overproduces. Watermaster has traditionally met its replenishment obligations by purchasing imported water from Metropolitan (replenishment water service) and unproduced groundwater from the appropriators. In the recent past, Metropolitan was typically able to supply all of the replenishment needs in its service area with replenishment water service, which was estimated to be available seven out of ten years. Recent court rulings regarding endangered species and the drought have severely limited the ability of Metropolitan and other SWP contractors to obtain SWP water. In 2008, Metropolitan provided a revised replenishment water service forecast, projecting that replenishment water would be available three out of ten years.

Watermaster has an obligation under the Judgment to provide replenishment water for overproduction[14] with the cost borne mostly or entirely by the overproducing party. Because Metropolitan eliminated the replenishment program and discounted rate, Watermaster will have to acquire new non-traditional supplemental water supplies for replenishment. These non-traditional supplemental water supplies could consist of Metropolitan Tier I and Tier II service waters, non-IEUA recycled water, and other imported supplies from the Central Valley, the Colorado River, and other areas.

4.1.3.2 Recycled Water

In 2005, the IEUA initiated an aggressive recycled water reuse program for its service area. Under this program, most of the recycled water produced in the IEUA service area will be directly reused for irrigation, landscaping, and other direct reuse purposes. The remaining recycled water is recharged at selected spreading basins.

[14] Judgment, paragraph 45

Recycled water recharge is not used to satisfy replenishment obligations. Instead, it is recharged into the basin and subsequently assigned to certain Appropriator parties' supplemental storage accounts, thereby potentially increasing the Appropriators' production rights and reducing their future replenishment liabilities. Watermaster assigns recharged recycled water to Appropriators based on the relative sewage contributions of the Appropriators to the IEUA.

4.1.4 Increase in Recharge from Operational and Minor Facility Improvements

As part of the review of the 2010 GWRMP Update, several additional operational and minor facility improvements were identified as potential opportunities to quickly enhance recharge within the Chino Basin. These enhancements are generally broken down into the following categories.

4.1.4.1 Internal Berms

- San Sevaine Basin – construction of internal berms within basin 5 would enable a larger portion of the basin floor to be wet, therefore increasing stormwater capture and recharge.
- College Heights Basins – the construction of internal berms (E-W) within basins will better spread recharge within the basin and is anticipated to reduce the potential of site seepage to the west.

4.1.4.2 Basin Rehabilitation

- Etiwanda Debris Basin – less than expected infiltration rates have been observed. Ripping of the basin and rebuilding of an internal berm would enhance capture and recharge.

4.1.4.3 Conveyance Improvements

- Jurupa Basin – the pump station at Jurupa Basin currently has only one pump that supplies a maximum delivery of 10 cfs of imported or stormwater to RP-3. The facility was constructed with an empty bay for a second pump. Installation of the second pump would enable the facility to capture all flows from the San Sevaine channel.
- Montclair Basins – as part of the CBFIP, it was originally planned to automate the inlet gate into Montclair Basin No. 1 as well as to construct an inlet from the San Antonio channel into Montclair Basin Nos. 2 or 3. These improvements would enable the Montclair Basin to make inlet adjustments remotely and ensure that diversion could remain in effect during maintenance activities.

In addition to the abovementioned operational and minor facility improvements, the following projects have been identified as viable opportunities to promote recharge with only minor improvements.

- Wineville Basin[15] – as outlined in detail within the 2010 GWRMP Update, Wineville Basin is a very large basin with outstanding conveyance infrastructure (flow through stormwater basin with upstream recycled water and imported water turnout facilities). It is proposed that as a short term improvement, a dirt berm be installed in this basin to promote water storage and recharge.

- Princeton Basin – this basin is a flow through basin that currently receives water released from 8th Street Basins prior to being recaptured at Ely Basin. Enhancement of this site would include minor grading and rehabilitation and would help relieve the heavy hydraulic loading to Ely Basin.

The Wineville Basin and Princeton Basin projects, mentioned above, are only two examples of numerous additional potential recharge basins within the service area. There are additional recharge basins that were not a part of the original eighteen CBFIP basins that have been identified by individual parties (i.e. recharge basins in Fontana). These additional stormwater retention basins are not owned by any of the existing parties to the Four-Party Agreement; however, these additional recharge opportunities will be pursued with the required coordination and agreements, if determined feasible. There are presently no estimates of increased storm or supplemental recharge capacity from the implementation of these projects.

4.1.5 Impact of Anticipated Changes in the Draft Title 22 Rules for Groundwater Recharge with Recycled Water

The California Department of Public Health (CDPH) is responsible for the development of regulations for the use of recycled water for groundwater recharge. The CDPH works with the local Regional Water Quality Control Board (RWQCB) to issue site-specific permits. The IEUA and Watermaster currently have 13 sites that are permitted through the RWQCB (Order No. R8-2007-0039)[16] for groundwater recharge of recycled water.

In 2010, Senate Bill 918 was enacted, which required the CDPH to adopt uniform water recycling criteria for groundwater recharge (using recycled water) by December 31, 2013. Following the release of new proposed recycled water groundwater recharge regulations, the

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[15] The Wineville Basin project was identified in the 2010 RMPU. The project described herein is part of reduced project that was described as “proof of concept” project to assess the infiltration characteristics and feasibility of the project identified in the 2010RMPU. The suggestion herein is that the proof of concept project could be the final project.

[16] http://www.waterboards.ca.gov/rwqcb8/board_decisions/adopted_orders/orders/2007/07_039_wdr_ieuacbw_cbrwgrp_06292007.pdf

CDPH initiated a series of workshops in late 2011. Key changes to the proposed regulations included additional monitoring (type and frequency), diluent water characterization, and travel time determination.

Based on these proposed changes, the primary change of concern that could affect recharge capabilities for new recharge projects is the diluent water characterization. The new regulations infer that stormwater will be regulated to meet maximum contaminant levels (MCLs). If MCLs are not met, the water cannot be used as diluent water when calculating the allowable recycled water contribution for that specific basin, hence reducing potential recycled water deliveries.

It is not expected that the requirements within the proposed regulations would affect the IEUA/Watermaster, as they are operating under an existing Order. In the event that the CDPH or the RWQCB identifies components of the Order that do not adequately meet public health targets, portions of all of the new regulations could be imposed on the IEUA/Watermaster.

4.2 Other Recharge/Storage Management Methods

4.2.1 In-Lieu Recharge

In-lieu recharge occurs when a water purveyor with production rights in the Chino Basin elects to use supplemental water (typically imported water) in-lieu of pumping Chino Basin groundwater. The unproduced Chino Basin groundwater is reclassified as supplemental water pursuant to the Judgment and can be used to satisfy a replenishment obligation by an equal amount. In-lieu recharge has proven to be a more feasible form of recharging the Chino Basin than constructing recharge basins or aquifer storage and recovery (ASR) wells. However, it typically requires economic incentives that are not always available to entice participation.

4.2.2 Existing In-lieu Recharge Capacity

The in-lieu recharge capacities estimated during the Dry Year Yield Program Expansion in 2008 range from 25,000 to 40,000 acre-ft/yr (Black & Veatch, 2008). The only other major Chino Basin groundwater producer that also receives imported water is the Fontana Water Company (FWC). Based on FWC imported water capacity, Chino Basin groundwater production capacity, and historical demands, it is estimated that another 5,000 to 10,000 acre-ft/yr of in-lieu potential could theoretically be added. This would give a total of 30,000 to 50,000 acre-ft/yr of estimated in-lieu potential for the Chino Basin.

4.2.3 Historical In-lieu Recharge

The Chino Basin has taken imported water in-lieu of groundwater production through a number of conjunctive use programs provided by Metropolitan (i.e. Replenishment, Cyclic, Trust Storage/Forbearance, and Dry Year Yield). All four programs have provided water to the Chino Basin in years when Metropolitan has surplus supplies; this water is then pumped out at a later date when Metropolitan has limited supplies. Each program has slightly different supply costs and incentives, but all programs increase local supplies to the Chino Basin that can be used in times of imported water shortages. Since 1978, an estimated 350,000 AF of imported water has come into the Chino Basin through in-lieu methods.

4.2.4 Increase in In-lieu Recharge Capacity from Operational and Minor Facility Improvements

As described above, historically there are several programs that Chino Basin parties have participated in that have brought surplus water into the basin via in-lieu. However, the parties have other local resources (i.e. groundwater, surface water, desalter water, and recycled water) that provide additional opportunities to bring surplus water into the basin through in-lieu methods. Below are few examples of potential in-lieu opportunities within the Chino Basin.

- Potable Water Interconnections – between the JCSD and the City of Ontario, the CVWD, and the Fontana Water Company (FWC).[17] Existing or constructed potable water interconnections between agencies (i.e. the CVWD, Ontario, the FWC, and the JCSD) can be utilized to deliver surplus surface water, other groundwater, or imported water in-lieu of Chino Basin groundwater production. This would achieve replenishment and improve the balance of recharge and discharge in management zones of concern by decreasing the JCSD's groundwater production.

- Desalter Production Reallocation – i.e. more to the JCSD. Desalter production could be reallocated to the JCSD, from any other CDA agency, in-lieu of Chino Basin groundwater production, which would achieve replenishment and improve the balance of recharge and discharge in the JCSD area.

- Metropolitan Improvements – i.e. Riverside/Corona feeder. The Riverside/Corona Feeder could supply treated SWP water to the JCSD in-lieu of groundwater production, which would achieve replenishment and improve the balance of recharge and discharge in the JCSD area.

4.3 Existing ASR Capacity

ASR wells are usually wells that function as injection and recovery wells. Water treated to drinking water standards is injected into an aquifer when surplus water is available and recovered later when needed. The only existing ASR wells in the Chino Basin are owned and

[17] In-lieu recharge requires that a party have a supplemental supply and possession of groundwater production rights. The Fontana Water Company's share of operating safe yield is about .009 percent and is likely too small to affect significant in-lieu recharge. However, an interconnection with the JCSD could be used for in-lieu recharge by the JCSD forgoing the production of some of its production rights and would provide significant benefits to the JCSD.

operated by Monte Vista Water District (MVWD). Typically, the MVWD can recharge up to 3,500 acre-ft/yr (can be as high as 5,400 acre-ft/yr, depending on maintenance schedules) of treated SWP water by injection at its wells—4, 30, 32, and 33 (ASR project)—and subsequently recover most this water within the same year. Injection has generally occurred in the seven-month period of October through April, and recovery has generally occurred in the five-month period of May through September. Table 4-5 lists the MVWD ASR wells and their respective injection and extraction capacities.

Through the RMPU process, four additional ASR projects were identified that could be used to increase the supplemental water recharge capacity of the Chino Basin, to provide Watermaster additional recharge capacity during the rainy season, and to provide Watermaster with another tool to balance recharge and discharge pursuant to the Peace Agreement.

These ASR projects would include the conversion of existing production wells or the construction of new wells within each service area. These facilities would be owned and operated by the individual agencies. These projects would not only provide additional water supply but increase the supplemental water recharge capacity of the Chino Basin and reduce the groundwater level impacts of reoperation in each service area. In addition, they will provide Watermaster with more wintertime recharge capacity when its recharge basins are being used to recharge stormwater. Table 4-6 shows the existing and potential ASR injection capacities.

4.4 Total Supplemental Recharge Capacity

The 2010 RMPU evaluated the frequency of storms and runoff into recharge facilities that also recharge imported water and determined that the supplemental water recharge capacity of the existing spreading basins is about 99,000 acre-ft/yr but is limited to about 83,100 acre-ft/yr due to turnout limitations on the Rialto Pipeline. Existing ASR capacity for supplemental water recharge is about 3,500 acre-ft/yr. The total wet-water recharge capacity (supplemental water recharge capacity in spreading basins + ASR recharge capacity) is 86,600 acre-ft yr. In-lieu recharge capacity ranges from about 25,000 to 40,000 acre-ft/yr. In-lieu recharge can be used to improve the balance of recharge and discharge in the basin. The total supplemental water recharge capacity (supplemental water recharge capacity in spreading basins + ASR recharge capacity + in-lieu capacity) ranges from 111,600 to 126,600 acre-ft yr.

Table 4-1
Storm and Supplemental Water Recharge Capacity Estimates

(acre-ft/yr)

Basin	IEUA Estimated Recharge Capacity[1]				2010 RMPU Recharge Capacity[2]		
	Storm	Imported	Recycled	Total	Storm	Supplemental[4]	Total
Brooks Street Basin	1,900	3,600	1,400	6,900	672	2,474	3,146
College Heights Basins	100	7,900	0	8,000	0	7,421	7,421
Montclair Basin 1	2,100	9,900	0	12,000	1,024	19,789	20,813
Montclair Basin 2							
Montclair Basin 3							
Montclair Basin 4							
Seventh and Eighth Street Basins	1,600	2,600	1,100	5,300	1,223	2,474	3,697
Upland Basin	1,000	8,700	0	9,700	479	9,895	10,373
Subtotal Management Zone 1	***6,700***	***32,700***	***2,500***	***41,900***	***3,398***	***42,052***	***45,450***
Ely Basins	1,000	0	2,300	3,300	1,366	2,474	3,840
Etiwanda Spreading Area (Joint Use of Etiwanda Debris Basin)	1,700	7,900	2,400	12,000	883	3,463	4,346
Etiwanda Ponds[3]	1,100	5,300	1,600	8,000	0	0	0
Hickory Basin	900	4,200	1,300	6,400	213	2,061	2,274
Lower Day Basin	500	3,700	1,000	5,200	555	4,453	5,008
San Sevaine No. 1	2,200	14,500	4,100	6,900	2,865	11,379	14,243
San Sevaine No. 2							
San Sevaine No. 3							
San Sevaine Nos. 4 and 5							
Turner Basins Nos. 1 and 2	2,700	5,100	1,900	6,900	1,485	1,484	2,970
Turner Basins Nos. 3 and 4[5]							
Victoria Basin	1,000	4,700	1,400	7,100	561	2,968	3,530
Subtotal Management Zone 2	***11,100***	***45,400***	***16,000***	***72,500***	***7,928***	***28,282***	***36,210***
Banana Basin	800	3,400	1,000	5,200	445	2,061	2,506
Declez Basin	300	1,600	500	2,400	912	2,474	3,385
IEUA RP3 Ponds	1,700	7,900	2,400	12,000	444	8,245	8,689
Subtotal Management Zone 3	***2,800***	***12,900***	***3,900***	***19,600***	***1,801***	***12,780***	***14,581***
Total	**20,600**	**91,000**	**22,400**	**134,000**	**13,126**	**83,114**	**96,241**

[1] From IEUA draft report dated April __, 2012 sent to Watermaster by email
[2] 2010 Recharge Master Plan (WEI, 2010)
[3] The Etiwanda Ponds became unavailable after the IEUA recharge capacity estimates were prepared
[4] Supplemental water includes imported and recycled water.
[5] New recharge improvements are being constructed on the land on which Turner Basins Nos. 3 and 4 is located and the recharge capacity on this land will subsequently be increased.

Table 4-2

Chino Basin Groundwater Recharge Value FY 2005/06 – FY 2011/12

Period	Stormwater	Metropolitan Water District	Recycled	Total
FY 2005/06	$4,302,729	$3,139,307	$333,762	$7,775,798
FY 2006/07	$1,566,967	$3,068,141	$704,928	$5,340,036
FY 2007/08	$3,492,863	-	$622,434	$4,115,297
FY 2008/09	$2,895,585	-	$842,875	$3,738,460
FY 2009/10	$6,737,328	$590,000	$2,862,370	$10,189,698
FY 2010/11	$8,620,292	$1,116,858	$3,134,934	$12,872,084
FY 2011/12*	$2,792,573	$2,662,092	$2,302,696	$7,757,361
Subtotals	**$30,408,337**	**$10,576,398**	**$10,803,999**	**$51,788,734**

*Note: Values (thru Feb) are calculated based on year specific water supply costs vs. MWD's Tier I untreated rate.

Table 4-3
Chino Basin Total Recharge
FY 2005/06 through FY 2011/12

Chino Basin Groundwater Recharge Sites	Stormwater and Local Runoff	Metropolitan Water District	Recycled	Total
8th Street 1 & 2	7,871	1,122	4,507	13,500
Banana	1,844	1,001	4,320	7,165
Brooks	3,637	5,045	5,166	13,848
College Heights	944	10,074	-	11,018
Declez	4,820	-	65	4,885
Ely	10,986	968	2,976	14,930
Etiwanda Conservation	-	-	-	0
Etiwanda Debris Basin	2,116	4,367	-	6,483
Grove	2,074	-	-	2,074
Hickory	3,468	1,340	4,061	8,869
Lower Day	2,508	7,310	-	9,818
Montclair	7,087	35,583	-	42,670
RP3	6,999	2,607	4,974	14,580
San Sevaine	5,448	17,132	851	23,431
Turner 1/2 and 3/4	11,763	860	2,500	15,123
Upland	3,280	16,013	-	19,293
Victoria	2,341	352	927	3,620
Total Replenishment	**77,186**	**103,774**	**30,347**	**211,307**

Table 4-4
Chino Basin Average Annual Recharge
FY 2005/06 through FY 2011/12

Chino Basin Groundwater Recharge Sites	Stormwater and Local Runoff	Metropolitan Water District	Recycled	Total
8th Street 1 & 2	1,124	160	644	1,928
Banana	263	143	617	1,023
Brooks	520	721	738	1,979
College Heights	135	1,439	-	1,574
Declez	689	-	9	698
Ely	1,569	138	425	2,132
Etiwanda Conservation	-	-	-	0
Etiwanda Debris Basin	302	624	-	926
Grove	296	-	-	296
Hickory	495	191	580	1,266
Lower Day	358	1,044	-	1,402
Montclair	1,012	5,083	-	6,095
RP3	1,000	372	711	2,083
San Sevaine	778	2,447	122	3,347
Turner 1/2 and 3/4	1,680	123	357	2,160
Upland	469	2,288	-	2,757
Victoria	334	50	132	516
Total Replenishment	**11,024**	**14,823**	**4,335**	**30,182**

Table 4-5
Chino Basin ASR Injection and Extraction Capacity[1]

ASR Facility	Injection Capacity[2]		Extraction Capacity[2]	
	(gpm)	(acre-ft/month)	(gpm)	(acre-ft/month)
MVWD-4	400	53	800	106
MVWD-30	1,000	133	2,000	265
MVWD-32	1,000	133	2,000	265
MVWD-33	1,000	133	2,000	265
Total	**3,400**	**451**	**6,800**	**902**

1. All of the existing ASR wells owned by the Monte Vista Water District with the exception being MVWD-33, which is co-owned by the City of Chino.

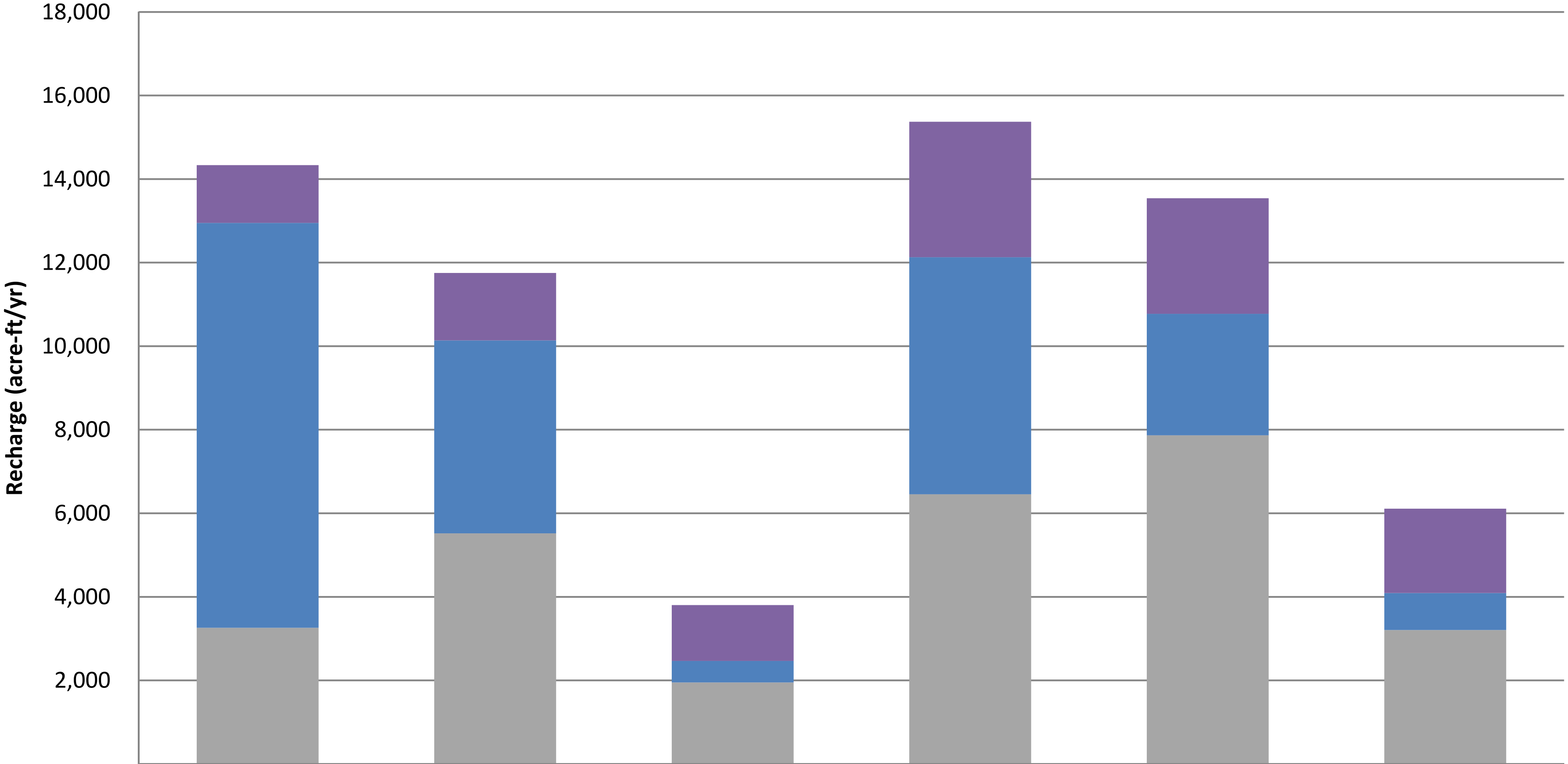
2. The injection and extraction capacities assume the wells are operating 24 hours a day for 30 days.

Table 4-6
Chino Basin Existing and Potential ASR Injection Capacity

Agency	Injection Capacity[1]	
	(gpm)	(acre-ft/yr)
Cucamonga Valley Water District	7,975	6,433
Jurupa Community Services District	4,000	3,228
City of Ontario	6,225	5,020
Fontana Water Company	0	0
Monte Vista Water District	3,400	2,742
Total	**21,600**	**17,423**

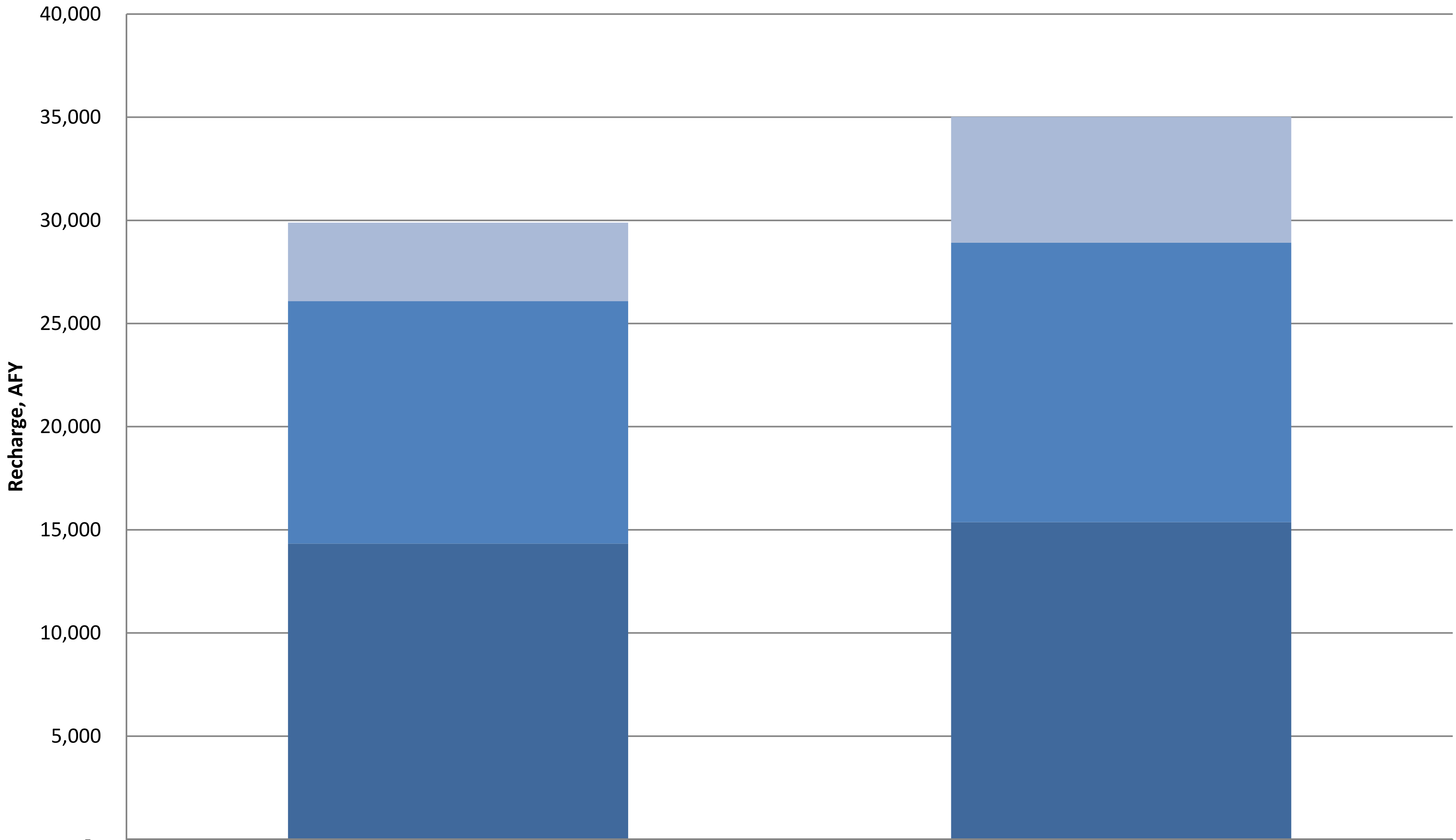
1. The injection capacity assumes the injection occurs six months out of the year.

Figure 4-1
Recharge by Management Zone and Type



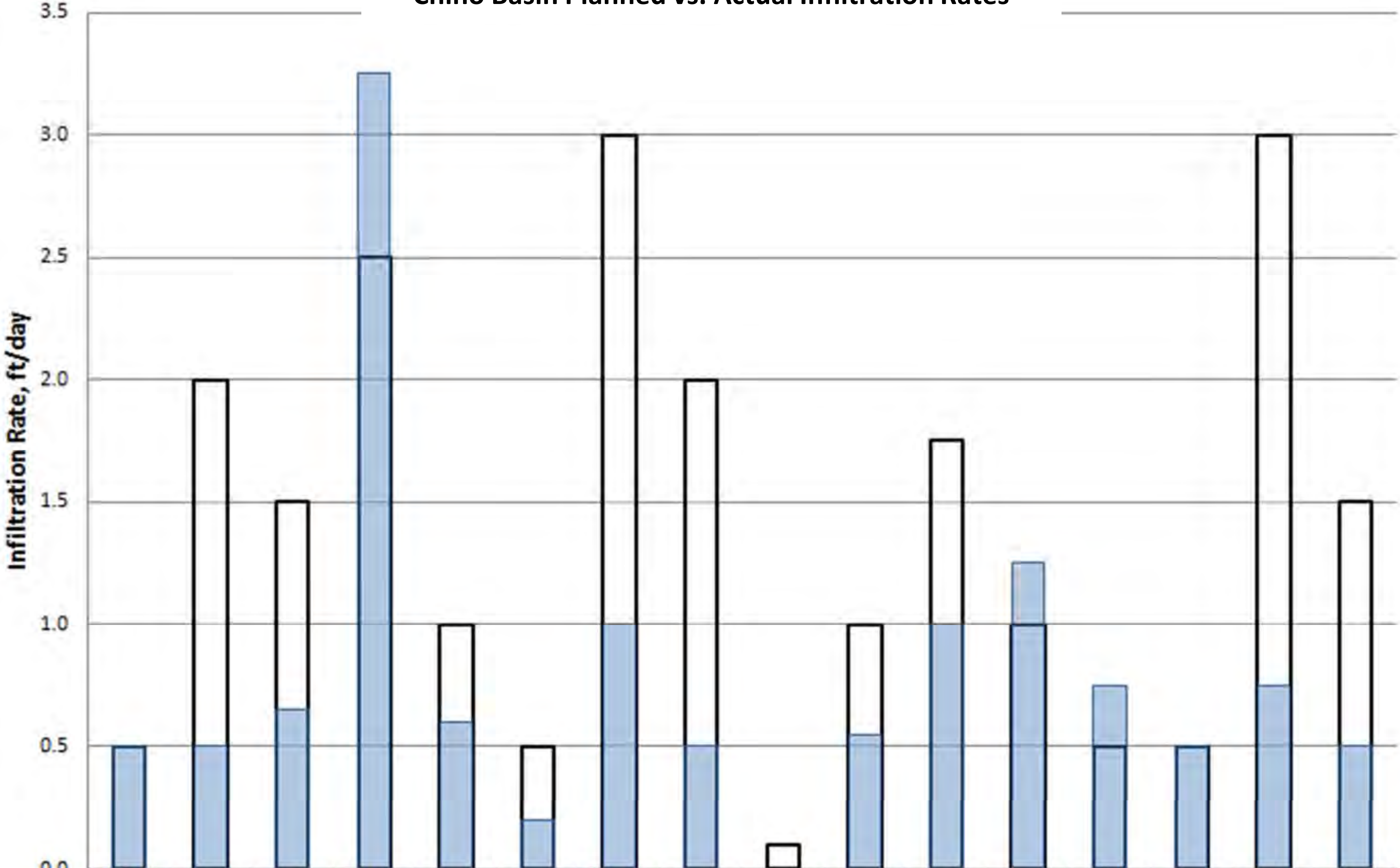
	MZ-1	MZ-2	MZ-3	MZ-1	MZ-2	MZ-3
Recycled	1,382	1,616	1,337	3,244	2,764	2,020
MWD	9,691	4,618	515	5,673	2,909	882
SW/LR	3,260	5,519	1,952	6,456	7,866	3,207
	Average for 2006-2011			FY2010/11		

Figure 4-2
Chino Basin Facilities Improvement Program Recharge by Management Zone



	2005-2011	FY10/11
MZ-3	3,804	6,109
MZ-2	11,754	13,539
MZ-1	14,333	15,373

Figure 4-3
Chino Basin Planned vs. Actual Infiltration Rates



	7th & 8th St.	Banana	Brooks	College Heights	Declez	Ely	Etiwanda Debris	Hickory	Jurupa	Lower Day	Montclair	RP3	San Sevaine	Turner	Upland	Victoria
Planned	0.5	2.0	1.5	2.5	1.0	0.5	3.0	2.0	0.1	1.0	1.8	1.0	0.5	0.5	3.0	1.5
Actual	0.5	0.5	0.7	3.3	0.6	0.2	1.0	0.5	0.0	0.6	1.0	1.3	0.8	0.5	0.8	0.5

Section 5 – Monitoring, Reporting, and Accounting Practices to Estimate Long-Term Average Annual Net New Stormwater Recharge

One of the conclusions of the engineering investigations that supported the development of the Peace II Agreement was that the safe yield of the Chino Basin was declining due changes in landuse and stormwater management practices. In the Final Report and Recommendations on Motion for Approval of Peace II Documents (Schneider, 2007), the Special Referee recommended and the Court ultimately ordered that several elements be included within the 2010 RMPU (Motion to Approve Watermaster's Filing in Satisfaction of Condition Subsequent 5; Watermaster Compliance with Condition Subsequent 6, August 21, 2008) one of which was:

> "3. Measures should be evaluated to lessen or stop the projected Safe Yield decline. All practical measures should be evaluated in terms of their potential benefits and feasibility."

The 2010 RMPU identified that the implementation of Municipal Separate Storm Sewer System (MS4) permit in the Chino Basin watershed had the potential to mitigate or offset some of the projected decline in safe yield. In its acceptance of 2010 RMPU, the Court ordered:

> "(3) Watermaster is hereby ordered to convene the committee described in item 3 of section 7.1 of the updated RMP to develop the monitoring, reporting, and accounting practices that will be required to estimate local project stormwater recharge and new yield."

Item 3 of Section 7.1 of the 2010 RMPU reads as follows:

> "3. In implementing the above, Watermaster should form a committee—consisting of itself, the landuse control entities, the County Flood Control Districts, the CBWCD, the IEUA, and others—to develop the monitoring, reporting, and accounting practices that will be required to estimate local project stormwater recharge and new yield. This committee should be formed immediately, and the monitoring, reporting, and accounting practices should be developed as soon as possible."[18]

[18] The term "New Yield" is defined in the Peace Agreement to mean "proven increases in yield in quantities greater than historical amounts from sources of supply including but not limited to, capture of rising water, capture of available storm flow, operation of the Desalters (including the Chino I Desalter), induced recharge and other management activities implemented and operational after June 1, 2000."

The RMPU Steering Committee was formed in November 2011 in response to the Court's order.[19] This section describes the monitoring, reporting, and accounting practices discussed and recommended by the RMPU Steering Committee. In June 2012, the Steering Committee started its investigation on the nature and occurrence of MS4 projects. A subcommittee of the Steering Committee (hereafter, the Subcommittee) was formed to review the formal process used by the MS4 permitees (land use control entities) to review and approve MS4 projects. The Subcommittee consisted of Dave Crosley of the City Chino, Rosemary Hoerning of the City of Upland, and Peter Kavounas of the Chino Basin Watermaster. The Subcommittee developed and presented draft procedures to the Steering Committee for the monitoring, reporting, and accounting practices required to estimate and account for recharge from MS4 projects.

The Watermaster pleading and subsequent Court order did not include the other two recommendations (1 and 2) described in Section 7.1 of the 2010 RMPU, which included:

> "1. Watermaster should allocate new yield that is created by new recharge above that required by MS4 permit compliance to the owners of those projects that create new recharge. This will require the development of (a) new agreements involving the Watermaster, project owners, and others, and (b) the development of new practices and procedures that can quantify new recharge during project development and subsequently verify that the new recharge is occurring during the project lifetime.
>
> 2. Watermaster, working with the Parties, should encourage the construction of local recharge projects in developed areas that will increase the capture and recharge of stormwater. The recommendations for local stormwater recharge projects in developed areas are the same as those for newly developed areas, articulated above."

5.1 MS4 Permit Background

The Cities and Counties that overlie the Chino Basin are obligated to implement the National Pollutant Discharge Elimination System (NPDES) MS4 Permit (Order R8-2010-0036 in San Bernardino County and Order R8-2010-0033 in Riverside County) adopted by the Santa Ana Regional Water Quality Control Board in 2010. Essentially, the new permits require that all stormwater generated from new development from a 24-hour, 85th percentile storm (about 1 inch over 24-hours in the Chino Basin) be detained and recharged onsite if recharge is feasible; if recharge is not feasible, the stormwater must be detained and treated and subsequently discharged. The specific technologies for detention and recharge are to be developed by landuse control entities. The landuse control entities are responsible for the inspection and maintenance of these new stormwater management facilities. The recharge

[19] The mandate of the Steering Committee was subsequently expanded to the scope of the entire 2013 RMPU amendment.

facilities could include detention and sedimentation basins, recharge basins, dry wells, and managed swales. The implementation of the new MS4 permits may result in new stormwater recharge relative to pre-project conditions in areas where recharge is feasible.

As part of the 2010 RMPU, projections of new stormwater recharge from the implementation of the 2010 MS4 permits were prepared. Models[20] were used to estimate the increase in stormwater recharge from new development by applying the stormwater management criteria from the new MS4 permit for two conditions: (1) half of the stormwater managed pursuant to the MS4 permit is recharged and (2) all of the stormwater managed pursuant to the MS4 permit is recharged. No assumptions were made as to the specific new stormwater management facilities used to comply with the permits except that they were maintained and functioned as originally conceived – there was no deterioration in infiltration capacity over time. The new stormwater recharge created through permit compliance was estimated to range from about 6,300 acre-ft/yr if half of the stormwater managed pursuant to the MS4 permit is recharged and 12,600 acre-ft/yr if all of the stormwater managed pursuant to the MS4 permit is recharged. This new recharge, if realized, would increase gradually from zero in the present to the above estimated value over the time that the land was improved. This could be a period of 40 to 50 years or more.

The recharge at downstream stormwater management facilities was projected to decrease slightly with MS4 permit implementation through the diversion of runoff that would have otherwise been recharged at these existing facilities. The adjusted recharge projections, correcting for reduction in downstream recharge, were about 5,300 acre-ft/yr if half of the stormwater managed pursuant to the MS4 permit is recharged and 10,500 acre-ft/yr if all of the stormwater managed pursuant to the MS4 permit is recharged. Finally, these adjusted estimates would need to be adjusted downward one more time to reduce them for incidental deep infiltration of precipitation that would have occurred in the pre-project condition. Thus, the net new recharge from the implementation of 2010 MS4 permit is equal to the stormwater recharge caused by the implementation of stormwater management projects pursuant to the MS4 permit minus the decrease in recharge at existing stormwater management facilities minus the incidental deep infiltration of precipitation that would have occurred in the pre-project condition. A strict accounting method would have to be able to provide the information necessary to estimate net new recharge.

5.2 Expected New Development

During the April 4, 2013 Steering Committee meeting, the Steering Committee expressed interest in knowing the projected development within Chino Basin to develop an estimate of potential MS4 recharge. The Committee discussed possible methods of obtaining

[20] Specifically, the Rainfall, Runoff, Router, and Rootzone (R4) Model (refer to Section 3 of the *2010 Recharge Master Plan Update* for more discussion on the recharge estimates for future MS4 compliance and more specifically to Appendix C of that report for a description of the R4 Model).

information, and the consensus was to ask Appropriators for assistance. The concept articulated was that the land use planning agencies have adopted General Plans that show, with a fairly high degree of accuracy, planned development information, including the acreage proposed to be developed; in addition, there is likely a projected timeline for development to occur. Watermaster staff issued a request by email to the Appropriators, requesting that, if they were a landuse control agency, that they could provide this planning information to Watermaster staff, If not a landuse control agency, its was requested that the Appropriator request this information from the landuse control agency whose areas they serve and provide it to Watermaster staff. Only a few agencies responded, and their responses suggested a lack of confidence in the rate of future development. The response received, or lack thereof, reflects the level of confidence the Appropriators and landuse control agencies have in predicting future development.

5.3 Alternatives for Estimation of Net New Recharge from MS4 Projects

Three alternative procedures were discussed by the Steering Committee. These alternatives included:

- Alternative 1 – Project-specific monitoring, reporting, and accounting
- Alternative 2 – Indirect estimation during the periodic redetermination of safe yield
- Alternative 3 – a hybrid of Alternatives 1 and 2.

5.3.1 Alternative 1 Project-Specific Monitoring, Reporting, and Accounting Alternative

In this alternative, systematic data collection and evaluation would be used to identify MS4 projects as they were implemented and estimate the projected long-term average annual net new stormwater recharge estimates for each project in the year that they were reported to the Watermaster. This alternative was identified by the Subcommittee.[21] The process to identify these projects and estimate net new recharge is illustrated in Figure 5-1 and Table 5-1. Figure 5-1 defines the proposed timeline and roles of the Chino Basin Watermaster and the Appropriator parties in this alternative. The process Figure 5-1 shows is as follows:

- The Watermaster will send quarterly reminders to the Appropriator parties to collect and compile Water Quality Management Plan (WQMP) reports and "as-built" drawings for all MS4 projects constructed (herein, collectively referred to as MS4 documentation) in the current fiscal year.

[21] The Subcommittee presented this alternative to the 2013 RMPU Steering Committee on February 7, 2013, and subsequently modified it to incorporate Steering Committee comments.

- In August, the Watermaster will request MS4 documentation from the Appropriators.
- The Appropriators will provide the MS4 documentation to the Watermaster in September in a digital format (e.g., an Adobe .pdf document).
- Watermaster staff will review the MS4 documentation, extract the information required to estimate the net new stormwater recharge from each new stormwater management facility. These recharge estimates will be prepared in October. The results will be provided in the format shown in Table 5-1.
- Watermaster will prepare and distribute these estimates in an annual report in November.
- Watermaster will true up the net new stormwater recharge estimates during the next scheduled safe yield redetermination.
- The trued up values will be included in this safe yield redetermination.

Table 5-1 lists the data required to create an annual report and quantify the theoretical potential New Yield. The table is organized as follows by column number.

1. Project Name
2. Date of Entry
3. Existence (or not) of Signed Maintenance Agreement
4. Ongoing Maintenance Verified (Every 3 years)
5. MS4-Required Capture volume (cubic feet)
6. Constructed Capture Volume (cubic feet)
7. Long-Term Average Annual Runoff from Site (acre-ft/yr)
8. Estimate of Pre-Project On-Site Incidental Recharge (acre-ft/yr)
9. Decrease in Recharge at Downstream Stormwater Management Facilities with MS4-required Capture Volume (acre-ft/yr)
10. Decrease in Recharge at Downstream Stormwater Management Facilities with Constructed Capture Volume (acre-ft/yr)
11. Long-Term Average Annual Recharge with MS4-Required Capture Volume (acre-ft/yr)
12. Long-Term Average Annual Recharge with Constructed Capture Volume (acre-ft/yr)

13. Long-Term Average Annual Net New Recharge with MS4-Required Capture Volume (acre-ft/yr)

14. Long-Term Average Annual Net New Recharge with Constructed Capture Volume (acre-ft/yr)

15. Chino Basin Management Zone

16. County

17. Land Use Control Agency

18. Service Provider (Appropriator)

The information contained in columns 1, 5, 6, and 15 through 18 can be found in the Water Quality Management Plan (WQMP) and drainage study reports associated with new development. Column 2 needs to be verified by the Appropriator when the project is built.

Columns 3 and 4 need to be provided by the Appropriator. Orders R8-2010-0036 and R8-2010-0033 contains the following language in reference to the operation and maintenance of post-construction best management practices (BMPs):

1. The Permittees shall ensure, to the maximum extent possible (MEP), that all post-construction BMPs continue to operate as designed and implemented with control measures necessary to effectively minimize the creation of nuisance or pollution associated with vectors, such as mosquitoes, rodents, flies, etc. WQMPs shall identify the responsible party for maintenance, including vector minimization and control measures, and funding source(s) for operation and maintenance of all site design and structural treatment control systems. Permittees shall, through conditions of approval and during inspections, ensure proper maintenance and operation of all permanent structural post-construction BMPs installed in new developments. Design of these structures shall allow adequate access for maintenance.

2. Within twelve months of adoption of this Order, the Permittees shall develop a database to track operation and maintenance of post-construction BMPs. The database should include available BMP information such as the type of BMP design, location of BMPs (latitude and longitude), date of construction, party responsible for maintenance, maintenance frequency, source of funding for operation and maintenance, maintenance verification, and any problems identified during inspection including any vector or nuisance problems. A copy of this database shall be submitted with the annual report.

The values in columns 7 through 14 would be calculated using modeling tools, such as those used in the 2010 RMPU, and the Chino Basin Groundwater Model. Models are required to estimate stormwater recharge at the new MS4 facilities as these facilities are currently not metered nor can they be practically metered. Models are required to estimate pre-project incidental recharge and the impact of recharge at MS4 facilities on existing downstream stormwater management facilities. The existing modeling tools would be modified to enable

Watermaster staff to efficiently estimate net new recharge from each MS4 project. The approximate cost to develop, demonstrate and document these modeling tools is about $50,000.[22] The cost to apply these tools to individual MS4 projects would be about $1,600 each.

The Chino Fire Station No.1 and Training Center was chosen by Watermaster staff to be a case study to demonstrate the major features of this alternative. Chino Fire Station 1 is located on a 3.6-acre site on the northeast corner of Schaefer and 4th Street. The WQMP for this site was provided by the City and reviewed by Watermaster staff. The data and results of this case study are shown in Table 5-1. The site has three subareas that drain to three bio retention basins. The storage capacity of the bio retention basins is made up of 1) the surface volume of the swale, 2) the subsurface 6-foot diameter perforated storm drain which is filled through grated inlets, and 3) the volume of the void spaces that fill the 12-foot deep space below the bio retention basin. The total storage capacity was estimated to be about 24,243 cubic feet or about 0.55 acre-ft (column 6 on Table 5-1). The MS4 permit required stormwater management volume is 15,857 cubic feet or about 0.36 acre-ft (column 5 on Table 5-1).

The long-term average annual runoff generated on the project site is 3.17 acre-ft/yr (column 7 on Table 5-1). The pre-project condition was assumed to be the land use immediately before development; in this case vacant land[23]. The long-term average annual deep infiltration of precipitation for the pre-project condition was estimated to be about 1.33 acre-ft/yr (column 8 on Table 5-1). The table below shows the calculation of long-term average annual net new recharge (in units of acre-ft/yr) as a function of infiltration rate.

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[22] The cost to revise the models alone is about $8,000. The additional cost includes the cost of documentation and demonstrating model to the Watermaster.

[23] The appropriate assumption for pre-project condition is a significant unknown. The Steering Committee members have suggested various options, including [i] land use immediately before development; [ii] land use in 1974, representing the end of the model calibration period; [iii] land use at the time nearby flood control channels were concrete-lined, representing the loss of infiltration in those channels; and [iv] June 1, 2000 to be consistent with the definition of New Yield in the Peace Agreement. For this example, we have used the first of these possibilities.

Estimated Long-Term Recharge Estimates for the Chino Fire Station No.1 and Training Center

	MS4-Required Capture Volume		Constructed Capture Volume	
Infiltration rate for MS4 Facility	0.5 ft/day	1.0 ft/day	0.5 ft/day	1.0 ft/day
Pre-project Deep Infiltration of Precipitation	1.33	1.33	1.33	1.33
Recharge at MS4 Facility	2.12	2.47	2.55	2.82
Net New Recharge	0.79	1.14	1.22	1.49

The recharge volumes shown in Table 5-1 columns 11 through 14 correspond to an infiltration rate of 0.5 ft/day. These recharge estimates assume that the infiltration rate is constant over the life of the project.

This project is located downstream of the existing regional stormwater management facilities; therefore, an adjustment is not required to account for the reduction in recharge at the regional stormwater management facilities that might be caused by construction of the BMP at the Chino Fire Station.

5.3.2 Alternative 2 Indirect Estimation during the Periodic Re-determination of Safe Yield Alternative

Watermaster is currently in the process of re-determining safe yield and will re-determine safe yield periodically in the future.[24] In this alternative, in regard to MS4 recharge, the net new recharge from determining safe yield would be automatically incorporated into the safe yield and the direct estimation of net new recharge would not be made. The volume of net new stormwater recharge caused by the implementation of stormwater management projects pursuant to the MS4 permit would likely be included as a minor calibration adjustment to parameters used in the equations (processes) that estimate the deep infiltration of precipitation and applied water.

5.3.3 Alternative 3 Hybrid Alternative

Watermaster staff would annually acquire and store electronic versions of MS4 project-related reports and maintenance verification databases. When scoping a future safe yield

[24] Watermaster is required to re-determine the safe yield every ten years pursuant to the OBMP Implementation Plan (page 45).

re-determination, Watermaster would use its judgment and discretion to determine if there has been a significant potential increase in MS4 project-related recharge. If judged significant, the Watermaster would explicitly incorporate significant MS4 projects into the modeling and other technical activities required to re-determine safe yield. The calibration process for the groundwater model used in the safe yield re-determination would be used to refine the MS4 recharge estimates. Net new recharge would be estimated by rerunning the calibration without the new MS4 facilities and comparing both simulations.

5.4 Alternatives Comparison

Three criteria were used to evaluate these alternative methods to estimate net new recharge from MS4 projects: timeliness of the estimates, relative cost, and expected relative accuracy. This comparison is shown in Table 5-2 and discussed below.

5.4.1 Timeliness of Estimates

The timeliness criterion speaks to the utility of the net new stormwater recharge being classified as New Yield and assigned to the Appropriators pursuant to the Peace Agreement. Alternative 1, the *project specific monitoring, reporting and accounting alternative,* will produce net new stormwater recharge estimates each year while the other two alternatives will produce estimates when Watermaster re-determines safe yield. The utility of annual net new stormwater recharge estimates over less frequent estimates would be the development of New Yield estimates and the allocation of these New Yield estimates in the Watermaster assessment process pursuant to the Peace Agreement.

The accuracy of net new recharge estimates *from Alternative 1* will likely be challenged during subsequent safe yield re-determination causing Watermaster to make downward corrective adjustments in future assessment processes. By contrast the other two alternatives will not provide timely estimates of New Yield – they will provide estimates of changes in safe yield that may or may not be attributable to new stormwater recharge.

5.4.2 Relative Cost

The relative cost to estimate net new stormwater recharge would be least (probably zero) for Alternative 2 and greatest for Alternative 1. Alternative 3, the *hybrid alternative,* would be relatively close in cost to *Alternative 2* provided that Watermaster annually acquires and stores electronic versions of the MS4 project related reports and maintenance verification databases that are developed by the land use control agencies and mandated by the Regional Board.

5.4.3 Expected Relative Accuracy of the Net New Recharge Estimate

The expected relative accuracy of the net new stormwater recharge estimates derived by Alternative 1 would be the lowest of the three alternatives because there is no way to validate the estimates. Alternative 3 is expected to have the greatest accuracy because preliminary estimates of the net new recharge and its location can be made (a theoretical cap) and subsequently adjusted and validated in calibration. The expected relative accuracy criterion is not applicable to Alternative 2 because net new stormwater recharge would not be explicitly estimated.

5.4.4 Discussion

The net new recharge from MS4 project implementation may, in the fullness of time, add significant recharge to the Chino Basin but there is reason to doubt that over the next 20 to 30 years that it will do so. First, it will be difficult to monitor on the surface and verify that each project is operating at design capacity. There are no provisions for monitoring the volume of water that will be recharged at these proposed facilities, and in most cases, it will be impossible to monitor them for recharge. From an engineering perspective, there is considerable doubt that most of these facilities can be maintained to ensure that these facilities will perform consistently and as designed for the next 20 to 30 years.

Second, these facilities will be constructed for new development and redevelopment. This means that these facilities will be constructed for relatively small areas spanning decades of time and thus will gradually increase recharge over time with each project contributing small amounts of new recharge. New, small amounts of recharge occurring over time and distributed across the basin will not noticeably impact groundwater levels and hence safe yield for several years[25], perhaps decades. The implication of the slow accumulation of net new recharge is that it will be difficult to quantify the changes in safe yield attributable to the MS4 project implementation in subsequent safe yield determination until considerable recharge, say 50,000 to 100,000 acre-ft, has occurred and accumulated in the basin.

If Alternative 1 were implemented, it's likely that most of the New Yield estimated directly from the MS4 project documents will have to retracted in the next safe yield determination, that will be done in 2021. Alternatives 2 and 3 will not have this problem, and Alternative 3 has the best chance of providing estimates of net new recharge from implementation of future MS4 projects.

Alternative 3 is the most appropriate way to estimate net new stormwater recharge. Alternative 3 will produce the most accurate estimates of the safe yield during future safe yield re-determination efforts.

5.5 Recommended Alternative

At the May 16, 2013 and June 6, 2013 Steering Committee meetings, the Committee discussed these three alternatives recommended Watermaster implement Alternative 3, and to

[25] Due to the time lag between recharge at the ground surface and arrival at the water table and the availability of groundwater level observations to sense it.

periodically review the time and effort in its implementation, and reassess the value provided by it. They further recommended that Watermaster subsequently implement Alternative 2 if the landuse agencies do not consistently provide the data to Watermaster or, based on the completeness and usefulness of the submitted data, the data collection effort is of limited value. As part of this alternative, Watermaster will keep updated maps and lists that document the available information on MS4 compliance measures received by Watermaster, and this information will be reviewed annually.

Table 5-1
Sample Annual Report to be Produced by Watermaster

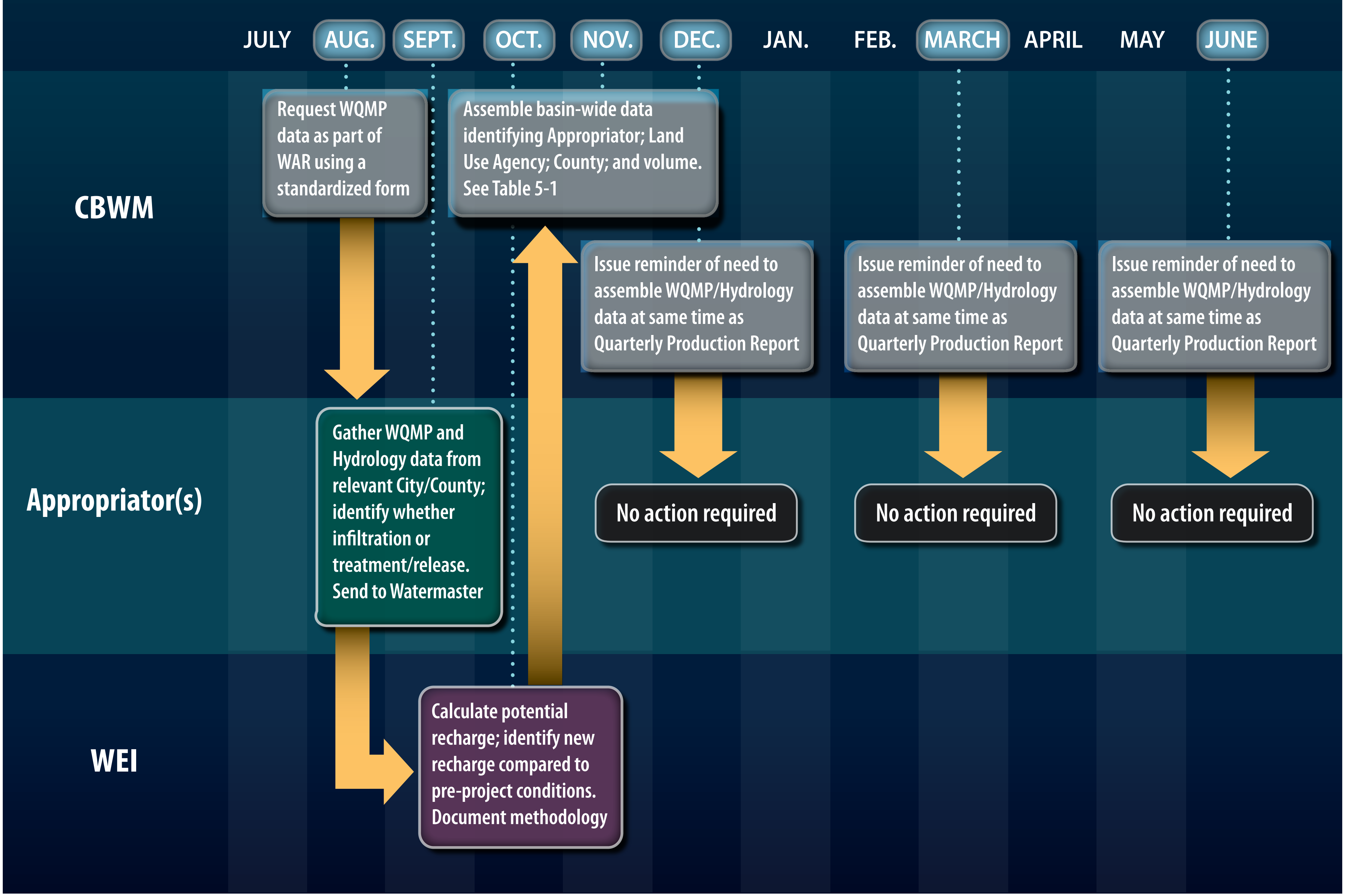
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13) =(11)-(8)-(9)	(14) =(12)-(8)-(10)	(15)	(16)	(17)	(18)
Project Name	Date of Entry	Existence (or not) of Signed Maintenance Agreement	Ongoing Maintenance Verified (every 3 years)	MS4-Required Capture Volume (cubic feet)	Constructed Capture Volume (cubic feet)	Long-Term Average Annual Runoff from Site (acre-ft/yr)	Estimate of Pre-Project On-Site Incidental Recharge (acre-ft/yr)	Decrease in Recharge at Downstream Stormwater Management Facilities (acre-ft/yr)		Long-Term Average Annual Recharge[1] (acre-ft/yr)		Long-Term Average Annual Net New Recharge (acre-ft/yr)		Chino Basin MZ	County	Land Use Control Agency	Service Provider (Appropriator)
								MS4-Required Capture Volume	Constructed Capture Volume	MS4-Required Capture Volume	Constructed Capture Volume	MS4-Required Capture Volume	Constructed Capture Volume				
Chino Fire Station No. 1				15,857	24,243	3.17	1.33	0	0	2.12	2.55	0.79	1.22	1	SB	City of Chino	City of Chino

[1]The long-term average annual recharge assumes an infiltration rate of 0.5 ft/day.

Table 5-2
Comparison of Alternatives to Estimate Net New Recharge from New MS4 Projects

Criterion	Alternative to Compute Net New Recharge		
	Project-Specific Monitoring, Reporting, and Accounting	Indirect Estimation During the Periodic Redetermination of Safe Yield	Hybrid
Summary of Method	Collect MS4 related documentation from Appropriators annually and use modeling tools to estimate long term average net new recharge.	Use future model calibration efforts to adjust areal recharge estimates (deep infiltration of precipitation and applied water) if necessary to account for new recharge from new MS4 facilities.	Collect MS4 related documentation from Appropriators annually and file for later review. Incorporate constructed MS4 facilities into recharge models and subsequent groundwater model calibration to estimate actual recharge from MS4 facilities. Net new recharge would be estimated by rerunning the calibration without the New MS4 facilities and comparing both simulations.
Timeliness of Information	Long-term average annual net new recharge is computed annually as new facilities come online.	Safe yield is redetermined every ten years.	Estimates of net new recharge will be computed when Watermaster redetermines safe yield. Safe yield is redetermined every ten years.
Cost	One time cost to revise recharge models. Annual cost to compile MS4 documentation and estimate net new recharge.	No new cost.	Annual cost to compile MS4 documentation and minor cost to incorporate into the groundwater model recalibration.
Relative Accuracy of Net New Recharge Estimate	Least because there is no way to validate estimates.	Not applicable because the net new recharge would not be estimated and would be incorporated directly into the safe yield.	Greatest because the groundwater level response due to new recharge can be validated by comparing groundwater model projected groundwater levels to measure groundwater levels. Could be years before the groundwater levels respond significantly to recharge from MS4 facilities -- the hybrid approach has the capability of assessing this lag.

Figure 5-1 MS4 Recharge Data Gathering and Accounting Procedure



Section 6 – Recharge Options to Improve Yield and Assure Sustainability

6.1 Background

In June 2012, Watermaster staff sent a "call for projects" to the Watermaster parties, seeking their recommendations for recharge improvement projects. Responses were provided by the CBWCD, Cities of Fontana, Ontario and Upland, the JCSD; and the IEUA. Watermaster staff combined these proposed projects with the 2010 RMPU projects and subsequently prepared an initial listing of these projects in July 2012.

The Steering Committee conducted seven meetings to discuss these recharge projects, among other things, over the period of July 19, 2012 through November 29, 2012. The projects in the initial list were characterized by their potential impact on production sustainability and their contribution to improving the balance of recharge and discharge in the Basin. Several potential project groupings based on these characterizations were discussed by the Steering Committee. At the end of these discussions, the Steering Committee recommended the complete initial list of projects be included by the Watermaster for consideration in the 2013 RMPU Amendment process. The Steering Committee recommendation was based on the collective opinion that the cost and benefit of each project should be understood before any projects were eliminated from consideration.

The Steering Committee recommendations are included in Table 6-1 which lists these projects. This table is described in more detail below. The final project list is a result of extensive discussions in which all the Steering Committee members' comments and suggestions were considered. The final list of projects for consideration in the 2013 RMPU Amendment was approved in December 2012 by the Watermaster Pool Committees, the Advisory Committee and the Board.

6.2 Recharge Projects Being Considered

Table 6-1 lists the projects submitted by the Steering Committee for consideration in the 2013 RMPU Amendment as approved by the Watermaster. Figure 6-1 shows the approximate location of these projects. The projects can be grouped by owner/advocate to include the 2010 RMPU projects, IEUA suggested projects, and projects suggested by Parties. Those projects characterized as 2010 RMPU projects include those projects included in the 2010 RMPU. In November 2011, the Steering Committee requested that IEUA develop a list of improvements and suggested actions that, based on their experience in operating the CBFIP facilities, could increase stormwater recharge at a reasonable cost – the IEUA suggested projects include these projects. Finally, several Watermaster Parties suggested projects that include stormwater management facilities and other recharge facilities that can be used to improve sustainable production in the JCSD and CDA Desalter II well field areas.

Table 6-1 lists the projects and other information that was used by the Steering Committee to characterize the projects.[26] Table 6-1 contains the following:

- Project Name – generally a facility name or, in some cases, a name more descriptive of what the project does.
- Facility Owner – generally the facility owner for an existing stormwater management facility or the probable owner for a future stormwater management facility or other recharge facility.
- Project Advocate – generally the entity that proposed the recharge project. In IEUA's case, "IEUA" is used herein to represent a larger group of stakeholders including IEUA that "advocate" the project.
- Map Code – denotes a location code for the project on Figure 6-1.
- Management Zone – denotes the management zone(s) that will be directly recharged from the proposed project.
- Estimated Increase in Recharge from Improvements – if known, contains estimates of the three sources of water that could potentially be recharged: storm and dry-weather discharge, imported water, and recycled water.
- Proposed Improvements – includes a list of the proposed improvements, their cost if known, and expected benefits.

The proposed improvements are characterized with either a: "C" which means a capital improvement, an "O," which signifies an operational improvement, or an "I" which signifies a proposed investigation. Capital improvements could include the construction or expansion of new basins, drainage improvements, pump stations and other conveyance facilities, etc. Operational improvements include more aggressive operations and maintenance activities that will increase stormwater recharge. The types of investigations proposed in Table 6-1 include investigations to determine: the recharge feasibility on presently undeveloped land, the causes of poor infiltration performance at select existing basins and ways to improve their infiltration rates, the feasibility of recycled water recharge in select existing basins, and the feasibility of drainage improvements in the Cucamonga Basin that could increase recharge in the Chino and Cucamonga Basins.

All the proposed projects listed in Table 6-1 will be evaluated using the evaluation criteria discussed in Section 7 Evaluation Criteria. Section 8 summarizes the evaluation and ranking of the proposed projects and Appendix D contains the detailed evaluation of the proposed projects.

[26] Table 6-1 is a summary table that was based on a more expansive table.

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Management Zone 1								
15th Street Basin	City of Upland	IEUA	20	Unknown	Unknown	Unknown	I1 Investigate ways to improve storm and supplemental water recharge	1. Increase storm and supplemental water recharge
Upland Basin	City of Upland	City of Upland	22	na	na	Unknown	I1 Investigate the recharge of recycled water	1. Increase the recharge of recycled water; helps achieve the Peace II 6,500 acre-ft/yr recharge commitment to MZ1
		IEUA		Unknown	Unknown	na	C1 Construct a low-level drain or pump station to drain basin for maintenance	1. Increase recharge of storm and imported water
Montclair Basins	CBWCD	CBWCD	23	150 to 200	Unknown	na	C1 Clean and grub Basin 4, remove 5 feet of bottom materials from Basin 4, construct pump stations and pipelines to convey water from Basin 4 to Basins 2 and 3 and from Basin 3 to Basin 2	1. Increase storm water recharge
		IEUA		Unknown	Unknown	na	C2 Construct new inlets from San Antonio Creek to Basins 2 and 3	1. Increase storm water recharge
				Unknown	Unknown	na	C3 Automate inlet to Basin 1	1. Increase storm water recharge
				Unknown	Unknown	na	C4 Construct low-level drains from Basin 1 to 2 and 2 to 3	1. Increase recharge of storm and imported water
				na	na	na	I1 Investigate the recharge of recycled water	1. Increase the recharge of recycled water; helps achieve the Peace II 6,500 acre-ft/yr recharge commitment to MZ1
College Heights	CBWCD	IEUA	24	Unknown	Unknown	na	C1 Construct internal berms to reduce seepage to Upland Basin	1. Increase recharge of imported water
				na	na	unknown	I1 Investigate the recharge of recycled water	1. Increase the recharge of recycled water; helps achieve the Peace II 6,500 acre-ft/yr recharge commitment to MZ1
Brooks Basin	CBWCD	IEUA	25	Unknown	Unknown	Unknown	O1 Remove trees from below high-water line	
				Unknown	na	Unknown	I1 Investigate the rerouting of recycled water and street runoff to State Street storm drain	1. Increase storm and recycled water recharge
				Unknown	Unknown	Unknown	I2 Evaluate the installation of a low elevation pump station to drain basin for maintenance	1. Increase storm and storm and supplemental water recharge
North West Upland Basin	City of Upland	City of Upland	36	Unknown	Unknown	Unknown	C1 Construct a new stormwater management basin that will recharge water	1. Increase storm water recharge with unknown potential for supplemental water recharge.

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Management Zone 2								
Princeton Basin	City of Ontario	City of Ontario, IEUA	21	Unknown	Unknown	Unknown	C1 Construct improvements to enable storm and supplemental water recharge	1. Increase recharge of storm and supplemental water
San Sevaine Basins 1 - 5 Improvements	SBCFCD	IEUA	5	Unknown	Unknown	Unknown	C1 Construct Internal berms in SS1 and SS2	1. Would help mitigate vector problems
				Unknown	Unknown	Unknown	C2 Install gate between SS1 and SS2	
				Unknown	Unknown	Unknown	C3 Construct internal berms in SS5	1. Would help mitigate vector problems and increase recharge capacity for storm and supplemental water
				Unknown	Unknown	Unknown	C4 Construct pump station from SS5 to SS3 or higher	1. Increase storm and recycled water recharge capacity
				Unknown	Unknown	Unknown	C5 Extend IEUA recycled water pipeline to SS3 or higher	1. Increase recycled water recharge
				Unknown	Unknown	Unknown	C6 CB13T power supply	
				na	Unknown	Unknown	C7 Increase CB13T capacity	1. Increase imported and recycled waters recharge
				Unknown	Unknown	Unknown	I1 Investigate SS5 poor infiltration rate	1. Increase storm and supplemental water recharge
				Unknown	Unknown	Unknown	I2 Evaluation of Etiwanda Creek and San Sevaine Channel area properties for new recharge sites	1. Increase storm and supplemental water recharge
				na	na	Unknown	I3 Conduct investigation/regulatory process to permit recycled water recharge in SS1 through SS4	1. Increase recycled water recharge
Etiwanda Debris Basin	SBCFCD	IEUA	6	Unknown	Unknown	Unknown	O1 Rip basin and shore up Berm	1. Increase storm and imported water recharge
				na	na	na	I1 Evaluate opportunity to use the "Etiwanda habitat Area" for recharge use	Increase storm and imported water recharge
Victoria Basin	SBCFCD	IEUA	7	Unknown	Unknown	Unknown	C1 Abandon the mid-level outlet	1. Increase storm and supplemental water recharge
				Unknown	Unknown	Unknown	C2 Remove fine-grained materials from basin floor	1. Increase storm and supplemental water recharge
				na	na	Unknown	C3 Extension of lysimeters	1. Increase the amount of recycled water recharge
Hickory Basin	SBCFCD	IEUA	9	na	na	na	O1 Increase frequency of basin maintenance	1. Increase storm and supplemental water recharge

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Lower Day Basin	SBCFCD	IEUA	10	Unknown	Unknown	Unknown	C1 Install gate on mid-level outlet to increase conservation storage	1. Increase storm and supplemental water recharge
				1,470	Unknown	Unknown	C2 Improve inlet per 2010 RMPU	1. Increase storm and recycled water recharge
				Unknown	Unknown	Unknown	I1 Evaluate the use of the northern part of the basin	1. Increase storm and supplemental water recharge
				Unknown	na	na	I2 Evaluate recharge potential of 200 acre-s of SBCFCD land just north of the 210 freeway	1. Increase storm and supplemental water recharge
Existing Turner Basins	CBWCD, SBCFCD	IEUA	16	Unknown	Unknown	Unknown	C1 Raise the Turner 2 spillway	1. Increase storm water recharge
				na	na	na	I1 Evaluate the property next to Turner 1 as a potential recycled water storage site	1 Increase recycled water recharge
Turner Basin Expansion East of Archibald Ave	IEUA	2010 RMPU	35	1,300	na	Unknown	C1 Construct basin and appurtenances	1. Increase storm and supplemental water recharge
Ely Basin	CBWCD, SBCFCD	IEUA	19	Unknown	na	Unknown	O1 Increase maintenance frequency	1. Increase storm and recycled water recharge
				Unknown	na	Unknown	I1 Investigate the poor infiltration rate	1. Increase storm and recycled water recharge
	City of Ontario	City of Ontario		Unknown	na	Unknown	C1 Construct storm drain improvements to increase drainage area by 770 acres and increase the conservation storage in the Ely Basin by 310 acre-ft.	1. Increase storm water recharge and potentially recycled water recharge.
Ontario Municipal Services Center Bioswale Project	City of Ontario	City of Ontario	37	1	na	na	C1. Construct infiltration/detention basin approximately 35 feet wide x 580 feet long with a depth varying from 0 to 4 feet.	1. Increase storm water recharge.
Lower San Sevaine Basin	TBD	2010 RMPU	34	1,679	Unknown	Unknown	C1 Construct basin and appurtenances	1. Increase storm and supplemental water recharge
Regulatory Storage in the Alta Loma Basin	SBCFCD	IEUA	34	Unknown	na	Unknown	C1 Improve basin and construct appurtenances	1. Increase storm water recharge in the Turner Basins

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Management Zones 2 and 3 Capture, Pump and Recharge Project								
Lower Cucamonga Basin	TBD	2010 RMPU	17	na	na	na	C1 Construct Basin C2 Construct a pump station and pipeline to Wineville Basin with a 20 cfs diversion rate	1. Increase stormwater recharge at other basins by pumping storm water captured at the LCB to other recharge basins; could increase recycled water by providing diluent water
Wineville Basin to Etiwanda Pump Station	TBD	2010 RMPU	26	na	na	na	C1 Construct a pump station and pipeline to Etiwanda Pump Station with a 40 cfs diversion rate	1. Increase stormwater recharge at other basins by pumping storm water captured at the Lower Cucamonga, Wineville and Jurupa Basins to other recharge basins; could increase recycled water by providing new diluent water supply
Etiwanda Pump Station & Pipeline to Hickory	TBD	2010 RMPU	27	2	na	na	C1 Construct a pump station and pipeline to Hickory Basin with a 40 cfs diversion rate	
Hickory Pump Station & Pipeline to Victoria	TBD	2010 RMPU	28	810	na	na	C1 Construct a pump station and pipeline to Victoria Basin with a 40 cfs diversion rate	
Hickory Pump Station & Pipeline to Banana	TBD	2010 RMPU	29	520	na	na	C1 Construct a pump station and pipeline to Banana Basin with a 6 cfs diversion rate	
Victoria Pump Station & Pipeline to Lower Day	TBD	2010 RMPU	30	260	na	na	C1 Construct a pump station and pipeline to Lower Day Basin with a 8 cfs diversion rate	
Victoria Pump Station & Pipeline to Etiwanda Debris	TBD	2010 RMPU	31	720	na	na	C1 Construct a pump station and pipeline to Etiwanda Debris Basin with a 7 cfs diversion rate	
Victoria Pump Station & Pipeline to San Sevaine 1-4	TBD	2010 RMPU	32	4,100	na	na	C1 Construct a pump station and pipeline to San Sevaine 1-4 Basins with a 27 cfs diversion rate	
Victoria Pump Station & Pipeline to San Sevaine 5	TBD	2010 RMPU	33	550	na	na	C1 Construct a pump station and pipeline to San Sevaine 5 Basin with a 17 cfs diversion rate	

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Management Zone 3								
CSI Storm Water Basin	CSI	CSI	38	Unknown	Unknown	Unknown	C1 Expand Basin Volume and construct recycled water recharge improvements	1. Increase storm water recharge with unknown potential for supplemental water recharge.
Wineville Basin	SBCFCD	2010 RMPU	11	1,529	0	0	C1 Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway	1. Increase storm water and supplemental water recharge
				0	0	0	C2 Construct a pump station and pipeline to Jurupa Basin with a 20 cfs diversion rate	1. Divert storm water from the Day Creek system for recharge in RP3 and Declez Basins
				0	0	0	C3 Construct pump station and pipeline to Etiwanda Basin with a 40 cfs diversion rate	1. Divert storm water from the Day Creek system to recharge basins high up in the San Sevaine system and to the Lower Day Creek Basin
Jurupa Basin	SBCFCD	2010 RMPU	15	0	0	0	C1 Inlet improvements	1. Increase storm and supplemental water recharge at RP3 and Declez Basins
				0	0	0	C2 Construct a pump station and pipeline to RP3 Basins with a 40 cfs diversion rate	1. Increase storm and supplemental water recharge at RP3 and Declez Basins
				0	0	0	C3 Increase conservation storage by basin enlargement	1. Increase storm and recycled water recharge at RP3 and Declez Basins
				na	Unknown	Unknown	C3 Increase CB18 turnout capacity	1. Increase supplemental water recharge at RP3 and Declez Basins
				na	na	na	I1 Investigate poor recharge capacity	1. Increase storm and supplemental water recharge
RP3 Basins	IEUA	2010 RMPU	13	2,810	Unknown	Unknown	C1 Inlet improvements	1. Increase storm and supplemental water recharge
				733	Unknown	Unknown	C2 Basin Enlargement	1. Increase storm and supplemental water recharge
Vulcan Pit		2010 RMPU	4	1,077	Unknown	Unknown	C1 Basin grading, Inlet and outlet improvements	1. Increase storm and supplemental water recharge
Sierra Avenue Water Conservation Project	City of Fontana	City of Fontana, FWC and JCSD	1	423	Unknown	Unknown	C1 Increase conservation storage, other onsite improvements and connection to recycled water system	1. Increase recharge of storm and recycled waters 2. Improve the balance of recharge and discharge in MZ3
Sultana Avenue/Miller Avenue Water Conservation Improvement Project	City of Fontana	City of Fontana, FWC and JCSD	2	94	Unknown	Unknown	C1 Increase conservation storage, other onsite improvements and connection to recycled water system	1. Increase in yield from storm water recharge and water supply from recycled water recharge 2. Improve the balance of recharge and discharge in MZ3
Alder Basin Water Conservation Improvement Project	City of Fontana	City of Fontana, FWC and JCSD	3	126	Unknown	Unknown	C1 Increase conservation storage, other onsite improvements and connection to recycled water system	1. Increase recharge of storm and recycled water 2. Improve the balance of recharge and discharge in MZ3; not included in Watermaster diversion permits
Banana Basin	SBCFCD	IEUA	8	Unknown	Unknown	Unknown	O1 Increase frequency of basin maintenance	1. Increase storm and supplemental water recharge
				na	na	na	C1 Extend level sensor to more readily monitor recharge at low levels	1. Improve estimates of recharge

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

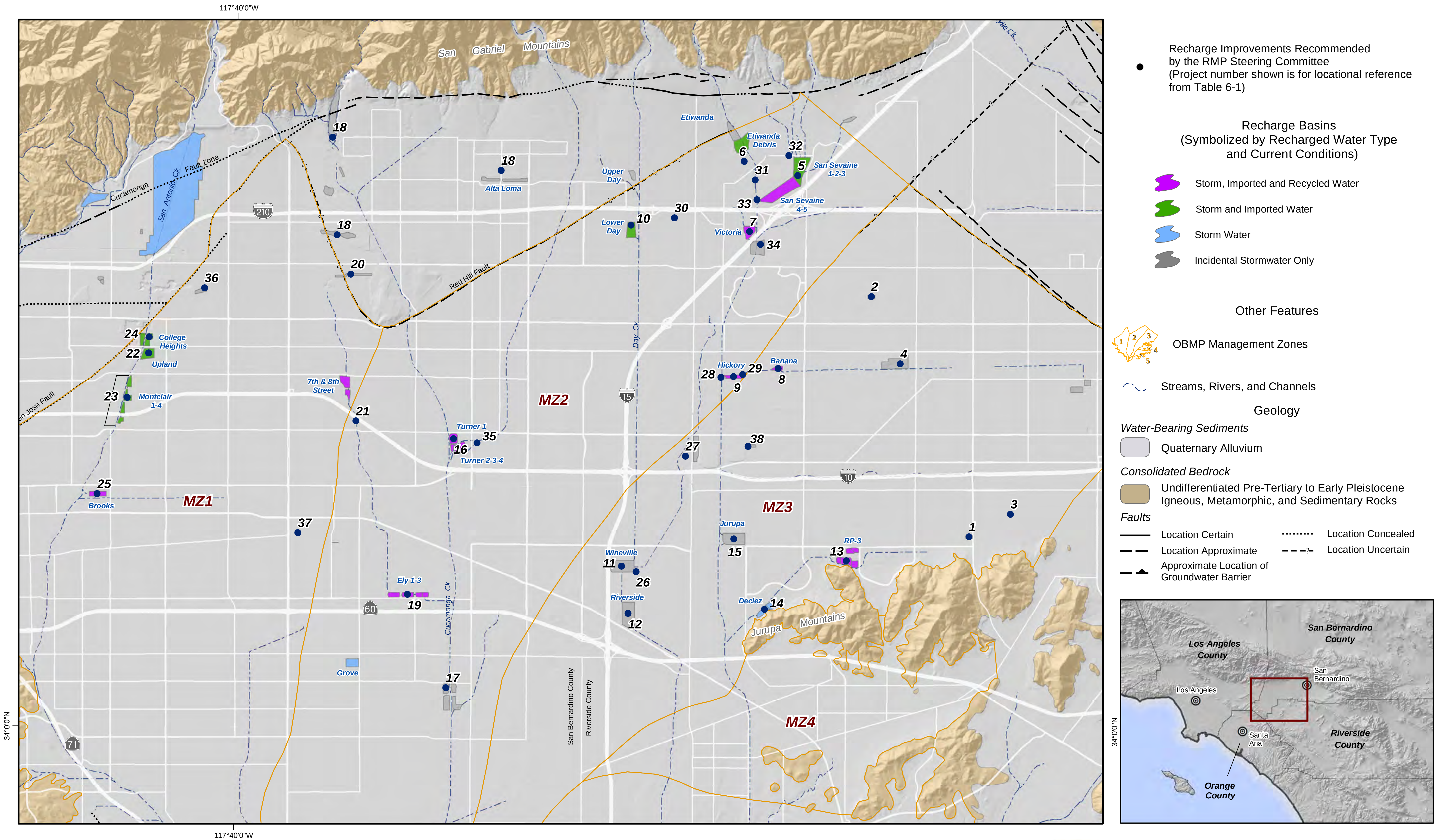
Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Riverside Basin	SBCFCD	IEUA	12	Unknown	Unknown	Unknown	I1 Conduct proof of concept investigation to determine recharge feasibility	1. Increase storm and supplemental water recharge
Basins Adjacent to the RP3 Basins	IEUA	IEUA, JCSD	13	Unknown	Unknown	Unknown	C2 Construct horizontal recharge wells under Fontana RDA and SCE rights of way	1. Increase storm and supplemental water recharge
				na	na	na	I1 Investigate the recharge feasibility of adjacent 60 acres	1. Increase storm and supplemental water recharge
Declez Basin	SBCFCD	IEUA	14	Unknown	Unknown	Unknown	O1 increase basin maintenance frequency	1. Increase storm and supplemental water recharge
				35	Unknown	Unknown	C1 construct improvements per 2010 RMPU	1. Minor increase storm and supplemental water recharge. RMPU did not recommend this project.
				na	na	na	I1 Investigate the recharge feasibility of adjacent 12 acres	1. Increase storm and supplemental water recharge

Table 6-1
Recharge Improvements Recommended by the Chino Basin Recharge Master Plan Steering Committee
For Evaluation in Task 8

Project Name	Facility Owner	Project Advocates[2]	Map Code	Estimated Increase in Recharge from Improvements (acre-ft/yr)			Proposed Improvements	
				Storm/Dry Weather	Imported	Recycled	Description of Improvements[1]	Expected Benefits
Management Zones 3, 4 and 5 Production Sustainability Projects								
Ontario MZ3 In-Lieu	na	City of Ontario and JCSD	na	na	na	na	O1 Exchange 3,200 to 9,500 acre-ft/yr using existing connections from the City of Ontario to JCSD	1. Reduce groundwater production in the JCSD Well Field area
Fontana MZ3 In-Lieu	na	FWC and the JCSD	na	na	na	na	C1 Construct a pipeline to connect to FWC. O1 Exchange 3,200 to 9,500 acre-ft/yr from FWC to JCSD	1. Reduce groundwater production in the JCSD Well Field area
CVWD MZ3 In-Lieu	na	CVWD and JCSD	na	na	na	na	O1 Exchange 3,200 to 9,500 acre-ft/yr from CVWD to JCSD conveyed by City of Ontario or FWC	1. Reduce groundwater production in the JCSD Well Field area
MZ3 In-Lieu Partnership	na	Partnership and the JCSD	na	na	na	na	O1 Exchange 3,200 to 9,500 acre-ft/yr from CVWD, City of Ontario or FWC to JCSD conveyed by some or all of the project owners	1. Reduce groundwater production in the JCSD Well Field area
CDA MZ3 In-Lieu	na	CDA and JCSD	na	na	na	na	O1 Exchange 3,200 to 9,500 acre-ft/yr using existing connections from CDA to JCSD	1. Reduce groundwater production in the JCSD Well Field area
Two JCSD ASR Wells - A	na	City of Ontario and JCSD	na	na	na	na	O1 Exchange 2,680 acre-ft/yr using existing connections from the City of Ontario to JCSD C1 Equip ASR wells	1. Reduce net groundwater production in the JCSD Well Field area
Two JCSD ASR Wells - B	na	FWC and the JCSD	na	na	na	na	C1 Construct a pipeline to connect to FWC. C2 Equip ASR wells O1 Exchange 2,680 acre-ft/yr from FWC to JCSD	1. Reduce net groundwater production in the JCSD Well Field area
Two JCSD ASR Wells - C	na	CVWD and JCSD	na	na	na	na	O1 Exchange 2,680 acre-ft/yr from CVWD to JCSD conveyed by City of Ontario or FWC C1 Equip ASR wells	1. Reduce net groundwater production in the JCSD Well Field area
Two JCSD ASR Wells - Partnership	na	Partnership and the JCSD	na	na	na	na	O1 Exchange 2,680 acre-ft/yr from CVWD, City of Ontario or FWC to JCSD conveyed by some or all of the project owners C1 Equip ASR wells	1. Reduce net groundwater production in the JCSD Well Field area

[1] O=Operational, I=Investigation, C=Capital

[2] In November 2011, the Steering Committee requested that IEUA develop a list of improvements and suggested actions that, based on their experience in operating the CBFIP facilities, could increase stormwater recharge at a reasonable cost – the IEUA suggested projects include these projects. "IEUA" is used herein to represent a larger group of stakeholders including IEUA that "advocate" the project.



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Name: Figure_6-1

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2013 Amendment to the 2010 RMPU

Recharge Improvements Recommended by the RMPU Steering Committee

Figure 6-1

7.1 Background

Section 6 contains lists of projects and project groupings that were reviewed and discussed by the Steering Committee. Subsequently the pool committees, advisory committee, and the Board approved Project Grouping 6, "Maximize Recharge" that is listed in Table 6-1. The project evaluation criteria discussed in this section were adopted by Watermaster to evaluate these projects to determine if the proposed projects are consistent with Watermaster's 2013 goals, to prioritize the projects, and to ultimately provide the Watermaster recommendations for implementation.

7.2 Watermaster's Recharge Goals

Given 2013 planning information discussed in Section 2, Watermaster will not likely be recharging significant quantities of supplemental water in the near future for replenishment purposes. The potential sustainability challenges faced by the JCSD and the CDA cannot be mitigated through spreading alone as was demonstrated in draft Section 3 of the 2013 RMPU Amendment report. Watermaster can work with the Appropriative Pool parties to facilitate the development of in-lieu recharge/exchange and aquifer storage and recovery (ASR) projects to mitigate potential sustainability challenges and direct that replenishment occur by providing replenishment water to the in-lieu recharge/exchange and/or ASR projects. Alternatively, the Appropriative Pool parties could make their own arrangements, independent of the Watermaster, to achieve the same purposes.

Changes in production patterns and reoperation have caused groundwater levels to decline in the northern parts of MZ2 and MZ3, specifically in areas where the CVWD, FWC, and the City of Ontario produce groundwater. Model investigations, discussed in a report titled *2009 Production Optimization and Evaluation of the Peace II Project Description* prepared by WEI suggest that this drawdown will continue through 2030. To improve the balance of recharge and discharge in the northern parts of MZ2 and MZ3, Watermaster could implement storm and dry-weather recharge projects listed in Table 6-1 that recharge in MZ2 and MZ3. These projects would increase the recharge of storm water and dry-weather flow in these management zones and add New Yield to the Chino Basin. Alternatively, a Party could implement these projects and Watermaster could facilitate their implementation by petitioning for amendment of its existing State Water Board stormwater diversion permits to include other recharge sites, in effect "sharing" its rights under its stormwater diversion permits with the implementing Party[27]. In terms of balance, MZ3 has the greatest need of new storm and dry-weather flow recharge and supplemental recharge capacity.

7.2.1 Watermaster Minimum Standard of Performance

The Watermaster is tasked with recharging the Basin in order to fulfill the following numeric obligations: first, the Watermaster coordinates the replenishment of the Basin in order to offset production in excess of the Safe Yield (Judgment, ¶ 49-50); and second, the Watermaster is obligated, pursuant to the Peace and Peace II Agreements, to recharge, on average, 6,500 acre-ft/yr of supplemental water to MZ1 (Peace Agreement, § 5.1[g], Peace II Agreement, § 8.4).

In the 2013 RMPU Amendment, the Watermaster's minimum standard of performance, related to the evaluation of new recharge facilities and their operations, comes from the Peace Agreement and the December 2011 Watermaster Board action. The Peace Agreement § 5.1 (e) items (i), (iii), (v), (vii), and (viii), read as follows (see Peace Agreement, pages 20 and 21):

"Watermaster shall exercise Best Efforts[28] to:

(i) protect and enhance the safe yield of the Chino Basin through Replenishment and Recharge; […]

(iii) direct Recharge relative to Production in each area and sub-area of the Basin to achieve long term balance and to promote the goal of equal access to groundwater in all areas and sub-areas of the Chino Basin; […]

(v) establish and periodically update criteria for the use of water from different sources for Replenishment purposes; […]

(vii) recharge the Chino Basin with water in any area where groundwater levels have declined to such an extent that there is an imminent threat of Material Physical Injury to any party to the Judgment;

(viii) maintain long-term hydrologic balance between total Recharge and discharge in all areas and sub-areas; […]."

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27 The addition of points of diversion to Watermaster's stormwater diversion permits would affect a change only in the ability to divert stormwater pursuant to the permits, as enforced by the California State Water Resources Control Board. Such addition does not contemplate any change in Watermaster's own mechanisms for the allocation of stormwater yield, which is outside the scope of the State Water Resources Control Board's oversight.

28 Best Efforts, per the Peace Agreement (see Peace Agreement, page 4), "means reasonable diligence and reasonable efforts under the totality of the circumstances. Indifference and inaction do not constitute Best Efforts. Futile action(s) are not required."

On December 15, 2011, the Watermaster Board directed that the 2013 RMPU Amendment's Implementation Plan "[…] address balance issues within the Chino Basin subzones […]."[29]

The following conclusions were documented in the draft Sections 2 through 4 herein and the *2009 Production Optimization and Evaluation of the Peace II Project Description*:

- "There is enough existing recharge capacity in the Chino Basin to meet projected replenishment obligations for the foreseeable future. Most of this recharge capacity is in MZ1 and MZ2.

- There are no recharge obstacles to meeting the MZ1 supplemental water recharge requirement of 6,500 acre-ft/yr. The IEUA projects that it will recharge about 3,300 acre-ft/yr of recycled water in MZ1. Therefore, to the extent that the annual replenishment obligation is less than the difference between the MZ1 recharge obligation and recycled water recharged by the IEUA in MZ1, the Watermaster will have to purchase some imported water from Metropolitan and recharge it in MZ1 to meet the 6,500 acre-ft/yr commitment.

- In the future, when the replenishment obligation becomes significant, the Watermaster will lack access to facilities to enable it to direct recharge in such a way as to balance recharge and discharge in MZ3.

- There are potential production sustainability challenges in the JCSD and CDA well field areas located in MZ3, MZ4, and MZ5. This challenge is caused by production in the well fields in excess of recharge and the inability of the aquifer to efficiently transmit recharge to the affected wells. Groundwater modeling investigations over the last five years suggest that the new artificial recharge at existing stormwater retention facilities will provide some benefits towards resolving the sustainability challenge faced by the JCSD and the CDA and that reducing net production in the JCSD well field would be beneficial in resolving the production sustainability challenge."

The following questions were developed for discussion purposes to guide the development of criteria that could be used by the Watermaster and the Parties to determine which projects are consistent with Watermaster goals, to rank the projects, and to determine which projects should be implemented.

Is the Project Cost Effective?

Planning for a storm and dry-weather flow recharge project begins when the estimated present value cost of the new storm water and dry-weather flow recharge project is determined to be less than the present value cost of recharging the next least cost supplemental water. There are limited supplies of recycled water given current and expected future land use at build out. Therefore, the next least cost supply is assumed herein to be imported water from Metropolitan or other imported water that is wheeled into the Chino Basin through

[29] From the minutes of the December 15, 2011 Watermaster Board meeting.

Metropolitan's facilities. The next least cost of supply is assumed herein to be the Metropolitan untreated Tier 1 rate.

A proposed storm and dry-weather flow recharge project will be considered for implementation when the unit cost of new recharge is determined to be comparable to or less than the unit cost of importing a comparable volume of untreated Tier 1 water from Metropolitan. A Funding Plan and an Implementation plan will be presented in Section 8 of the 2013 Amendment (2010 RMPU). These plans will include a list of projects that will collectively make sense to implement after being examined under all of the proposed criteria. The cost effectiveness test of comparison to Tier 1 cost will not be a strict Pass/Fail criterion.

There are limits to funding available to implement these new projects. Thus, the projects that will be implemented must meet the recharge goals and priorities of the Watermaster and must be the most cost-efficient.

Does a Proposed Project Create Significant New Storm Water Recharge and Dry-Weather Flow Recharge?

Smaller projects require relatively more resources to develop and operate than larger projects. For discussion purposes, significant is defined herein to be greater than 100 acre-ft/yr.

Does the Project Create New Supplemental Water Recharge Capacity?

New storm and dry-weather flow recharge facilities can be used to recharge supplemental water if supplemental water can be conveyed to them. In fact, because of the hydrology of the watershed, it is likely that the supplemental water recharge capacity of a new project will be greater than the storm water and dry-weather flow recharge capacity.

There is also the possibility of constructing recharge facilities for supplemental water recharge only. These recharge facilities include injection wells and ASR wells and may include recharge basins.

What are the Barriers to Implementation?

Spreading basins that will be developed from existing retention basins will require outlet controls, SCADA, potentially significant grading, and increased maintenance. The barriers for these recharge projects may include: developing an agreement with the basin owner to construct improvements and allow recharge; the flood control function of an existing or planned retention basin; mitigation for habitat losses and other resource agency requirements; Watermaster material physical injury findings; obtaining the ability, pursuant to a water right permit, to divert water for recharge and subsequent beneficial use; and the potential for diverting water that would otherwise be captured at an existing downstream facility.

For a new spreading basin that would not be otherwise built for flood control purposes, the implementation barriers may include: property acquisition; obtaining change in the general plan to allow the land to be developed as a recharge basin; agreement with the owner of the drainage works to divert storm water and convey excess back to the drainage works;

mitigation for habitat losses and other resource agency requirements; Watermaster material physical injury findings; obtaining the ability, pursuant to a water right permit, to divert water for recharge and subsequent beneficial use; and the potential for diverting water that would otherwise be captured at an existing downstream facility.

The barriers to supplemental water recharge in existing and future retention basins may include: developing agreement with the owners of the basin to allow construction of improvements and supplemental water recharge; cost of obtaining and conveying supplemental water supplies to the basin; obtaining permit to recharge recycled water, conflicting schedules for supplemental water recharge and basin maintenance, mitigation for habitat losses and other resource agency requirements; and Watermaster material physical injury findings.

In-lieu recharge/exchange projects involve the conveyance of supplemental and or groundwater[30] to the JCSD from the Appropriative Pool Parties, the IEUA, the TVMWD, the WMWD, and/or some combination of these sources. Interties would be constructed among these agencies. The barriers to in-lieu recharge/exchange projects anticipated herein include: the drafting of agreements to allow in-lieu recharge/exchange; source water availability and cost, and Watermaster material physical injury findings.

All the ASR projects listed in Table 6-3 involve the JCSD with the injection water supplied by the Appropriative Pool Parties, the IEUA, the TVMWD, the WMWD, or some combination of these sources, as in the in-lieu recharge/exchange projects. In fact, it is possible that the in-lieu recharge/exchange and ASR projects could be combined to form a more robust project. The barriers to the ASR well projects are essentially the same as in-lieu recharge/exchange projects.

Barriers to Implementation cannot be quantitatively assessed. They will be used as a qualitative factor in ranking projects.

Is This Project Solely Required for MS4 Compliance?

If a project on the list is serving the purpose of meeting MS4 compliance exclusively, then that project will not be included in the Funding and Implementation plans. If, on the other hand, the project represents enhancements beyond those required for MS4 compliance, then the enhancements and their associated yield will be considered.

[30] Where this groundwater production would not impact the groundwater levels in the JCSD well field.

7.3 Recommended Criteria

7.3.1 Exercise Best Efforts to Sustain Production in the JCSD Well Field

Watermaster will use its best efforts to facilitate recharge project implementation that sustain groundwater production in the JCSD well field. These projects will have the highest priority in the 2013 RMPU Amendment and, except for cost considerations, will not be comparatively evaluated with storm, dry-weather, and supplemental water recharge projects that use existing and proposed spreading facilities. These new projects need to consider the following:

- The groundwater modeling work described in Section 3, suggested that this could best be done by the JCSD reducing production in their existing well field and either producing groundwater elsewhere or using another water supply in lieu of producing groundwater from the area where their existing wells are located.
- Increasing recharge in existing recharge basins and new recharge accomplished through the conversion of stormwater retention basins to recharge facilities was found to not significantly increase the production sustainability in the JCSD well field.
- The modeling work also demonstrated that reoperation has little impact on sustainable production in the JCSD well field.

These facts mean that the Watermaster and the Parties concentrate their best efforts on projects that reduce groundwater production by JCSD and replace the reduced groundwater production with another supply. This can be accomplished through interconnections with the Appropriative Pool Parties, the IEUA, the TVMWD and/or the WMWD. There are multiple in-lieu recharge/exchange and ASR project alternatives. The criteria that will be applied to evaluate these production sustainability projects:

- Reliability of the supply to ensure sustainability – the project must be sized, scalable, and sourced to ensure sustainability.
- Cost – the cost to the Watermaster and the Parties should be minimized.
- Water quality – the project must not cause new water quality challenges and would hopefully improve groundwater quality.
- Ease of implementation – the project must be readily implementable with minimum institutional and regulatory difficulties.

7.3.2 Storm water and Dry-Weather Flow Recharge Projects

There are three types of storm water recharge projects that include: improvements at existing recharge facilities, improvements at existing storm water management facilities that currently produce only incidental recharge, and new facilities. The criteria that will be applied to storm and dry-weather flow recharge projects (hereafter yield enhancement projects) include:

- Confidence in the estimate of new storm water and dry-weather flow recharge – The procedure used by Watermaster to estimate new stormwater recharge is summarized as follows:
  - Watermaster will develop estimates of stormwater discharge and recharge at all the facilities proposed in Section 6 using the WasteLoad Allocation Model (WLAM), developed by WEI, using current land use and drainage system data and the daily precipitation for the period of July 1, 1949 through June 30, 2011. This is an updated version of the modeling approach used in the 2010 RMPU.
  - WEI will compare the historical recharge performance at existing facilities to the WLAM estimates for the period 2005 through 2011, develop correlation statistics, and implement a bias correction procedure for flow-through, flow-by, and hybrid facilities. All assumptions will be reviewed by the Steering Committee prior to conducting the evaluations.
  - New recharge will be estimated at 90 percent of the bias-corrected model estimate.
- Location of recharge – current preference will be given to MZ3 then MZ2 and then MZ1, up to specific new recharge goals per management zone. These recharge goals are discussed in Section 8 and are based on the 2013 Chino Basin Groundwater Model.
- Expandability of the project to include supplemental water recharge if recharge location is desirable.
- Cost – the cost to the Watermaster and the Parties should be minimized with the goal that the unit cost of the new recharge be less than the Metropolitan Tier 1 untreated rate. The unit cost of recharge will be based on the sum of amortized capital plus operations and maintenance costs divided by average annual new recharge.
- Water quality – the new recharge must not cause existing contaminant plumes to be redirected in such a way as to cause contamination to wells or interfere with existing groundwater cleanup programs.
- Ease of implementation – the project must be readily implementable with minimal institutional and regulatory difficulties.

7.3.3 Application of Criteria

The following information will be compiled, where appropriate, for all of the projects identified in Section 6 for consideration in the 2013 RMPU Amendment:

- Project name and management zone
- Average annual New Yield (new storm and dry-weather flow recharge)
- Average annual new recharge
- Supplemental water recharge capacity
- Capital and operations and maintenance costs
- Supplemental water acquisition cost
- Annual cost of the project and confidence in that cost estimate
- Unit cost of recharge (storm and dry-weather flow recharge separate from supplemental water recharge)[31]
- Production sustainability score[32]
- Management zone where project contributes to balance of recharge and discharge
- Water quality challenges
- Institutional challenges (water rights, access, environmental, and regulatory)

Tables 7-1a through 7-1c are mockups of the table format that will be used for characterizing the MZ3/MZ4/MZ5 production sustainability projects and include: the summary of important project characteristics (Table 7-1a), the final screening of all the projects (Table 7-2b), and the final ranked projects (Table 7-1c).

Table 7-2a through 7-2c are similar table mockups for the yield enhancement projects. Yield enhancement projects with unit cost exceeding the Metropolitan untreated Tier 1 rate may be recommended.

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[31] Expressed in dollars per acre-ft and which includes amortized capital and operations and maintenance costs. The intent is to capture all costs and express it as a unit cost for comparison to the cost of the next least cost supply.

[32] The production sustainability score is a tool to characterize a project's contribution to production sustainability in areas with sustainability challenges. In simple terms, the score will be as follows: 0 – does not contribute to production sustainability; 1 – contributes minimally to production sustainability (a necessary but not sufficient condition of sustainability); 2 – contributes significantly to production sustainability (a necessary and sufficient condition of sustainability).

Table 7-1a
Project Data for MZ3/MZ4/MZ5 Sustainability Projects

Project	Management Zone	Summary of Key Project Features	New Recharge	Capital Cost	Annualized Capital Cost	Annual O&M Cost	Other Annual Cost	Supplemental Water Acquisition Cost	Total Annual Cost	Unit Cost	Reliability of the Water Supply	Production Sustainability Score
X_1												
X_2												
"												
"												
"												
X_z												

Table 7-1b
Screening of MZ3/MZ4/MZ5 Sustainability Projects

Project	New Recharge	Unit Cost	Capital Cost	Reliaiblity of the Water Supply	Water Quality Challenges	Institutional Challenges
X_m						
X_j						
"						
"						
"						
X_q						

Table 7-1c
Ranked MZ3/MZ4/MZ5 Sustainability Projects

Project	New Recharge	Unit Cost[1]	Capital Cost
Recommended Projects			
X_l			
X_n			
X_q			
Total of Recommended Projects[1]			
Other Projects			
Xa			
Xb			
"			
"			
Xz			

[1] "Total" unit cost is a yield-weighted average.

Table 7-2a
Project Data for Yield Enhancement Projects

Project	Management Zone	Summary of Key Project Features	New Yield	Capital Cost	Annualized Capital Cost	Annual O&M Cost	Other Annual Cost	Supplemental Water Acquisition Cost	Total Annual Cost	Unit Cost	Supplemental Water Recharge Capacity	Production Sustainability Score
Y_1												
Y_2												
"												
"												
"												
Yz												

Table 7-2b
Screening of Yield Enhancement Projects

Project	Management Zone	New Yield	Unit Cost	Capital Cost	Water Quality Challenges	Institutional Challenges
Y_m Y_j " " " Yq						

Table 7-2c
Ranked Yield Enhancement Projects

Project	Yield	Unit Cost[1]	Capital Cost
Recommended Projects to Balance MZ3			
Y_l			
Y_n			
Y_p			
Y_q			
Total MZ3			
Recommended Projects to Balance MZ2			
Y_g			
Y_n			
Y_m			
Y_o			
Total MZ2			
Recommended Projects to Balance MZ1			
Y_a			
Y_d			
Y_r			
Y_j			
Total MZ1			
Other Recommended Projects, Not MZ Specific			
Y_u			
Y_v			
Y_w			
Y_x			
Total Other Recommended			
Total Recommended Projects			
Other Projects			
Y_1			
Y_2			
"			
"			
"			
Yz			

[1] "Total" unit cost is a yield-weighted average.

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Section 8 – Recommended 2013 Recharge Master Plan

8.1 Introduction

This section presents the recommended recharge master plan update based on the list of projects identified in Section 6 and the criteria described in Section 7. Specific projects are recommended in Tables 8-1c and 8-2c for production sustainability and yield enhancement projects, respectively. Implementation and financing plans are also described for the recommended projects.

8.2 Initial Project Screening

8.2.1 Production Sustainability Projects

Table 6-1 contains nine production sustainability projects that the Steering Committee and Watermaster approved for initial screening. In contrast to the yield enhancement projects, the production sustainability projects were described conceptually and needed further development prior to screening and ranking. In the winter and spring of 2013, Watermaster staff encouraged capable Appropriators to participate with the JCSD in projects that would supply the JCSD with water in-lieu of JCSD production from the parts of MZ3/MZ4/MZ5 where production sustainability is a concern. Members of the Steering Committee convened informal meetings to discuss various alternatives in which water could be provided to the JCSD and potentially to the CDA that would result in reduced production by the JCSD. From these meetings, subsequent discussions, and information provided by the City of Ontario, the Monte Vista Water District and others, four project categories were identified: 1) transfer of CDA water from CDA members to the JCSD in lieu of JCSD production; 2) supply of water from other Appropriator parties through new connections among the parties, potentially including new wells and pipelines; 3) oversizing the proposed Ontario Groundwater Recovery Project (OGRP) and using the increased supply to reduce CDA Desalter II production; and 4) the use of JCSD ASR wells to seasonally increase groundwater levels in the JCSD well field area. Figure 8-1 shows the locations of the existing water distribution systems, wells, and the proposed OGRP in the parts of MZ3/MZ4/MZ5 where production sustainability is a concern. The production sustainability projects considered herein include:

1. The City of Ontario could sell the JCSD up to 5,000 acre-ft/yr of its CDA deliveries from the Chino II Desalter without the construction of new additional facilities. The sales price would be Ontario's cost of water from the CDA of $920 per acre-ft.[33] Ontario and the JCSD take their Desalter II deliveries from a common reservoir in the JCSD service area, and Ontario would forego its deliveries from this reservoir and sell some or all of its share of CDA allocation from the Chino II Desalter to the JCSD. This would be an interim supply until Ontario needs its capacity in the Chino II

[33] CDA charge to the City of Ontario for fiscal 2013/14.

Desalter to meet its water supply needs. As an interim supply, this project could also be a proof-of-concept demonstration to determine the amount and timing of alternative supplies required to ensure production sustainability.

2. The City of Chino Hills and the Monte Vista Water District (MVWD) have proposed an in-lieu exchange project where the MVWD and Chino Hills would use more groundwater produced in Management Zone 1 and/or imported water, and Chino Hills would forego taking some of its 4,200 acre-ft/yr CDA Desalter I allocation, having that desalter water conveyed to the JCSD through existing CDA facilities. The JCSD would exchange annual production rights to Chino Hills and the MVWD equal to the amount of water supplied to the JCSD in this project. This proposal is modeled on the interim forbearance plan that was implemented during the development of the Management Zone 1 subsidence management plan. Similar to the Management Zone 1 forbearance plan, this project may be interim in nature, while a more permanent management strategy is developed by the affected party(ies).

3. Other than through CDA facilities, there are no physical connections to the JCSD system from Chino Basin Appropriator parties that would permit a direct supply of water to the JCSD. A new connection would be required from the Ontario distribution system 1212 zone to the JCSD's 1100 zone. If this connection were constructed, Ontario could be a source of alternative supply as well as other Appropriators that could exchange water with the JCSD through Ontario's system. A new connection from the Cucamonga Valley Water District (CVWD) to the City of Ontario would be required to enable the CVWD to supply water to the JCSD. A new connection from the Fontana Water Company (FWC) to either the City of Ontario or directly to the JCSD would be required for the FWC to supply water to the JCSD. Other Appropriators may have the ability to connect to the City of Ontario to wheel water to the JCSD. Watermaster staff has encouraged the Appropriator parties that could participate in these water supply projects to review their capabilities and interests in participating in production sustainability projects and to provide Watermaster staff with alternative descriptions, operating plans, and costs. At the time this report was written, only three of the potential participants had provided alternatives to Watermaster staff. Watermaster staff developed two generic in-lieu or exchange projects to bracket the scale and cost of such projects that will improve production sustainability in the JCSD service area: Minimum (Min) Generic In-Lieu and Maximum (Max) In-Lieu projects. These projects are described in Appendix D and listed herein in Table 8-1a.

4. The City of Ontario has developed a project concept, the OGRP. The purpose of the OGRP is to produce groundwater near the southern leading edge of the South Archibald VOC plume, treat that water to remove VOCs, treat it again at the Chino II Desalter for nitrate and TDS reduction, and subsequently serve it. The locations of the OGRP wells and raw water pipeline are shown in Figure 8-1. Ontario has suggested that the OGRP could be oversized with the resulting surplus capacity used to reduce CDA Desalter II groundwater production, and thereby providing a sustainable supply of raw water to the CDA Desalter II and helping to maintain higher groundwater levels in the JCSD well field area.

The JCSD has developed ASR wells that could be used to improve production sustainability but has not identified the water supply that would be used for injection or the magnitude and timing of that supply. As of the time of this report's preparation, the JCSD had not provided Watermaster staff with a plan to improve production sustainability with its ASR wells. Therefore, consideration of specific production sustainability projects utilizing the JCSD's ASR wells will not be included in the 2013 RMPU Amendment. Exclusion of the JCSD ASR project in the 2013 RMPU Amendment does not preclude them from future development and implementation before the next Recharge Master Plan update.

The water supply sources for the production sustainability projects include Chino Basin groundwater produced sufficiently far from the sustainability challenged area and imported water. For projects 2 and 3 described above, the JCSD would contribute its unused production rights to the Appropriator(s) that supplies them water to offset the water supply cost. The cost to produce and convey the water to the JCSD could be paid for by the JCSD or some other arrangement that could involve Watermaster. Some or all the cost to produce and convey water to the JCSD would be offset by the JCSD's avoided cost to produce and convey its own water. Table 8-1a contains the list of production sustainability projects considered for evaluation and ranking. The JCSD ASR well project is not included in Table 8-1a for the reasons described above. Table 8-1a contains project names, descriptions, new supplies generated by the projects, capital cost estimates, supplemental water costs, annual costs, unit costs, and ratings for water quality and reliability.

8.2.2 Yield Enhancement Projects

Table 6-1 contains 41 yield enhancement projects that the Steering Committee recommended and approved through the Watermaster process for initial screening. These projects involve the construction of new facilities and four proposals to increase the frequency of operations and maintenance at existing facilities. Watermaster, the IEUA, and WEI reviewed all of the projects based on the information that was readily available to define how each project would operate, to estimate their storm and recycled water recharge performance, and to estimate their cost. Certain projects listed in Table 6-1 were not analyzed as their projected unit costs were higher than the initial screening level of $1,500 per acre-ft. Table 8-2a lists the projects that were advanced to detailed evaluation using the criteria described in Section 7. Table 8-2a contains the following:

- Project identification numbers, names, and descriptions
- Indications of when a project was combined with another project or projects to take advantage of increased yield or cost efficiencies
- Opportunities for IEUA and Watermaster joint financial participation pursuant to the Peace II Agreement
- Characterizations of the new storm water recharge created by the proposed projects
- Indications as to whether a project would be constructed for regulatory compliance purposes and whether a project was already constructed

- Capital cost opinions for stormwater improvements, annualized capital costs, operations and maintenance costs, total annual costs, and unit costs of stormwater recharge

- New recycled water recharge capacities and recycled water acquisition costs

- Capital cost opinions for recycled water, annualized capital costs, operations and maintenance costs, total annual costs, and unit costs of recycled water recharge

- New imported water recharge capacities and imported water acquisition costs

- Capital cost opinions for imported water, annualized capital costs, operations and maintenance costs, total annual costs, and unit costs of imported water recharge

- Total combined recharge capacities for all storm, recycled, and imported waters

- Indications of additional project benefits and contributions to production sustainability

The projected new stormwater recharge estimates are based on the updated and calibrated Wasteload Allocation Model (WLAM), which has been used in past recharge investigations and to support Watermaster's groundwater model. The capital and operation and maintenance costs are based on recent experience in the construction and operations of the CBFIP projects and other construction projects. The IEUA also provided estimates of new recycled water recharge capabilities for some of the proposed projects listed in Table 8-2a. Appendix D contains all available detailed drawings and cost opinions for each project listed in Table 8-2a. In total, Table 8-2a contains 54 projects and combinations of projects. Some of the projects are mutually exclusive as indicated in the notes. Table 8-2a was vetted thoroughly by the Steering Committee in the period of April through June of 2013.

8.3 Project Evaluation and Ranking

8.3.1 Production Sustainability Projects

8.3.1.1 Application of Section 7 Criteria

Table 8-1a contains the five production sustainability projects that were selected for screening by the Steering Committee. The purpose of Table 8-1a is to provide a detailed characterization of the projects in tabular form. Table 8-1b lists the same projects and the criteria upon which they will be screened. Table 8-1c lists the production sustainability projects in their order of preference, based on the screening criteria of Section 7 and as described below.

8.3.1.1.1 Reliability

To achieve the desired sustainability benefits, the water substituted for JSCD groundwater production must be at least as reliable as the current JCSD supplies. The production sustainability project must be sized, scalable, and sourced to ensure sustainability. The five projects listed in Table 8-1b are all assumed to use Chino Basin groundwater as a source supply, produced from parts of the Basin that are sustainable, and/or imported water treated at an existing treatment plant. Therefore, the reliability for all five projects will be high and the five projects are assumed to be of equivalent reliability to one another. The amount and timing of supply required to ensure sustainability is currently unknown. Two or more of the projects listed in Table 8-1b could be combined to ensure sustainability.

8.3.1.1.2 Cost

The capital costs vary greatly among the four projects and range from zero to about $10.6 million with unit costs ranging from $95 to $920 per acre-ft. There could be additional costs for the Max General In-Lieu and Min General In-Lieu projects if the water quality produced for these projects becomes degraded. There is also opportunity for the Appropriator(s) that constructs the new wells and conveyance facilities used in these projects to use these same facilities for other uses when not used to supply the JCSD.

8.3.1.1.3 Water Quality

The Ontario-CDA MZ3 In-Lieu, the Chino Hills/MVWD, and the OGRP projects will always produce potable water that can be used to replace JCSD groundwater production. For the Max General In-Lieu and Min General In-Lieu projects, water will be wheeled through an adjacent Appropriator's water system where it is assumed that the water will already be potable. The new wells associated with this project will presumably be sited to avoid water quality challenges and may in fact provide water quality benefits to the source agency. That said, future groundwater degradation could occur, necessitating treatment, and the level of risk is unknown.

8.3.1.1.4 Ease of Implementation

The facilities required to implement the Ontario-CDA MZ3 In-Lieu project and the Chino Hills/MVWD project exist, and these projects could be initiated quickly after an agreement between the parties is negotiated.

The OGRP project, if implemented, is several years out and is dependent on 1) the potentially responsible parties involved in the South Archibald Plume paying for VOC treatment prior to delivery of the source water to the Chino II Desalter and 2) the project proponents obtaining substantial grant funding. The JCSD would benefit from reduced Chino II Desalter pumping at the existing wells by about 2,900 acre-ft/yr and would not receive any new water directly from the project.

The Max General In-Lieu and Min General In-Lieu projects would require an agreement between the JCSD and the Appropriator(s) that serves it water. Existing wells, potentially new wells, existing treatment plant capacity, or some combination of these will be required. Interconnections between the JCSD and the City of Ontario and potentially Ontario and other Appropriators will be required. There may also be other benefits to participating Appropriators that include increasing their groundwater production capacity (joint use of wells) and improving conveyance capacity within their own distribution systems. The agreement(s) will need to consider the cost to construct and operate the improvements and economic consideration for the source water.

8.3.1.2 Ranking of Production Sustainability Projects

Table 8-1c shows a preliminary ranking of these projects by unit cost. The projects, in order of unit cost priority, are: the Min General In-Lieu project, the Chino Hills/MVWD project, the Max General In-Lieu project, the OGRP, and the Ontario-CDA MZ3 In-Lieu project. At the time this report was written, there were no cost estimates available for the Chino Hills/MVWD project, but it is believed to have an implementation cost less than the Max General In-Lieu and Min General In-Lieu projects. The Min General In-Lieu and Max General In-Lieu are ranked higher than the OGRP project even though their estimated unit cost is 50 percent greater ($150 per acre-ft versus $95 per acre-ft). The Min and Max General In-Lieu and Chino Hills/MVWD projects were rated higher than the OGRP project due to ease of implementation. The OGRP depends on substantial grant funding and cooperation with private entities, which is speculative at this time. In contrast, the Max and Min General In-Lieu and Chino Hills/MVWD projects can be more readily implemented and may provide benefits to the Appropriators that participate. The Ontario-CDA MZ3 in-Lieu project was ranked last due to its unit cost of greater than $900 per acre-ft.

Specific recommended projects will be identified through the implementation plan process described in Section 8.4.2.

8.3.2 Yield Enhancement Projects

8.3.2.1 Application of Section 7 Criteria

Table 8-2b lists the yield enhancement projects and summarizes their features pursuant to the screening criteria articulated in Section 7 herein. Some projects have two variants where the difference is how excavation cost is accounted for in the construction cost. Projects with an "a" attached to their identification numbers have their excavation costs reduced by 90 percent under the assumption that sand and gravel operators will extract the materials at their cost. Table 8-2b summarizes the project economics in Table 8-2a and includes information on the water quality and institutional challenges of each project. Table 8-2c contains the final rankings based on the Section 7 criteria and input from the Steering Committee. The application of the criteria is described below.

8.3.2.1.1 Confidence in Recharge Estimate

The WLAM was calibrated for selected recharge basins where the IEUA develops recharge estimates based on observed data. The results of these calibration efforts are contained in Appendix D. Subsequently, recharge estimates were developed for the proposed yield enhancement projects included in Table 8-2a as well as for the no-project condition at the proposed recharge sites. Pursuant to the screening and evaluation criteria contained in Section 7, new recharge is estimated as 90 percent of the difference between the recharge estimate for the proposed project and the estimate of recharge for the no-project condition. This 10 percent reduction produces a reliable and conservative estimate of new recharge.

The IEUA prepared estimates of recycled water recharge capacity for some of the proposed projects listed in Table 8-2a. These estimates are based on the availability of recycled water that is not currently being recharged and will not be used to meet direct reuse demands;

therefore, recycled water is considered highly reliable. The reliability of new recharge estimates is equal among the projects.

8.3.2.1.2 Location of Recharge

The locations of new storm and supplemental (imported and recycled) water recharge projects have been prioritized to assist Watermaster in its best efforts to balance recharge and discharge in every area and subarea of the basin. Watermaster's current recommended supplemental water recharge plan[34] calls for Watermaster to prioritize supplemental water recharge as follows:

- Recharge the first 6,500 acre-ft/yr of supplemental water in Management Zone 1 pursuant to the Peace Agreement.
- Recharge Management Zone 3 up to its maximum supplemental water recharge capacity (current supplemental water recharge capacity is 12,700 acre-ft/yr).
- Recharge Management Zone 2 up to its maximum supplemental water recharge capacity (current supplemental water recharge capacity is 28,300 acre-ft/yr).
- Recharge Management Zone 1 up to its maximum supplemental water recharge capacity (current supplemental water recharge capacity is 42,100 acre-ft/yr).[35]

This priority scheme was developed to balance recharge and discharge at the management zone level when supplemental water recharge is being done. Watermaster recharges imported water primarily to replenish overproduction, to store imported water for the existing Dry-Year Yield program, and more recently for preemptive replenishment. The IEUA recharges recycled water in certain basins where the IEUA and Watermaster have a joint permit to recharge recycled water.

The yield enhancement projects are prioritized by management zone in Table 8-2c with the priorities that mirror the supplemental water recharge priority.

8.3.2.1.3 Expandability to Include Supplemental Water Recharge

The IEUA has identified recharge projects that could be used to recharge recycled water. These projects have been identified in Table 8-2a and feature prominently in Table 8-2c.

8.3.2.1.4 Cost

Watermaster, the IEUA, and WEI developed Level-5[36] cost opinions for each of the projects listed in Table 8-2a. The backup for these cost opinions is included in Appendix D. For

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[34] 2009 Production Optimization and Evaluation of the Peace II Project Description (WEI, 2009).

[35] The supplemental water recharge capacities cited above are based on Table 6-3 in the 2010 Recharge Master Plan Update (WEI et al., 2010).

projects that consist of only operations and maintenance activities, the IEUA prepared annual cost estimates based on their experience in basin operations and maintenance.

8.3.2.1.5 Water Quality Challenges

Storm water is considered an impaired water source for surface waters. After filtration through the soil and unsaturated zone, storm water is considered to be of suitable quality for potable uses.

There are some instances where storm and supplemental water recharge may cause or exacerbate existing groundwater quality challenges. Storm water and supplemental water recharge can cause groundwater mounding under recharge sites that can redirect movement of existing contaminant plumes. Recharge can also flush contaminants from the unsaturated zone to the saturated zone, thus mobilizing contaminants that could subsequently impact well water quality. Figure 8-2 shows the locations of all recharge projects listed in Table 8-2a by identification number and the locations of significant water quality anomalies. For example some of the concerns include:

- Increased recharge at the Ely Basins could redirect the GE Test Cell plume further to the west and impact down-gradient wells.
- Increased recharge at the Wineville Basin could redirect the Kaiser Steel Mill plume and potentially impact down-gradient wells.
- Contaminants in the unsaturated zone near the CSI Basin could be mobilized with increased recharge and impact down-gradient wells.
- Contaminants that may exist in the soil and unsaturated zone from historical operations in and adjacent to the Vulcan Pit could be mobilized with increased recharge and impact down-gradient wells

Watermaster reviewed the locations of these water quality anomalies relative to the locations of potential yield enhancement projects and concluded that water quality impacts, if any, from new recharge at the potential yield enhancement projects would be determined and vetted during the preliminary engineering, CEQA and Watermaster Material Physical Injury review processes, and appropriate mitigation measures would be identified and committed to during these processes.

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[36] See Recommended Practice Nu. 17R-97, Cost Estimate Classification System,

http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.aluminium.gl%2Fsites%2Fdefault%2Ffiles%2Fpdf%2Fnogletal%2Fcostestimatingsystemaace-208a.pdf&ei=VcQGUu6RBIaSyAHFjoDoAg&usg=AFQjCNH5E6v6F-qxcQXIDW894iTFN48eGA&sig2=wWQ1gparE5ed1pEVkrOpJg

8.3.2.1.6 Institutional Challenges

The common potential institutional challenges to implement the projects listed in Table 8-2a consist of the following:

- Determination of a lead entity for California Environmental Quality Act (CEQA) review and project implementation
- Determination of who pays and who benefits
- Obtaining access to recharge sites and the ability to construct and operate recharge facilities
- Modification of the IEUA-Watermaster recharge permit to include recycled water recharge at new recharge basins and to increase recycled water recharge amounts at existing basins

Table 8-2b includes the institutional challenges at specific basins above and beyond those listed above.

8.3.2.2 Ranking of Yield Enhancement Projects

Table 8-2c contains the yield enhancement projects ranked using the Section 7 criteria and based on input from the Steering Committee. The projects are listed by management zone in order of increasing unit cost. The Project ID numbers with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project or leased to a mining operator. The cost effectiveness threshold for a recharge project was identified in Section 7 as the MWD Tier 1 rate, however it was determined that it would not be used as a pass/fail mechanism. The projects were evaluated using three thresholds: a marginal unit cost less than $600 per acre-ft, a melded unit cost less than $600 per acre-ft, and a melded unit cost less than $612 per acre-ft. The three unit cost thresholds were analyzed with and without the excavation discount. The associated tables and a description of each unit cost threshold are located in Appendix D (Tables D-20 through D-24).

The Steering Committee indicated a preference for a melded unit cost less than $612 per acre-ft would be considered for implementation. As shown on Table 8-2c, there are eleven projects recommended for construction that will increase stormwater recharge by about 6,780 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $612 per acre-ft, the capital cost is about $57,000,000, and an annual cost of $4,150,000. The distribution of recharge by management zone is listed below:

Distribution of New Recharge by Management Zone for the Yield Enhancement Projects (acre-ft/yr)

Management Zone	Stormwater Recharge	Recycled Water Recharge	Total
1	250	0	250
2	2,980	2,000	4,980
3	3,550	2,900	6,450
Total	6,780	4,900	11,680

Most of the new recharge is concentrated in Management Zone 3 and 2, which will contribute to production sustainability in these management zones and more specifically in the JCSD well field area.

The IEUA is committing to cost share on three projects; San Sevaine Basin (PID 7), Victoria Basin (PID 11), and RP3 Basin (PID 22a). The table below displays the capital costs of the cost shared projects assuming a 50/50 split of the capital cost per Peace II Agreement Article VIII.

Project ID	Project	Yield	Recycled Water	Capital Costs		Total Capital Cost
				Watermaster	IEUA	
11	Victoria Basin	43	120	$ 75,000	$ 75,000	$ 150,000
7	San Sevaine Basins	642	1,911	$ 1,775,000	$ 1,775,000	$ 3,550,000
22a	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 1,855,000	$ 1,855,000	$ 3,710,000
Total		**822**	**4,936**	**$ 3,705,000**	**$ 3,705,000**	**$ 7,410,000**

8.4 Final Project Recommendations and Implementation Plan

This section describes the overall implementation strategy, recommended projects, implementation plan and financing plan. There are two types of projects being considered in the 2013 RMPU: production sustainability and yield enhancement projects. The magnitude of the production sustainability challenge is currently unknown and will depend on future groundwater production and recharge at existing recharge facilities, and the recharge at proposed yield enhancement projects located in Management Zones 2 and 3. The yield enhancement projects in Management Zones 2 and 3 being considered herein will provide some production sustainability benefits to the JCSD area where production sustainability challenges may occur in the future. Therefore it seems premature to recommend specific production sustainability projects until the magnitude of its production sustainability challenges can be more definitively characterized. The effort to definitively characterize the production sustainability challenges faced by JCSD and others is incorporated in the first year of the implementation plan of the 2013 Recharge Master Plan Update. (See Section 8.4.2.1)

8.4.1 Yield Enhancement and Production Sustainability Project Recommendations

Upon reviewing all available information, it is recommended that the parties proceed with additional characterization of the production sustainability challenges to determine the magnitude of sustainable groundwater production in the JCSD well field area with and without the yield enhancement projects proposed herein.

It is recommended that the yield enhancement projects listed in Table 8-2c be implemented according to the implementation and financing plan detailed in the following sections.

8.4.2 Implementation Plan

The implementation plan described below presents an orderly way to implement the yield enhancement projects and the production sustainability project(s) as needed. Time is of the essence in this implementation plan. The implementation plan is described by calendar year or years. Figure 8-3 is a graphical summary of the implementation plan.

8.4.2.1 Year 1 – 2014

Determine Need and Refine Production Sustainability Projects. The objectives of this work are to definitively characterize the magnitude of the production sustainability challenges faced by the JCSD and others, and to define the magnitude and timing of water deliveries to the JCSD to ensure production sustainability. During this year, technical investigations will be done to define the production sustainability challenges, to estimate the magnitude and timing of water deliveries to the JCSD to ensure production sustainability and to identify and refine alternative sources of supply. The end product of this work will be an optimized JCSD groundwater production plan, up to three alternative water supplies that will enable the JCSD to reduce groundwater production to sustainable levels, and a recommended project. This work will be done by the JCSD and participating Appropriators and facilitated by Watermaster.

There are benefits to developing sustainability projects as quickly as possible. Ideally sustainability projects could be developed in advance of the yield enhancement projects. Implementation of sustainability projects depend on the Appropriators willingness and ability to engage.

Contact Sand and Gravel Companies. Sand and gravel companies will be contacted to determine their interest in participating in yield enhancement projects.

Watermaster and the IEUA Yield Enhancement Project Implementation Agreement. The objective of this agreement is to define the roles of Watermaster and the IEUA in the planning, permitting, design, and implementation of the yield enhancement projects, and the cost allocations pursuant to the Peace II Agreement.

Appropriative Pool New Yield and Cost Allocation Agreement. Watermaster assumes that capital cost and New Yield will be allocated to the Appropriator parties based on their share of Operating Safe Yield, and future operation and maintenance expenses will be production based per Peace II Section 8.1. Any change in allocation method would first require a negotiation process to reach agreement among the Appropriative Pool parties. The objectives of this agreement would be to determine the allocation of New Yield and cost among the Appropriative Pool parties.

Flood Control and Water Conservation Agreement. The parties to this agreement include San Bernardino County Flood Control District (SBCFCD), Watermaster, and the IEUA. The objectives of this agreement are to define the terms and conditions to jointly explore and construct new conservation works on SBCFCD and IEUA properties and to conduct flood control and water conservation activities utilizing those same conservation works on the properties. The agreement will define the project sites, facility improvements, construction and maintenance cost allocations, user or license fees, operating criteria (with flood control purposes taking priority over conservation for joint use facilities), and other conditions.

The SBCFCD will require Watermaster and the IEUA to fund SBCFCD engineering studies and analyses to demonstrate that all conservation improvements at flood control facilities will not negatively impact the operation and maintenance of SBCFCD facilities or reduce the level of the designed flood protection. All engineering studies and analyses shall be done and provided to SBCFCD for review and approval and an encroachment permit obtained from SBCFCD before the construction of any conservation improvements can commence. SBCFCD will require that all applicable Environmental Agencies' permits and approvals be obtained and submitted to the SBCFCD before an encroachment permit can be issued.

Agreement with Property Owners. Develop an agreement among a property owner, IEUA, and Watermaster on the terms for use of land where land is required for a recharge project.

In addition to these agreements, the Watermaster will determine whether it is necessary to submit a Petition for Change with the State Water Resources Control Board for projects shown in 8-2c that are not included in the Watermaster's current diversion permits. The duration of the Petition for Change process is unknown but would likely be more than one year.

8.4.2.2 Years 2 and 3 – 2015 and 2016

Develop an Implementation Agreement among the Parties Participating in the Production Sustainability Project. The objective of this agreement would be to define the roles of the parties that would participate in the recommended production sustainability project; in the planning, permitting, design, and implementation of the production sustainability projects; and the cost allocations. This work will be done by the JCSD and participating Appropriators and facilitated by Watermaster.

Appropriative Pool Production Sustainability Cost Allocation Agreement. The objective of this agreement is to define how the Appropriators would participate in a production sustainability agreement and what, if any, production sustainability project costs will be borne by the Appropriators and how the projects costs would be allocated.

Preliminary Design of Recommended Yield Enhancement Projects. The level of design will be such that it enables the preparation of environmental documentation pursuant to CEQA, provides information for identifying and acquiring construction and related permits, and produces updated New Yield and cost estimates. This work will start in January 2015 and be completed in September 2015.

Prepare Environmental Documentation for Yield Enhancement Projects. CEQA will cover the recommended projects in Table 8-2c at the project level and the deferred projects at a programmatic level, based on the project descriptions contained herein. Watermaster will conduct a Material Physical Injury analysis in parallel with the CEQA process. This work will start in July 2015 and be completed in June 2016.

8.4.2.3 Years 3 and 4 – 2016 and 2017

Preliminary Design of Recommended Production Sustainability Projects. If new facilities are required, then one of the parties to the implementation agreement will contract for preliminary design. The level of design will be such that it enables the preparation of environmental documentation pursuant to the CEQA, provides information for identifying and acquiring construction and related permits, and produces cost estimates. This work will start in January 2016 and be completed in September 2016.

Prepare Environmental Documentation for Production Sustainability Projects. One of the parties to the implementation agreement will be the lead agency and contract for the preparation of environmental documentation. The lead agency will determine the type of environmental documentation and subsequently prepare it. This work will start in July 2016 and be completed in June 2017.

Prepare Final Designs and Acquire Permits for Production Sustainability Projects. One of the parties will contract for the development of final designs and acquire permits. This work will begin in July 2017 and be completed by December 2017.

Prepare Final Designs and Acquire Necessary Permits for the Yield Enhancement Projects. This work will begin in July 2016 and be completed by December 2017.

8.4.2.4 Years 5 and 6 – 2018 and 2019

Construct 2013 RMPU Amendment Production Sustainability Projects. One of the parties will contract for the construction of the recommended production sustainability project and construct the project during calendar 2018.

Construct 2013 RMPU Amendment Yield Enhancement Projects. The recommended projects will be constructed over the two-year period of 2018 and 2019.

8.4.3 Financing Plan

The financing plan for the production sustainability projects will be developed during the second year of the implementation plan as part of the process to develop an implementation agreement among the parties participating in the production sustainability project and in the third year if some of the project costs are allocated among all Appropriators. Parties are encouraged to complete these efforts sooner than the above schedule if possible.

The financing plan for the yield enhancement projects consists of the following elements:

- Identify the IEUA and Watermaster cost share. Watermaster and the IEUA will determine each party's cost share based on the Peace II Agreement and on the benefit to the parties. This will be negotiated and memorialized in an agreement as identified in the Implementation Plan above.

- Once the scope of the Montclair Basins project is defined, the IEUA and Watermaster will request that the CBWCD consider contributing funding to recharge improvements at the Montclair Basins.

- Identify grant-funding share. The IEUA, Watermaster, and the Appropriators will combine their efforts to secure grant funding and low-interest financing from the State Water Resources Control Board, the DWR, and others.

- Allocation of cost and benefit among the Appropriators. Watermaster assumes that capital cost and New Yield will be allocated to the Appropriator parties based on their share of Operating Safe Yield and future operation and maintenance expenses will be production based per Peace II Section 8.1. Any change in allocation method would first require a negotiation process among the Appropriative Pool parties.

- Finance the construction of recharge improvements. The IEUA, the TVMWD, the WMWD, and potentially certain Appropriator parties will use their revenue structure and other means (municipal bonds, pay-as-you-go, etc.) to construct the recommended yield enhancement projects.

- Apply pay-as-you-go for all the soft costs through completion of the final design. The soft costs were distributed between IEUA and Watermaster by the proportion of the total capital cost of the recommended projects to IEUA's portion of the cost shared projects (about six percent). The soft costs through completion of final design are:

Approximate Annual Costs for Pay-As-You-Go for All Soft Costs

	Fiscal 2014/15	Fiscal 2015/16	Fiscal 2016/17	Fiscal 2017/18	Fiscal 2018/19
Watermaster	$ 100,000[37]	$ 668,000	$ 668,000	$ 3,213,000	$ 3,213,000
IEUA	$ -	$ 44,000	$ 44,000	$ 211,000	$ 211,000
Total	$ 100,000	$ 712,000	$ 712,000	$ 3,424,000	$ 3,424,000

- All costs associated with the development of implementing agreements, preliminary design, proof-of-concept, completion of the CEQA process, and final design are considered part of the project capital cost and will be paid for through the Watermaster assessment process pursuant to the Peace II Agreement unless a new Appropriative Pool New Yield and Cost Allocation agreement is reached. In the case that such an agreement is reached, an assessment reconciliation will be done consistent with the new agreement.

A detailed financing plan will be developed in a process running in parallel to the development of the implementation agreements in years 2014 and 2015.

[37] Watermaster's cost to negotiate implementation agreements, legal costs and staff time.

Table 8-1a
Project Data for MZ3/MZ4/MZ5 Sustainability Projects[1]

Project	Benefiting Management Zone	Summary of Key Project Features	New Supply (acre-ft/yr)	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Other Annual Cost ($/acre-ft)	Supplemental Water Acquisition Cost ($)	Total Annual Cost ($)	Unit Cost ($/acre-ft)	Reliability of the Water Supply	Production Sustainability Score[4]
Min General In-Lieu	3	Construct two wells and related conveyance to move non-MZ3 groundwater or imported water to the JCSD.	5,800	$ 5,440,000	$ 354,000	$ 524,000	$ -	$ -	$ 878,000	$ 151	High	2
Max General In-Lieu	3	Construct four wells and related conveyance to move non-MZ3 groundwater or imported water to the JCSD.	11,600	$ 10,640,000	$ 692,000	$ 1,048,000	$ -	$ -	$ 1,740,000	$ 150	High	2
Chino Hills/MVWD Exchange Project	3	Chino Hills forgoes taking Desalter I water and provides that water to the JCSD. Chino Hills makes up the exchanged supply from MZ1 groundwater production or imported water treated at the WFA plant.	2,800	$ -	$ -	(see note 5 below)	$ -	$ -	(see note 5 below)		High	2
OGRP Project[2]	3	Installation of one well and extend OGRP raw water conveyance.	2,900	$ 4,222,500	$ 275,000	$ -	$ -	$ -	$ 275,000	$ 95	High	2
Ont-CDA MZ3 In-Lieu[3]	3	Ontario sale of 5,000 acre-ft/yr of their CDA water to the JCSD using existing connections.	5,000	$ -	$ -	$ -	$ 920	$ -	$ 4,600,000	$ 920	High	2

[1] The amount and timing of in-lieu supply required to ensure sustainability is unknown.

[2] The total estimated costs for the well and pipeline were derived from Table 9 of the Technical Report, Ontario Groundwater Recovery Project(Carollo, 2013). The production rate was assumed to be 2,000 gpm (2,900 acre-ft/yr at an operating factor of 90%).

[3] The Other Annual Cost for the CDA MZ3 In-Lieu project is the Fiscal Year 2013/14 gross cost/acre-ft for Ontario before the MWD local projects contribution. Source is Exhibit A of the June 6, 2013 CDA Special Board of Directors Meeting Agenda. Note that this cost does not reflect a credit for the avoided cost of pumping by JCSD.

[4] The production sustainability score is a tool to characterize a project's contribution to production sustainability in areas with sustainability challenges. Per the evaluation criteria described in Section 7, the score will be as follows: 0 – does not contribute to production sustainability, 1 – contributes minimally to production sustainability (a necessary but not sufficient condition of sustainability), and 2 – contributes significantly to production sustainability (a necessary and sufficient condition of sustainability).

[5] Annual and unit costs are unknown. The amount of available water and required in-lieu supply may be operationally limited due to water quality and reliability concerns. The cost to produce and convey water to the JCSD could be paid for by the JCSD or some other arrangement that could involve the Watermaster. Some or all the cost to produce and convey the water to the JCSD would be offset by the JCSD's avoided cost to produce and convey its own water. There is a possibility of no new capital cost and that this alternative could be the lowest cost production sustainability alternative.

Table 8-1b
Screening of MZ3/MZ4/MZ5 Sustainability Projects[1]

Project	New Supply (acre-ft/yr)	Unit Cost ($/acre-ft)	Capital Cost ($)	Reliability of the Water Supply	Water Quality Challenges	Ease of Implementation
Min General In-Lieu[3]	5,800	$ 151	$ 5,440,000	High	None[2]	b
Max General In-Lieu[3]	11,600	$ 150	$ 10,640,000	High	None[2]	b
Chino Hills/MVWD Exchange Project	2,800	(See note 5 on Table 8-1a)		High	None[2]	d
OGRP Project	2,900	$ 95	$ 4,222,500	High	None	c
Ont-CDA MZ3 In-Lieu	5,000	$ 920	$ -	High	None	a

[1] The amount and timing of in-lieu supply required to ensure sustainability is unknown.

[2] The water supplied will be wheeled through adjacent agency's water system where it is assumed that the water will already be potable. The new wells associated with this project will presumably be sited to avoid water quality challenges and may in fact provide water quality benefits to the source agency. That said, future groundwater degradation could occur necessitating treatment.

[3] Assumes that the water supply cost is offset by the JCSD's avoided production and annual transfer of an equal amount of water from their own production rights.

a - Requires an agreement between the City of Ontario and the JCSD.

b - Requires an agreement between the JCSD and others to construct, operate, and pay for the improvements.

c - Requires an agreement with non-Watermaster Parties that are PRPs may not want to participate in VOC treatment costs, and is dependent on grant funding.

d - Requires an agreement between the City of Chino Hills, the MVWD, the CDA, and the JCSD.

Table 8-1c
Ranked MZ3/MZ4/MZ5 Sustainability Projects

Project	New Supply (acre-ft/yr)	Unit Cost ($/acre-ft)	Capital Cost ($)
Min General In-Lieu	5,800	$ 151	$ 5,440,000
Chino Hills/MVWD Exchange Project[1]	2,800	Unknown	Unknown
OGRP Project	2,900	$ 95	$ 4,222,500
Max General In-Lieu	11,600	$ 150	$ 10,640,000
Ont-CDA MZ3 In-Lieu	5,000	$ 920	$ -

[1] Annual and unit costs are unknown. The cost to produce and convey water to the JCSD could be paid for by the JCSD or some other arrangement that could involve the Watermaster. Some or all the cost to produce and convey the water to the JCSD would be offset by the JCSD's avoided cost to produce and convey its own water. There is possibility of no new capital cost and that this alternative could be the lowest cost production sustainability alternative.

Table 8-2a
Project Data for Yield Enhancement Projects

Project ID	Project Combinations	Group[1]	Project	Man. Zone	Summary of Key Project Features	Potential Cost Share if Mutually Agreed?	Storm Water Recharge: Baseline Storm Water Recharge (acre-ft/yr)	New Storm Water Recharge (acre-ft/yr)	Constructed for Regulatory Compliance?	Project Complete?	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	Storm Water Recharge Unit Cost[2]	Recycled Water Recharge: New Recycled Water Recharge (acre-ft/yr)	Recycled Water Acquisition Cost[3]	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	Recycled Water Recharge Unit Cost[2]	Imported Water Recharge: New Imported Water Recharge (acre-ft/yr)	Imported Water Acquisition Cost[4]	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	Imported Water Recharge Unit Cost[2]	All Recharge: Total New Storm and Supplemental Water (acre-ft/yr)	Total Capital Cost ($)	Total Unit Cost of All New Recharge	Additional Benefit	Production Sustainability Score[5]
Proposed Projects in Table 6-1 that Were Analyzed in Detail																																		
1		i	Montclair Basins	1	Transfer water between Montclair Basins and deepen MC 4	N	1,188	71	N	N	$ 5,450,000	$ 354,500	$ 2,631	$ 357,131	$ 4,997	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	71	$ 5,450,000	$ 4,997		0
1a		i	Montclair Basins	1	Transfer water between Montclair Basins and deepen MC 4	N	1,188	71	N	N	$ 5,050,000	$ 328,500	$ 2,631	$ 331,131	$ 4,633	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	71	$ 5,050,000	$ 4,633		
2		i	Montclair Basins	1	New drop inlet structures to MC 2 and MC 3	N	1,188	248	N	N	$ 1,440,000	$ 93,700	$ 9,132	$ 102,832	$ 415	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	248	$ 1,440,000	$ 415		0
3		i	Montclair Basins	1	Automate inlet to MC 1[6]	N	1,188	0	N	N	$ 50,000	$ 3,300	$ (6,000)	$ (2,700)	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 50,000	$ -	Y[19]	0
4		i	Montclair Basins	1	Construct low-level drains from Basin 1 to 2 and 2 to 3	N	1,188	0	N	N	$ 790,000	$ 51,400	$ -	$ 51,400	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 790,000	$ -		0
5		i	North West Upland Basin	1	Increase drainage area and basin enlargement	N	29	93	N	N	$ 5,490,000	$ 357,100	$ 3,441	$ 360,541	$ 3,858	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	93	$ 5,490,000	$ 3,858		0
5a		i	North West Upland Basin	1	Increase drainage area and basin enlargement	N	29	93	N	N	$ 4,640,000	$ 301,800	$ 3,441	$ 305,241	$ 3,266	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	93	$ 4,640,000	$ 3,266		
6		i	Princeton Basin	2	Basin enlargement and increased drainage area[22]	N	48	0	N	N	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -		0
7		ii	San Sevaine Basins	2	Construct pump station, pump water from SS 5 to SS 3, and construct internal berm in SS 5[7]	Y	1,177	642	N	N	$ 1,775,000	$ 115,500	$ 23,641	$ 139,141	$ 217	1,911	$ 372,645	$ 1,775,000	$ 115,500	$ 45,311	$ 533,456	$ 279	0	$ -	$ -	$ -	$ -	$ -	$ -	2,553	$ 3,550,000	$ 263		0
8		ii	San Sevaine Basins	2	Extend IEUA recycled water pipeline to SS 3 and construct internal berm in SS 5[7]	Y	1,177	345	N	N	$ 1,310,000	$ 85,200	$ 12,719	$ 97,919	$ 283	1,911	$ 372,645	$ 1,310,000	$ 85,200	$ 45,311	$ 503,156	$ 263	0	$ -	$ -	$ -	$ -	$ -	$ -	2,256	$ 2,620,000	$ 266		0
9		i	San Sevaine Basins	2	Construct internal berms in SS 1 and SS 2 and install a gate between SS 1 and SS 2	N	1,177	0	N	N	$ 300,000	$ 19,500	$ -	$ 19,500	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ 300,000	$ -	Y[20]	0
10		i	San Sevaine Basins	2	Increase CB13T capacity and power supply	N	1,177	0	N	N	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	1,235	$ 766,935	$ 1,980,000	$ 128,800	$ 29,283	$ 925,018	$ 749	1,235	$ 1,980,000	$ 749		0
11		i	Victoria Basin	2	Abandon the mid-level outlet and extend the lysimeters	Y	439	43	N	N	$ 75,000	$ 4,900	$ 1,576	$ 6,476	$ 151	120	$ 23,400	$ 75,000	$ 4,900	$ 2,845	$ 31,145	$ 260	0	$ -	$ -	$ -	$ -	$ -	$ -	163	$ 150,000	$ 231		0
12		ii	Lower Day Basin (2010 RMPU)	2	Inlet improvements, rebuilding embankment, elimination of mid-level outlet	N	395	789	N	N	$ 2,480,000	$ 161,300	$ 29,041	$ 190,341	$ 241	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	789	$ 2,480,000	$ 241		0
13		ii	Lower Day Basin	2	Install gate on mid-level outlet	N	395	75	N	N	$ 600,000	$ 39,000	$ 2,777	$ 41,777	$ 554	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	75	$ 600,000	$ 554		0
14		i	Turner Basin	2	Raise Turner 2 spillway[8]	N	1,226	66	N	N	$ 890,000	$ 57,900	$ 2,426	$ 60,326	$ 916	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	66	$ 890,000	$ 916		1
15		i	Ely Basin	2	Basin enlargement and increased drainage area	N	1,103	221	N	N	$ 9,120,000	$ 593,300	$ 8,122	$ 601,422	$ 2,726	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	221	$ 9,120,000	$ 2,726		0
15a		i	Ely Basin	2	Basin enlargement and increased drainage area	N	1,103	221	N	N	$ 3,200,000	$ 208,200	$ 8,122	$ 216,322	$ 981	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	221	$ 3,200,000	$ 981		
16		i	Ontario Bioswale Project	2	New bioswale	N	0	8	Y	Y	$ 650,000	$ 42,300	$ 277	$ 42,577	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	8	$ 650,000	$ -		0
17		i	Lower San Sevaine Basin (2010 RMPU)	2	New basin	Y	0	1,221	N	N	$ 22,715,000	$ 1,477,600	$ 44,947	$ 1,522,547	$ 1,247	500	$ 97,500	$ 22,715,000	$ 1,477,600	$ 11,855	$ 1,586,955	$ 3,174	0	$ -	$ -	$ -	$ -	$ -	$ -	1,721	$ 45,430,000	$ 1,807		0
17a		i	Lower San Sevaine Basin (2010 RMPU)	2	New basin	Y	0	1,221	N	N	$ 11,275,000	$ 733,500	$ 44,947	$ 778,447	$ 638	500	$ 97,500	$ 11,275,000	$ 733,500	$ 11,855	$ 842,855	$ 1,686	0	$ -	$ -	$ -	$ -	$ -	$ -	1,721	$ 22,550,000	$ 942		0
18		i	CSI Storm Water Basin	3	Deepen basin by 10 feet	N	72	81	N	N	$ 900,000	$ 58,500	$ 2,998	$ 61,498	$ 755	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	81	$ 900,000	$ 755		0
18a		i	CSI Storm Water Basin	3	Deepen basin by 10 feet	N	72	81	N	N	$ 440,000	$ 28,600	$ 2,998	$ 31,598	$ 388	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	81	$ 440,000	$ 388		0
19		iii	Wineville Basin (2010 RMPU)	3	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway[9]	Y	5	2,157	N	N	$ 3,140,000	$ 204,300	$ 79,438	$ 283,738	$ 132	630	$ 122,850	$ 3,140,000	$ 204,300	$ 14,938	$ 342,088	$ 543	0	$ -	$ -	$ -	$ -	$ -	$ -	2,787	$ 6,280,000	$ 225		2
19a		iii	Wineville Basin (2010 RMPU)	3	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway[9]	Y	5	2,157	N	N	$ 2,445,000	$ 159,100	$ 79,438	$ 238,538	$ 111	630	$ 122,850	$ 2,445,000	$ 159,100	$ 14,938	$ 296,888	$ 471	0	$ -	$ -	$ -	$ -	$ -	$ -	2,787	$ 4,890,000	$ 192		2
20		iii	Jurupa Basin	3	Inlet improvements and CB-18 turnout modifications	N	234	421	N	N	$ 2,150,000	$ 139,900	$ 15,516	$ 155,416	$ 369	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	421	$ 2,150,000	$ 369	Y[21]	2
21		ii	RP3 Basin Improvements (2010 RMPU)	3	Inlet improvements and enlargement	N	628	406	N	N	$ 22,044,000	$ 1,434,000	$ 14,931	$ 1,448,931	$ 3,573	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	406	$ 22,044,000	$ 3,573		2
21a		ii	RP3 Basin Improvements (2010 RMPU)	3	Inlet improvements and enlargement	N	628	406	N	N	$ 13,464,000	$ 875,900	$ 14,931	$ 890,831	$ 2,197	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	406	$ 13,464,000	$ 2,197		
22		ii, iii	RP3 Basin Improvements (2013 RMPU)	3	Increase conservation storage[10]	Y	628	137	N	N	$ 2,645,000	$ 172,100	$ 5,062	$ 177,162	$ 1,289	2,905	$ 566,475	$ 2,645,000	$ 172,100	$ 68,879	$ 807,454	$ 278	0	$ -	$ -	$ -	$ -	$ -	$ -	3,042	$ 5,290,000	$ 324		2
22a		ii, iii	RP3 Basin Improvements (2013 RMPU)	3	Increase conservation storage[10]	Y	628	137	N	N	$ 1,855,000	$ 120,700	$ 5,062	$ 125,762	$ 915	2,905	$ 566,475	$ 1,855,000	$ 120,700	$ 68,879	$ 756,054	$ 260	0	$ -	$ -	$ -	$ -	$ -	$ -	3,042	$ 3,710,000	$ 290		2
23	Includes PID's 19,20,22	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	2010 RMPU Proposed Wineville Basin Improvements, Wineville 20 cfs PS to Jurupa, Improved Jurupa Basin Inlet, 40 cfs PS to RP3 Basin with Proposed 2013 RMPU RP3	Y	867	3,166	N	N	$ 11,662,000	$ 758,600	$ 311,014	$ 1,069,614	$ 338	3,535	$ 689,325	$ 11,662,000	$ 758,600	$ 83,817	$ 1,531,742	$ 433	0	$ -	$ -	$ -	$ -	$ -	$ -	6,701	$ 23,324,000	$ 388		2
23a	Includes PID's 19,20,22	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	2010 RMPU Proposed Wineville Basin Improvements, Wineville 20 cfs PS to Jurupa, Improved Jurupa Basin Inlet, 40 cfs PS to RP3 Basin with Proposed 2013 RMPU RP3	Y	867	3,166	N	N	$ 10,657,000	$ 693,300	$ 311,014	$ 1,004,314	$ 317	3,535	$ 689,325	$ 10,657,000	$ 693,300	$ 83,817	$ 1,466,442	$ 415	0	$ -	$ -	$ -	$ -	$ -	$ -	6,701	$ 21,314,000	$ 369		2
24		i	Vulcan Pit	3	Construct new inflow and outflow structures[11]	Y	0	857	N	N	$ 13,850,000	$ 901,000	$ 31,548	$ 932,548	$ 1,088	840	$ 163,800	$ 13,850,000	$ 901,000	$ 19,917	$ 1,084,717	$ 1,291	0	$ -	$ -	$ -	$ -	$ -	$ -	1,697	$ 27,700,000	$ 1,189		1
25		i	Sierra	3	Deepen basin by 10 feet	N	12	64	N	N	$ 1,000,000	$ 65,100	$ 2,351	$ 67,451	$ 1,056	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	64	$ 1,000,000	$ 1,056		1
25a		i	Sierra	3	Deepen basin by 10 feet	N	12	64	N	N	$ 490,000	$ 31,900	$ 2,351	$ 34,251	$ 536	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	64	$ 490,000	$ 536		1
26		i	Sultana Avenue	3	Deepen basin by 10 feet	N	89	7	N	N	$ 1,026,200	$ 66,800	$ 258	$ 67,058	$ 9,556	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	7	$ 1,026,200	$ 9,556		1
26a		i	Sultana Avenue	3	Deepen basin by 10 feet	N	89	7	N	N	$ 502,200	$ 32,700	$ 258	$ 32,958	$ 4,697	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	7	$ 502,200	$ 4,697		1
27		i	Declez Basin	3	Reconstruct existing embankment and install a gate on the low level outlet[12]	N	674	241	N	N	$ 4,070,000	$ 264,800	$ 8,877	$ 273,677	$ 1,135	0	$ -	$ -	$ -	$ -	$ -	$ -	0	$ -	$ -	$ -	$ -	$ -	$ -	241	$ 4,070,000	$ 1,135		2
Operations and Maintenance[13]																																		
28		ii	Banana Basin (annual cleaning)	3	Increase frequency of basin maintenance (Increased infiltration rate to 0.6 ft/day)	Y	317	11	N	N			$ 3,183	$ 3,183	$ 294	130	$ 25,350	$ -	$ -	$ 38,159	$ 63,509	$ 489	0	$ -	$ -	$ -	$ -	$ -	$ -	141		$ 474		0
29		ii	Banana Basin (semiannual cleanings)	3	Increase frequency of basin maintenance (Increased infiltration rate to 0.72 ft/day)	Y	317	31	N	N			$ 15,192	$ 15,192	$ 495	155	$ 30,225	$ -	$ -	$ 76,744	$ 106,969	$ 690	0	$ -	$ -	$ -	$ -	$ -	$ -	186		$ 658		0
30		ii	Declez Basin (annual cleaning)	3	Increase basin maintenance frequency (Increased infiltration rate to 0.66 ft/day)	Y	674	16	N	N			$ 6,537	$ 6,537	$ 409	178	$ 34,710	$ -	$ -	$ 72,735	$ 107,445	$ 604	0	$ -	$ -	$ -	$ -	$ -	$ -	194		$ 588		0
31		ii	Declez Basin (semiannual cleanings)	3	Increase basin maintenance frequency (Increased infiltration rate to 0.78 ft/day)	Y	674	47	N	N			$ 32,923	$ 32,923	$ 701	210	$ 40,950	$ -	$ -	$ 147,109	$ 188,059	$ 896	0	$ -	$ -	$ -	$ -	$ -	$ -	257		$ 860		0
32		ii	Ely Basin (annual cleaning)	2	Increase maintenance frequency (Increased infiltration rate to 0.27 ft/day)	Y	1,103	44	N	N			$ 29,450	$ 29,450	$ 668	217	$ 42,315	$ -	$ -	$ 144,868	$ 187,183	$ 863	0	$ -	$ -	$ -	$ -	$ -	$ -	261		$ 830		0
33		ii	Ely Basin (semiannual cleanings)	2	Increase maintenance frequency (Increased infiltration rate to 0.33 ft/day)	Y	1,103	128	N	N			$ 127,949	$ 127,949	$ 997	258	$ 50,310	$ -	$ -	$ 257,342	$ 307,652	$ 1,192	0	$ -	$ -	$ -	$ -	$ -	$ -	386		$ 1,128		0
34		ii	Hickory Basin (annual cleaning)	2	Increase frequency of basin maintenance (Increased infiltration rate to 0.44 ft/day)	Y	353	7	N	N			$ 3,812	$ 3,812	$ 518	148	$ 28,860	$ -	$ -	$ 76,622	$ 105,482	$ 713	0	$ -	$ -	$ -	$ -	$ -	$ -	155		$ 703		0
35		ii	Hickory Basin (semiannual cleanings)	2	Increase frequency of basin maintenance (Increased infiltration rate to 0.52 ft/day)	Y	353	20	N	N			$ 17,640	$ 17,640	$ 877	175	$ 34,125	$ -	$ -	$ 153,435	$ 187,560	$ 1,072	0	$ -	$ -	$ -	$ -	$ -	$ -	195		$ 1,052		0
Proposed Projects in Table 6-1 that Were Not Analyzed																																		
36			Turner Expansion	2	Basin improvements to the basins east of Archibald Ave and new basins adjacent to Turner 4[14]																													
37			Upland Basin	1	Construct low level drain[15]																													
38			College Heights	1	Construct internal berms to reduce seepage to the Upland basin[16]																													
39			Lower Cucamonga Basin	2	Basin enlargement for distribution[17]																													
40			Management Zones 2 and 3 Capture, Pump and Recharge	2,3	Capture water in MZ-2 and 3 basins low in the system and pump to basins higher in the system[17]																													
41			Jurupa Basin	3	Inlet improvements and basin enlargement[17]																													
42			RP3 Basins	3	Inlet improvements[18]																													
43			Alder Basin	3	Deepen basin[17]																													

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; iv- the project is included in a "iii" group.
[2] The results of this table provide an estimate of the cost per acre-ft of recharge. These estimates are reconnaissance level (level 5) estimates, and additional technical work needs to be done to assure feasibility.
[3] The IEUA recycled water recharge rate was assumed to be $195/acre-ft per Table 2-9.
[4] The MWD imported water recharge rate was assumed to be untreated Tier 1 Service at a price of $621 an acre-ft per Table 2-9.
[5] The production sustainability score is a tool to characterize a project's contribution to production sustainability in areas with sustainability challenges. In simple terms, the score is as follows: 0 – does not contribute to production sustainability; 1 – contributes minimally to production sustainability (a necessary but not sufficient condition of sustainability); 2 – contributes significantly to production sustainability (a necessary and sufficient condition of sustainability).
[6] The automation of the inlet gate and flume data to MC 1 results in a reduction of O&M.
[7] With a 40-percent RWC limitation, an additional 1,911 acre-ft/yr of recycled water can be recharged.
[8] The baseline for the Turner 2 Spillway Project and the Turner Expansion includes the recharge from Turner 1, 2, 3, and 4.
[9] The results from the Wineville proof-of-concept project may render the project infeasible. Recycled water recharge was estimated to be 630 acre-ft/yr, assuming an infiltration rate of 0.10 ft/day over 30 acres.
[10] The maximum amount of recycled water that can be recharged is 12,800 acre-ft/yr at RP3 due to the RWC.
[11] Recycled water recharge based upon an estimated 0.1 ft/day infiltration at 40-acres for 7-months of operations. Actual RWC is unknown; recharge based upon an assumed RWC at 25% with the following flows: 840 AFY storm water, 1,800 AFY underflow, and diluent water the same at Banana Basin. The project includes the price of land at $14 million.
[12] Recycled water recharge operations will not benefit from the increased operating level.
[13] Based on available information, it can be assumed that basin infiltration can be increased 10 to 20% with annual cleaning and 20 to 50 % with cleaning twice a year. Field data needs to be established to determine optimum cleaning frequencies per basin.
[14] The Turner Basin expansion project was not included because it is currently under construction.
[15] The Upland Basin Project was removed by the IEUA because the basin performs well, and limited cleaning is needed.
[16] The College Heights project does not affect stormwater recharge.
[17] The projects did not pass the screening criteria and were not considered.
[18] The estimated total stormwater recharge gained by the 2010 RMPU RP3 inlet improvement is comparable to the currently achievable stormwater recharge at RP3 due to enhance stormwater recharge efforts by IEUA.
[19] Reduces the amount of lost water due to basin inlet constraints and clogging.
[20] Will increase the amount of time water can be recharged in SS-1 by solving the vector control issues.
[21] Will allow the Jurupa Basin to accept an additional 15 cfs from the CB 18 if Hickory and Banana Basins were offline.
[22] The SBCFCD did not allow the City of Ontario to connect the new 5th Street storm drain to the Princeton Basin. The SBCFCD required improvements to the Princeton Basin such as enlarging the basin by purchasing the adjacent property, deepening the basin, and enlarging the outlet structures in order to allow the diversion of the 15th St storm drain to the Princeton Basin. These costs made the improvement infeasible. The City of Ontario connected the 60" storm drain to the West Cucamonga channel to the south of the Princeton Basin. This information was not presented until after the model runs and cost estimates were completed.
a - The project includes excavation costs, and the capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table 8-2b
Screening of Yield Enhancement Projects

Project ID	Project	Management Zone	Capital Cost	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	New Yield	Recycled Water	Unit Cost	Water Quality Challenges	Institutional Challenges
1	Montclair Basins	1	$ 5,450,000	$ 354,500	$ 2,644	$ 357,144	71	0	$ 4,997		c
1a	Montclair Basins	1	$ 5,050,000	$ 328,500	$ 2,644	$ 331,144	71	0	$ 4,634		c
2	Montclair Basins	1	$ 1,440,000	$ 93,700	$ 9,176	$ 102,876	248	0	$ 415		c
3	Montclair Basins	1	$ 50,000	$ 3,300	$ -	$ 3,300	0	0	--		c
4	Montclair Basins	1	$ 790,000	$ 51,400	$ -	$ 51,400	0	0	--		c
5	North West Upland Basin	1	$ 5,490,000	$ 357,100	$ 3,458	$ 360,558	93	0	$ 3,858		c, g
5a	North West Upland Basin	1	$ 4,640,000	$ 301,800	$ 3,458	$ 305,258	93	0	$ 3,267		c, g
6	Princeton Basin	2	$ -	$ -	$ -	$ -	0	0	--		c
7	San Sevaine Basins	2	$ 1,775,000	$ 115,500	$ 23,756	$ 139,256	642	1,911	$ 217		c, e, f
8	San Sevaine Basins	2	$ 2,620,000	$ 170,400	$ 12,781	$ 183,181	345	1,911	$ 530		c, e
9	San Sevaine Basins	2	$ 300,000	$ 19,500	$ -	$ 19,500	0	0	--		c
10	San Sevaine Basins	2	$ 1,980,000	$ 128,800	$ -	$ 128,800	0	0	--		c
11	Victoria Basin	2	$ 75,000	$ 4,900	$ 1,584	$ 6,484	43	120	$ 151		c, e, f
12	Lower Day Basin (2010 RMPU)	2	$ 2,480,000	$ 161,300	$ 29,182	$ 190,482	789	0	$ 242		c
13	Lower Day Basin	2	$ 600,000	$ 39,000	$ 2,791	$ 41,791	75	0	$ 554		c
14	Turner Basin	2	$ 890,000	$ 57,900	$ 2,438	$ 60,338	66	0	$ 916		c
15	Ely Basin	2	$ 9,120,000	$ 593,300	$ 8,162	$ 601,462	221	0	$ 2,727	b	
15a	Ely Basin	2	$ 3,200,000	$ 208,200	$ 8,162	$ 216,362	221	0	$ 981	b	
16	Ontario Bioswale Project	2	$ 650,000	$ 42,300	$ 279	$ 42,579	8	0	$ 5,652		
17	Lower San Sevaine Basin (2010 RMPU)	2	$ 45,430,000	$ 2,955,300	$ 45,165	$ 3,000,465	1,221	500	$ 2,458		d, e
17a	Lower San Sevaine Basin (2010 RMPU)	2	$ 22,550,000	$ 1,466,900	$ 45,165	$ 1,512,065	1,221	500	$ 1,239		d, e
18	CSI Storm Water Basin	3	$ 900,000	$ 58,500	$ 3,012	$ 61,512	81	0	$ 756	b	g
18a	CSI Storm Water Basin	3	$ 440,000	$ 28,600	$ 3,012	$ 31,612	81	0	$ 388	b	g
19	Wineville Basin (2010 RMPU)	3	$ 6,280,000	$ 408,500	$ 79,824	$ 488,324	2,157	630	$ 226	b	
19a	Wineville Basin (2010 RMPU)	3	$ 4,890,000	$ 318,100	$ 79,824	$ 397,924	2,157	630	$ 184	b	
20	Jurupa Basin	3	$ 2,150,000	$ 139,900	$ 15,591	$ 155,491	421	0	$ 369		
21	RP3 Basin Improvements (2010 RMPU)	3	$ 22,044,000	$ 1,434,000	$ 15,004	$ 1,449,004	406	0	$ 3,573		
21a	RP3 Basin Improvements (2010 RMPU)	3	$ 13,464,000	$ 875,900	$ 15,004	$ 890,904	406	0	$ 2,197		
22	RP3 Basin Improvements (2013 RMPU)	3	$ 2,645,000	$ 172,100	$ 5,087	$ 177,187	137	2,905	$ 1,289		f
22a	RP3 Basin Improvements (2013 RMPU)	3	$ 1,855,000	$ 120,700	$ 5,087	$ 125,787	137	2,905	$ 915		f
23	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	$ 23,324,000	$ 1,517,300	$ 311,014	$ 1,828,314	3,166	3,535	$ 577		d, e
23a	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	$ 21,314,000	$ 1,386,500	$ 311,014	$ 1,697,514	3,166	3,535	$ 536		d, e
24	Vulcan Pit	3	$ 27,700,000	$ 1,801,900	$ 31,701	$ 1,833,601	857	840	$ 2,140	b	d, e, g
25	Sierra	3	$ 1,000,000	$ 65,100	$ 2,362	$ 67,462	64	0	$ 1,057		g
25a	Sierra	3	$ 490,000	$ 31,900	$ 2,362	$ 34,262	64	0	$ 537		g
26	Sultana Avenue	3	$ 1,026,200	$ 66,800	$ 260	$ 67,060	7	0	$ 9,556		g
26a	Sultana Avenue	3	$ 502,200	$ 32,700	$ 260	$ 32,960	7	0	$ 4,697		g
27	Declez Basin	3	$ 4,070,000	$ 264,800	$ 8,920	$ 273,720	241	0	$ 1,135		
28	Banana Basin (annual cleaning)	3					11	130	$ 294		
29	Banana Basin (semiannual cleanings)	3					31	155	$ 495		
30	Declez Basin (annual cleaning)	3					16	178	$ 409		
31	Declez Basin (semiannual cleanings)	3					47	210	$ 701		
32	Ely Basin (annual cleaning)	2					44	217	$ 668	b	
33	Ely Basin (semiannual cleanings)	2					128	258	$ 997	b	
34	Hickory Basin (annual cleaning)	2					7	148	$ 518		
35	Hickory Basin (semiannual cleanings)	2					20	175	$ 877		

a - Project ID no.'s with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project.

Key to Water Quality Challenges

b - A potential water quality challenge has been identified with this project.

Key to Institutional Challenges

c - An agreement will be required with the property owner to construct and operate stormwater recharge facilities. Other agreements with resource agencies may also be required. The time required to negotiate and approve these agreements could range from one to two years.

d - This basin is not currently included in the Watermaster/IEUA recharge permit. Therefore, the existing permit will need to be amended to include recycled water at this basin. The time required to prepare the Title 22 engineering report and regulatory process is about two years.

e - The project includes a recycled water recharge component. The IEUA has discretion as to whether to participate or not in this project.

f - At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared. The capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

g - The Watermaster will have to submit a Petition for Change with the State Water Resources Control Board for the project because it is not included in the Watermaster's current diversion permits.

Table 8-2c
Ranked Yield Enhancement Projects (Melded Unit Cost Under $612 acre-ft)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
18a	i	CSI Storm Water Basin	81	0	$ 388	$ 440,000	$ 31,612
23a	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 500	$ 19,552,000	$ 1,582,914
25a	i	Sierra	64	0	$ 537	$ 490,000	$ 34,262
27	i	Declez Basin	241	0	$ 1,135	$ 4,070,000	$ 273,720
Total MZ3			**3,552**	**2,905**	**$ 541**	**$ 24,552,000**	**$ 1,922,509**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
14	i	Turner Basin	66	0	$ 916	$ 890,000	$ 60,338
15a	i	Ely Basin	221	0	$ 981	$ 3,200,000	$ 216,362
17a	i	Lower San Sevaine Basin (2010 RMPU)	1,221	0	$ 1,239	$ 22,550,000	$ 1,512,065
Total MZ2			**2,981**	**2,031**	**$ 713**	**$ 30,970,000**	**$ 2,124,987**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**6,781**	**4,936**	**$ 612**	**$ 56,962,000**	**$ 4,150,372**
Other Projects							
19a	iii	Wineville Basin (2010 RMPU)	2,157	0	$ 184	$ 4,890,000	$ 397,924
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22a	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 915	$ 1,855,000	$ 125,787

Note - color shading within each MZ indicates mutually exclusive projects.

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

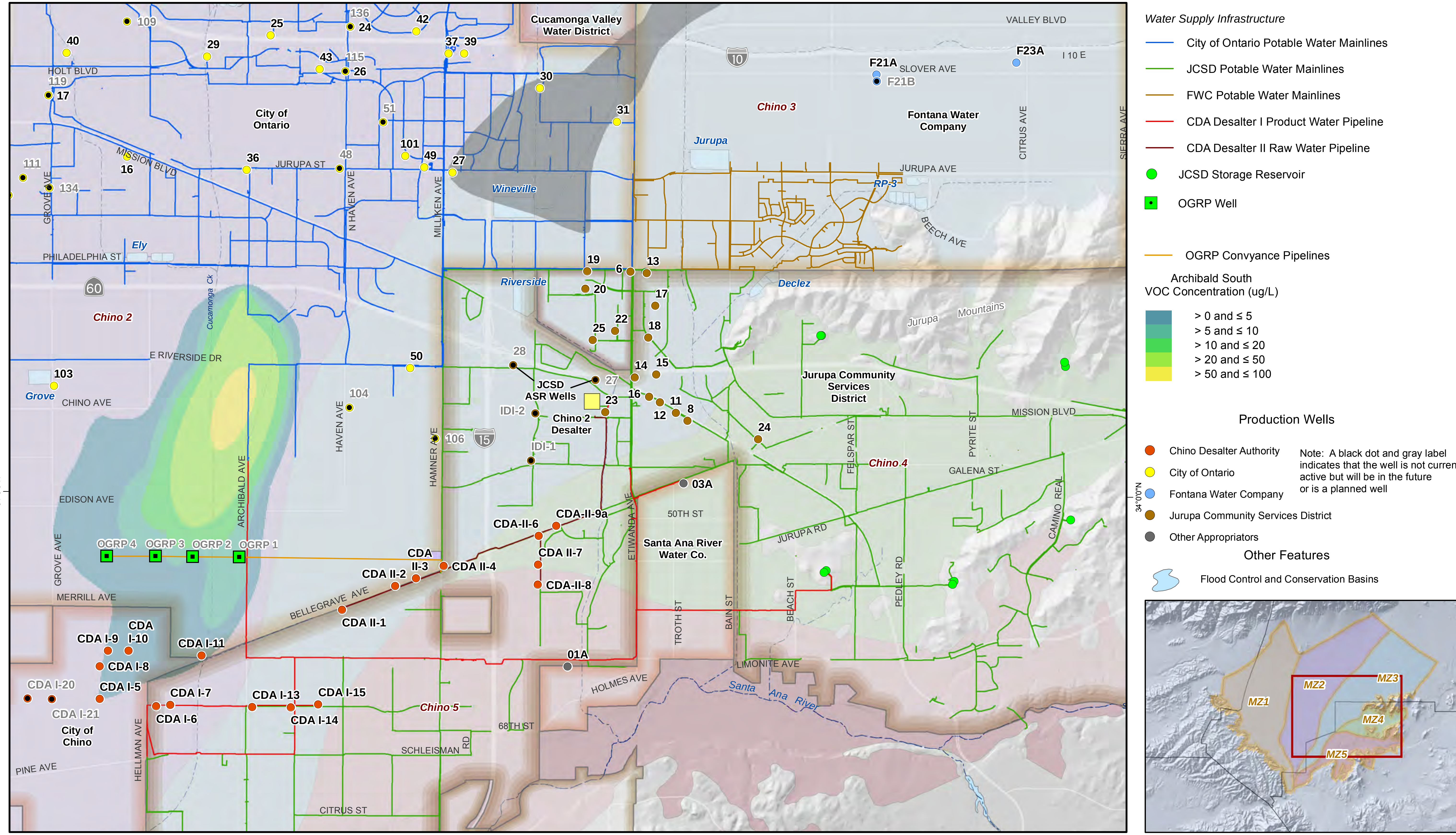
[2] At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

[3] Project ID 23a includes Project IDs 19a, 20, and 22a and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22a. The capital costs associated with Project IDs 19a and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22a. The recycled water recharge associated with Project ID 19a was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23a is about $21,300,000.

[4] The total capital cost for Project ID 11 is about $150,000.

[5] The total capital cost for Project ID 12 is about $3,550,000.

a - Project ID no.'s with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project.



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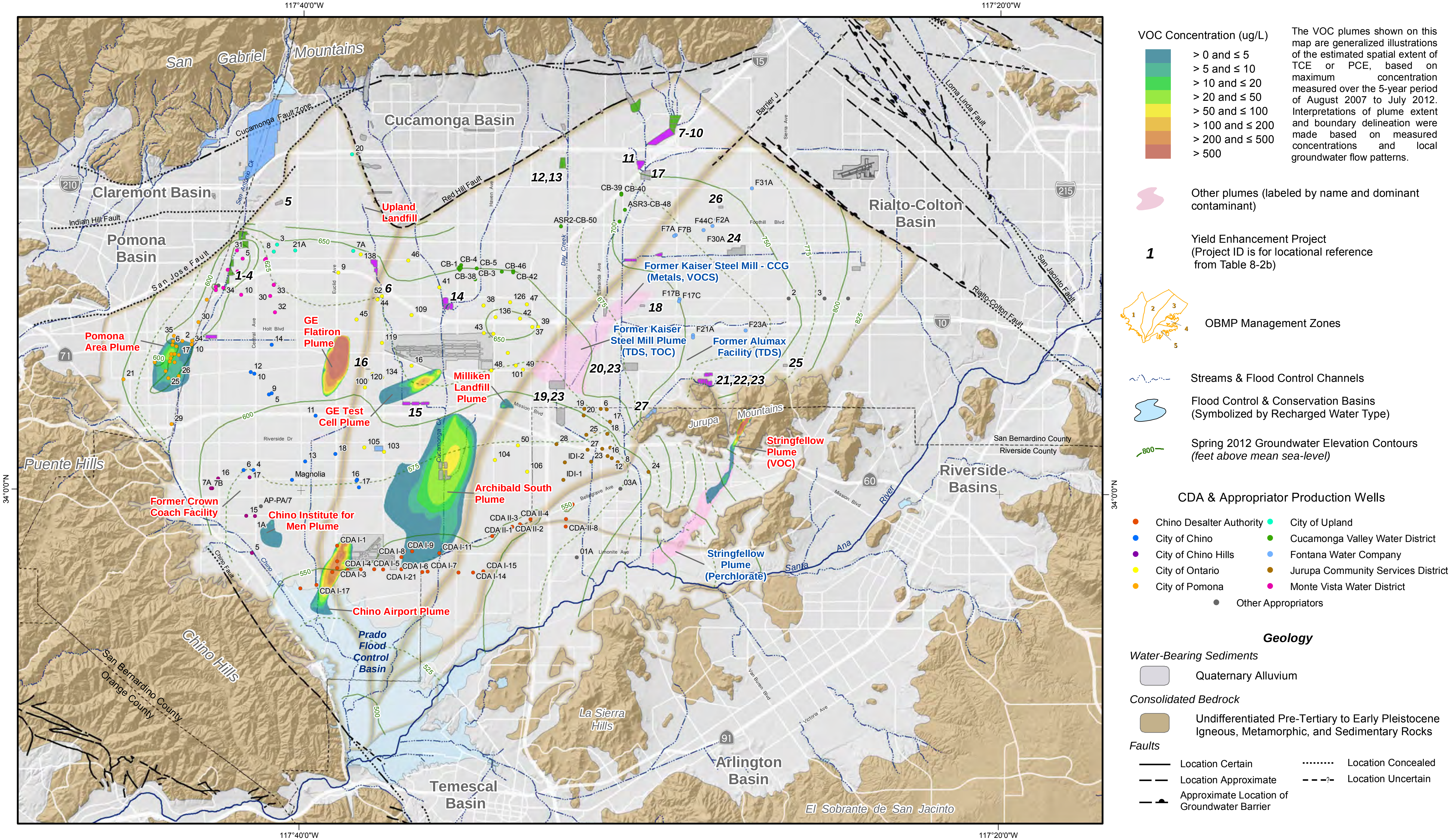
Name: Figure_8-1

2013 Amendment to the 2010 RMPU

In-Lieu Recharge/Exchange Project Configurations Submitted by Steering Committee Members

Figure 8-1



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2013 Amendment to the 2010 RMPU

Delineation of Groundwater Contamination Plumes and Point-Sources of Concern in Relation to the Yield Enhancement Projects

Figure 8-2

Figure 8-3
Implementation Plan and Schedule

Implementation Step	Project Type (PS or YE)	Implementation Period											
		2014		2015		2016		2017		2018		2019	
Determine Need and Refine Production Sustainability Projects	PS												
Contact Sand and Gravel Companies	YE												
Develop Watermaster and the IEUA Yield Enhancement Project Implementation Agreement	YE												
Consider Appropriative Pool New Yield and Cost Allocation Agreement	YE												
Develop Flood Control and Water Conservation Agreement	YE												
Develop an Implementation Agreement among the Parties Participating in the Production Sustainability Project(s)	PS												
Develop Appropriative Pool Production Sustainability Cost Allocation Agreement	PS												
Prepare Preliminary Design of Recommended Yield Enhancement Projects	YE												
Prepare Environmental Documentation for Yield Enhancement Projects	YE												
Select Final Set of Yield Enhancement Projects from the 2013 RMPU for Implementation and Finalize Capital Requirements	YE					*							
Prepare Preliminary Design of Recommended Production Sustainability Projects	PS												
Prepare Environmental Documentation for Production Sustainability Projects	PS												
Select Final Set of Production Sustainability Projects from the 2013 RMPU for Implementation and Finalize Capital Requirements	PS							*					
Prepare Final Designs and Acquire Permits for Production Sustainability Projects	PS												
Prepare Final Designs and Acquire Permits for Yield Enhancement Projects	YE												
Construct 2013 RMPU Amendment Production Sustainability Projects	PS												
Construct 2013 RMPU Amendment Yield Enhancement Projects	YE												

* -- Decision Point Milestone

S:\Clients\CBWM\OBMP_Implementation\Peace II Implementation\2012 RMPU Implementation\Task 8 Concepts\Figures\20130818 Figure 8-3 Implementation Plan for Yield Ehancement projects.xlsx
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WILDERMUTH ENVIRONMENTAL INC.

Appendix A

Projected Groundwater Elevation Time Series for Selected Wells for Scenarios 1 and 3

Table A-1
Sustainability Metrics and First Occurrence of Failure

Figure #	Owner	Well Name	Top of Screen Elevation	Pump Setting Elevation	Constraint Type	Sustainability Metric Elevation	First Occurrence of Breaking the Sustainability Metric (Year)									
							Scenario 1	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 1D	Scenario 3	Scenario 3A	Scenario 3B	Scenario 3C	Scenario 3D
1	City of Chino Hills	1A	462	383	Pump Setting Elev. + 20 ft	403	-	-	-	-	-	-	-	-	-	-
2	City of Chino Hills	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	City of Chino Hills	7A	529	443	Pump Setting Elev. + 20 ft	463	-	-	-	-	-	-	-	-	-	-
4	City of Chino Hills	7B	545	443	Pump Setting Elev. + 20 ft	463	-	-	-	-	-	-	-	-	-	-
5	City of Chino Hills	15	269	383	Pump Setting Elev. + 20 ft	403	-	-	-	-	-	-	-	-	-	-
6	City of Chino Hills	17	394	172	Pump Setting Elev. + 20 ft	192	-	-	-	-	-	-	-	-	-	-
7	City of Chino	5	425	505	Pump Setting Elev. + 40 ft	545	2024	2024	2024	2024	2024	2021	2021	2021	2021	2021
8	City of Chino	6	499	449	Pump Setting Elev. + 40 ft	489	-	-	-	-	-	-	-	-	-	-
9	City of Chino	9	543	453	Pump Setting Elev. + 40 ft	493	-	-	-	-	-	-	-	-	-	-
10	City of Chino	10	530	435	Pump Setting Elev. + 40 ft	475	-	-	-	-	-	-	-	-	-	-
11	City of Chino	11	431	415	Pump Setting Elev. + 40 ft	455	-	-	-	-	-	-	-	-	-	-
12	City of Chino	12	469	-	-	-	-	-	-	-	-	-	-	-	-	-
13	City of Chino	13	448	308	Pump Setting Elev. + 40 ft	348	-	-	-	-	-	-	-	-	-	-
14	City of Chino	14	476	-	-	-	-	-	-	-	-	-	-	-	-	-
15	City of Chino	16	486	-	-	-	-	-	-	-	-	-	-	-	-	-
16	City of Chino	17	489	-	-	-	-	-	-	-	-	-	-	-	-	-
17	MVWD	MVWD-33	444	-	-	-	-	-	-	-	-	-	-	-	-	-
18	City of Chino	18	512	-	-	-	-	-	-	-	-	-	-	-	-	-
19	City of Chino	NEW-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	City of Chino	NEW-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	CVWD	CB-1	651	-	-	-	-	-	-	-	-	-	-	-	-	-
22	CVWD	CB-2C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	CVWD	CB-3	722	513	Pump Setting Elev. + 40 ft	553	-	-	-	-	-	-	-	-	-	-
24	CVWD	CB-4	599	453	Pump Setting Elev. + 40 ft	493	-	-	-	-	-	-	-	-	-	-
25	CVWD	CB-5	555	573	Pump Setting Elev. + 40 ft	613	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
26	CVWD	CB-30	619	449	Pump Setting Elev. + 40 ft	489	-	-	-	-	-	-	-	-	-	-
27	CVWD	CB-38	479	469	Pump Setting Elev. + 40 ft	509	-	-	-	-	-	-	-	-	-	-
28	CVWD	CB-39	530	615	Pump Setting Elev. + 40 ft	655	-	-	-	-	-	-	-	-	-	-
29	CVWD	CB-40	526	401	Pump Setting Elev. + 40 ft	441	-	-	-	-	-	-	-	-	-	-
30	CVWD	CB-41	451	435	Pump Setting Elev. + 40 ft	475	-	-	-	-	-	-	-	-	-	-
31	CVWD	CB-42	443	471	Pump Setting Elev. + 40 ft	511	-	-	-	-	-	-	-	-	-	-
32	CVWD	CB-43	549	394	Pump Setting Elev. + 40 ft	434	-	-	-	-	-	-	-	-	-	-
33	CVWD	CB-46	433	461	Pump Setting Elev. + 40 ft	501	-	-	-	-	-	-	-	-	-	-
34	CVWD	ASR1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	CVWD	ASR2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	CVWD	ASR3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	CVWD	ASR4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	FWC	F2A	683	676	Pump Setting Elev. + 50 ft	726	2016	2016	2016	2016	2016	2015	2015	2015	2015	2015
39	FWC	F7A	619	644	Pump Setting Elev. + 50 ft	694	-	-	-	-	-	-	-	-	-	-
40	FWC	F7B	608	583	Pump Setting Elev. + 50 ft	633	-	-	-	-	-	-	-	-	-	-
41	FWC	F17B	578	565	Pump Setting Elev. + 50 ft	615	-	-	-	-	-	-	-	-	-	-
42	FWC	F17C	573	510	Pump Setting Elev. + 50 ft	560	-	-	-	-	-	-	-	-	-	-
43	FWC	F21A	793	582	Pump Setting Elev. + 50 ft	632	-	-	-	-	-	-	-	-	-	-
44	FWC	F23A	623	-	-	-	-	-	-	-	-	-	-	-	-	-
45	FWC	F30A	740	632	Pump Setting Elev. + 50 ft	682	-	-	-	-	-	-	-	-	-	-
46	FWC	F31A	694	621	Pump Setting Elev. + 50 ft	671	-	-	-	-	-	-	-	-	-	-
47	FWC	F44A	713	671	Pump Setting Elev. + 50 ft	721	2024	2024	2024	2025	2026	2022	2022	2023	2023	2024
48	FWC	F44B	633	641	Pump Setting Elev. + 50 ft	691	-	-	-	-	-	2030	2030	-	-	-
49	FWC	F44C	633	641	Pump Setting Elev. + 50 ft	691	-	-	-	-	-	2030	2030	-	-	-
50	GSWC	#1	879	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A-1
Sustainability Metrics and First Occurrence of Failure

Figure #	Owner	Well Name	Top of Screen Elevation	Pump Setting Elevation	Constraint Type	Sustainability Metric Elevation	First Occurrence of Breaking the Sustainability Metric (Year)									
							Scenario 1	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 1D	Scenario 3	Scenario 3A	Scenario 3B	Scenario 3C	Scenario 3D
51	JCSD	6	610	-	Top of screens	610	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
52	JCSD	8	581	459	Top of screens	581	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
53	JCSD	11	559	497	Top of screens	559	2029	-	-	-	-	2025	-	2028	-	-
54	JCSD	12	557	479	Top of screens	557	2014	2014	2014	2014	2014	2013	2013	2013	2013	2013
55	JCSD	13	627	526	Top of screens	627	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
56	JCSD	14	560	402	Top of screens	560	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
57	JCSD	15	565	518	Top of screens	565	2024	-	2028	-	-	2020	2028	2024	-	2030
58	JCSD	16	552	504	Top of screens	552	2028	-	-	-	-	2024	-	2028	-	-
59	JCSD	17	566	545	Top of screens	566	2025	-	2030	-	-	2020	2029	2024	-	-
60	JCSD	18	580	495	Top of screens	580	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013
61	JCSD	19	546	474	Top of screens	546	-	-	-	-	-	-	-	-	-	-
62	JCSD	20	580	496	Top of screens	580	2021	2028	2026	-	-	2018	2024	2021	-	2030
63	JCSD	22	537	498	Top of screens	537	-	-	-	-	-	-	-	-	-	-
64	JCSD	23	492	462	Top of screens	492	-	-	-	-	-	-	-	-	-	-
65	JCSD	24	-	477	Top of screens	547	-	-	-	-	-	-	-	-	-	-
66	JCSD	25	525	485	Top of screens	525	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
67	JCSD	Galleano	490	-	Top of screens	490	-	-	-	-	-	-	-	-	-	-
68	JCSD	ODA	496	-	Top of screens	496	-	-	-	-	-	-	-	-	-	-
69	JCSD	IDI-1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	JCSD	IDI-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	MMWC	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	MMWC	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	MMWC	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	MVWD	4	707	501	Pump Setting Elev. + 20 ft	521	-	-	-	-	-	-	-	-	-	-
75	MVWD	5	572	432	Pump Setting Elev. + 20 ft	452	-	-	-	-	-	-	-	-	-	-
76	MVWD	6	762	502	Pump Setting Elev. + 20 ft	522	-	-	-	-	-	-	-	-	-	-
77	MVWD	10	537	357	Pump Setting Elev. + 20 ft	377	-	-	-	-	-	-	-	-	-	-
78	MVWD	19	423	423	Pump Setting Elev. + 20 ft	443	-	-	-	-	-	-	-	-	-	-
79	MVWD	26	434	434	Pump Setting Elev. + 20 ft	454	-	-	-	-	-	-	-	-	-	-
80	MVWD	27	478	488	Pump Setting Elev. + 20 ft	508	-	-	-	-	-	-	-	-	-	-
81	MVWD	28	418	293	Pump Setting Elev. + 20 ft	313	-	-	-	-	-	-	-	-	-	-
82	MVWD	30	446	489	Pump Setting Elev. + 20 ft	509	-	-	-	-	-	-	-	-	-	-
83	MVWD	31	416	316	Pump Setting Elev. + 20 ft	336	-	-	-	-	-	-	-	-	-	-
84	MVWD	32	407	432	Pump Setting Elev. + 20 ft	452	-	-	-	-	-	-	-	-	-	-
85	MVWD	MVWD-33	444	479	Pump Setting Elev. + 20 ft	499	-	-	-	-	-	-	-	-	-	-
86	MVWD	34	398	362	Pump Setting Elev. + 20 ft	382	-	-	-	-	-	-	-	-	-	-
87	City of Ontario	9	543	-	-	-	-	-	-	-	-	-	-	-	-	-
88	City of Ontario	16	540	-	-	-	-	-	-	-	-	-	-	-	-	-
89	City of Ontario	17	543	510	Pump Setting Elev. + 20 ft	530	-	-	-	-	-	-	-	-	-	-
90	City of Ontario	20	-	532	Pump Setting Elev. + 20 ft	552	-	-	-	-	-	-	-	-	-	-
91	City of Ontario	24	507	561	Pump Setting Elev. + 20 ft	581	2029	2030	-	-	-	2028	2029	2030	-	-
92	City of Ontario	25	611	497	Pump Setting Elev. + 20 ft	517	-	-	-	-	-	-	-	-	-	-
93	City of Ontario	26	628	518	Pump Setting Elev. + 20 ft	538	-	-	-	-	-	-	-	-	-	-
94	City of Ontario	27	500	551	Pump Setting Elev. + 20 ft	571	2030	-	-	-	-	2029	-	-	-	-
95	City of Ontario	29	561	521	Pump Setting Elev. + 20 ft	541	-	-	-	-	-	-	-	-	-	-
96	City of Ontario	30	548	538	Pump Setting Elev. + 20 ft	558	-	-	-	-	-	-	-	-	-	-
97	City of Ontario	31	538	615	Pump Setting Elev. + 20 ft	635	2029	-	-	-	-	2027	2030	2030	-	-
98	City of Ontario	34	398	431	Pump Setting Elev. + 20 ft	451	-	-	-	-	-	-	-	-	-	-
99	City of Ontario	35	397	478	Pump Setting Elev. + 20 ft	498	-	-	-	-	-	-	-	-	-	-
100	City of Ontario	36	362	497	Pump Setting Elev. + 20 ft	517	-	-	-	-	-	-	-	-	-	-

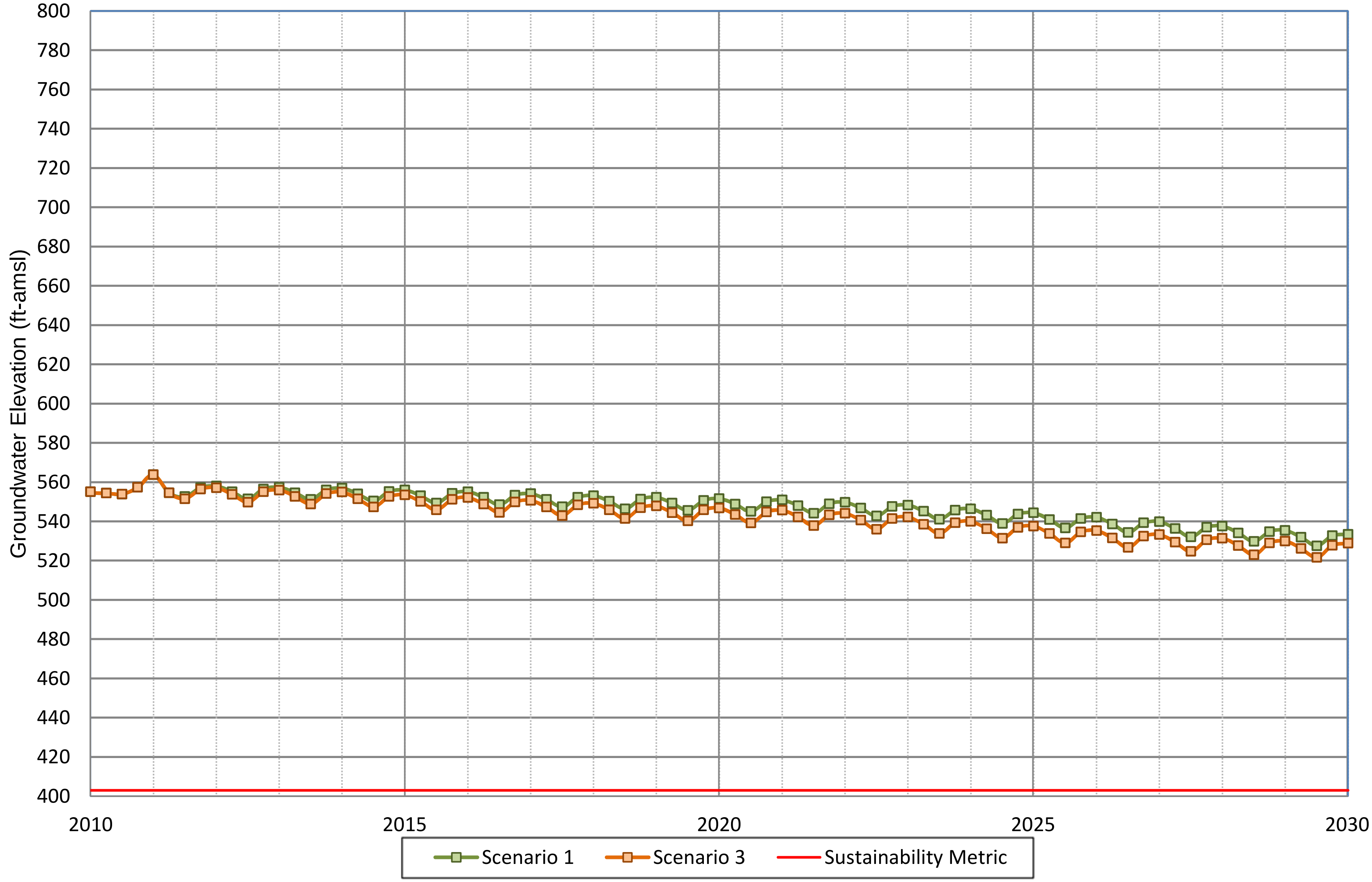
Table A-1
Sustainability Metrics and First Occurrence of Failure

Figure #	Owner	Well Name	Top of Screen Elevation	Pump Setting Elevation	Constraint Type	Sustainability Metric Elevation	First Occurrence of Breaking the Sustainability Metric (Year)									
							Scenario 1	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 1D	Scenario 3	Scenario 3A	Scenario 3B	Scenario 3C	Scenario 3D
101	City of Ontario	37	578	589	Pump Setting Elev. + 20 ft	609	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
102	City of Ontario	38	-	569	Pump Setting Elev. + 20 ft	589	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
103	City of Ontario	39	-	589	Pump Setting Elev. + 20 ft	609	2016	2016	2016	2016	2016	2016	2016	2016	2016	2016
104	City of Ontario	40	489	472	Pump Setting Elev. + 20 ft	492	-	-	-	-	-	-	-	-	-	-
105	City of Ontario	41	430	463	Pump Setting Elev. + 20 ft	483	-	-	-	-	-	-	-	-	-	-
106	City of Ontario	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-
107	City of Ontario	43	523	-	-	-	-	-	-	-	-	-	-	-	-	-
108	City of Ontario	44	475	553	Pump Setting Elev. + 20 ft	573	2027	2027	2028	2028	2028	2025	2026	2027	2028	2028
109	City of Ontario	45	409	480	Pump Setting Elev. + 20 ft	500	-	-	-	-	-	-	-	-	-	-
110	City of Ontario	46	482	521	Pump Setting Elev. + 20 ft	541	-	-	-	-	-	-	-	-	-	-
111	City of Ontario	47	496	539	Pump Setting Elev. + 20 ft	559	-	-	-	-	-	-	-	-	-	-
112	City of Ontario	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-
113	City of Ontario	49	491	518	Pump Setting Elev. + 20 ft	538	-	-	-	-	-	-	-	-	-	-
114	City of Ontario	50	472	499	Pump Setting Elev. + 20 ft	519	-	-	-	-	-	2028	-	-	-	-
115	City of Ontario	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-
116	City of Ontario	52	485	465	Pump Setting Elev. + 20 ft	485	-	-	-	-	-	-	-	-	-	-
117	City of Ontario	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
118	City of Ontario	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-
119	City of Ontario	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-
120	City of Ontario	104	-	-	-	-	-	-	-	-	-	-	-	-	-	-
121	City of Ontario	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-
122	City of Ontario	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-
123	City of Ontario	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-
124	City of Ontario	111	-	-	-	-	-	-	-	-	-	-	-	-	-	-
125	City of Ontario	119	-	-	-	-	-	-	-	-	-	-	-	-	-	-
126	City of Ontario	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-
127	City of Ontario	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-
128	City of Ontario	126	-	-	-	-	-	-	-	-	-	-	-	-	-	-
129	City of Ontario	134	-	-	-	-	-	-	-	-	-	-	-	-	-	-
130	City of Ontario	136	-	-	-	-	-	-	-	-	-	-	-	-	-	-
131	City of Ontario	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-
132	City of Pomona	2	886	-	-	-	-	-	-	-	-	-	-	-	-	-
133	City of Pomona	5B	433	-	-	-	-	-	-	-	-	-	-	-	-	-
134	City of Pomona	6	699	-	-	-	-	-	-	-	-	-	-	-	-	-
135	City of Pomona	10	611	-	-	-	-	-	-	-	-	-	-	-	-	-
136	City of Pomona	11	701	-	-	-	-	-	-	-	-	-	-	-	-	-
137	City of Pomona	12	630	-	-	-	-	-	-	-	-	-	-	-	-	-
138	City of Pomona	14	541	-	-	-	-	-	-	-	-	-	-	-	-	-
139	City of Pomona	15	649	-	-	-	-	-	-	-	-	-	-	-	-	-
140	City of Pomona	16	615	-	-	-	-	-	-	-	-	-	-	-	-	-
141	City of Pomona	17	417	-	-	-	-	-	-	-	-	-	-	-	-	-
142	City of Pomona	18	555	-	-	-	-	-	-	-	-	-	-	-	-	-
143	City of Pomona	21	678	-	-	-	-	-	-	-	-	-	-	-	-	-
144	City of Pomona	23	607	-	-	-	-	-	-	-	-	-	-	-	-	-
145	City of Pomona	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-
146	City of Pomona	25	589	-	-	-	-	-	-	-	-	-	-	-	-	-
147	City of Pomona	26	539	-	-	-	-	-	-	-	-	-	-	-	-	-
148	City of Pomona	27	534	-	-	-	-	-	-	-	-	-	-	-	-	-
149	City of Pomona	29	510	-	-	-	-	-	-	-	-	-	-	-	-	-
150	City of Pomona	30	380	-	-	-	-	-	-	-	-	-	-	-	-	-

Table A-1
Sustainability Metrics and First Occurrence of Failure

Figure #	Owner	Well Name	Top of Screen Elevation	Pump Setting Elevation	Constraint Type	Sustainability Metric Elevation	First Occurrence of Breaking the Sustainability Metric (Year)									
							Scenario 1	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 1D	Scenario 3	Scenario 3A	Scenario 3B	Scenario 3C	Scenario 3D
151	City of Pomona	34	531	-	-	-	-	-	-	-	-	-	-	-	-	-
152	City of Pomona	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-
153	City of Pomona	36	507	-	-	-	-	-	-	-	-	-	-	-	-	-
154	SARWCo	01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
155	SARWCo	03A	547	-	-	-	-	-	-	-	-	-	-	-	-	-
156	City of Upland	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
157	City of Upland	7A	575	-	-	-	-	-	-	-	-	-	-	-	-	-
158	City of Upland	8	700	-	-	-	-	-	-	-	-	-	-	-	-	-
159	City of Upland	20	1326	-	-	-	-	-	-	-	-	-	-	-	-	-
160	City of Upland	21A	610	-	-	-	-	-	-	-	-	-	-	-	-	-
161	CDA	CDA I-1	332	362	Pump Setting Elev. + 40 ft	402	-	-	-	-	-	-	-	-	-	-
162	CDA	CDA I-2	374	264	Pump Setting Elev. + 40 ft	304	-	-	-	-	-	-	-	-	-	-
163	CDA	CDA I-3	363	313	Pump Setting Elev. + 40 ft	353	-	-	-	-	-	-	-	-	-	-
164	CDA	CDA I-4	406	316	Pump Setting Elev. + 40 ft	356	-	-	-	-	-	-	-	-	-	-
165	CDA	CDA I-5	465	370	Pump Setting Elev. + 40 ft	410	-	-	-	-	-	-	-	-	-	-
166	CDA	CDA I-6	451	456	Pump Setting Elev. + 40 ft	496	-	-	-	-	-	-	-	-	-	-
167	CDA	CDA I-7	446	451	Pump Setting Elev. + 40 ft	491	-	-	-	-	-	-	-	-	-	-
168	CDA	CDA I-8	455	350	Pump Setting Elev. + 40 ft	390	-	-	-	-	-	-	-	-	-	-
169	CDA	CDA I-9	454	459	Pump Setting Elev. + 40 ft	499	2026	2028	2028	-	-	2024	2026	2026	2029	2029
170	CDA	CDA I-10	466	471	Pump Setting Elev. + 40 ft	511	2015	2015	2015	2015	2015	2014	2014	2014	2014	2014
171	CDA	CDA I-11	484	369	Pump Setting Elev. + 40 ft	409	-	-	-	-	-	-	-	-	-	-
172	CDA	CDA I-13	448	436	Pump Setting Elev. + 40 ft	476	-	-	-	-	-	-	-	-	-	-
173	CDA	CDA I-14	533	493	Pump Setting Elev. + 40 ft	533	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
174	CDA	CDA I-15	538	488	Pump Setting Elev. + 40 ft	528	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
175	CDA	CDA I-16	469	-	-	-	-	-	-	-	-	-	-	-	-	-
176	CDA	CDA I-17	445	-	-	-	-	-	-	-	-	-	-	-	-	-
177	CDA	CDA I-18	492	-	-	-	-	-	-	-	-	-	-	-	-	-
178	CDA	CDA I-19	-	-	-	-	-	-	-	-	-	-	-	-	-	-
179	CDA	CDA I-20	508	-	-	-	-	-	-	-	-	-	-	-	-	-
180	CDA	CDA I-21	520	-	-	-	-	-	-	-	-	-	-	-	-	-
181	CDA	CDA II-1	529	534	Pump Setting Elev. + 40 ft	574	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
182	CDA	CDA II-2	533	418	Pump Setting Elev. + 40 ft	458	-	-	-	-	-	-	-	-	-	-
183	CDA	CDA II-3	532	417	Pump Setting Elev. + 40 ft	457	-	-	-	-	-	-	-	-	-	-
184	CDA	CDA II-4	542	428	Pump Setting Elev. + 40 ft	468	-	-	-	-	-	-	-	-	-	-
185	CDA	CDA-II-6	562	437	Pump Setting Elev. + 40 ft	477	-	-	-	-	-	-	-	-	-	-
186	CDA	CDA II-7	554	421	Pump Setting Elev. + 40 ft	461	-	-	-	-	-	-	-	-	-	-
187	CDA	CDA-II-8	560	432	Pump Setting Elev. + 40 ft	472	-	-	-	-	-	-	-	-	-	-
188	CDA	CDA-II-9a	557	470	Pump Setting Elev. + 40 ft	510	-	-	-	-	-	-	-	-	-	-
189	CBWM	AP-PA/7	-	-	Guidance Level	398	-	-	-	-	-	-	-	-	-	-

Figure A-1
Projected Groundwater Elevation for Scenarios 1 and 3
City of Chino Hills Well 1A



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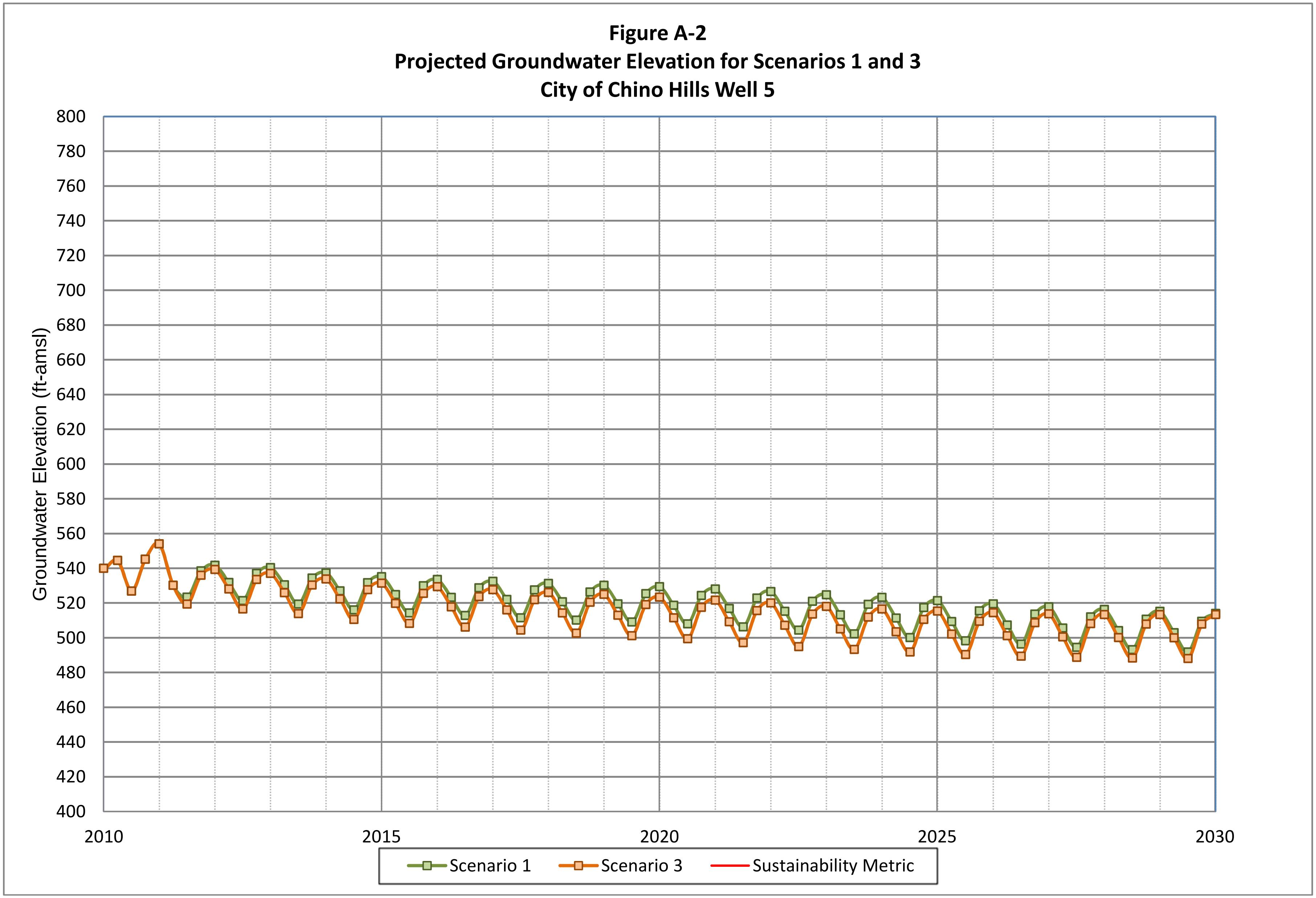

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Figure A-3
Projected Groundwater Elevation for Scenarios 1 and 3
City of Chino Hills Well 7A

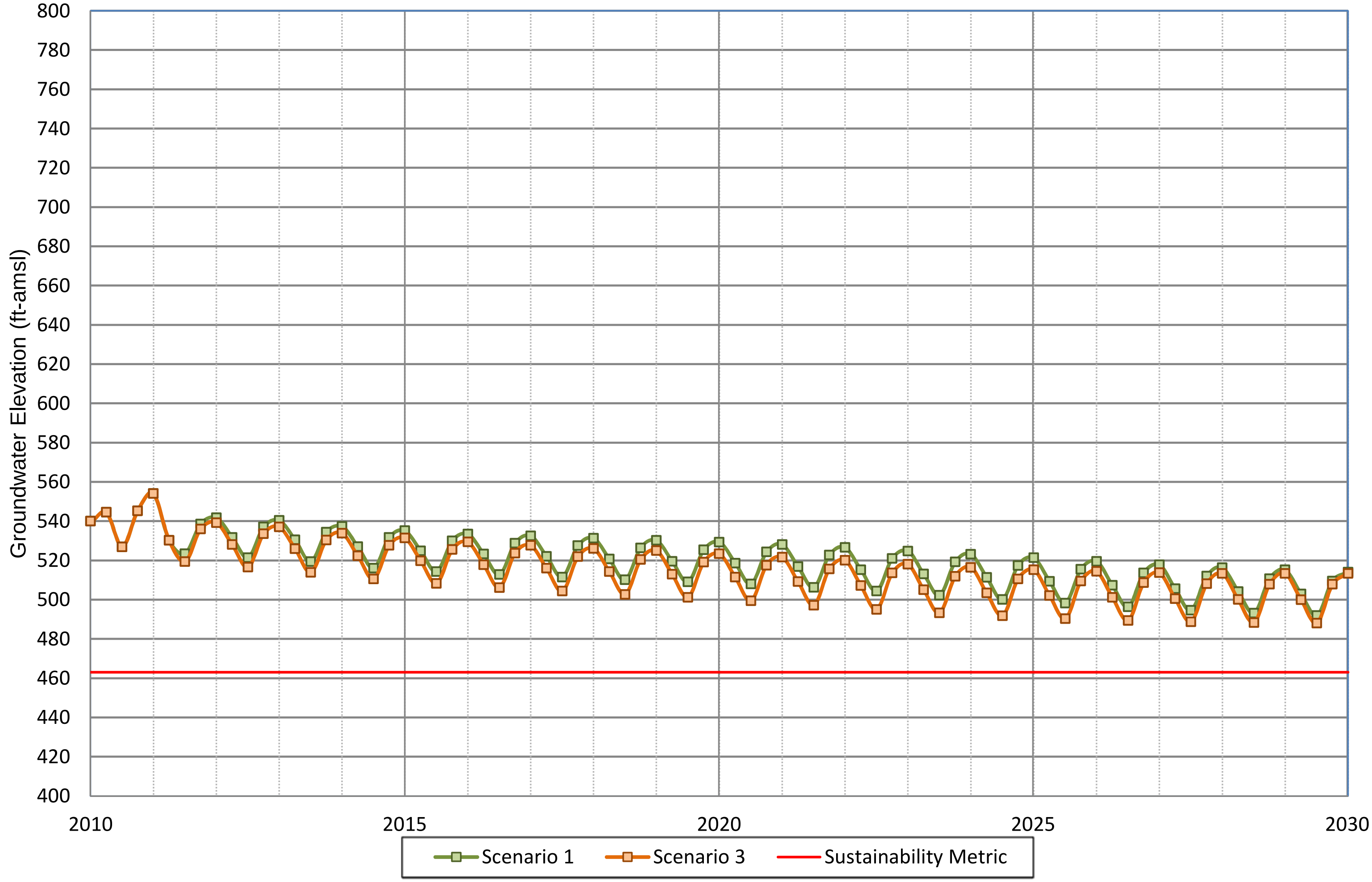

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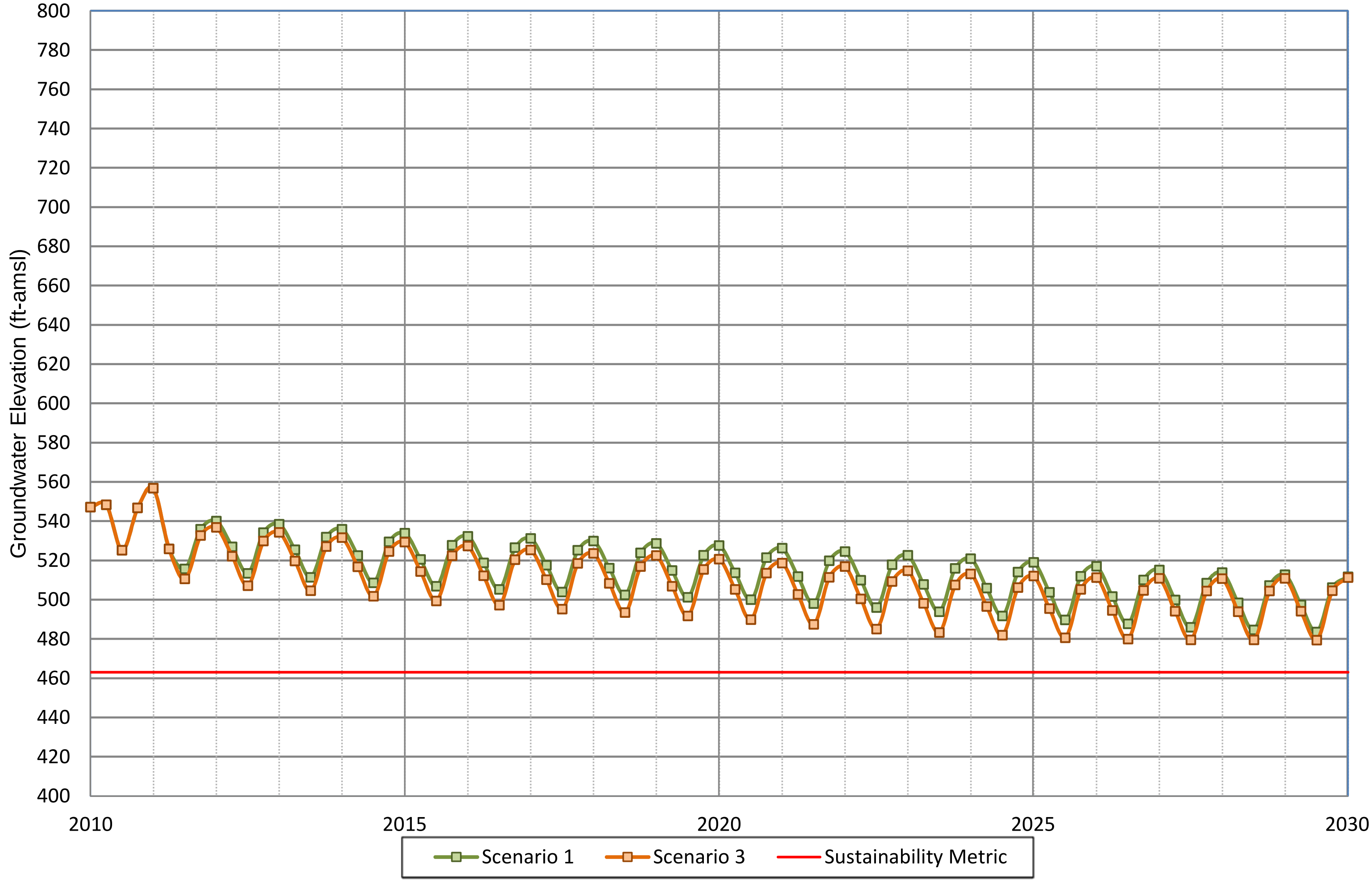
Figure A-4
Projected Groundwater Elevation for Scenarios 1 and 3
City of Chino Hills Well 7B



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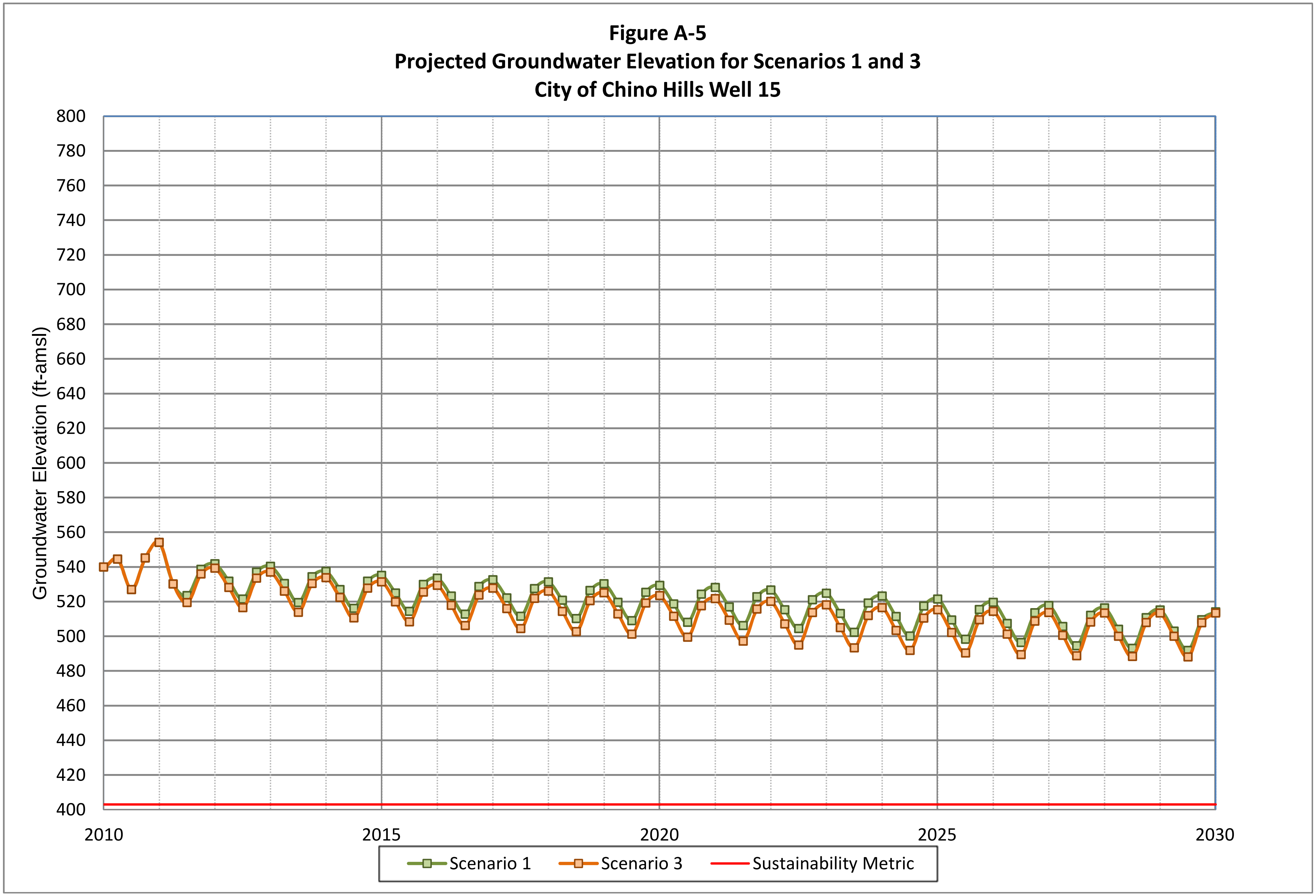

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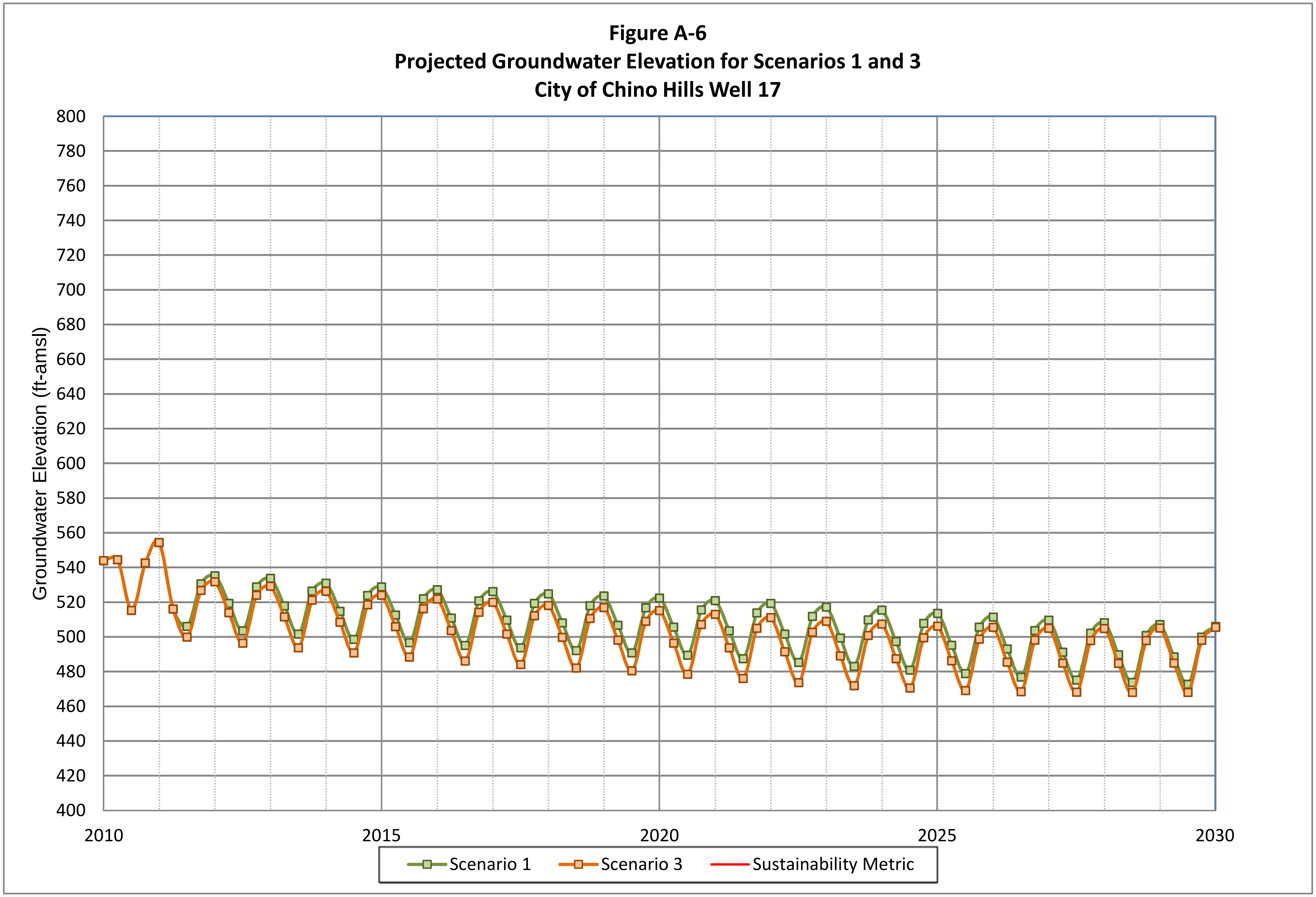

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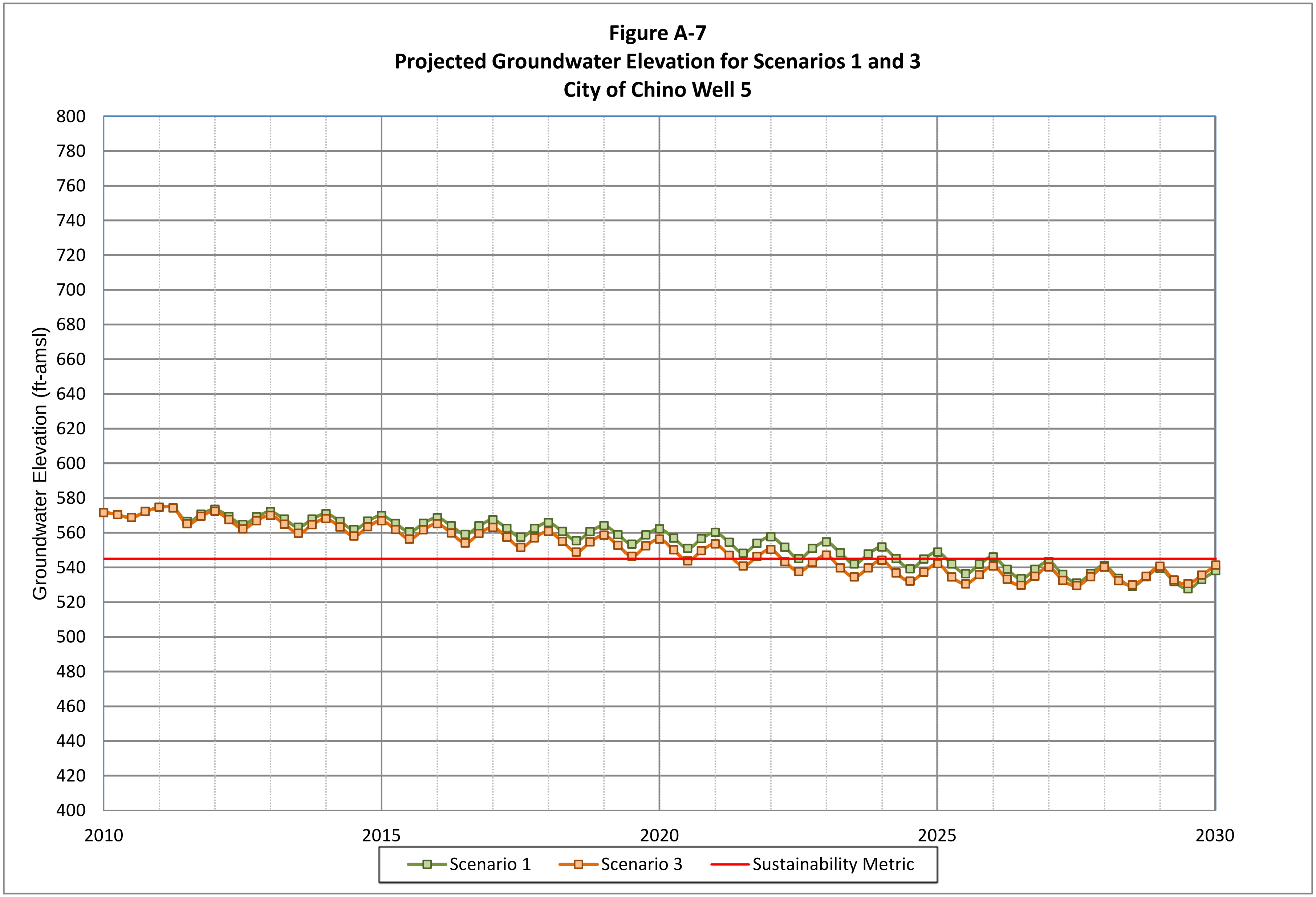

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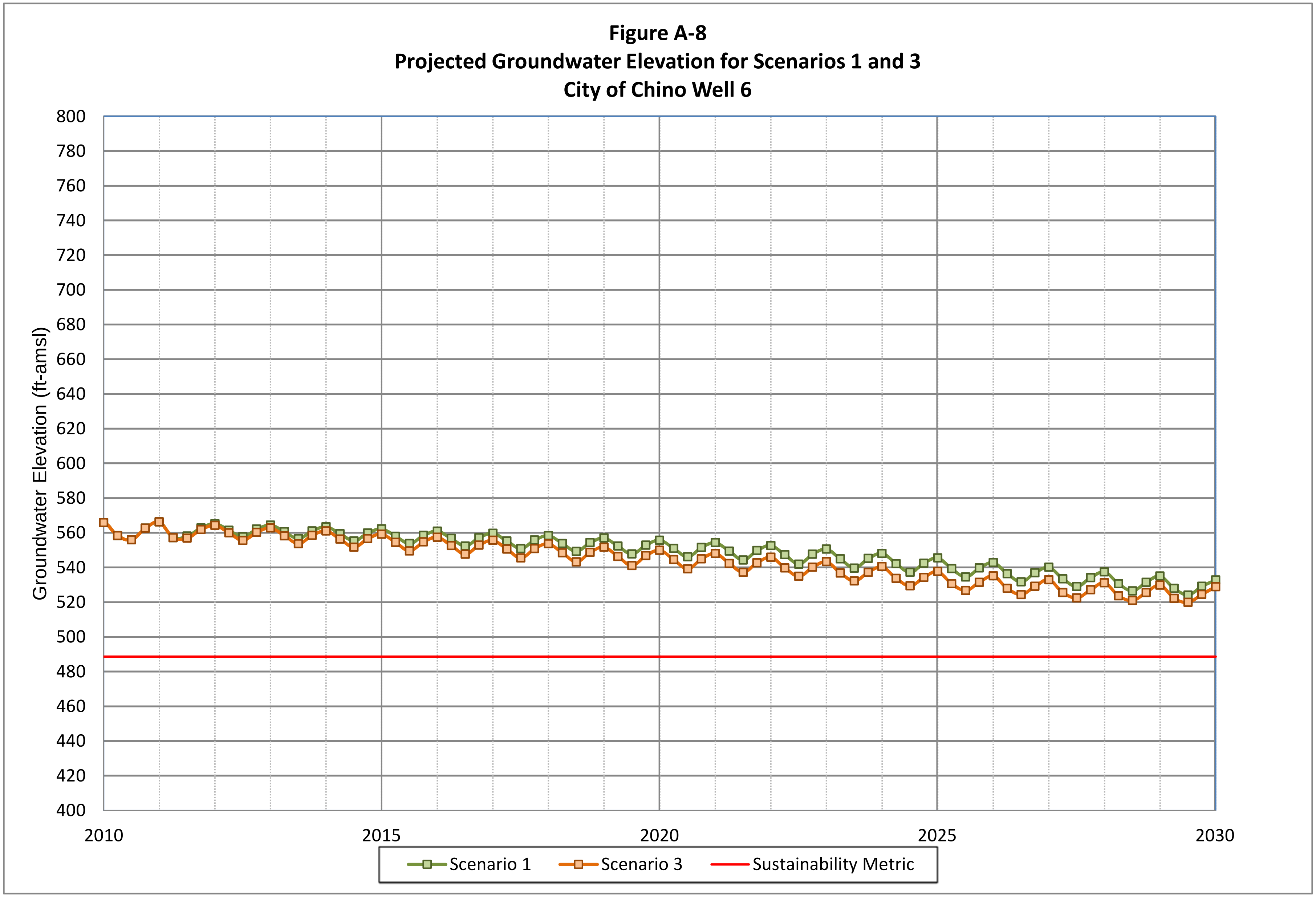

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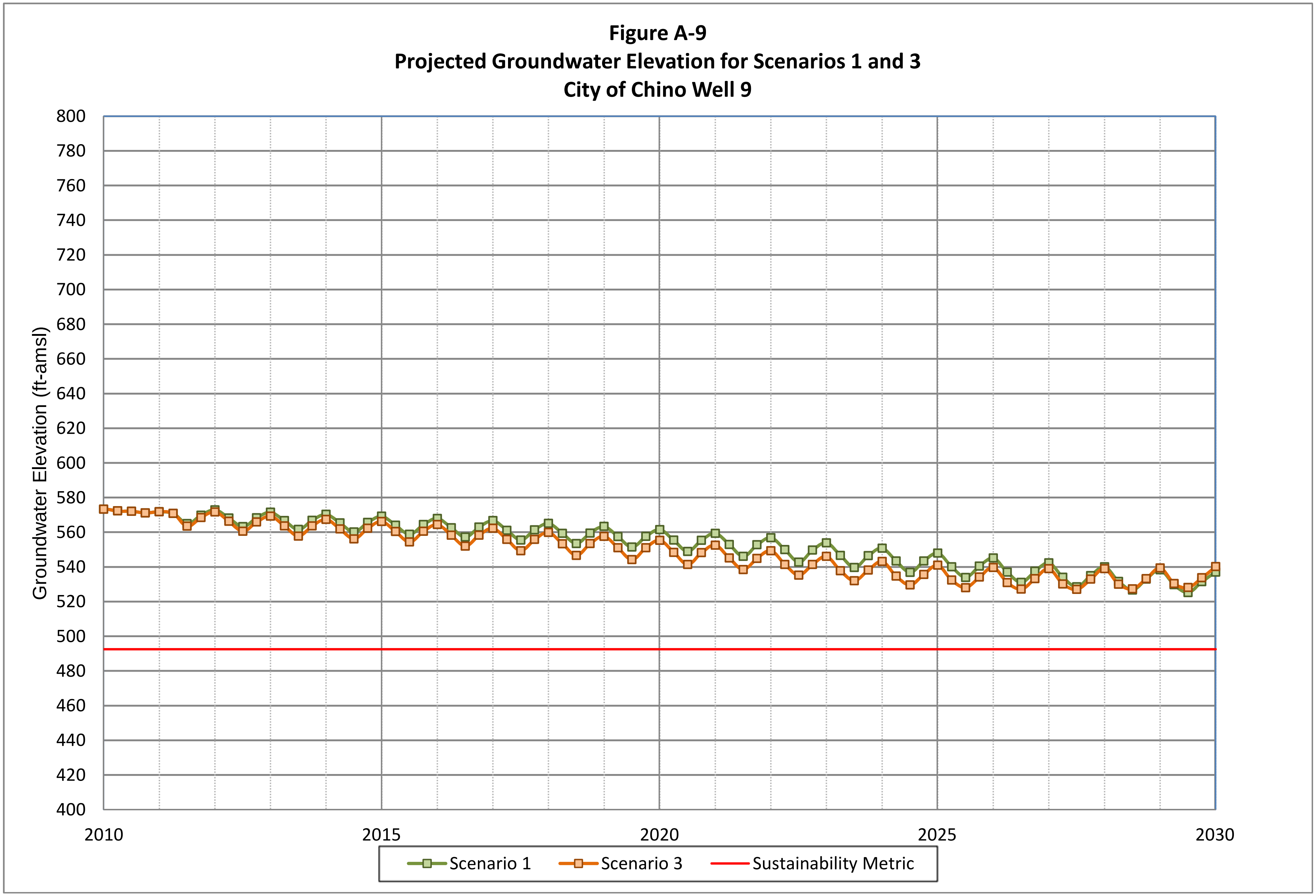

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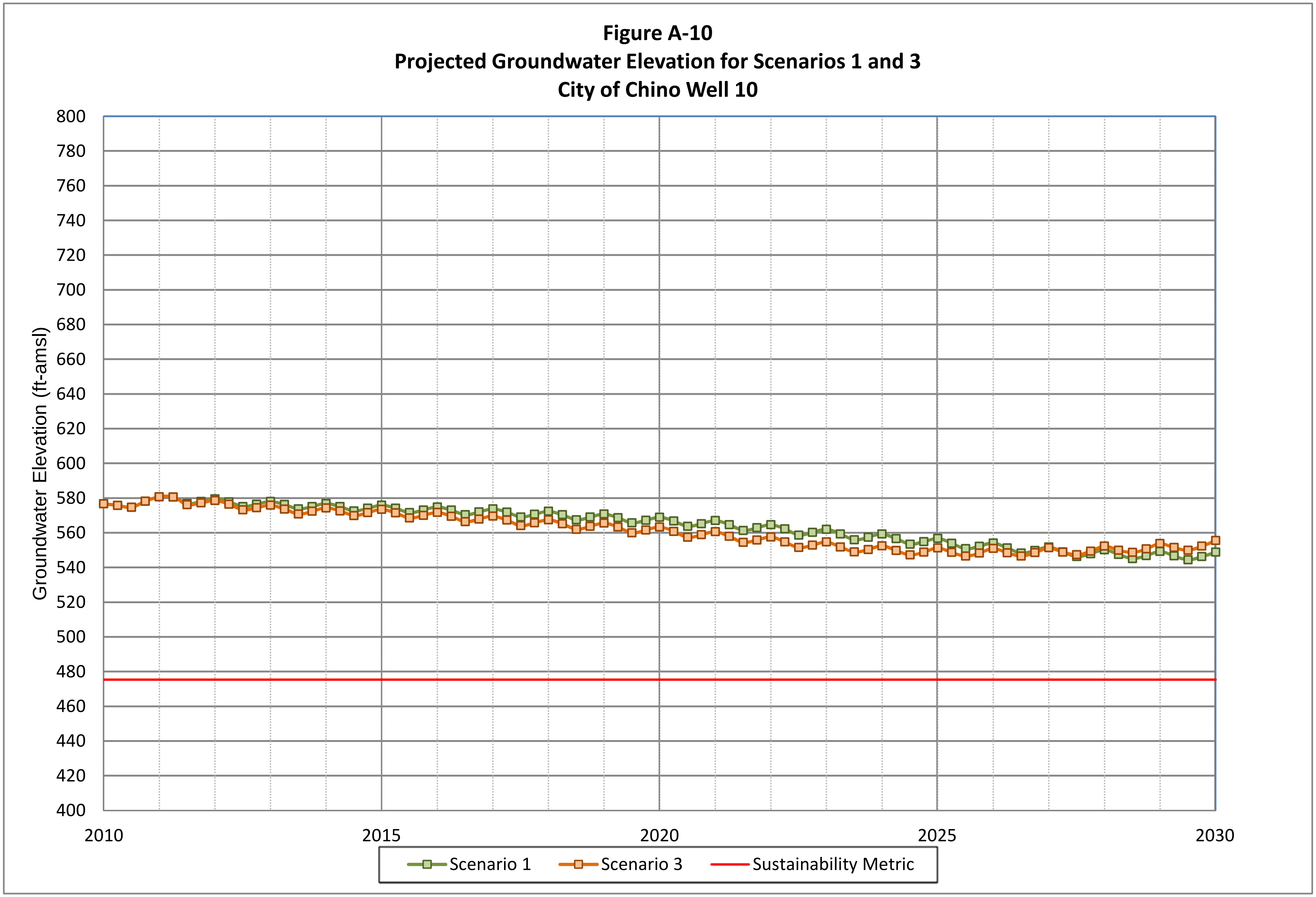

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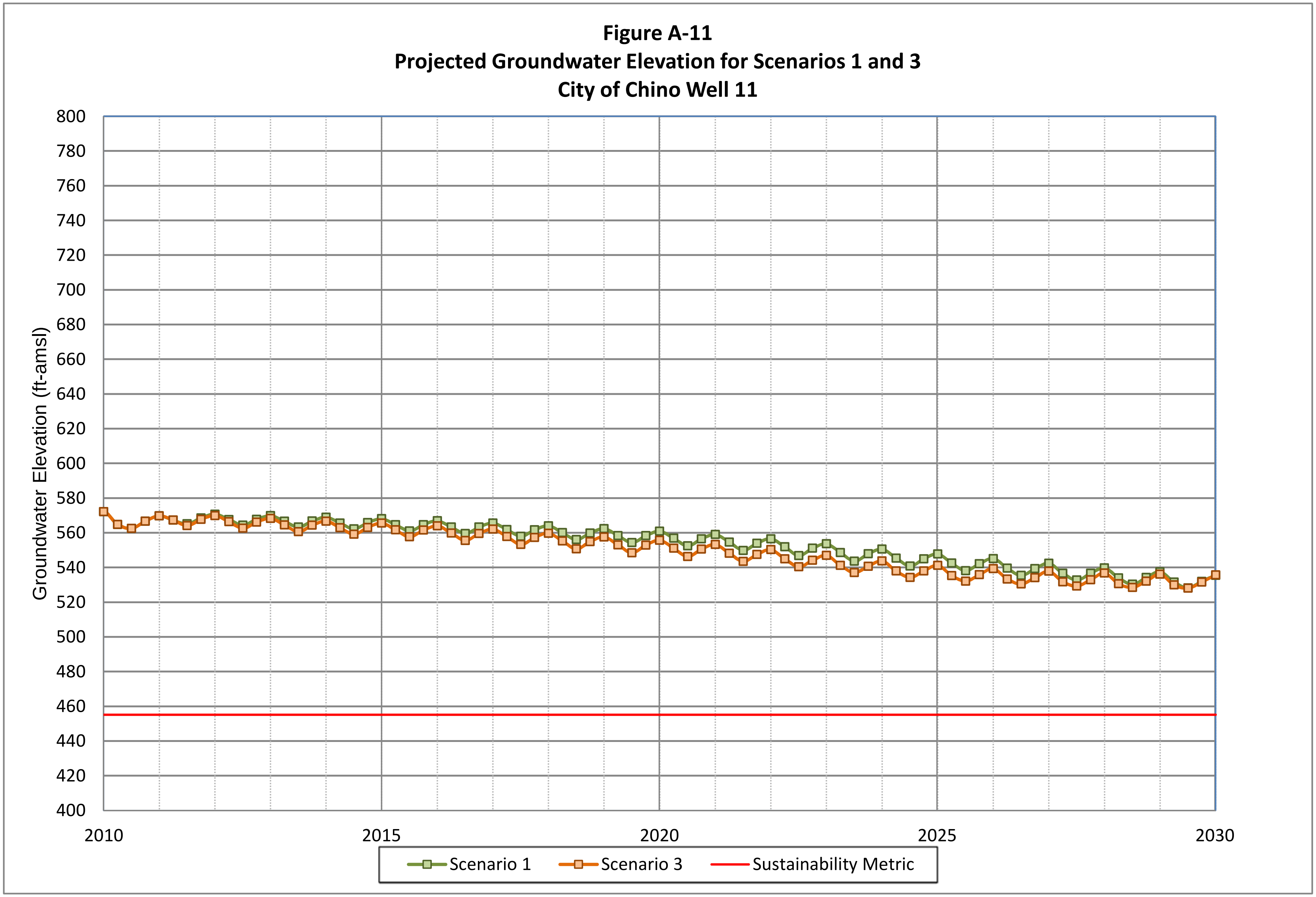

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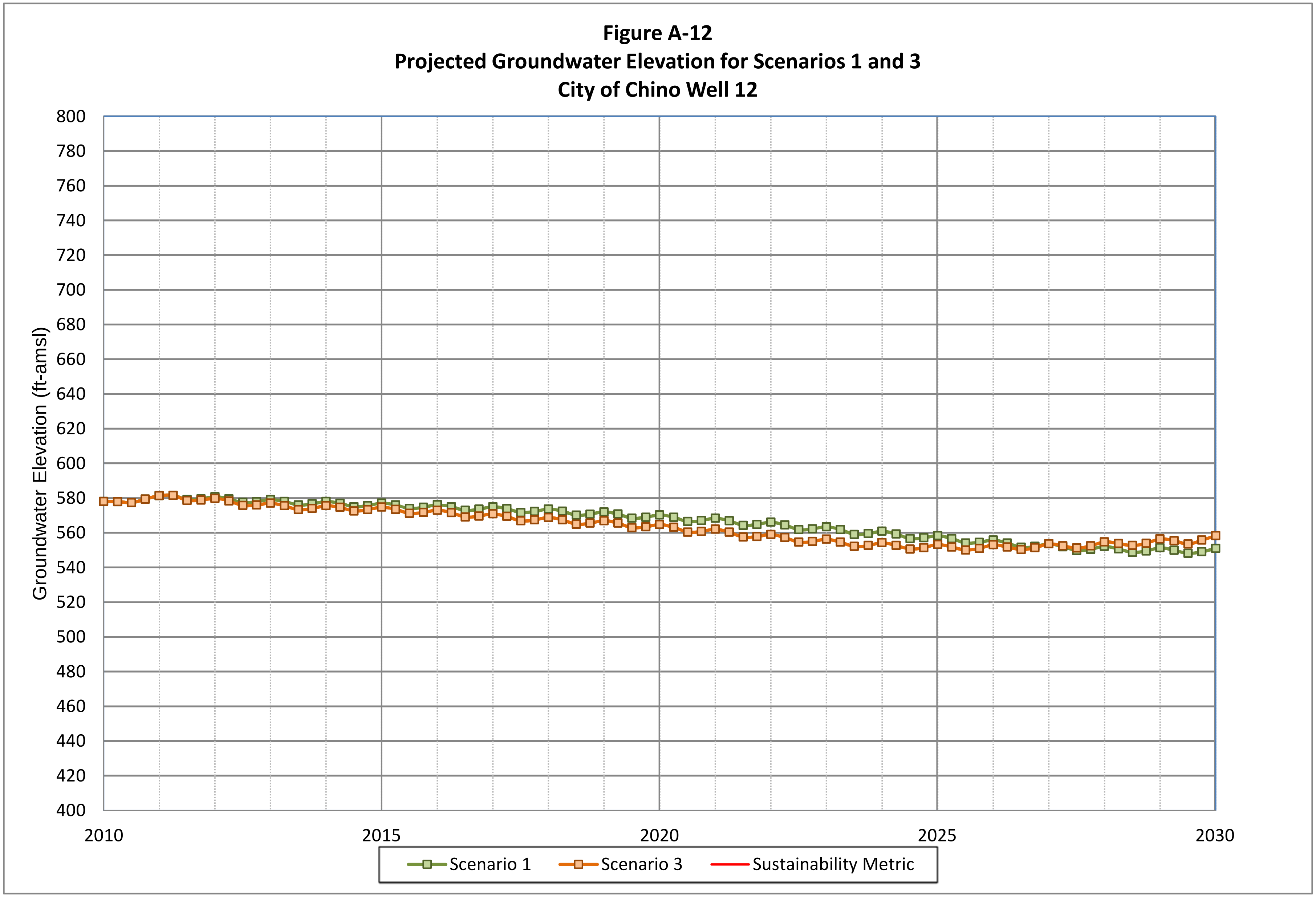

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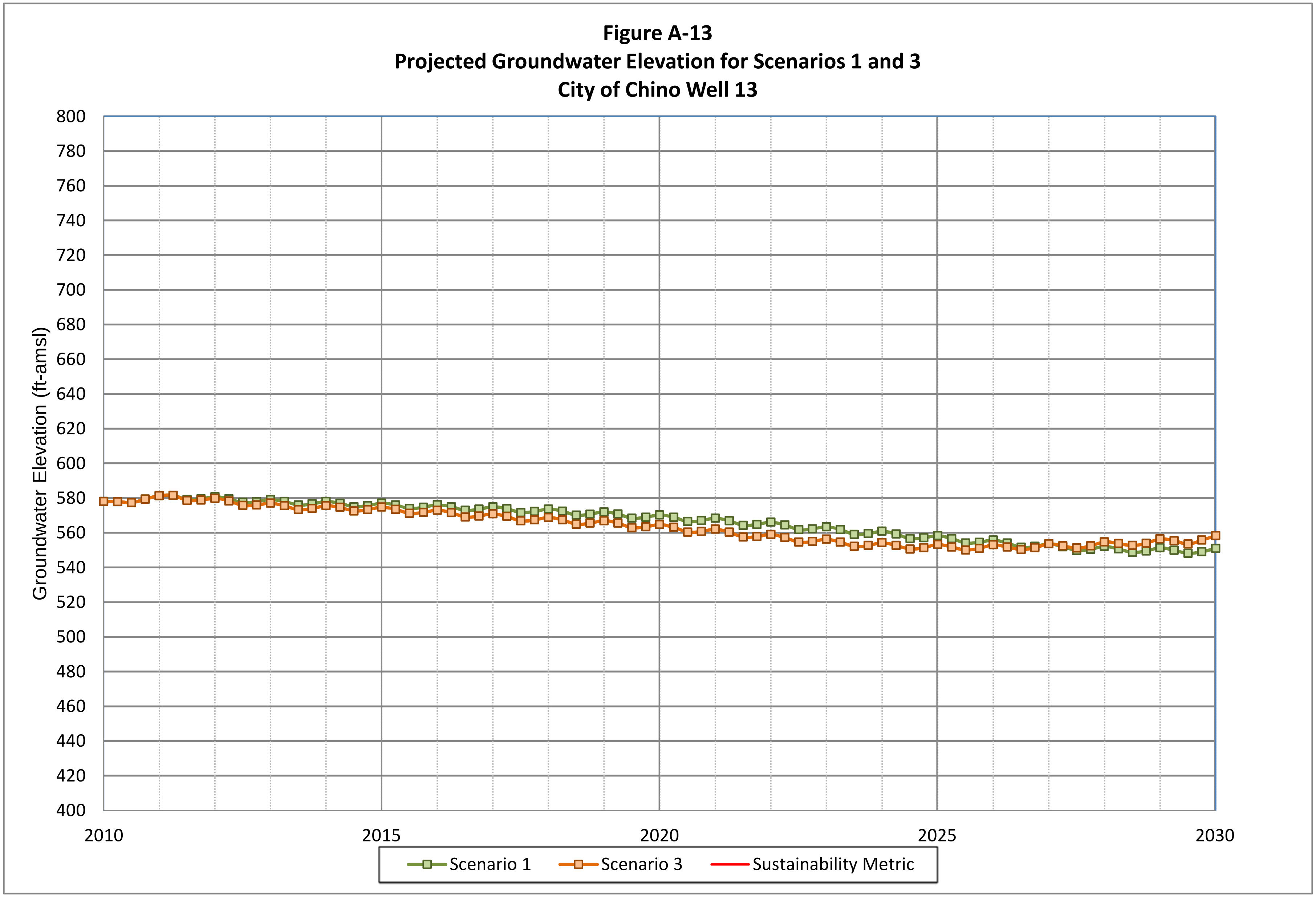

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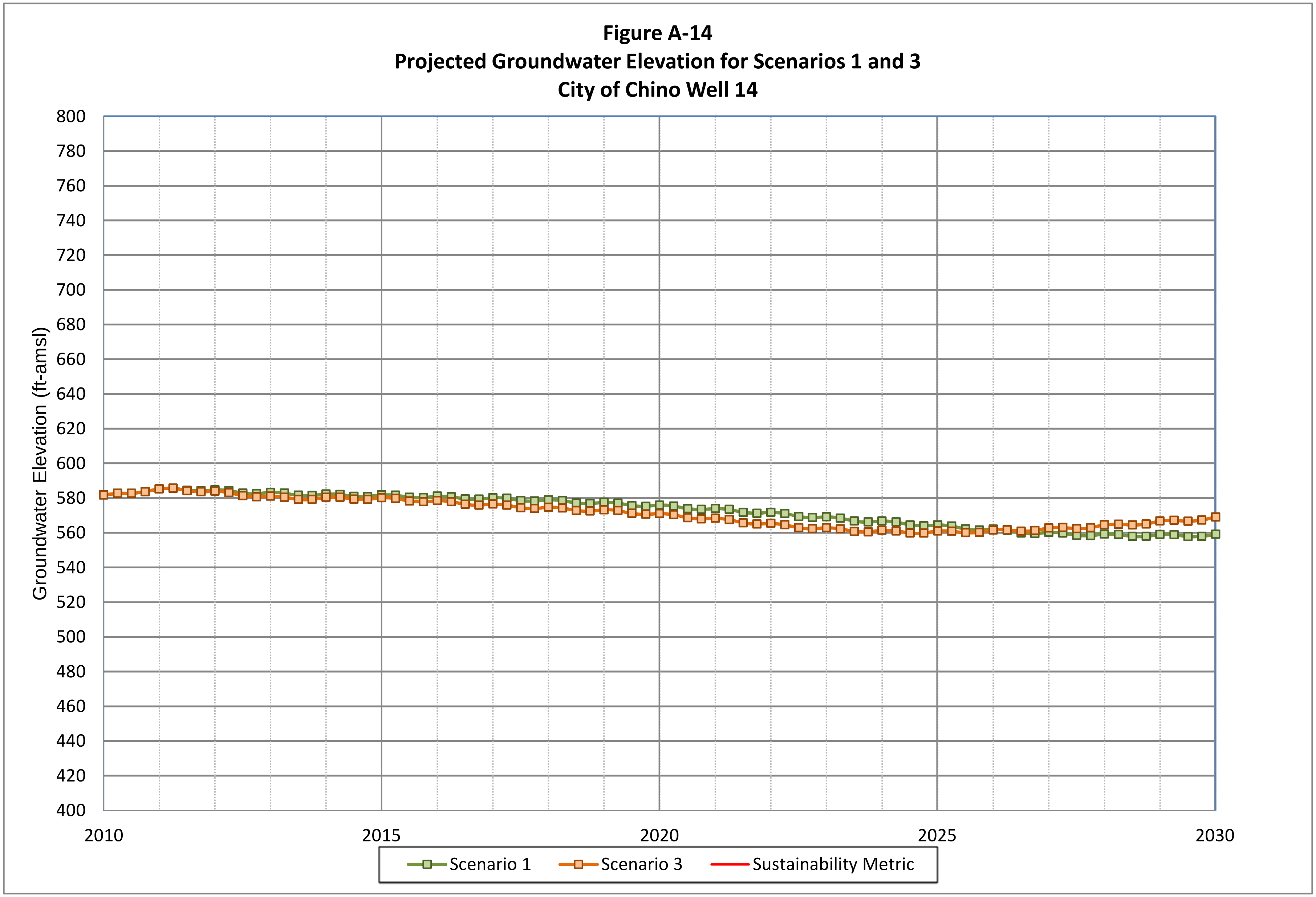

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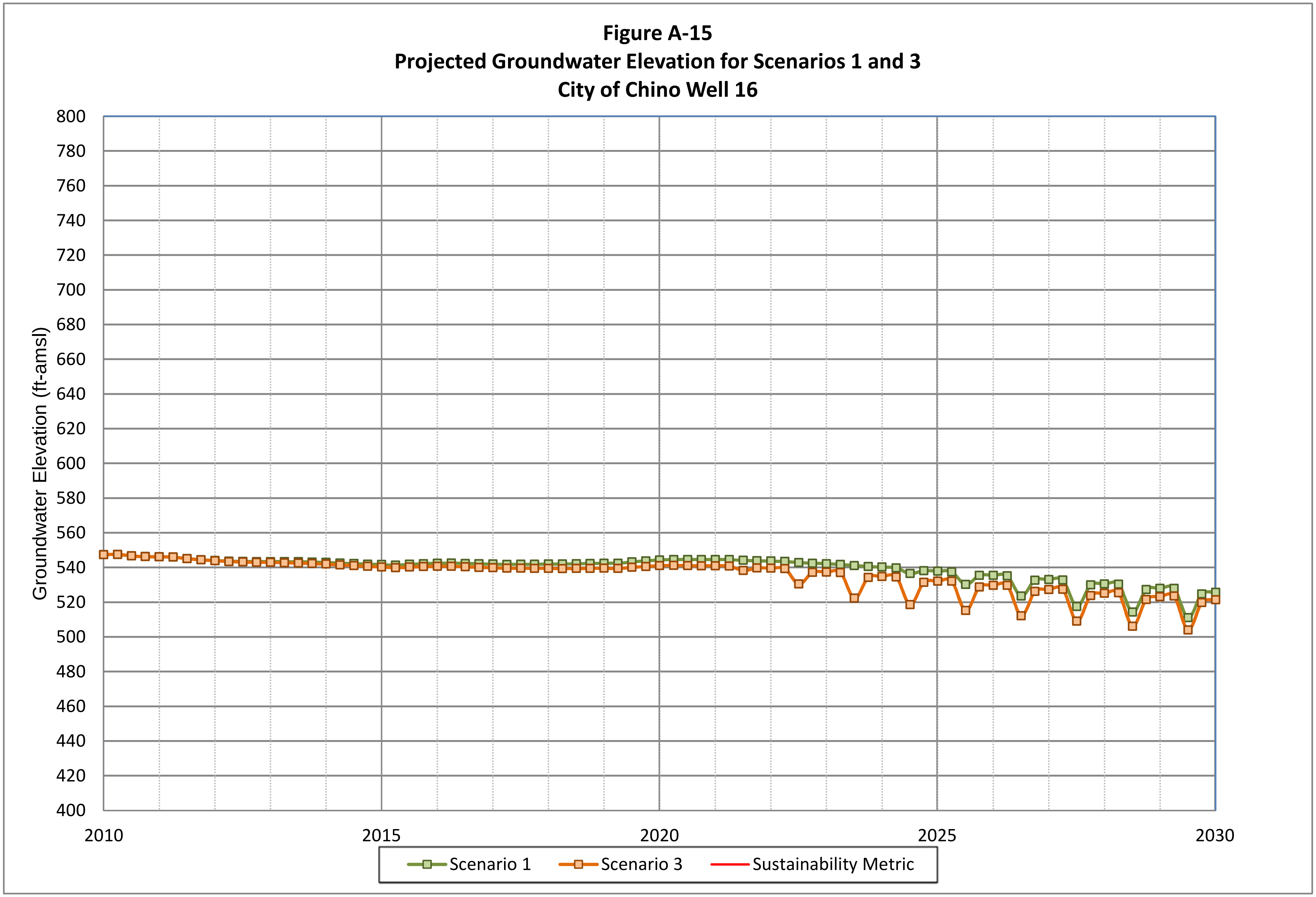

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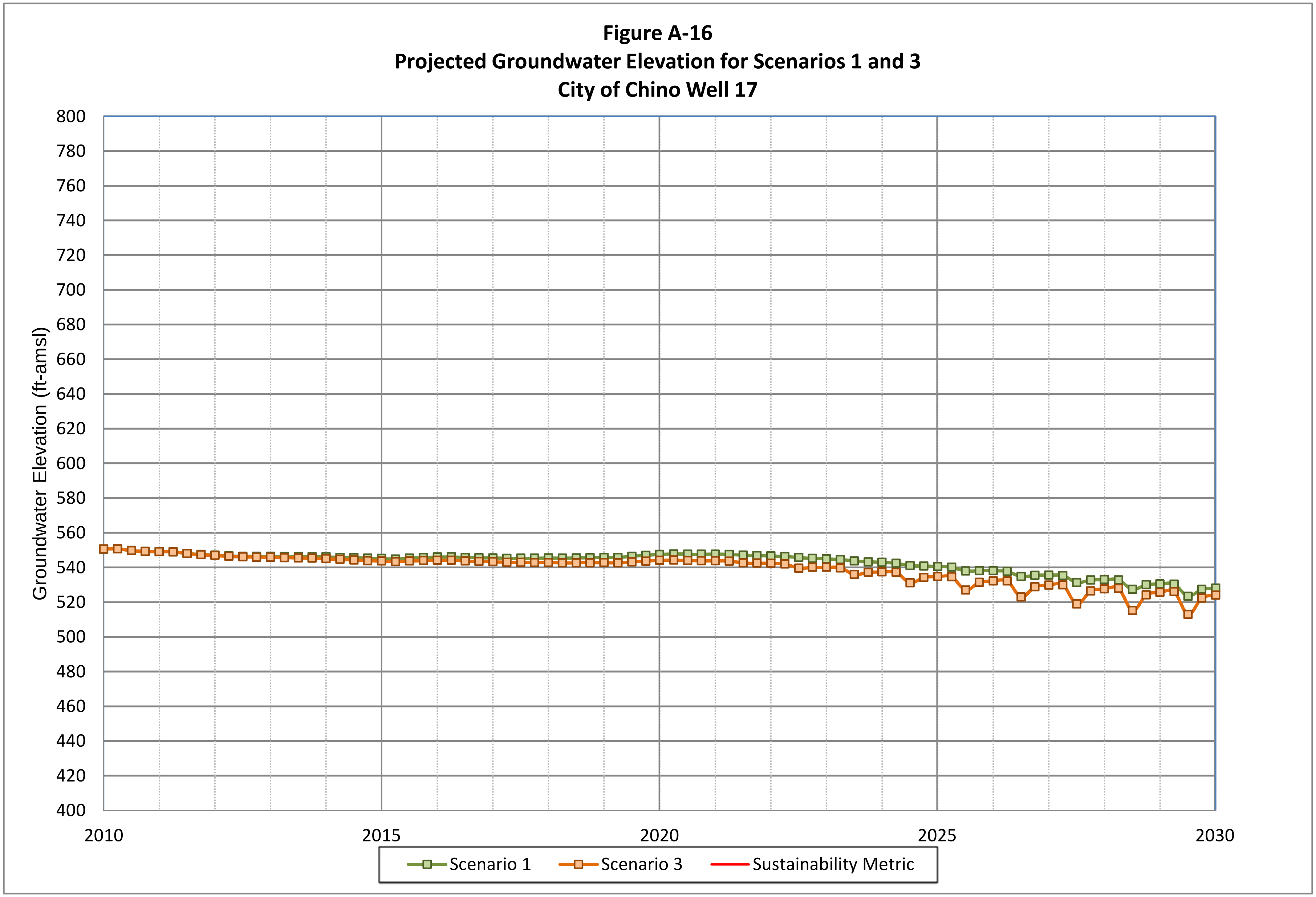

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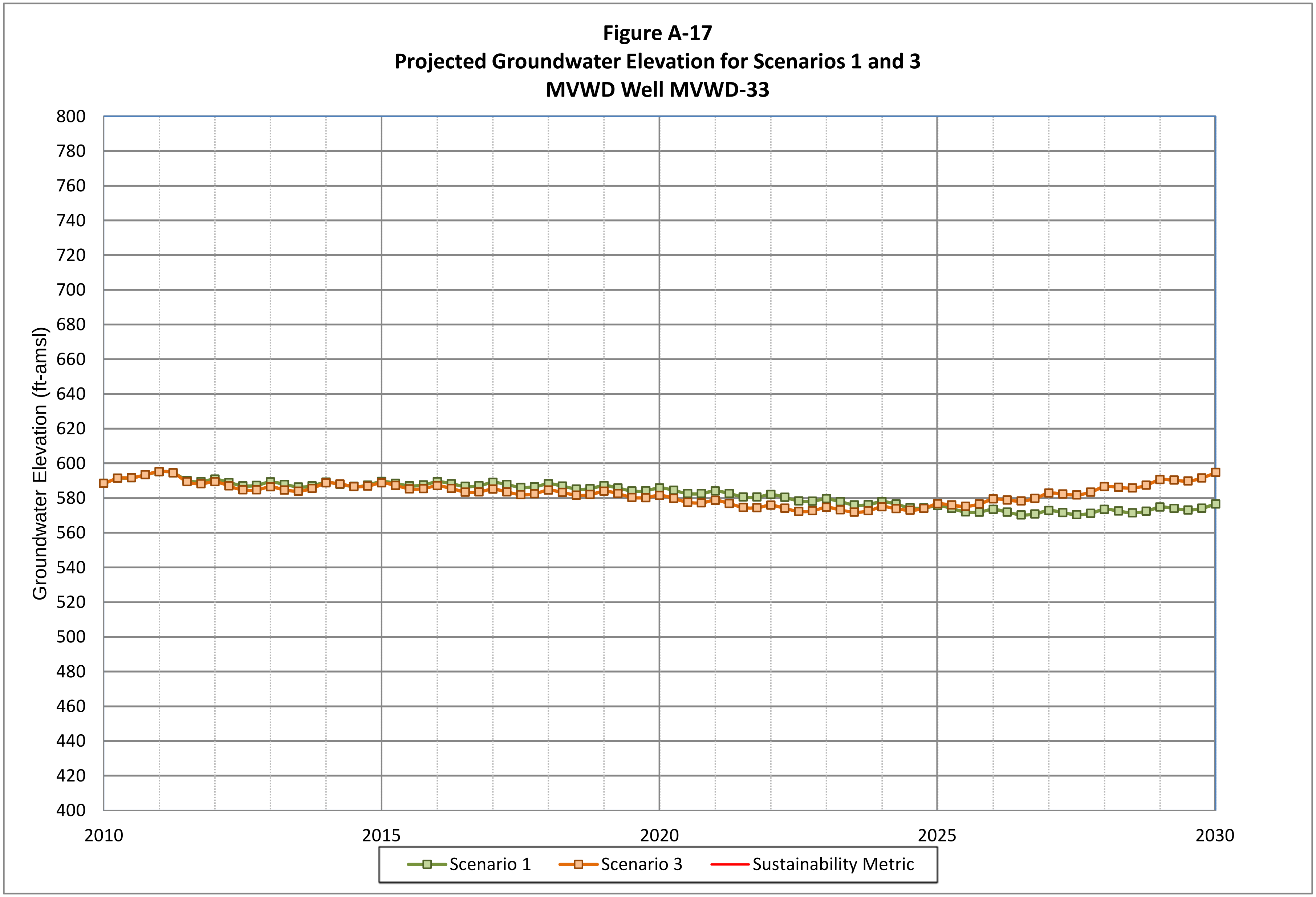

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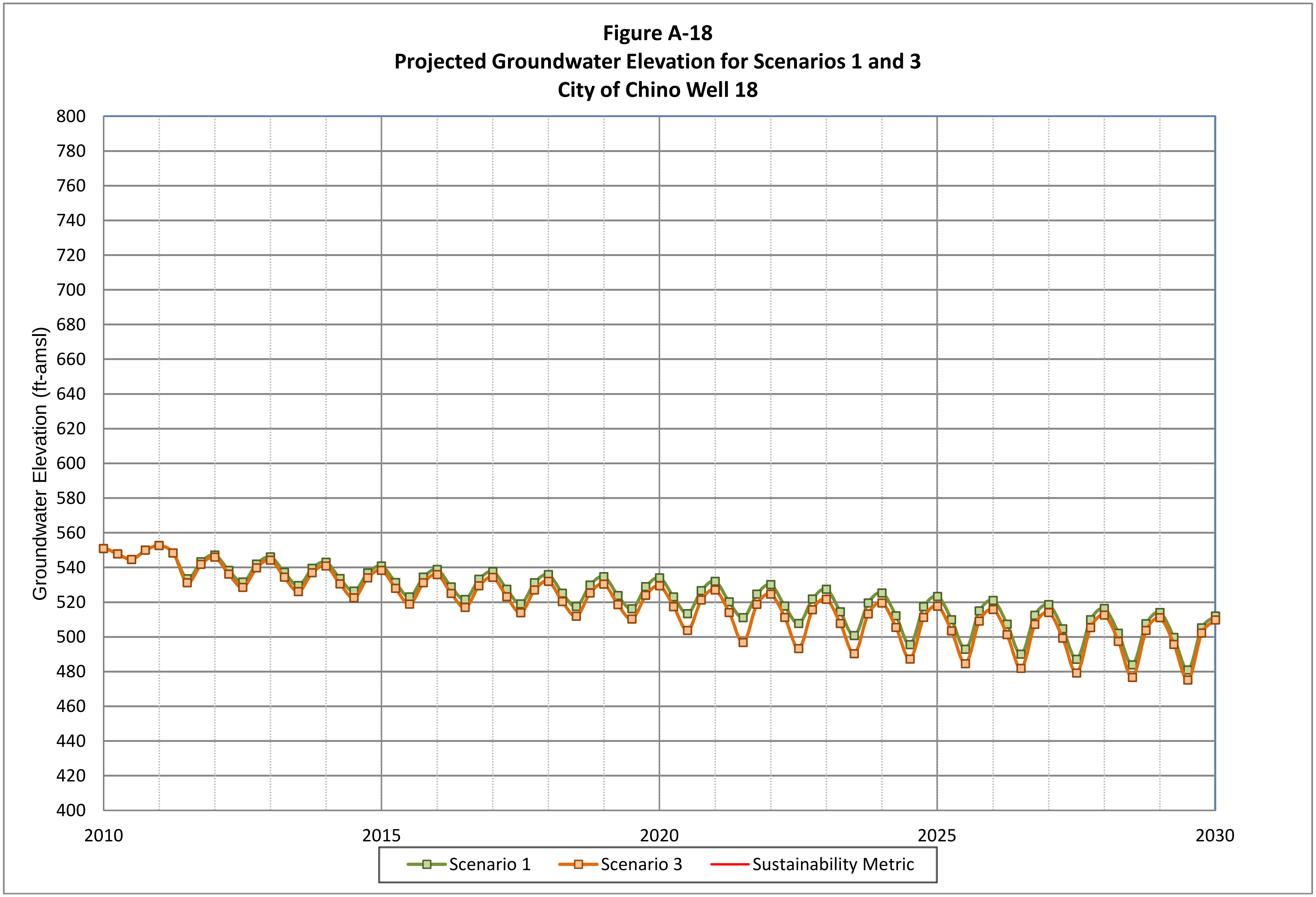

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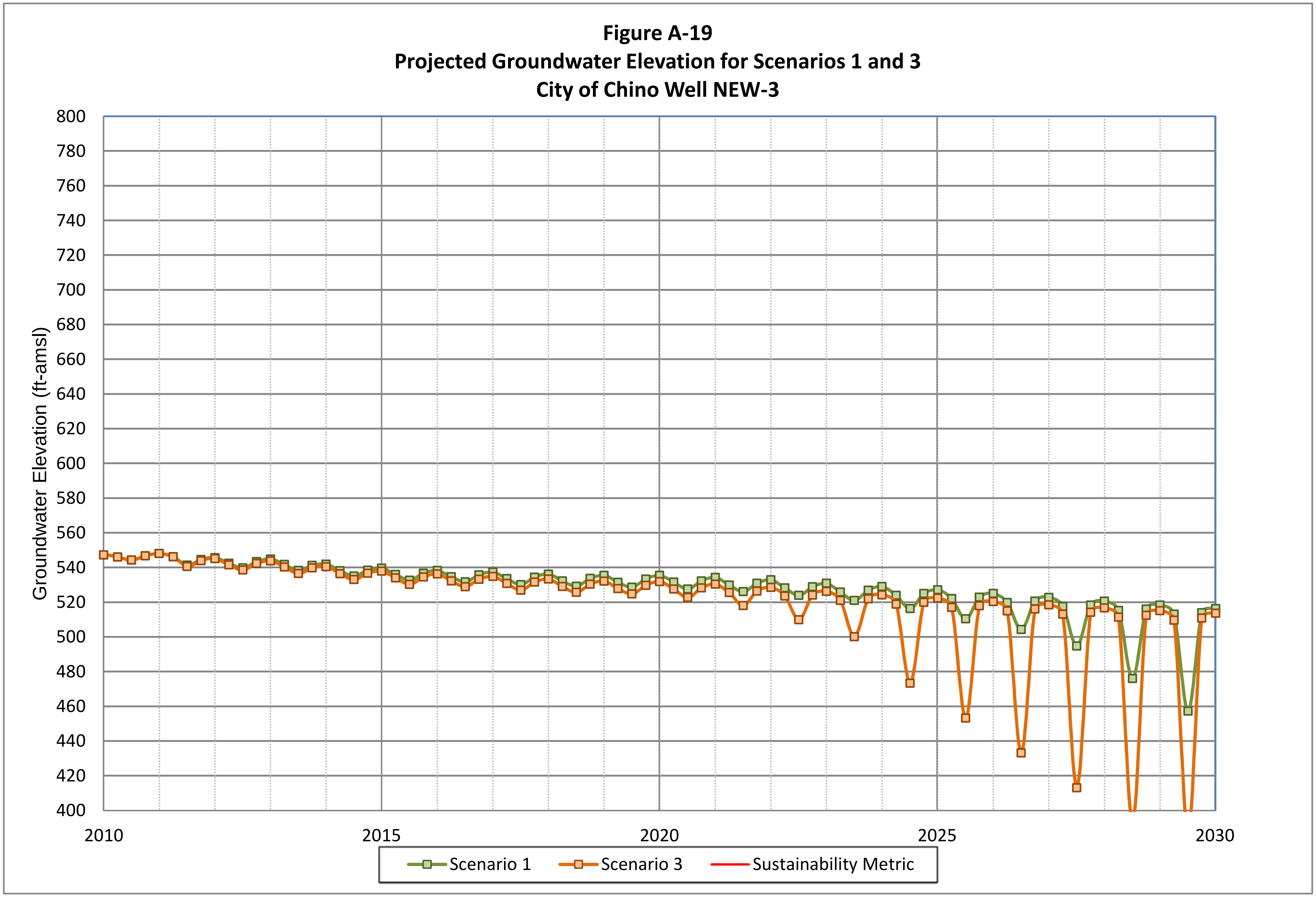

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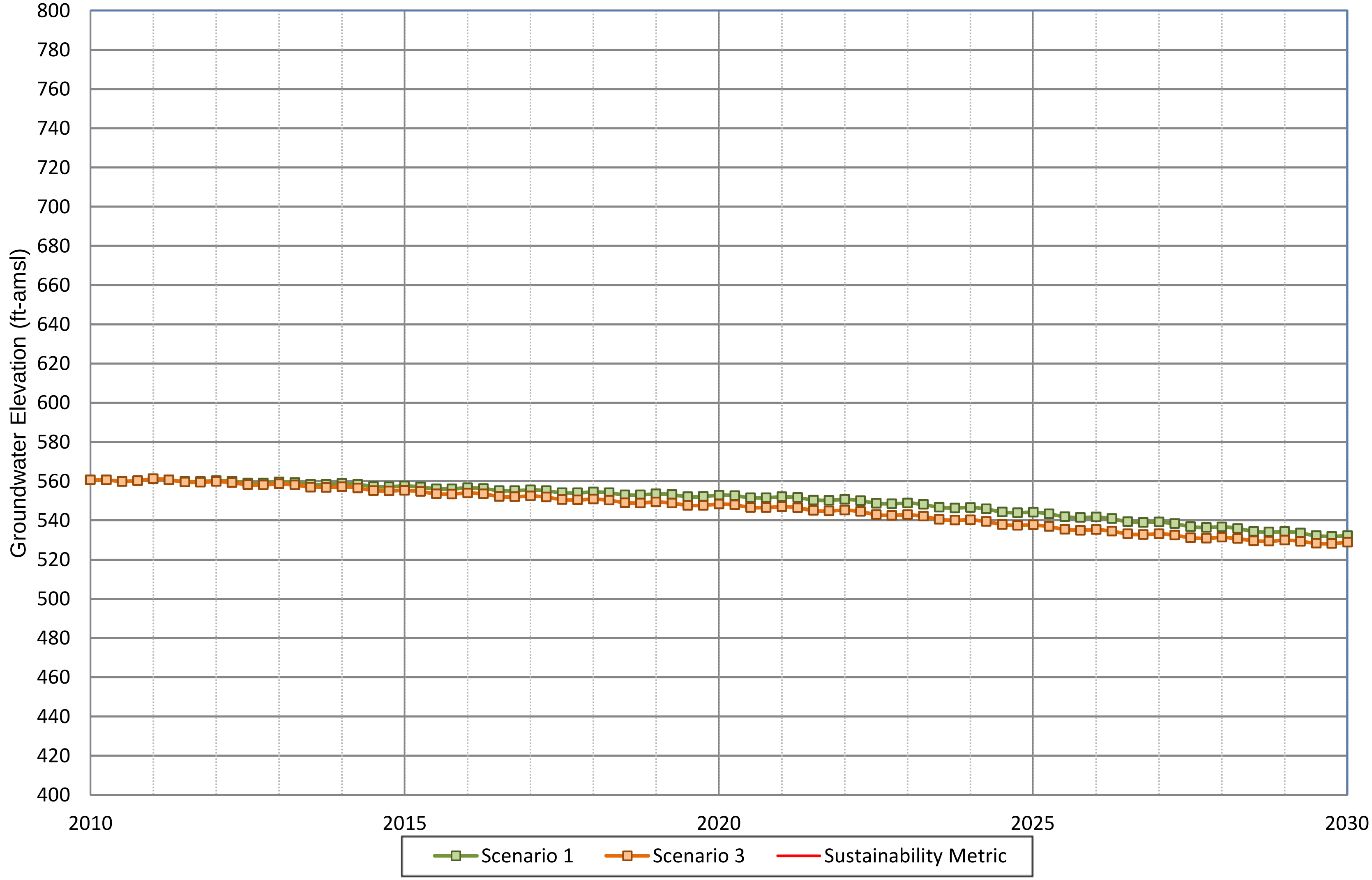
Figure A-20
Projected Groundwater Elevation for Scenarios 1 and 3
City of Chino Well NEW-7



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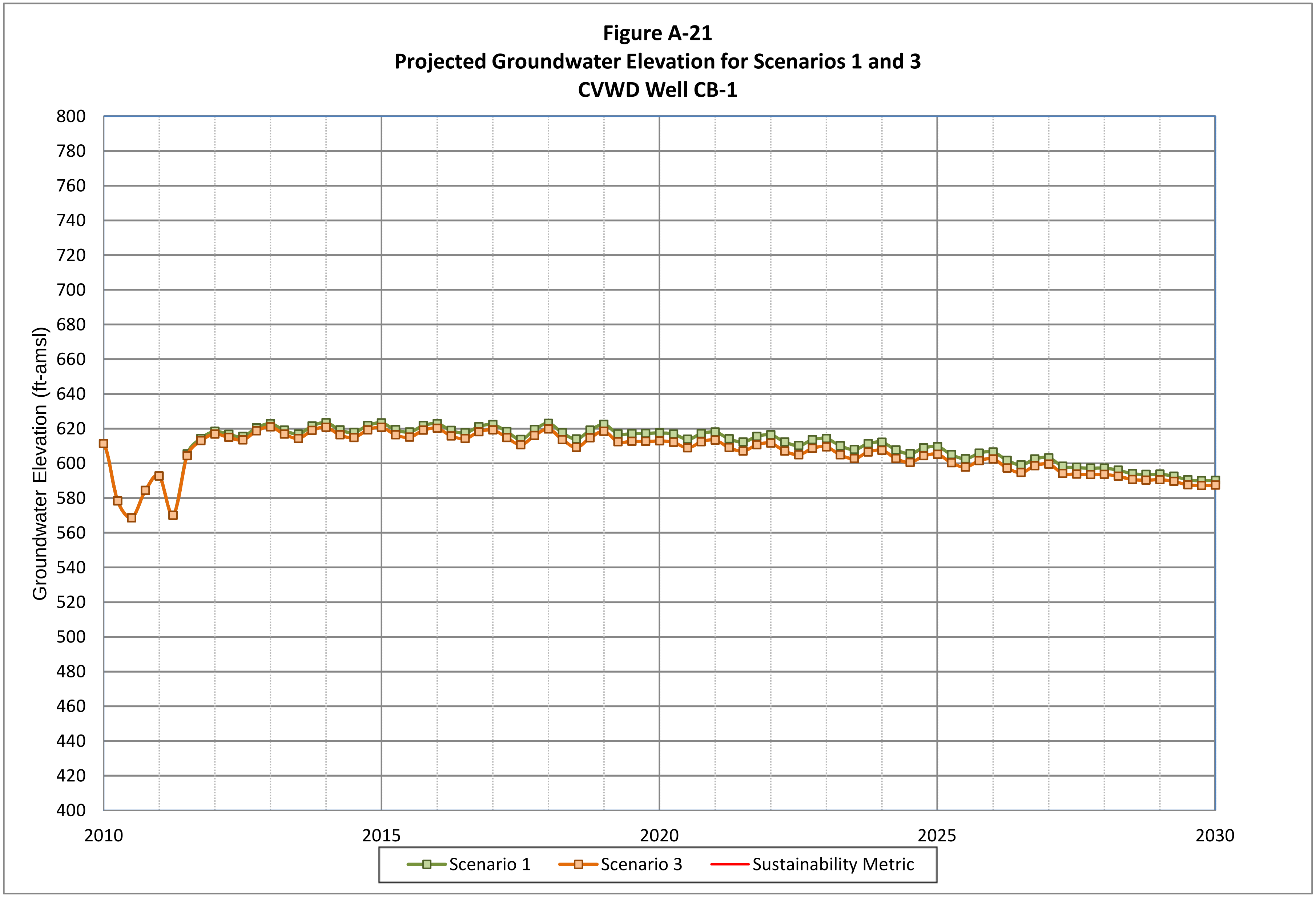

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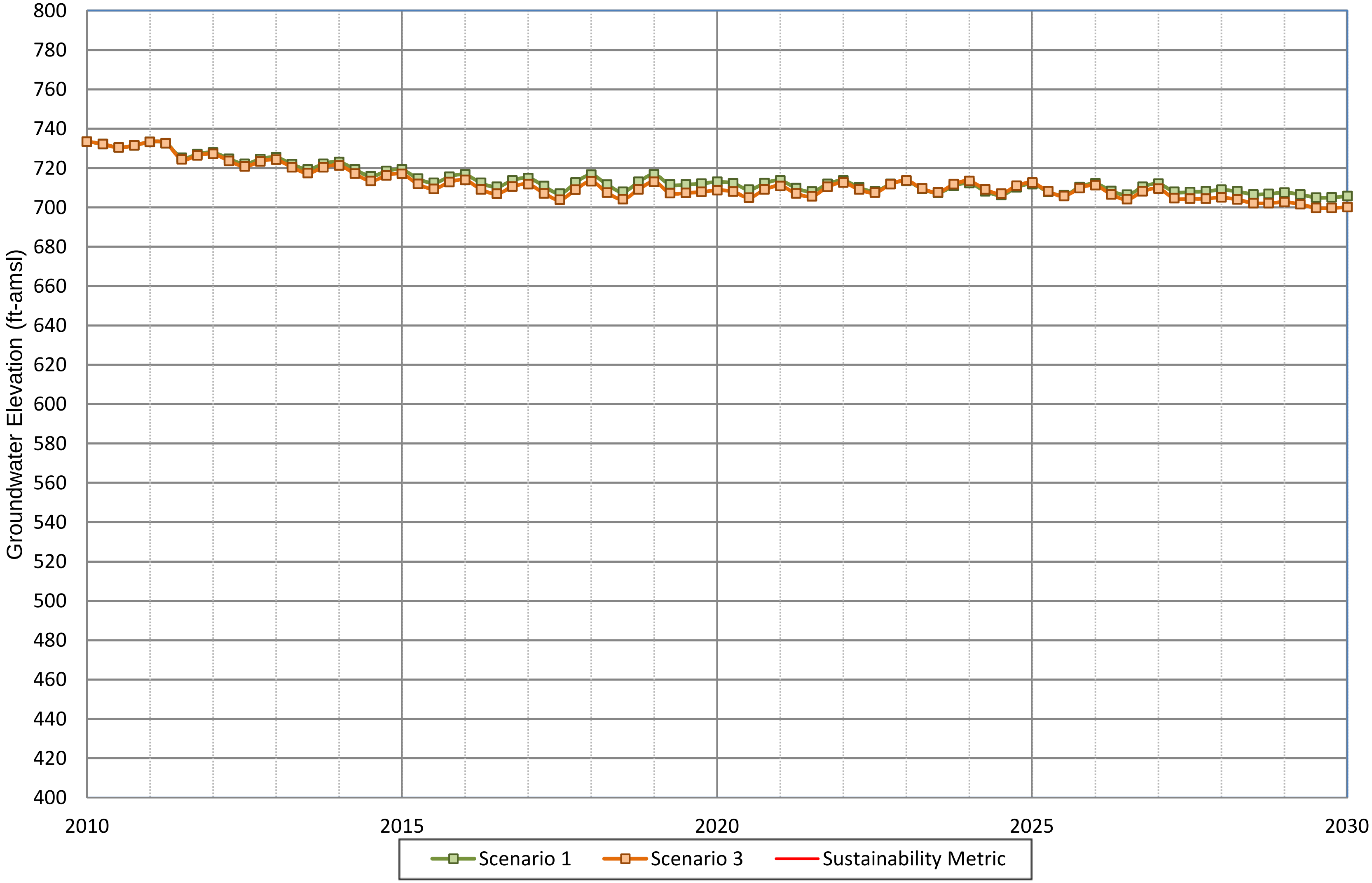
Figure A-22
Projected Groundwater Elevation for Scenarios 1 and 3
CVWD Well CB-2C



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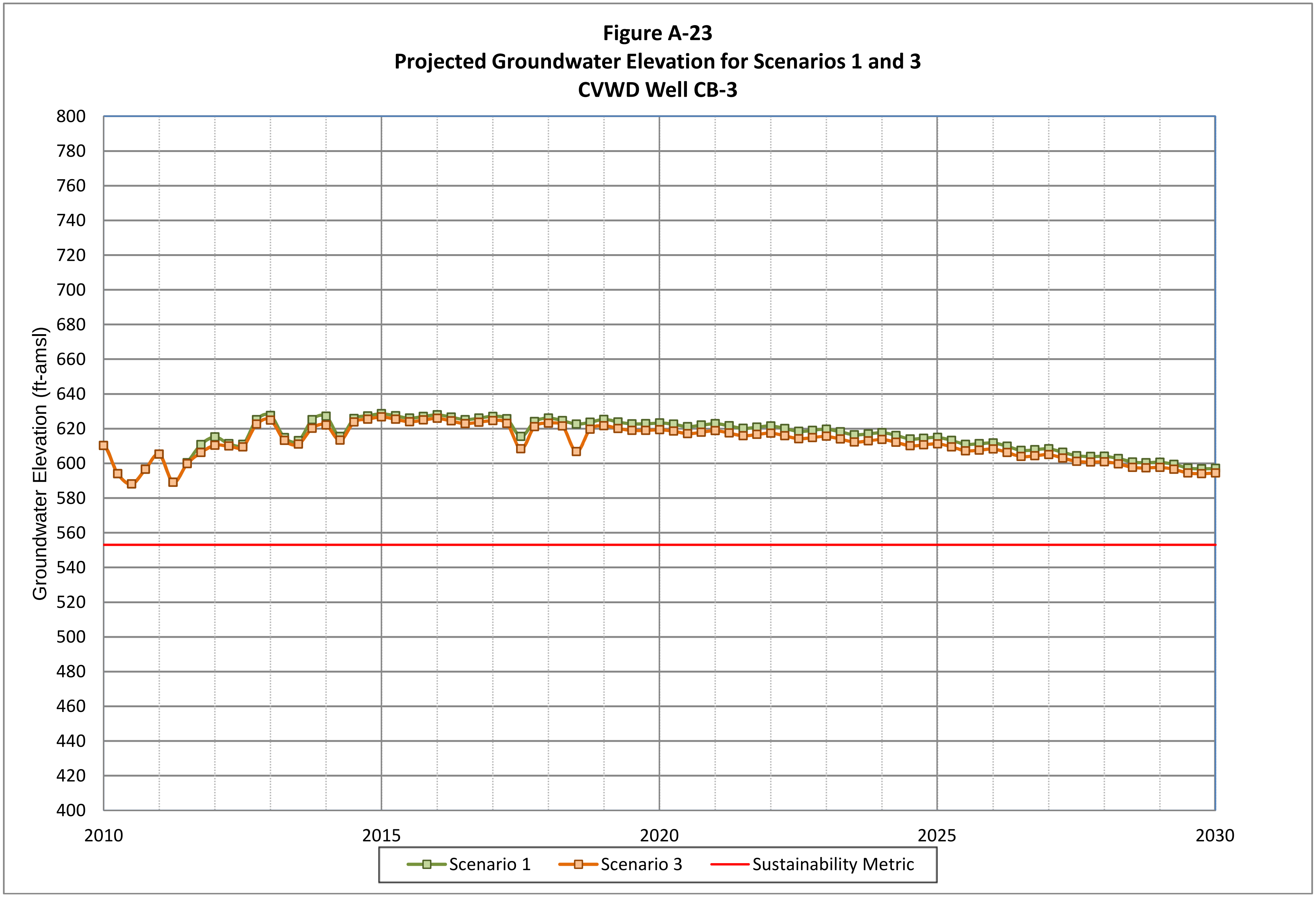

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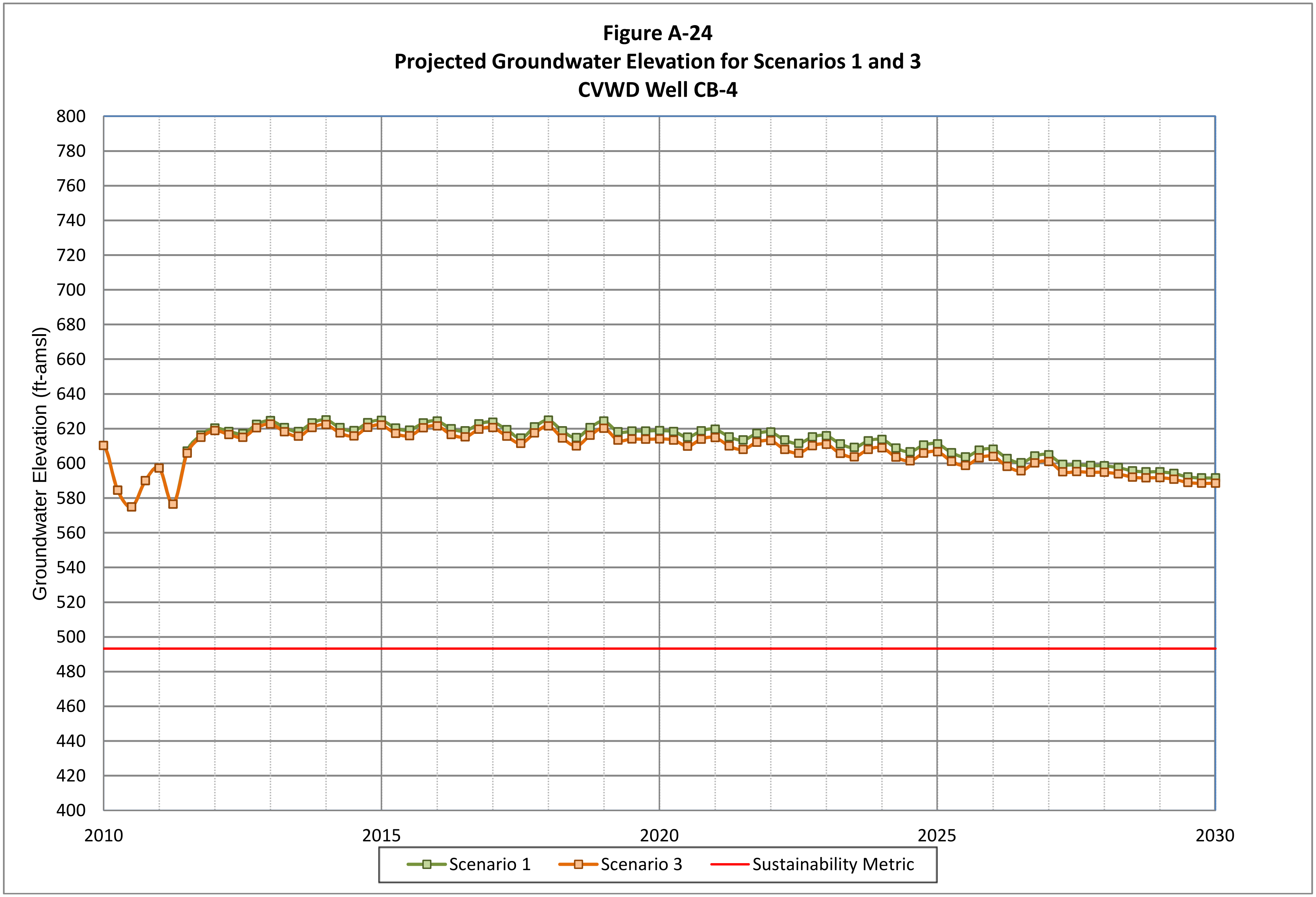

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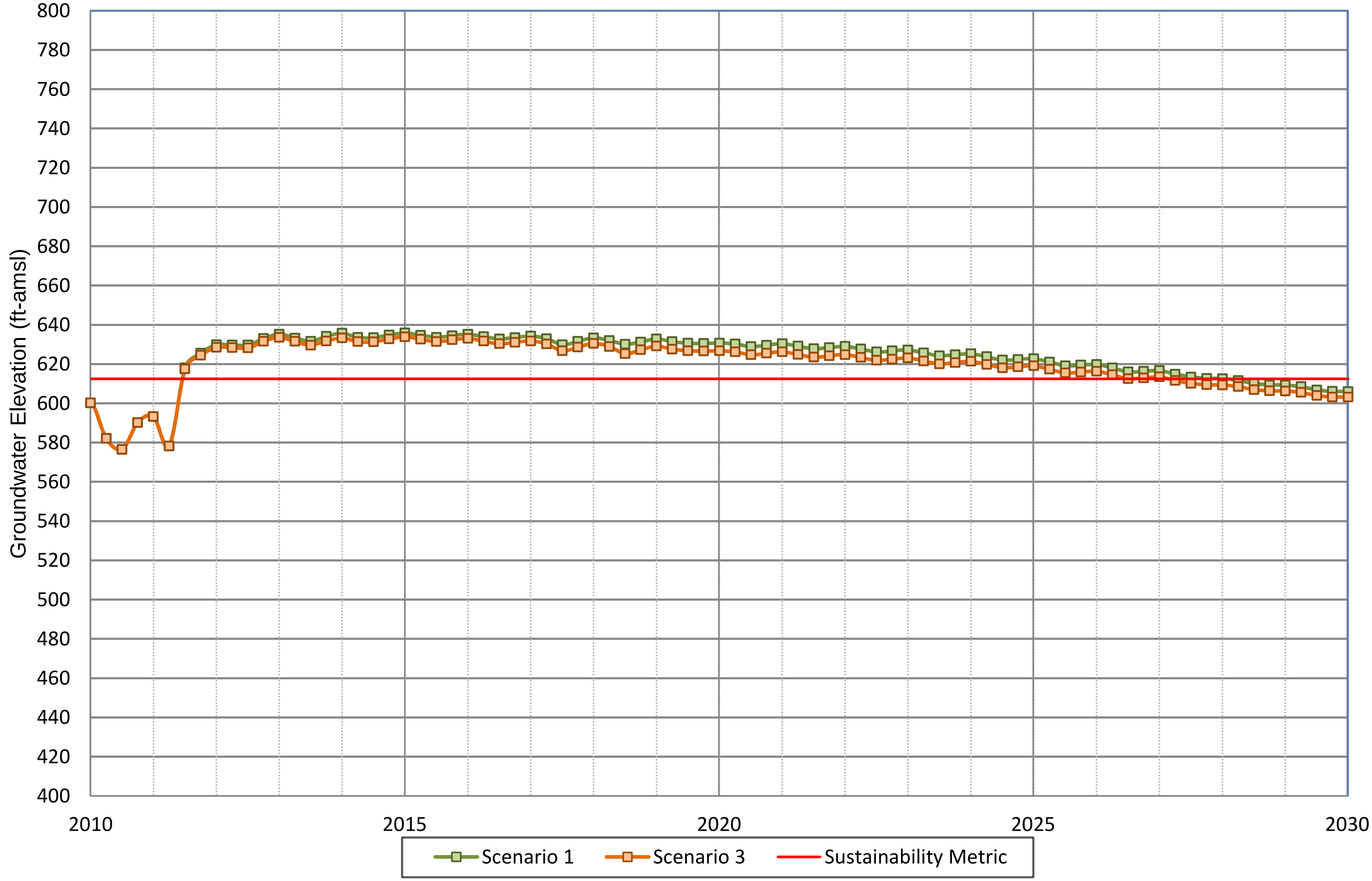
WILDERMUTH ENVIRONMENTAL INC.

Figure A-25
Projected Groundwater Elevation for Scenarios 1 and 3
CVWD Well CB-5



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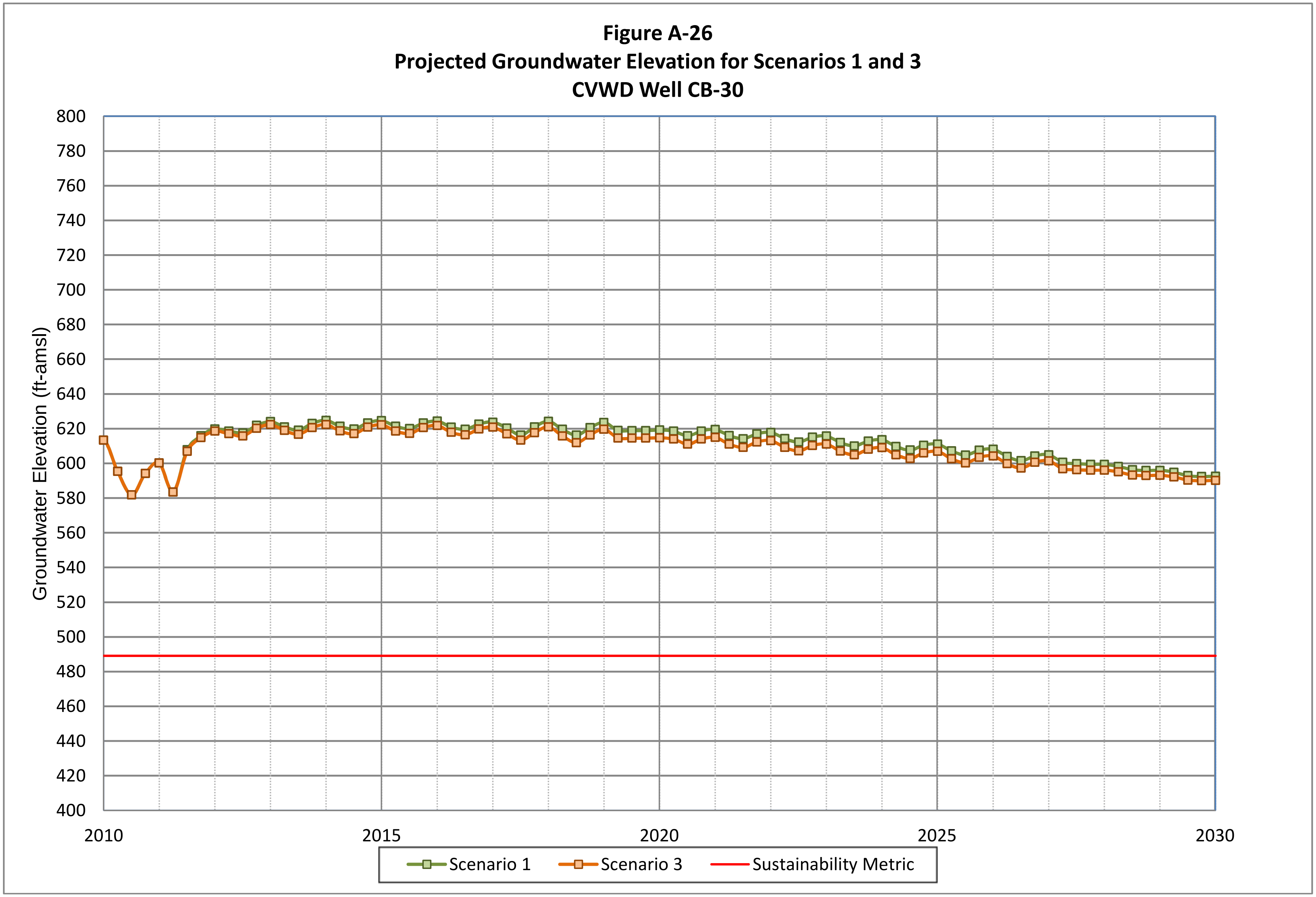

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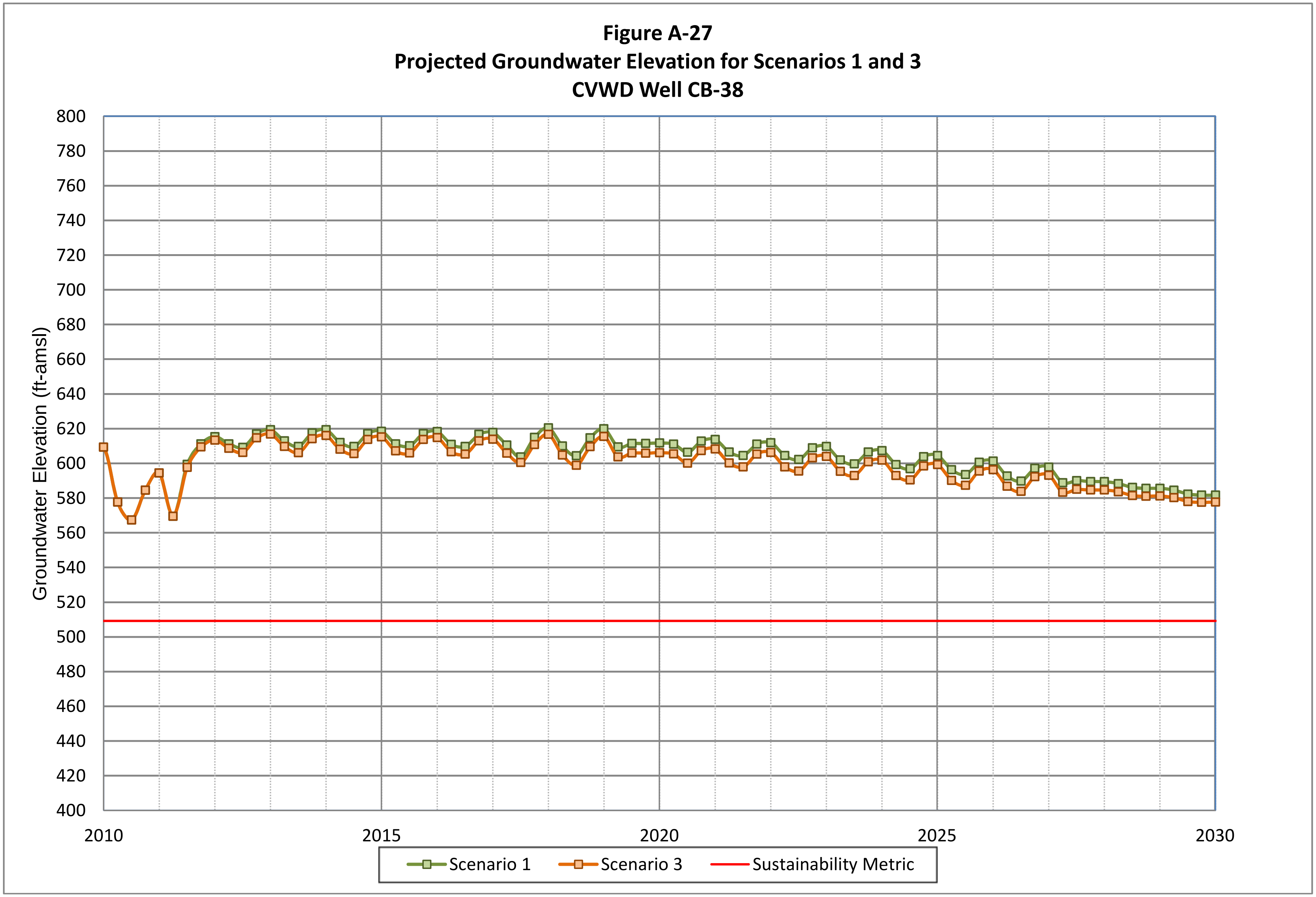
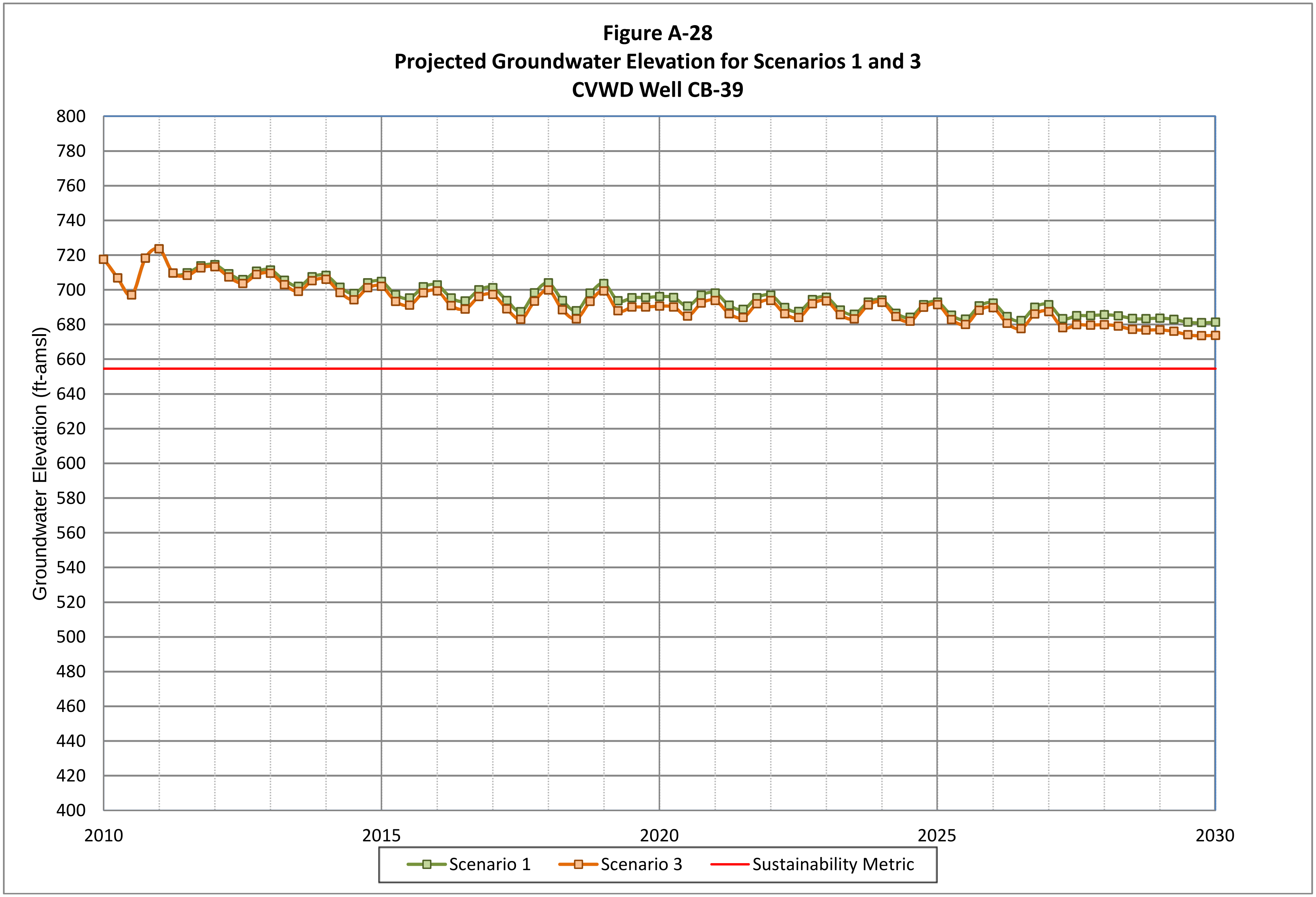


Figure A-27
Projected Groundwater Elevation for Scenarios 1 and 3
CVWD Well CB-38
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



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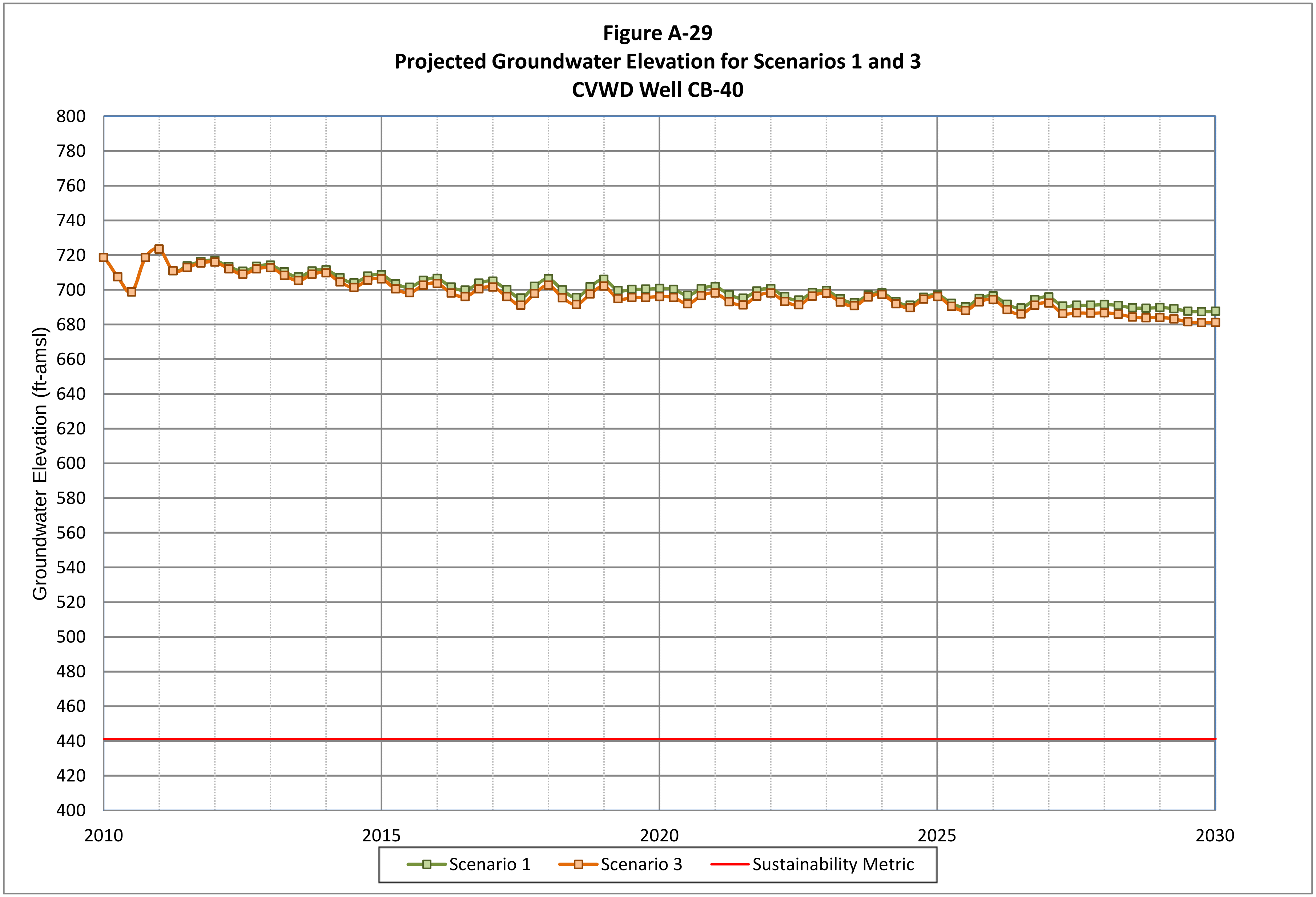

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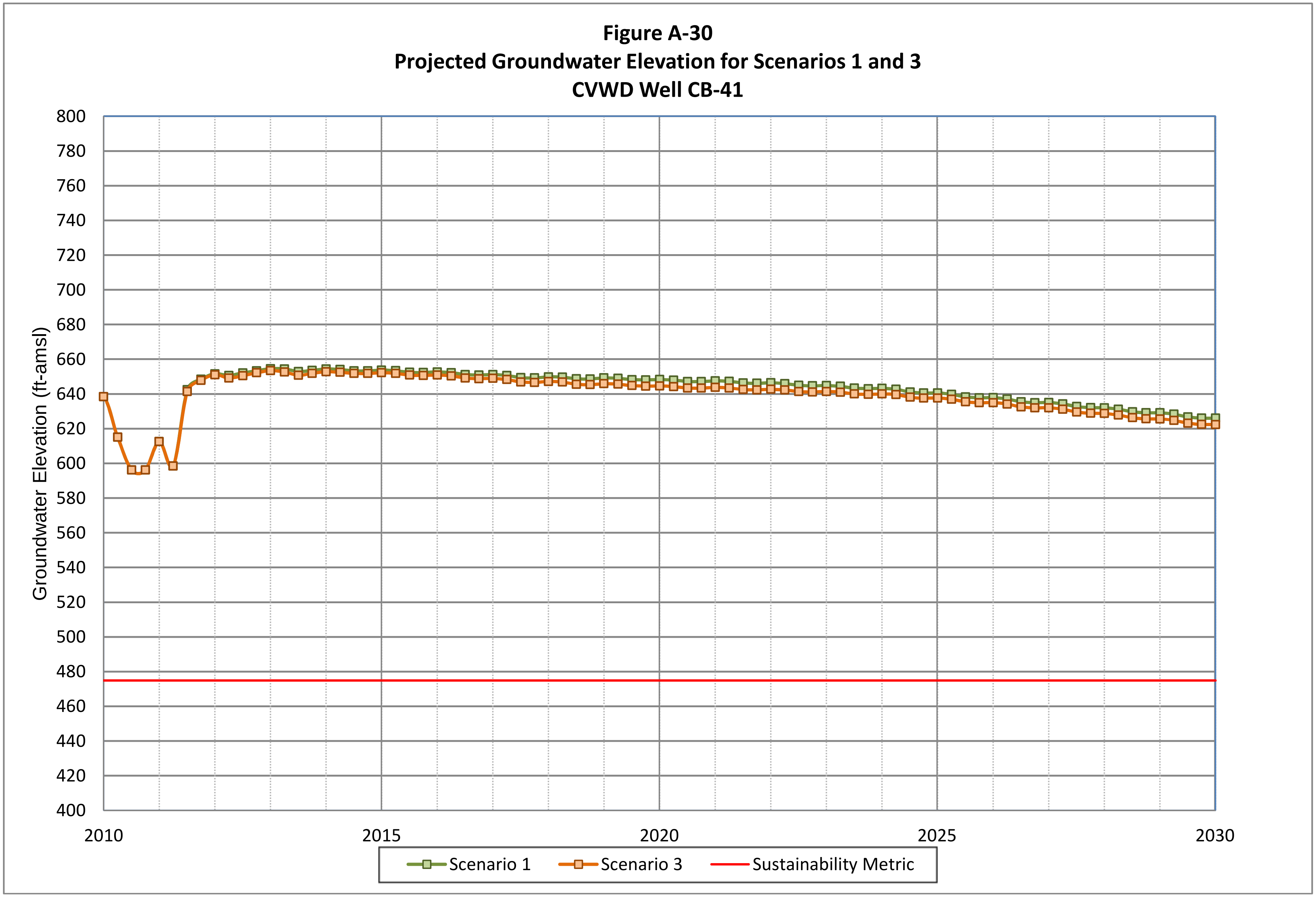
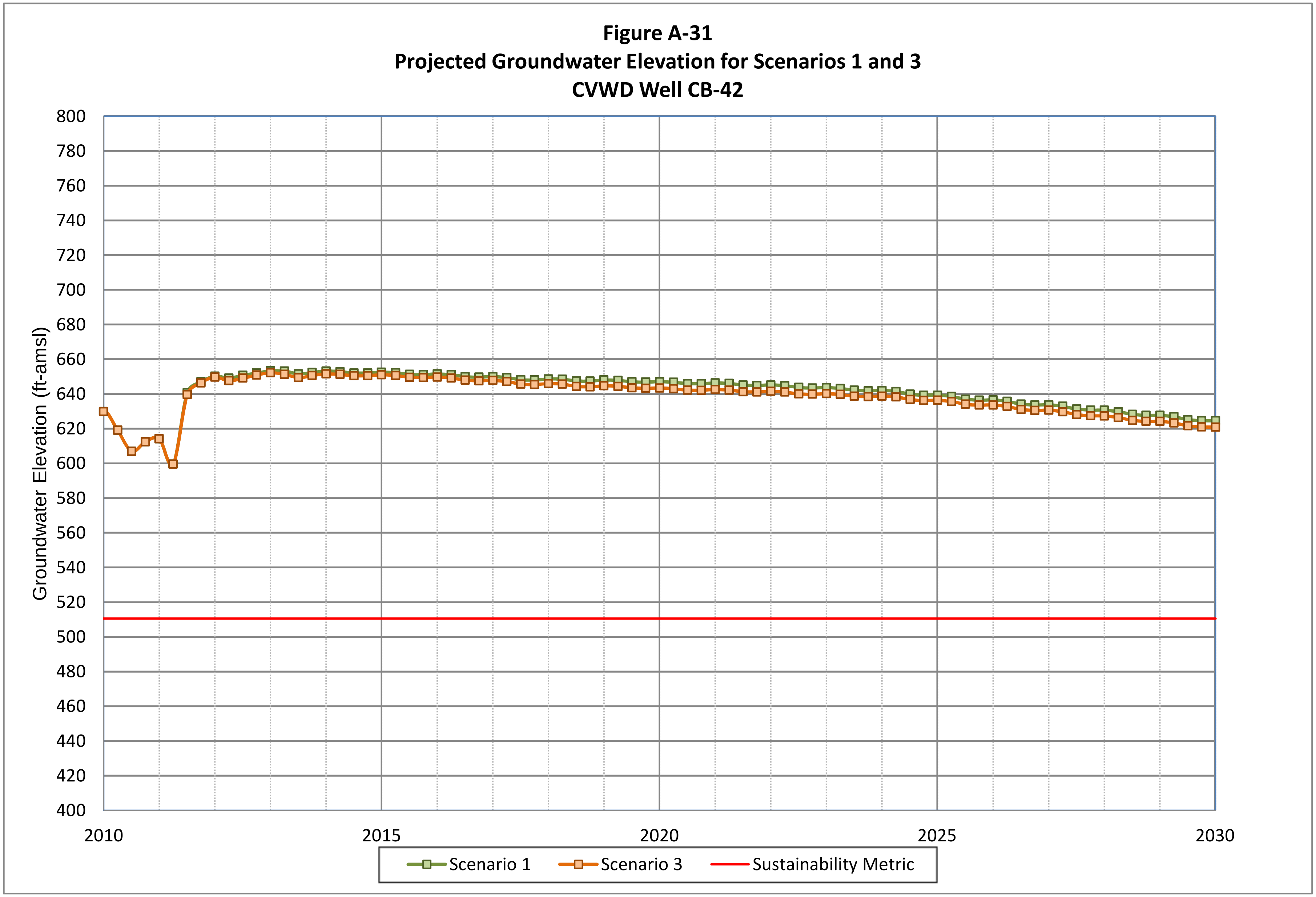


Figure A-30
Projected Groundwater Elevation for Scenarios 1 and 3
CVWD Well CB-41
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



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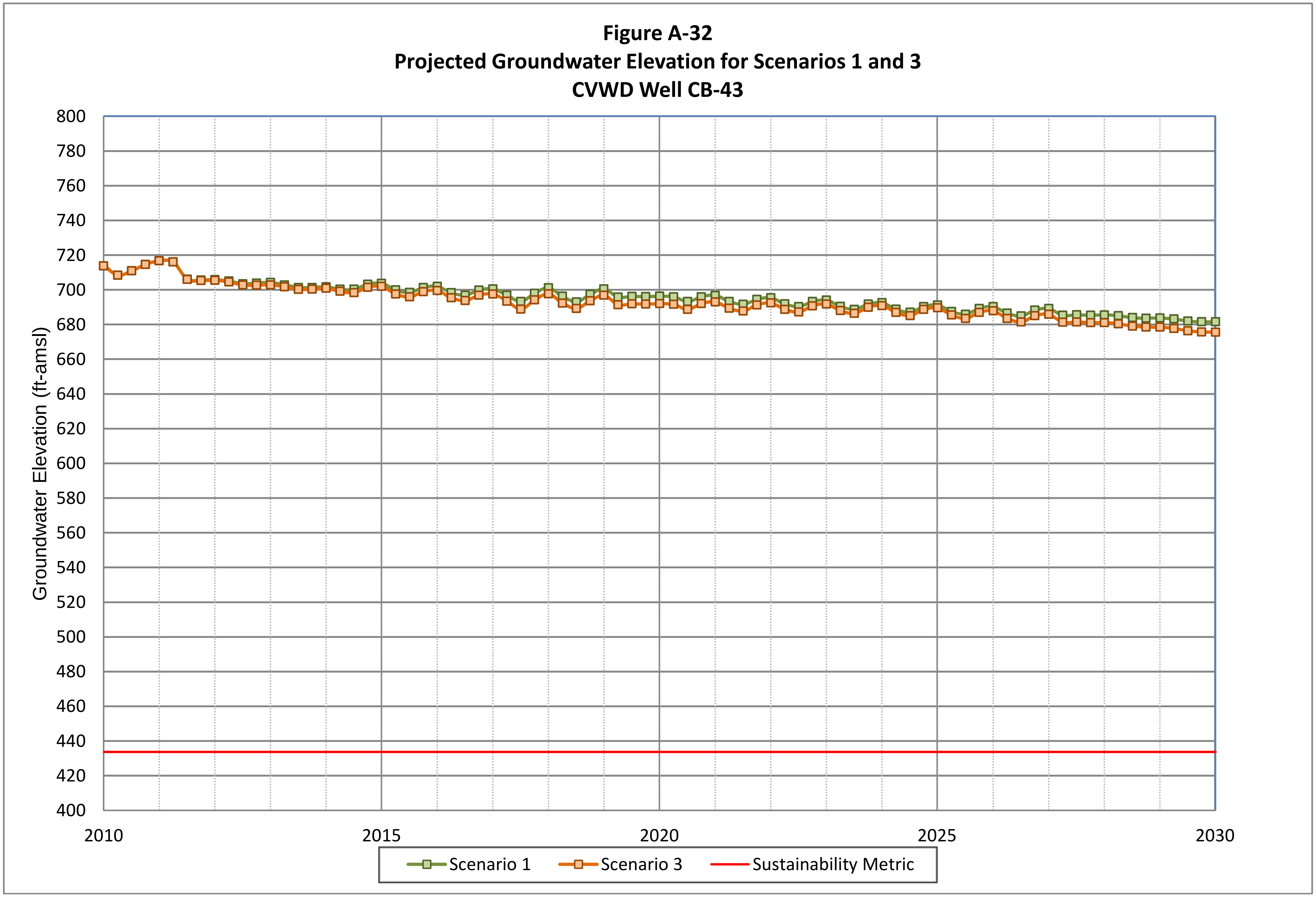
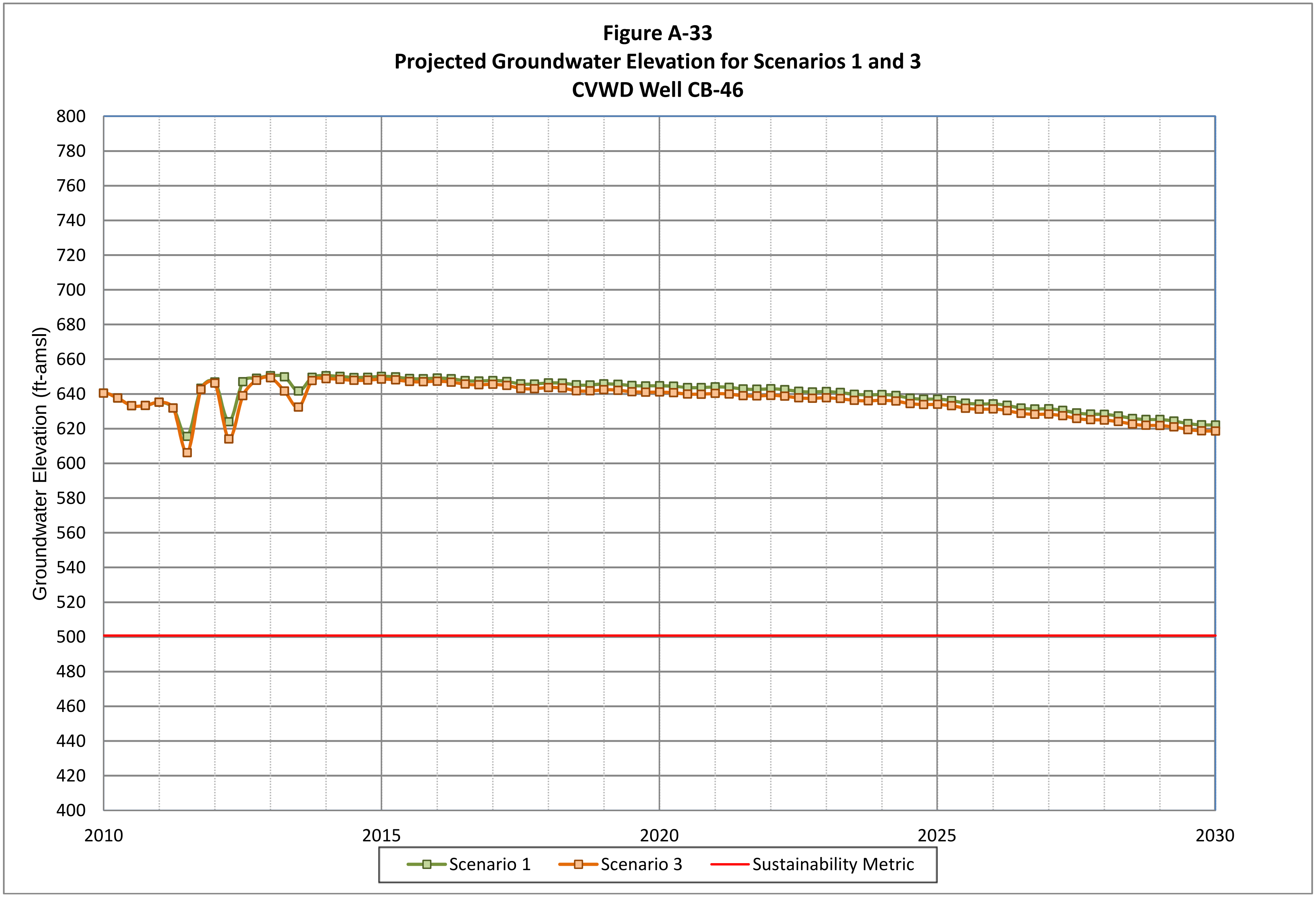


Figure A-32
Projected Groundwater Elevation for Scenarios 1 and 3
CVWD Well CB-43
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



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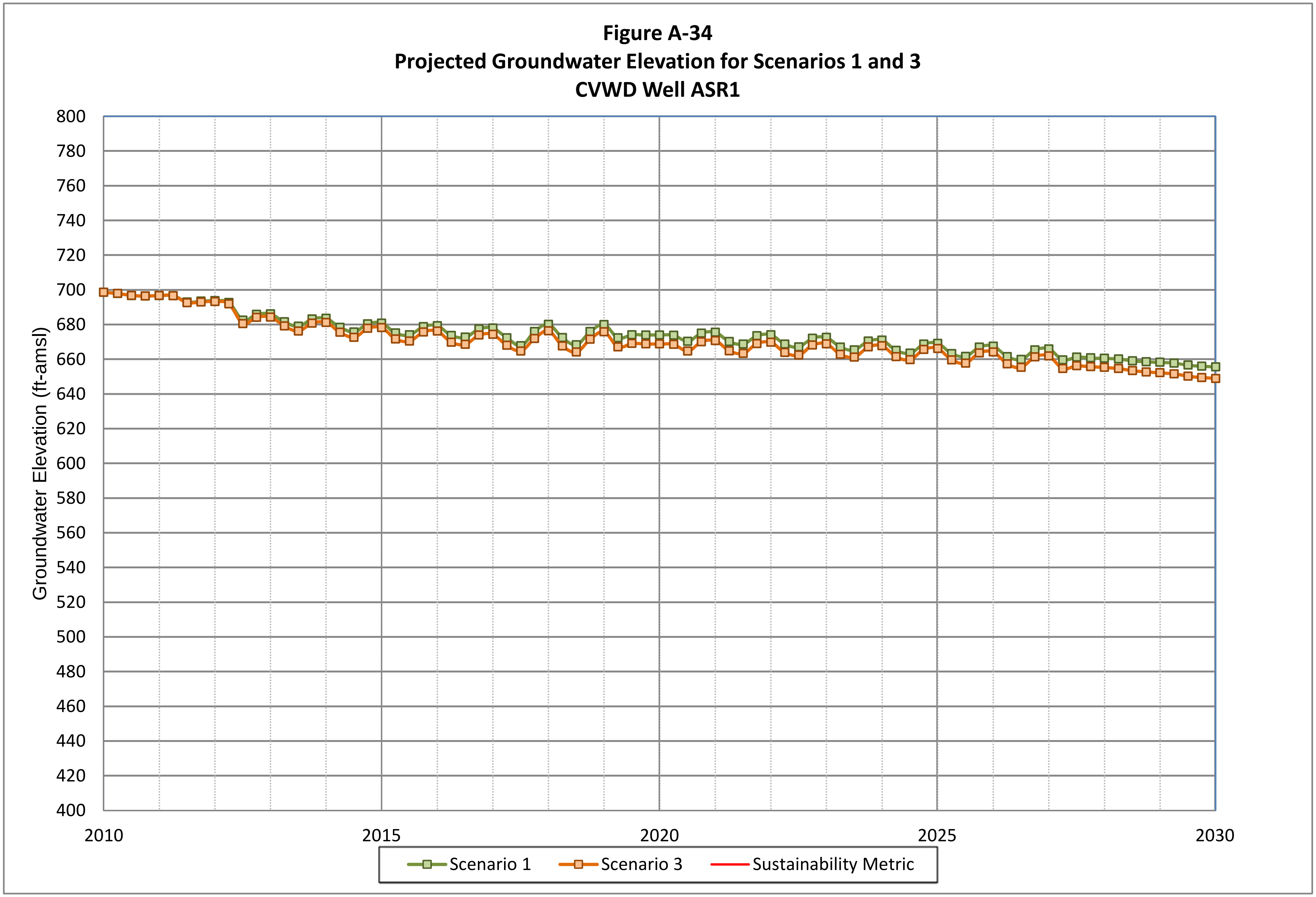

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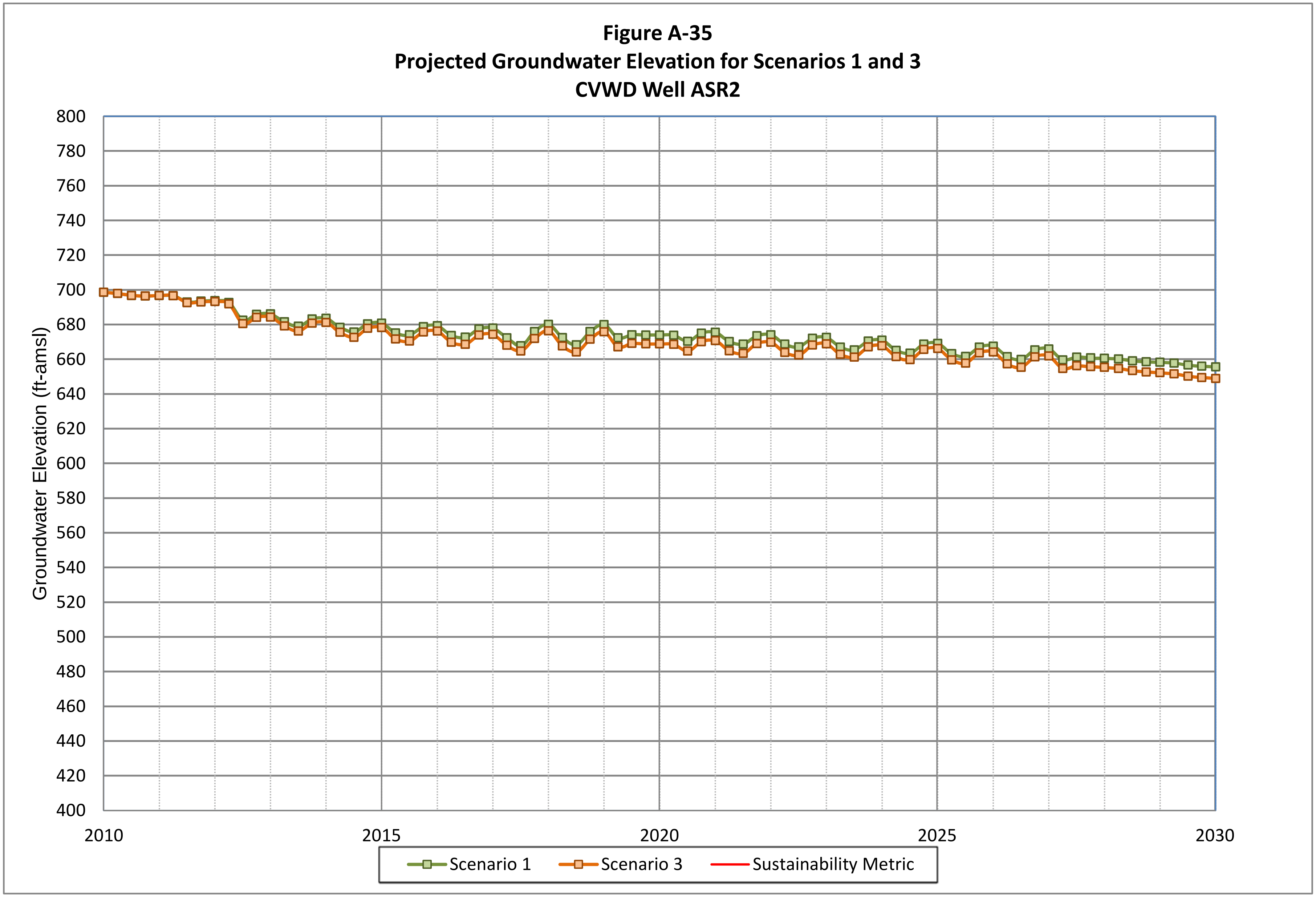

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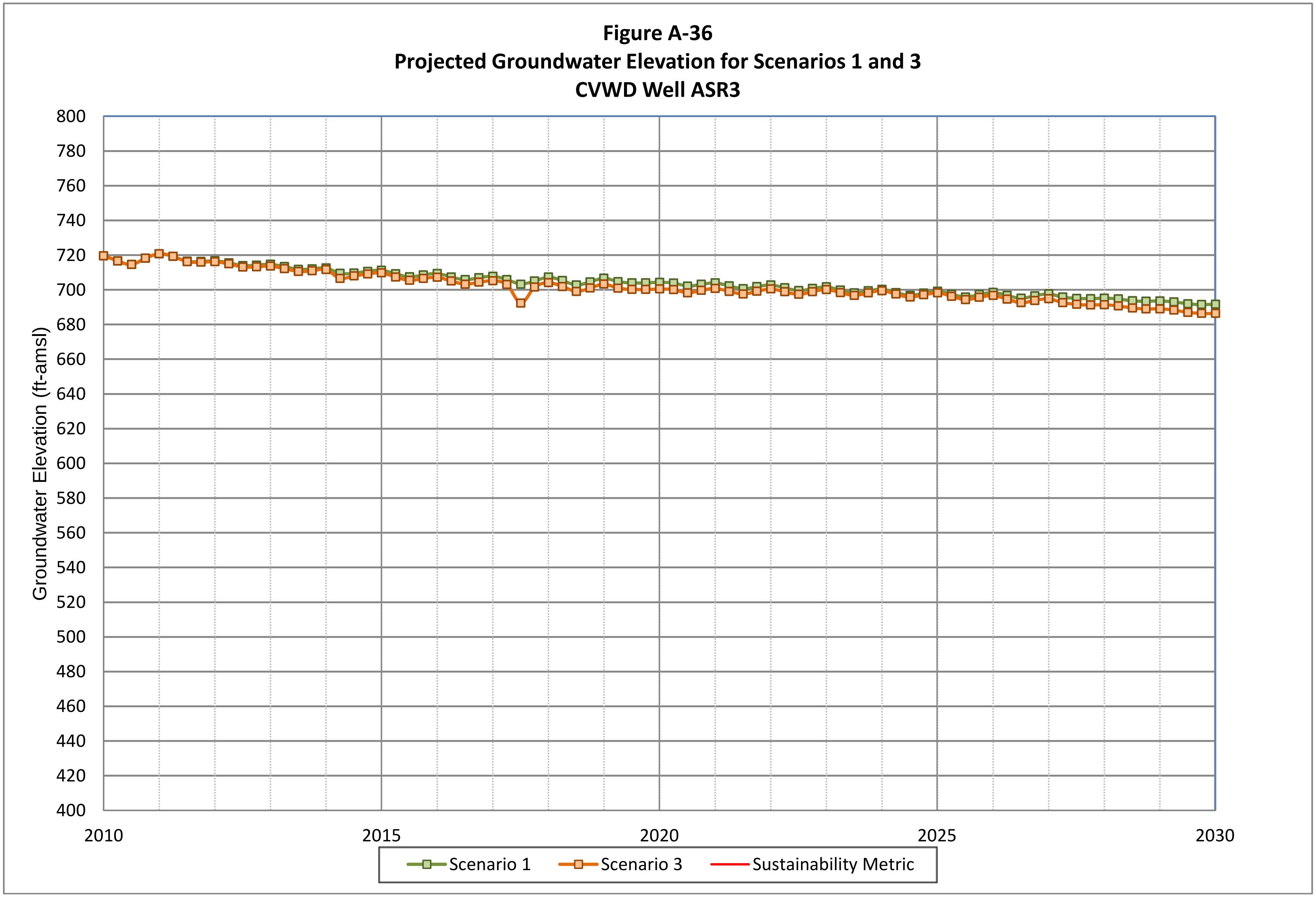

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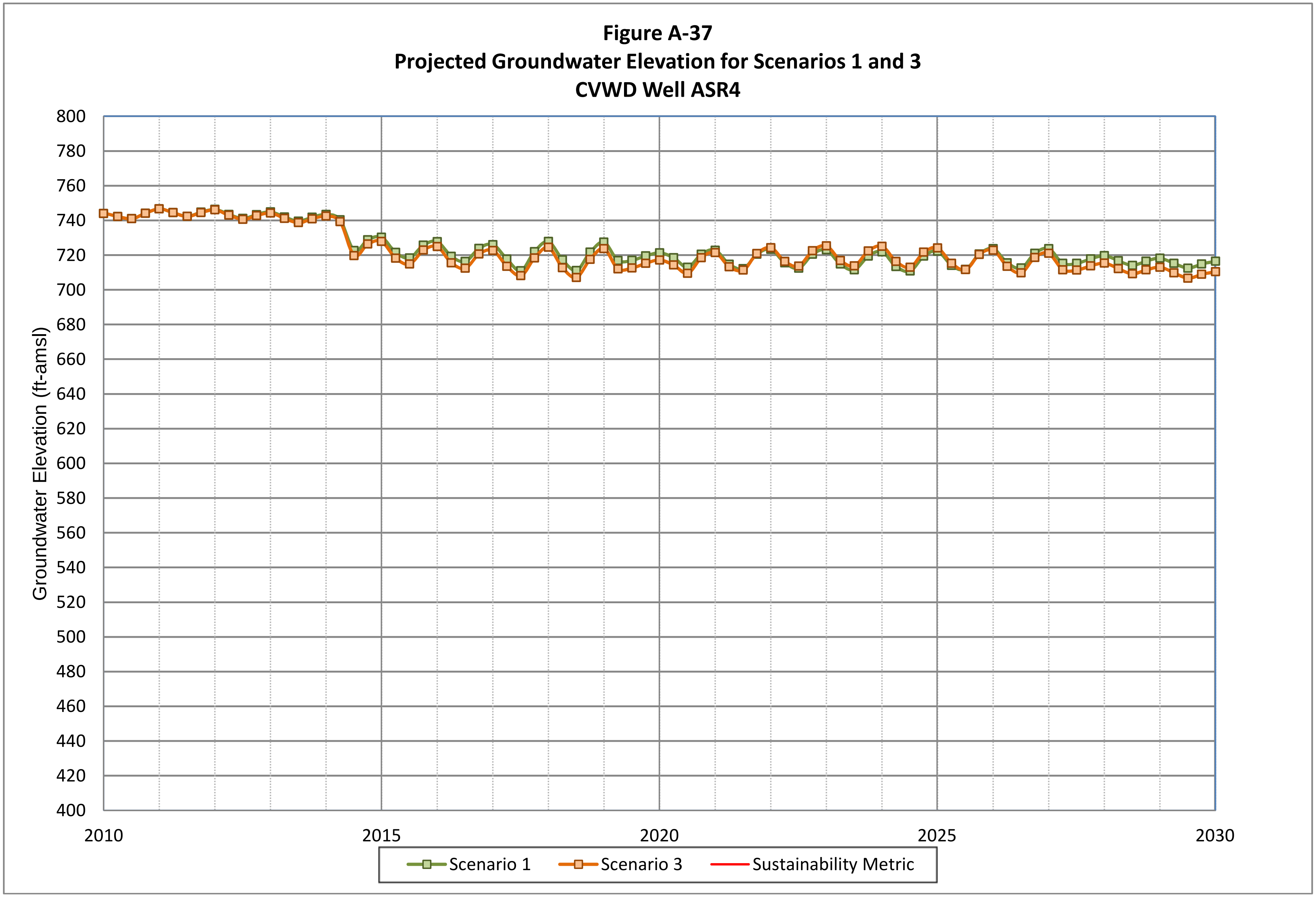

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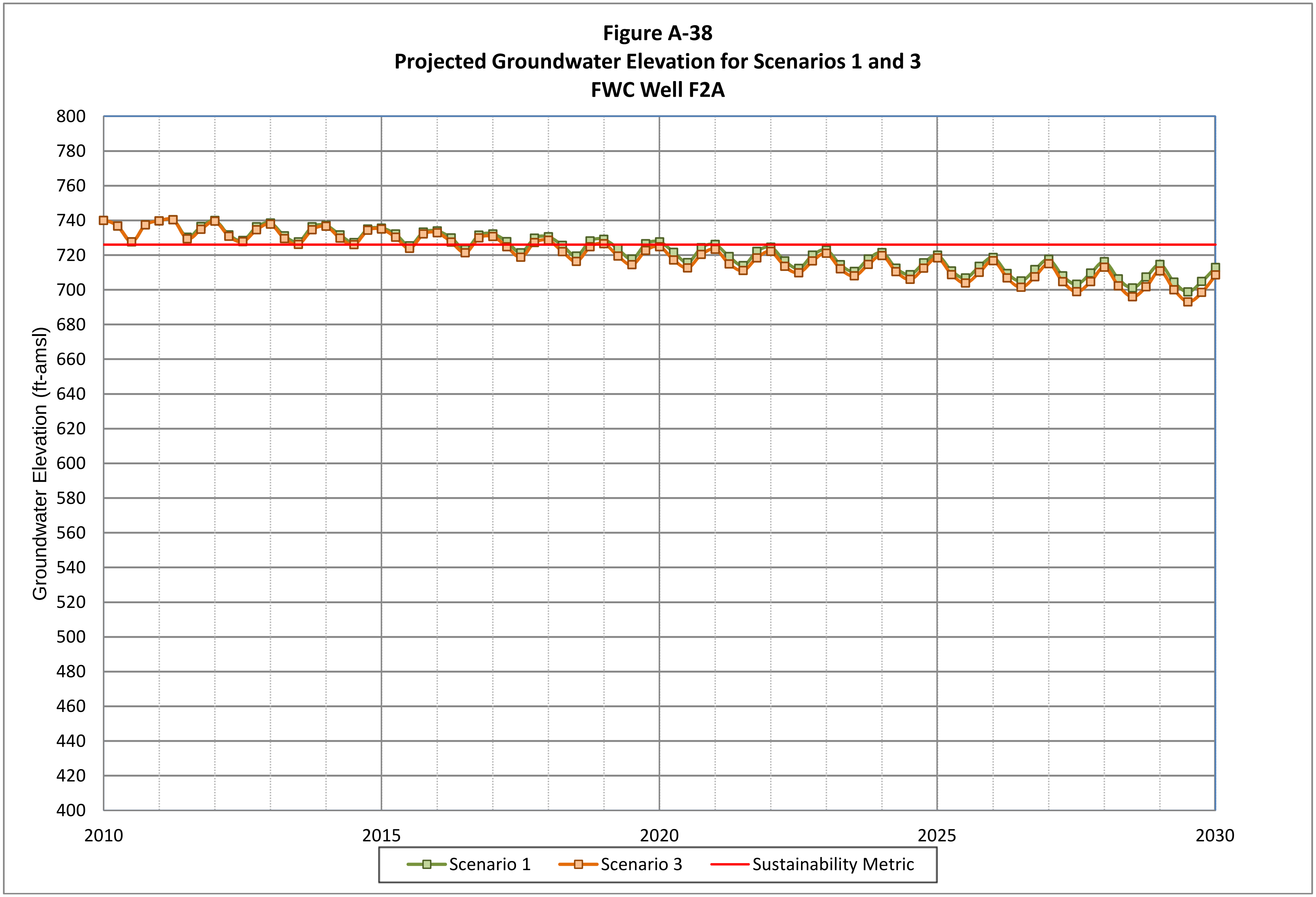

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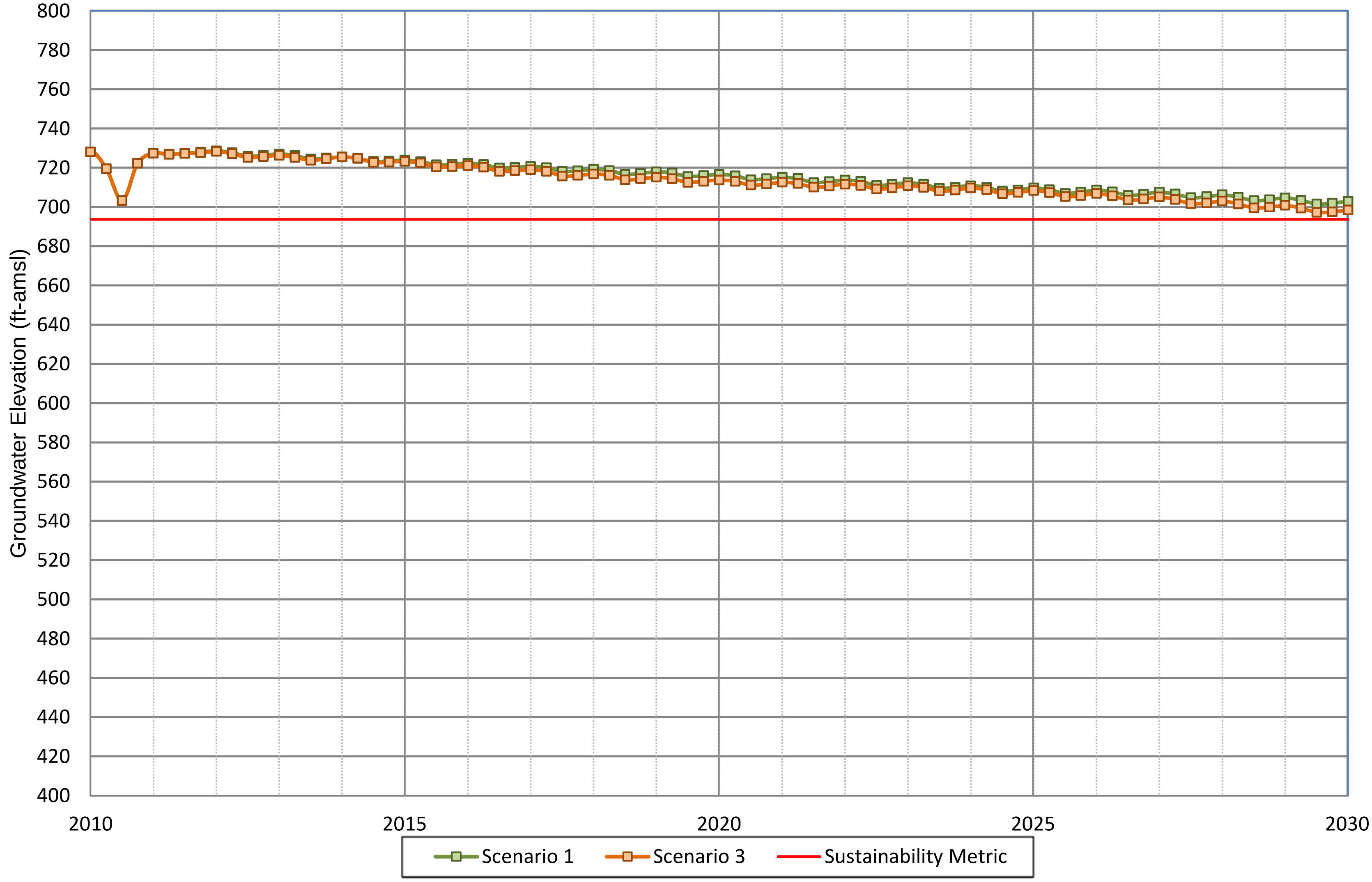
Figure A-39
Projected Groundwater Elevation for Scenarios 1 and 3
FWC Well F7A



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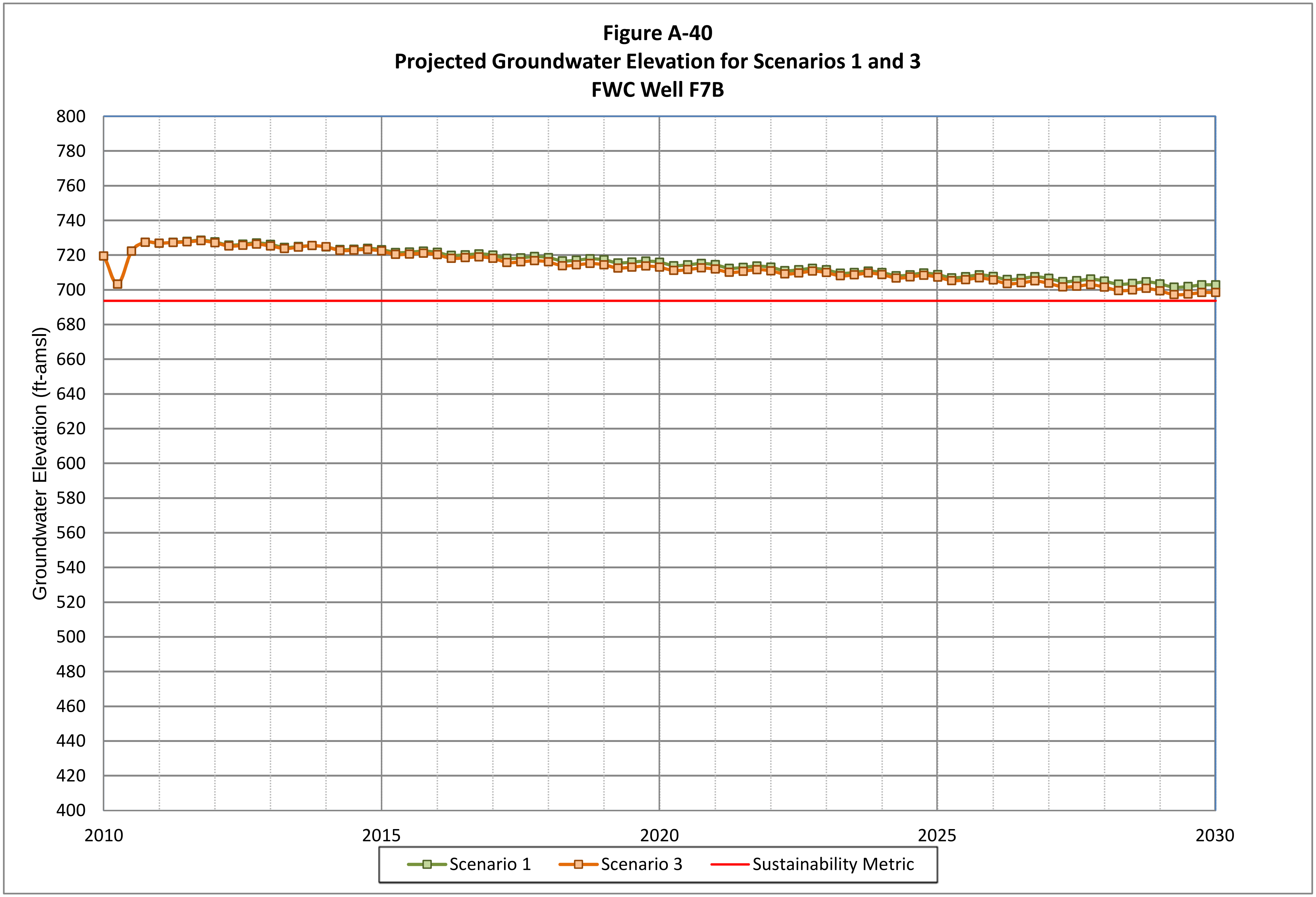

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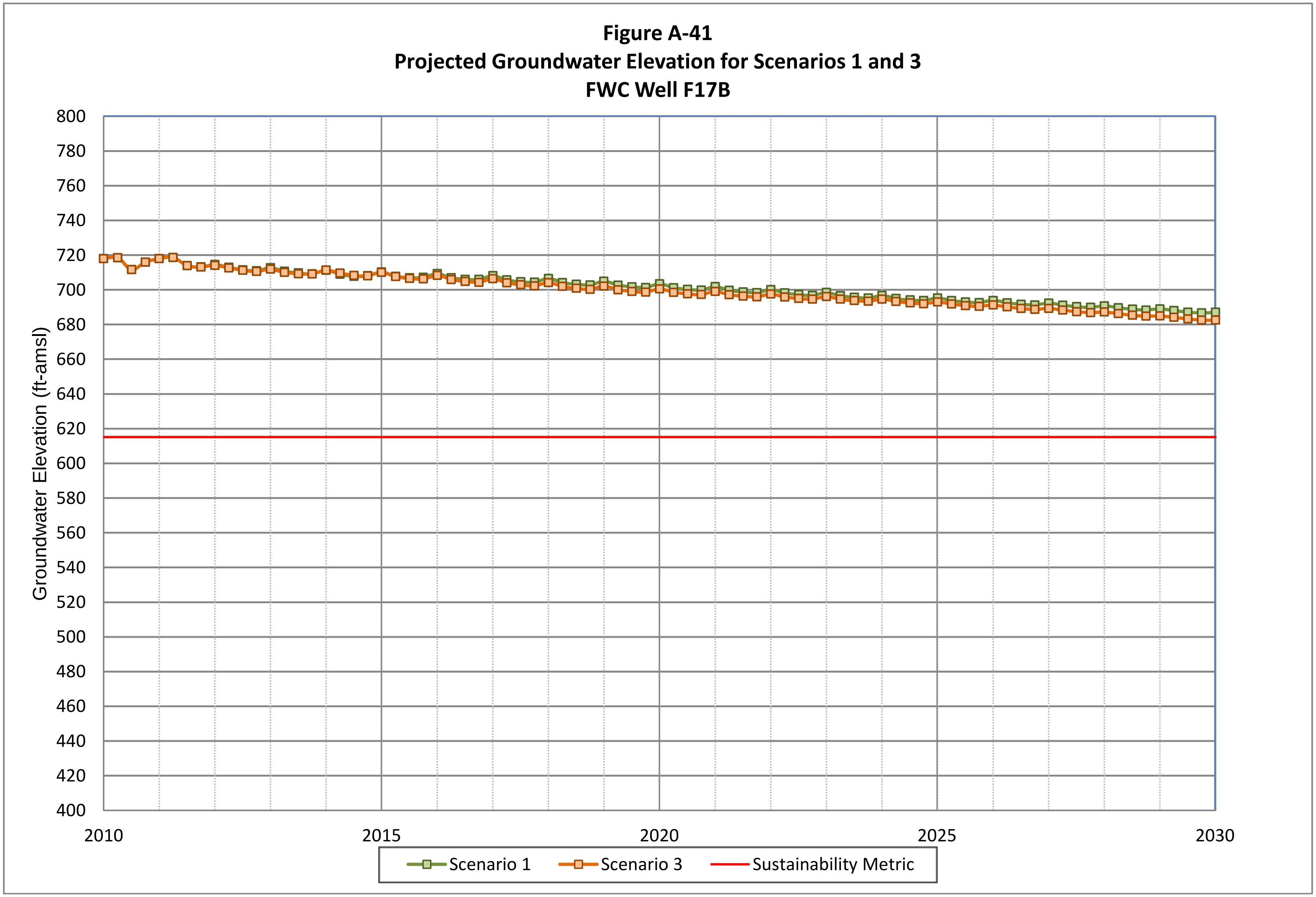

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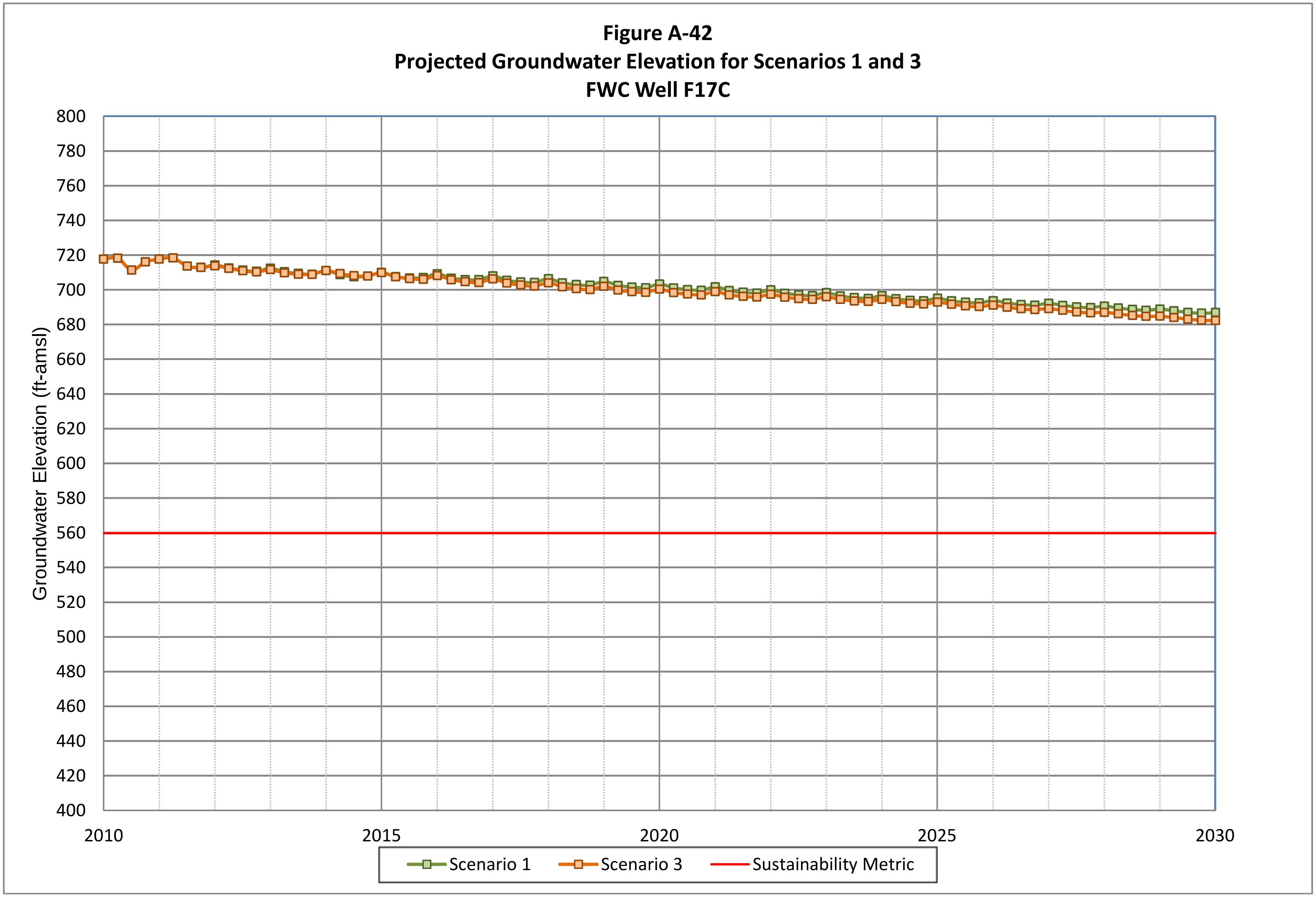

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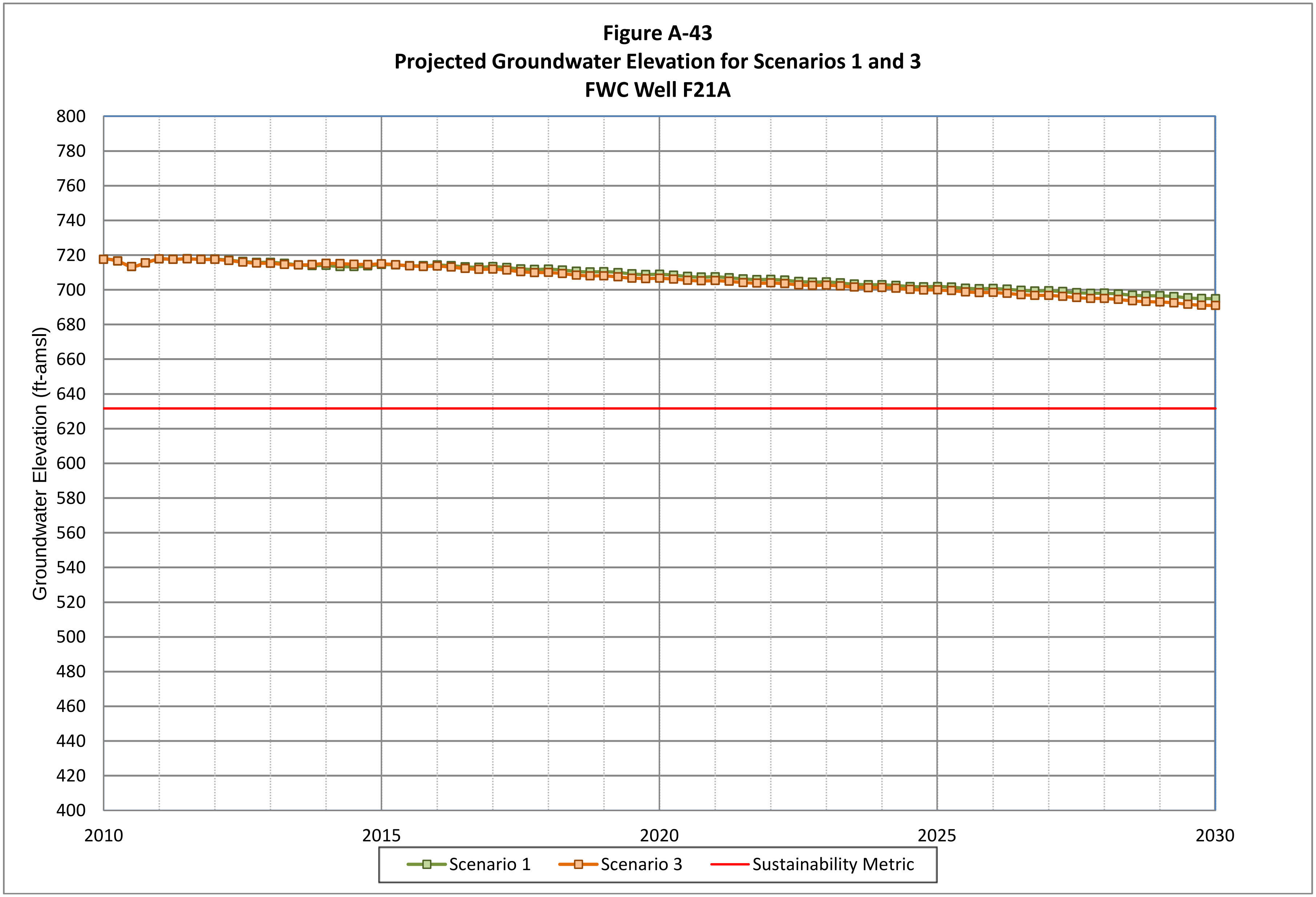

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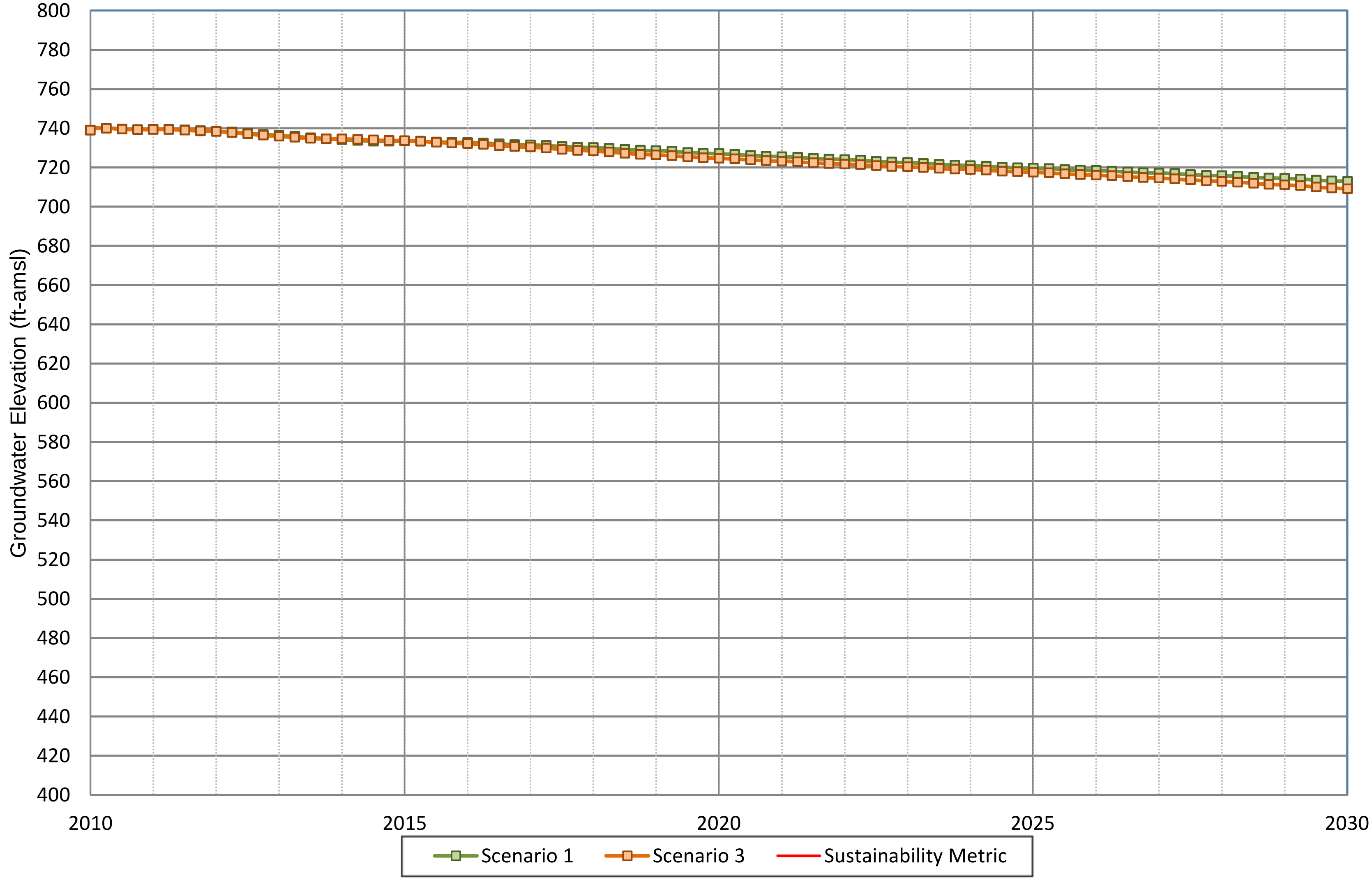
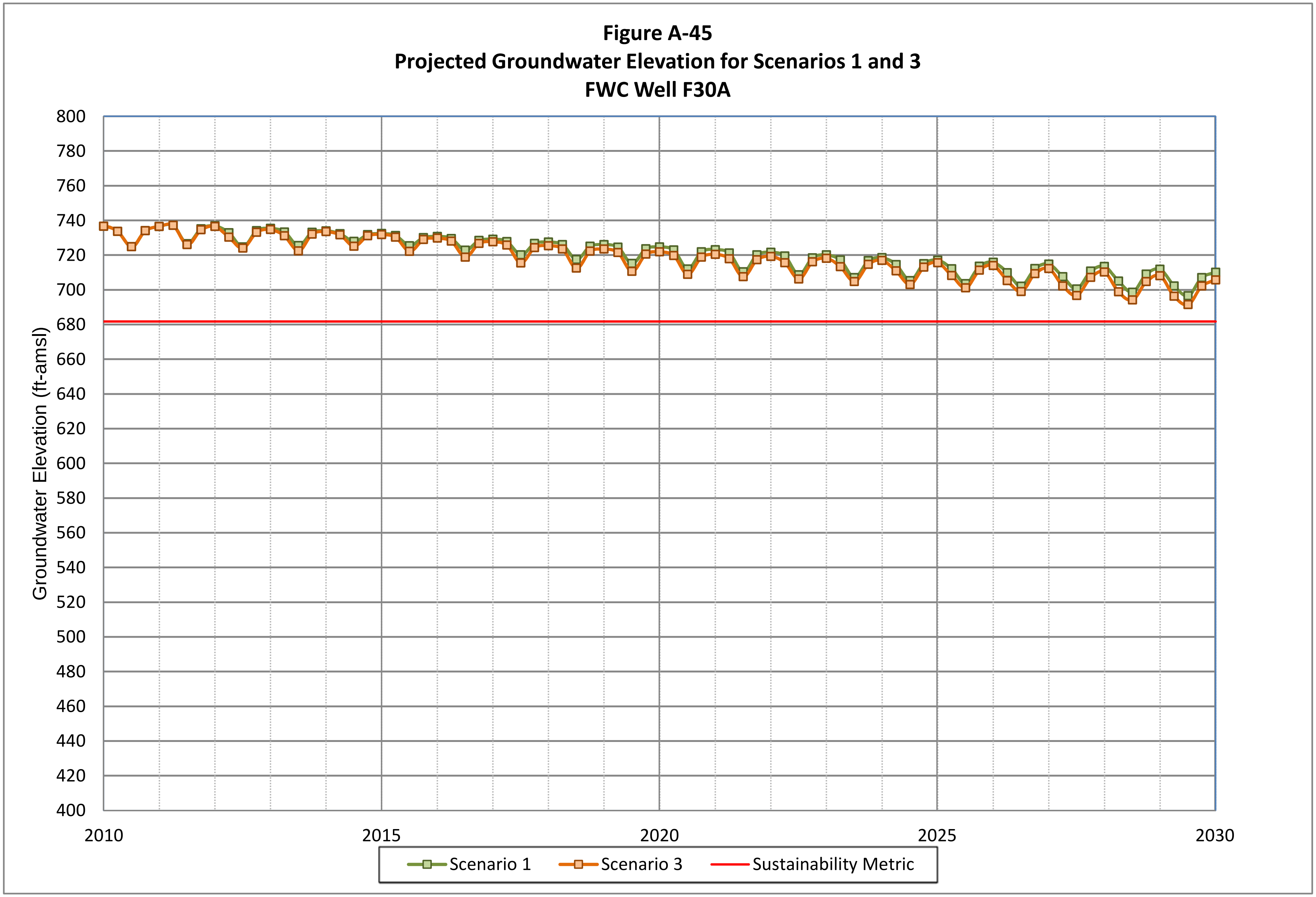
Figure A-44
Projected Groundwater Elevation for Scenarios 1 and 3
FWC Well F23A





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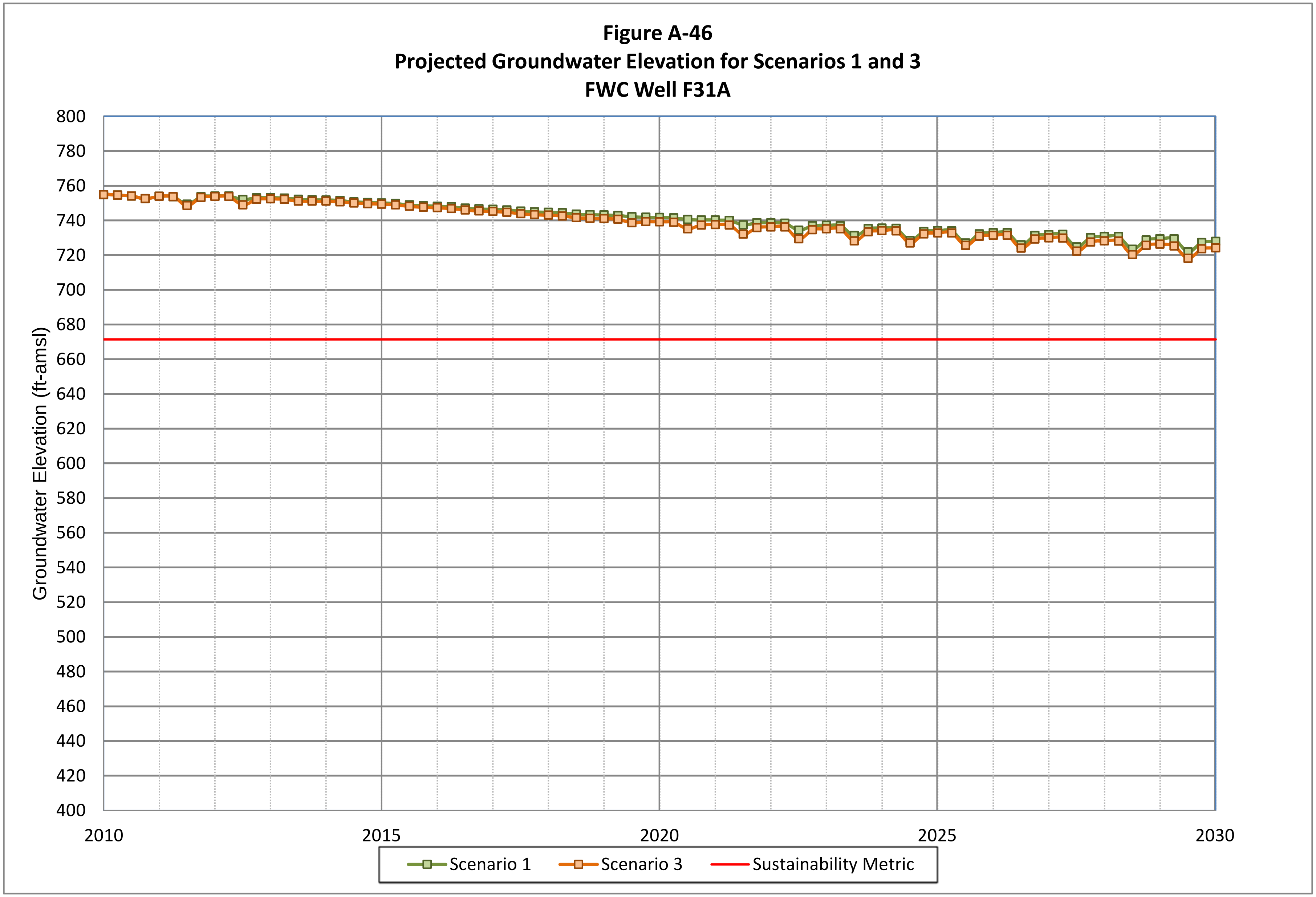

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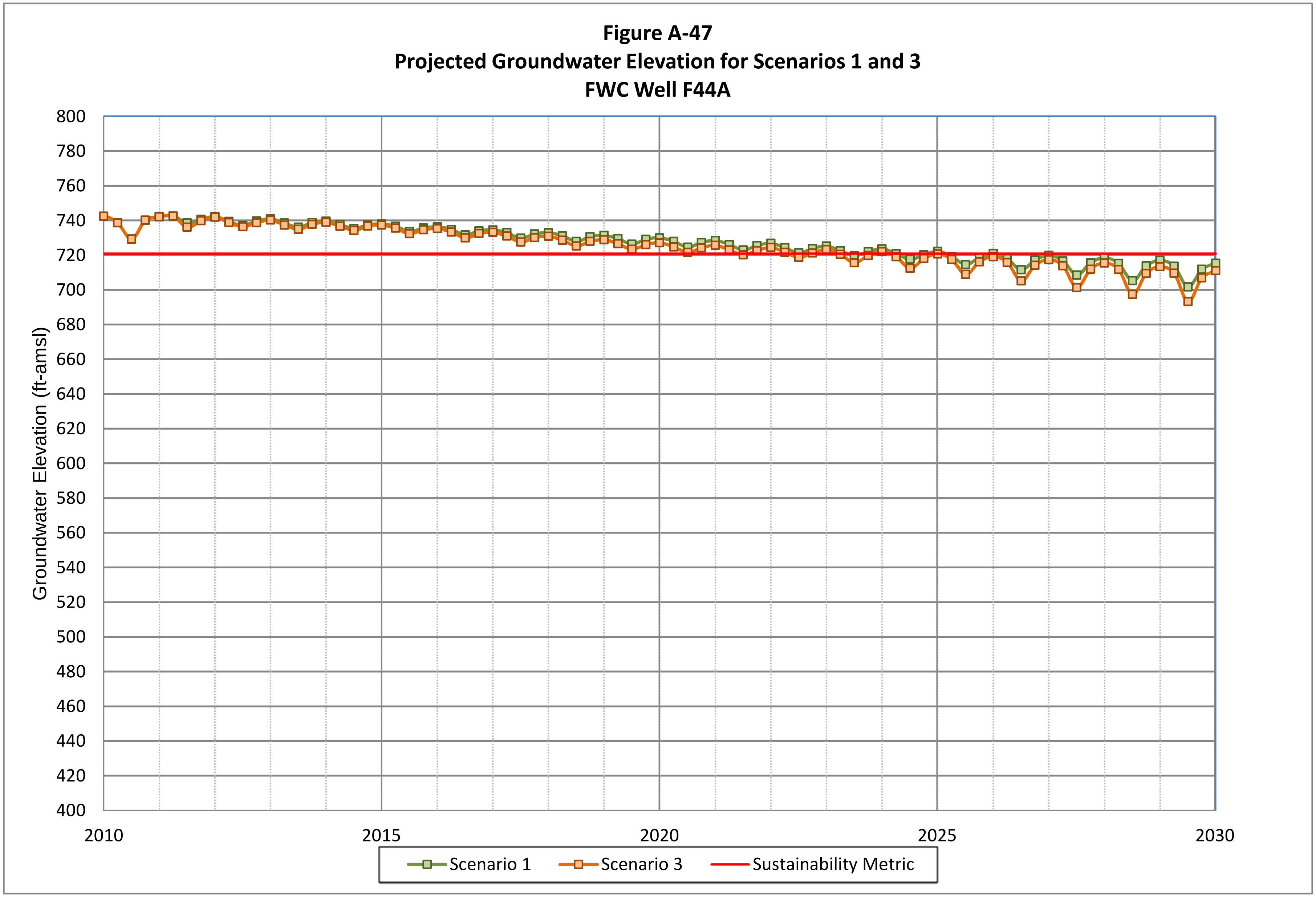

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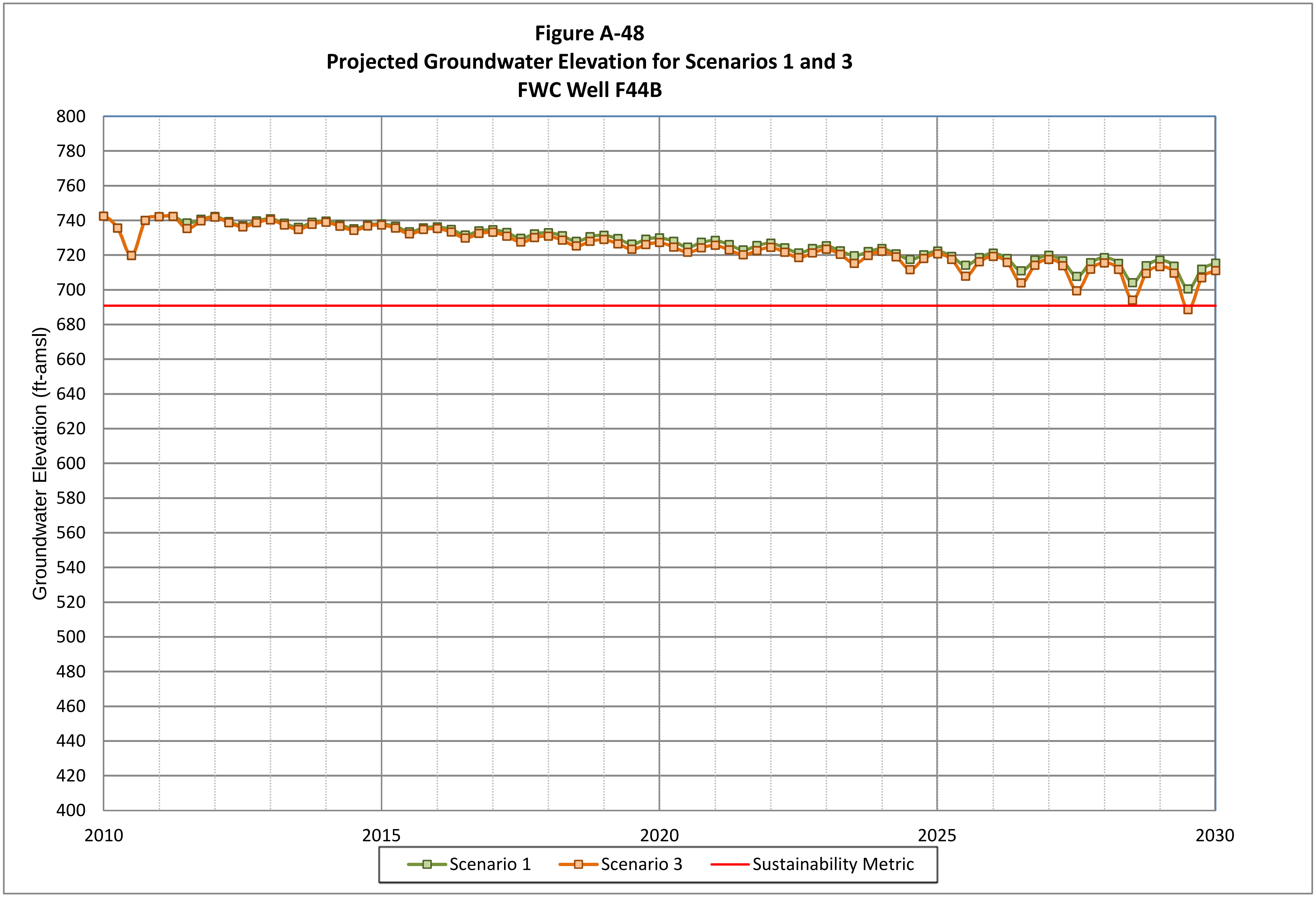

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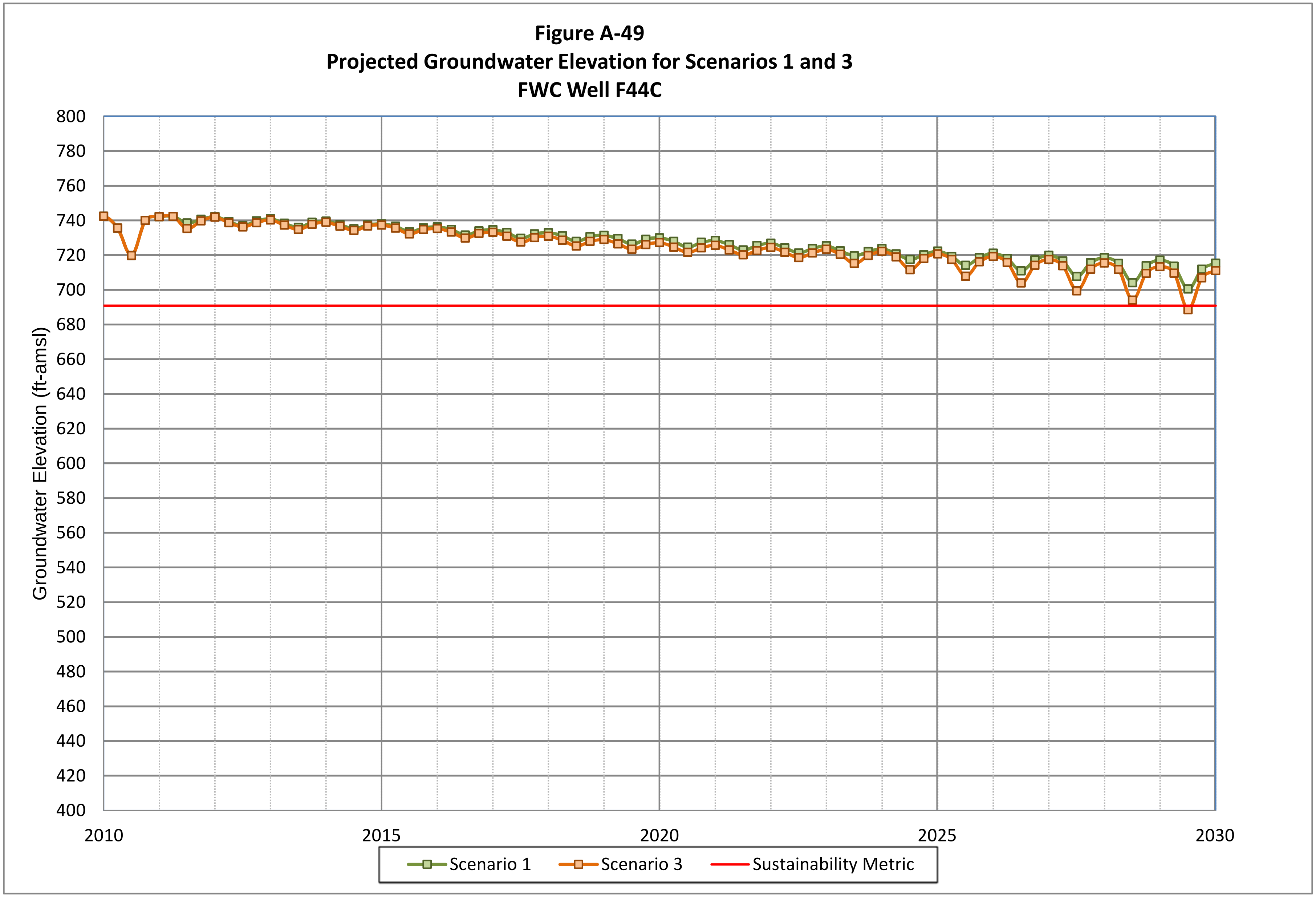

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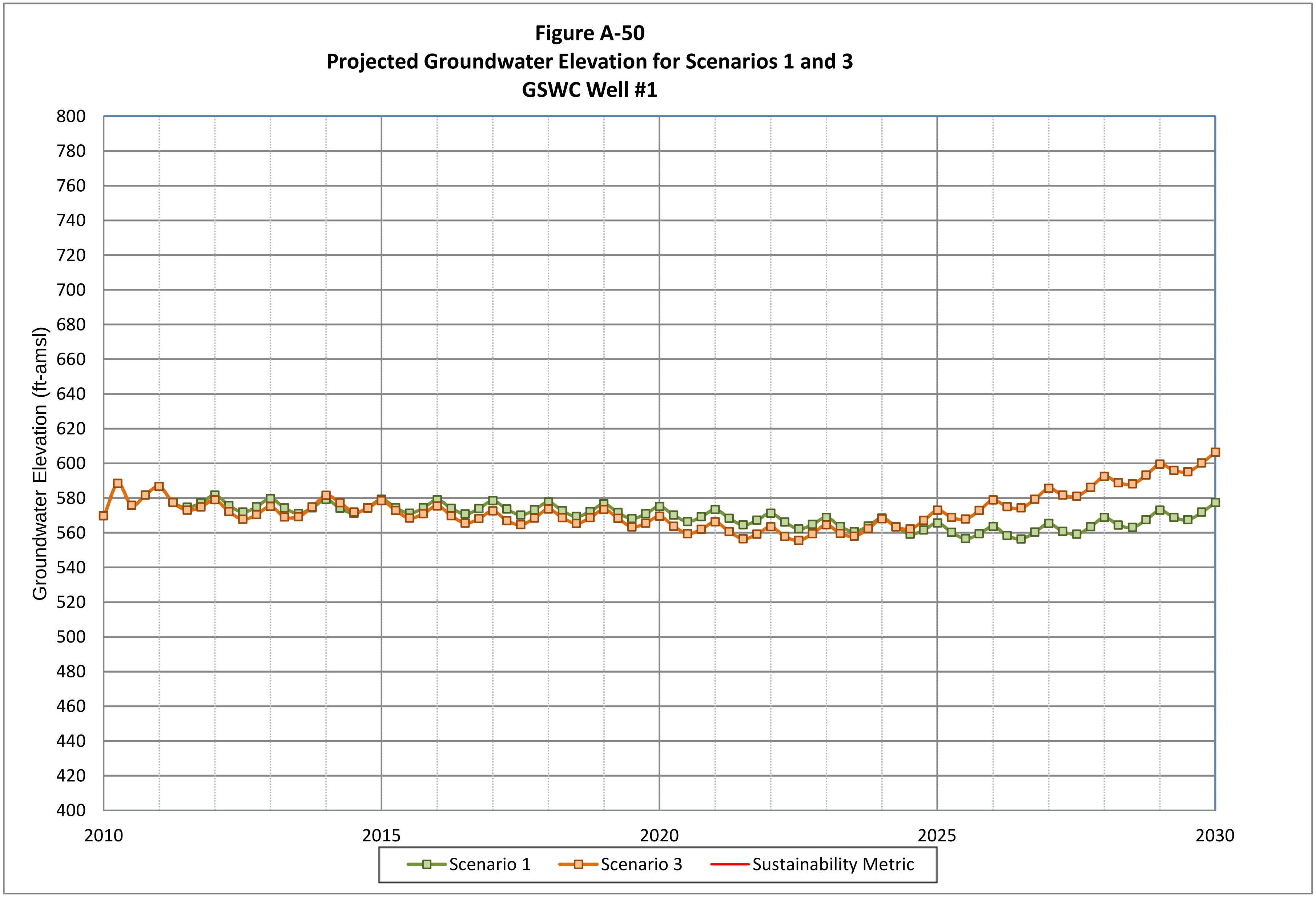

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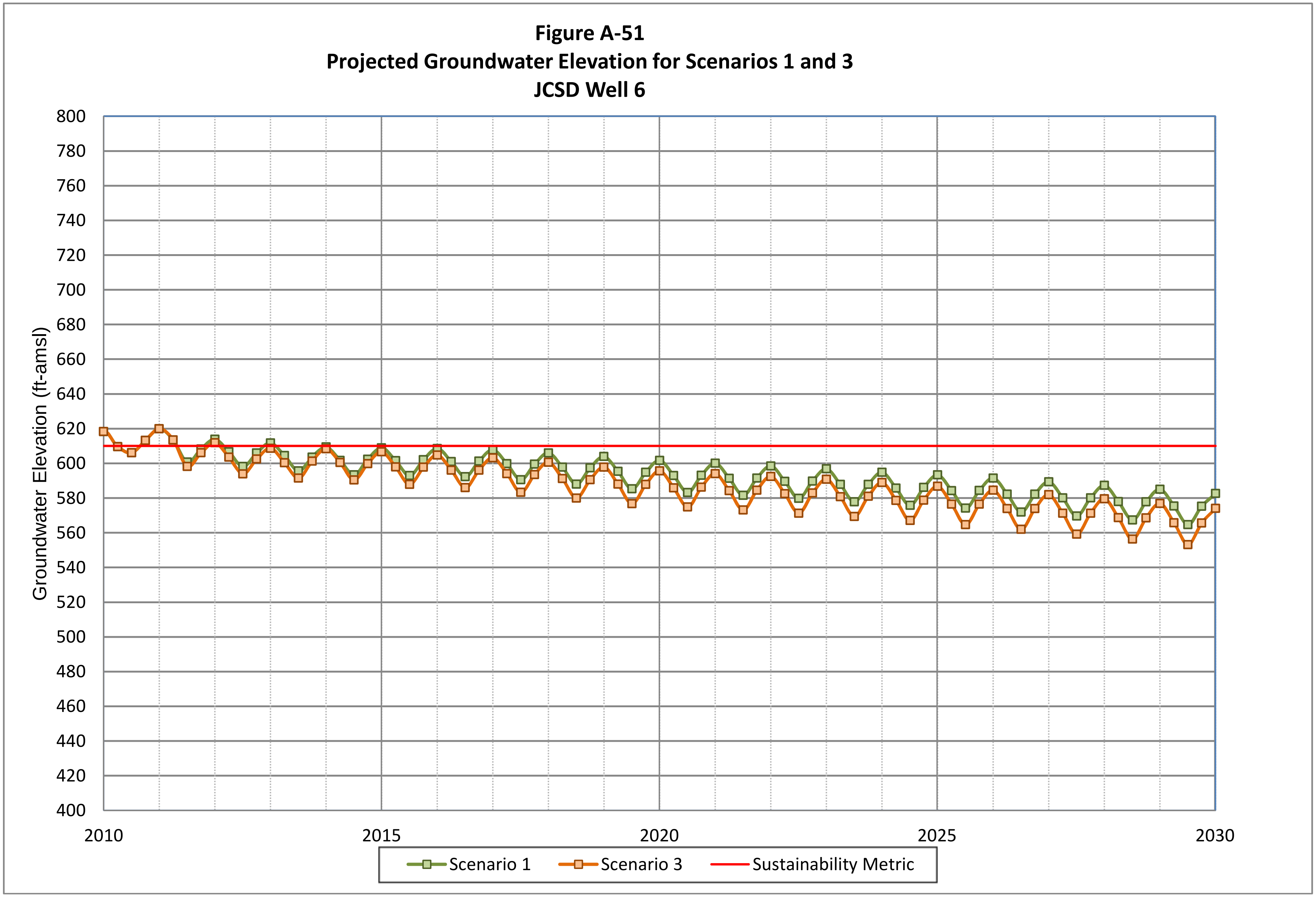

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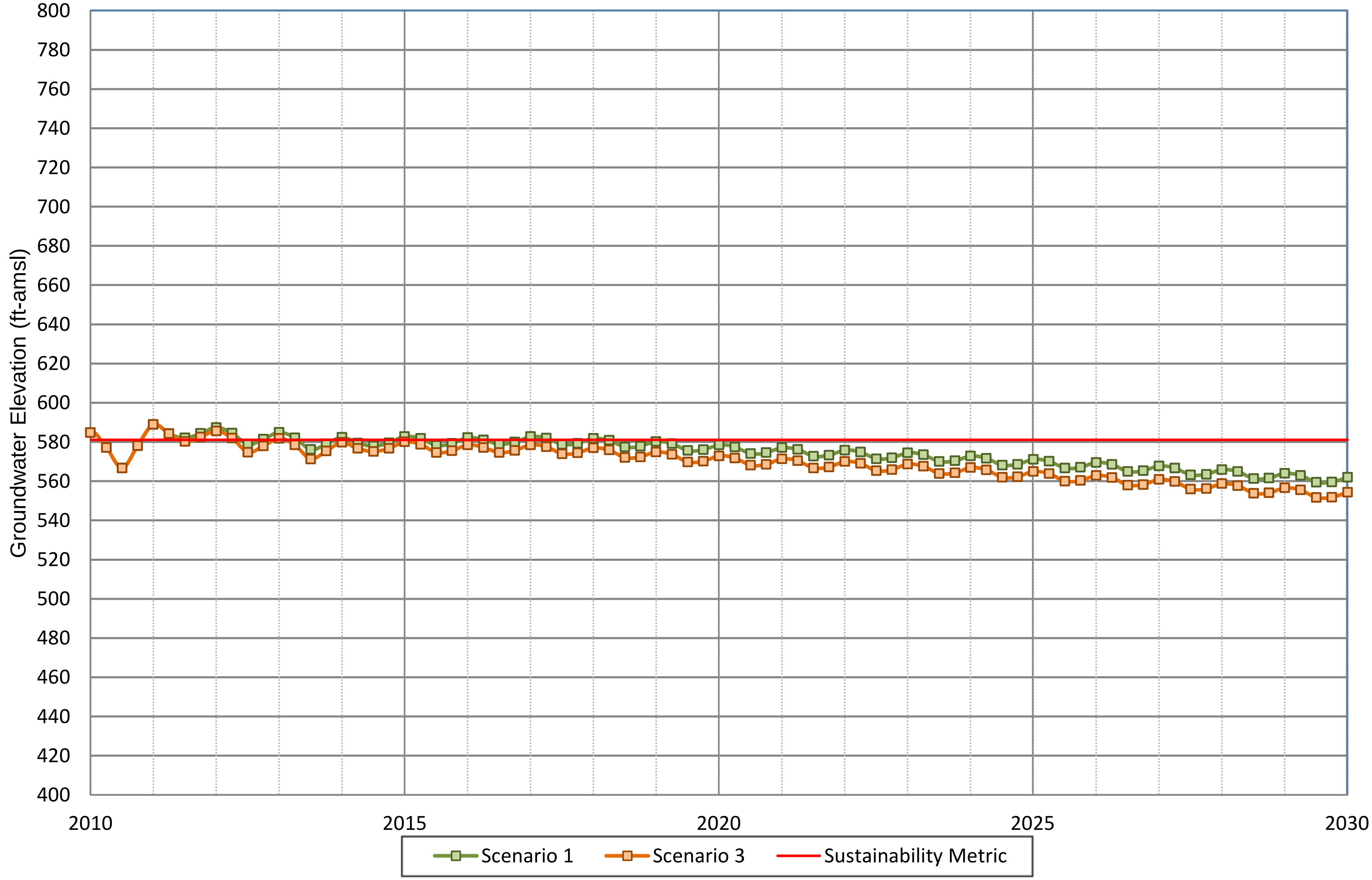
Figure A-52
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 8



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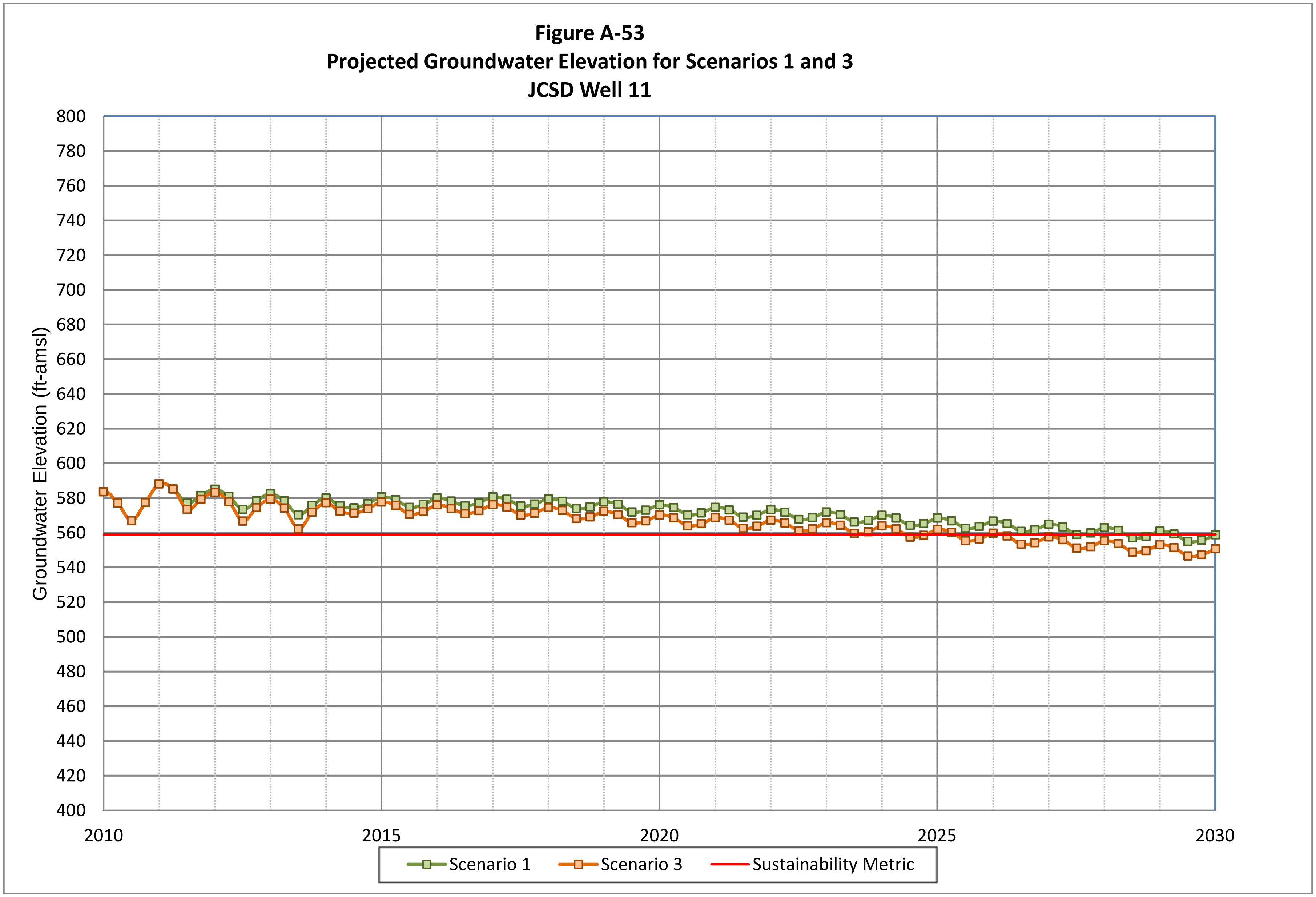

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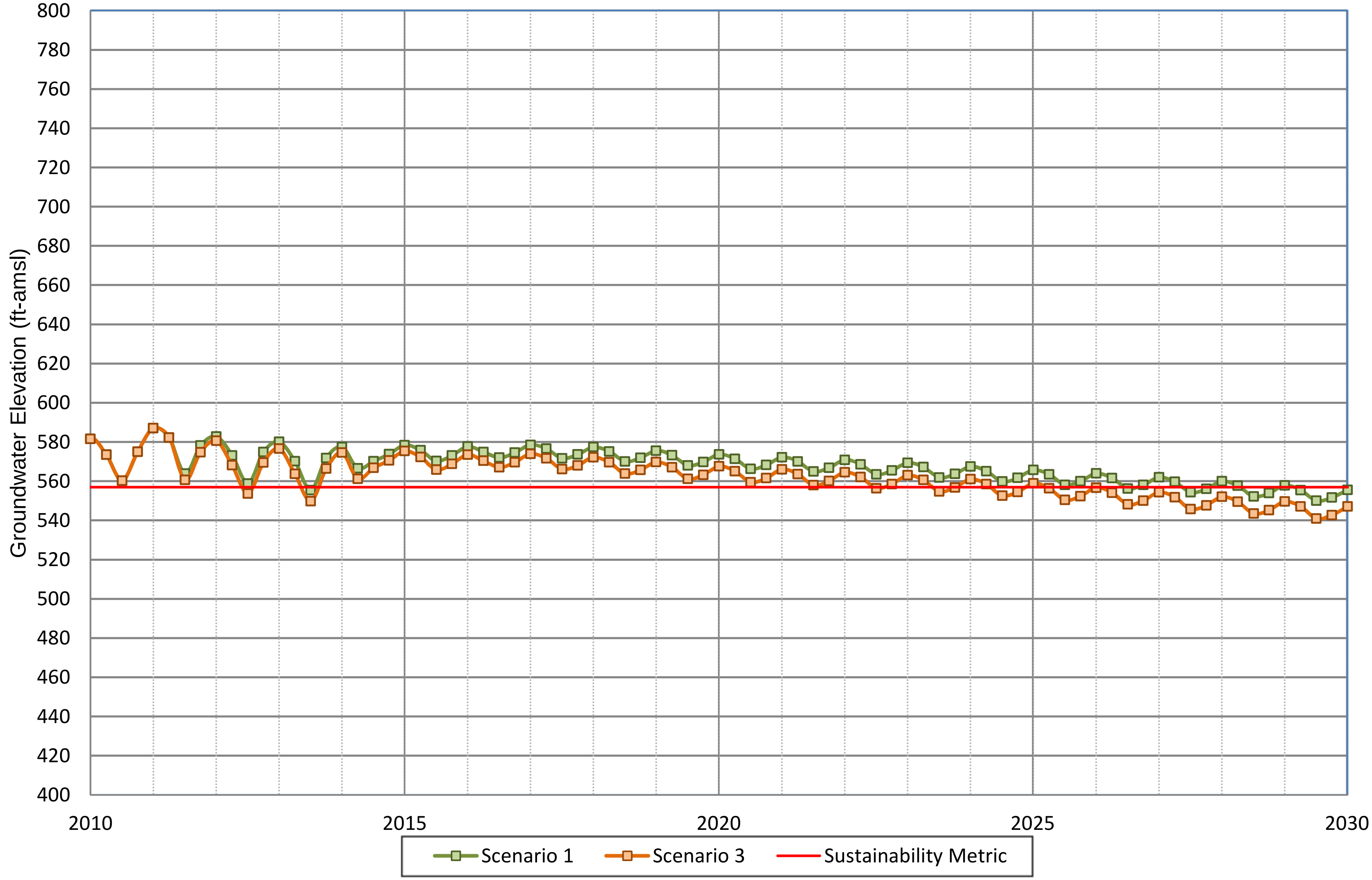
Figure A-54
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 12



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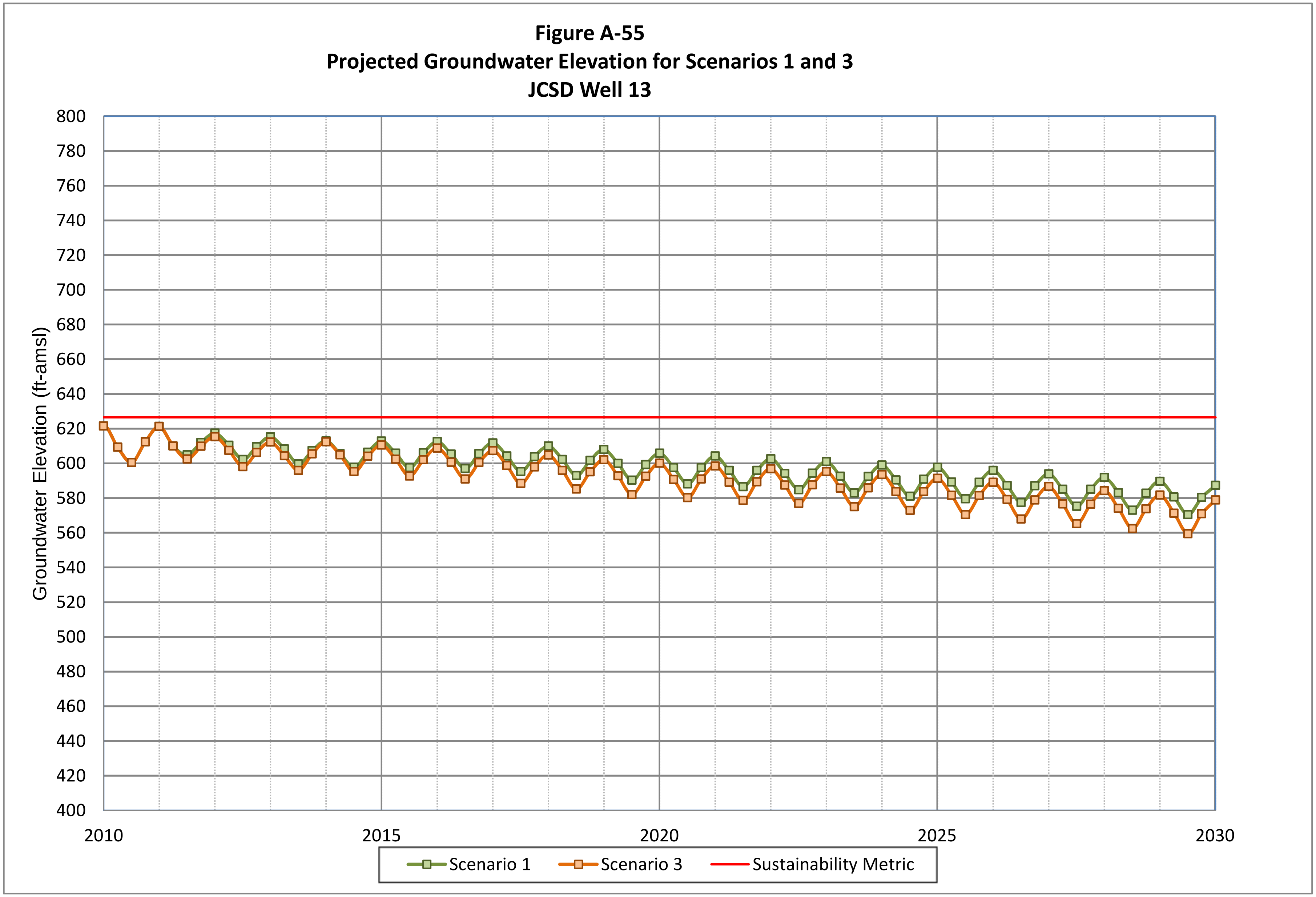
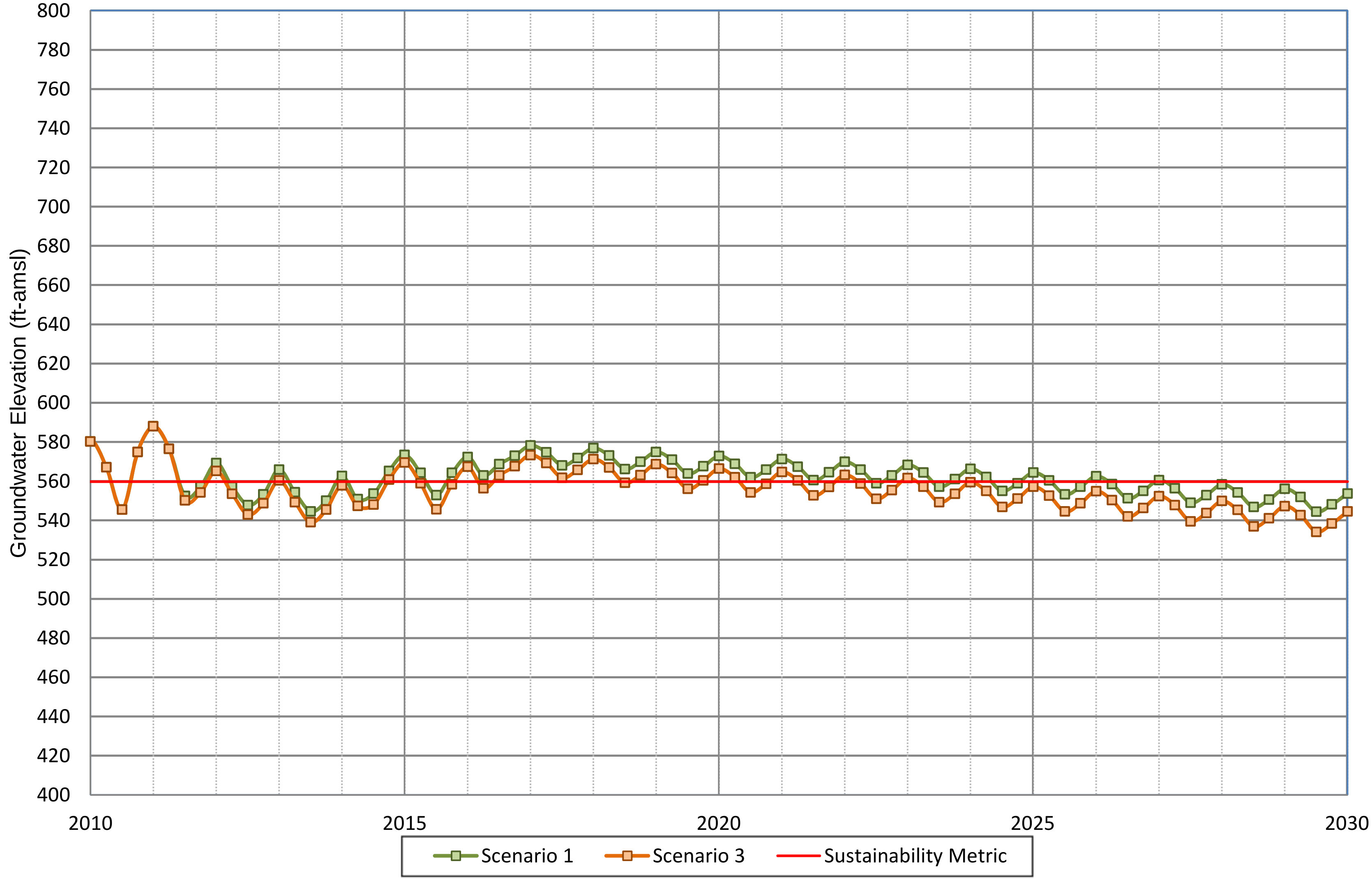
WILDERMUTH ENVIRONMENTAL INC.



20120503_Projected_Hydrographs.xlsx

Figure A-56
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 14



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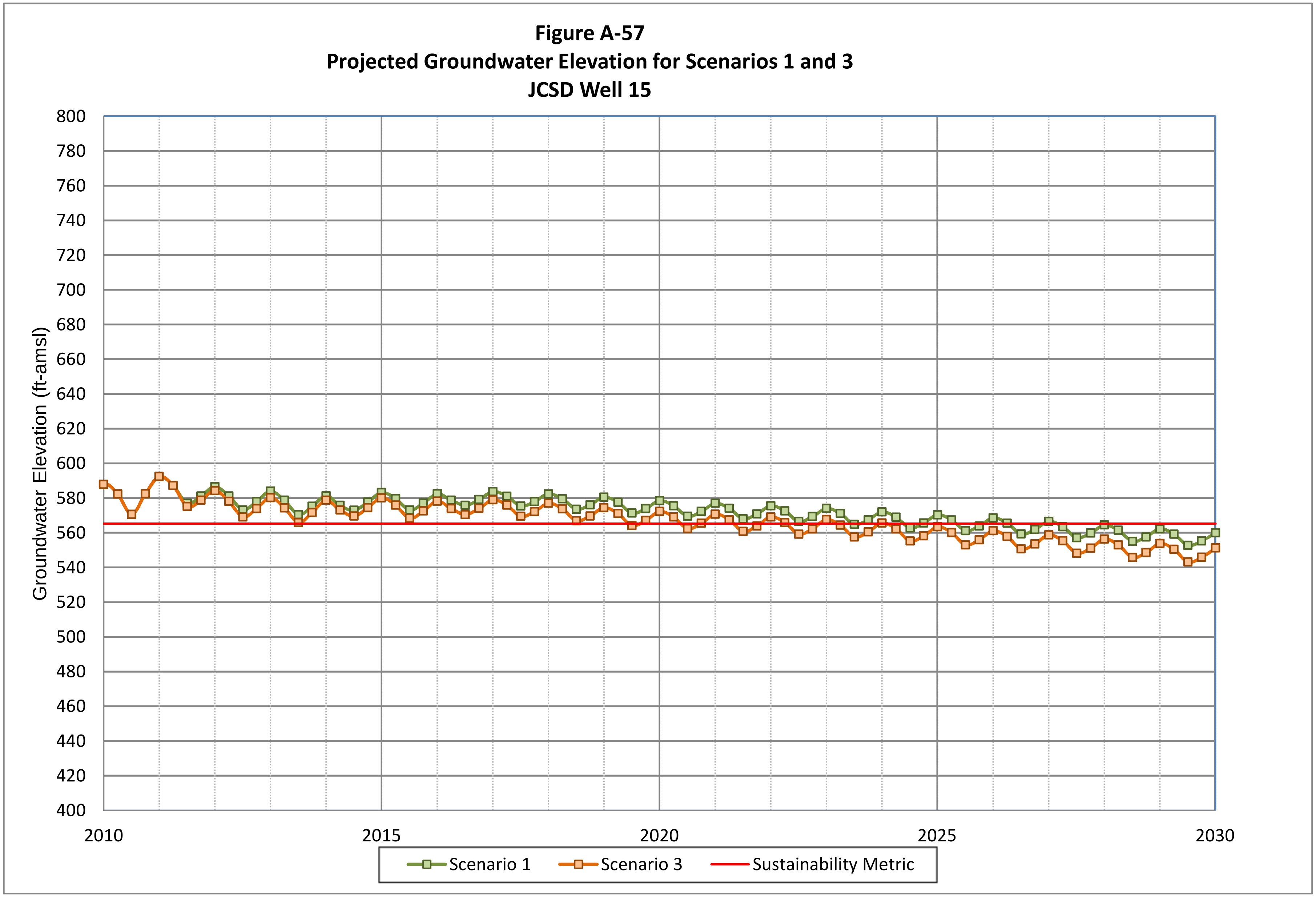
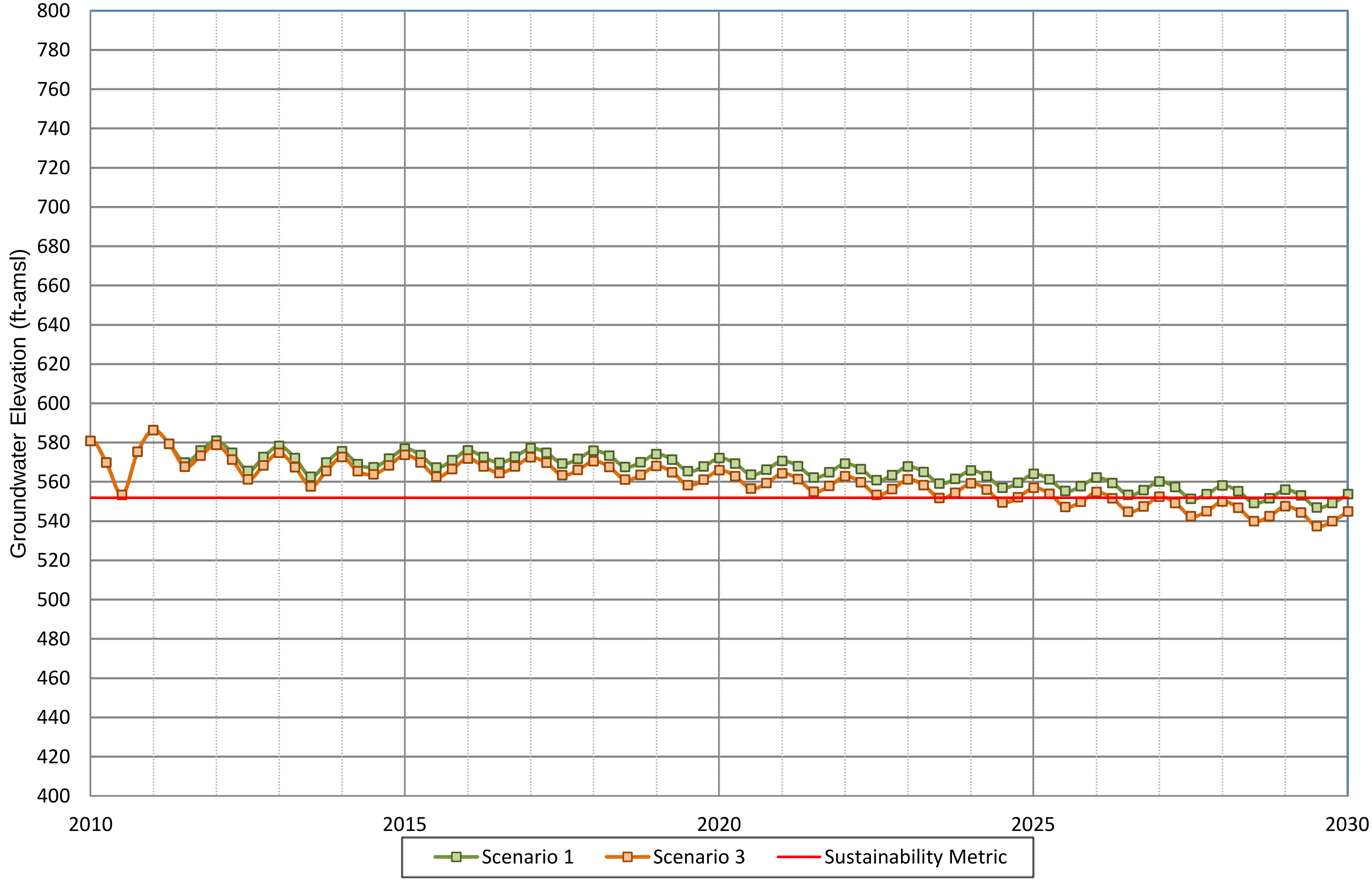


Figure A-57
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 15
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric

Figure A-58
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 16



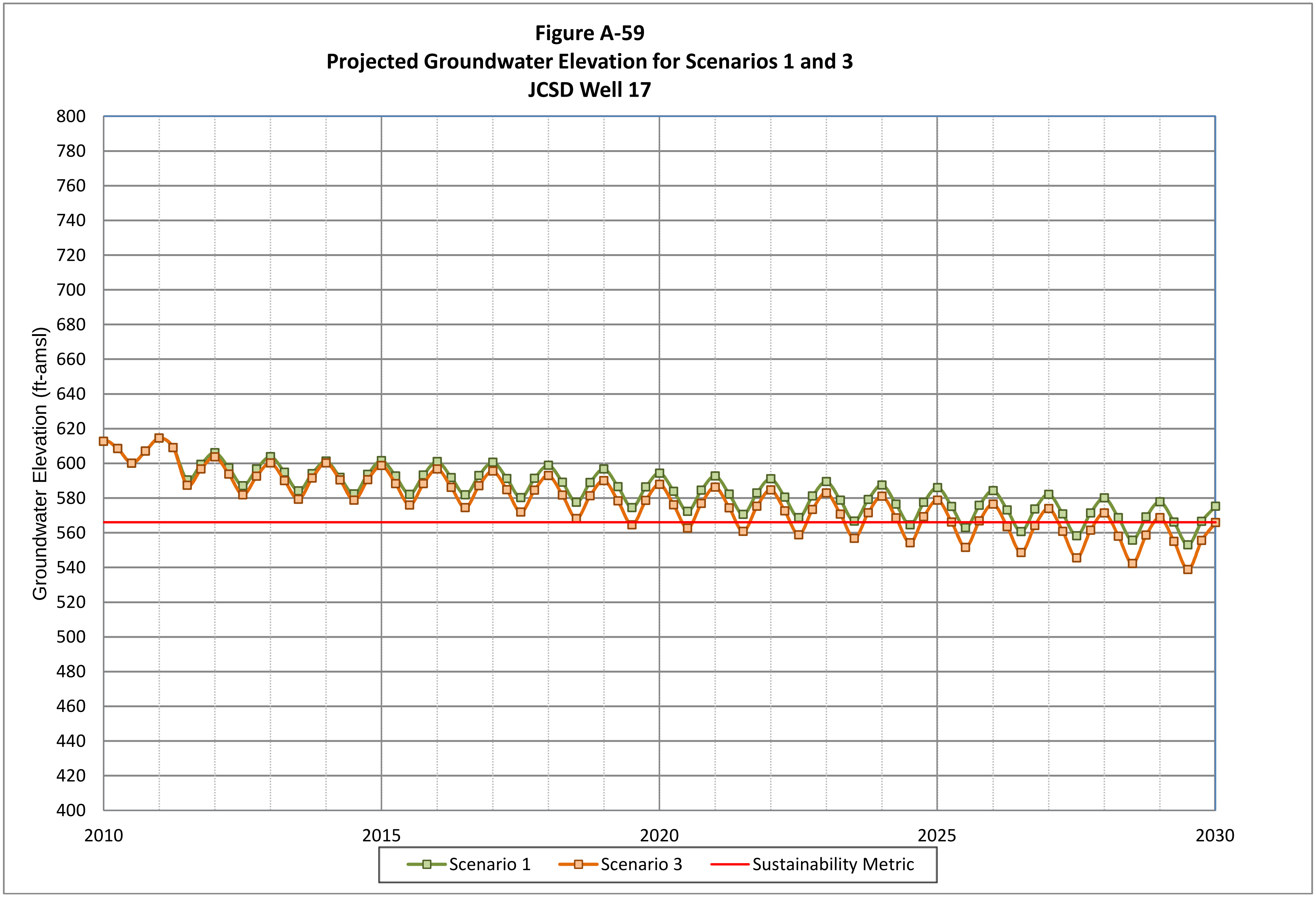
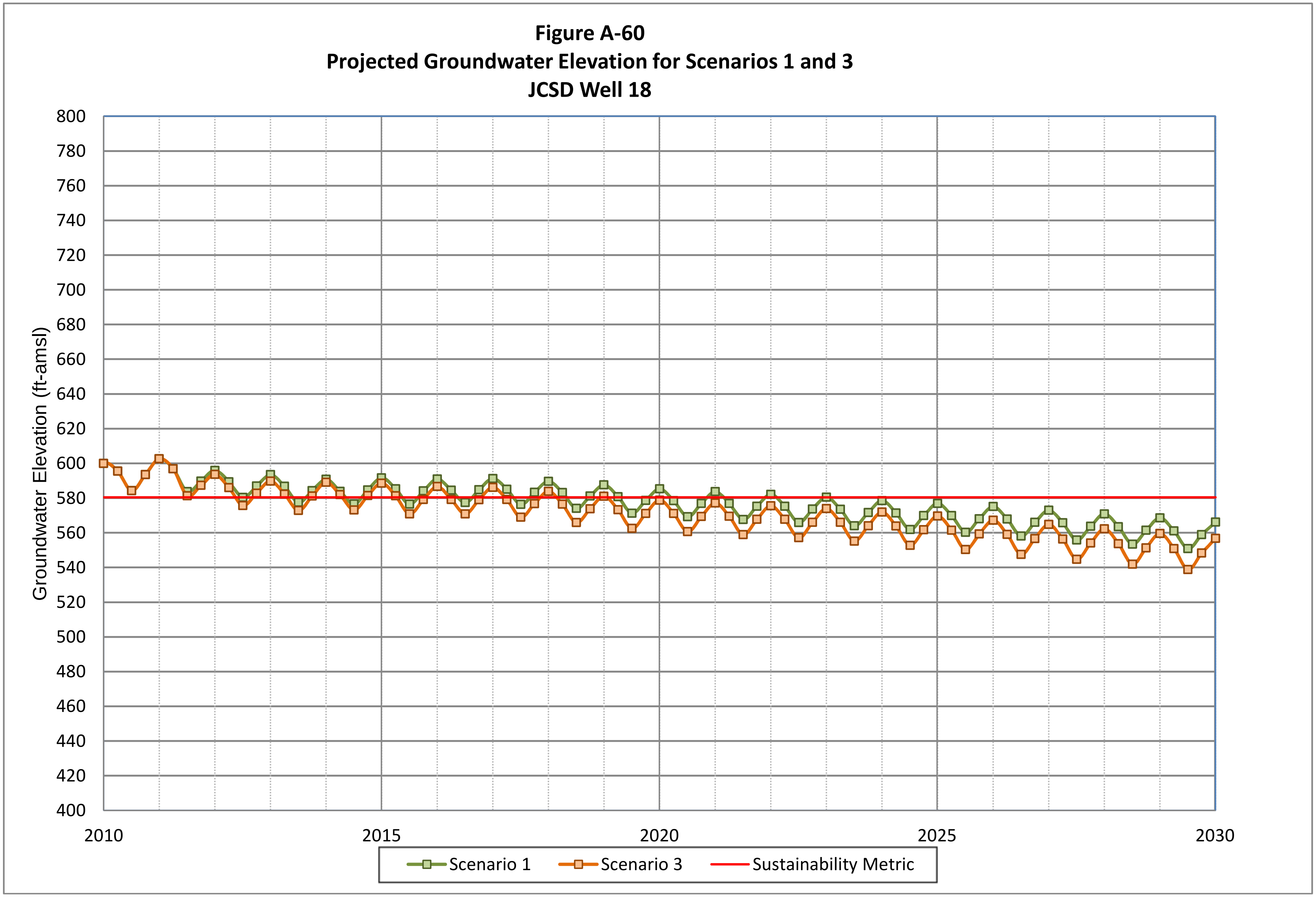


Figure A-59
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 17
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



20120503_Projected_Hydrographs.xlsx

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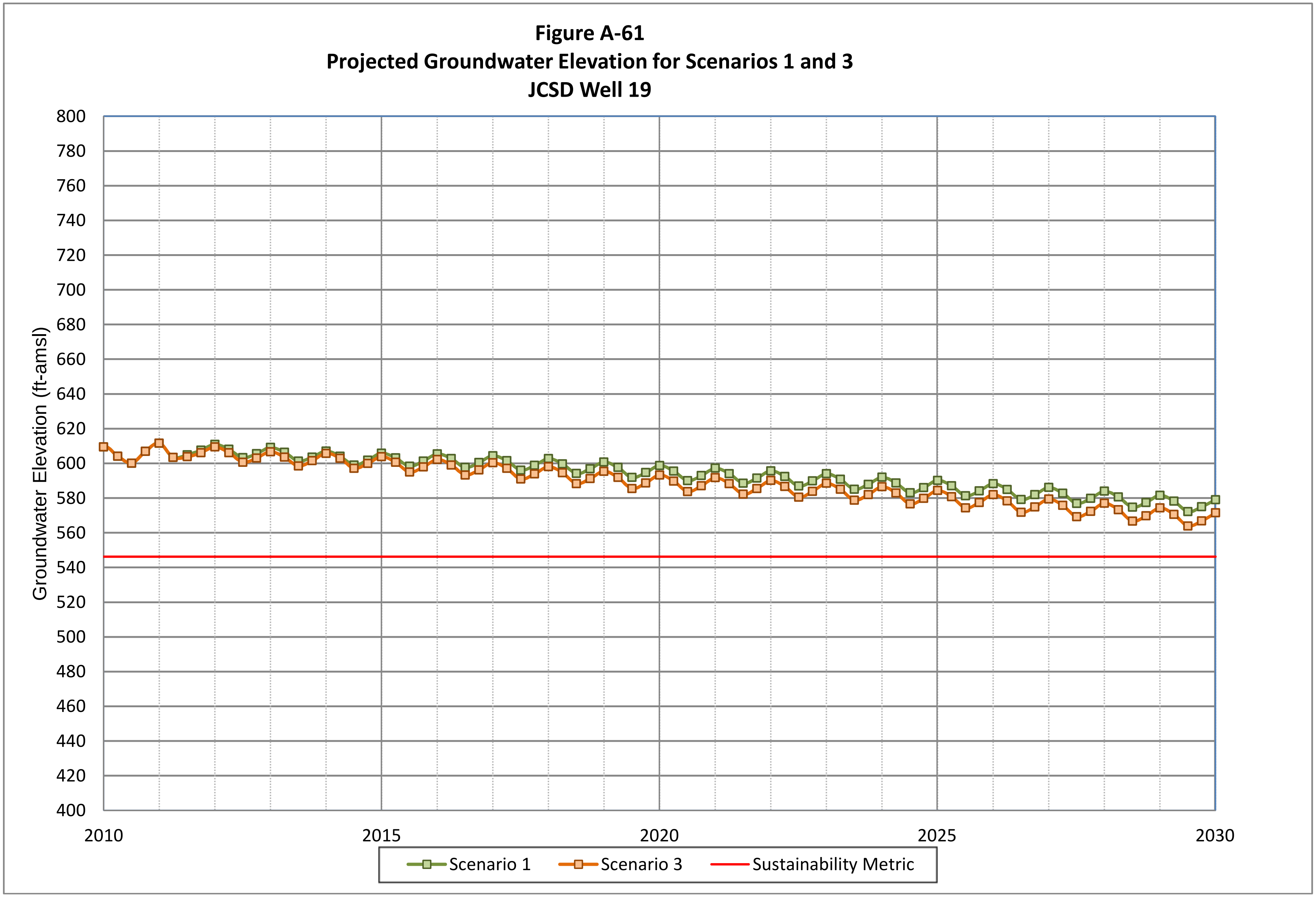

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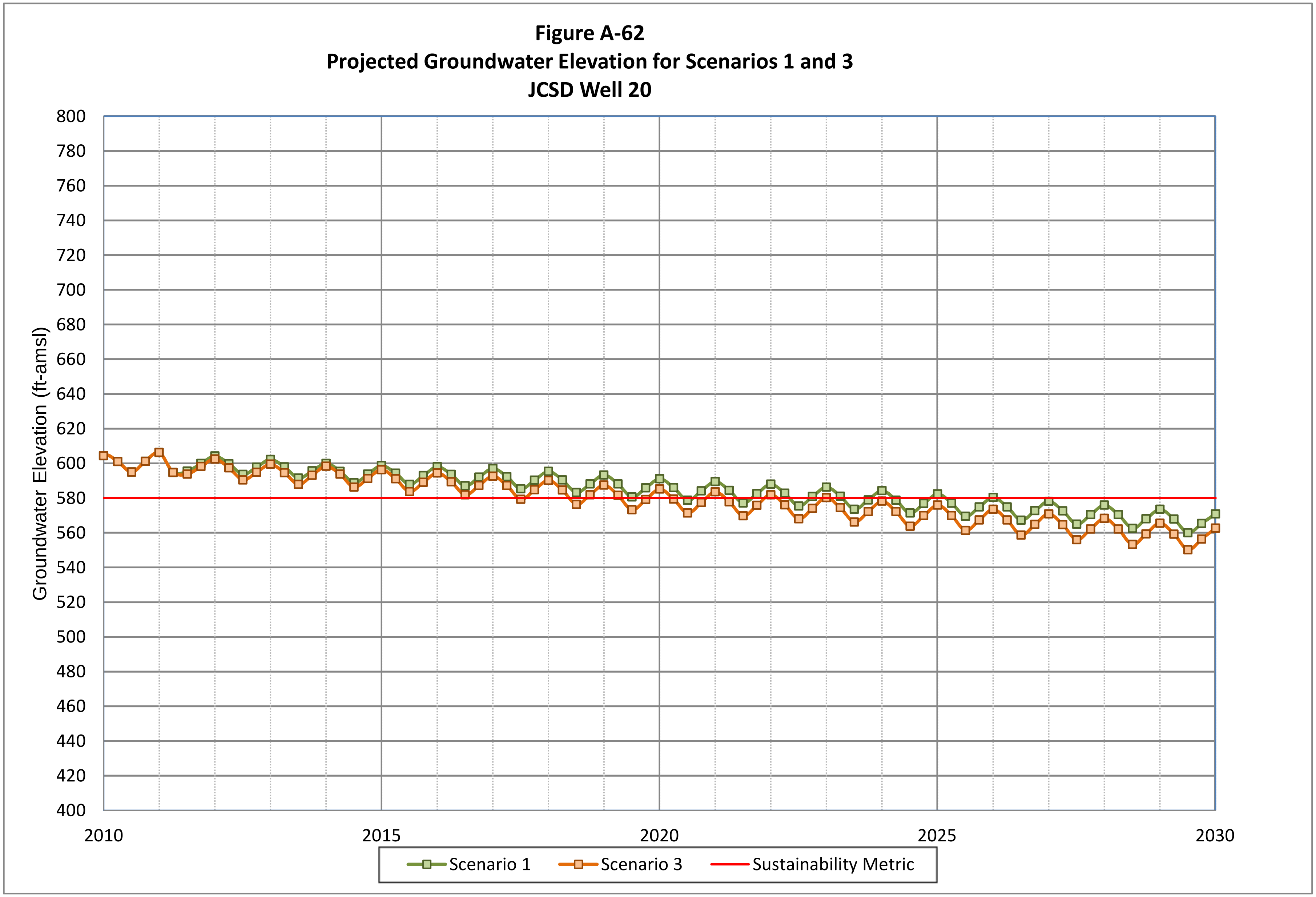

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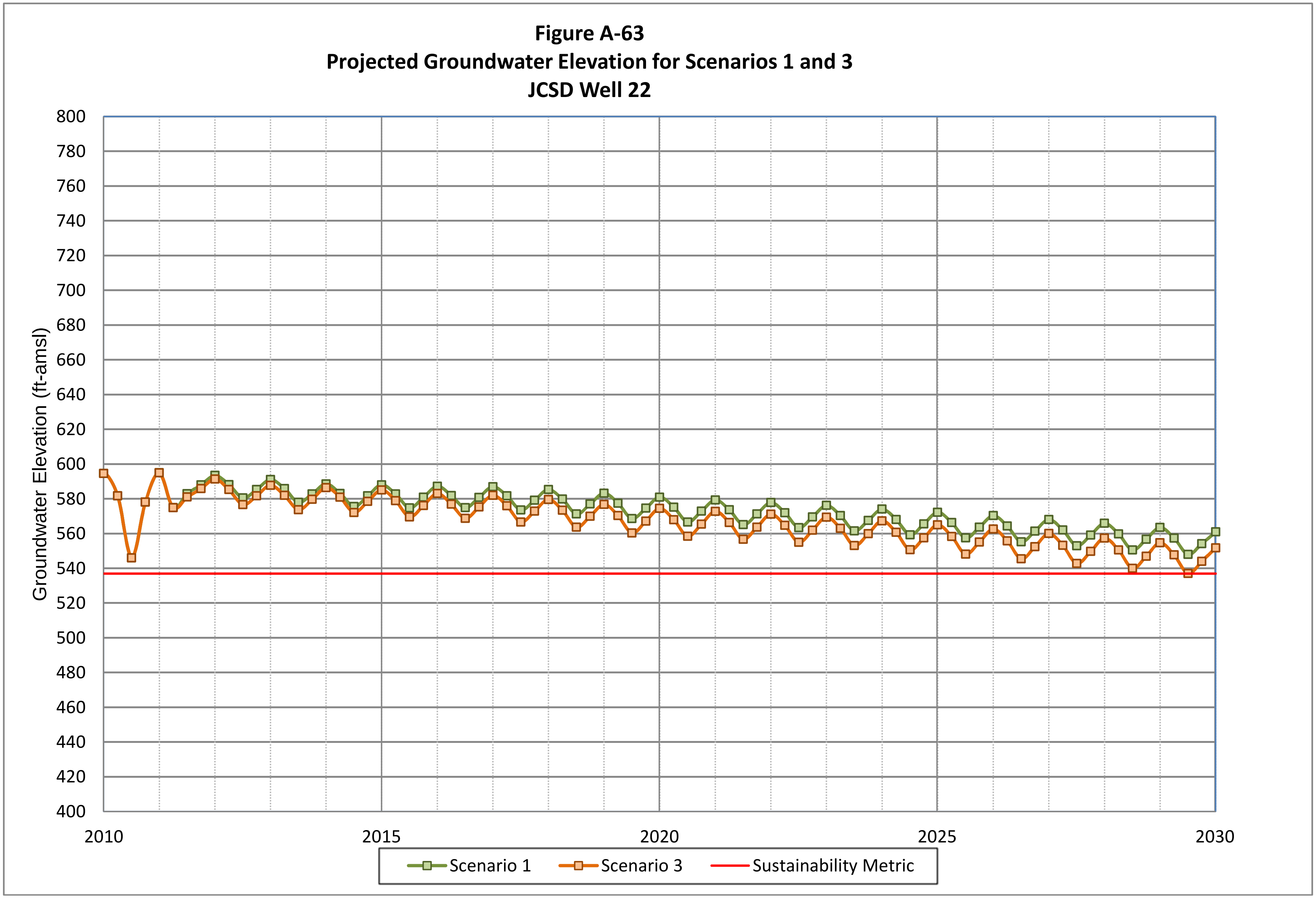

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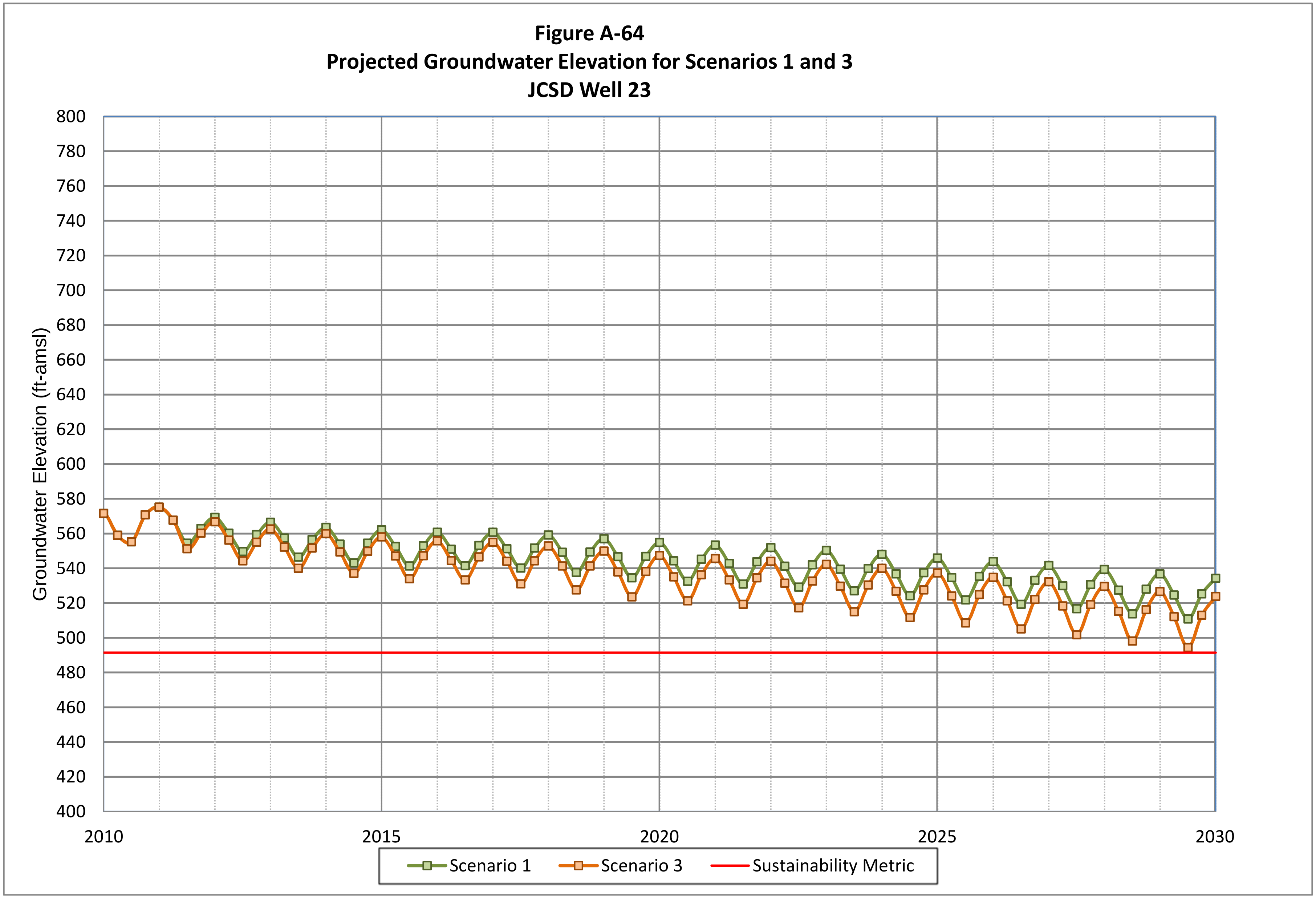

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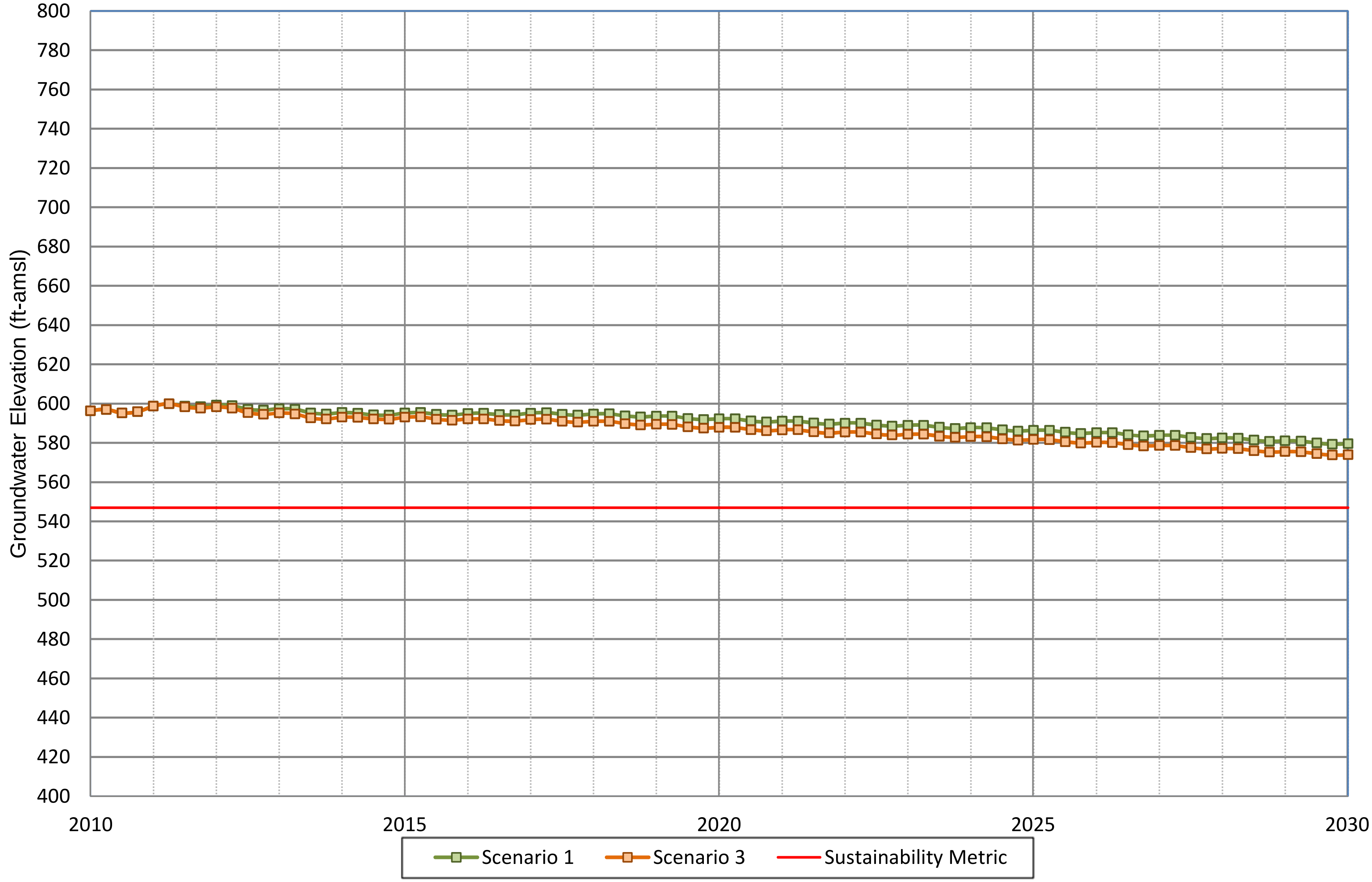
Figure A-65
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well 24



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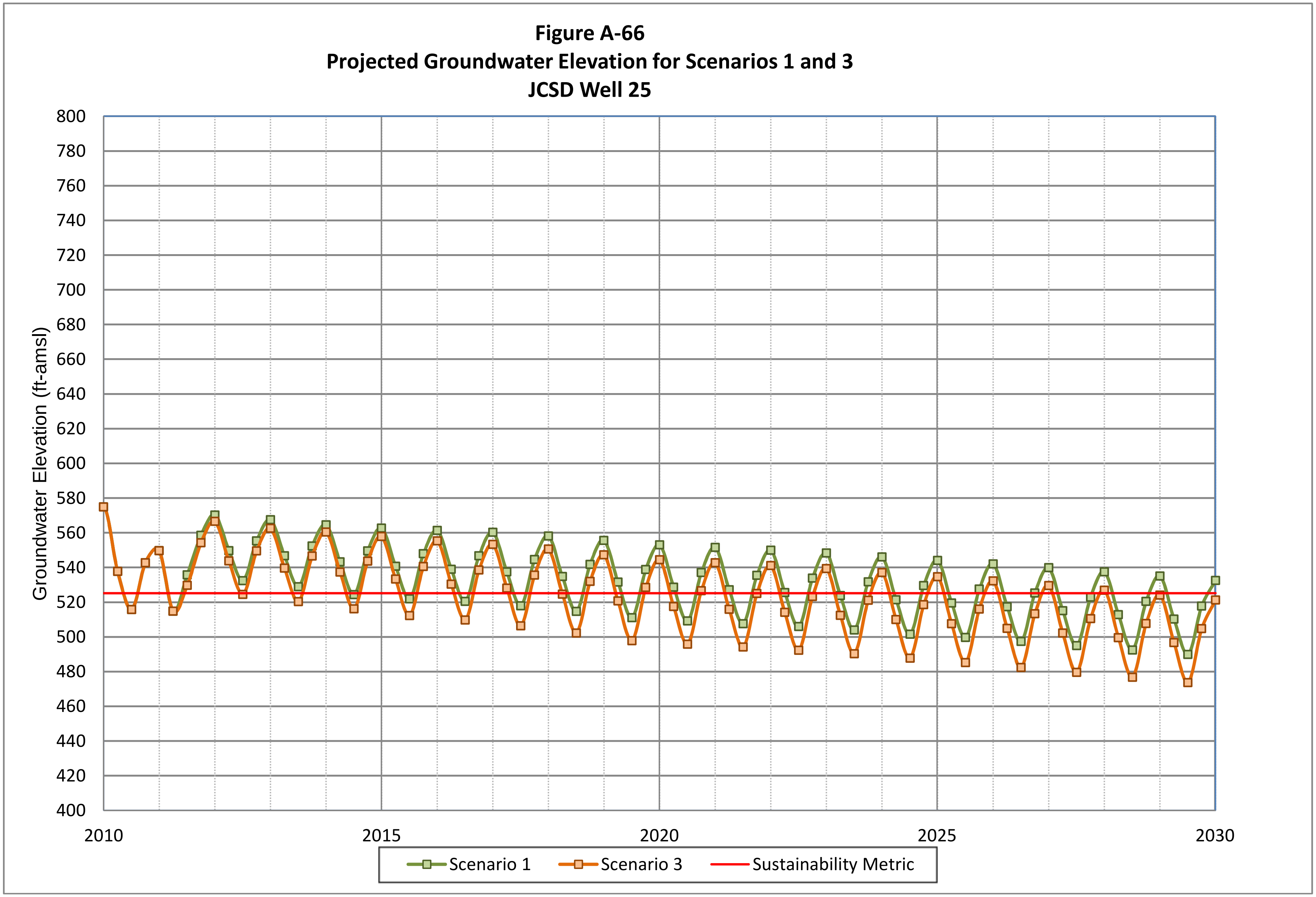
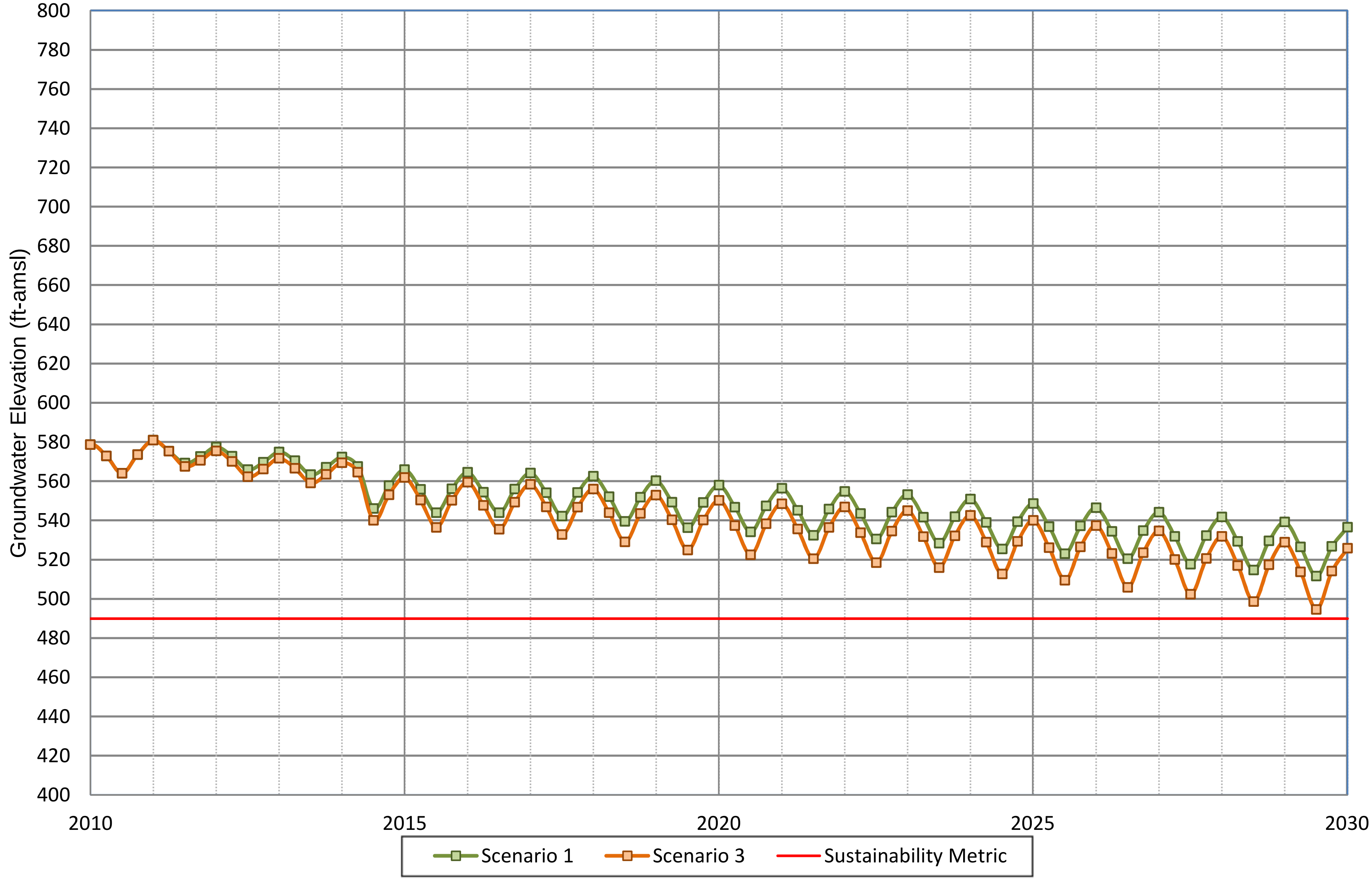


20120503_Projected_Hydrographs.xlsx

Figure A-67
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well Galleano



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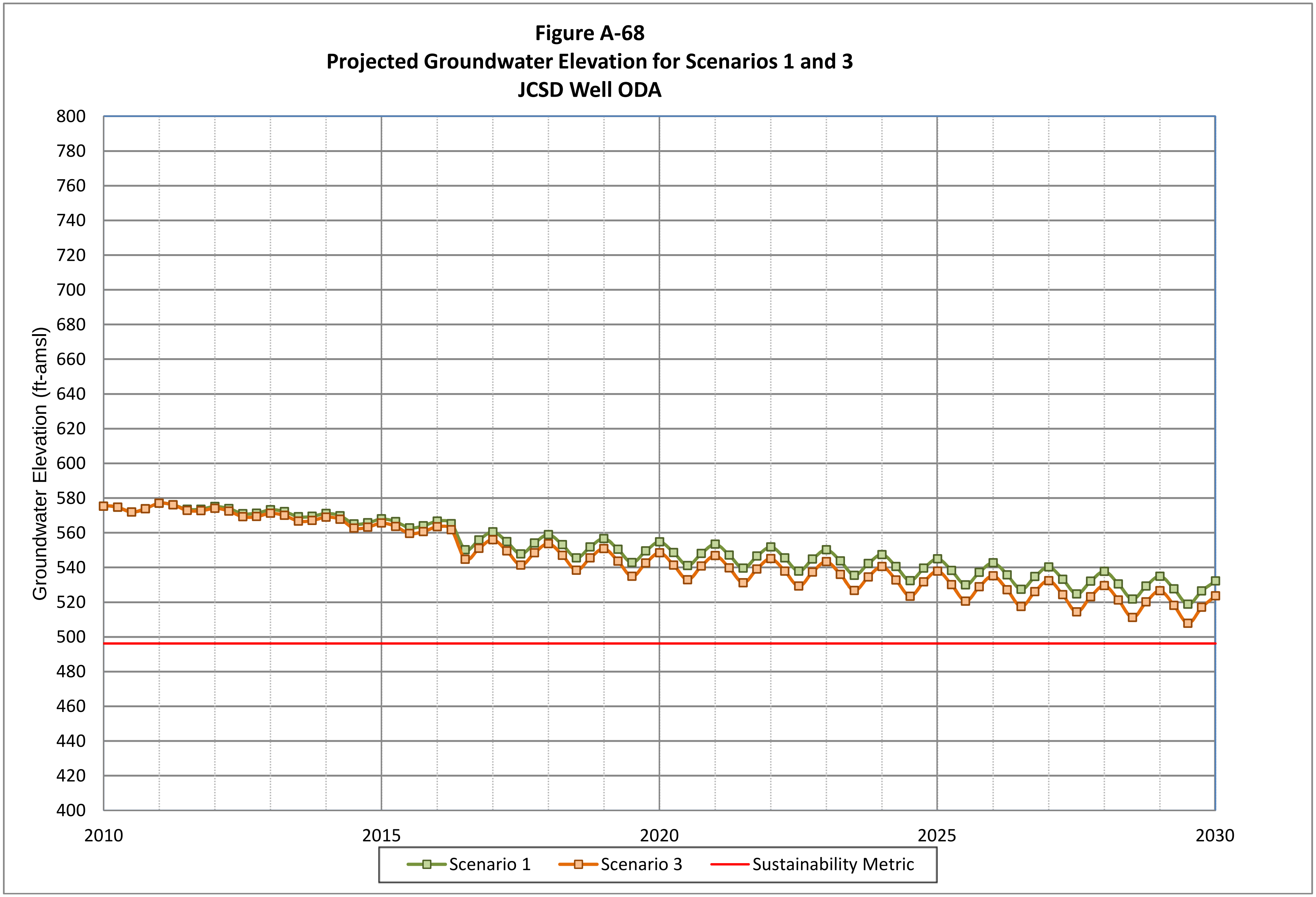
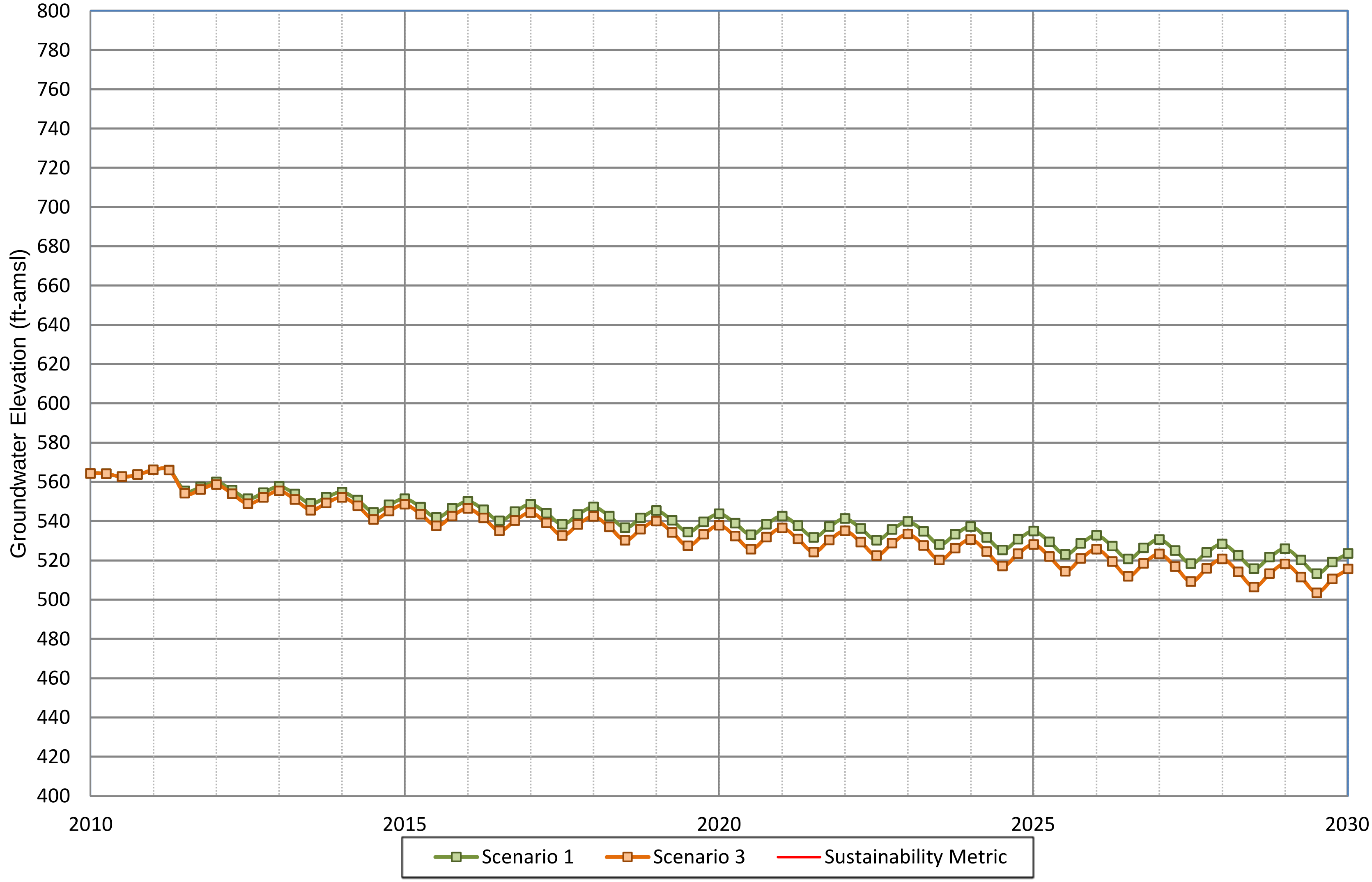
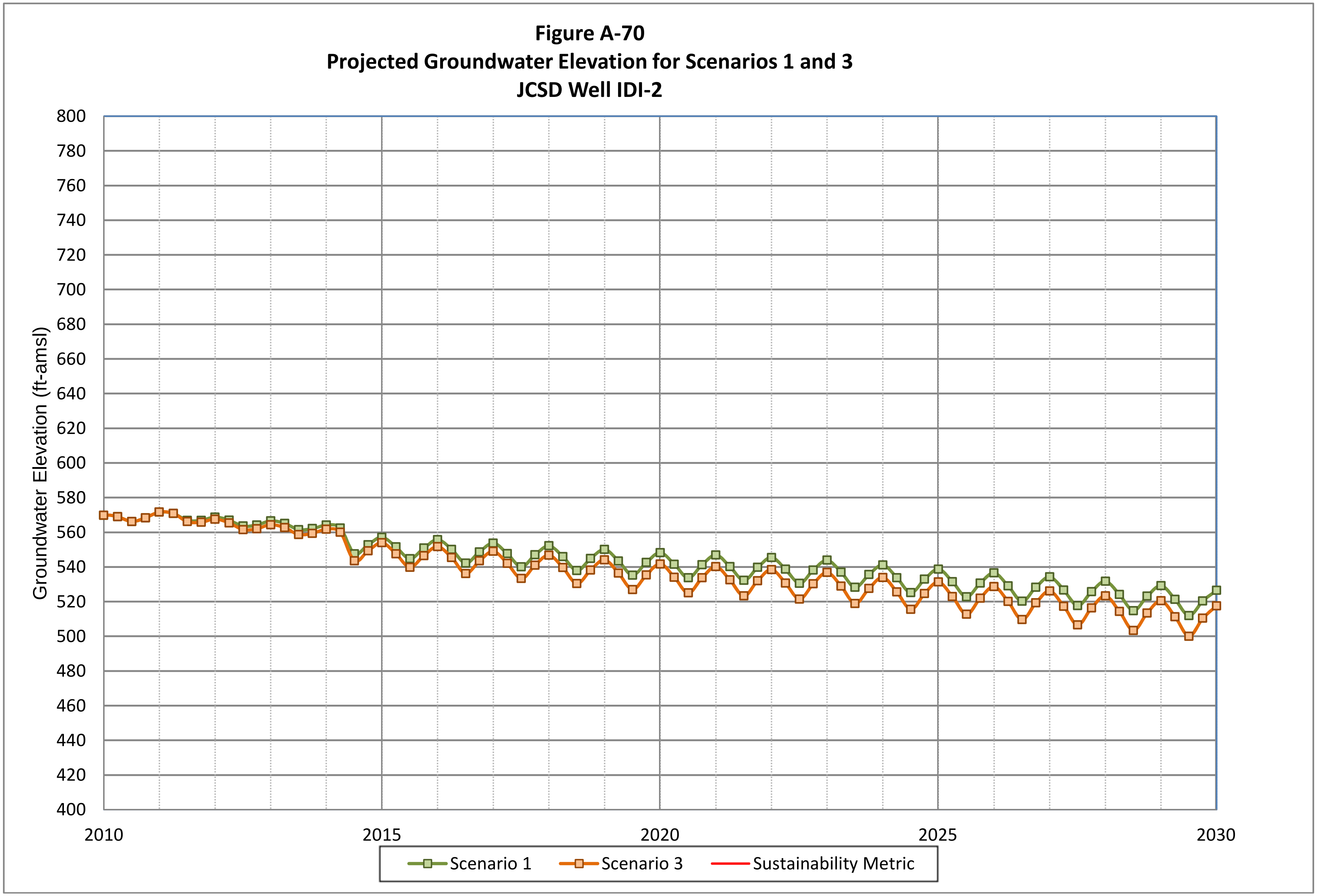


20120503_Projected_Hydrographs.xlsx

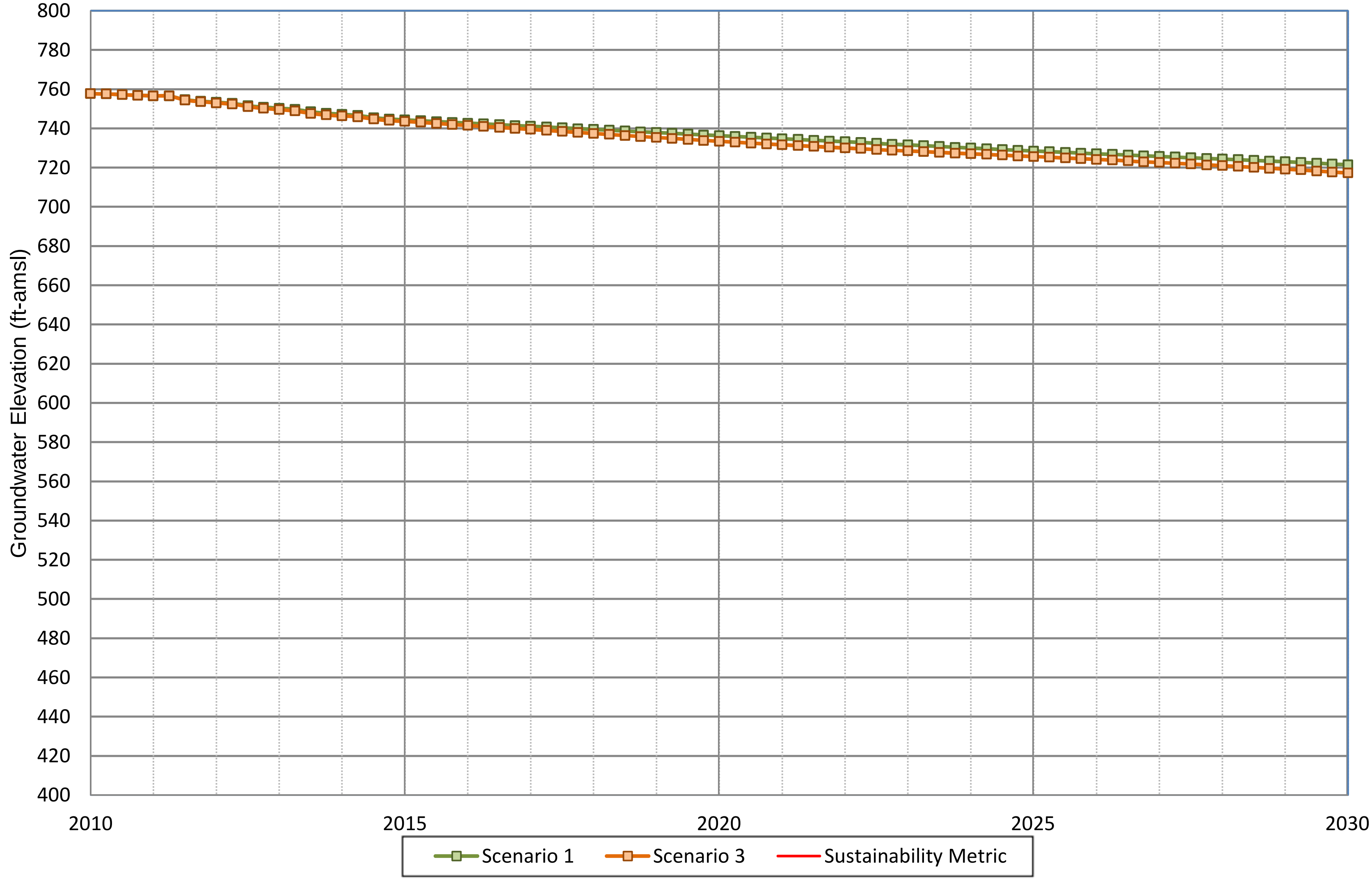
Figure A-69
Projected Groundwater Elevation for Scenarios 1 and 3
JCSD Well IDI-1





20120503_Projected_Hydrographs.xlsx

Figure A-71
Projected Groundwater Elevation for Scenarios 1 and 3
MMWC Well 2



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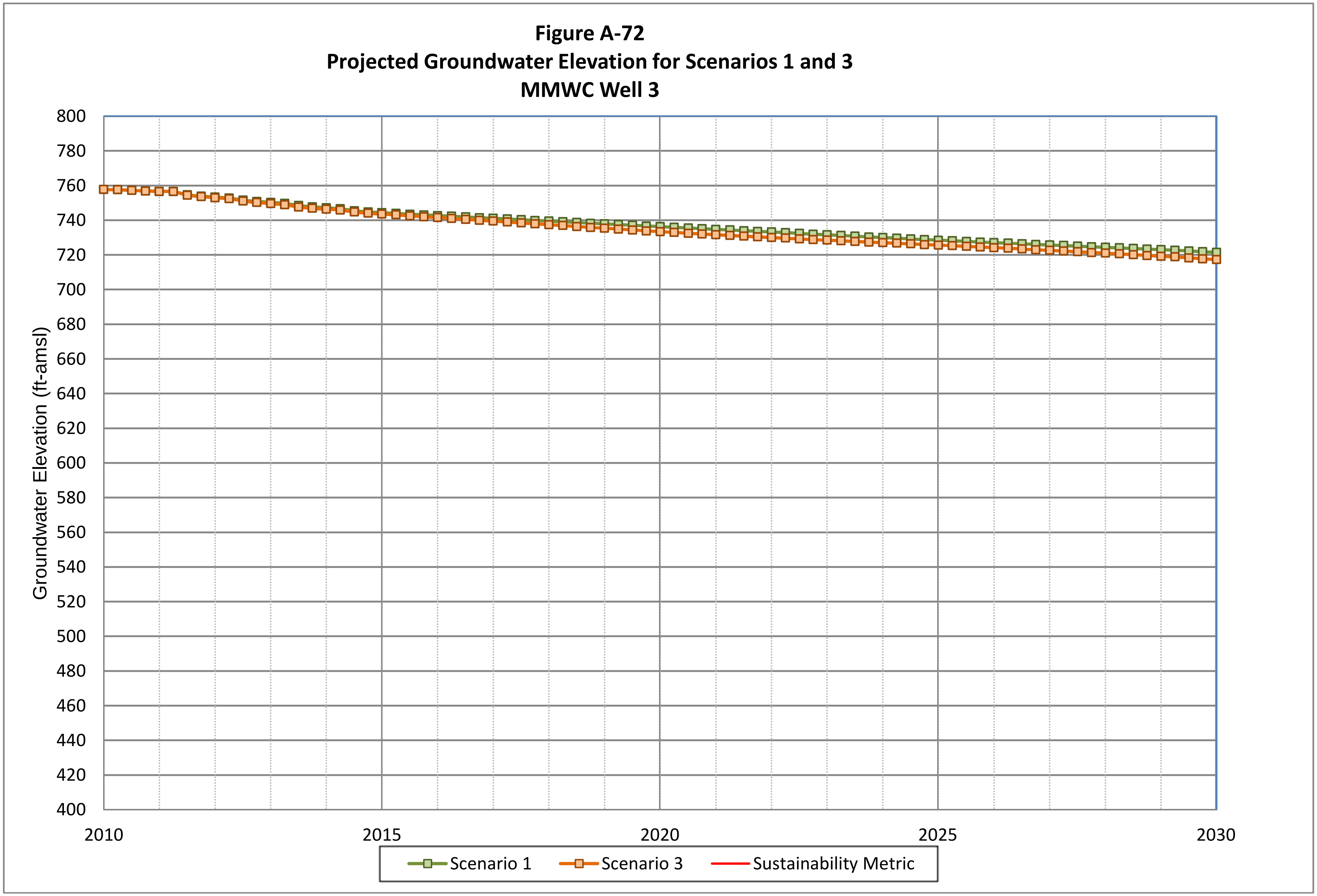

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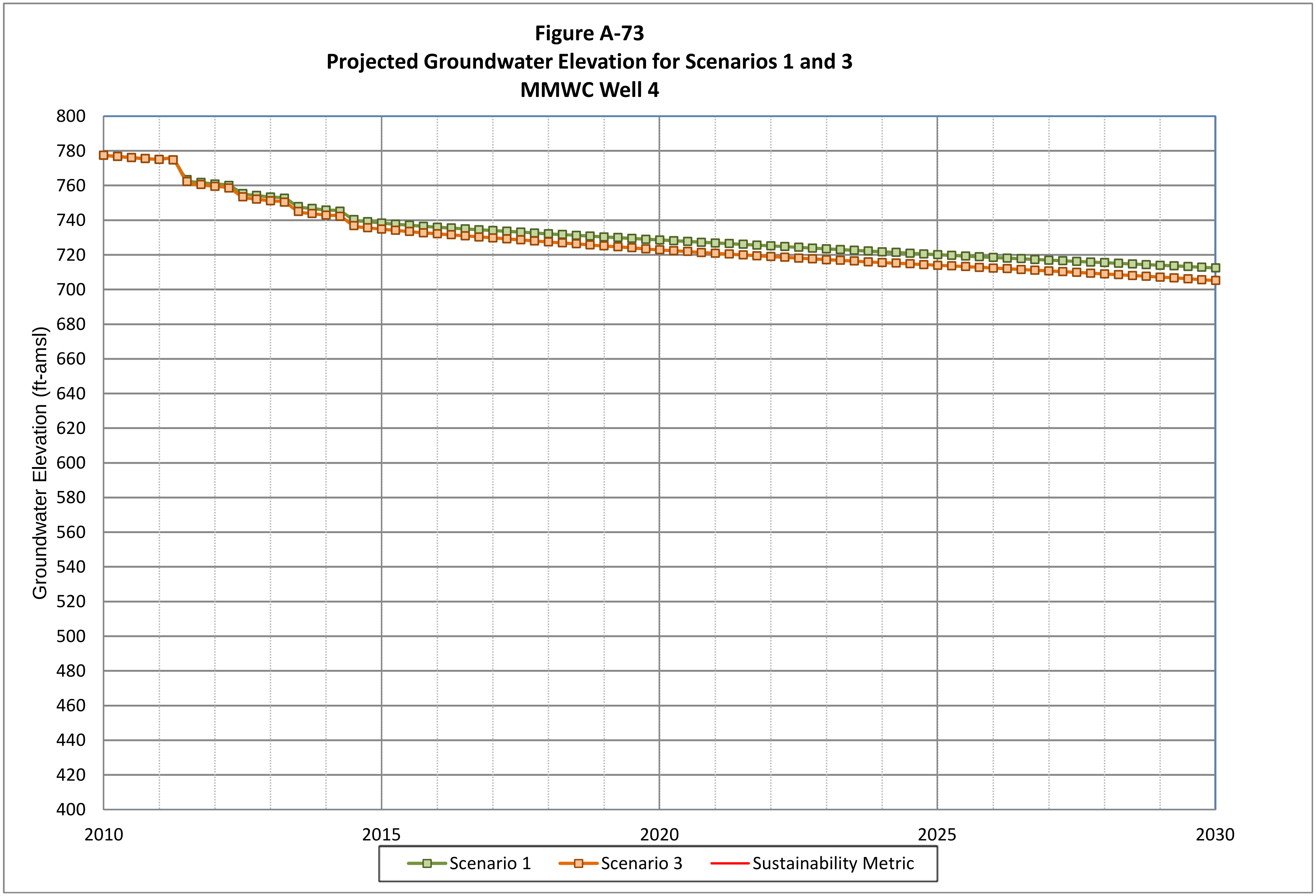

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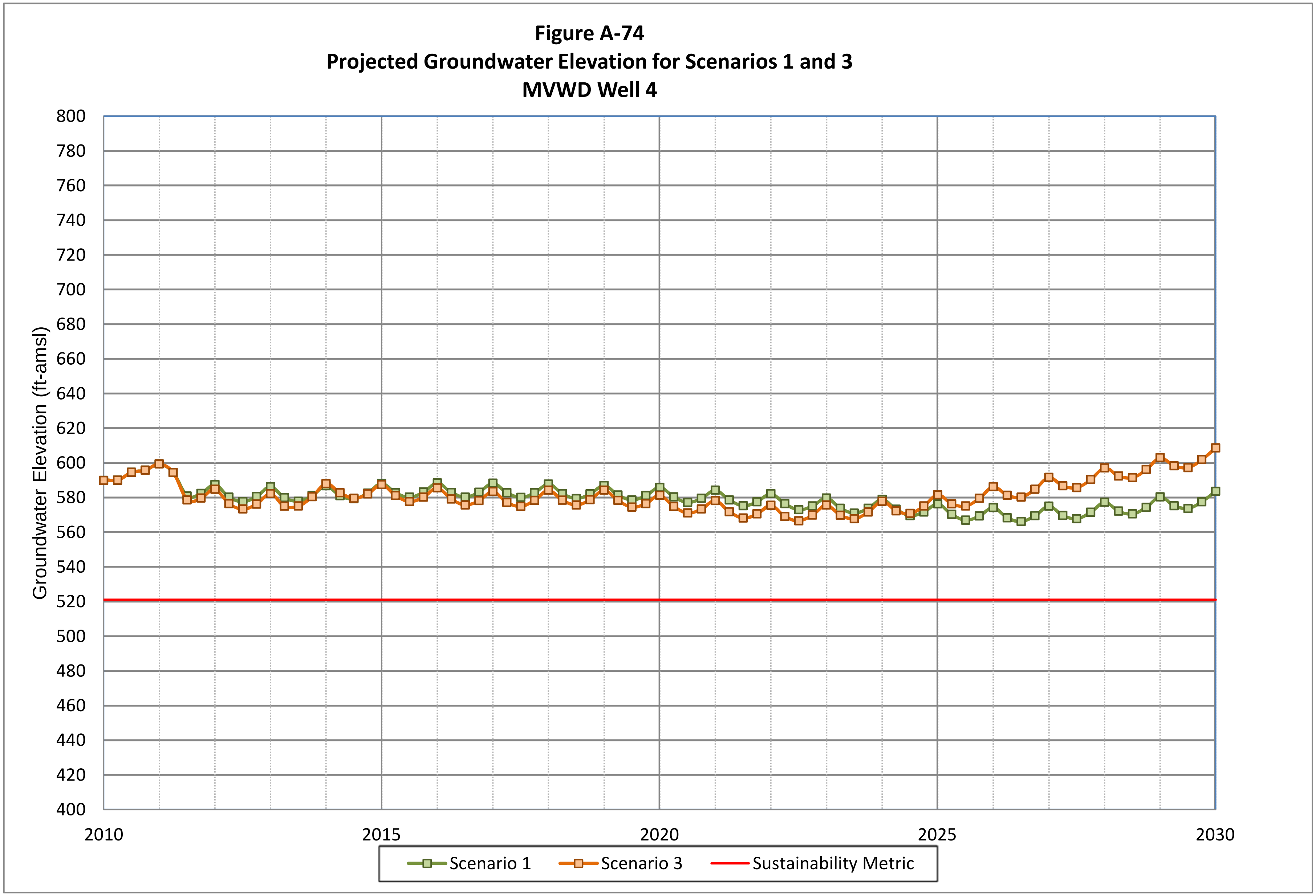

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Figure A-75
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well 5

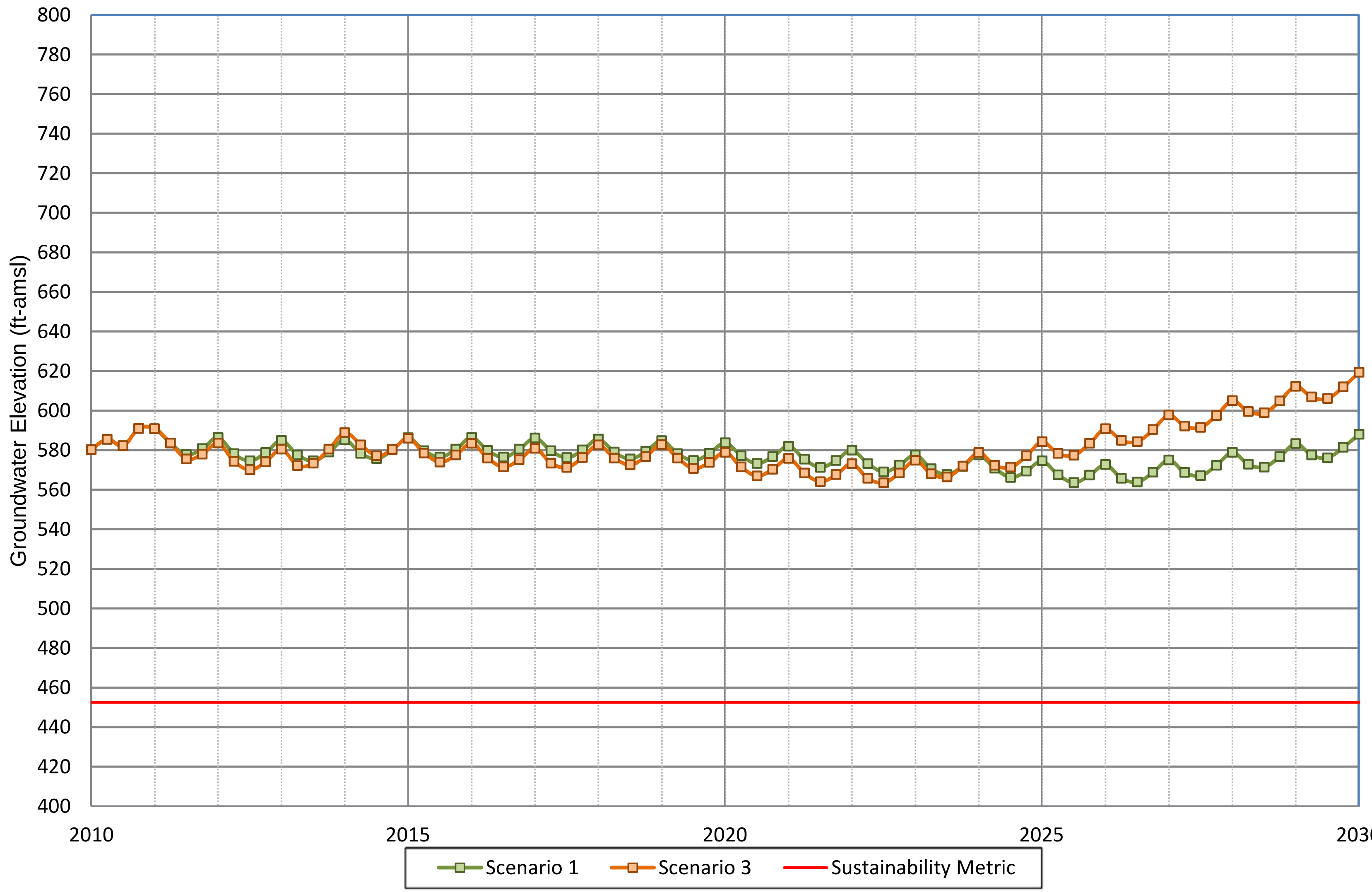
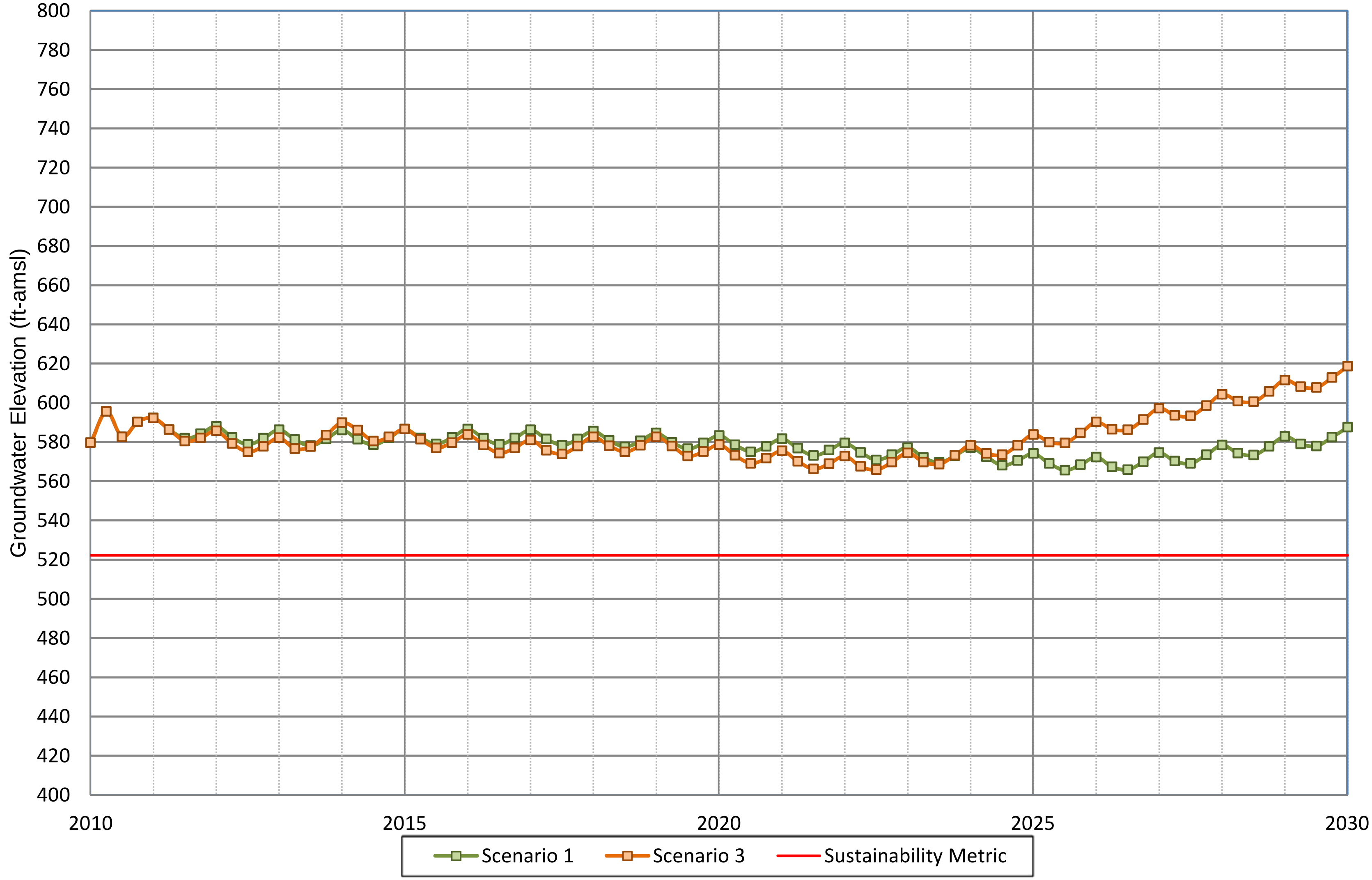


Figure A-76
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well 6



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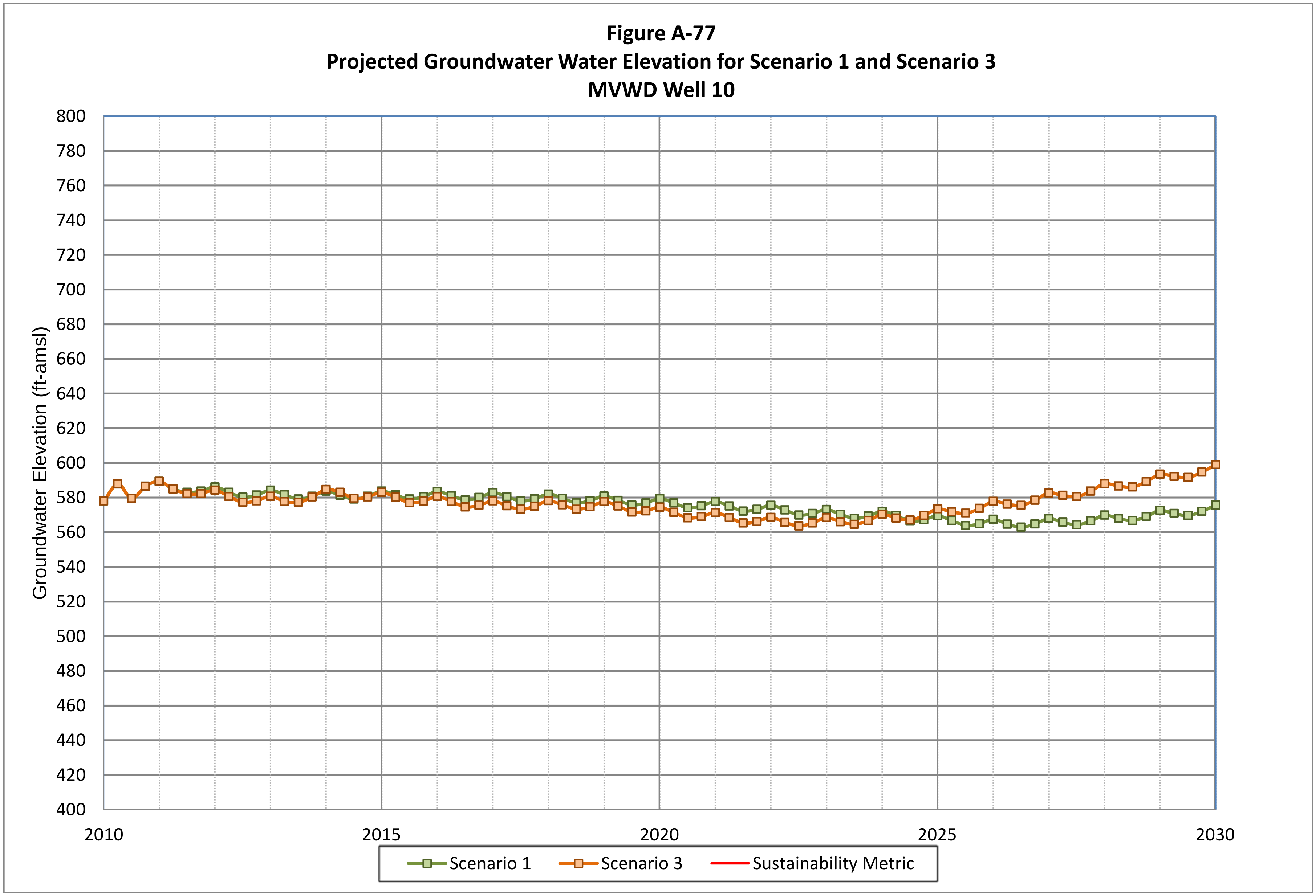

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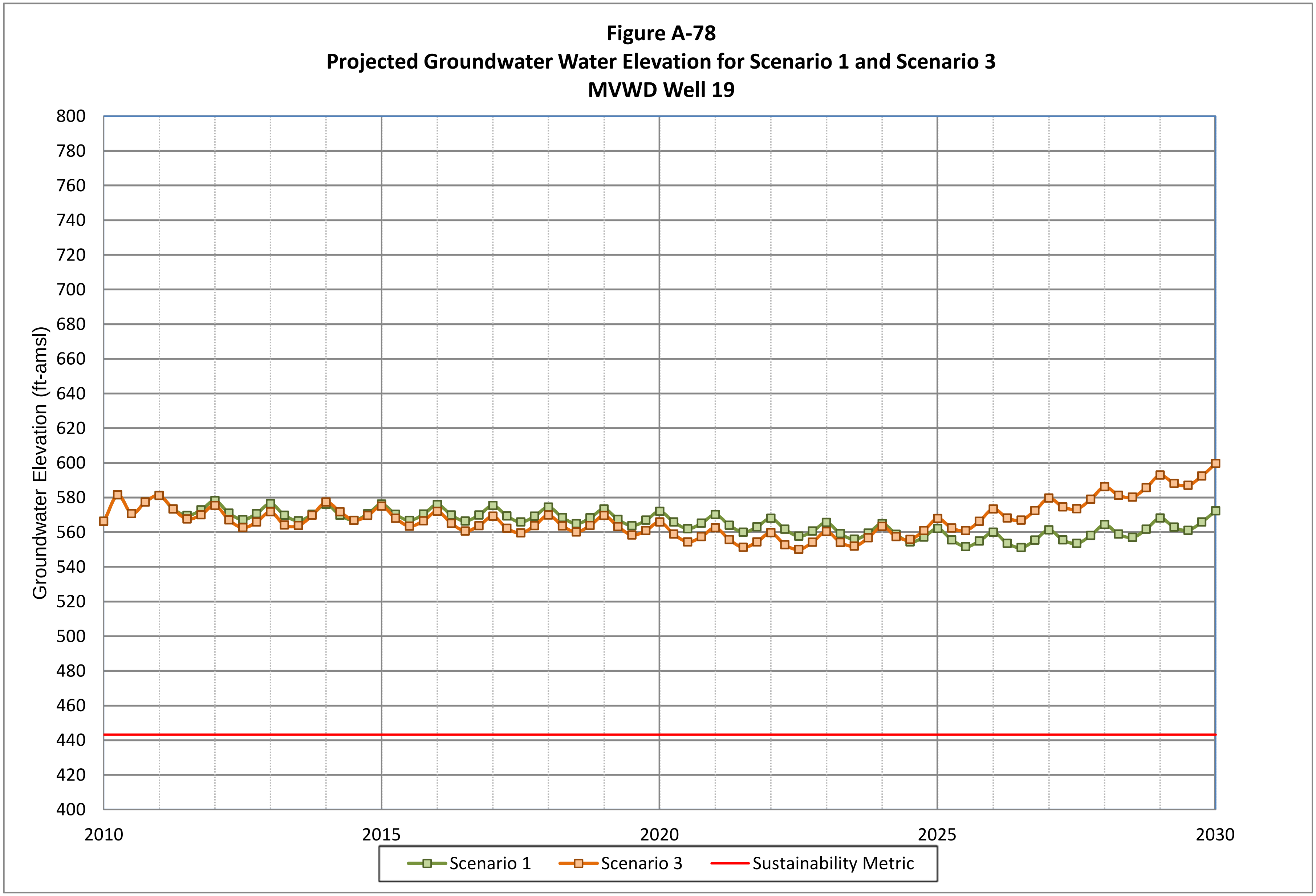

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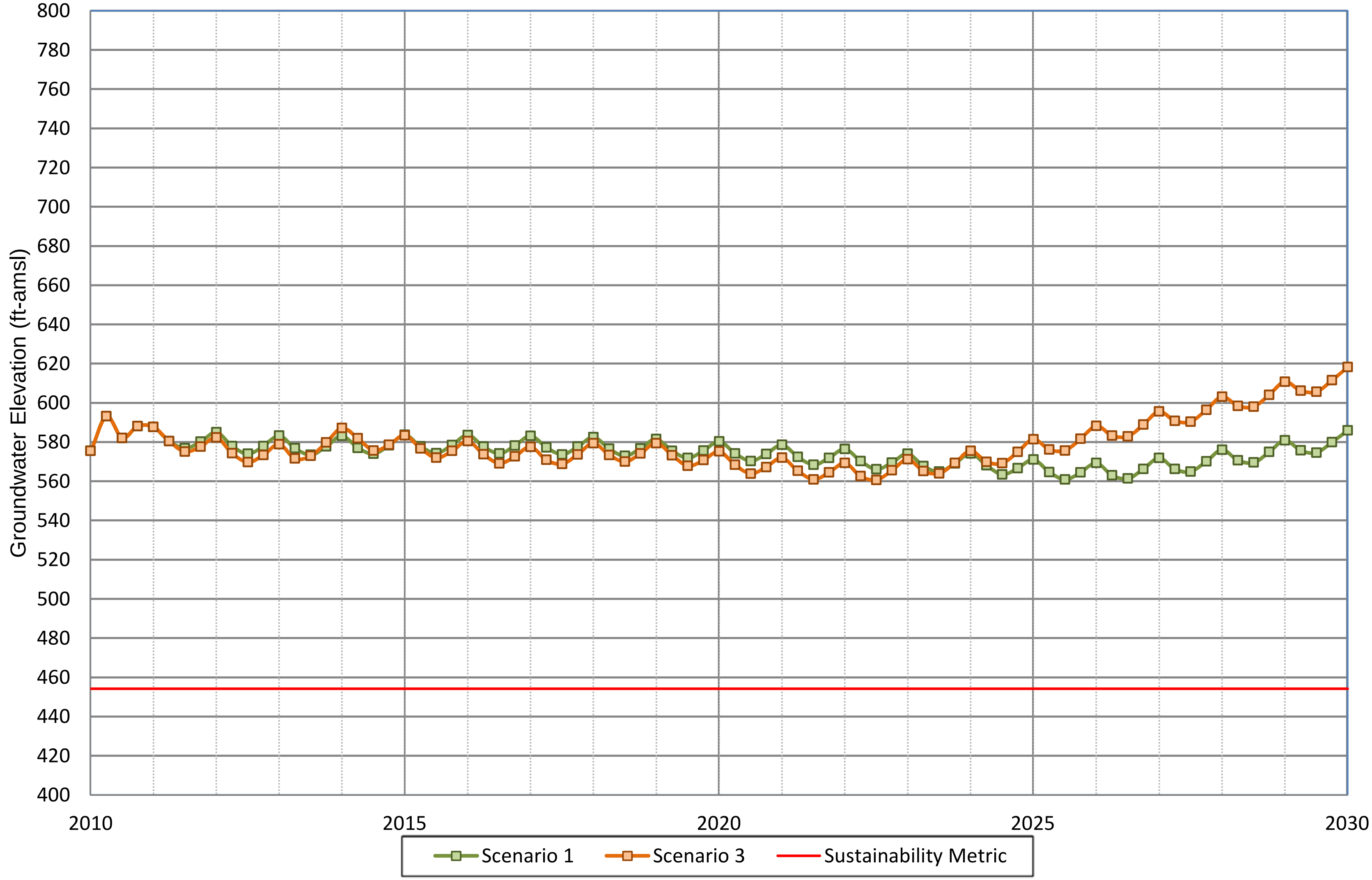
Figure A-79
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well 26



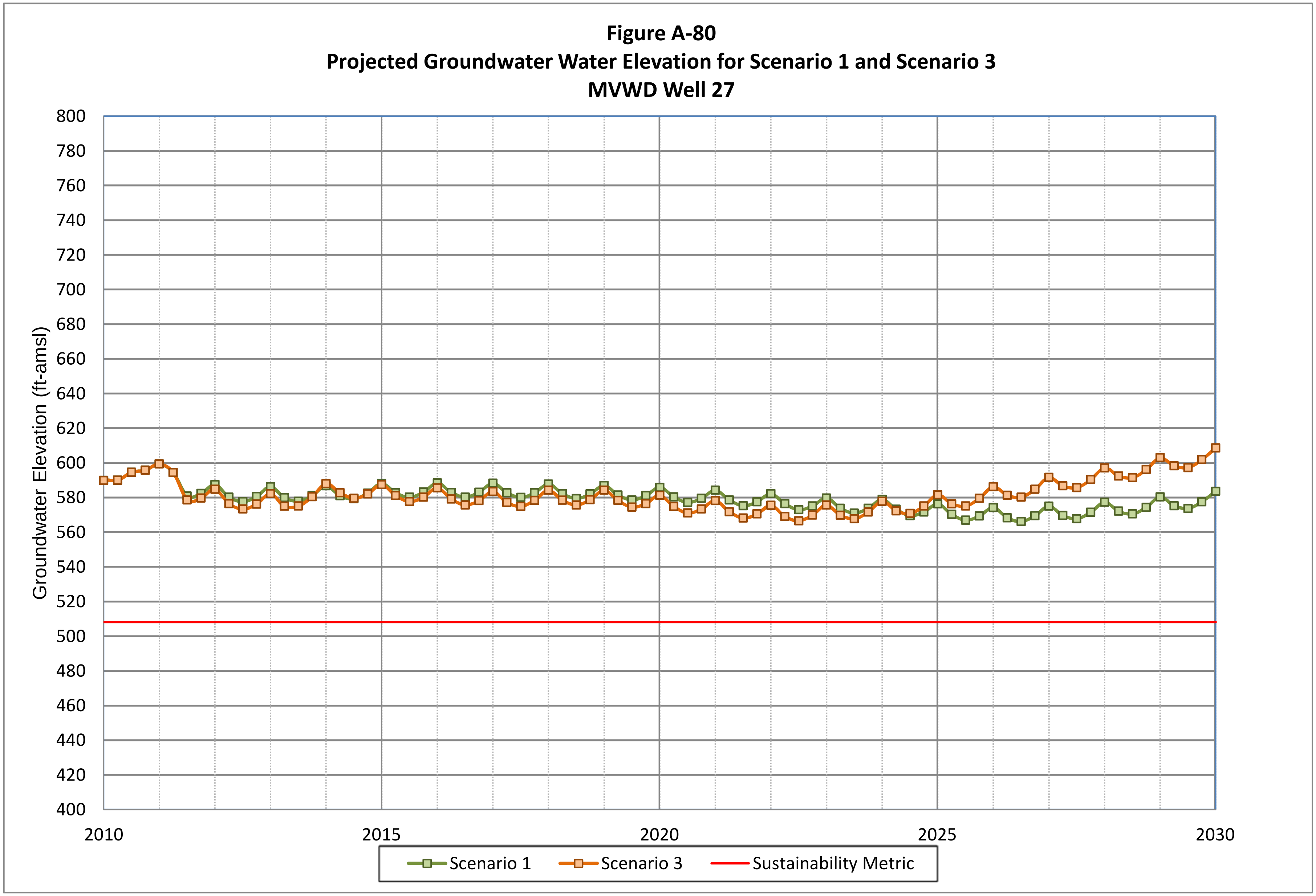
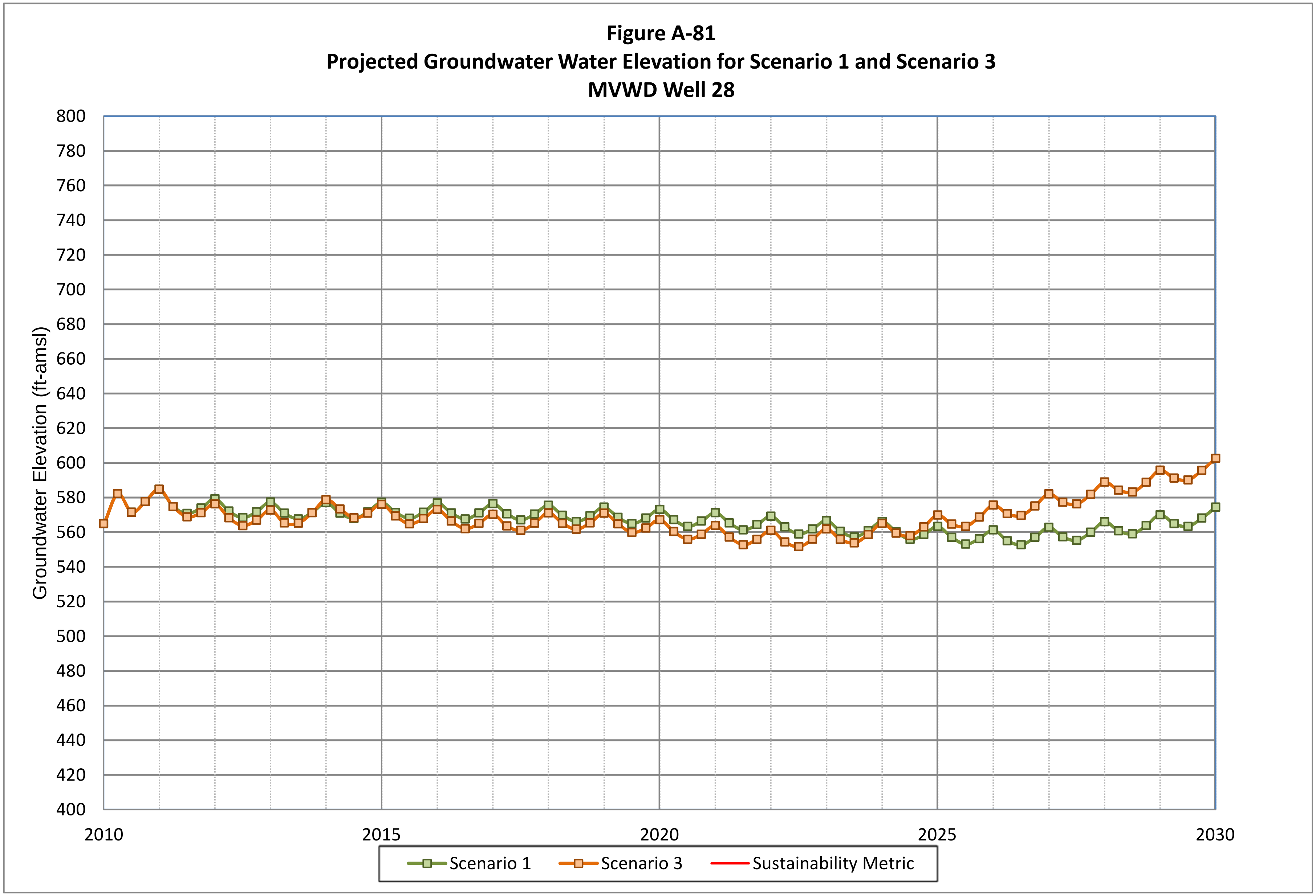


Figure A-80
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well 27
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



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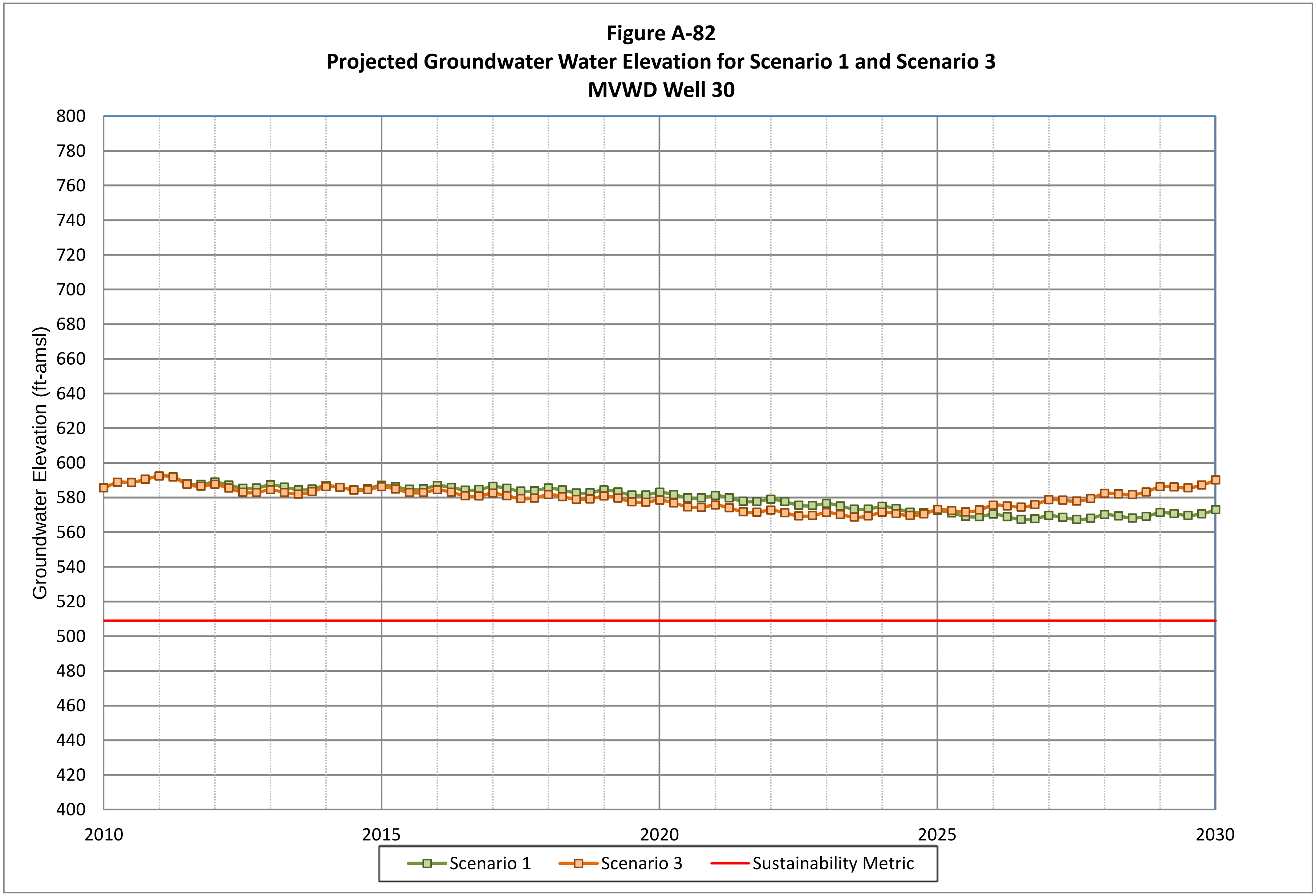

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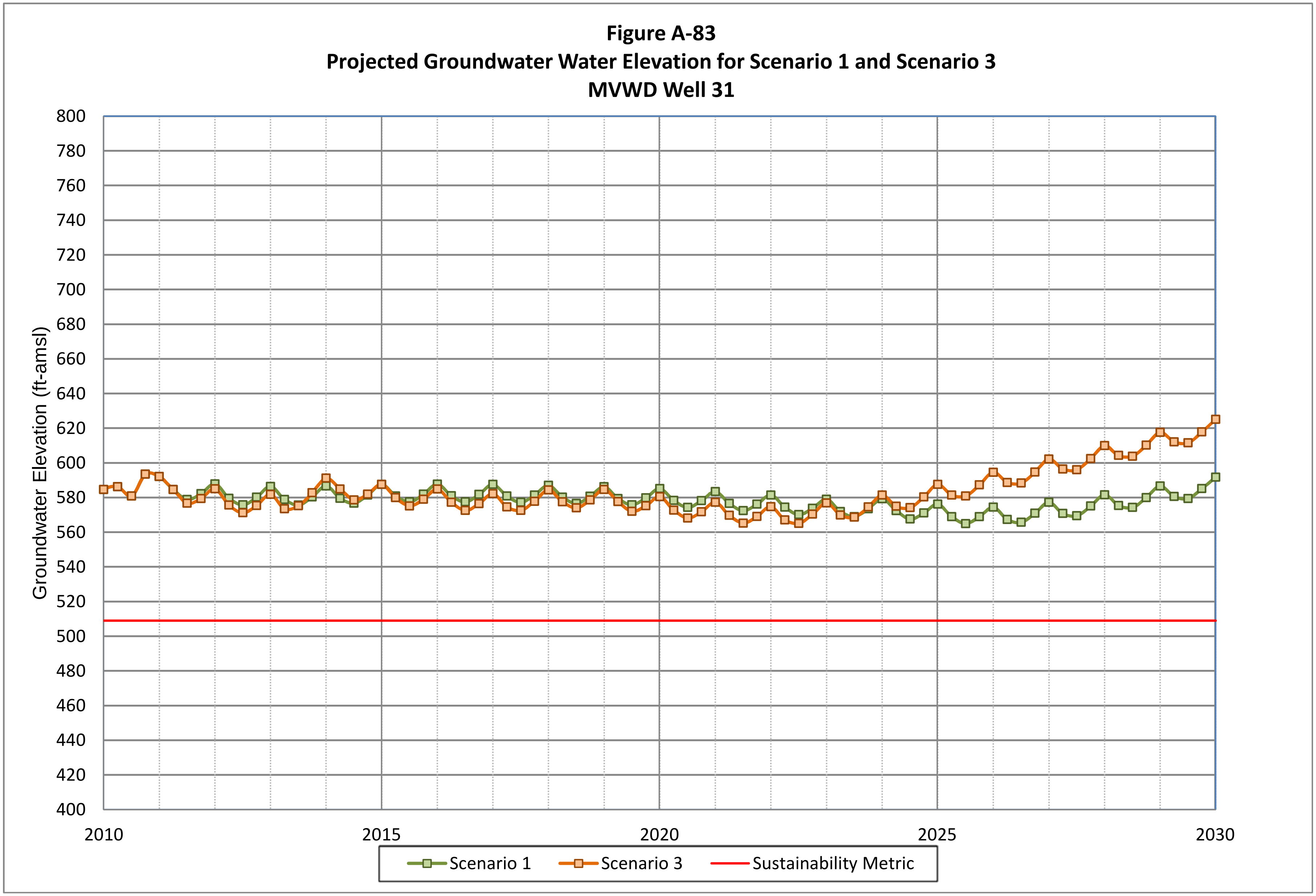

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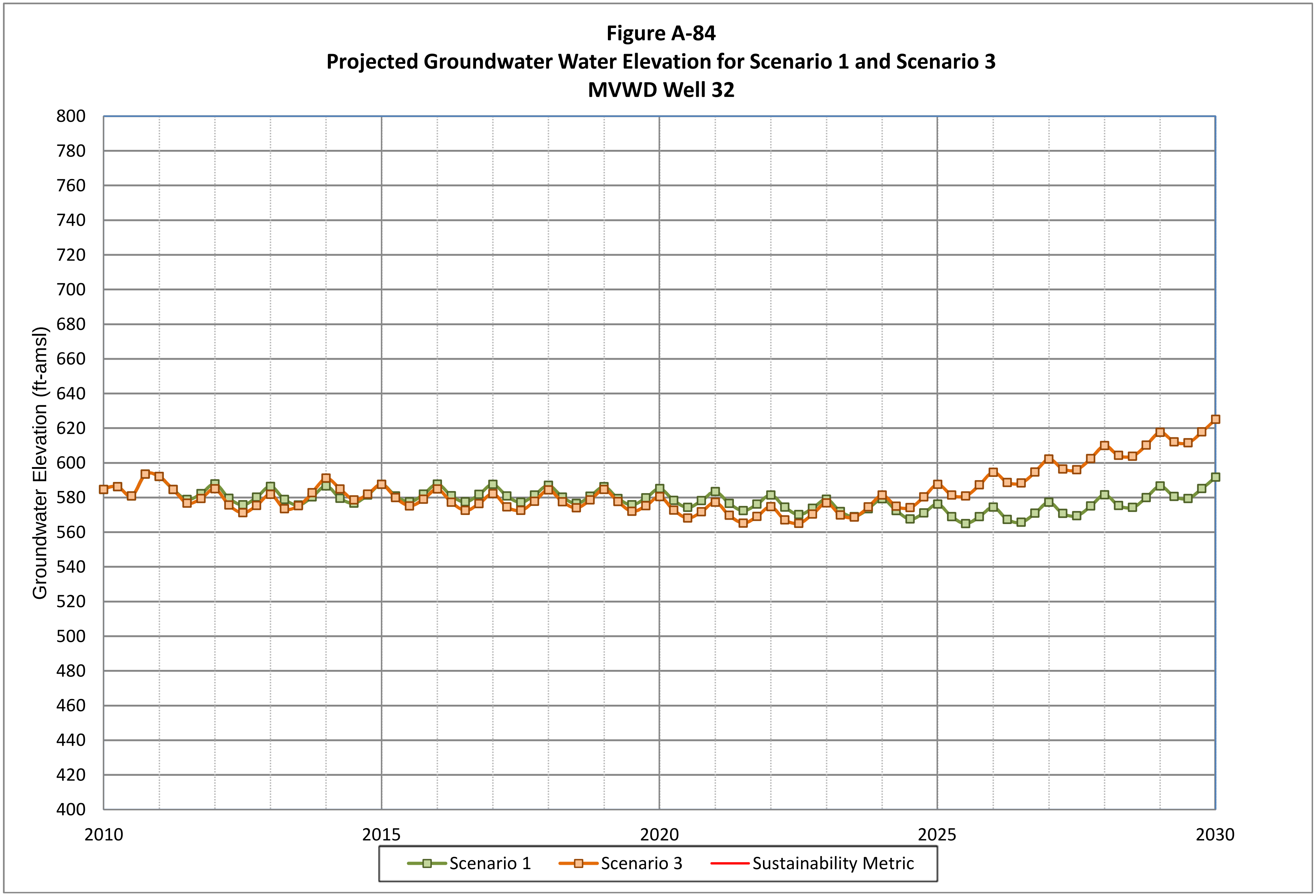


Figure A-84
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well 32
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric

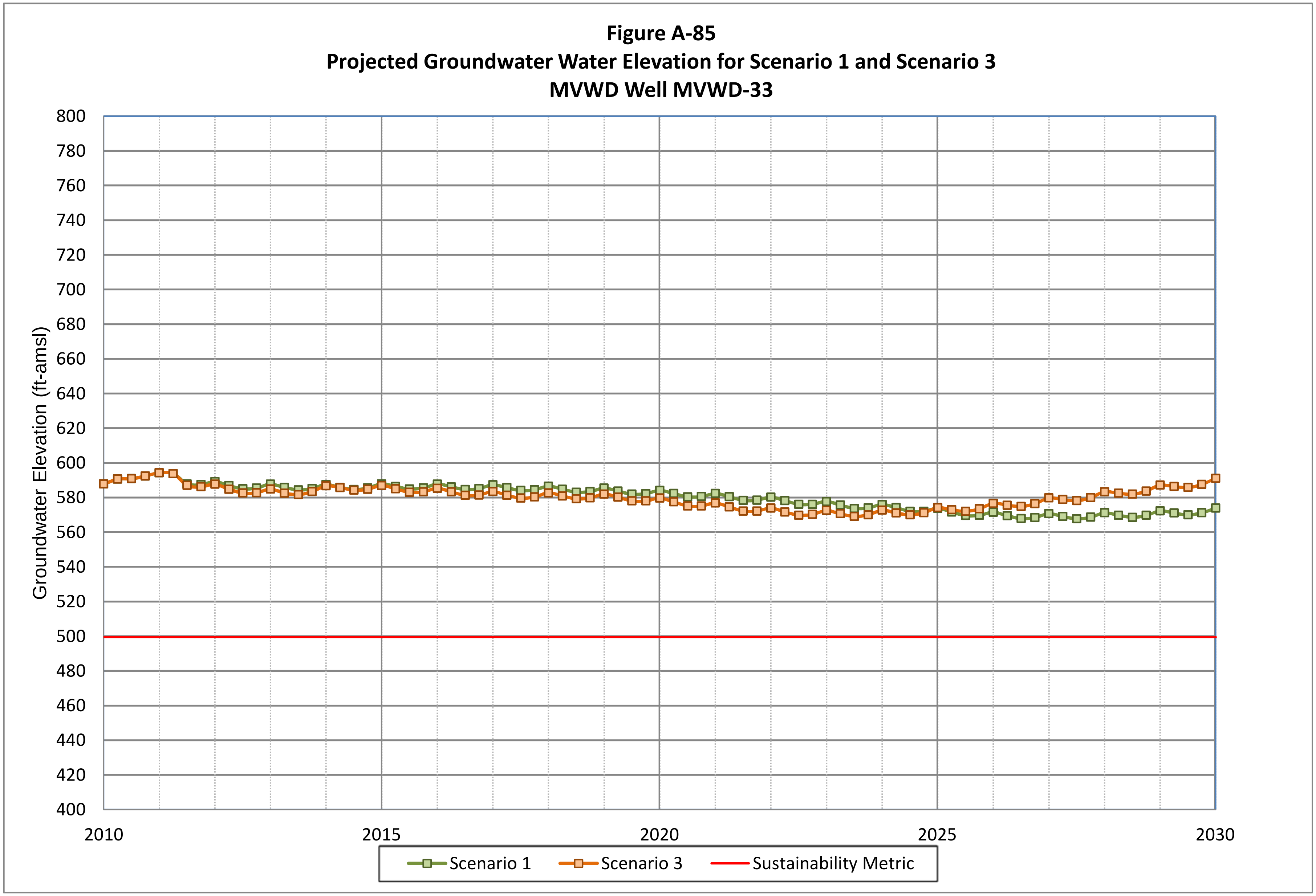
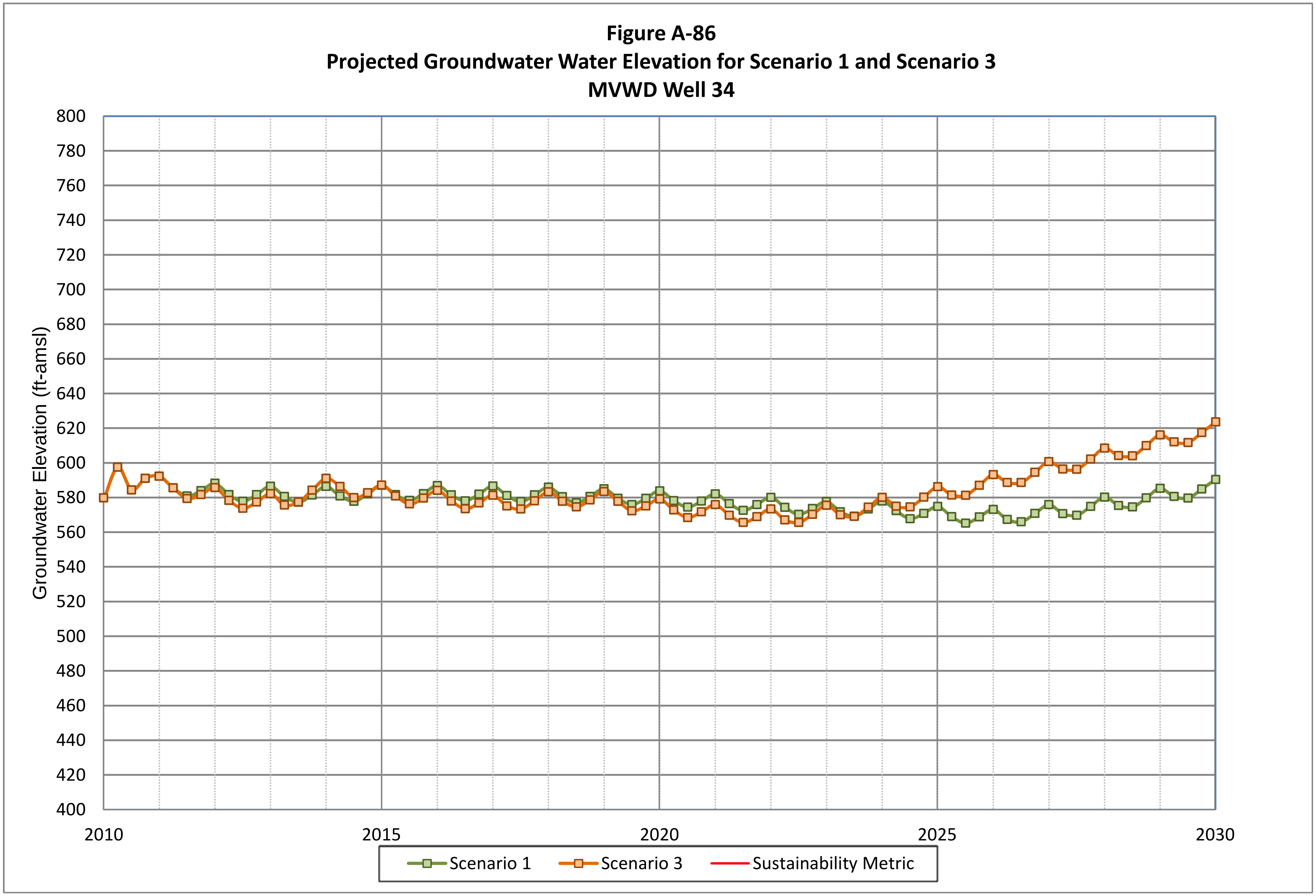


Figure A-85
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
MVWD Well MVWD-33
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric



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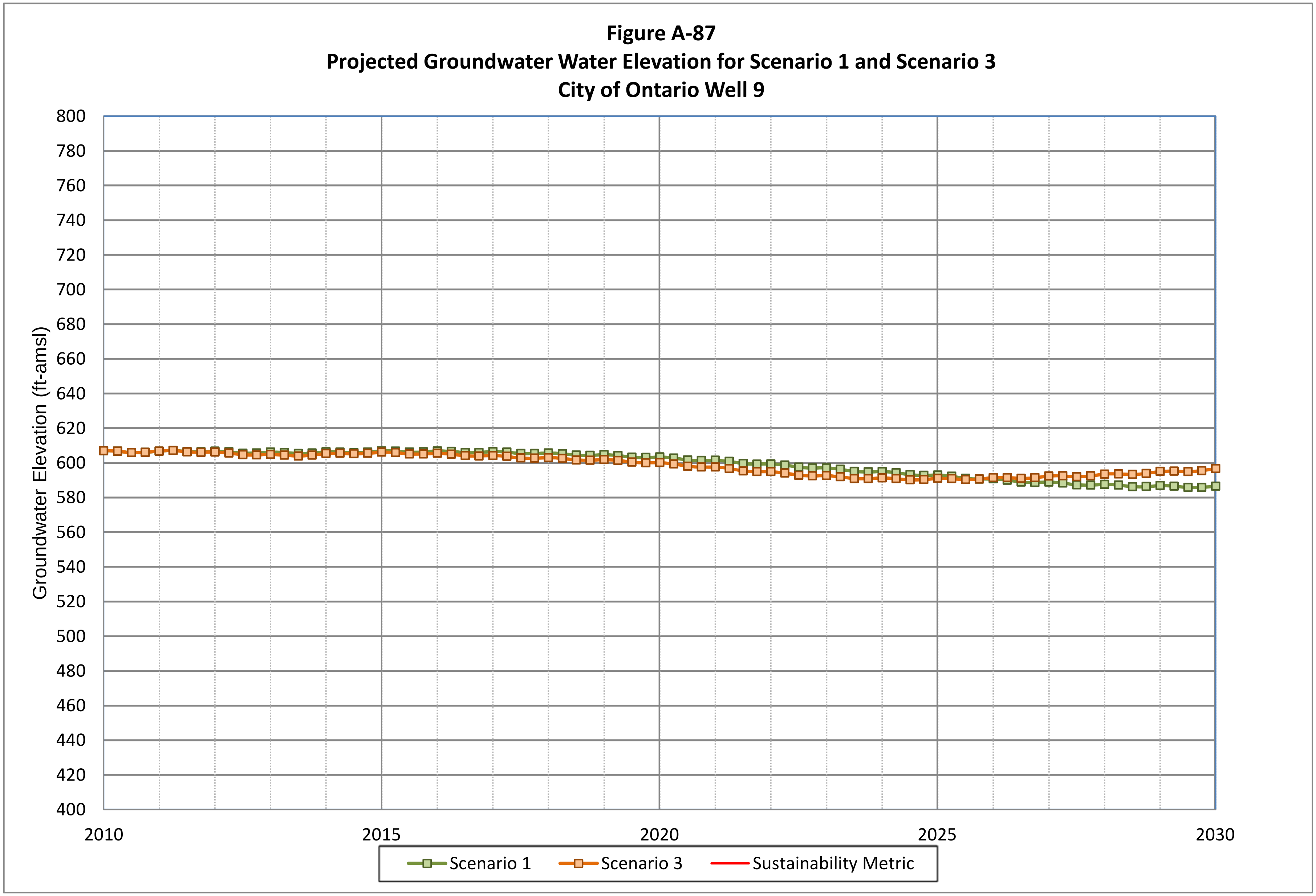

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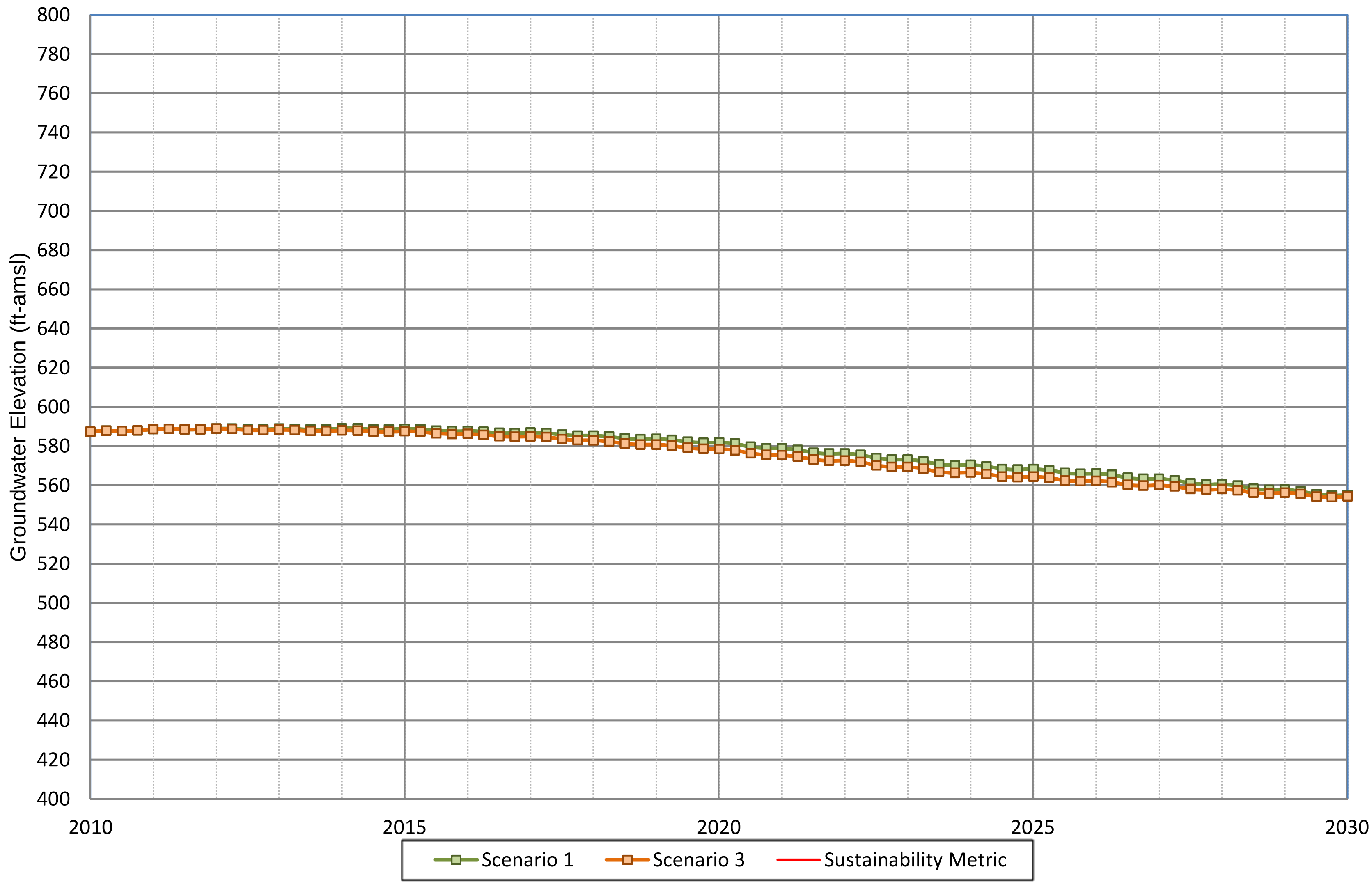
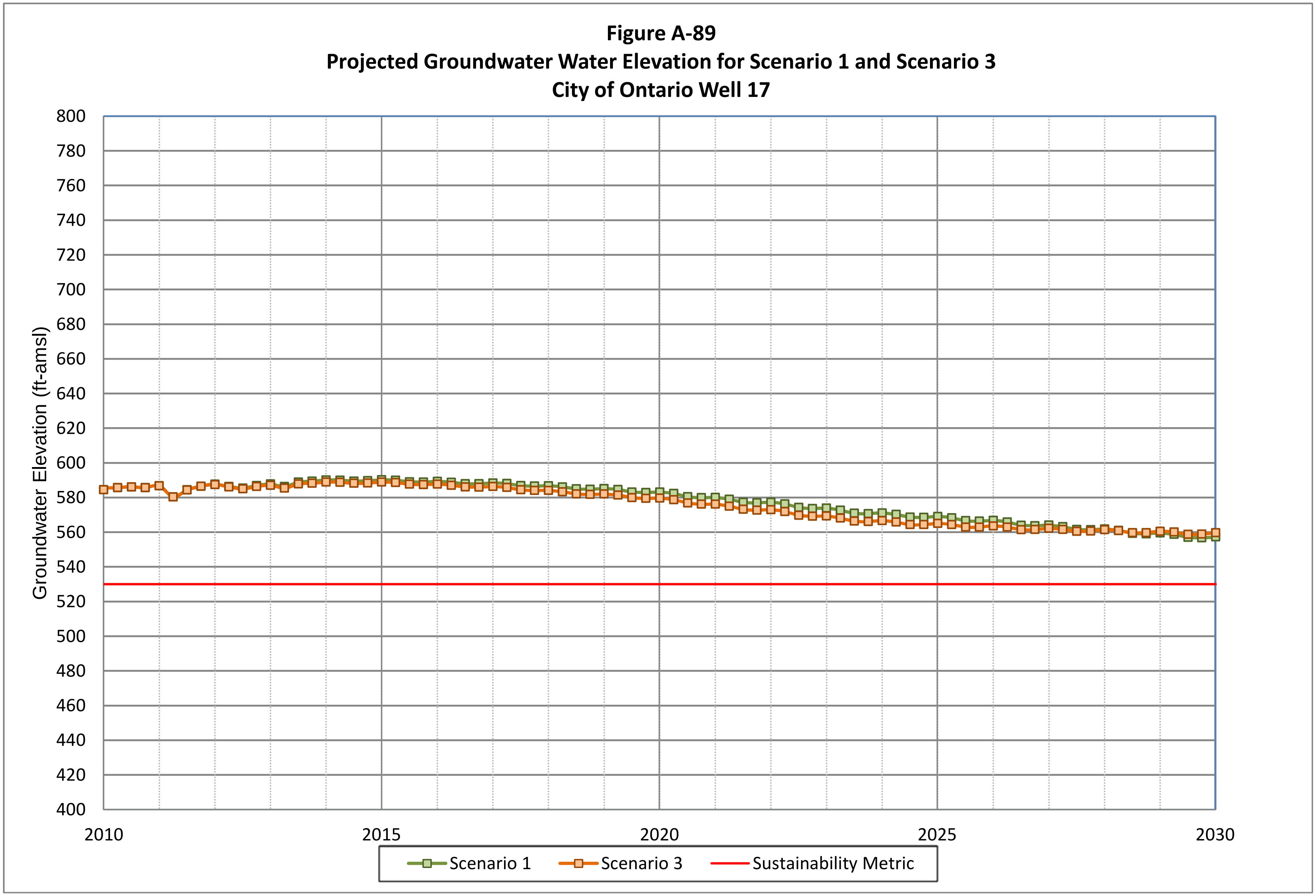
Figure A-88
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 16





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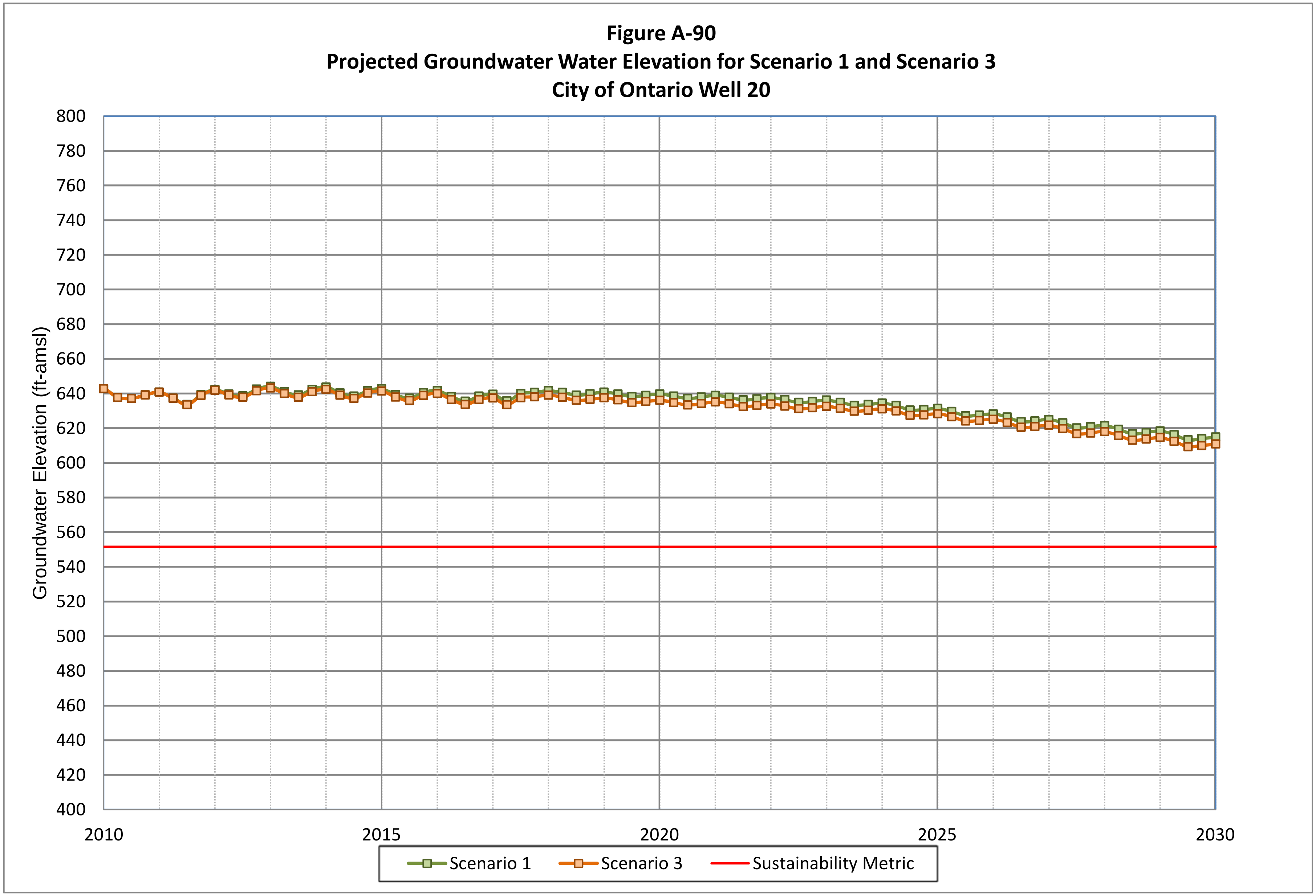

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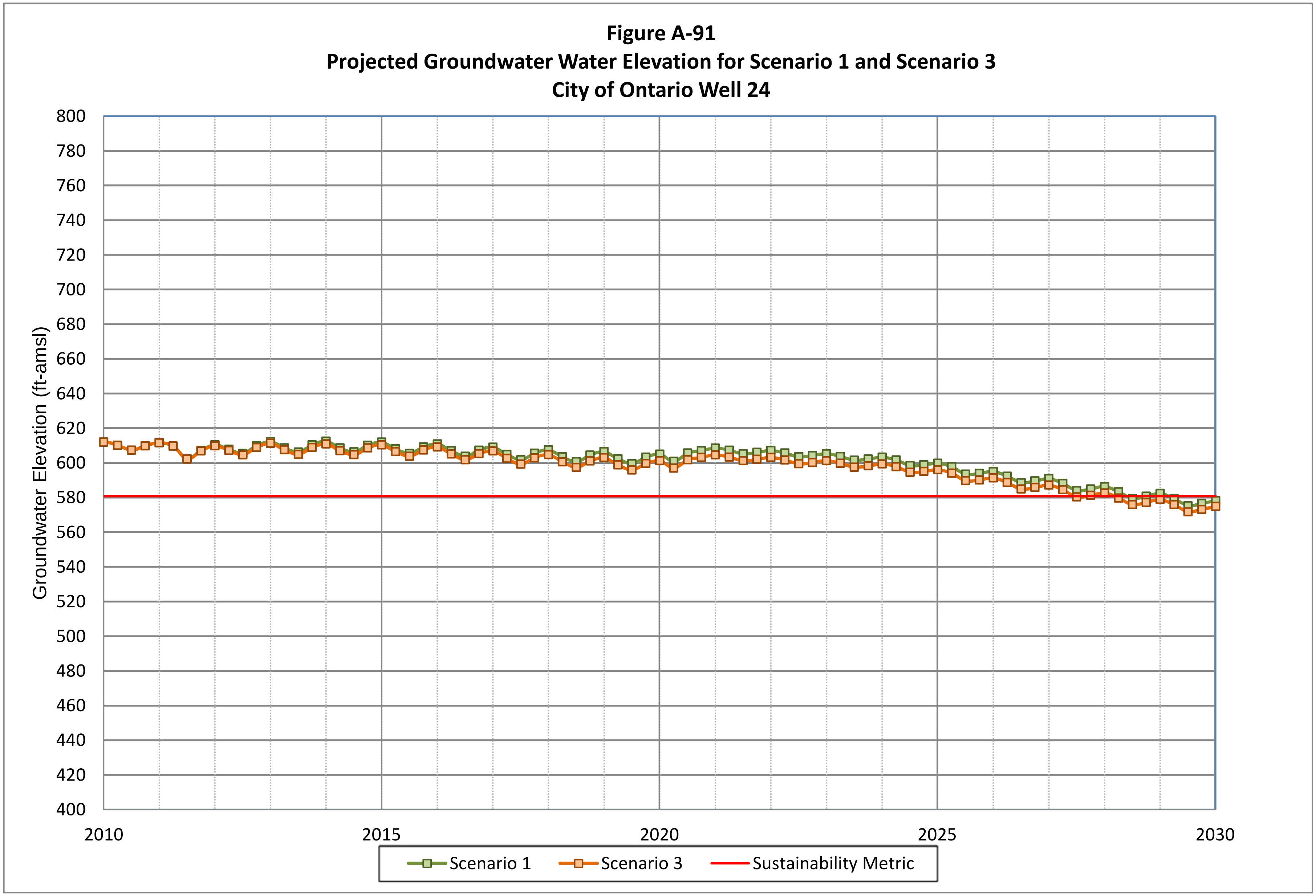
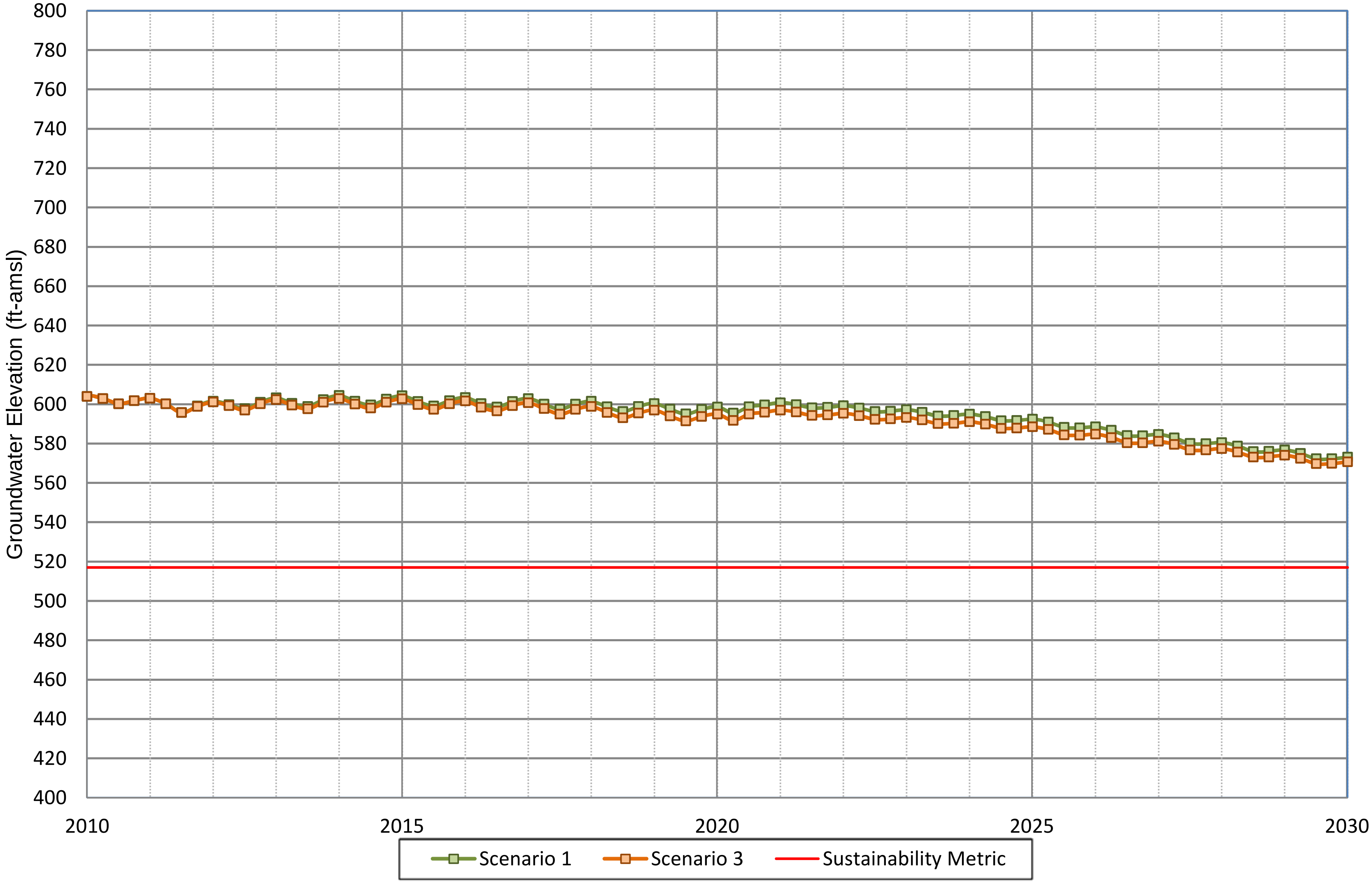


Figure A-91
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 24
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric

Figure A-92
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 25



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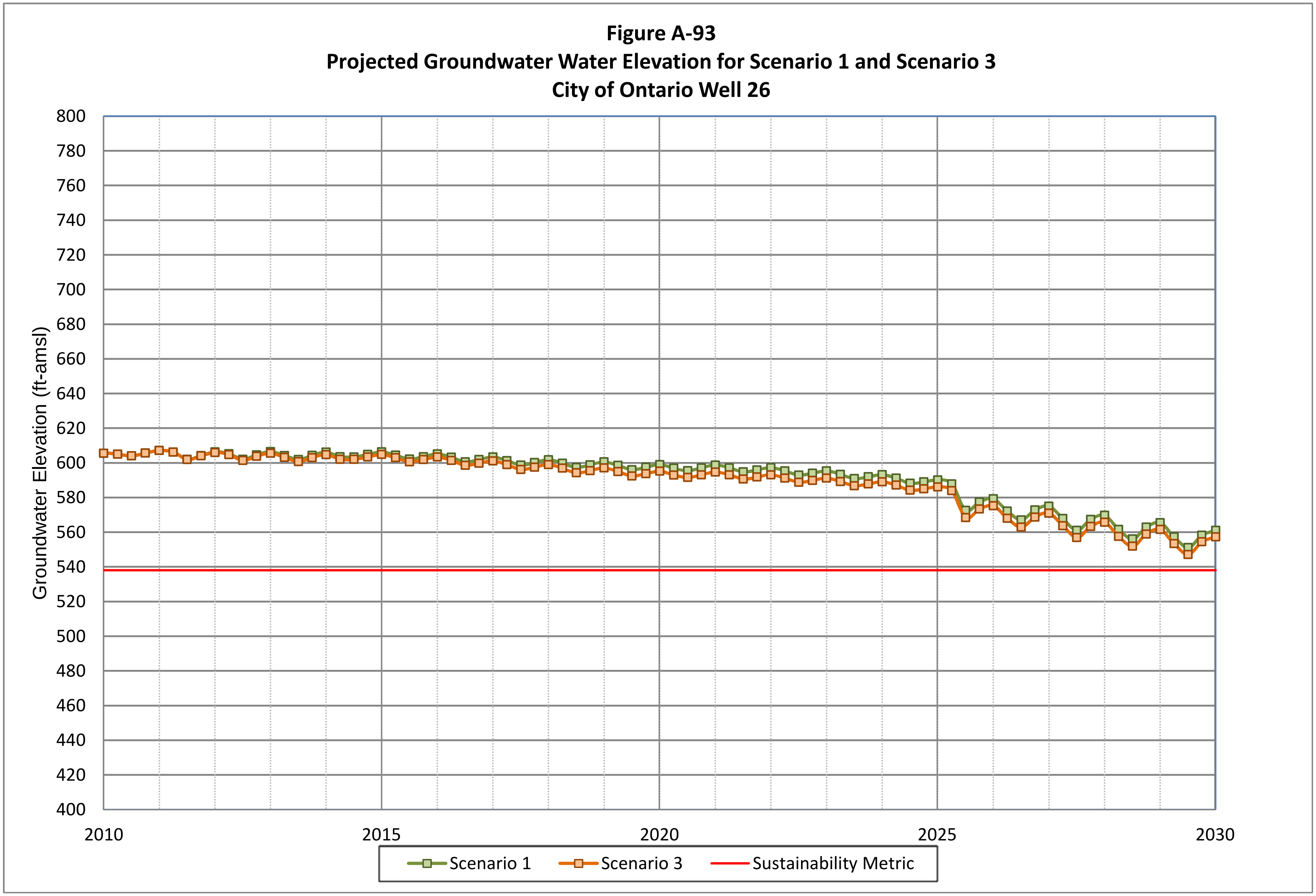

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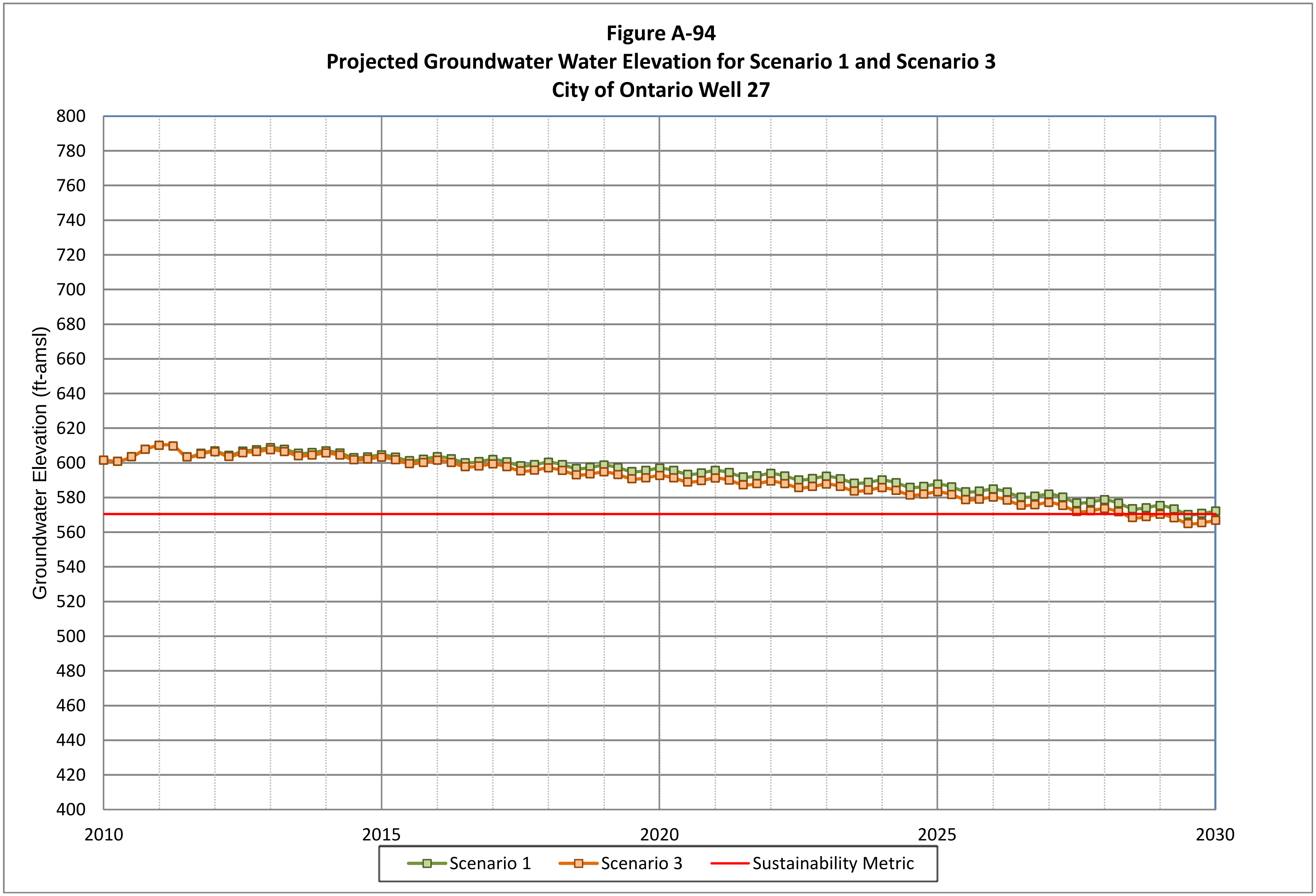

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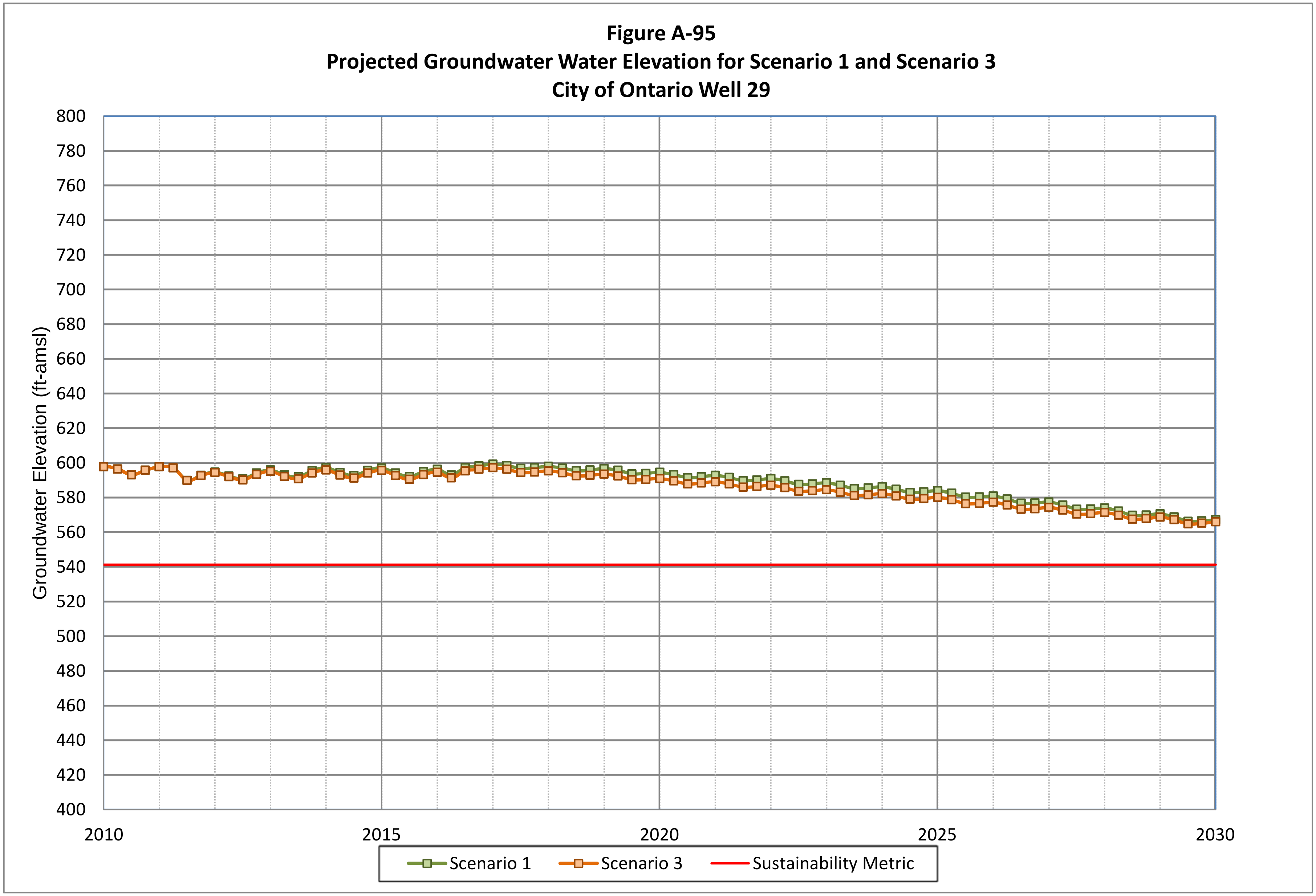

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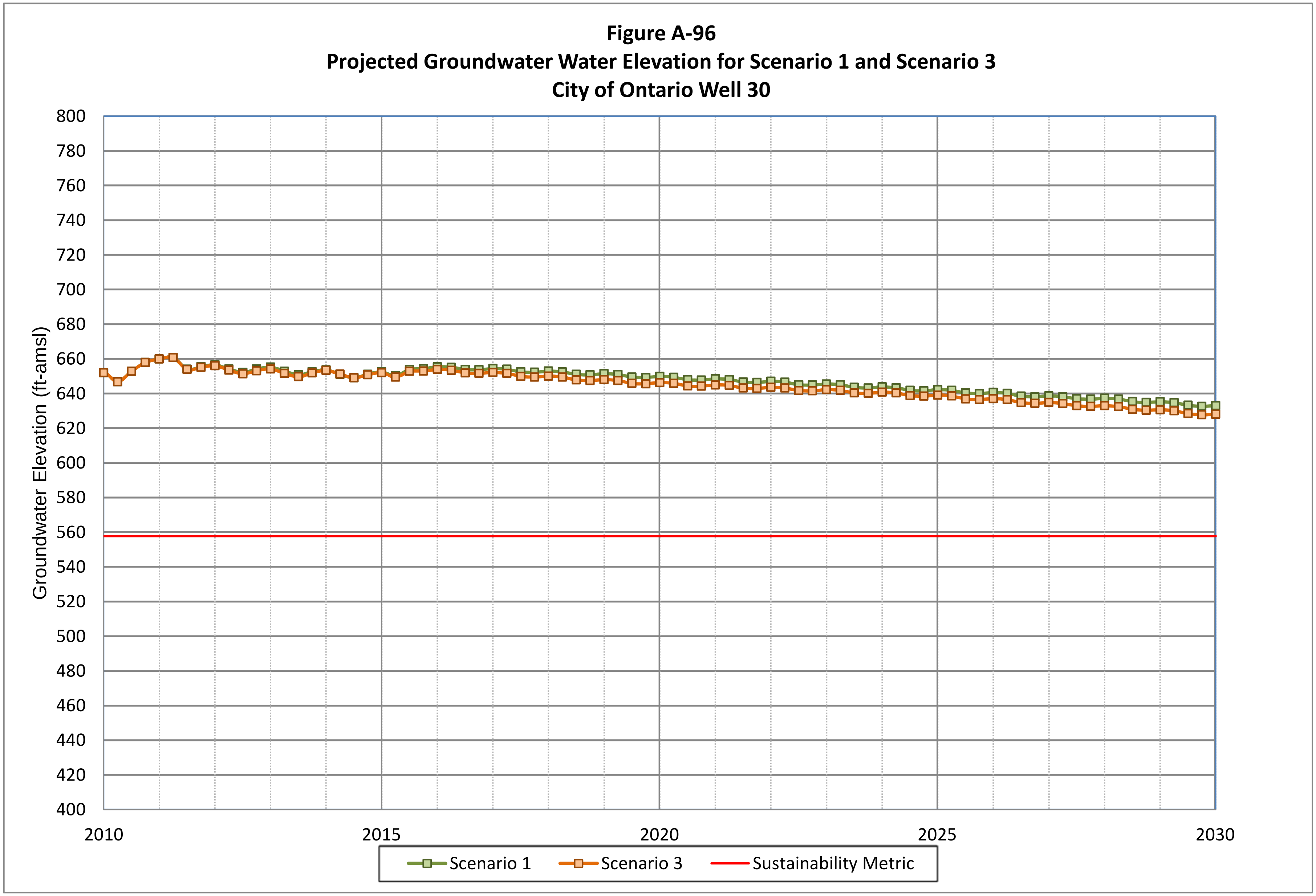

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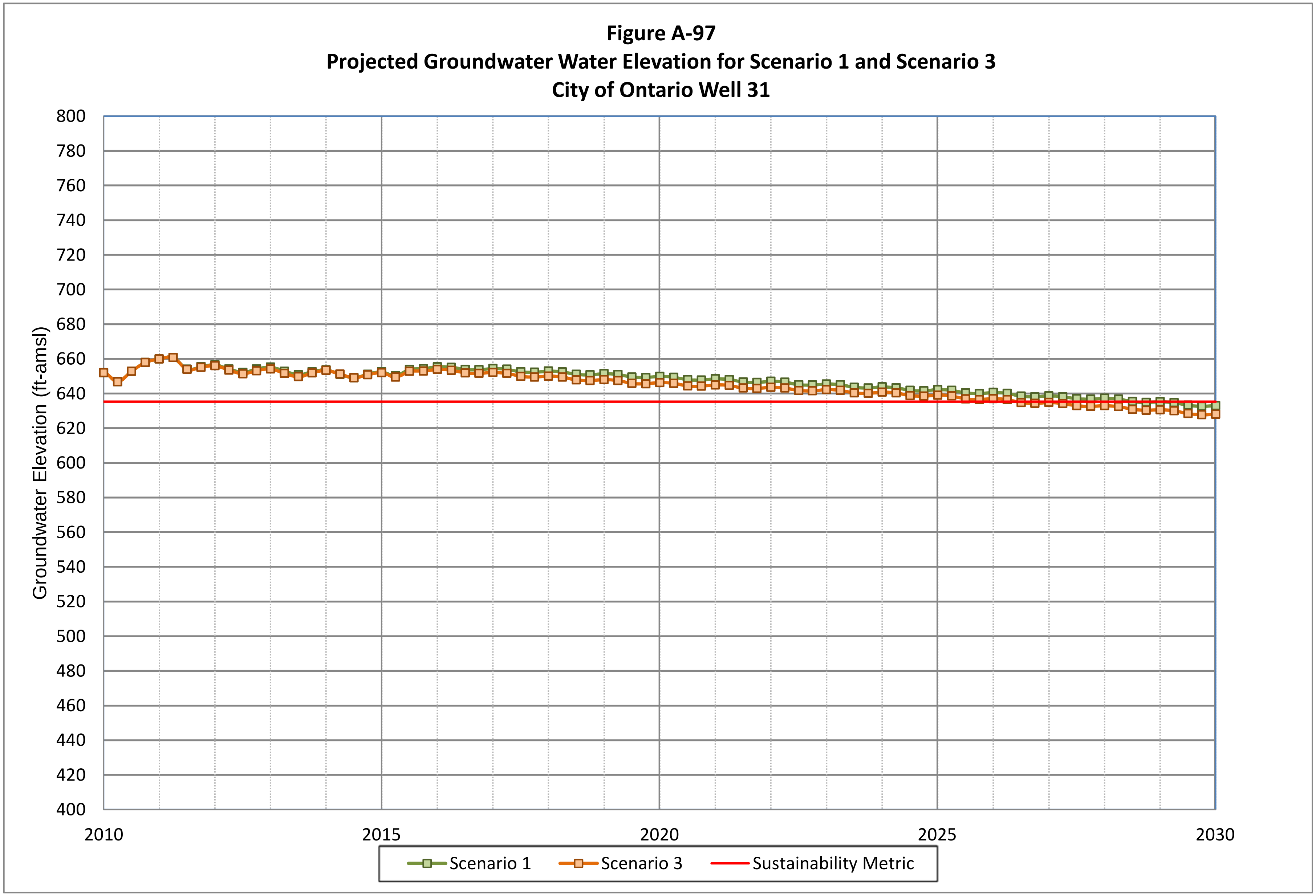
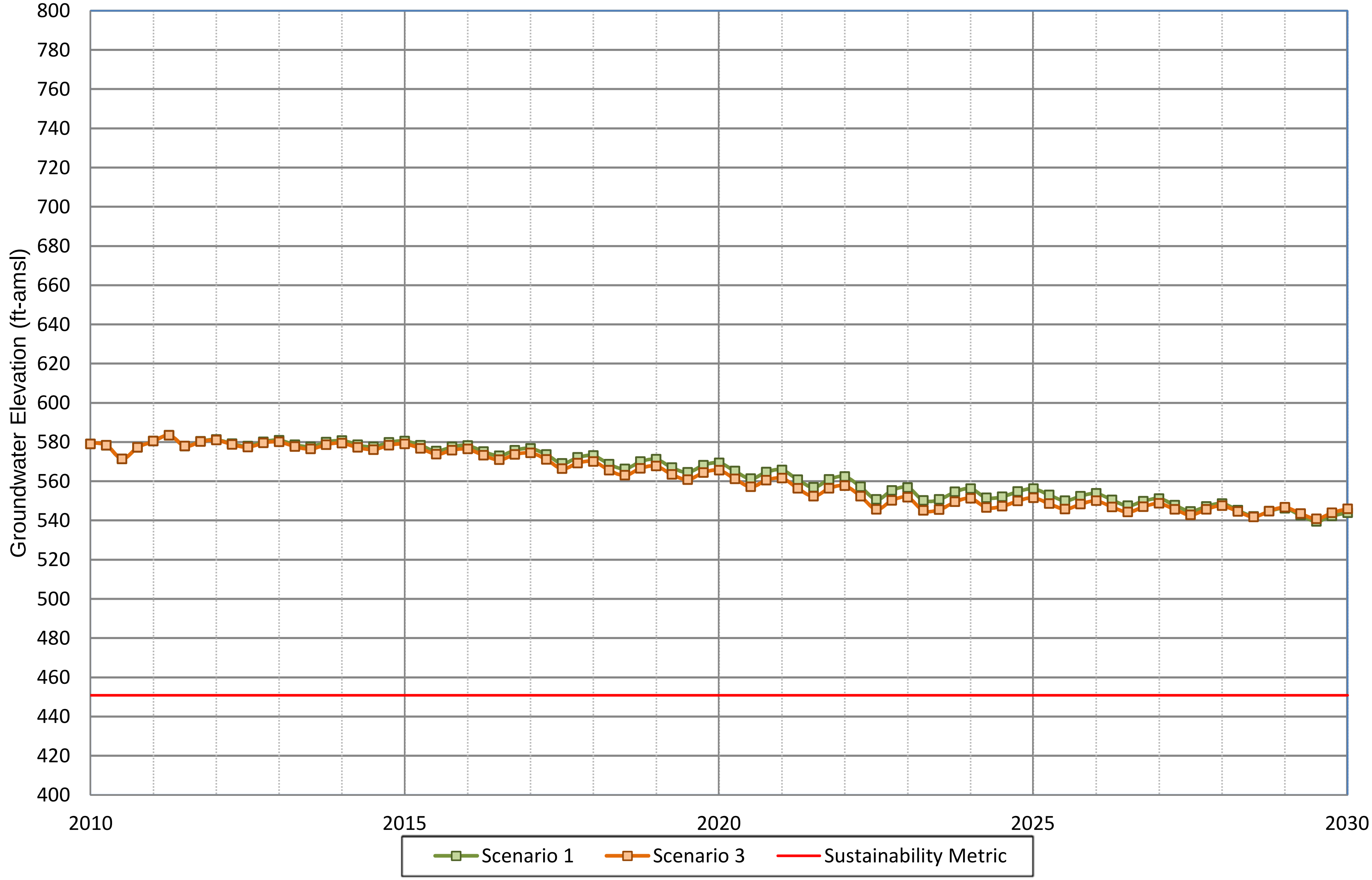


20120503_Projected_Hydrographs.xlsx

Figure A-98
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 34



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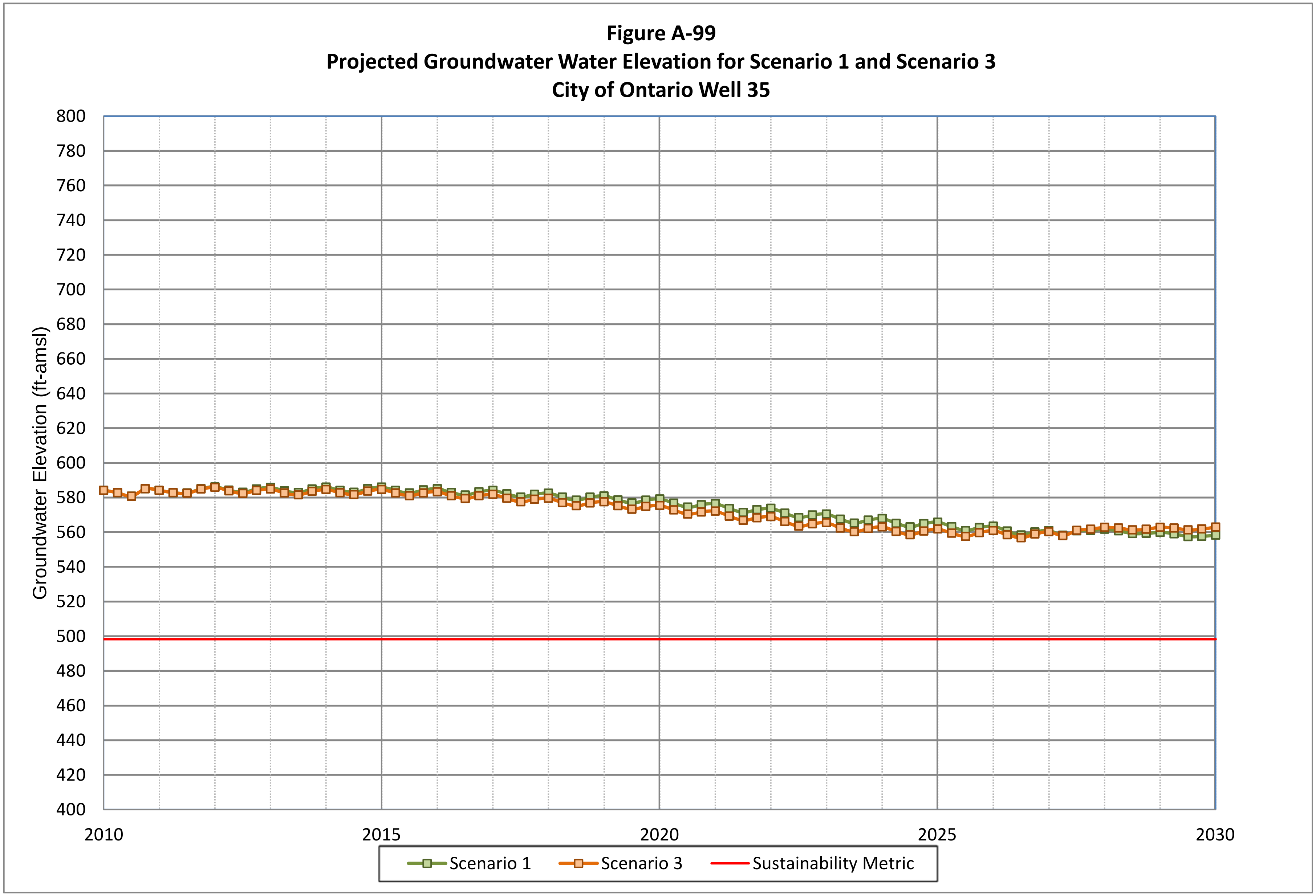

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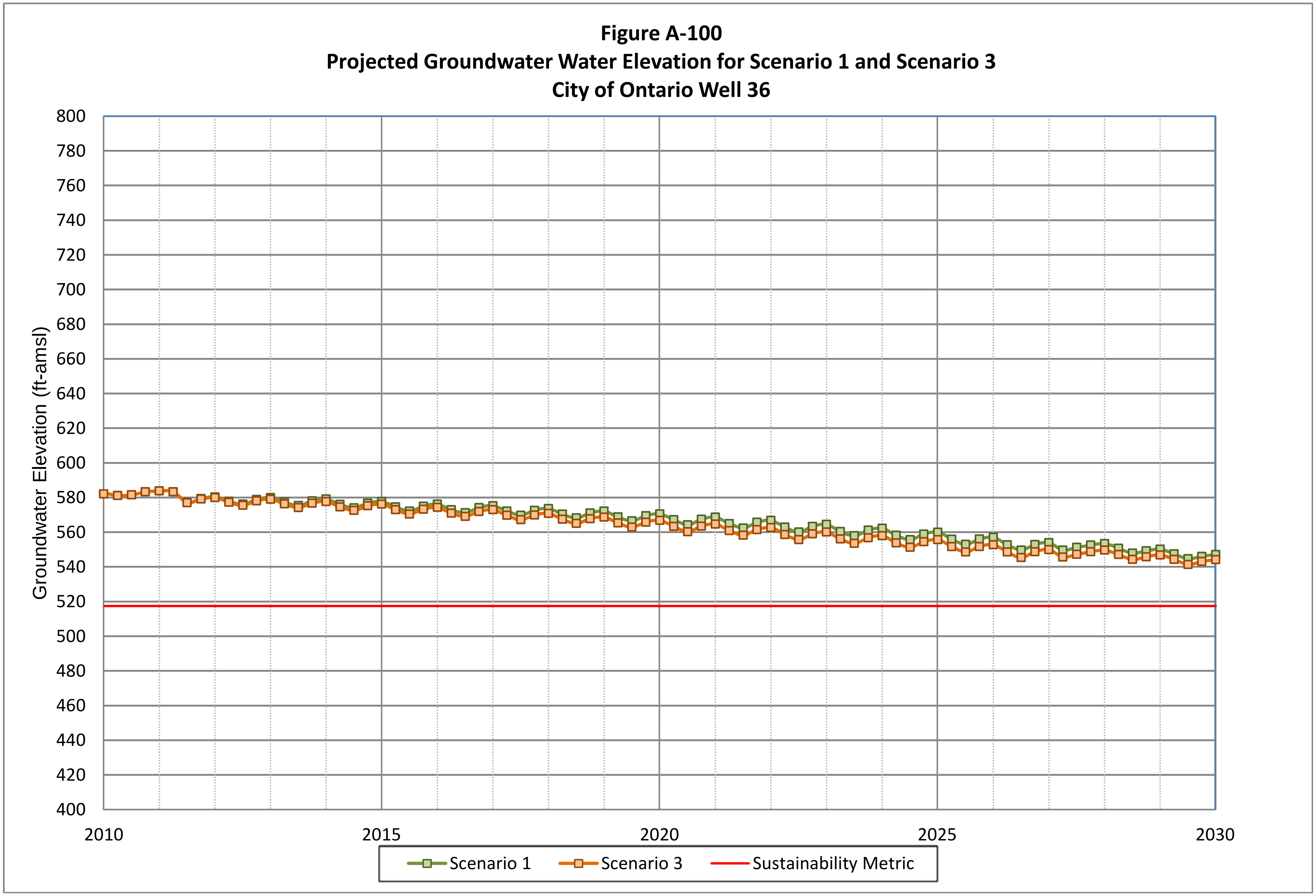

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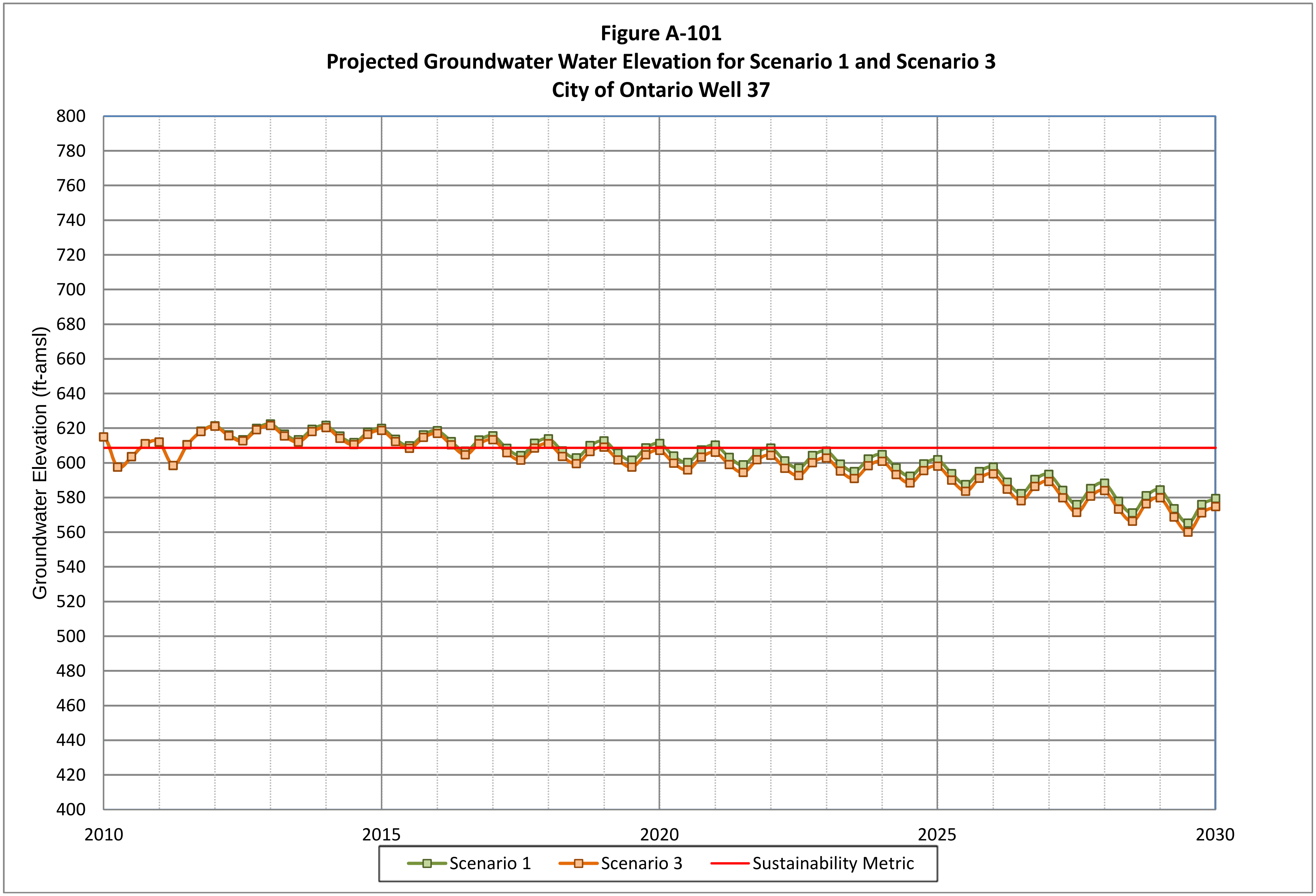

20120503_Projected_Hydrographs.xlsx

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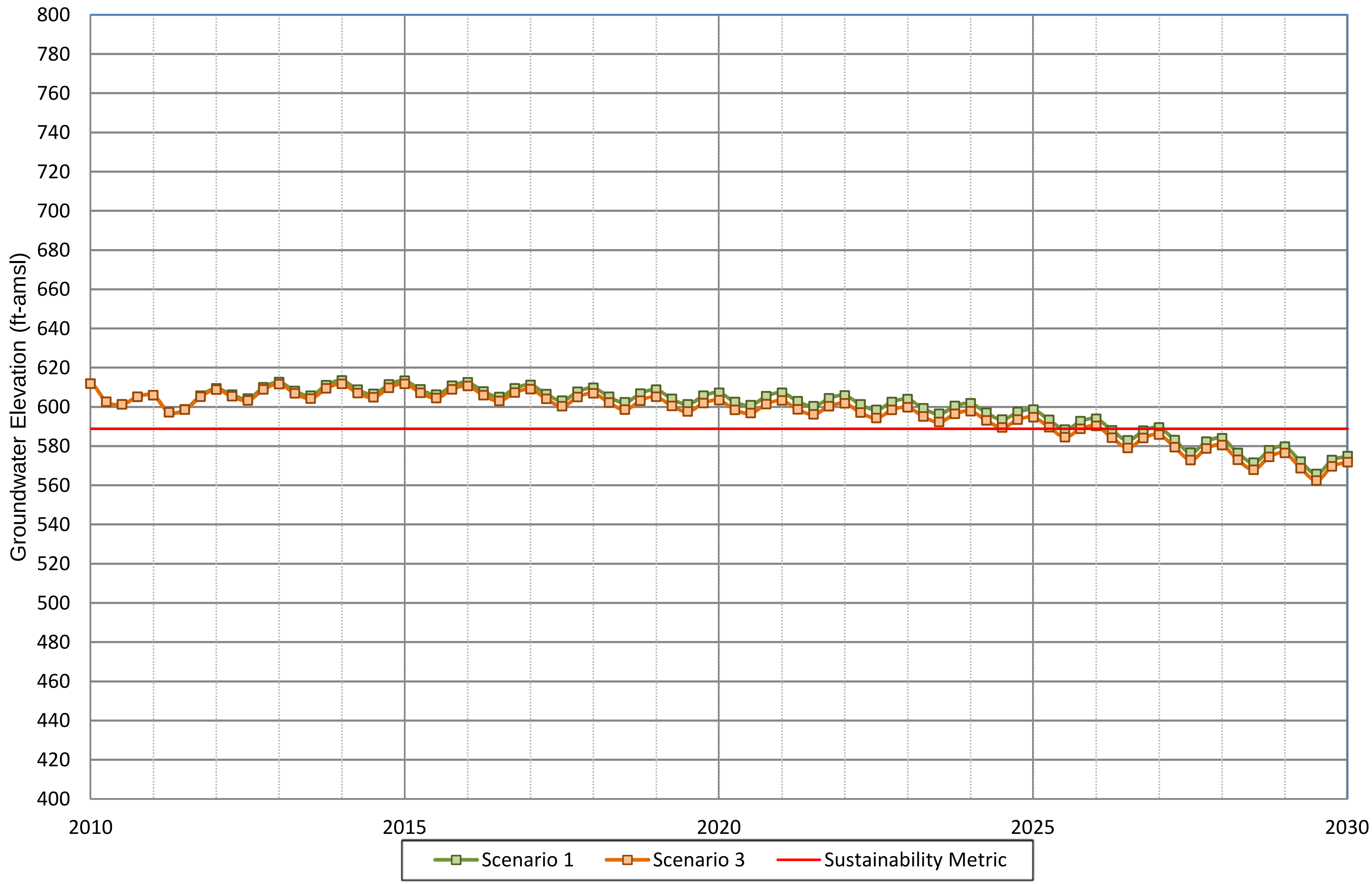
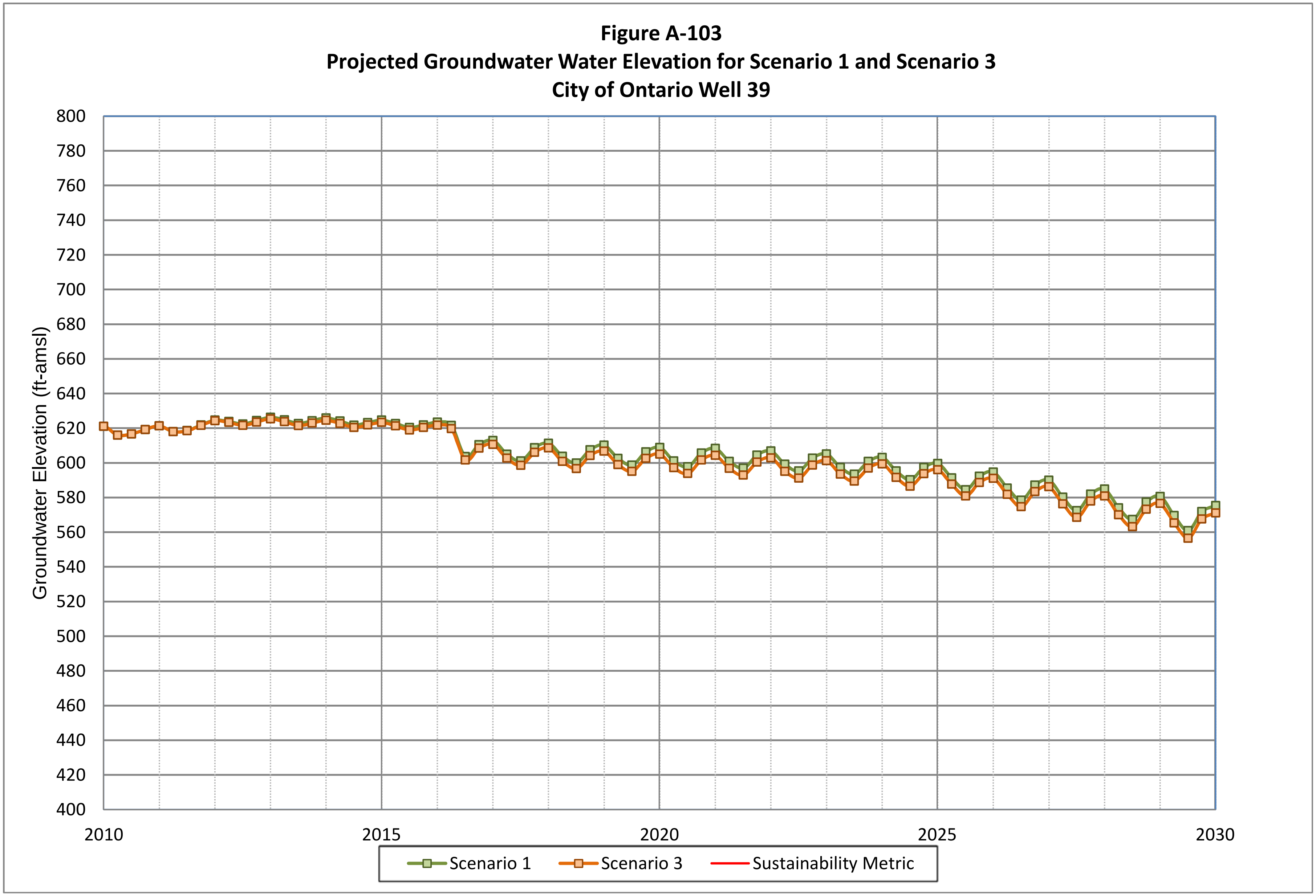
Figure A-102
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 38





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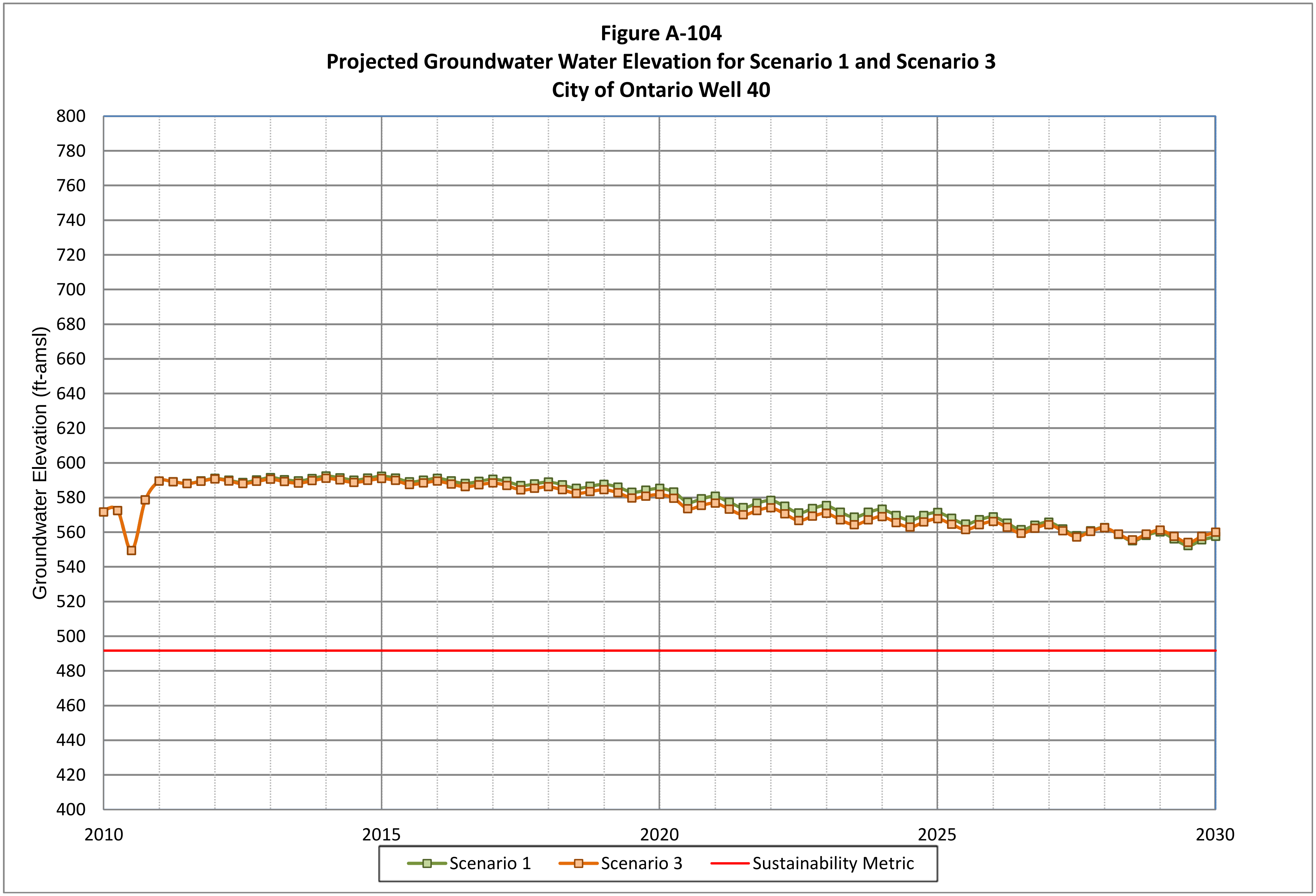

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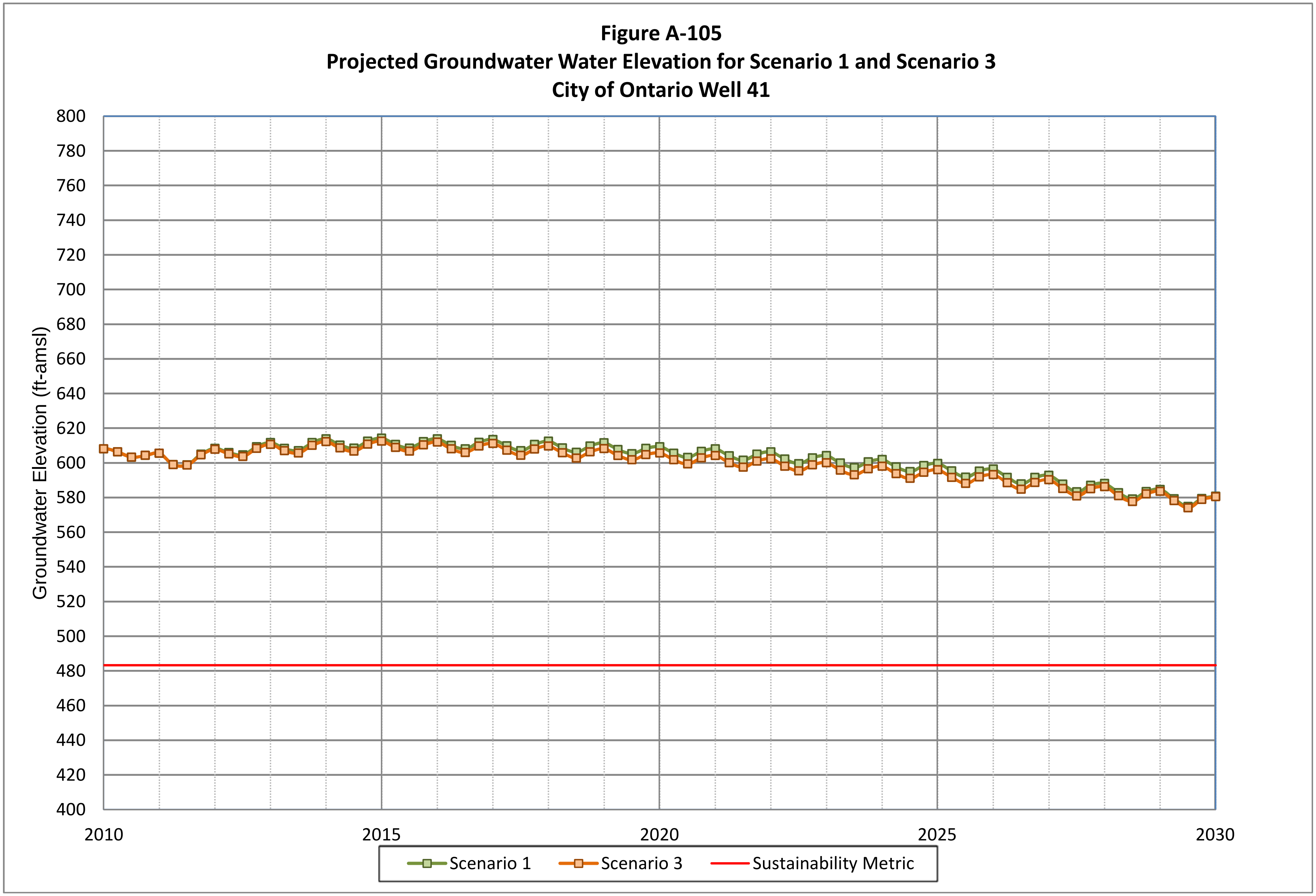

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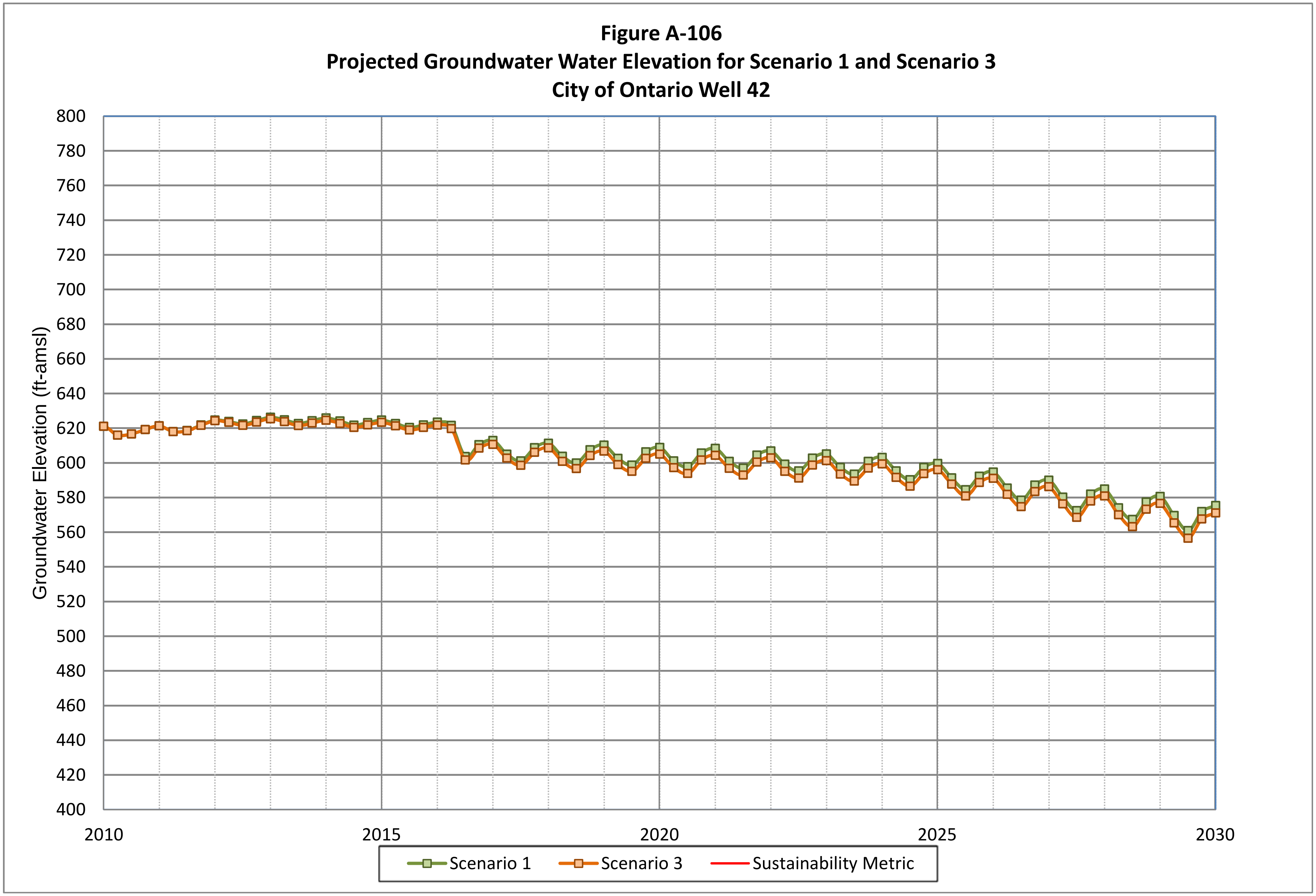

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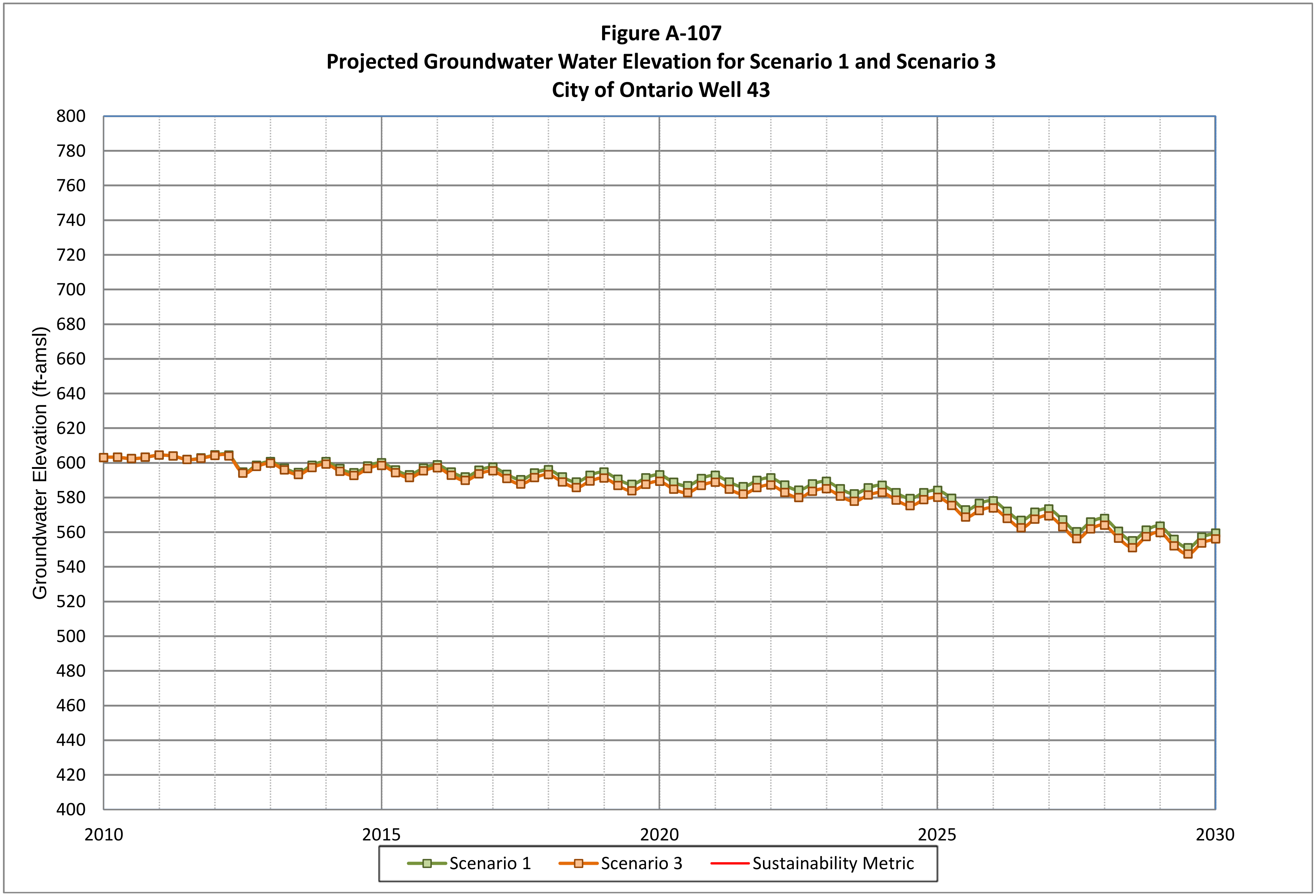

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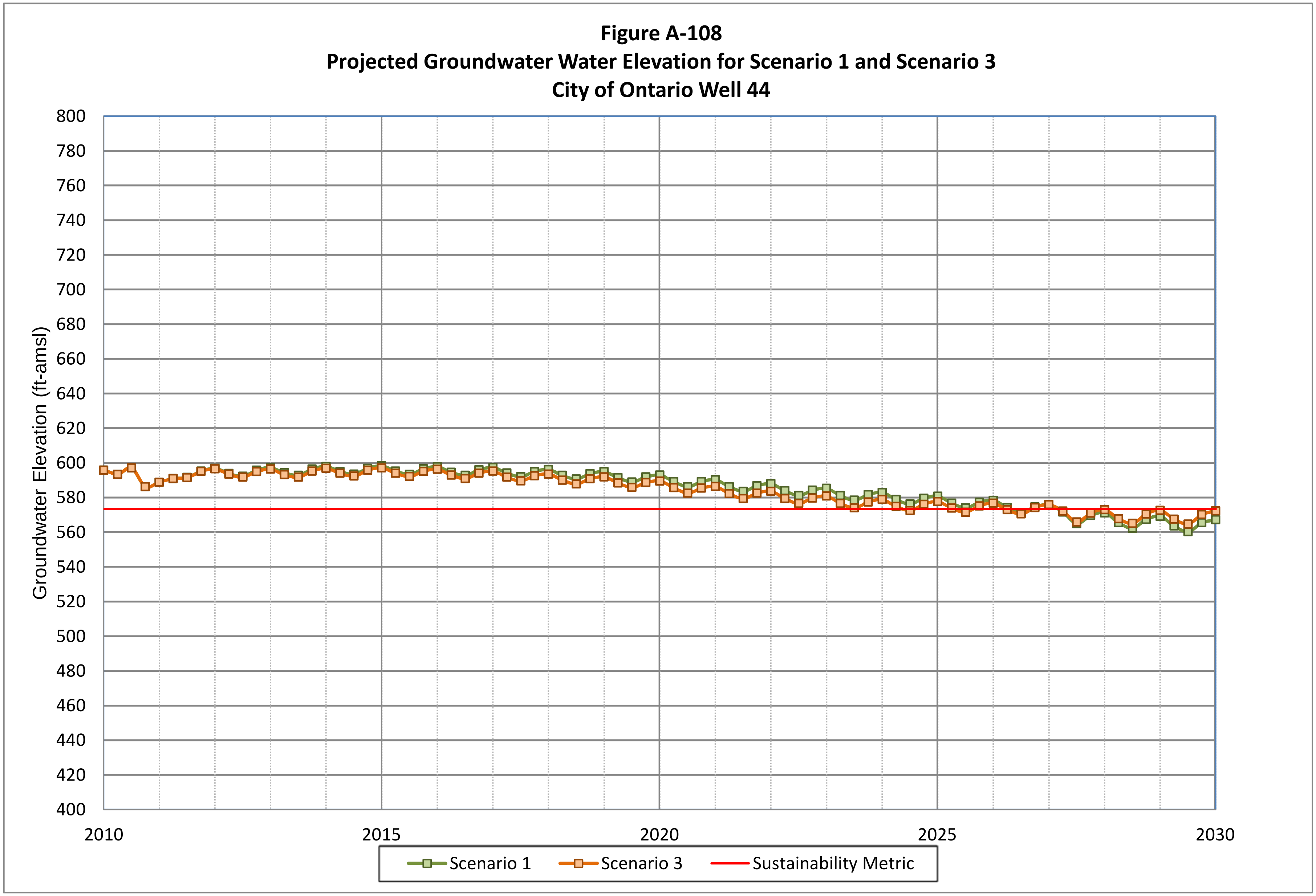

20120503_Projected_Hydrographs.xlsx

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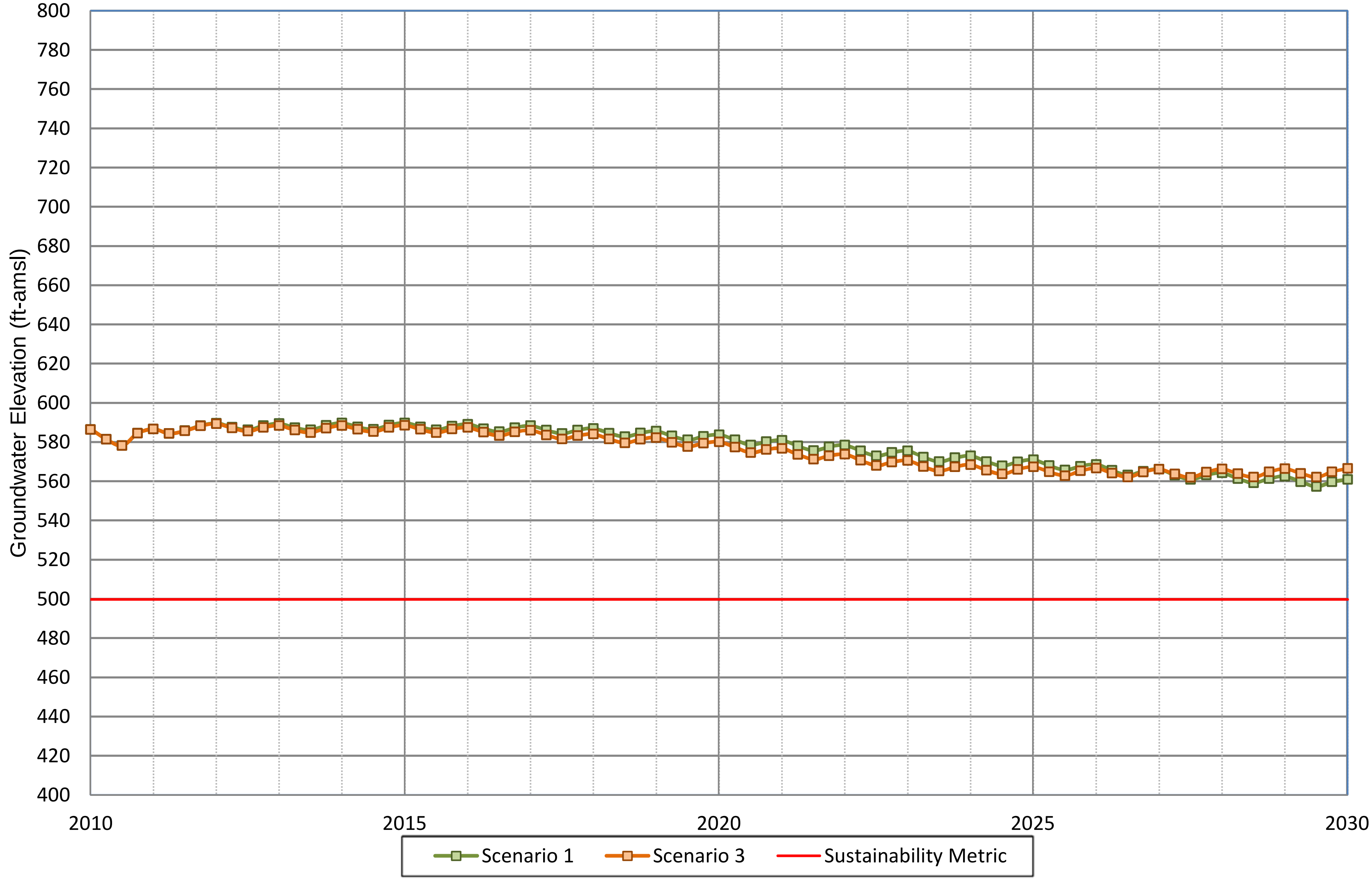
Figure A-109
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 45



20120503_Projected_Hydrographs.xlsx

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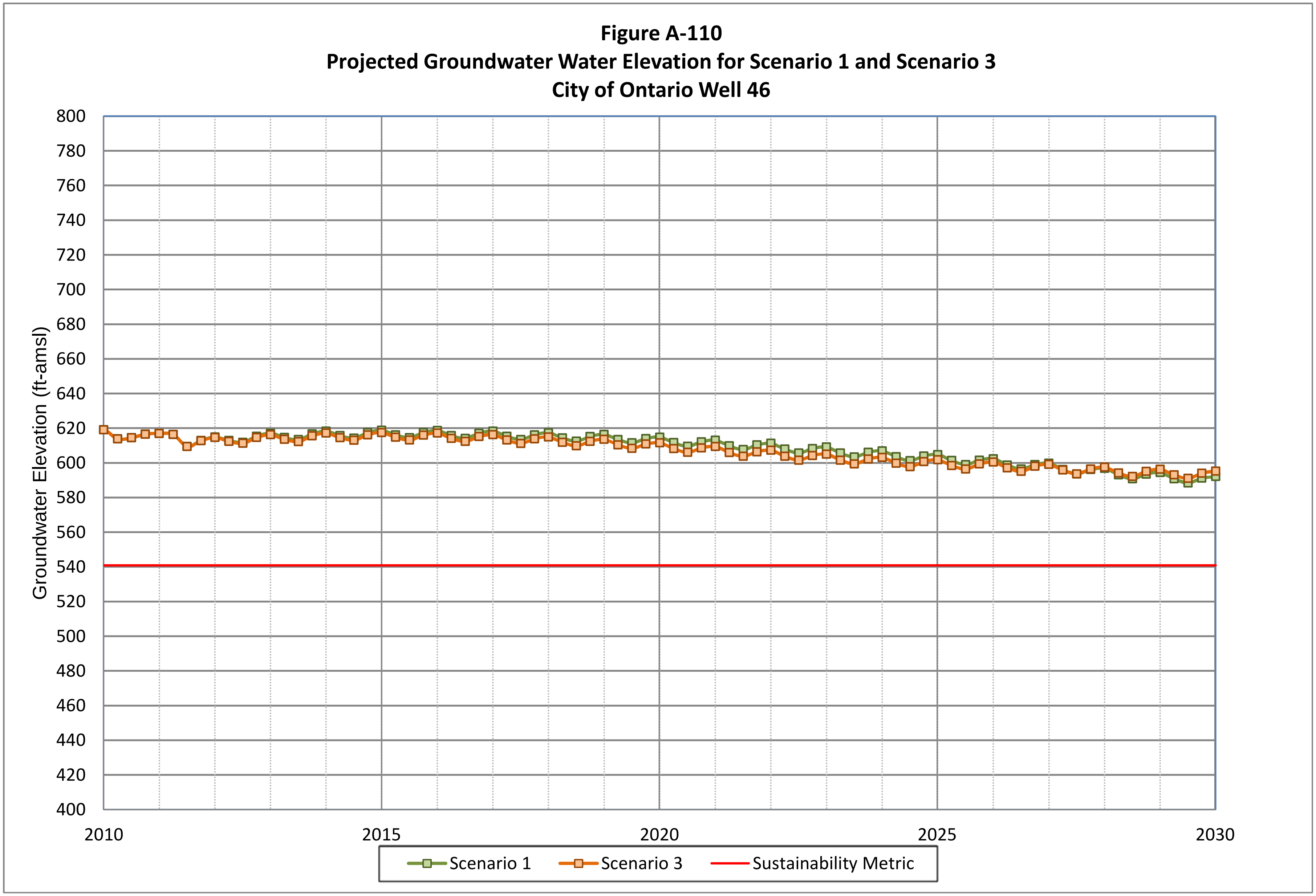

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Figure A-111
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 47

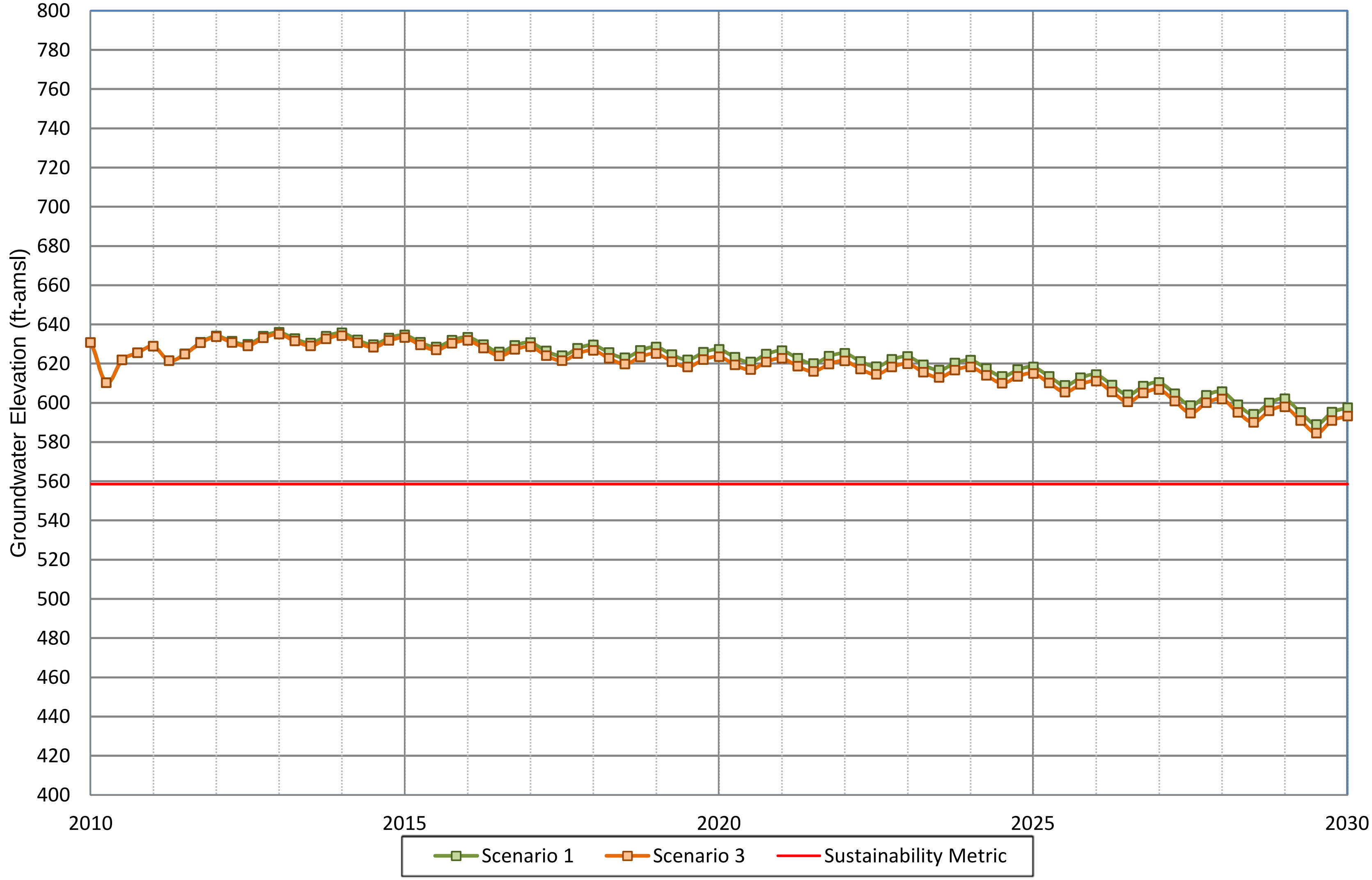

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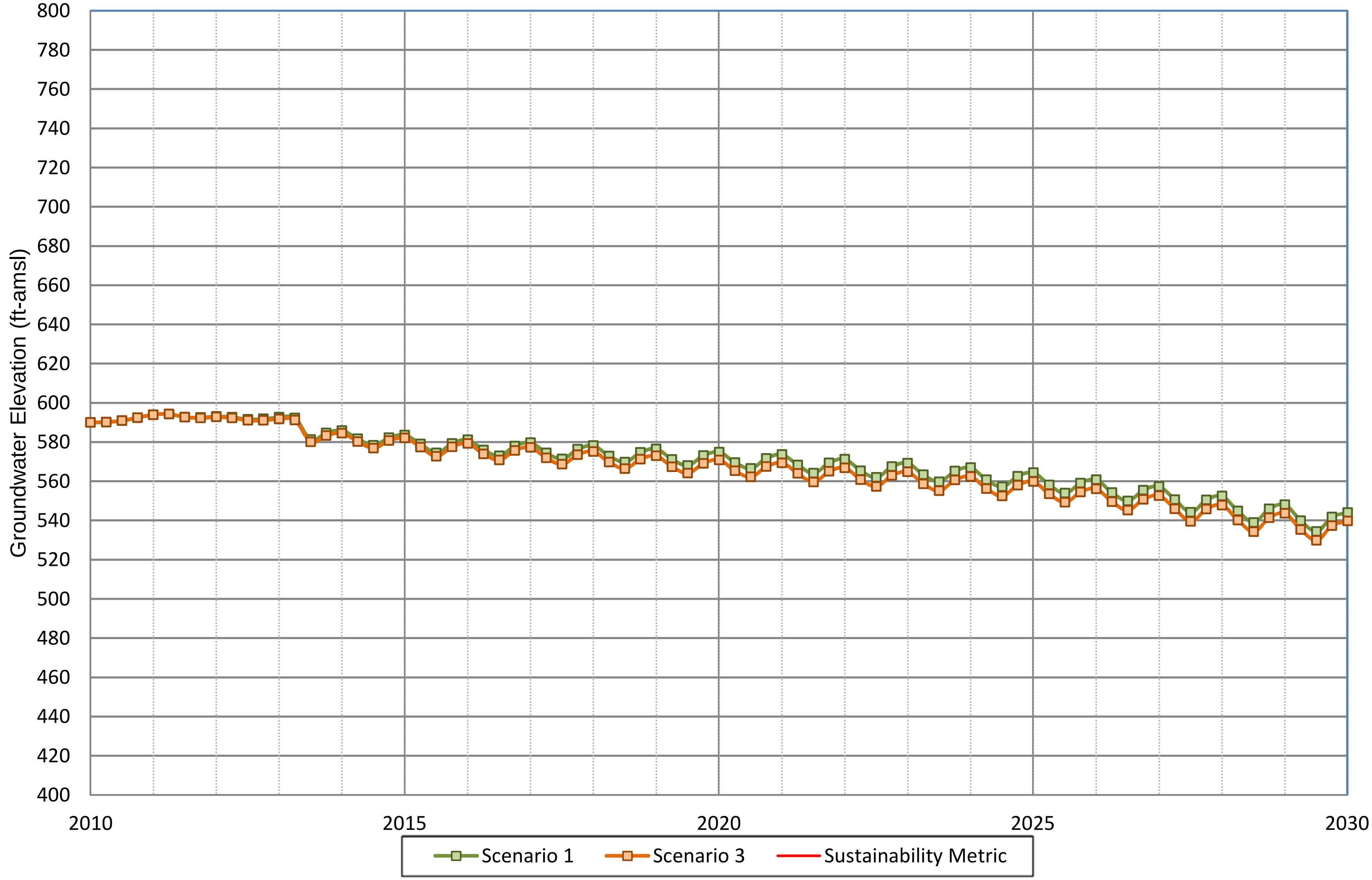
Figure A-112
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 48



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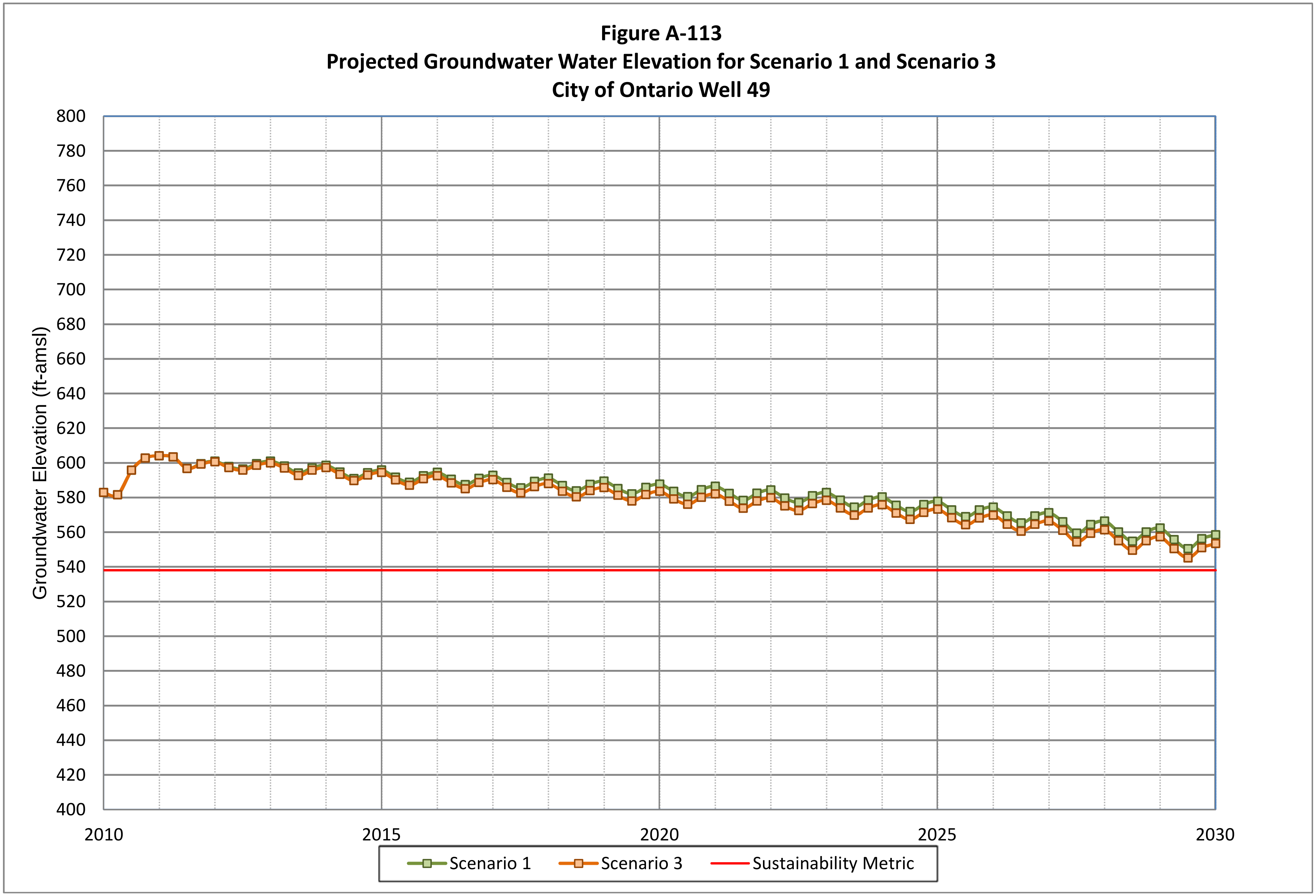

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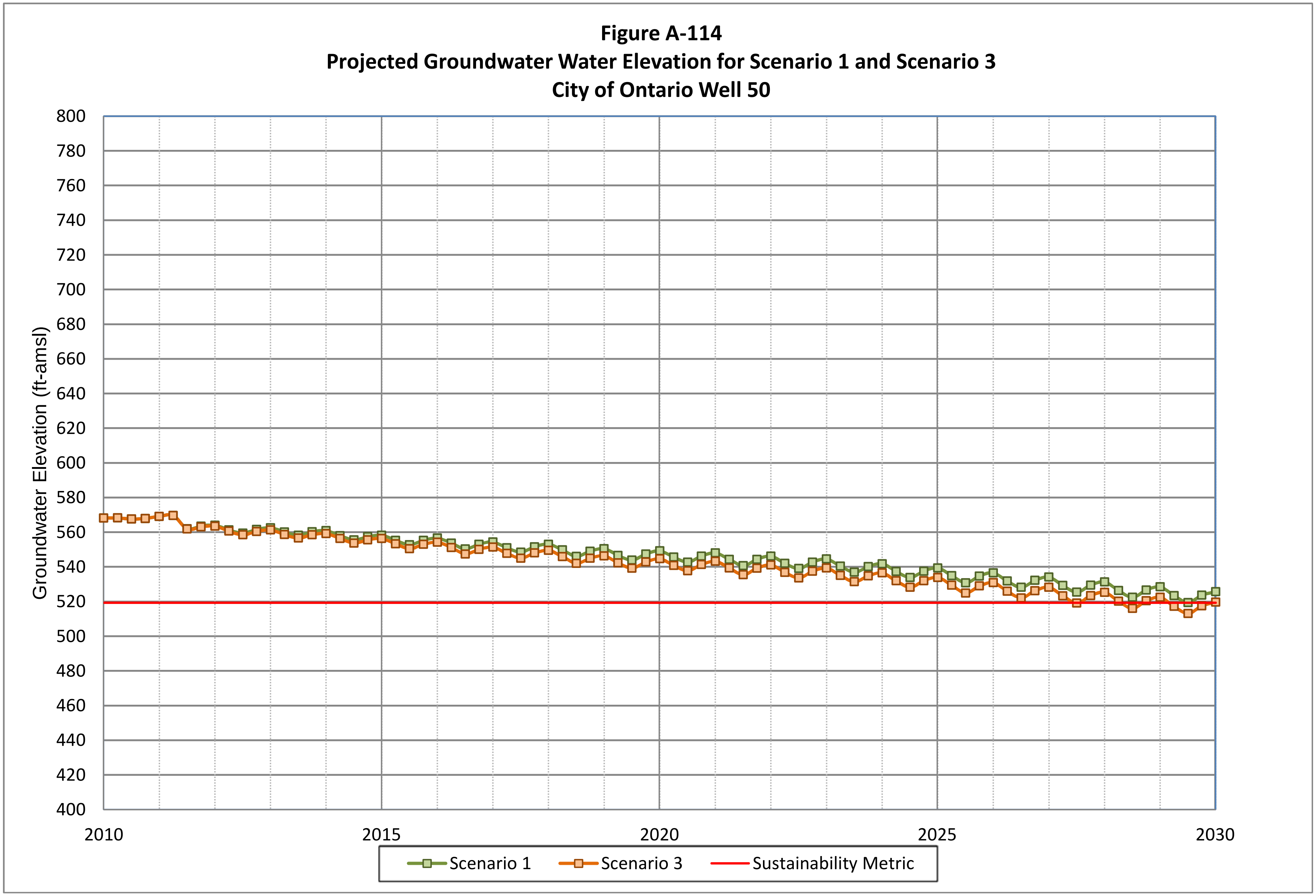

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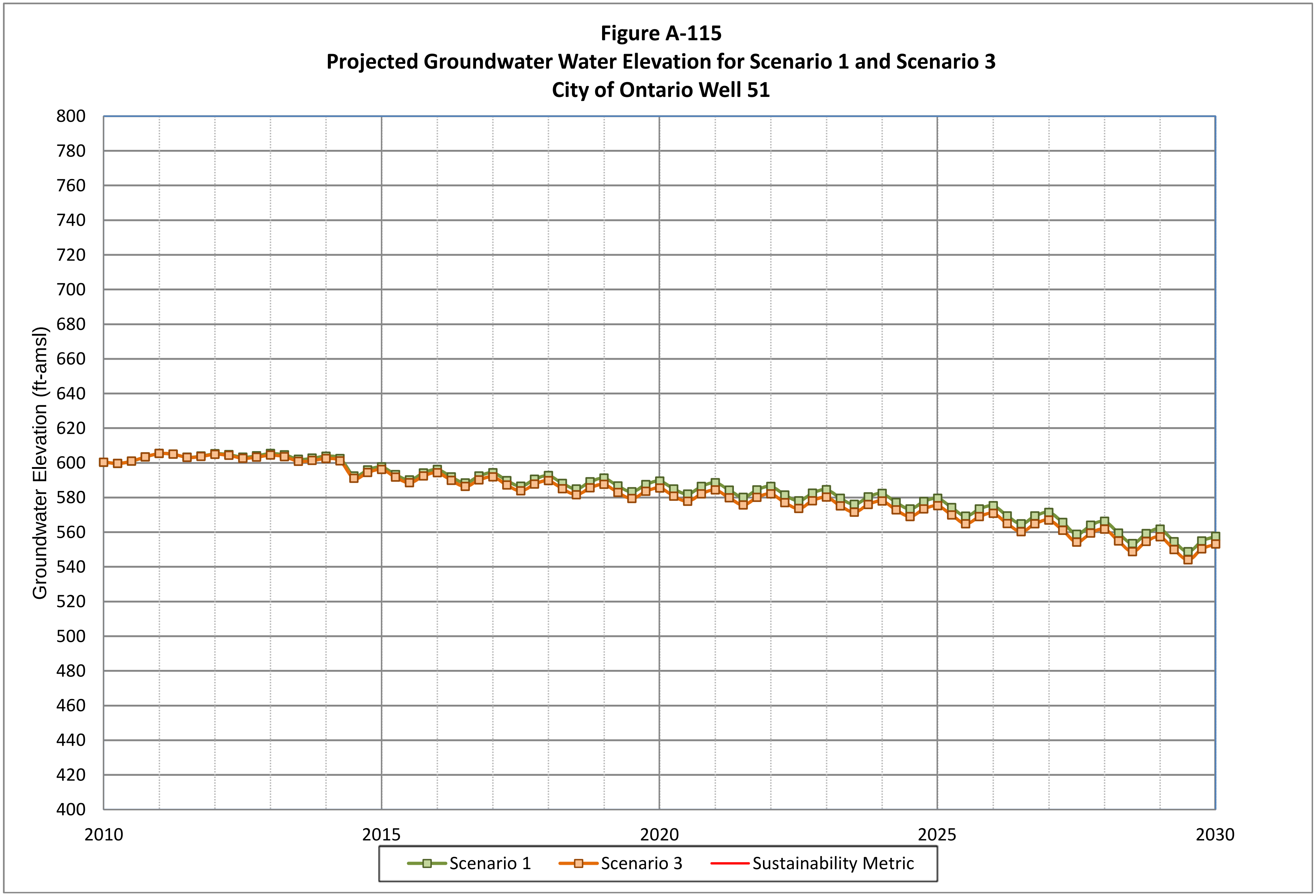

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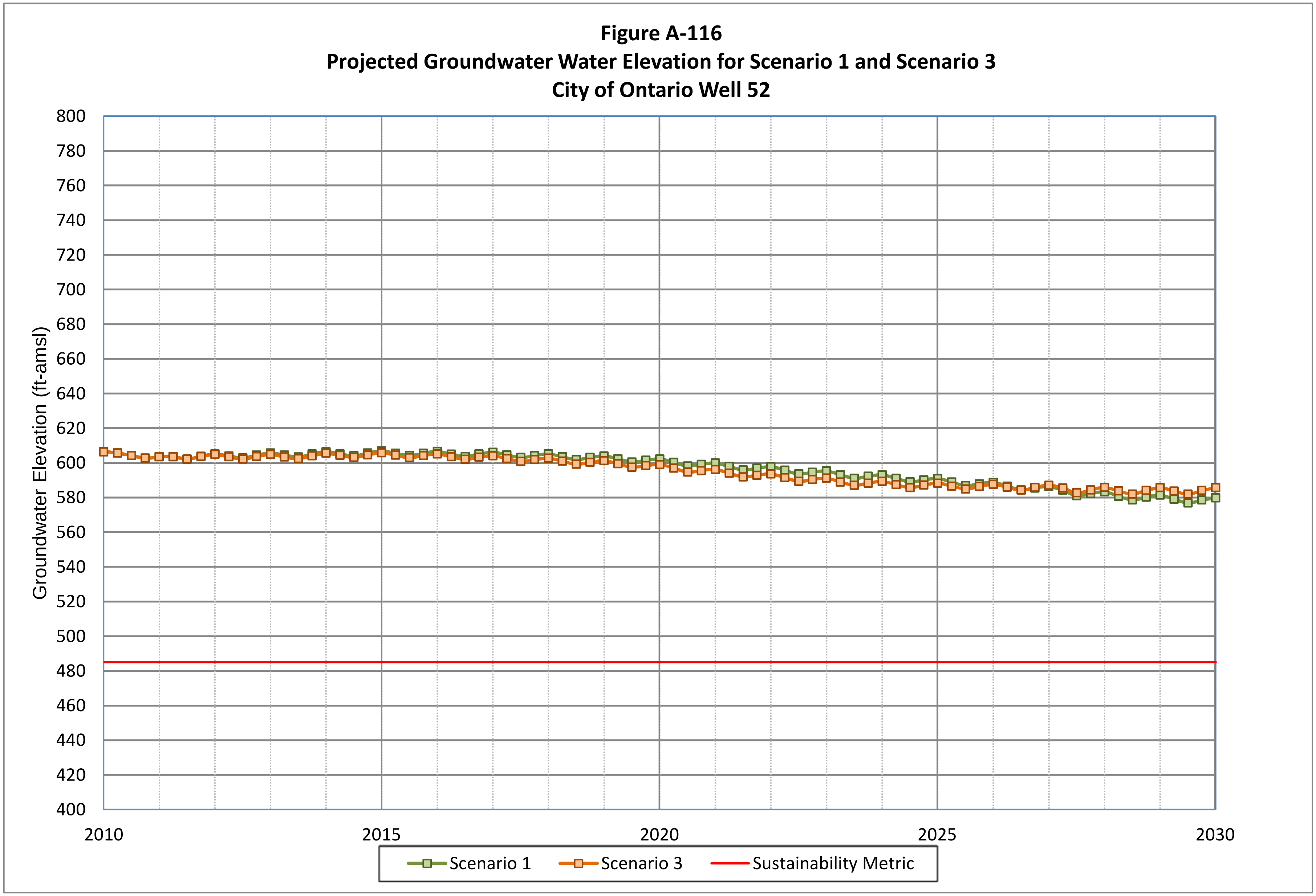

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Figure A-117
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 100

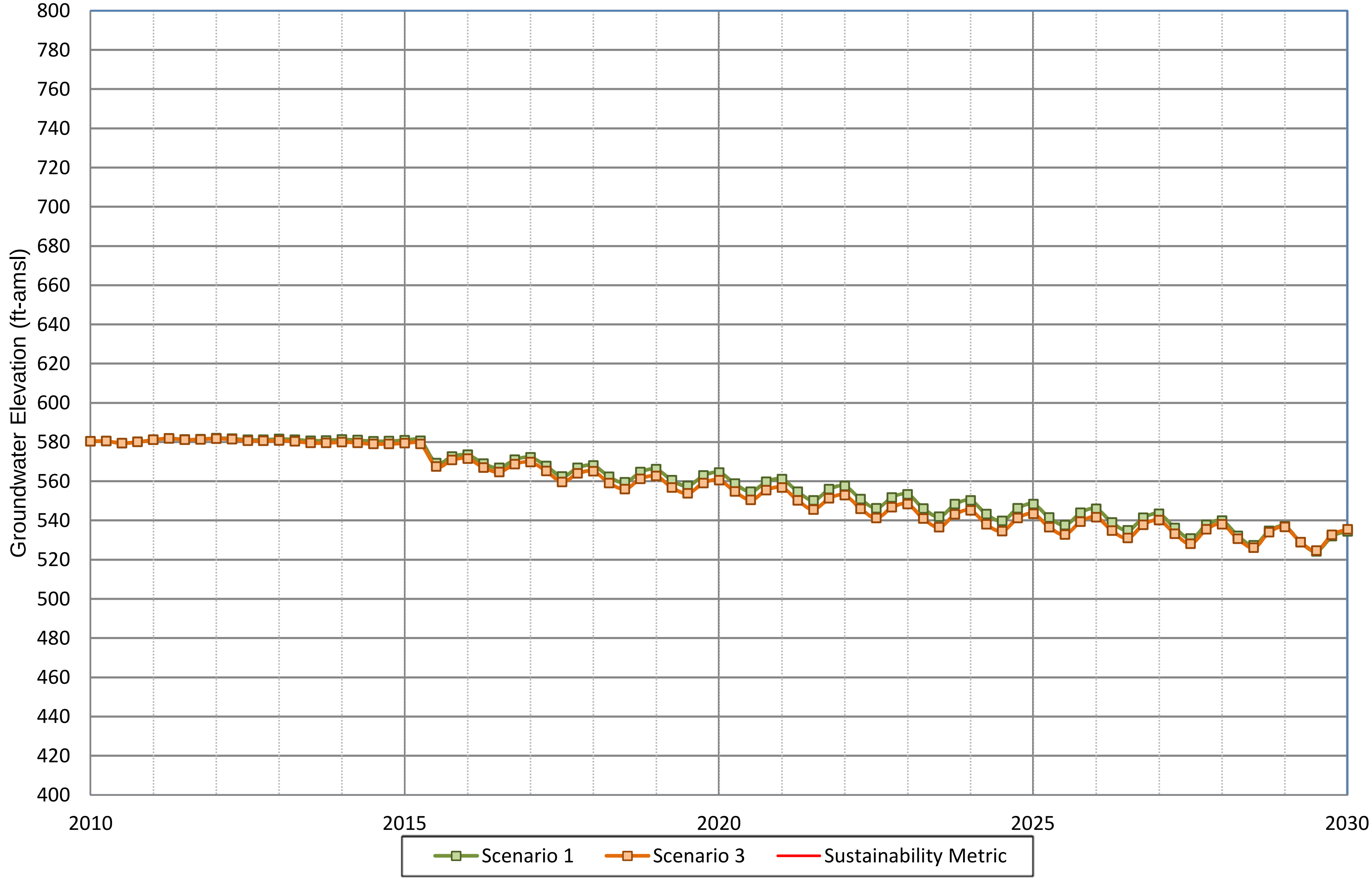
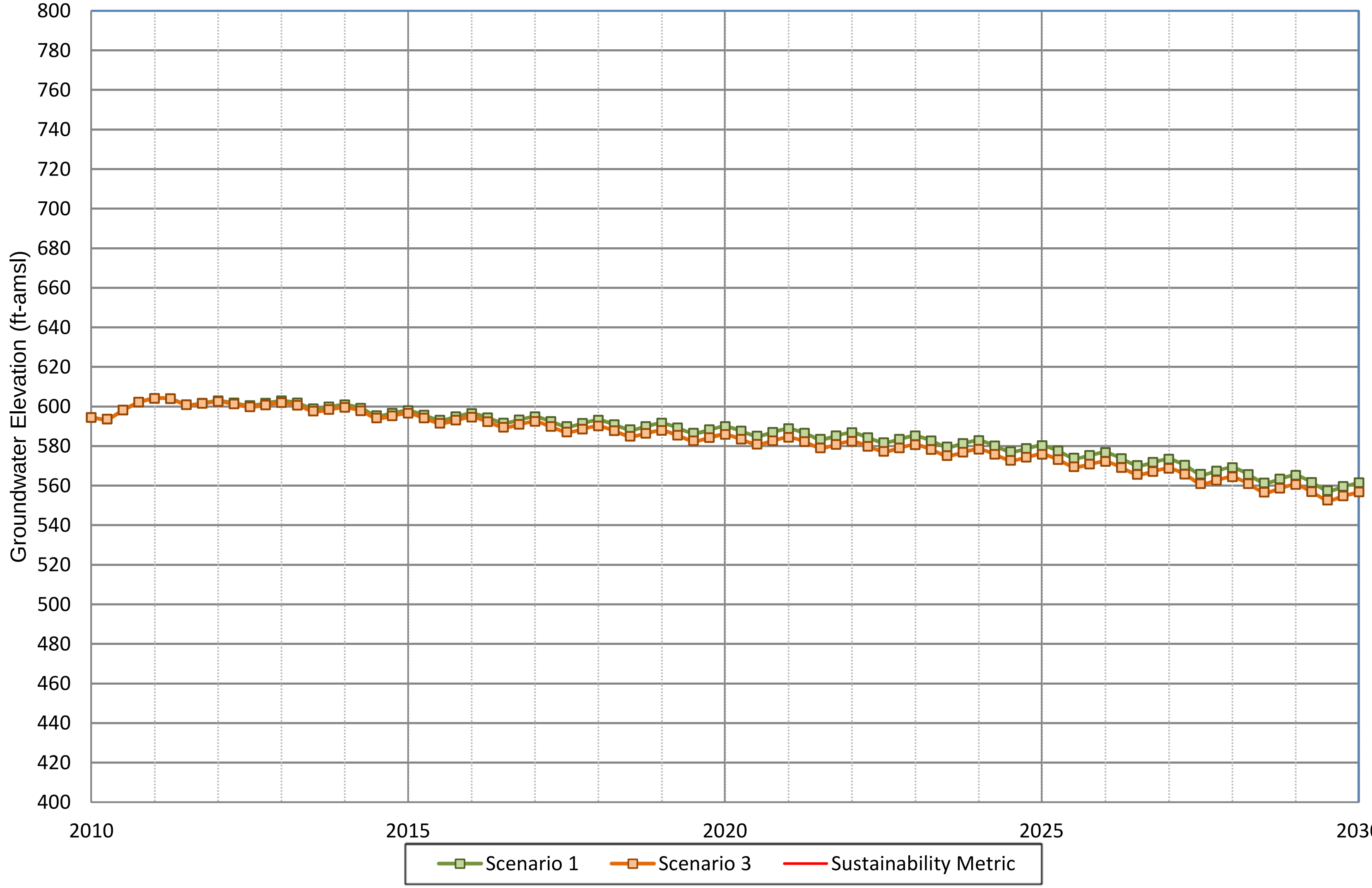
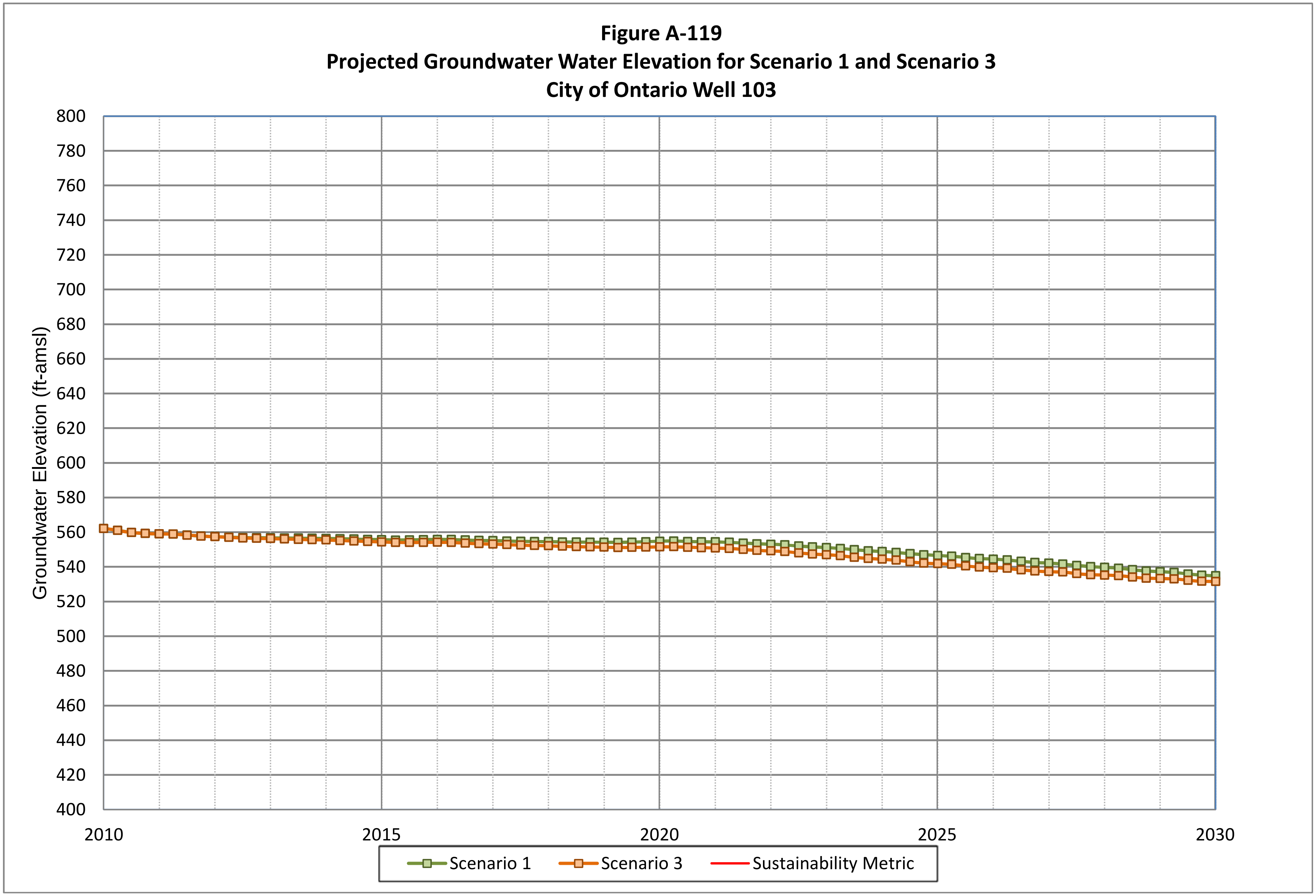


Figure A-118
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 101





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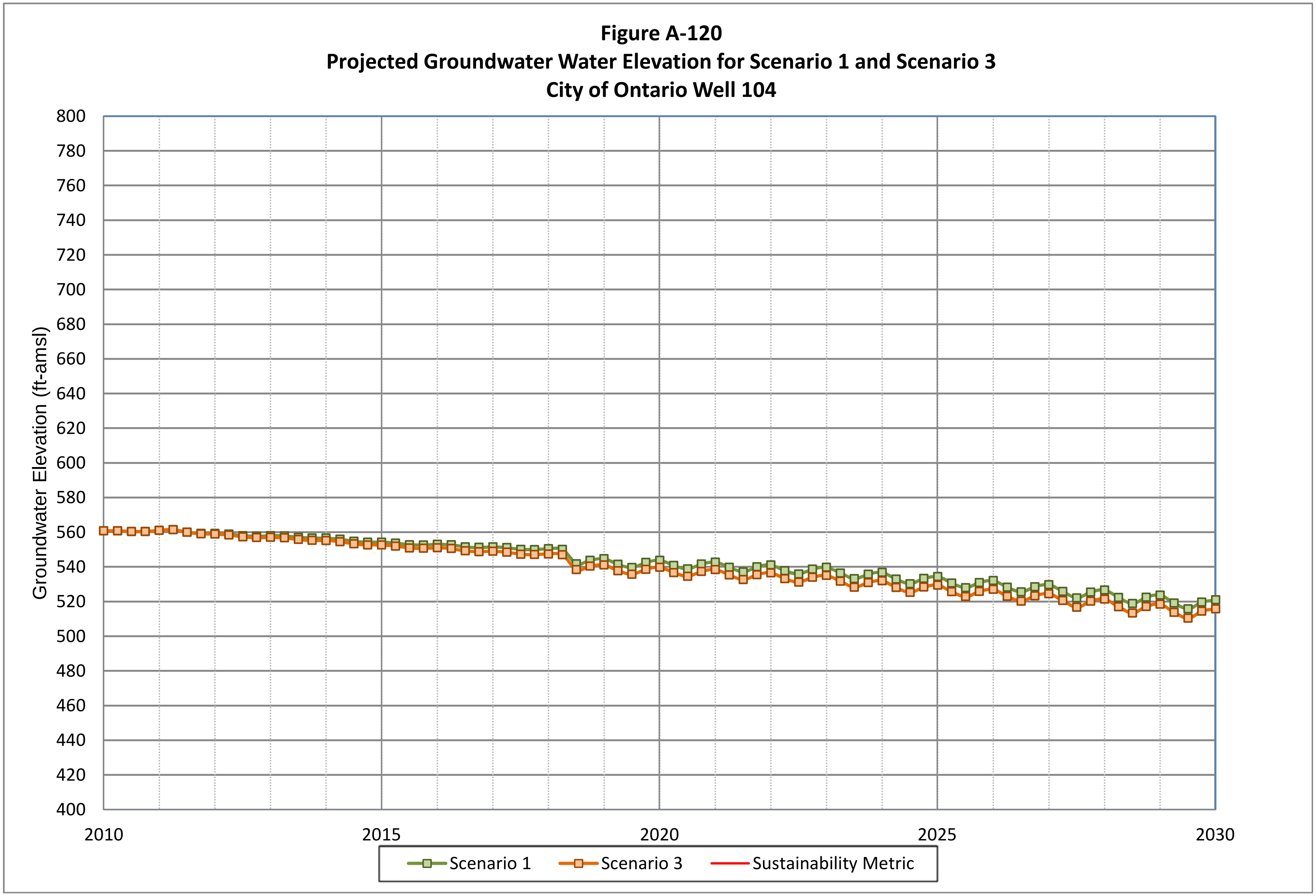

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Figure A-121
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 105

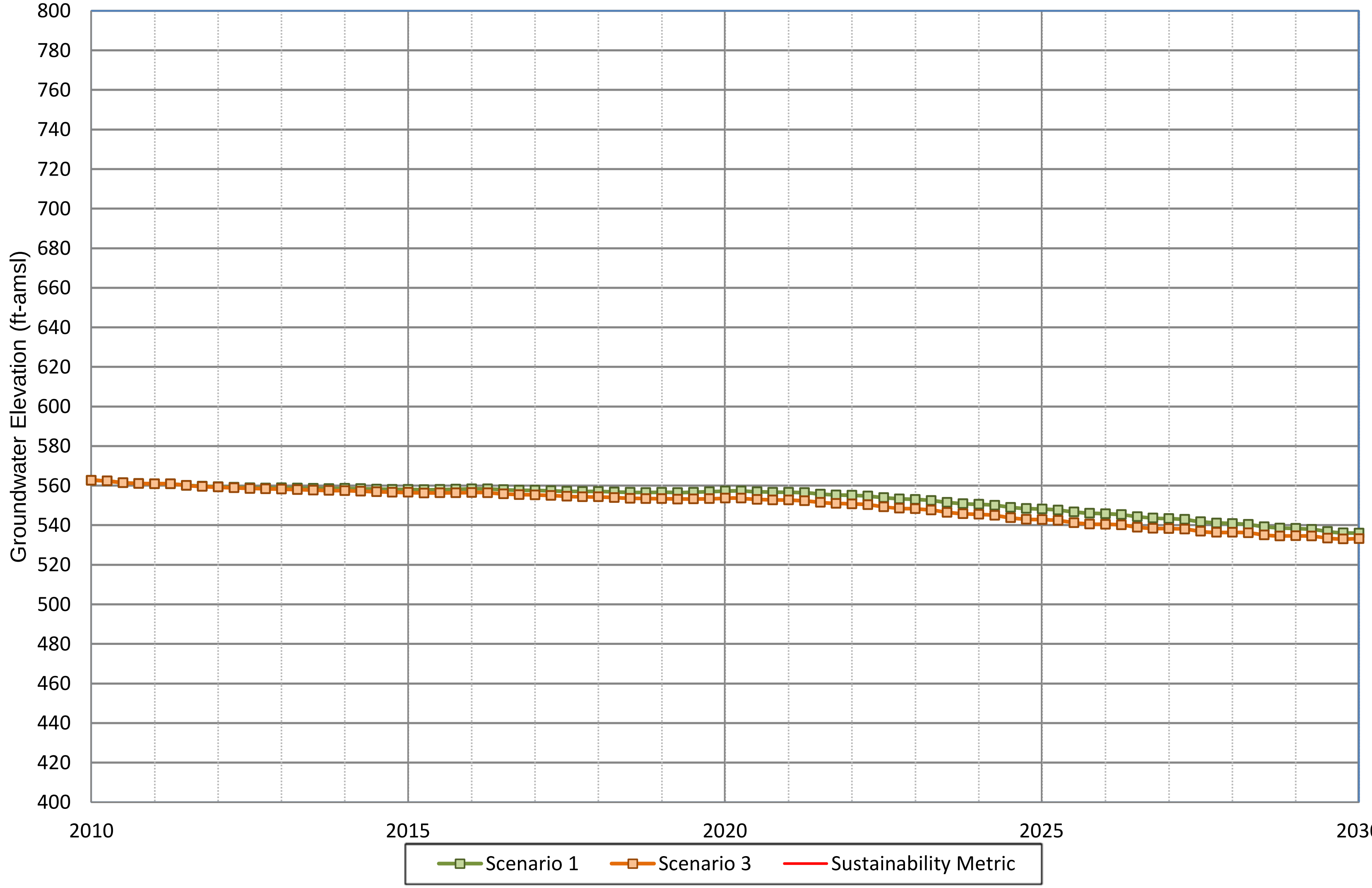

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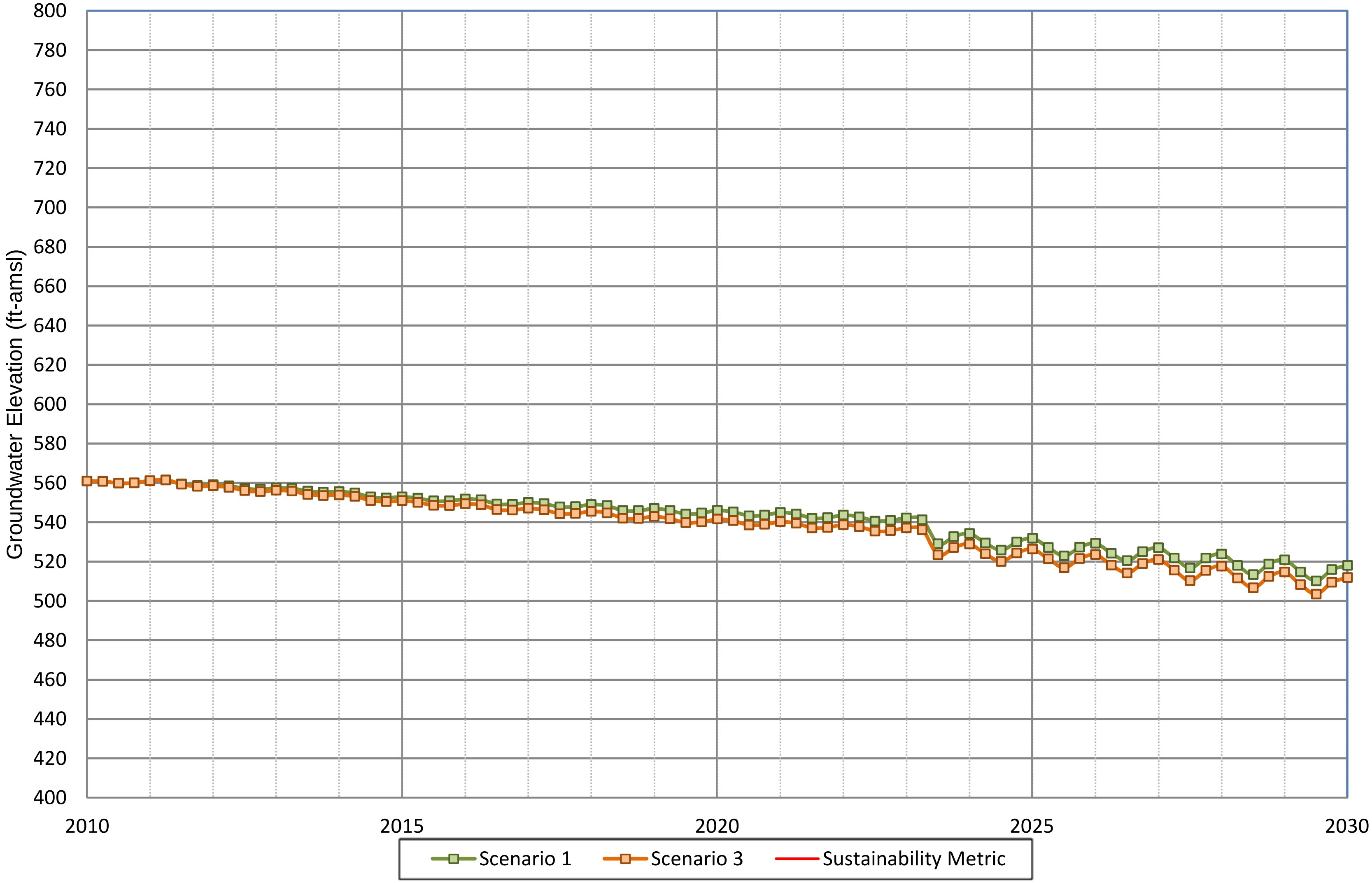
Figure A-122
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 106



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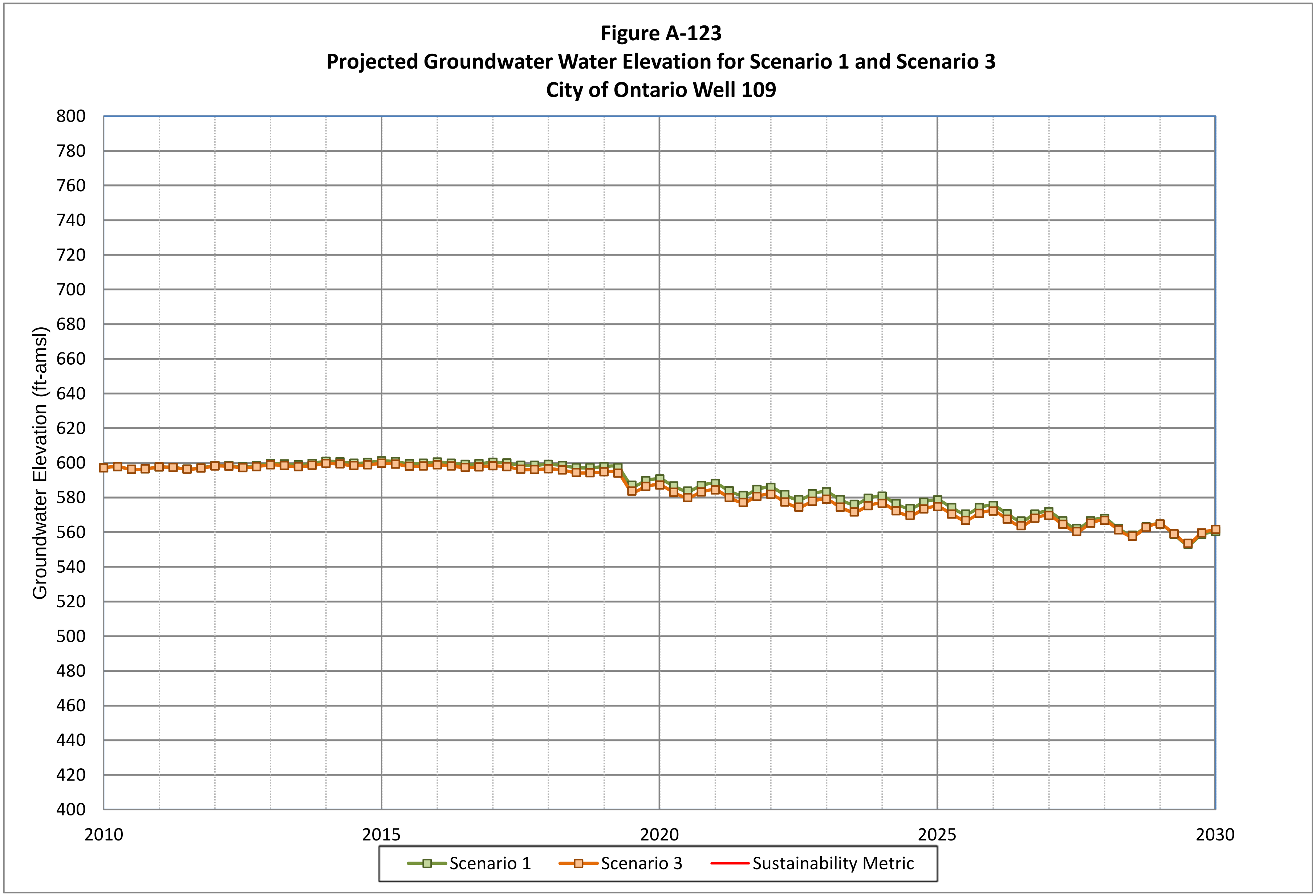

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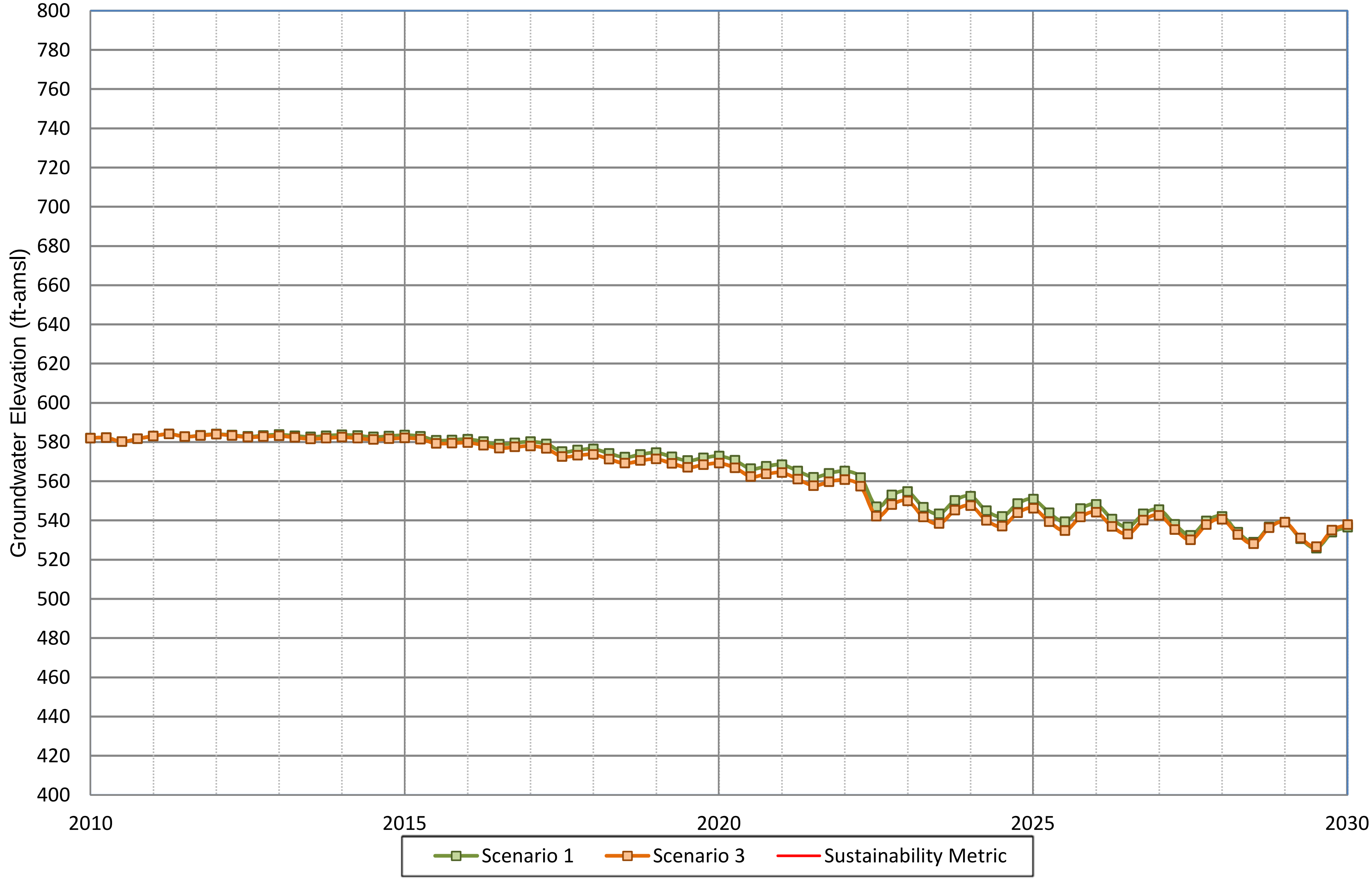
Figure A-124
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 111



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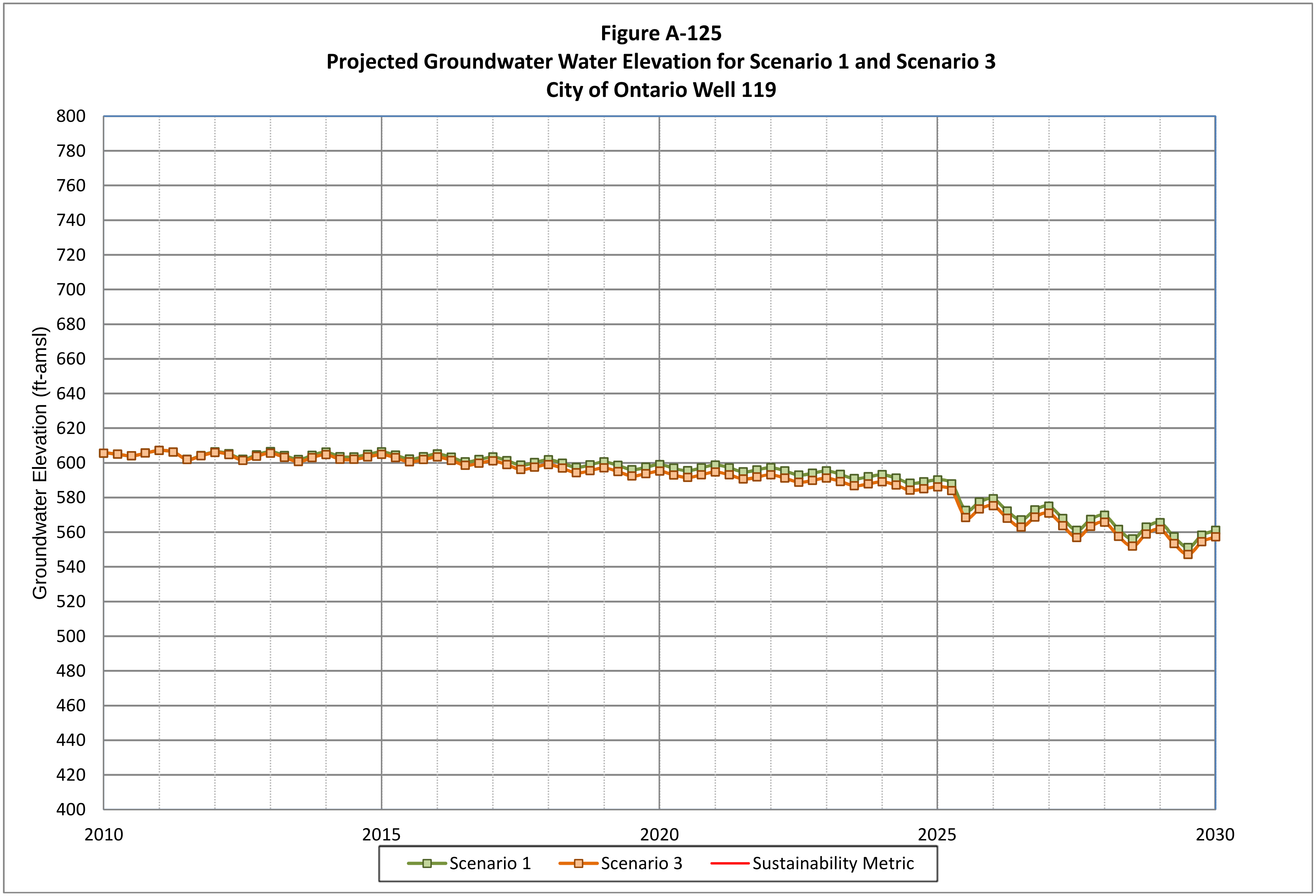

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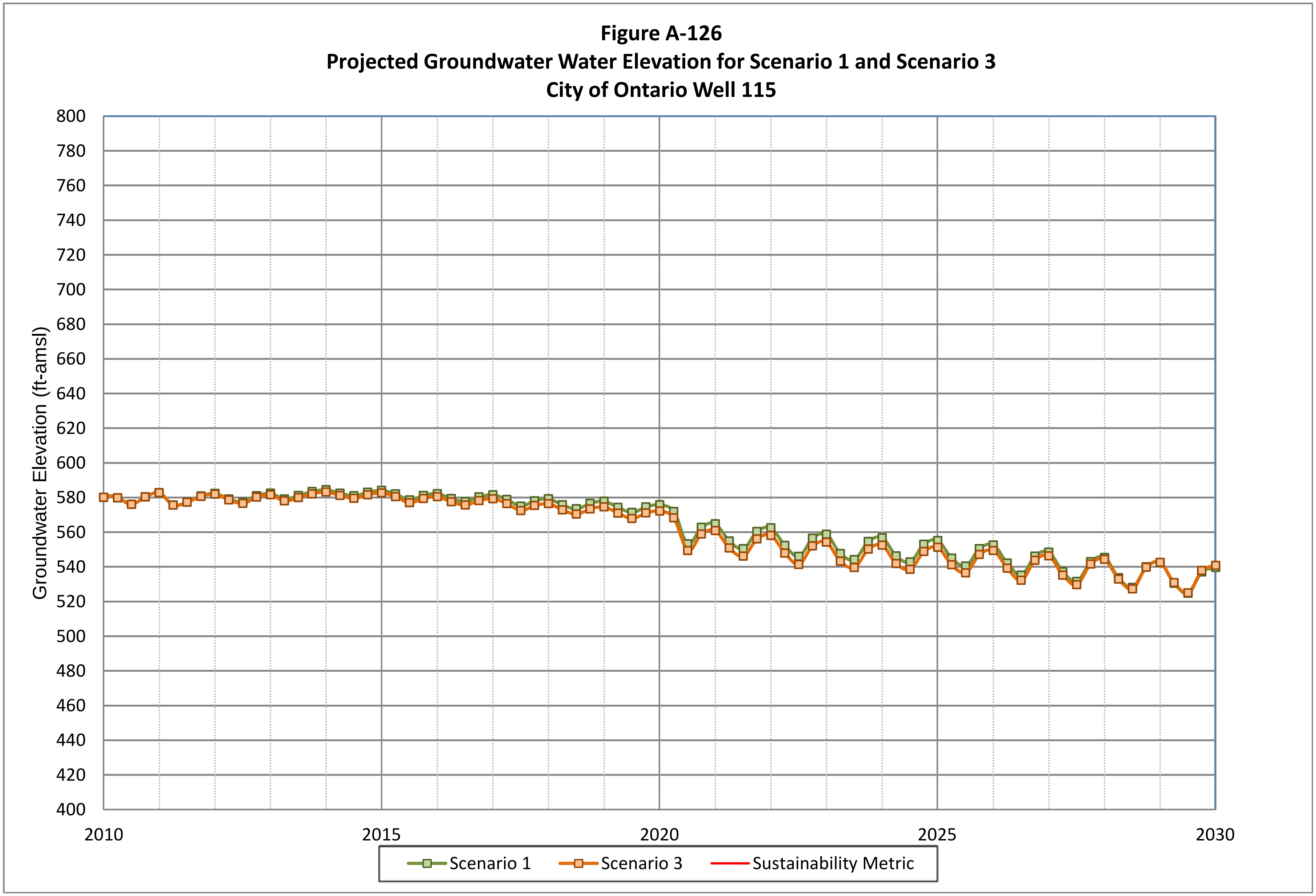

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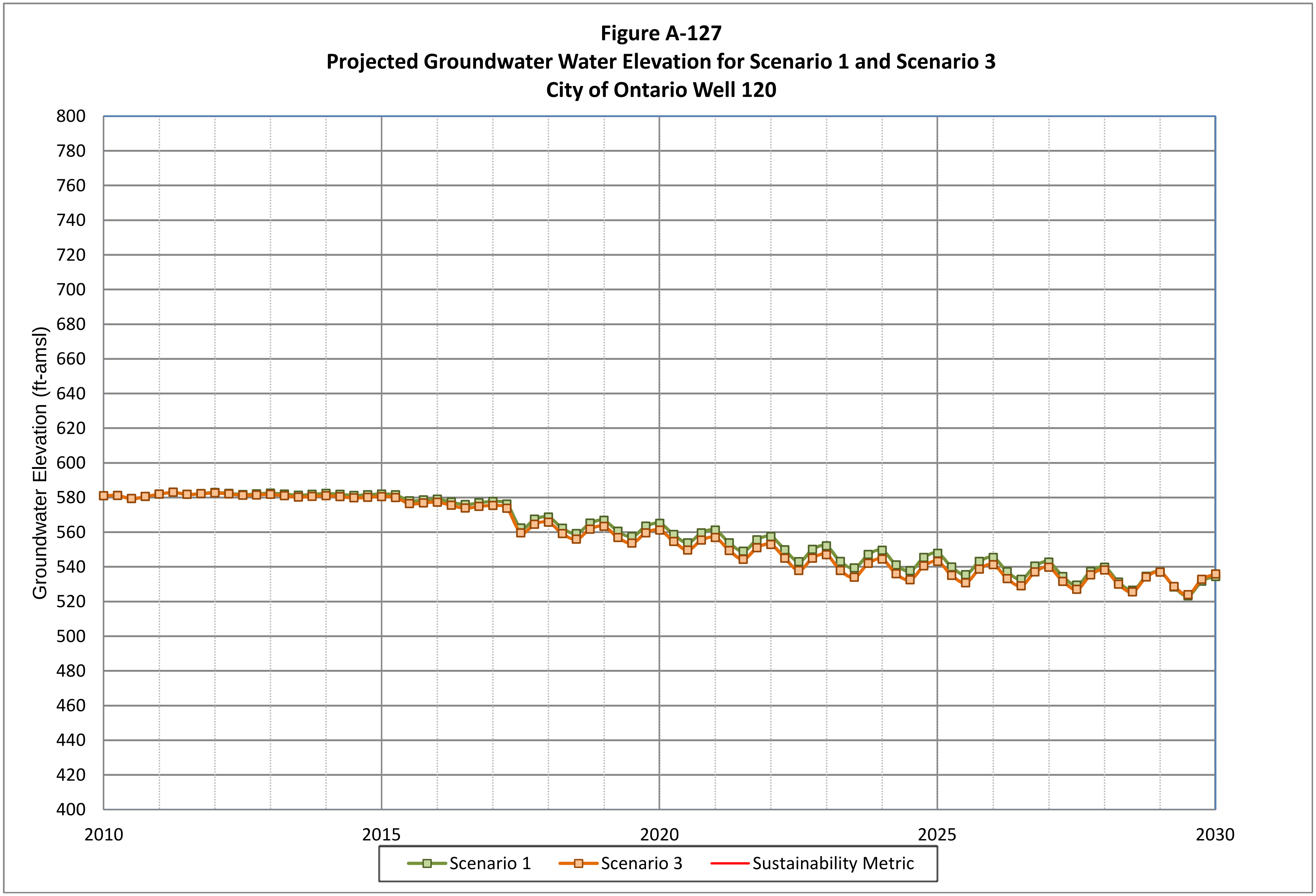

20120503_Projected_Hydrographs.xlsx

Figure A-128
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 126

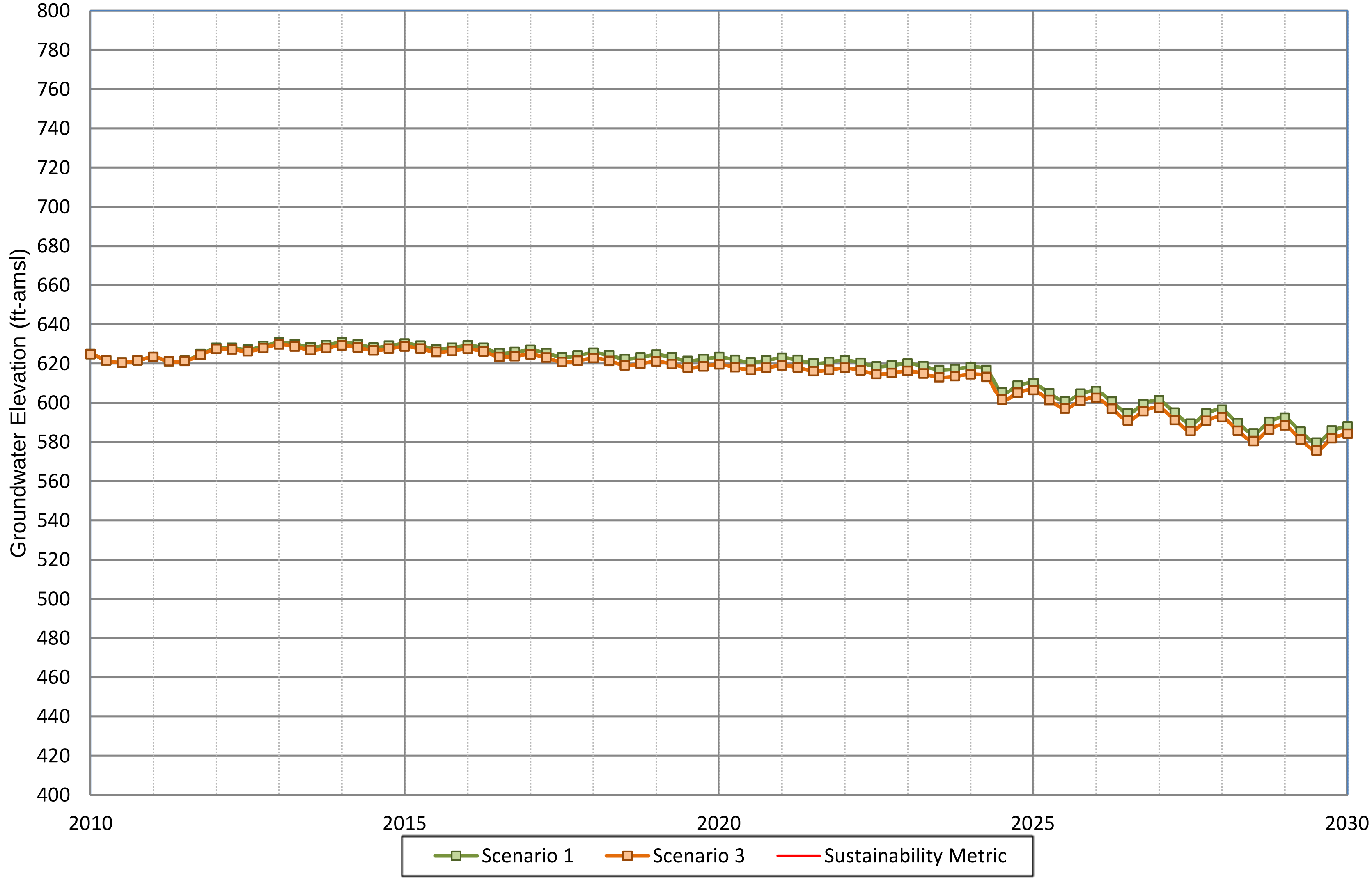

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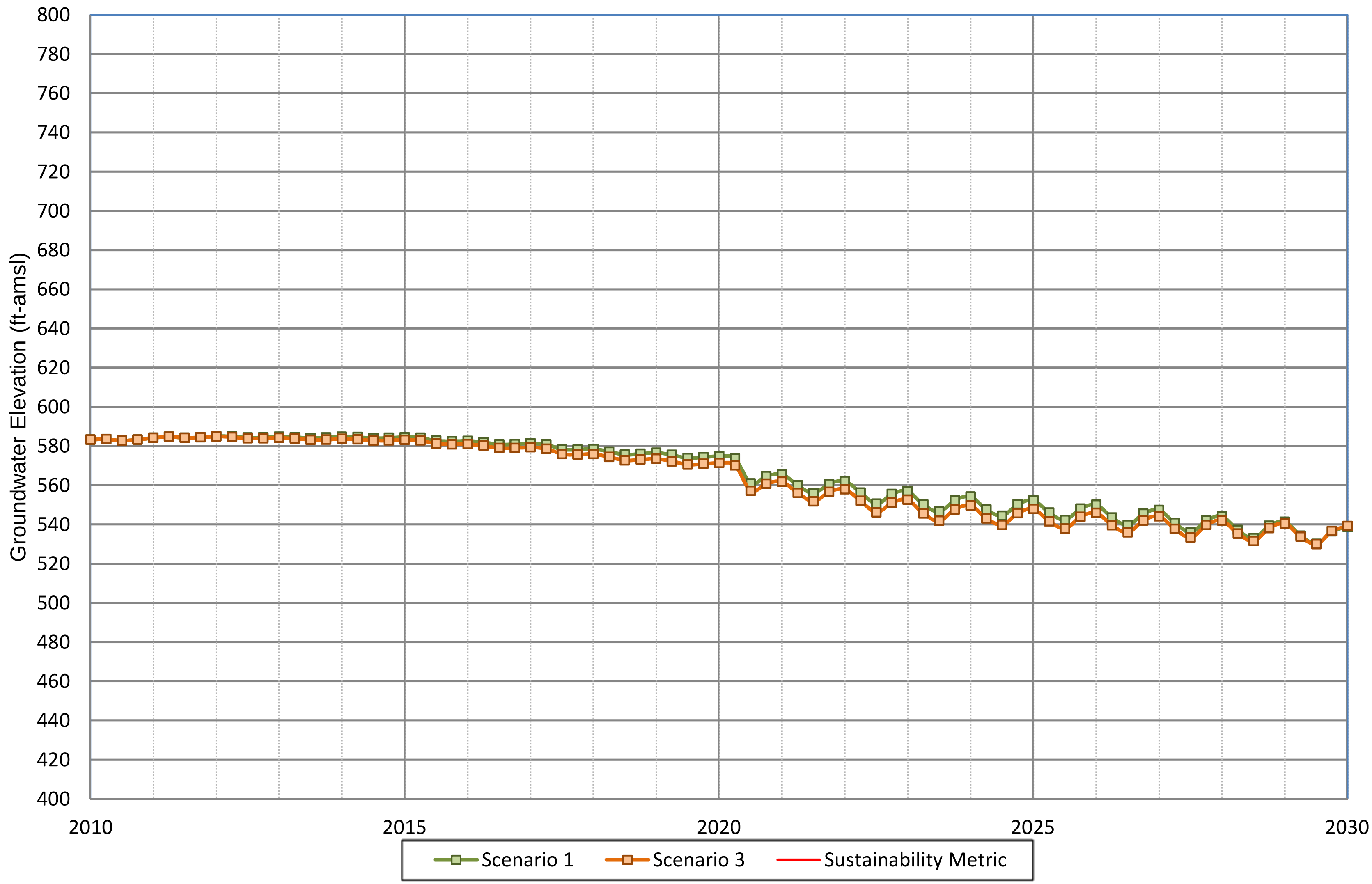
Figure A-129
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 134



20120503_Projected_Hydrographs.xlsx

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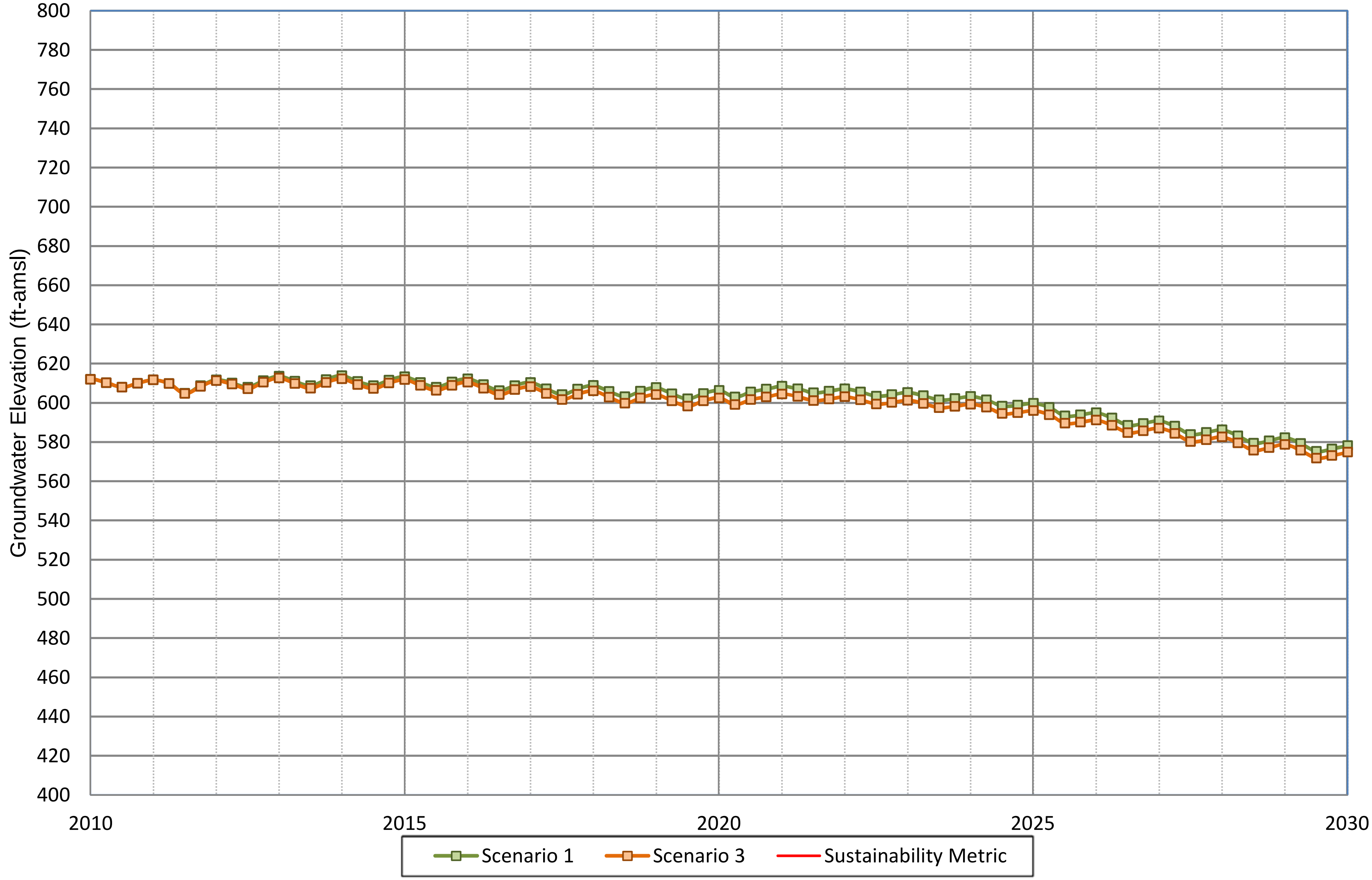
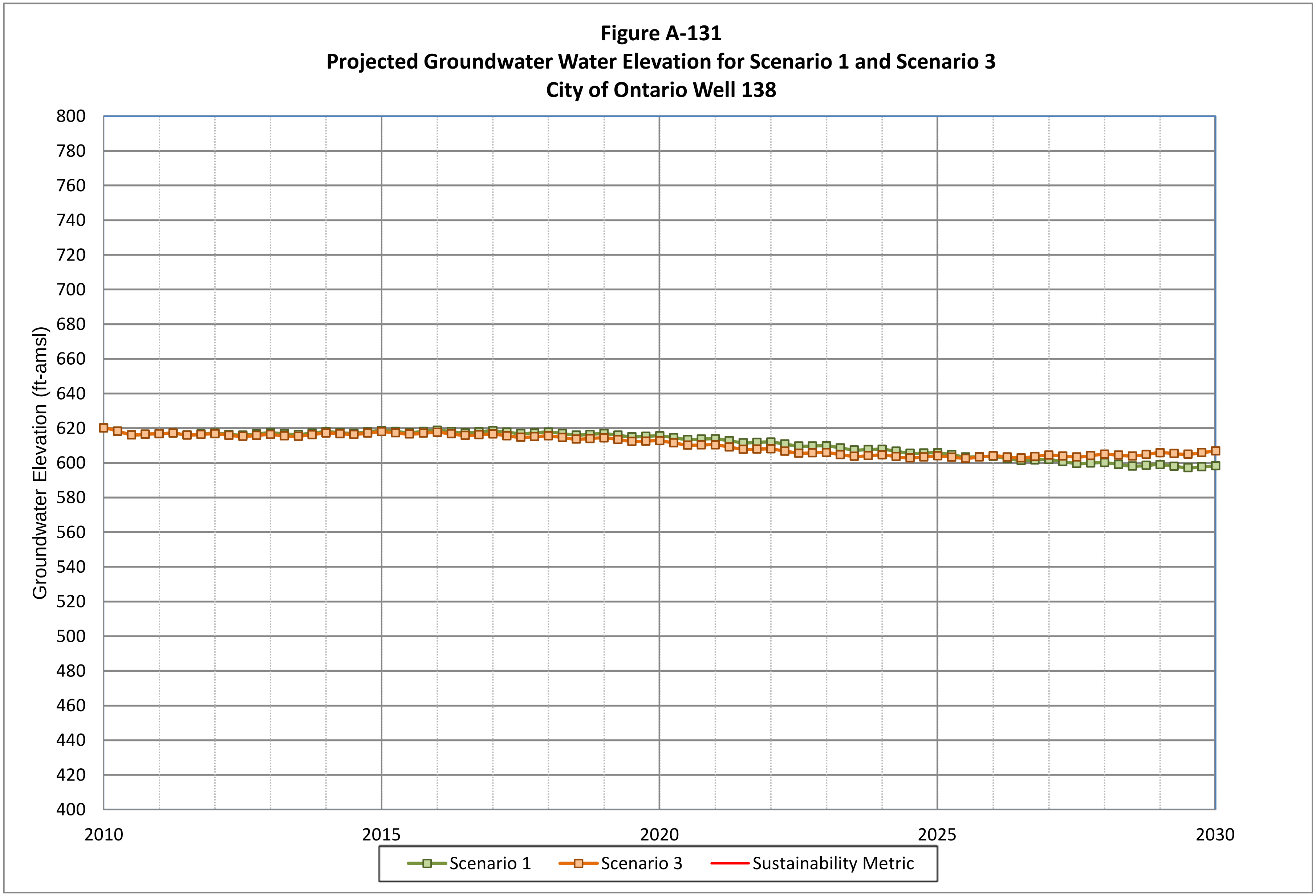
Figure A-130
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Ontario Well 136





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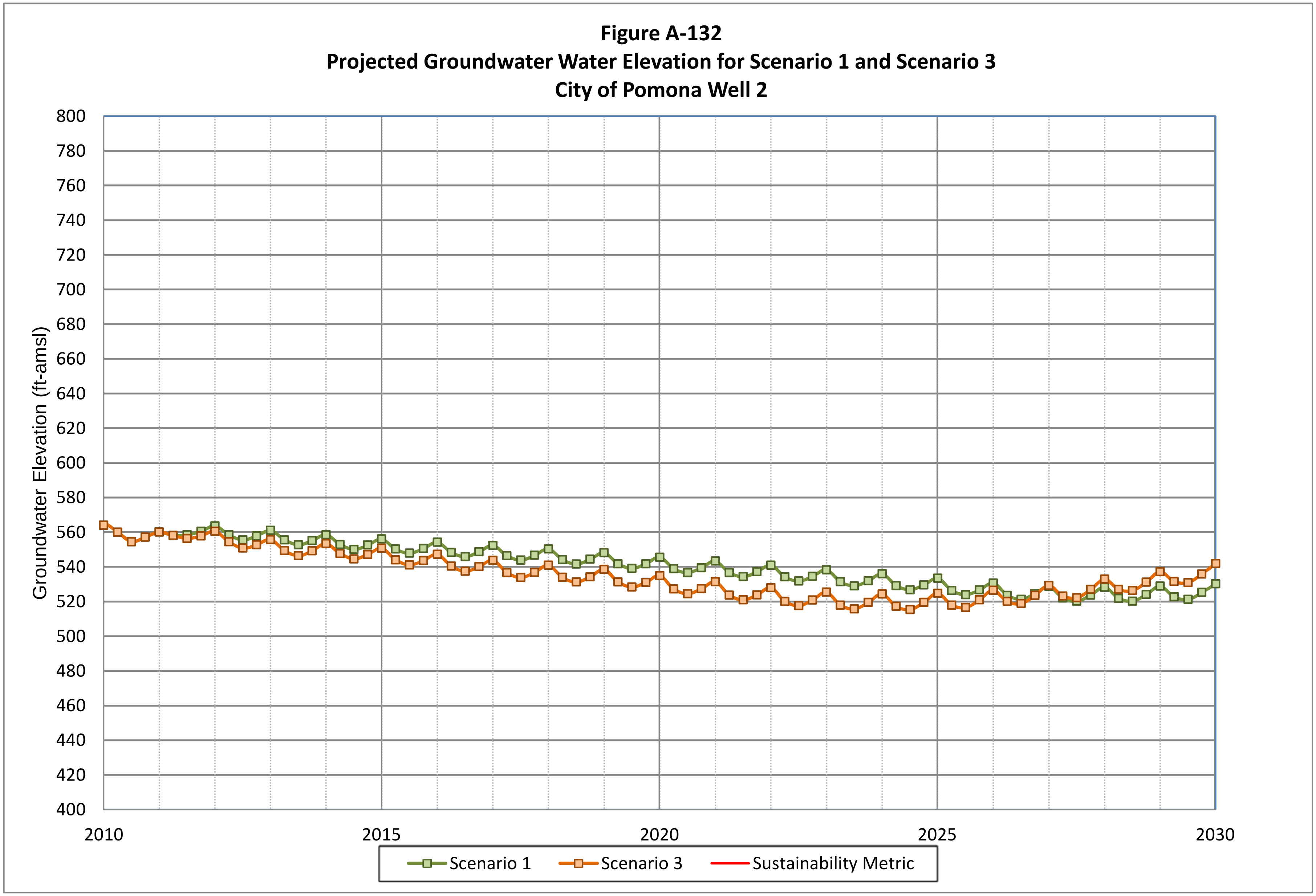

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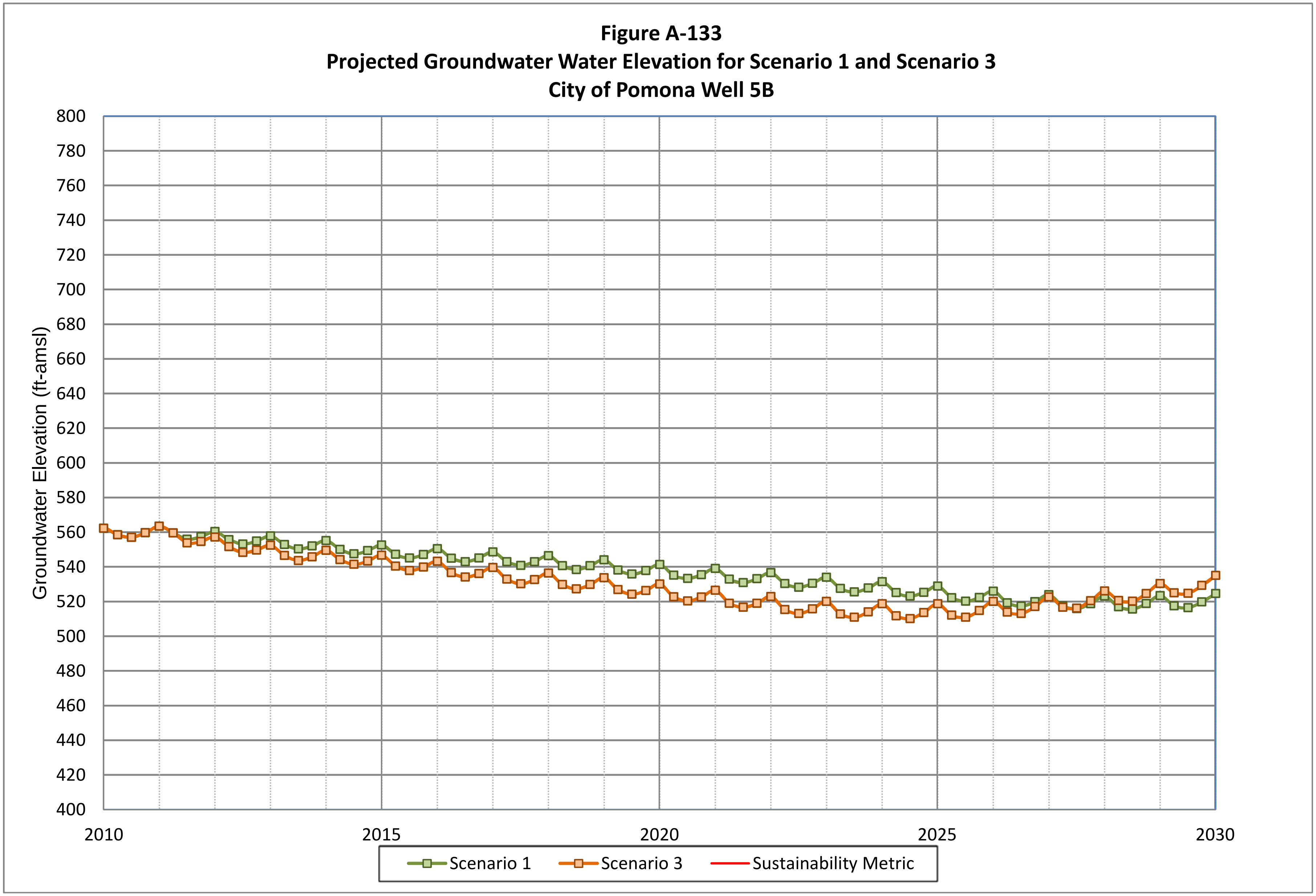

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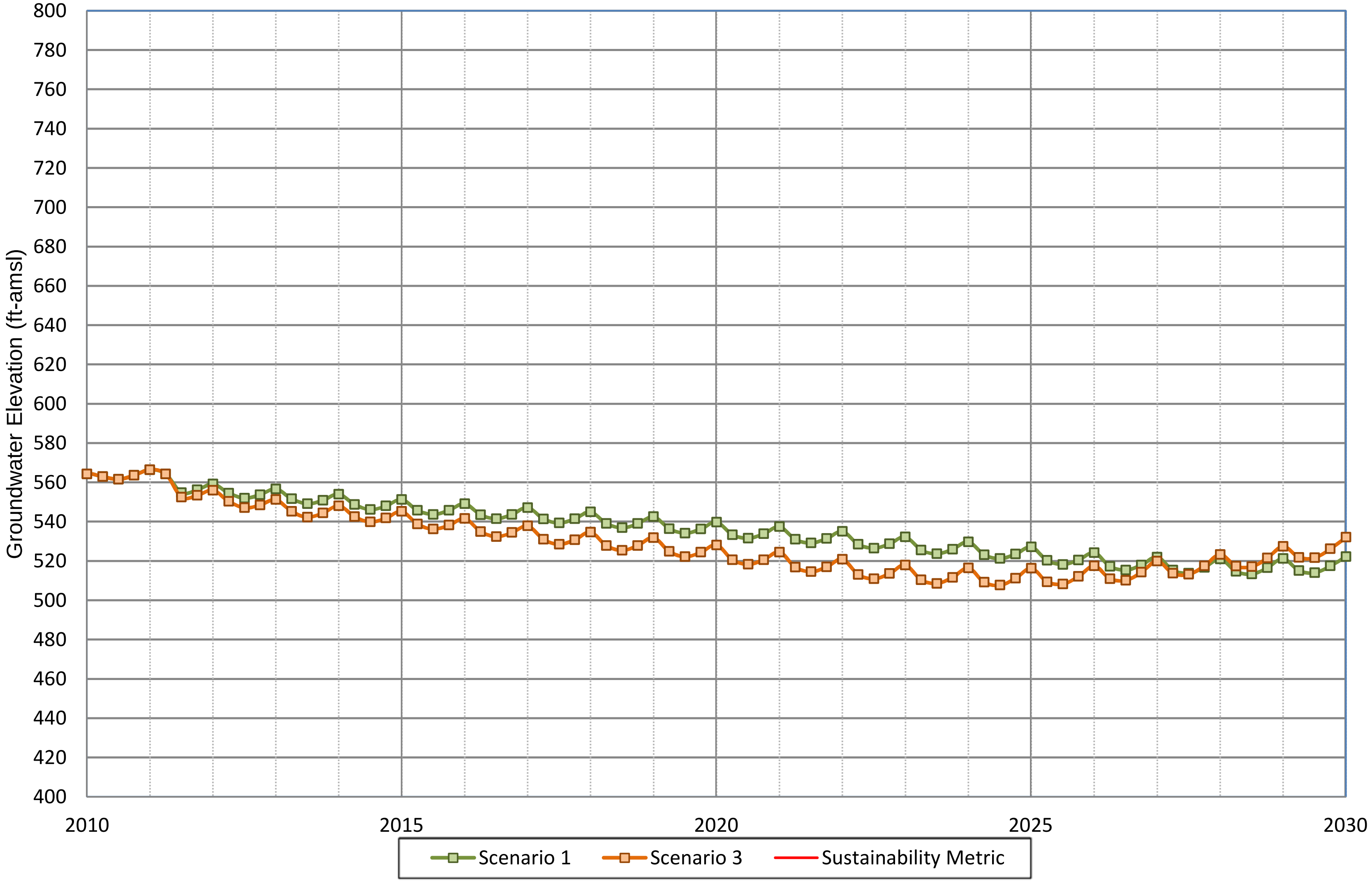
Figure A-134
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 6



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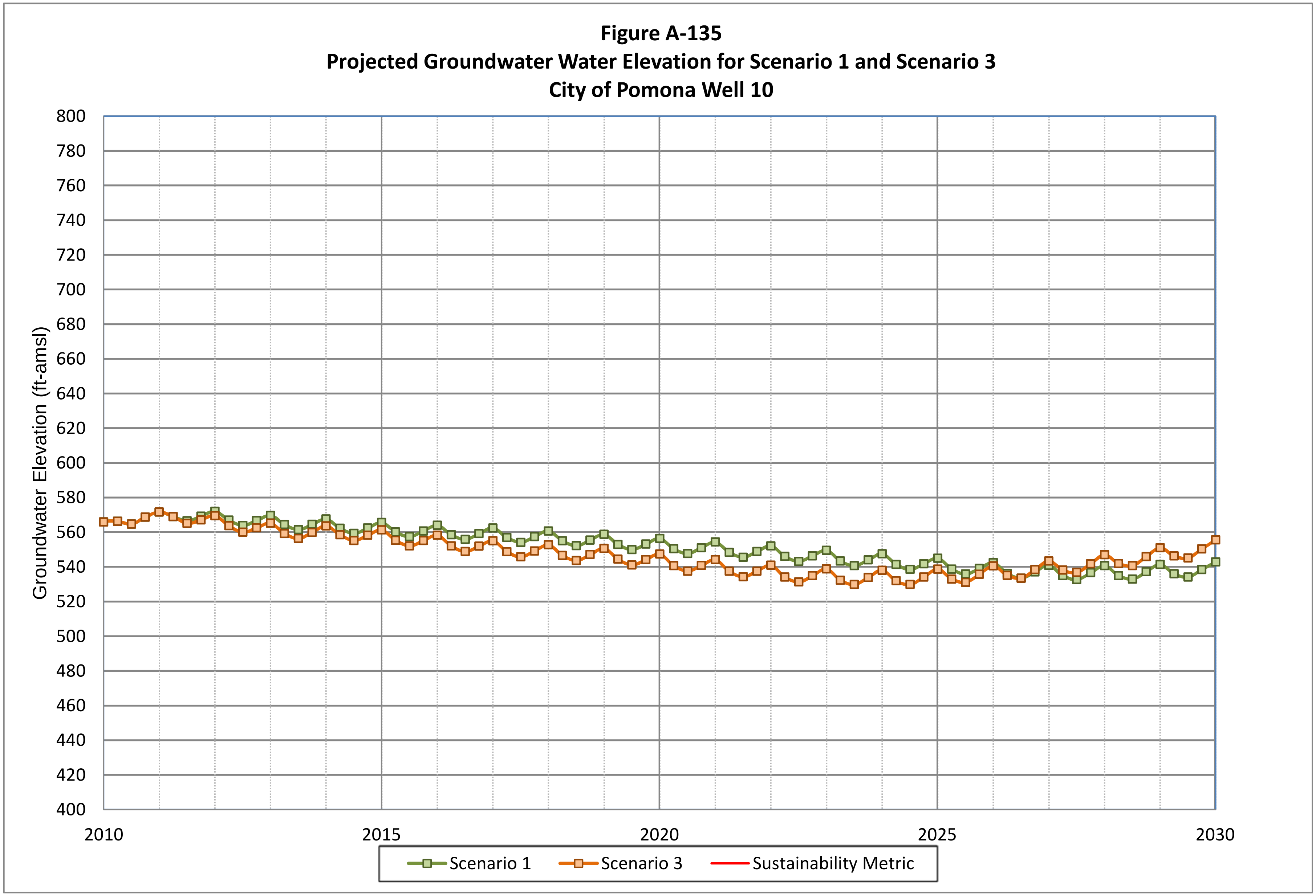
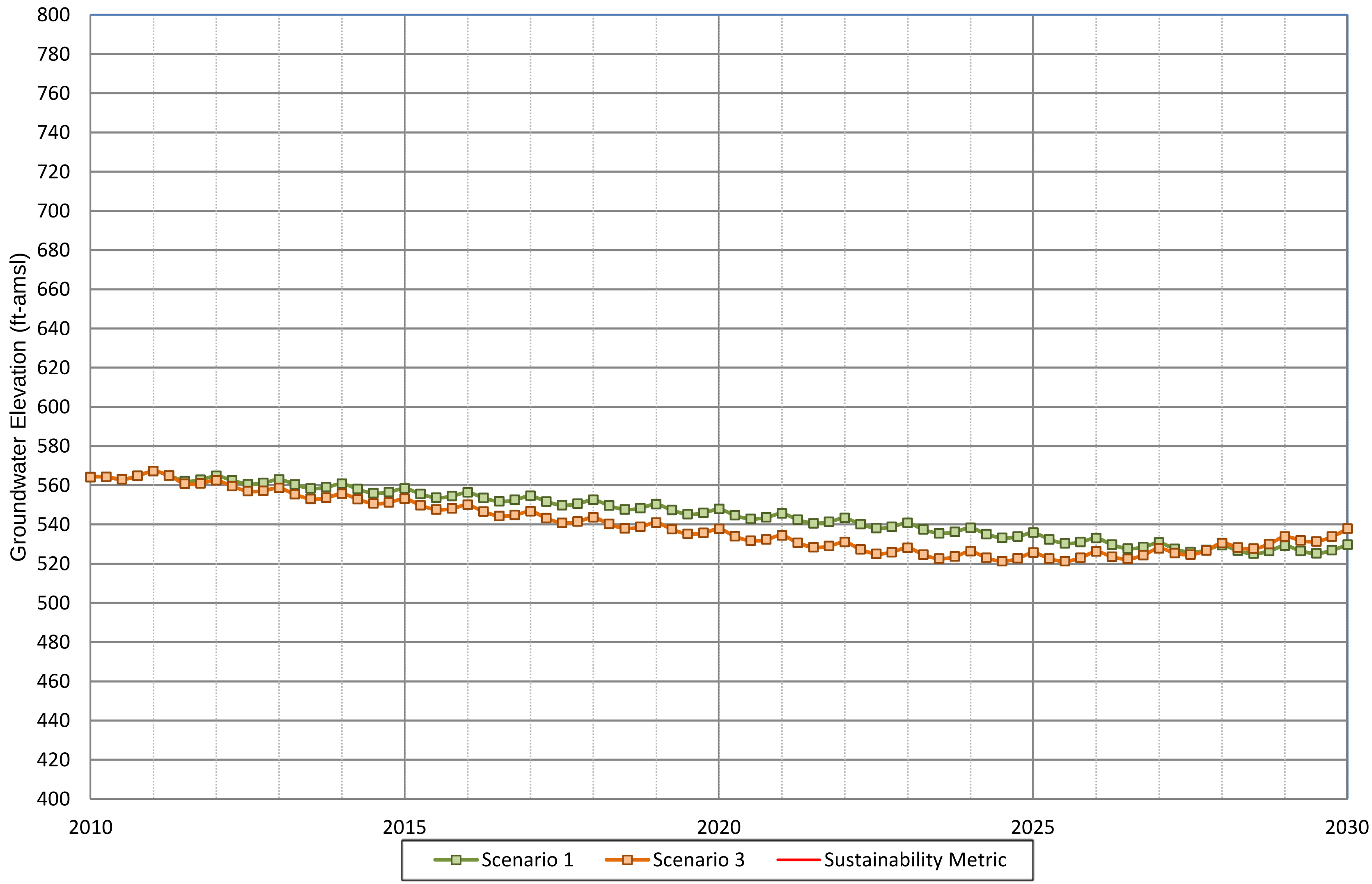
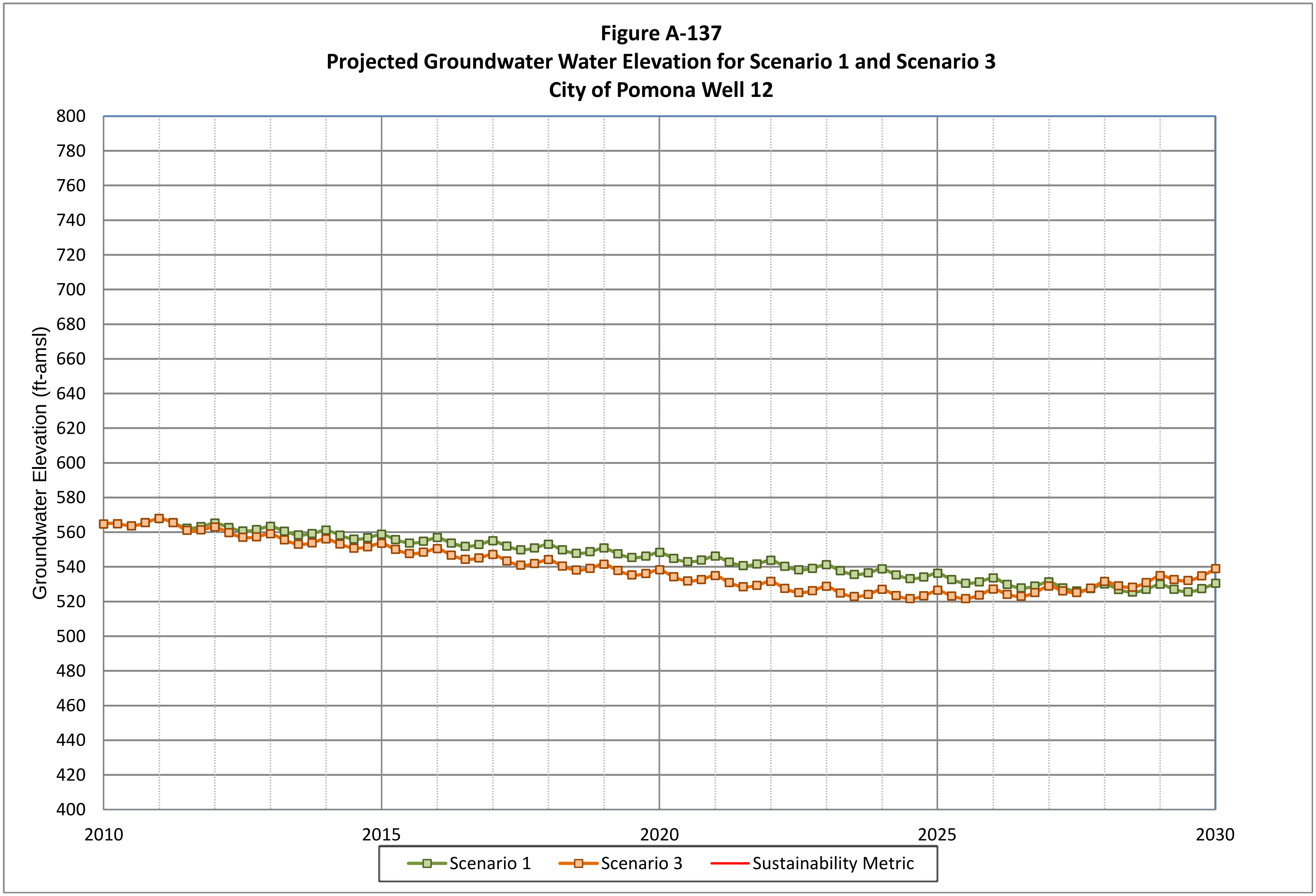


20120503_Projected_Hydrographs.xlsx

Figure A-136
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 11





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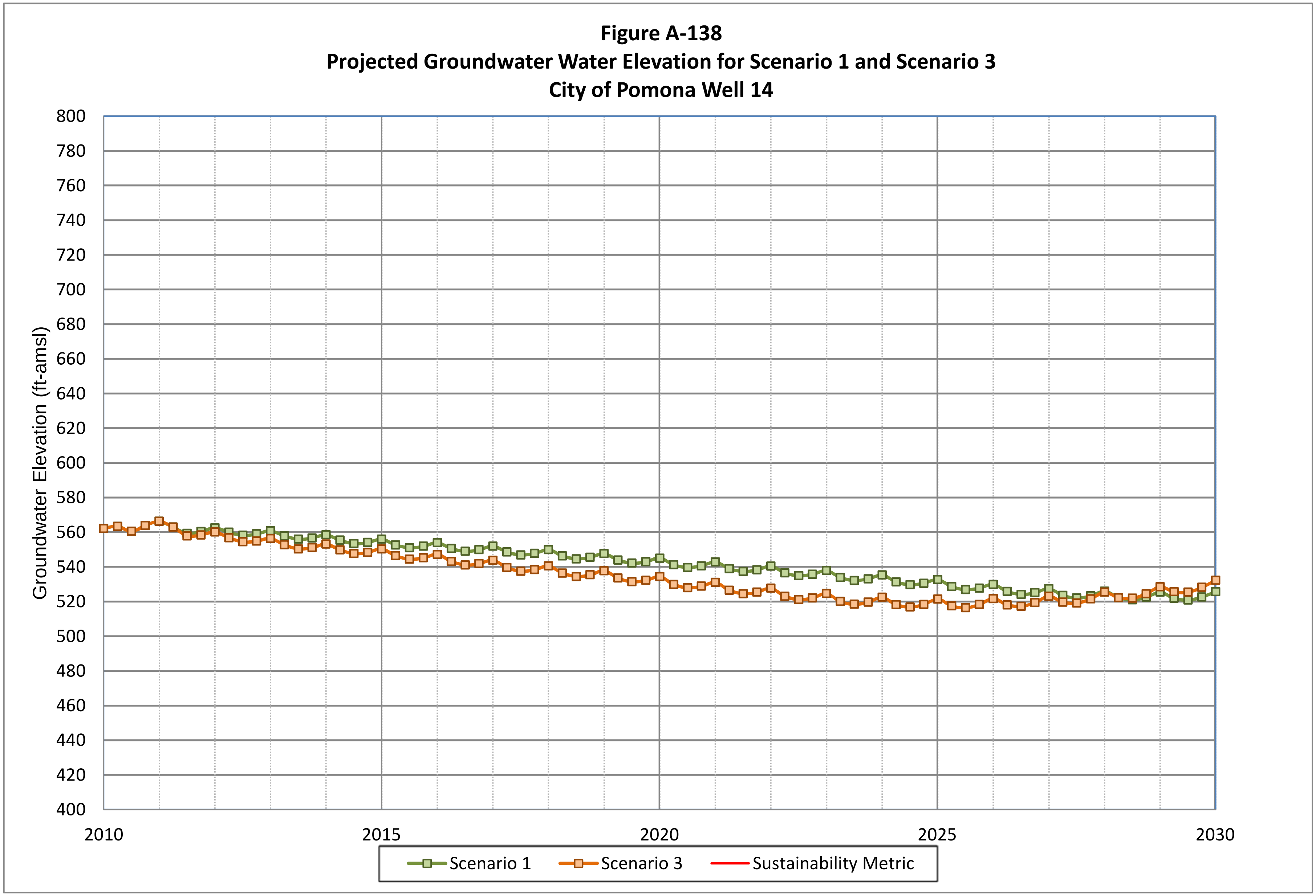

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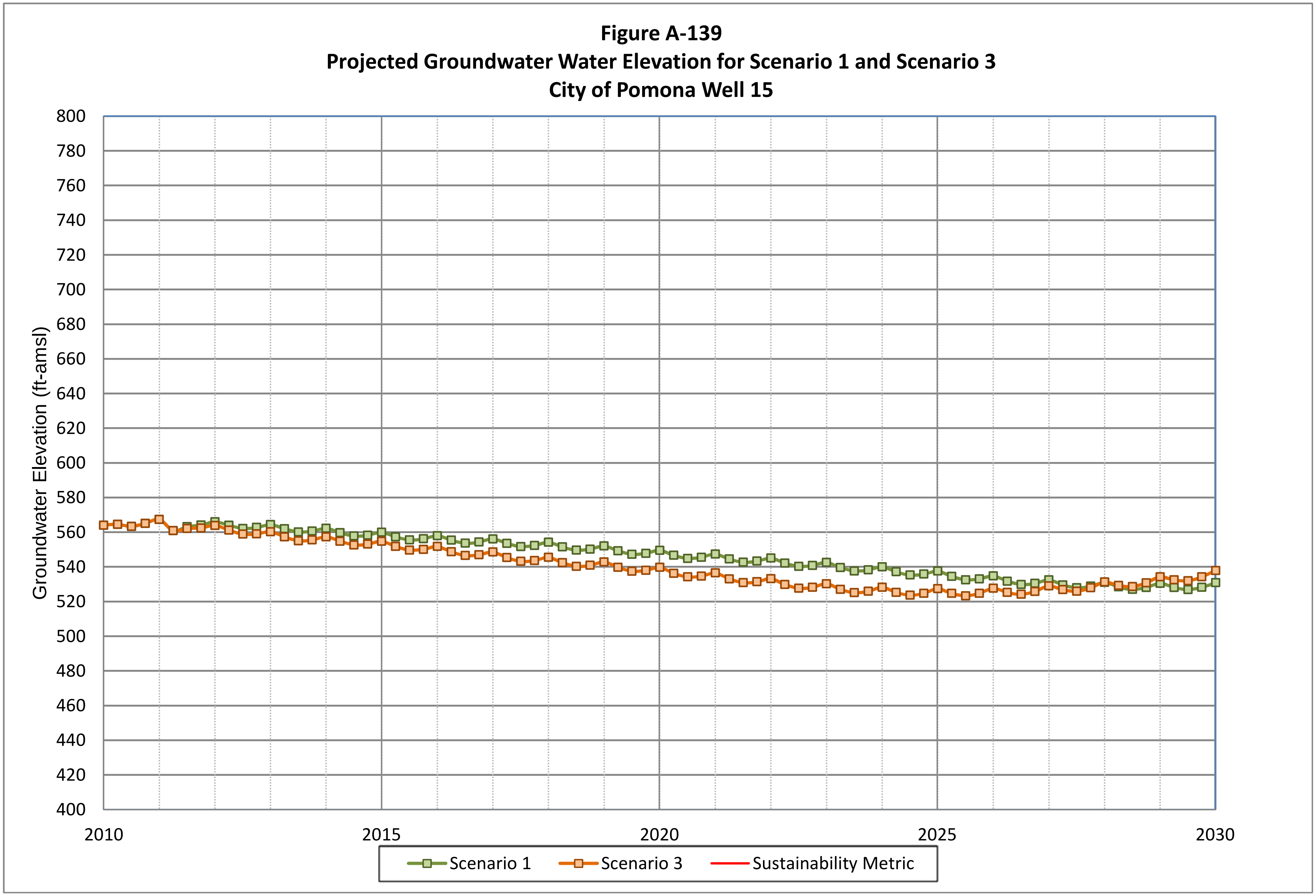

20120503_Projected_Hydrographs.xlsx

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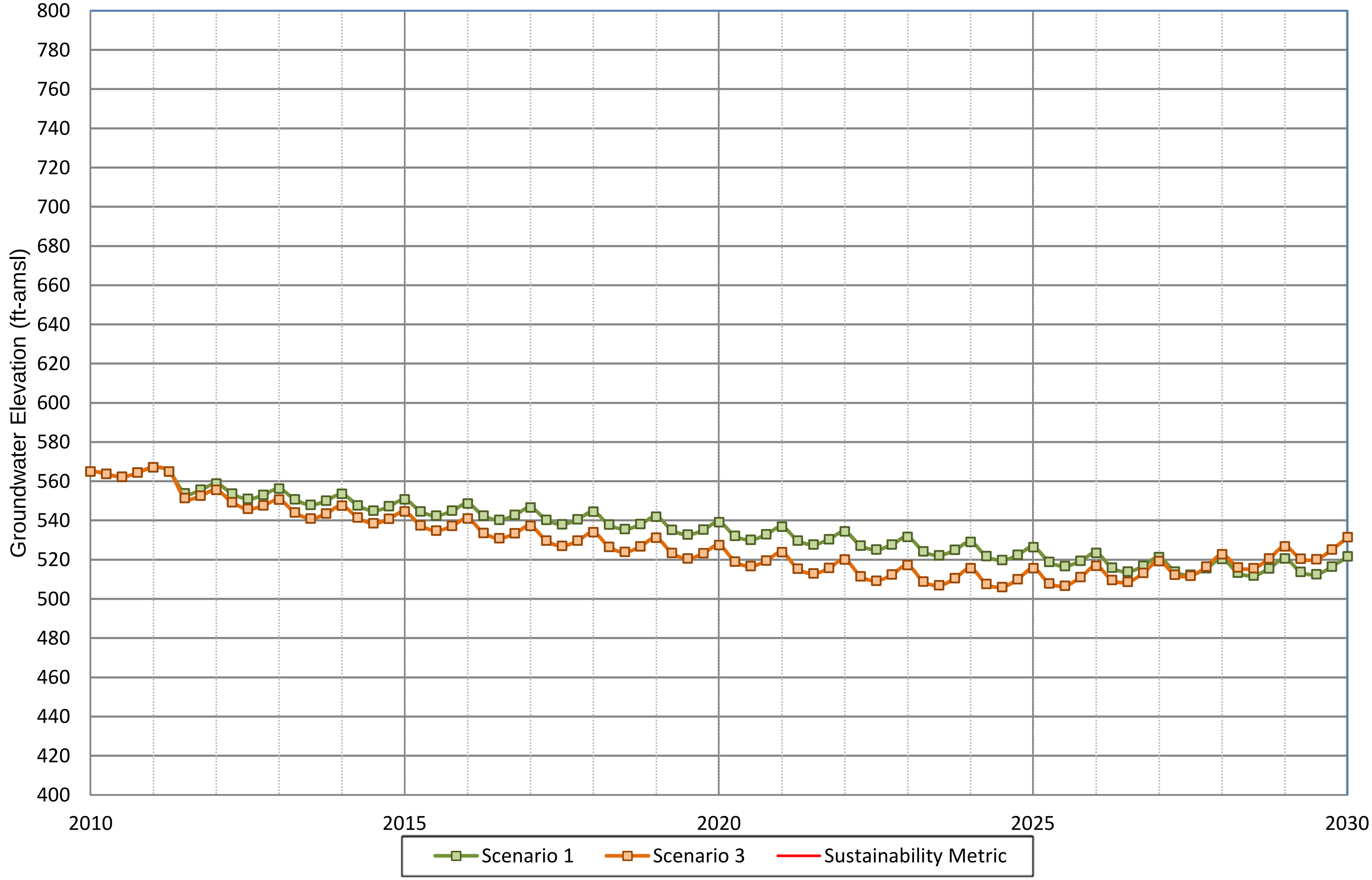
Figure A-140
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 16



20120503_Projected_Hydrographs.xlsx

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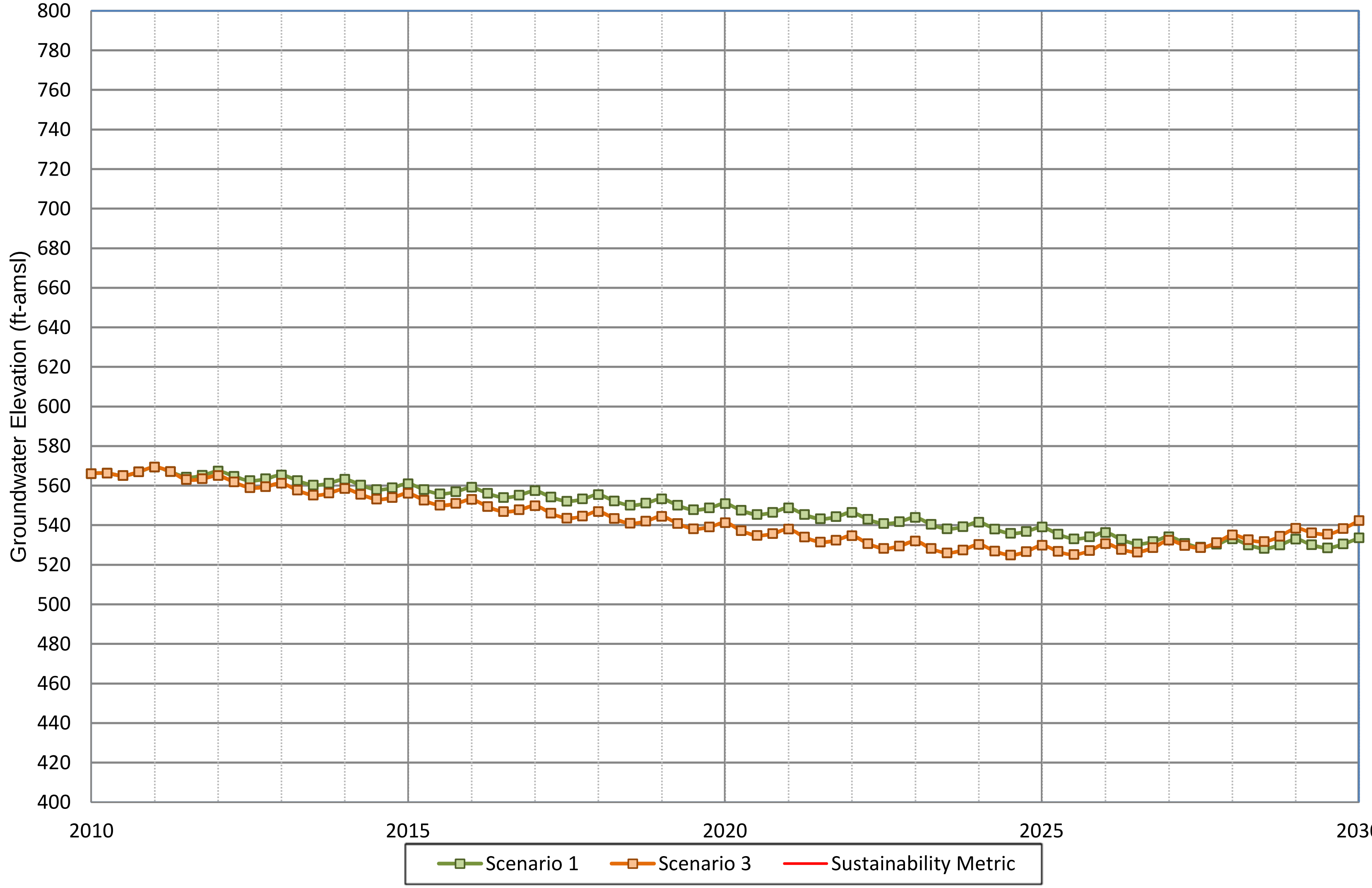
Figure A-141
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 17



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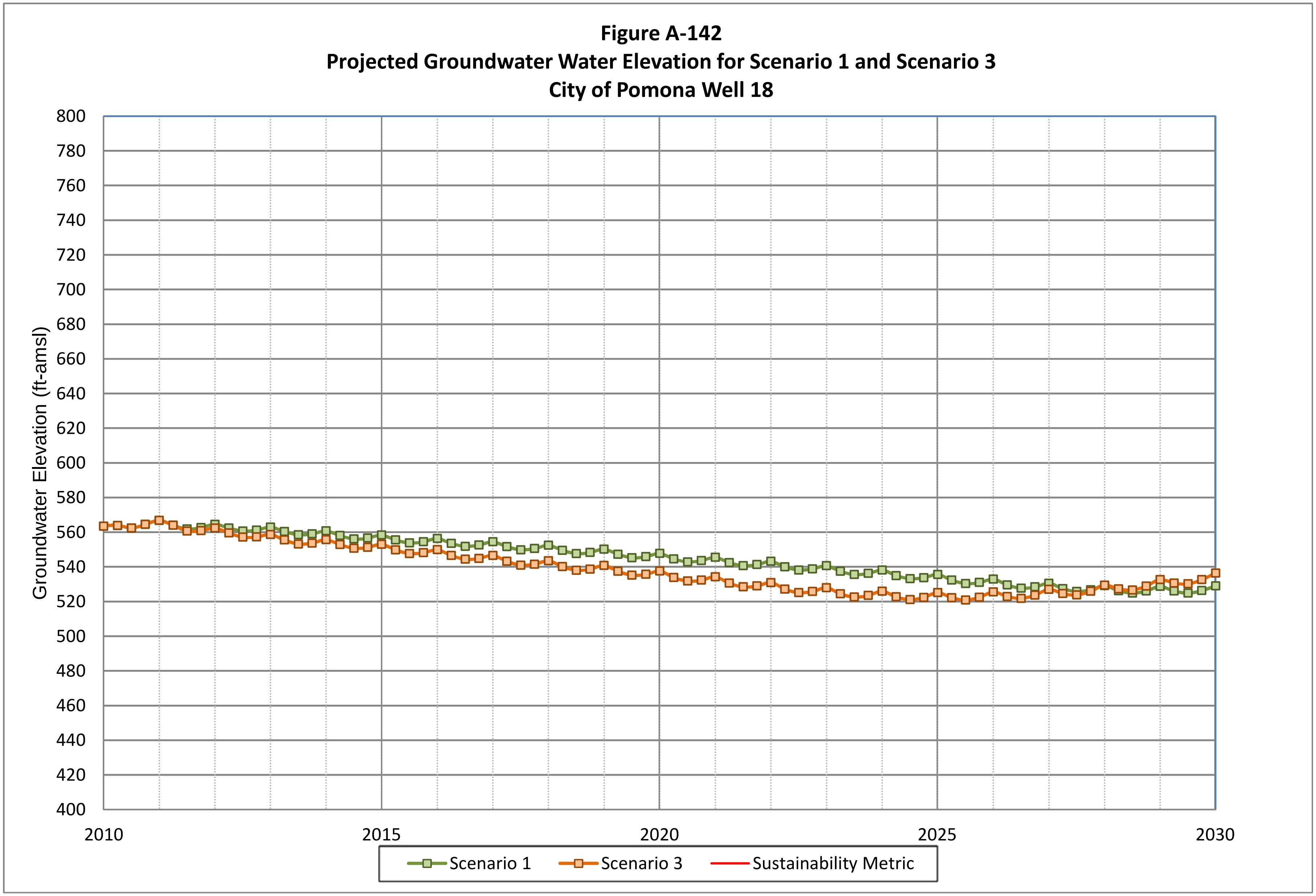

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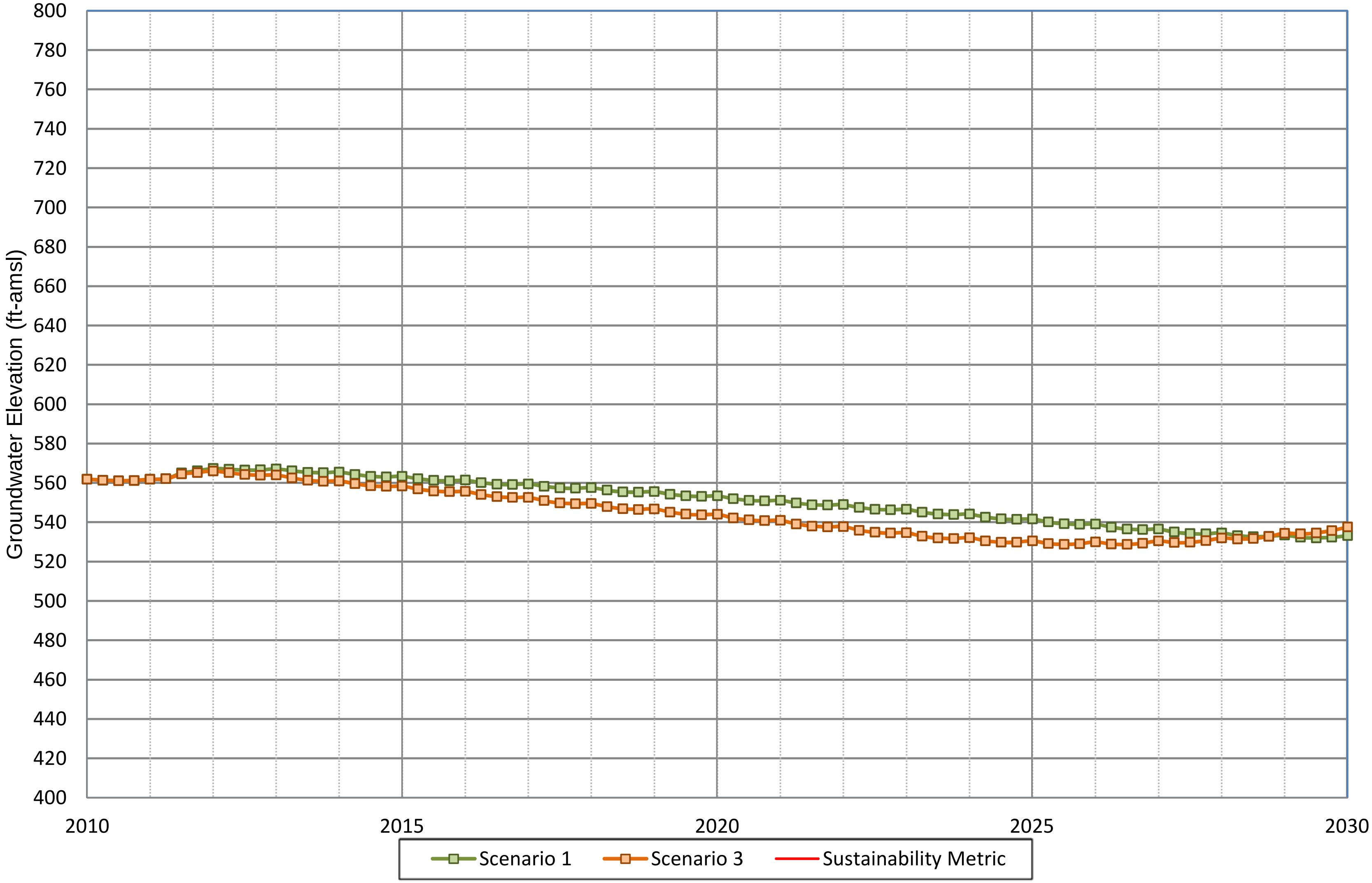
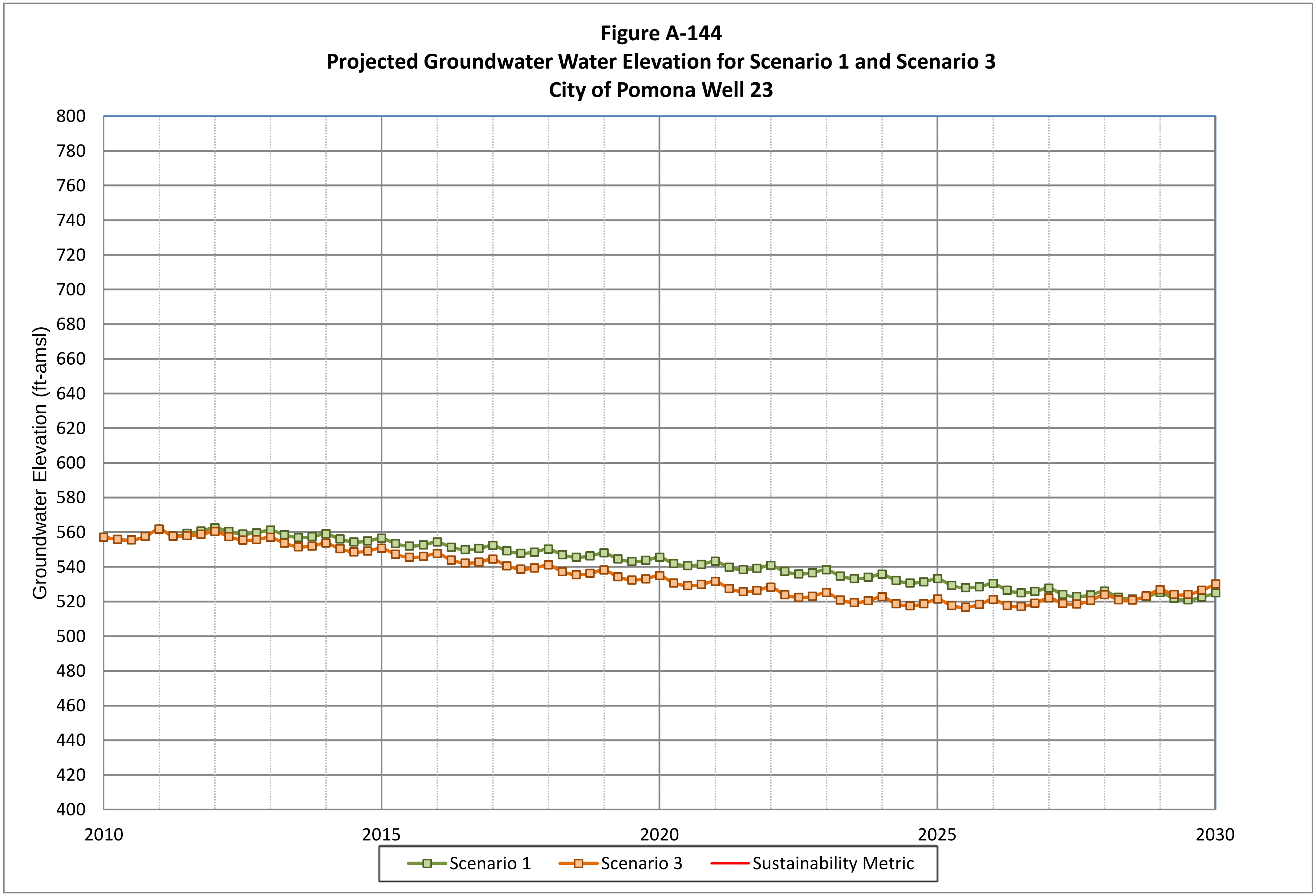
WILDERMUTH ENVIRONMENTAL INC.

Figure A-143
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 21





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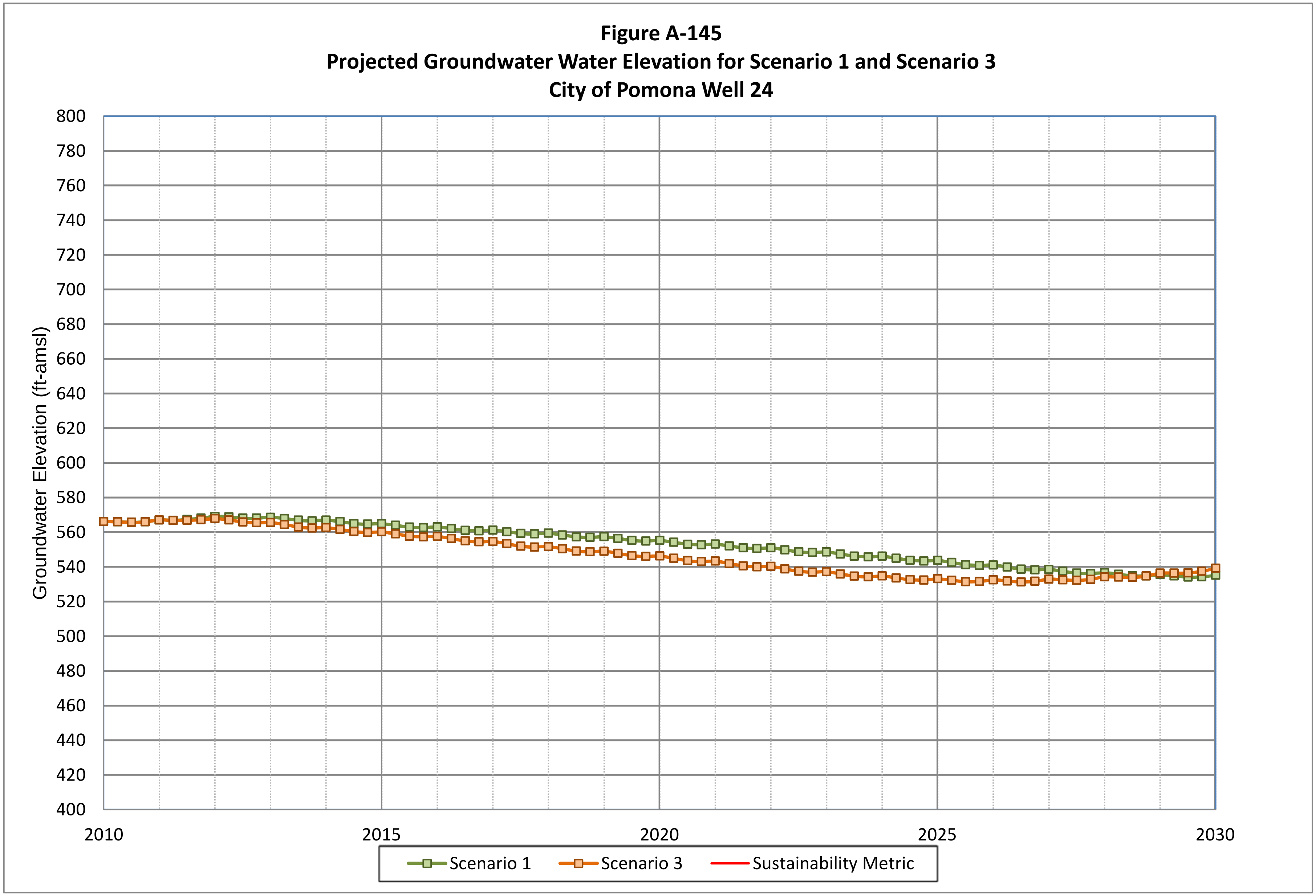

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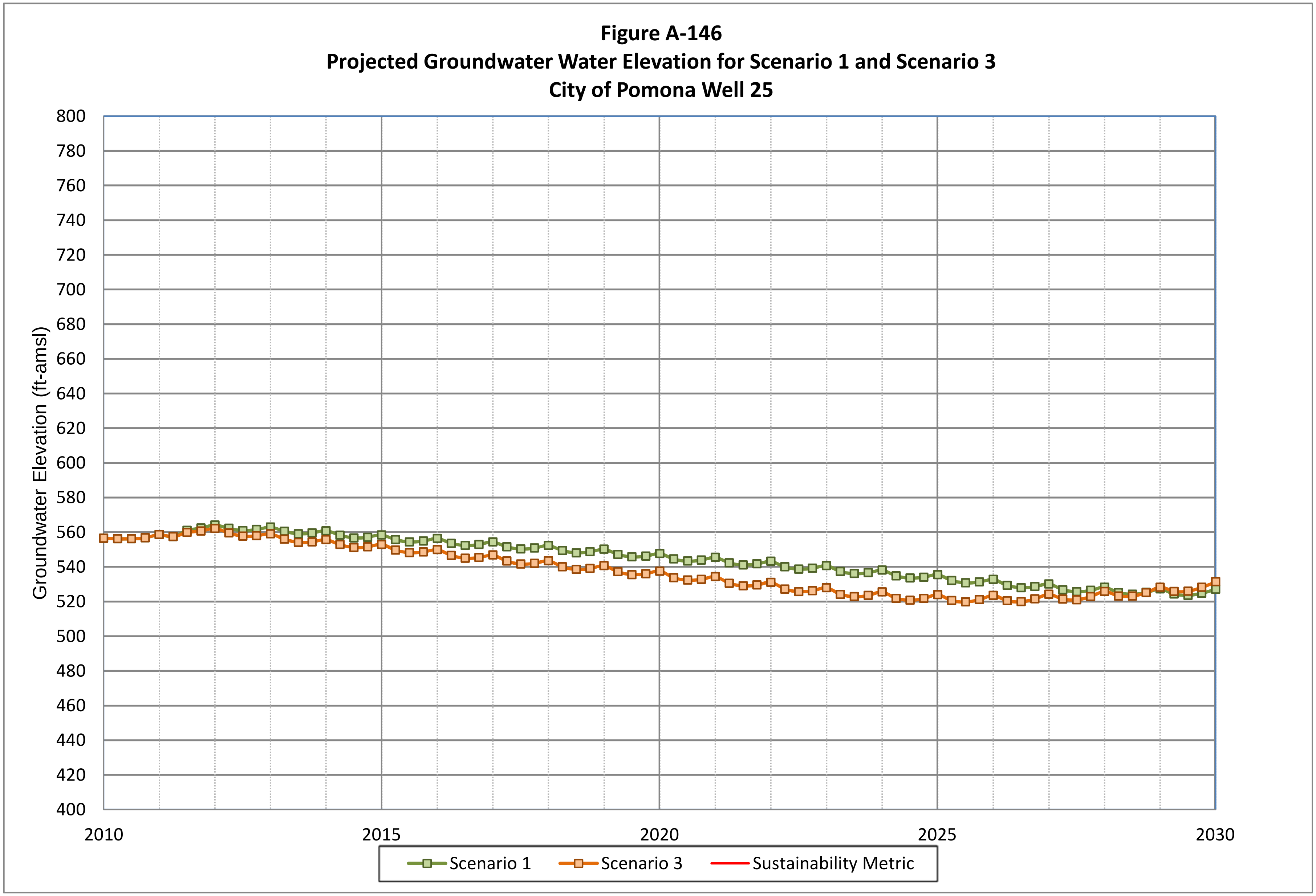

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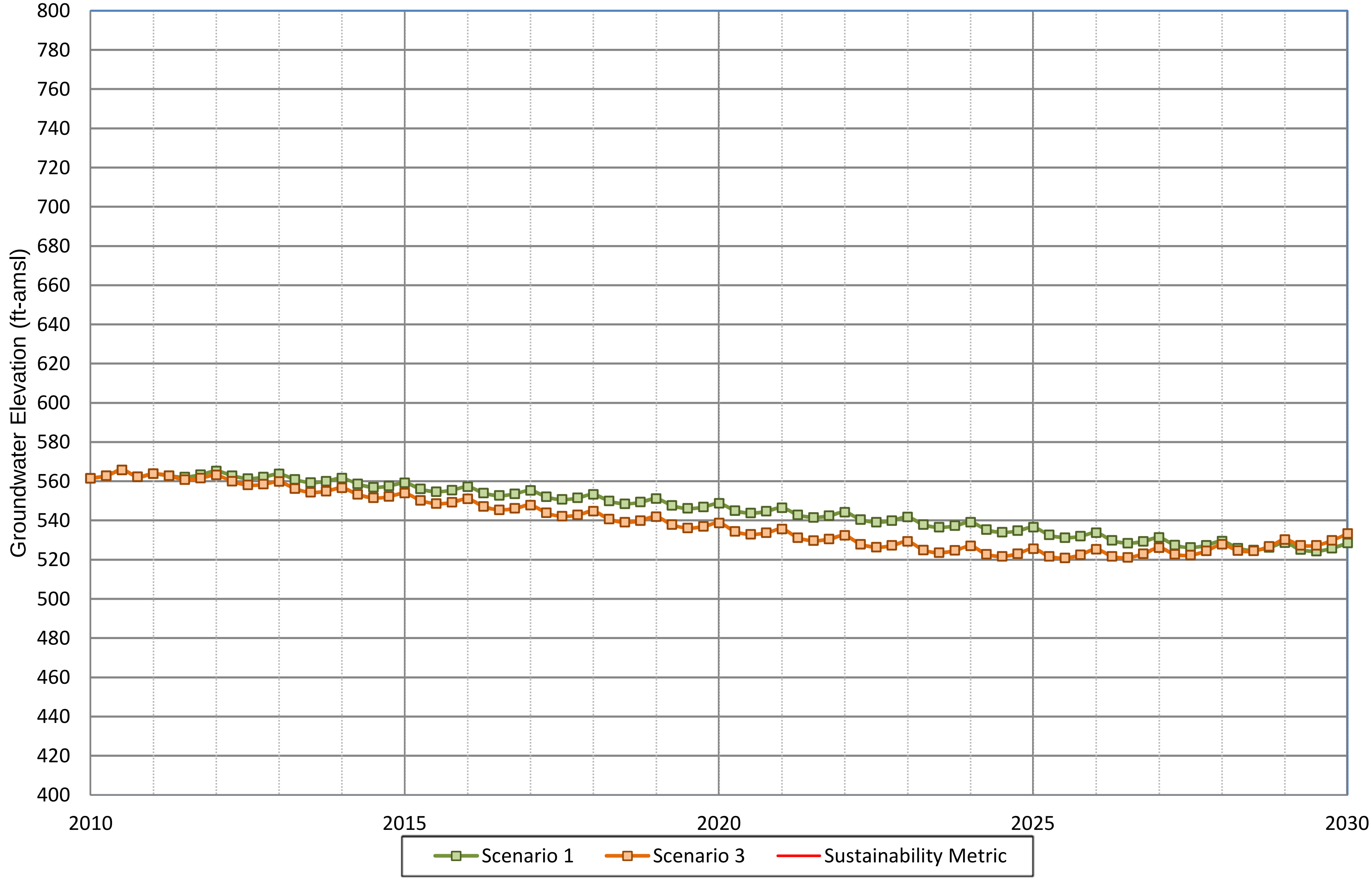
Figure A-147
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 26



20120503_Projected_Hydrographs.xlsx

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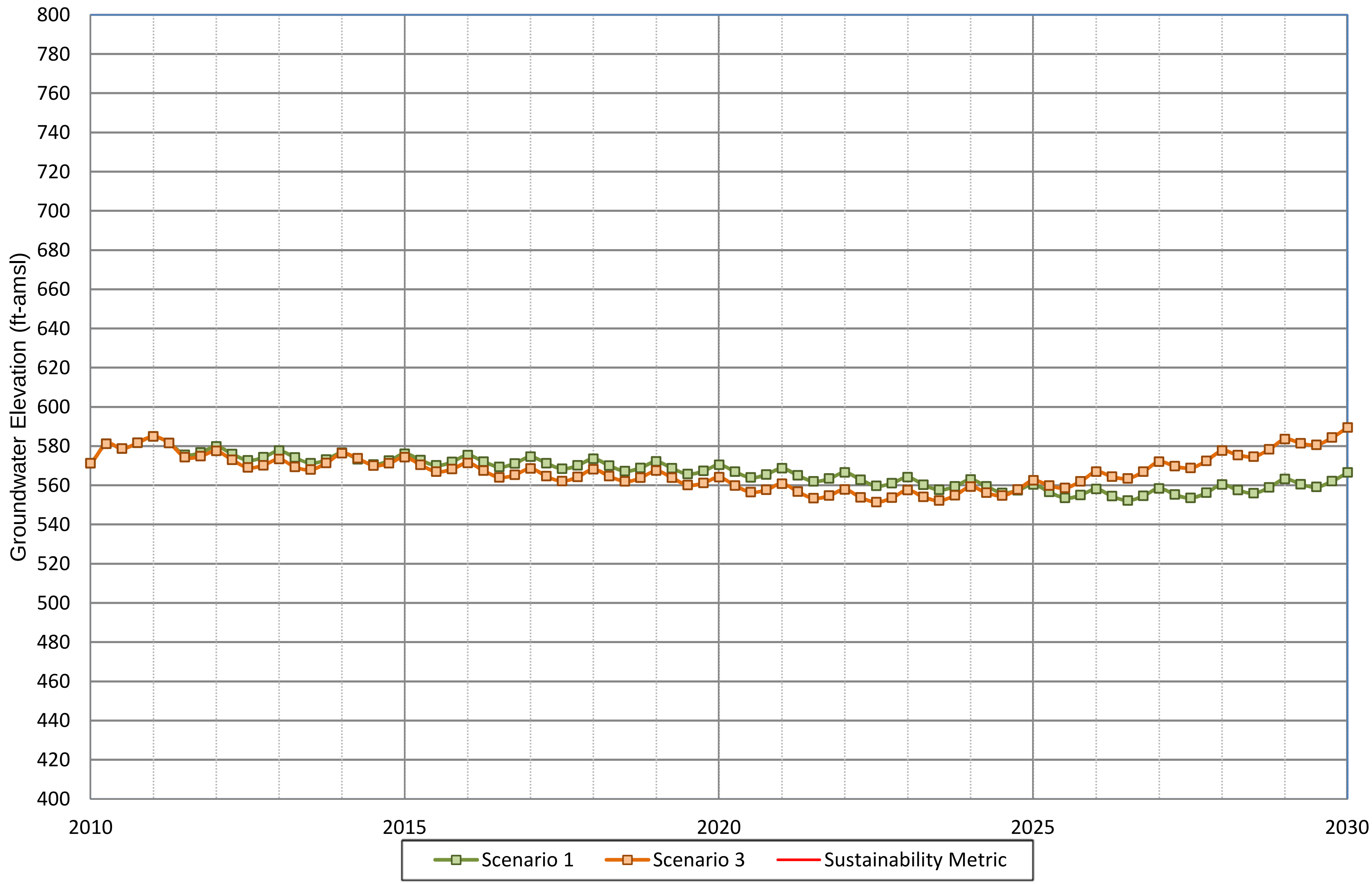
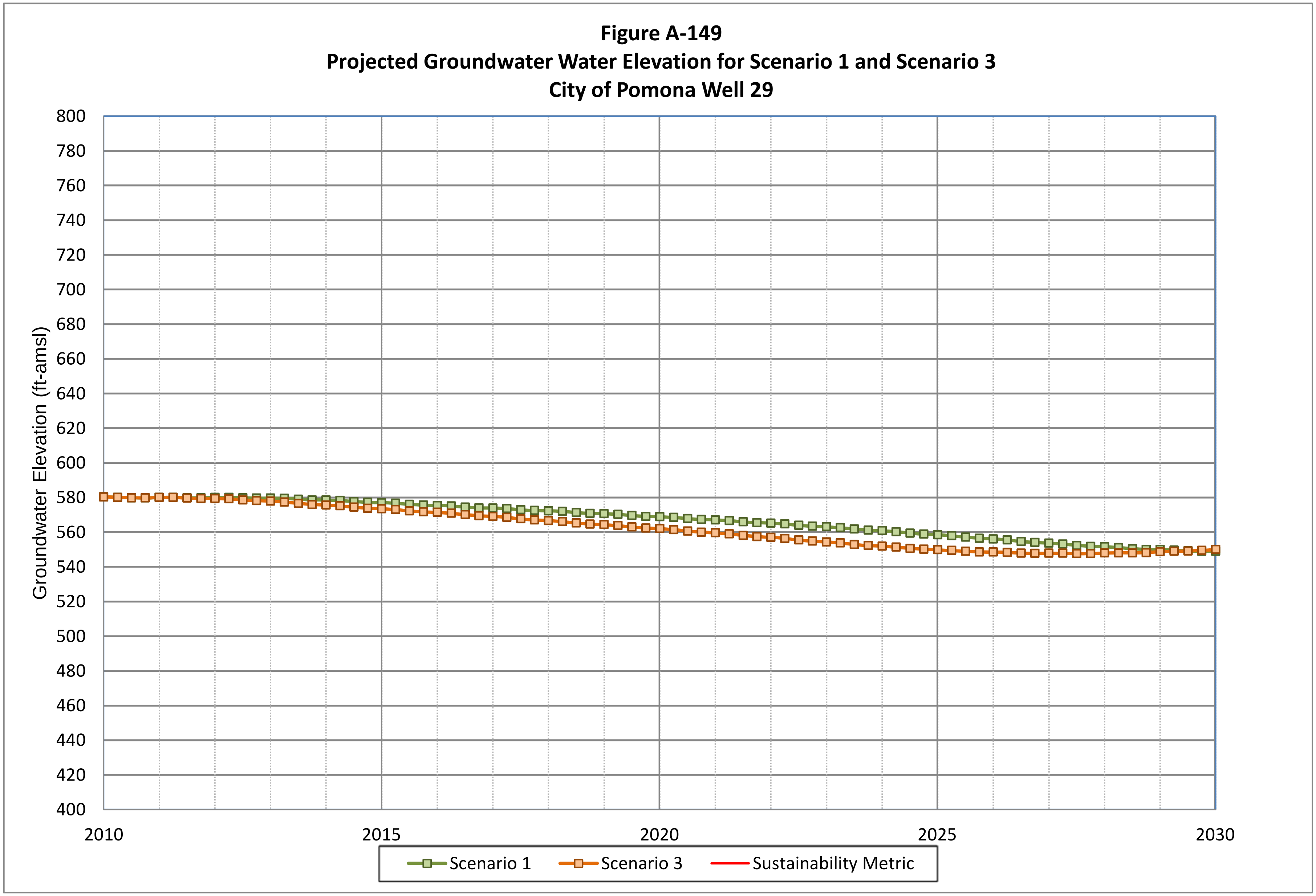
Figure A-148
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 27





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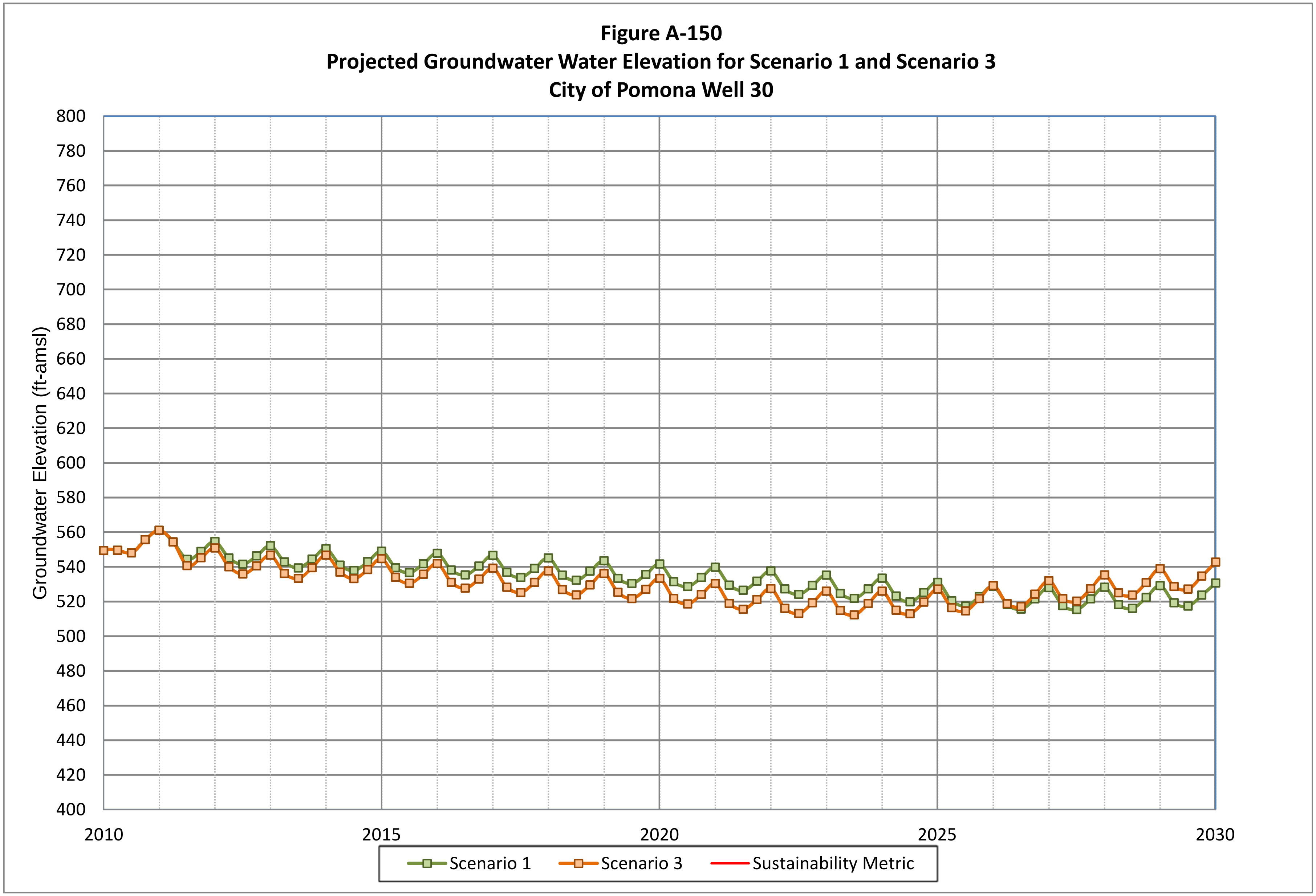

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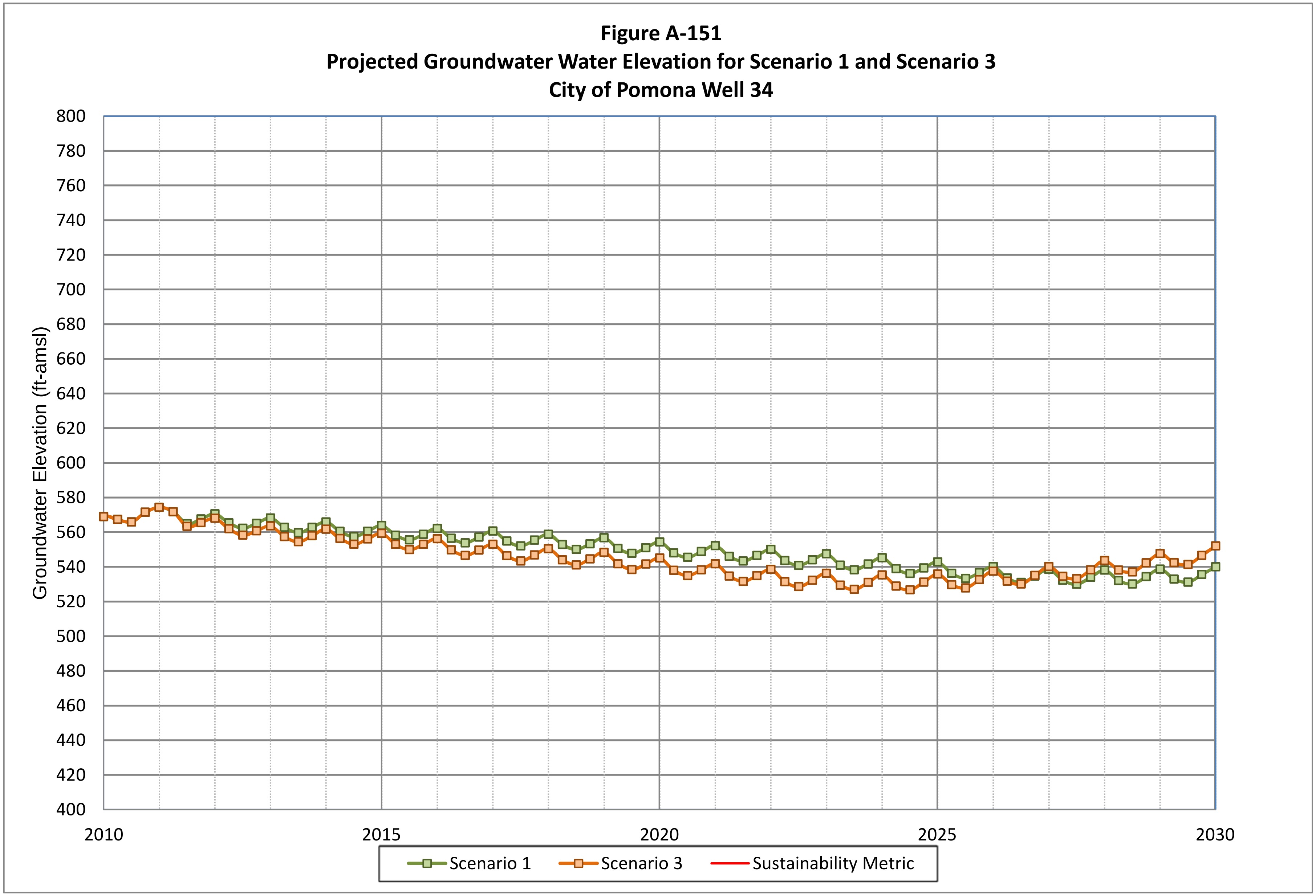

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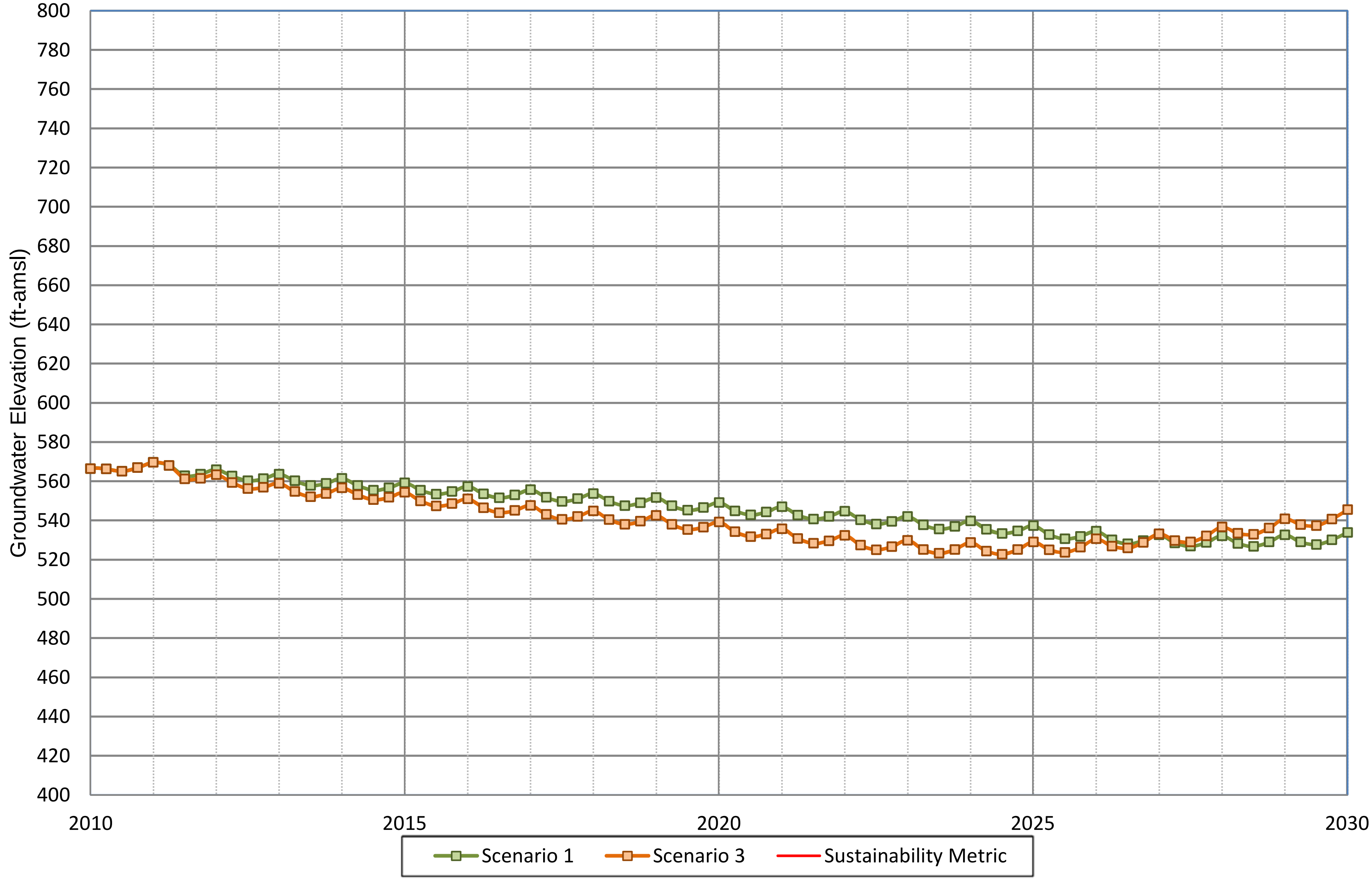
Figure A-152
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Pomona Well 35



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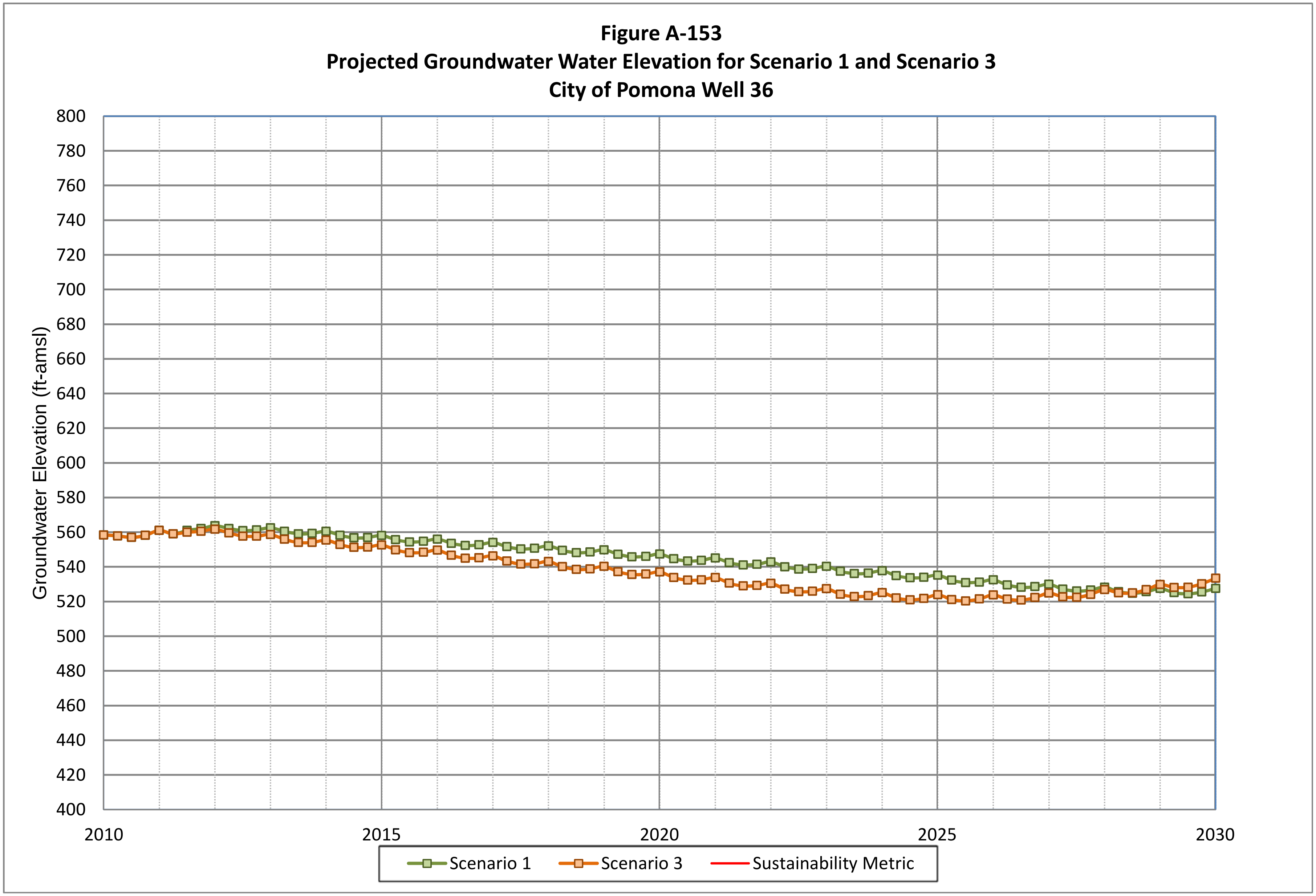
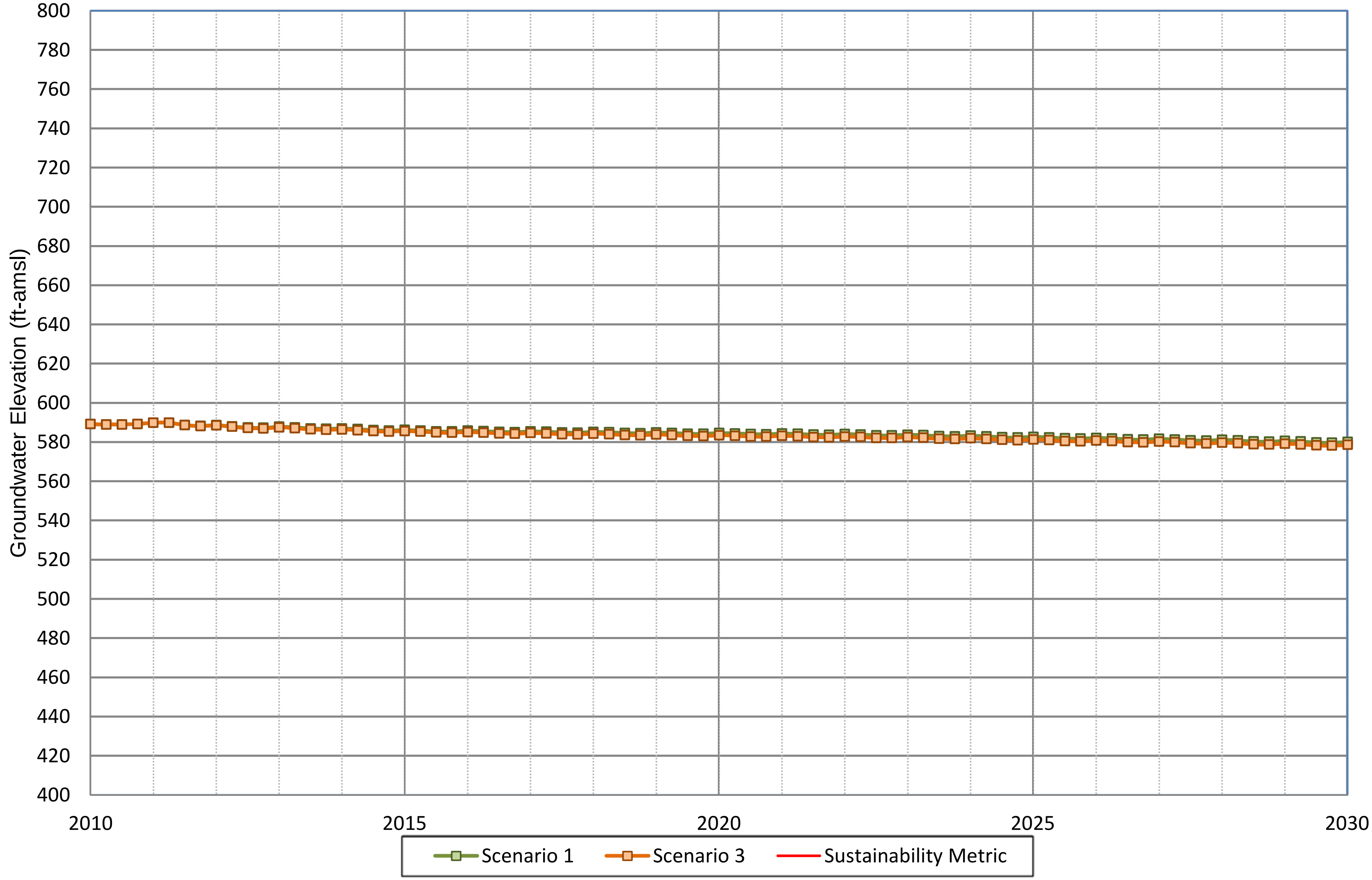


20120503_Projected_Hydrographs.xlsx

Figure A-154
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
SARWCo Well 01A



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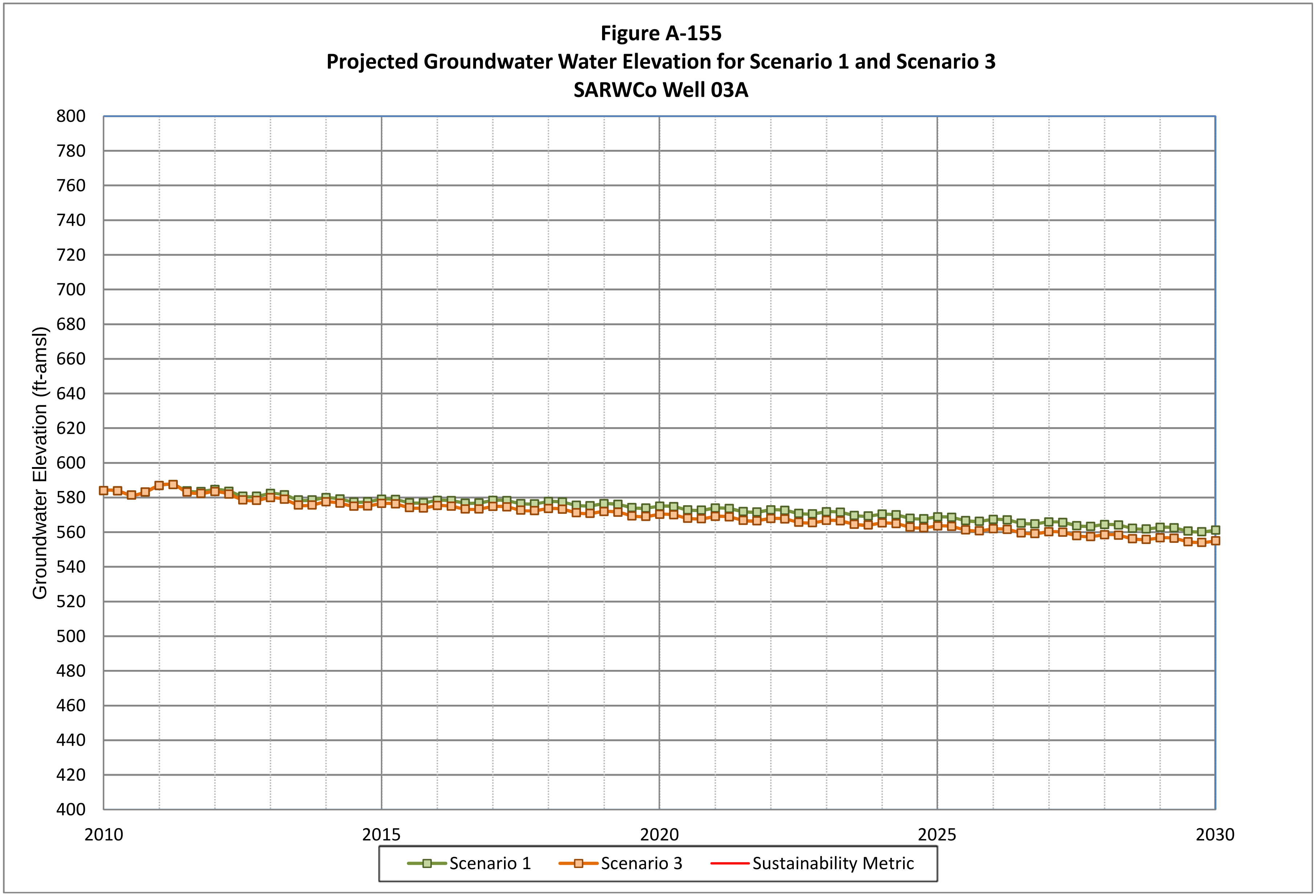

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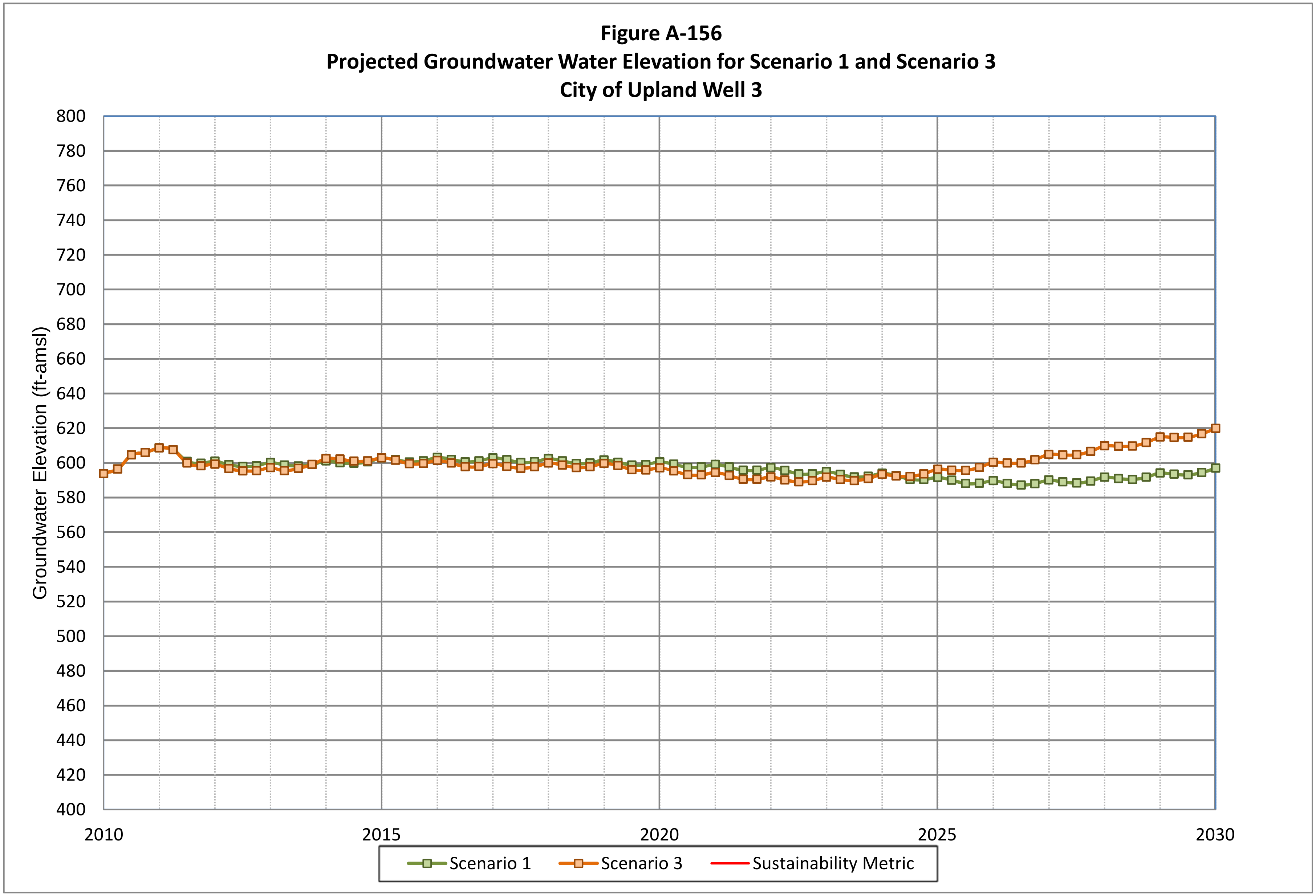

20120503_Projected_Hydrographs.xlsx

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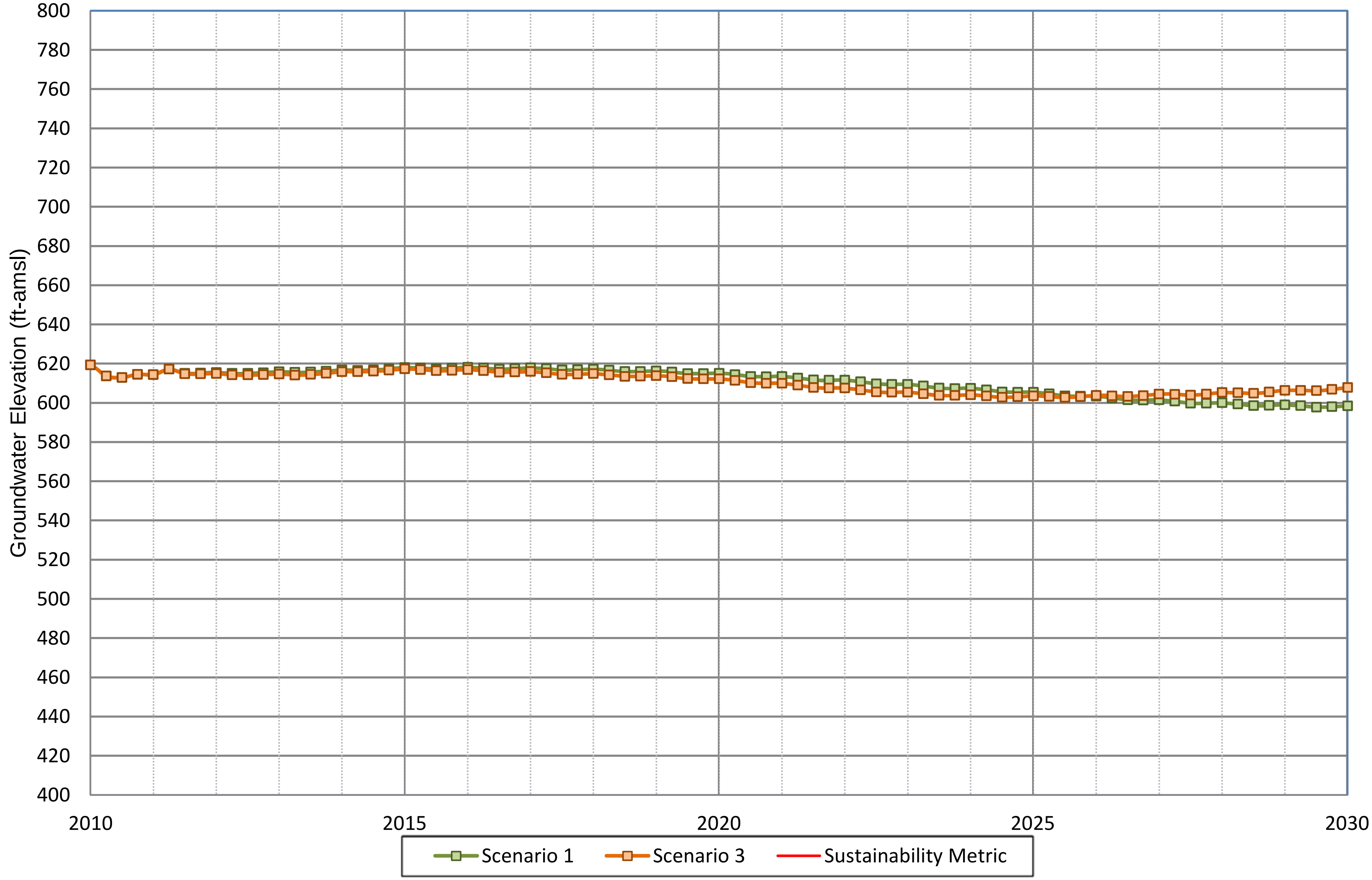
Figure A-157
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Upland Well 7A



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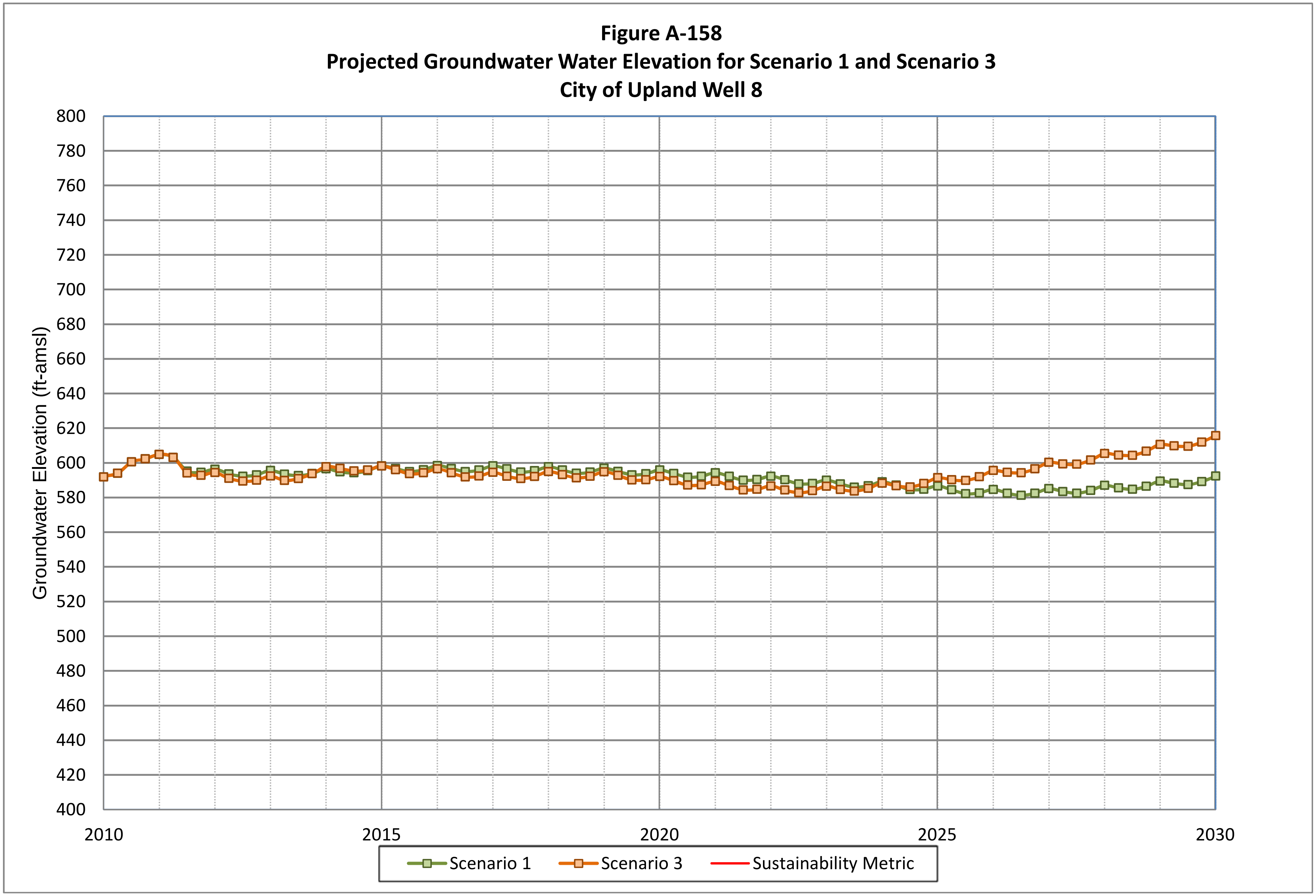

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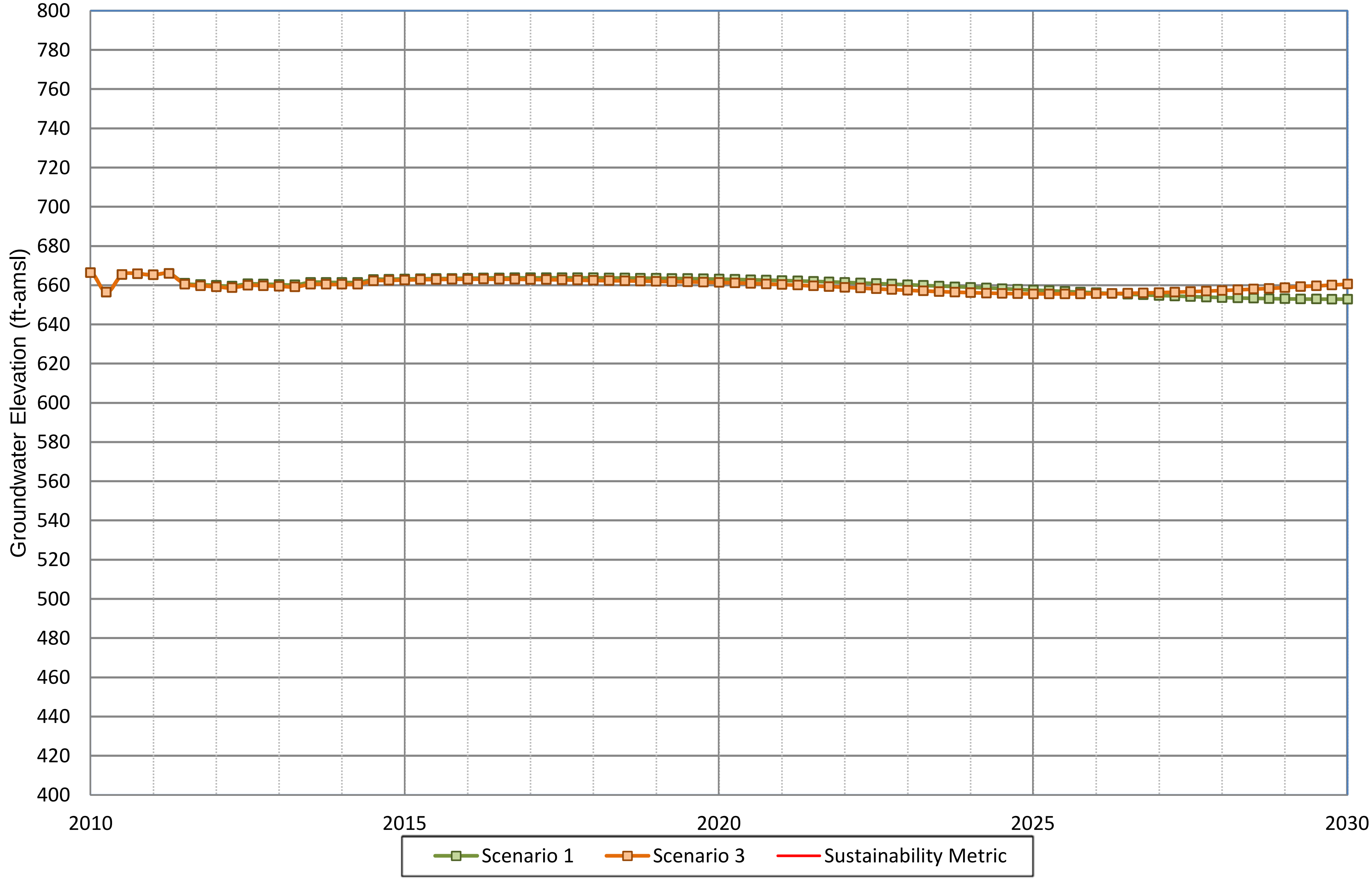
WILDERMUTH ENVIRONMENTAL INC.

Figure A-159
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
City of Upland Well 20



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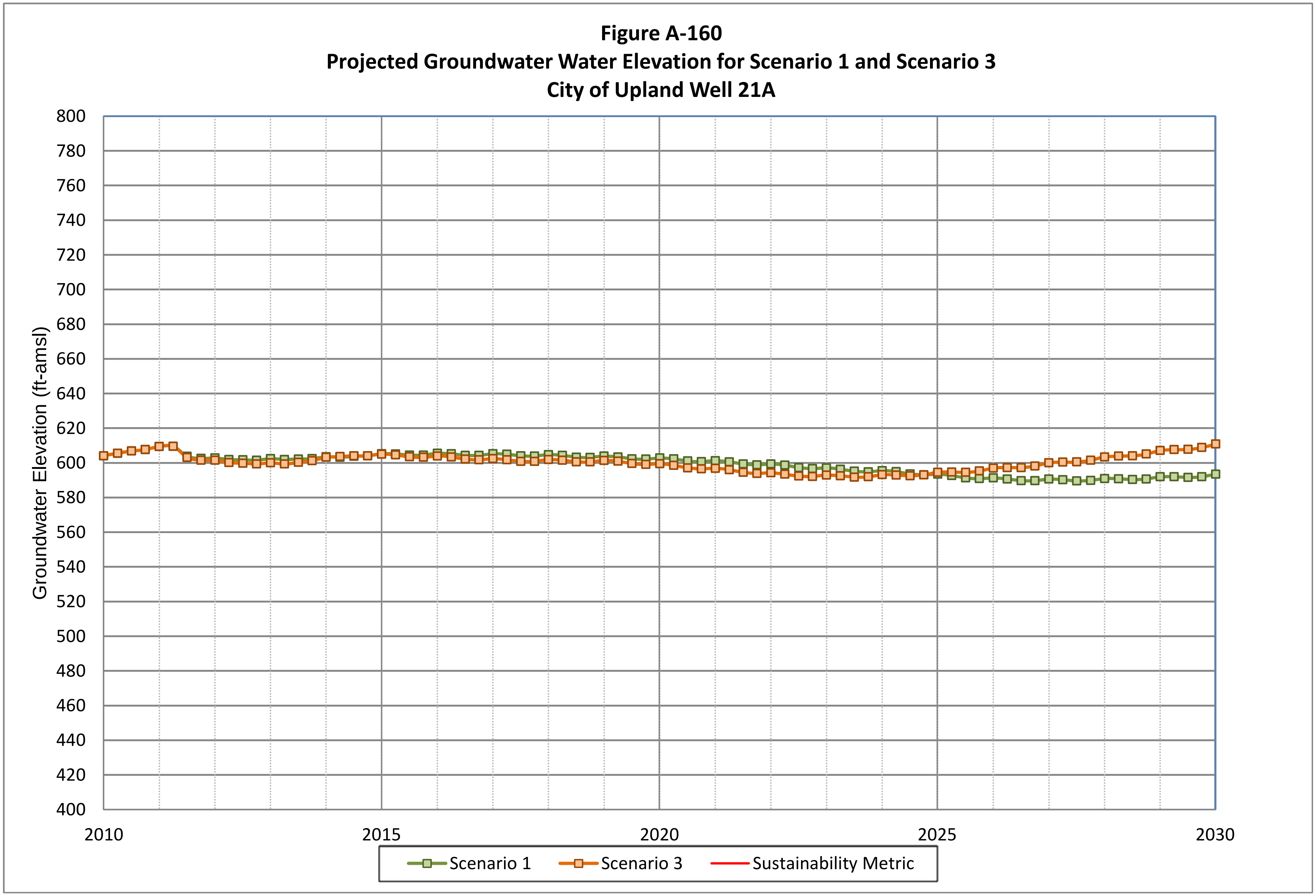


20120503_Projected_Hydrographs.xlsx

Figure A-161
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-1

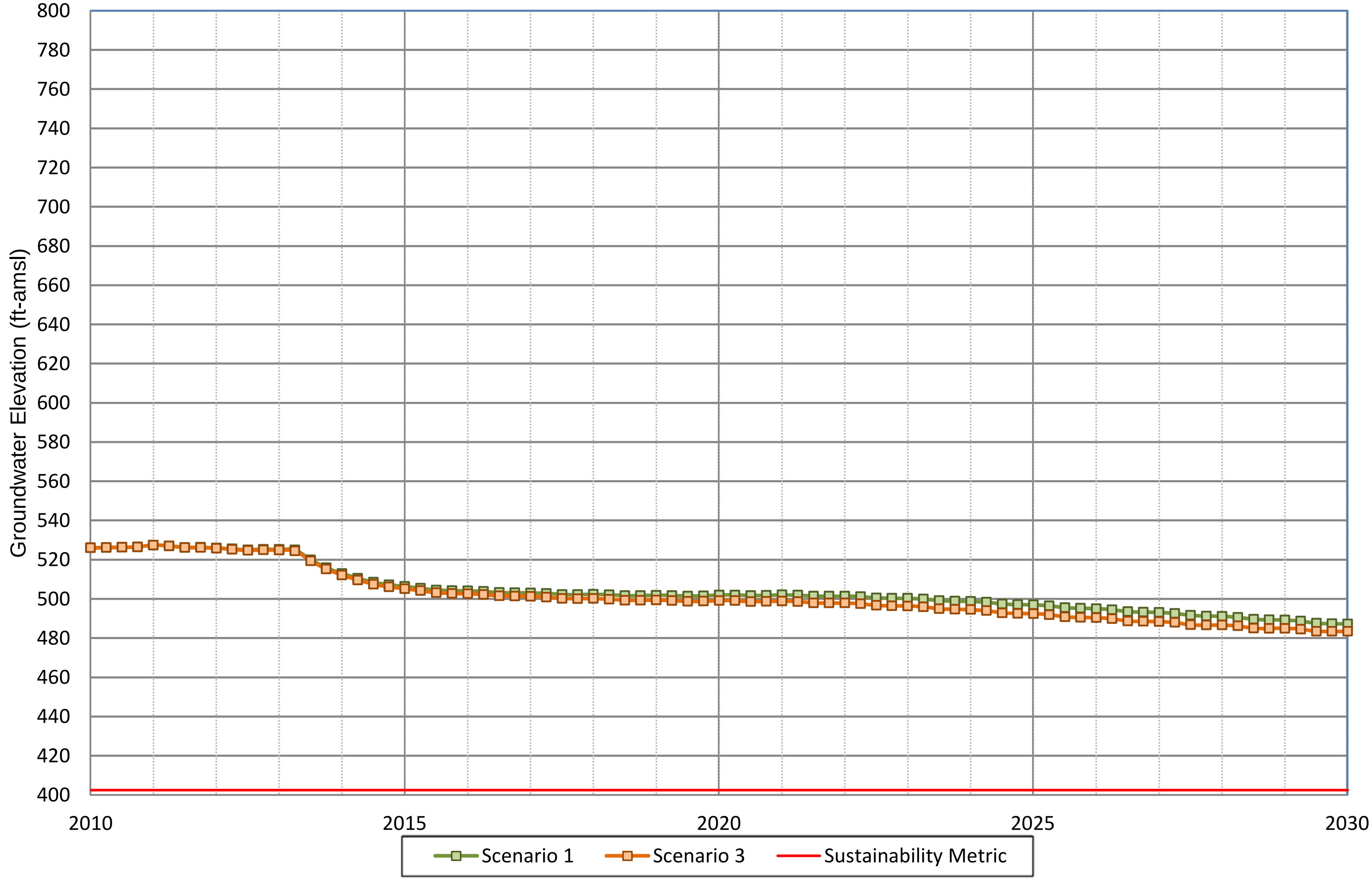
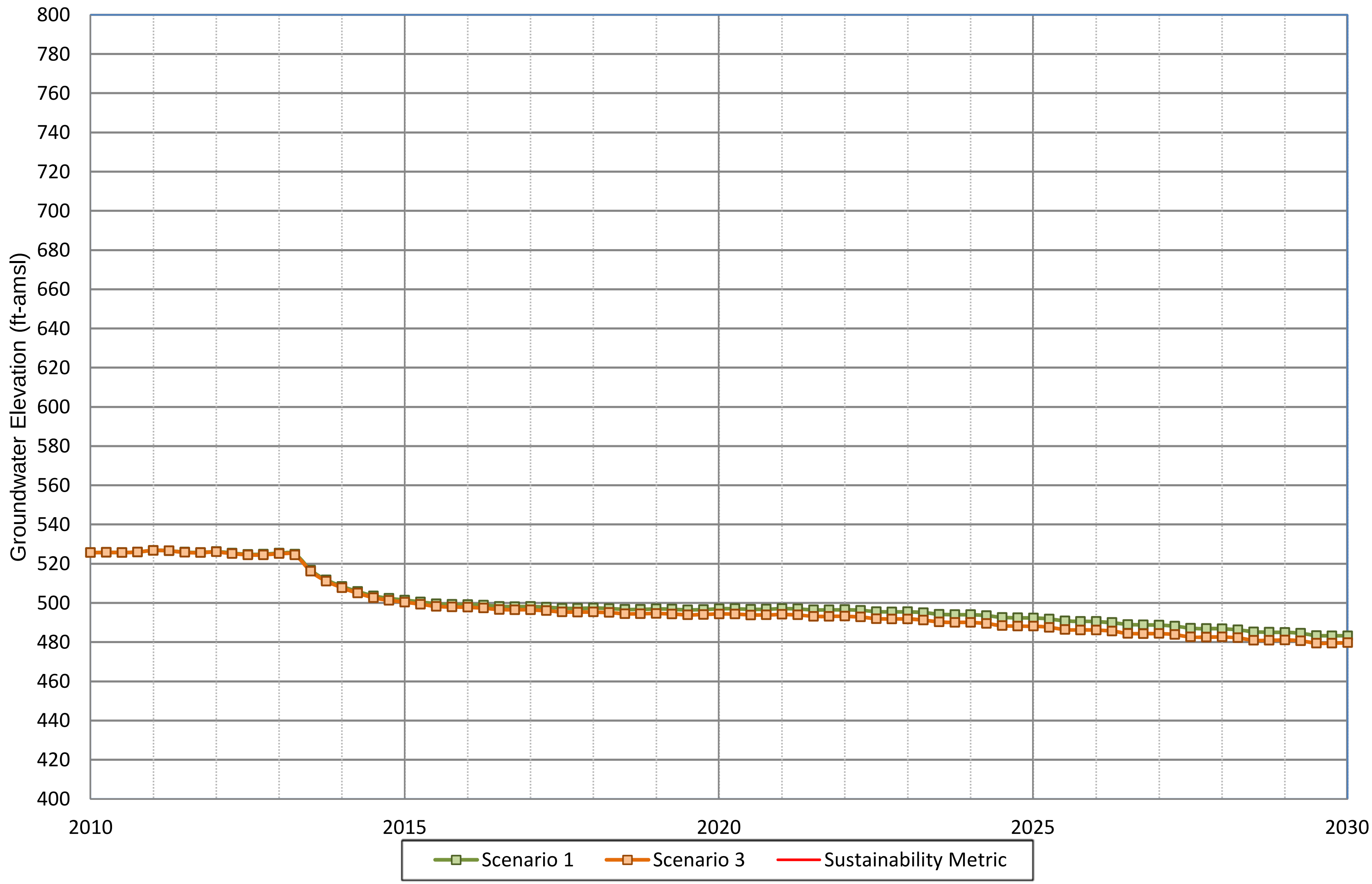


Figure A-162
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-2



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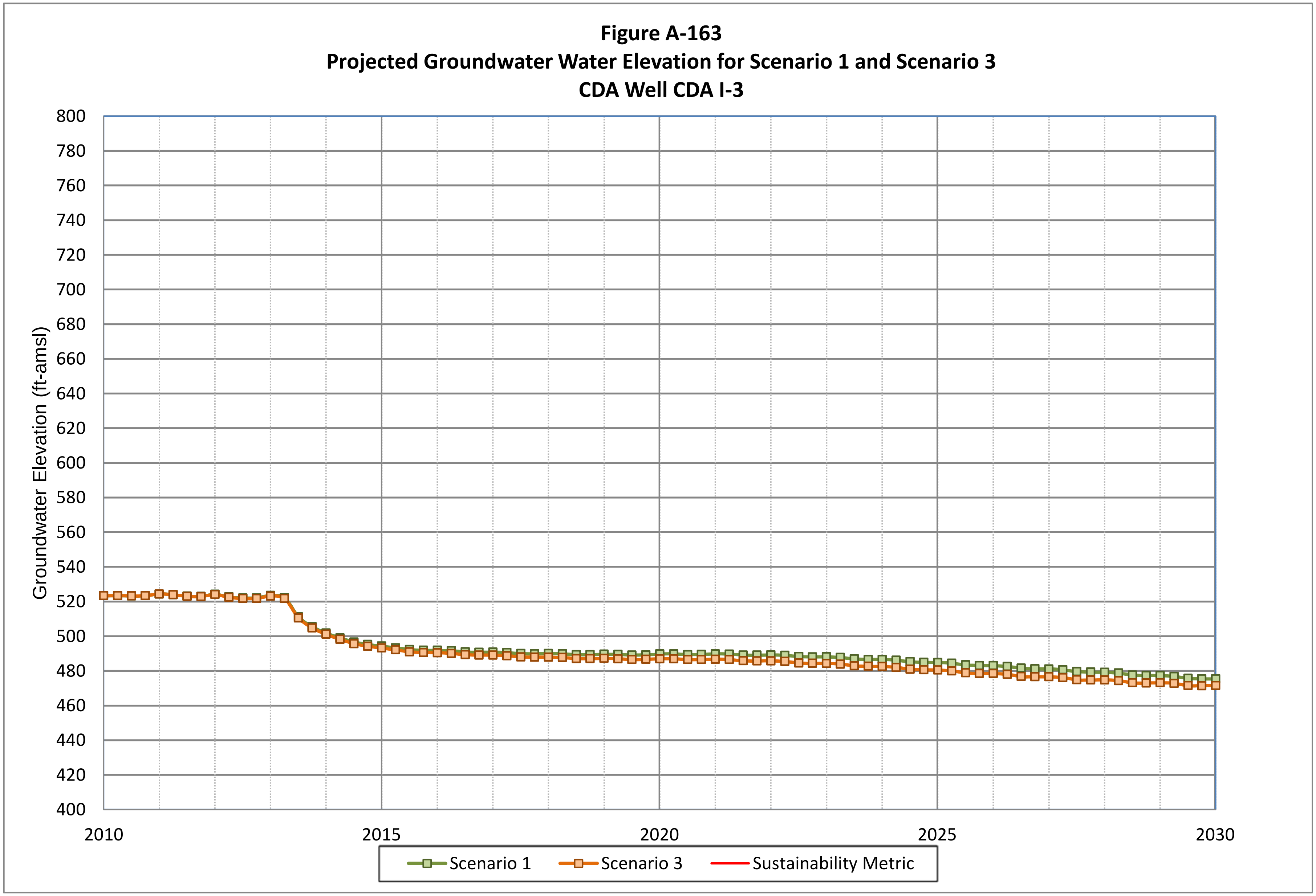

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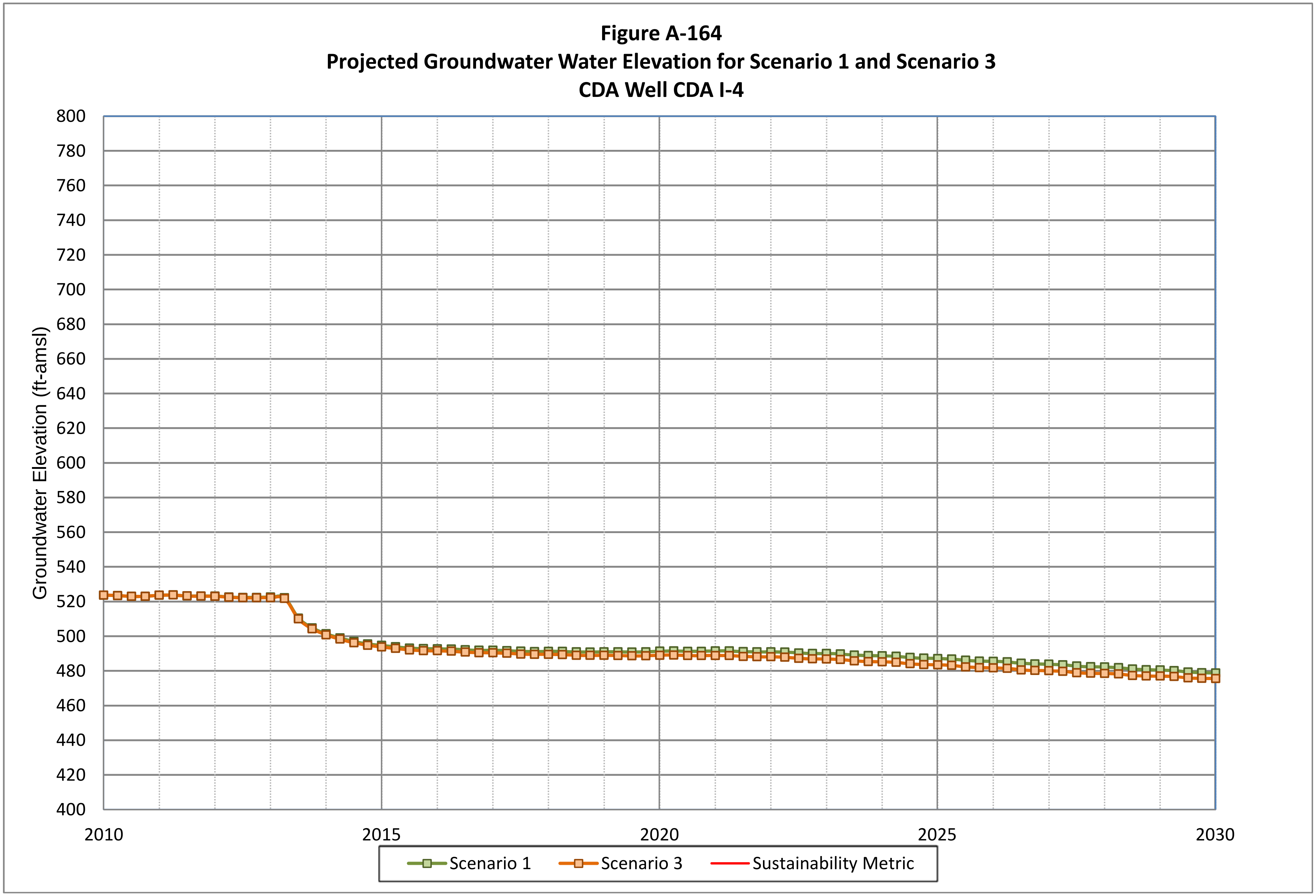

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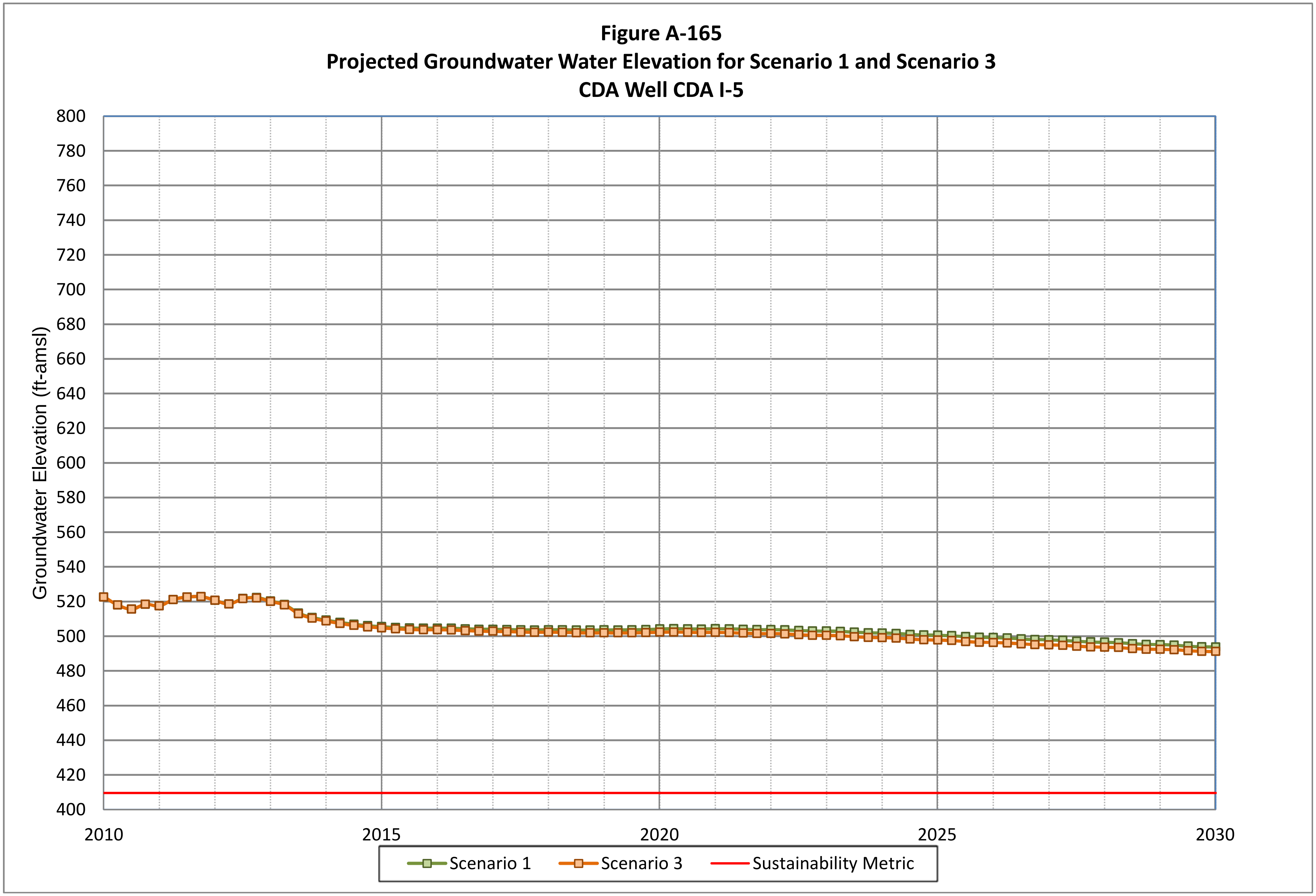

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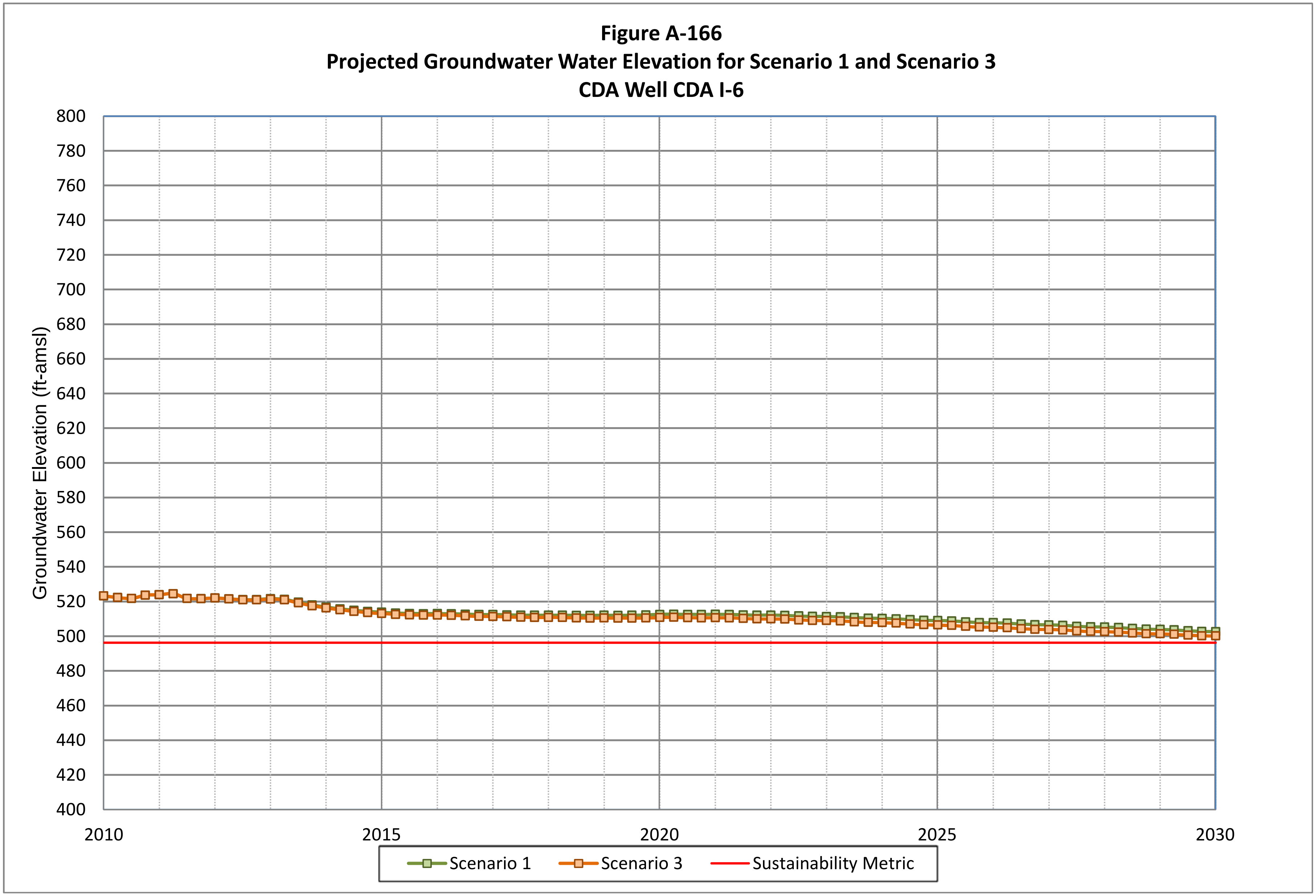

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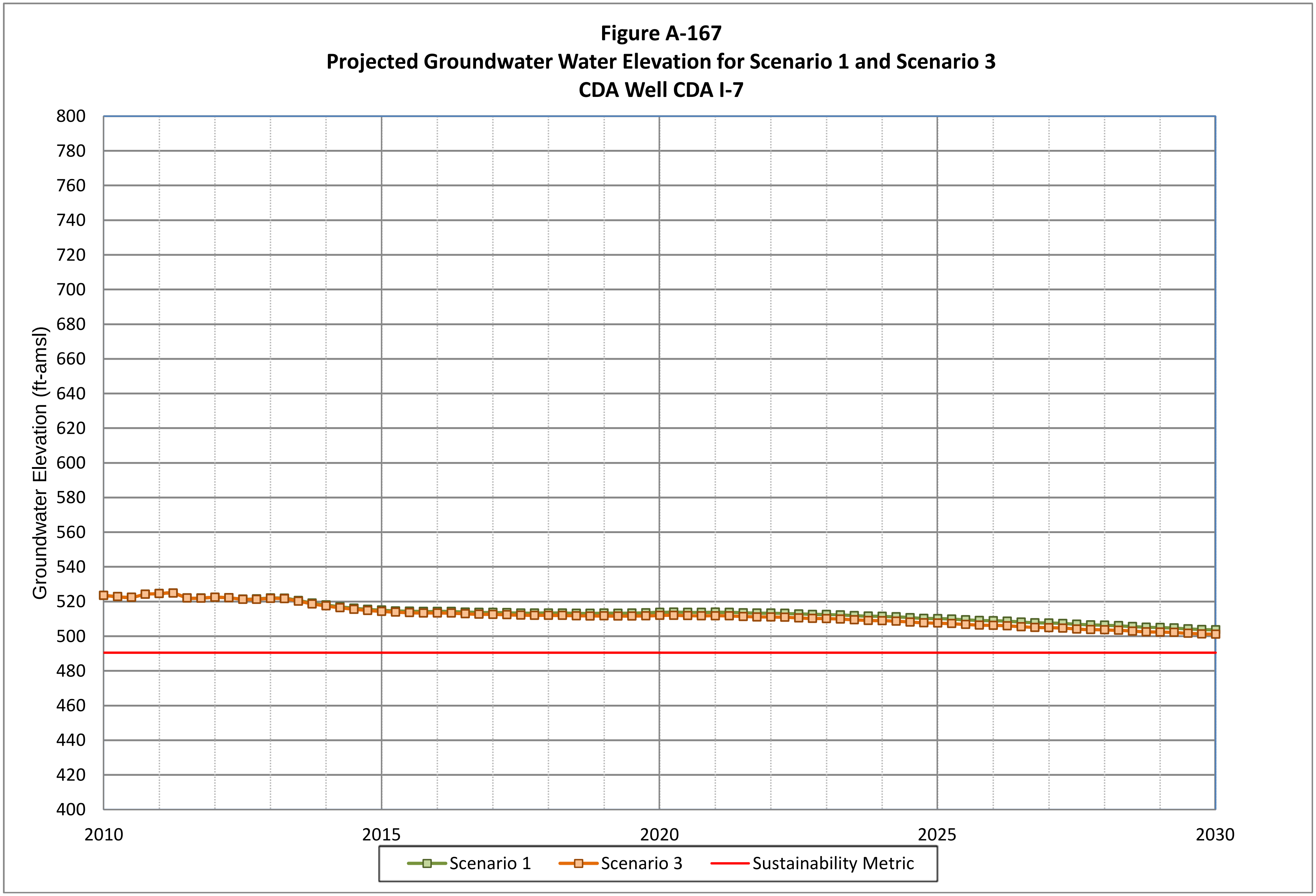

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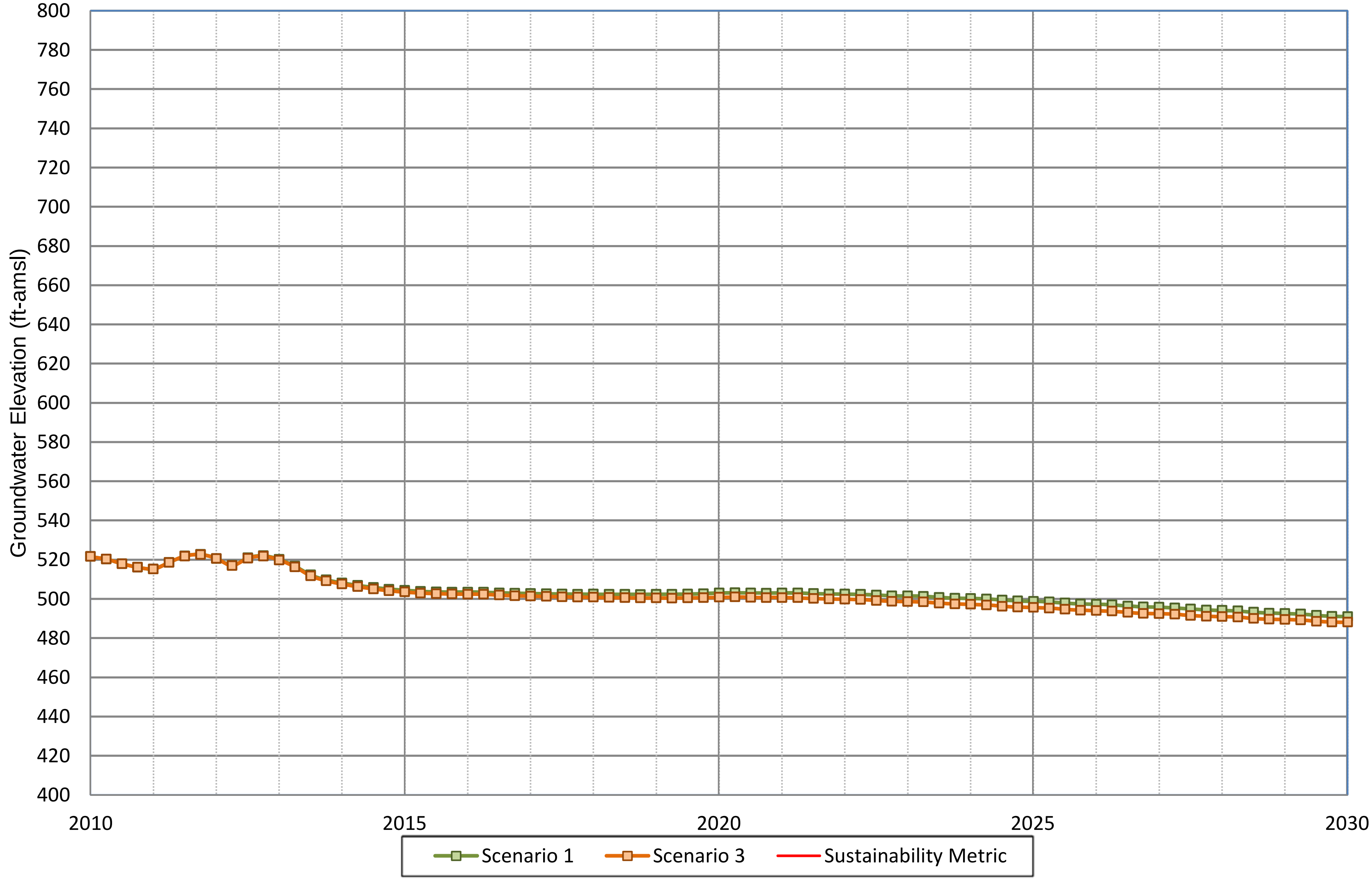
Figure A-168
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-8



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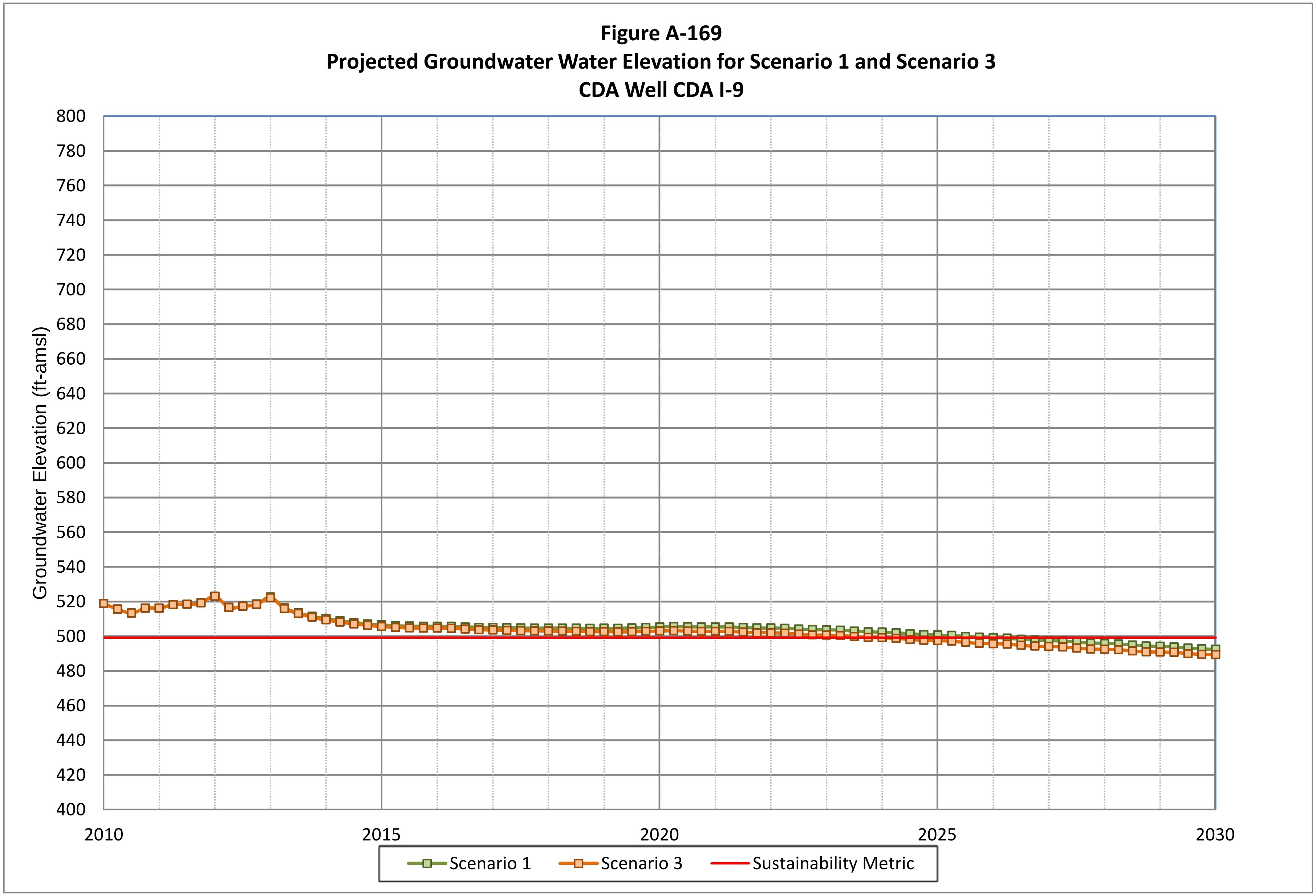

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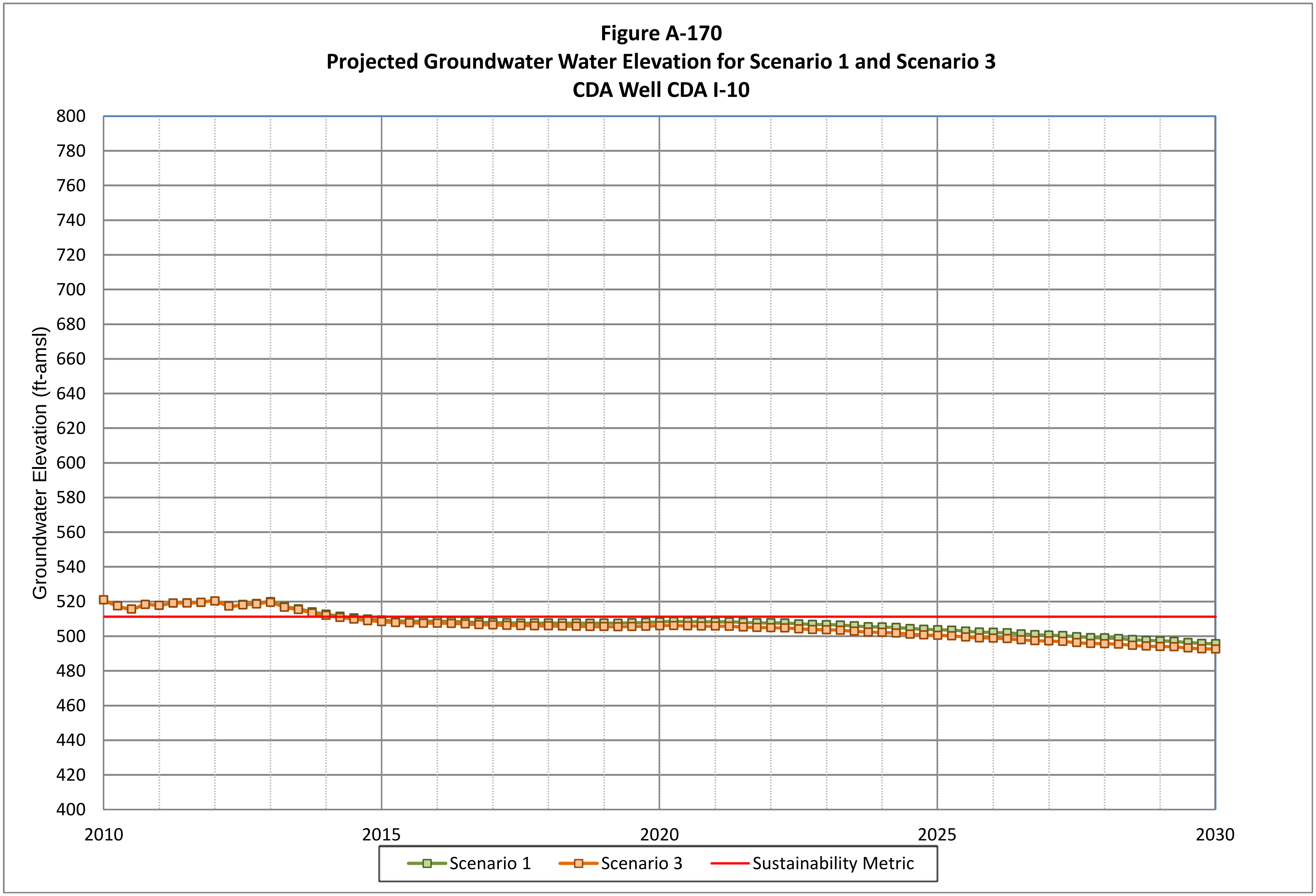
WILDERMUTH ENVIRONMENTAL INC.



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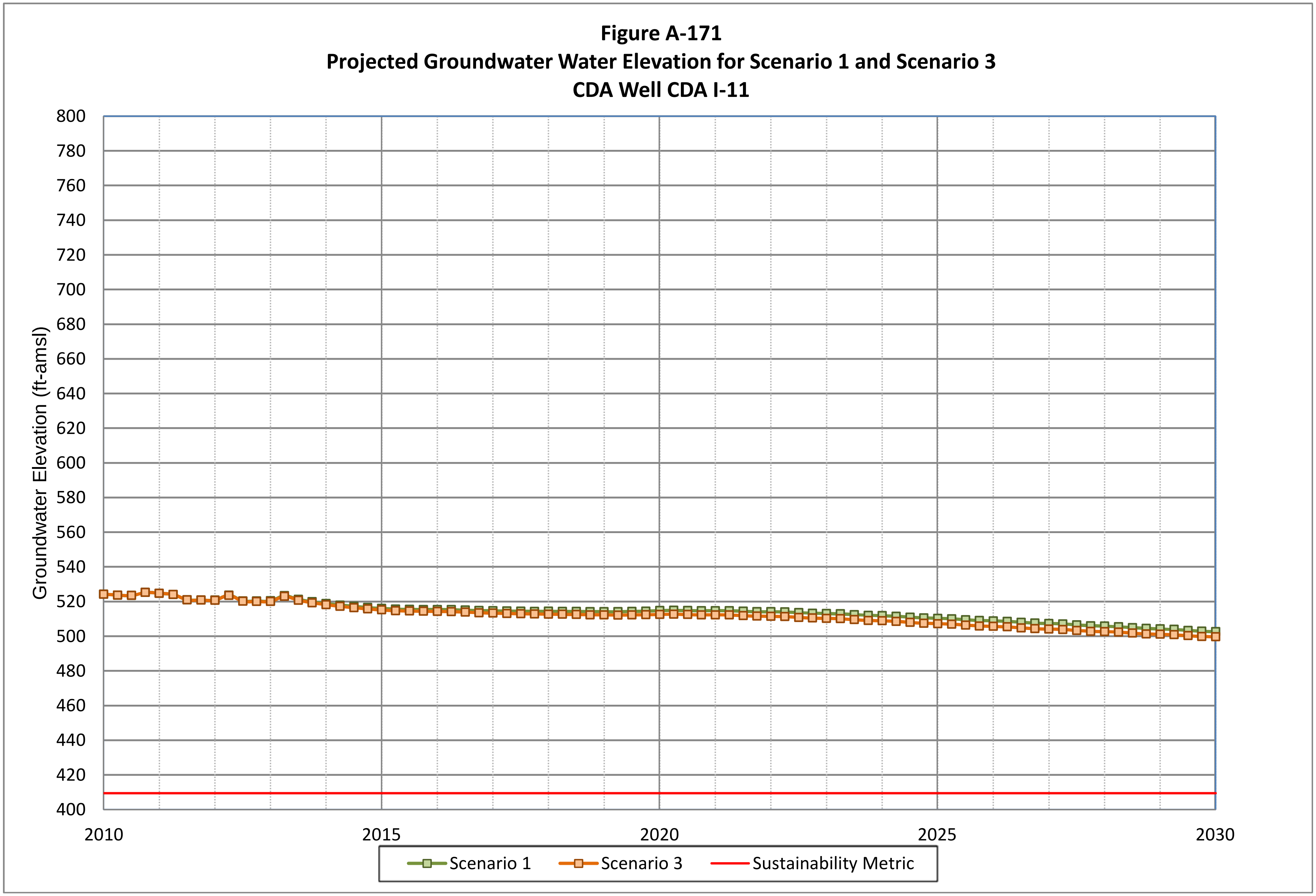

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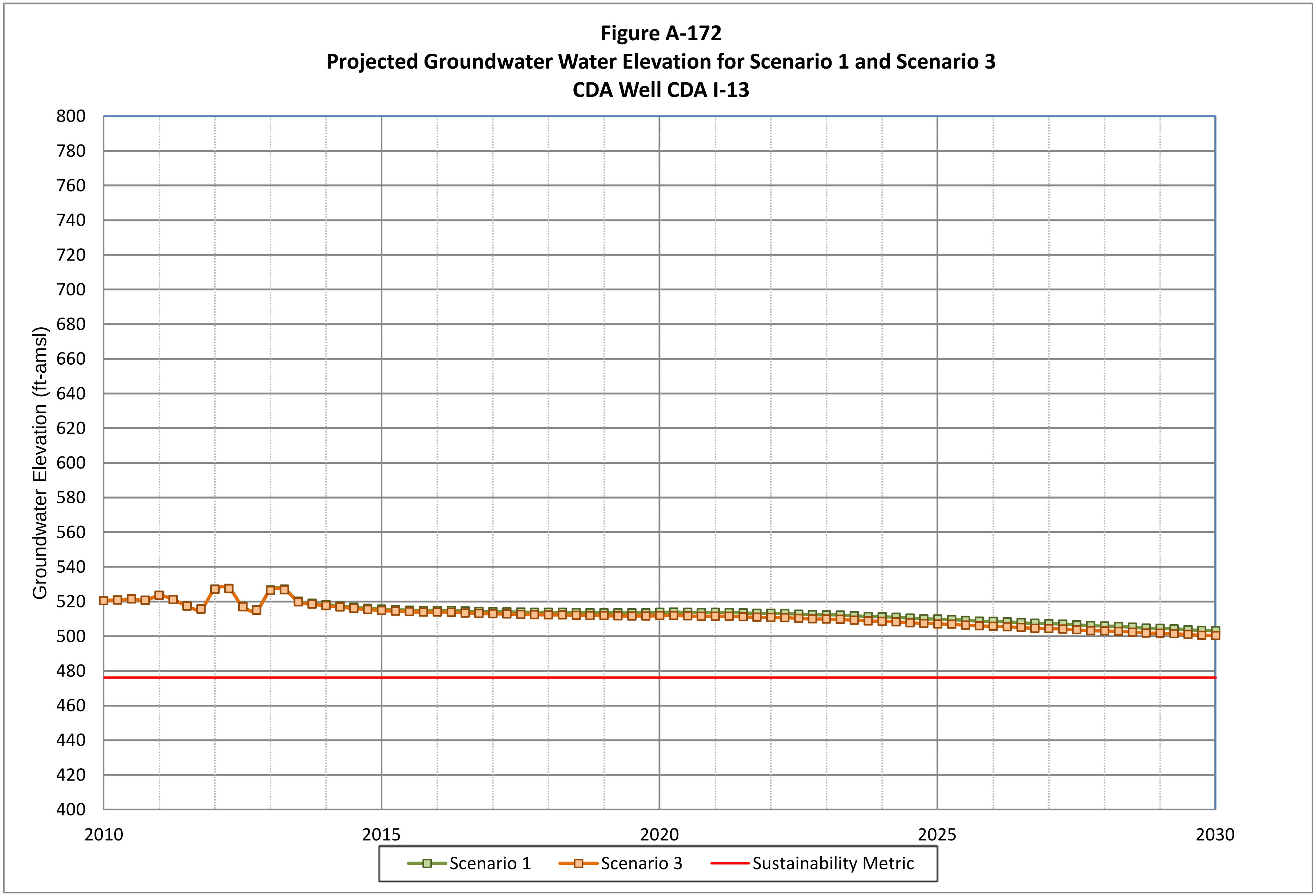

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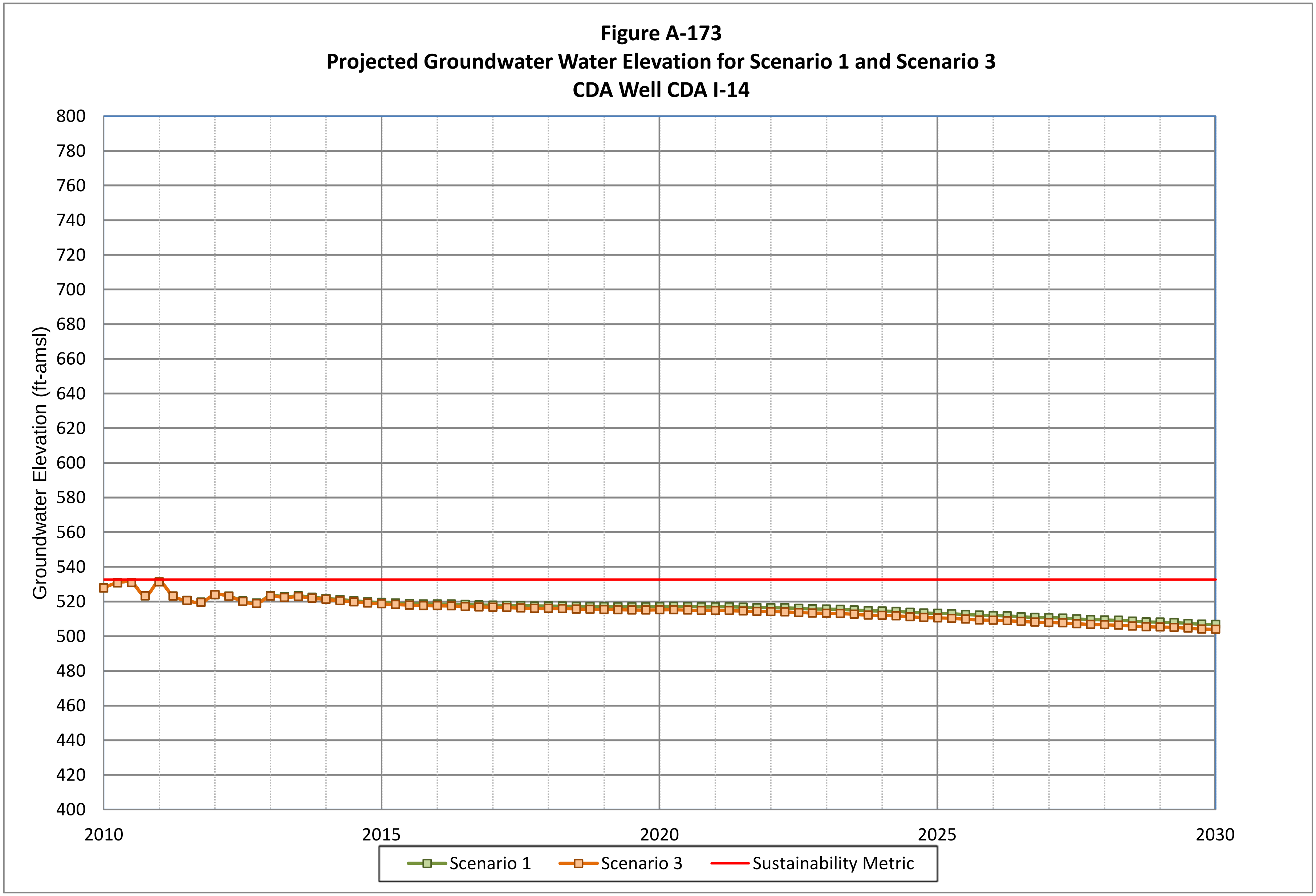
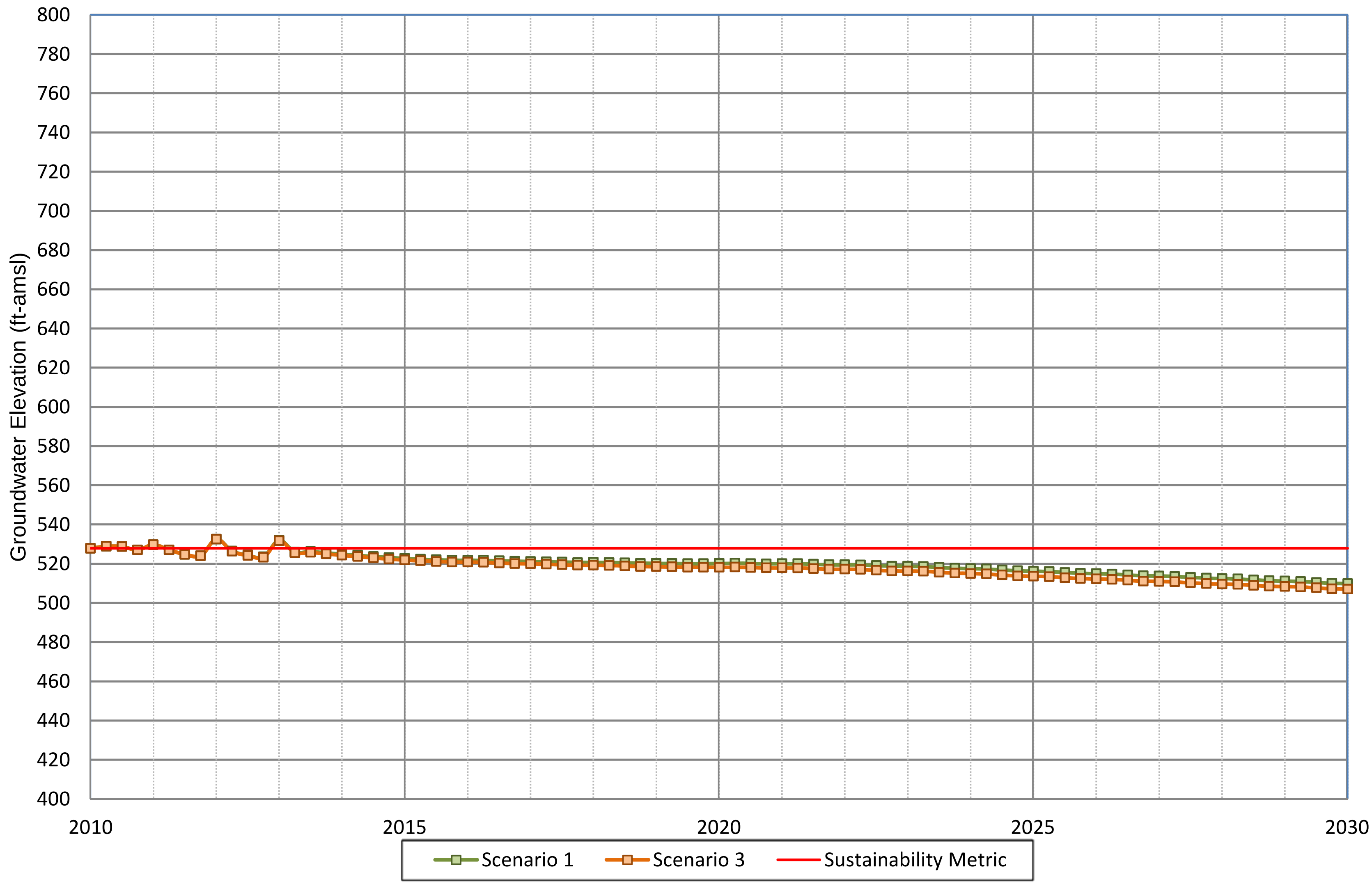
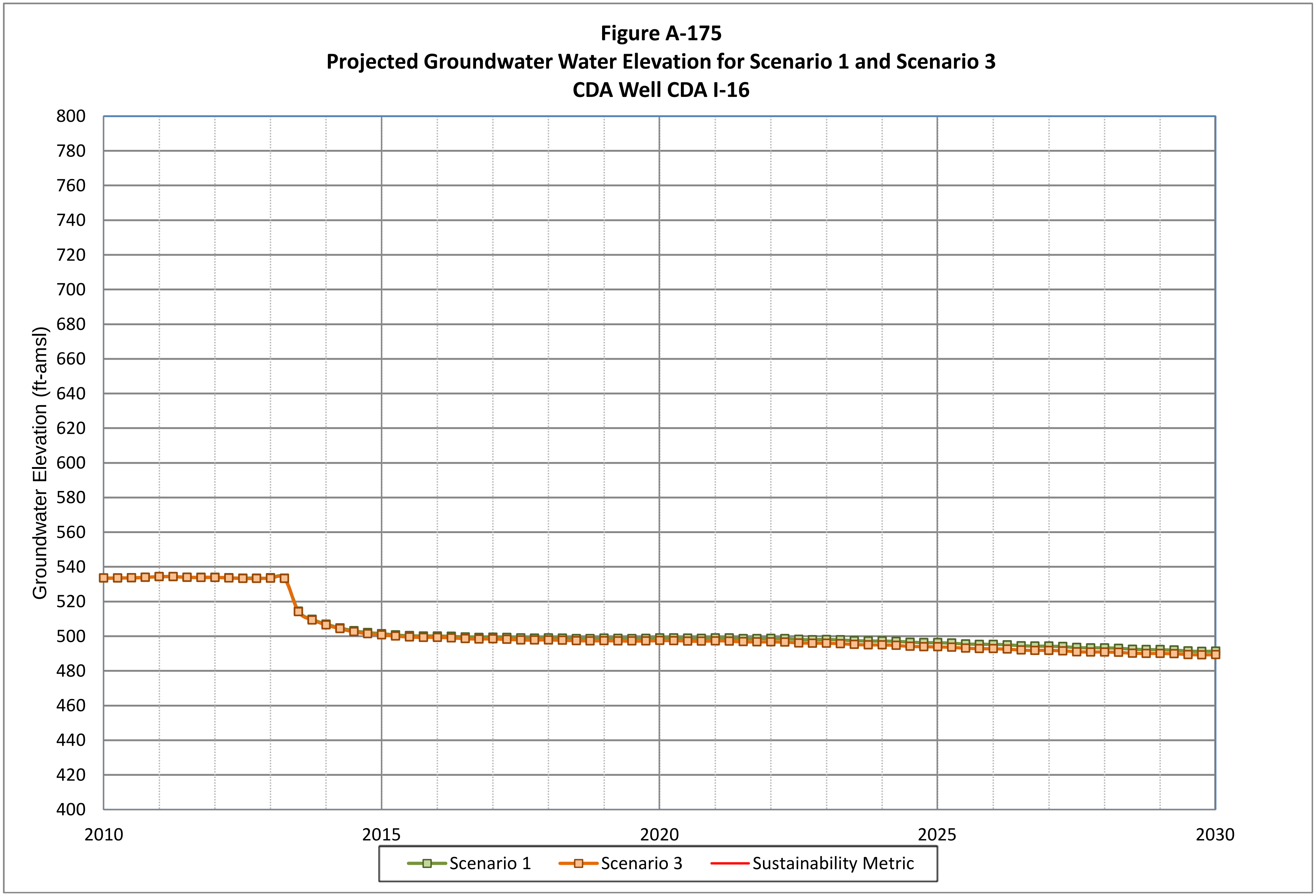


Figure A-173
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-14
Groundwater Elevation (ft-amsl)
800
780
760
740
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
2010
2015
2020
2025
2030
Scenario 1
Scenario 3
Sustainability Metric

Figure A-174
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-15

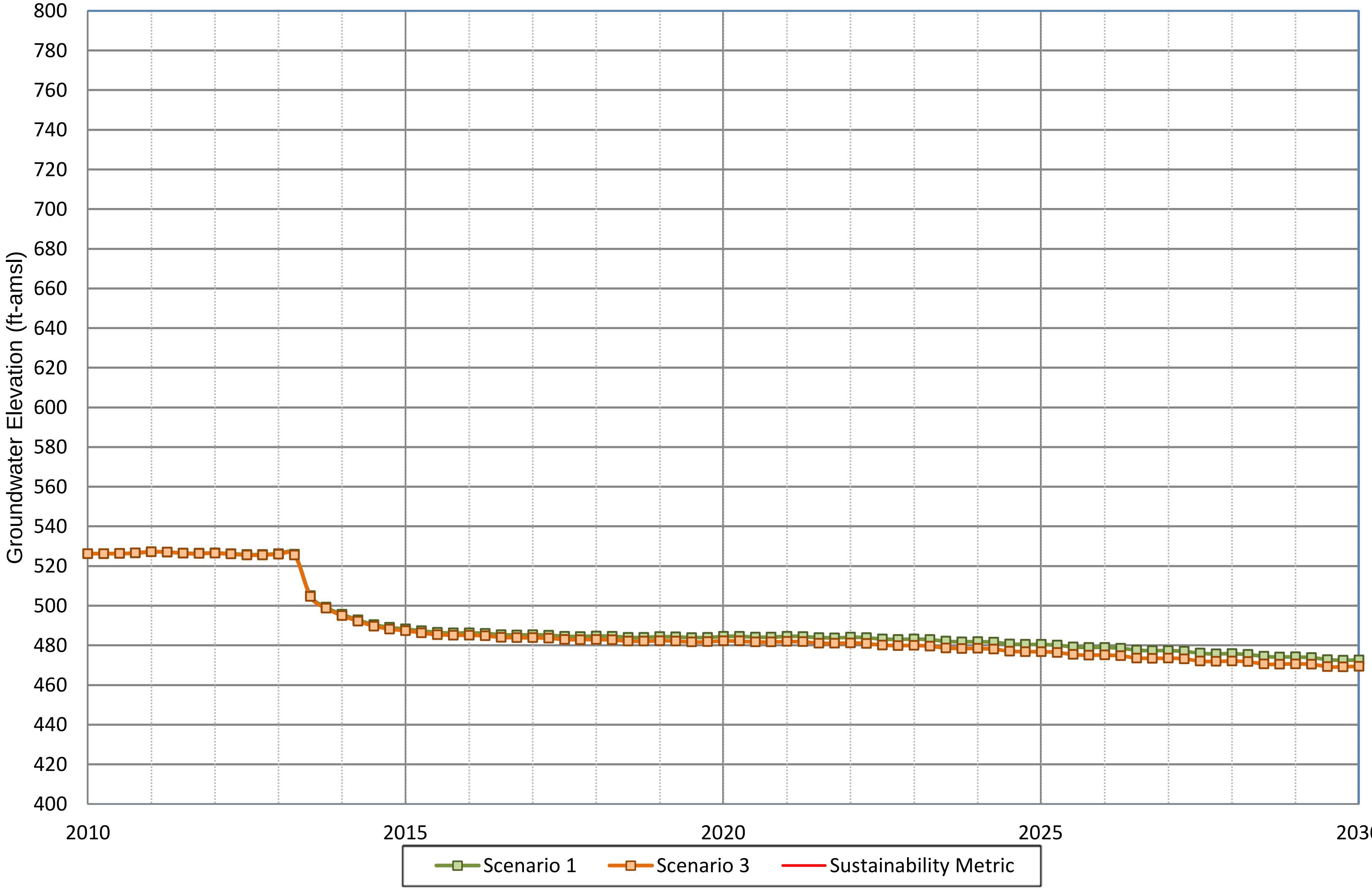


20120503_Projected_Hydrographs.xlsx



20120503_Projected_Hydrographs.xlsx

Figure A-176
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-17



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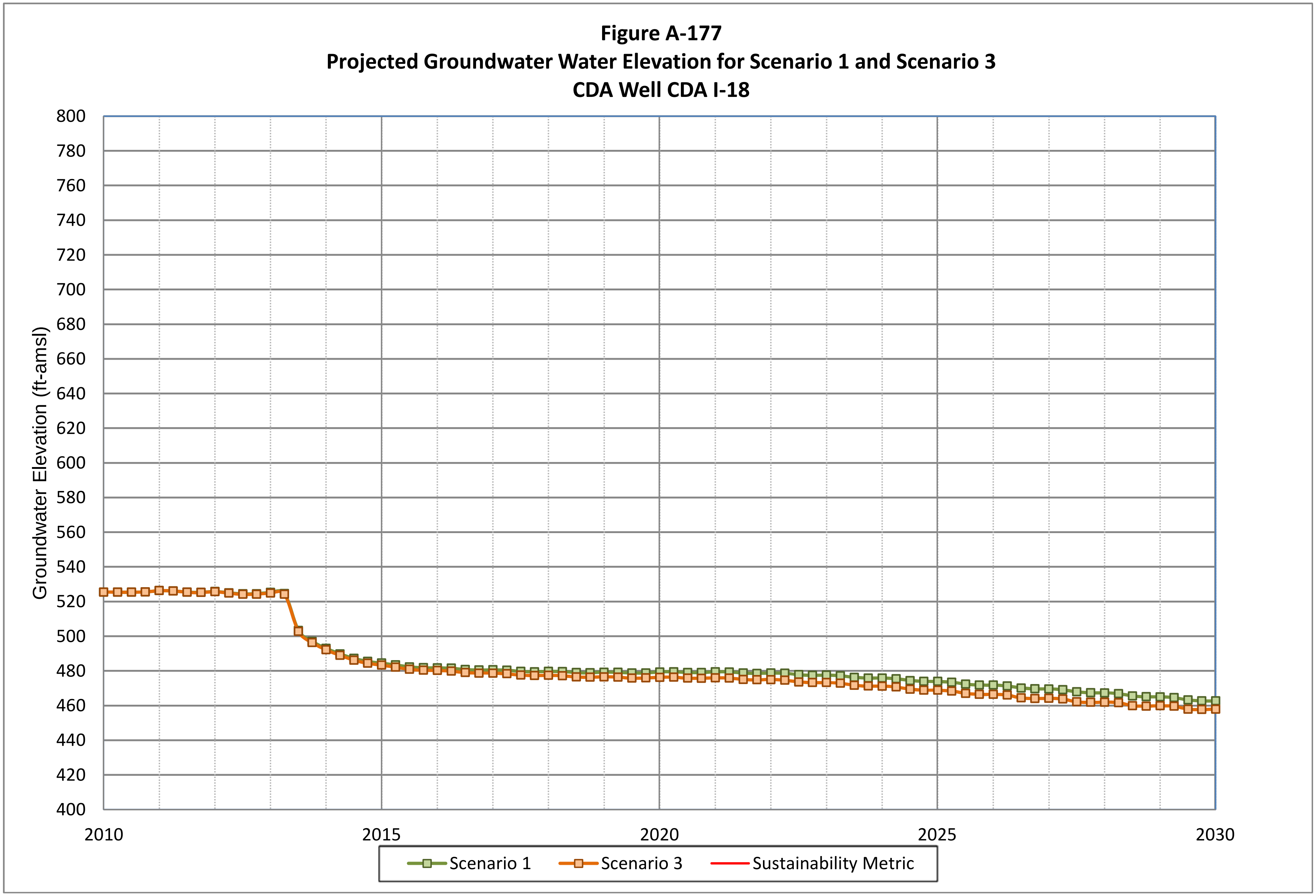
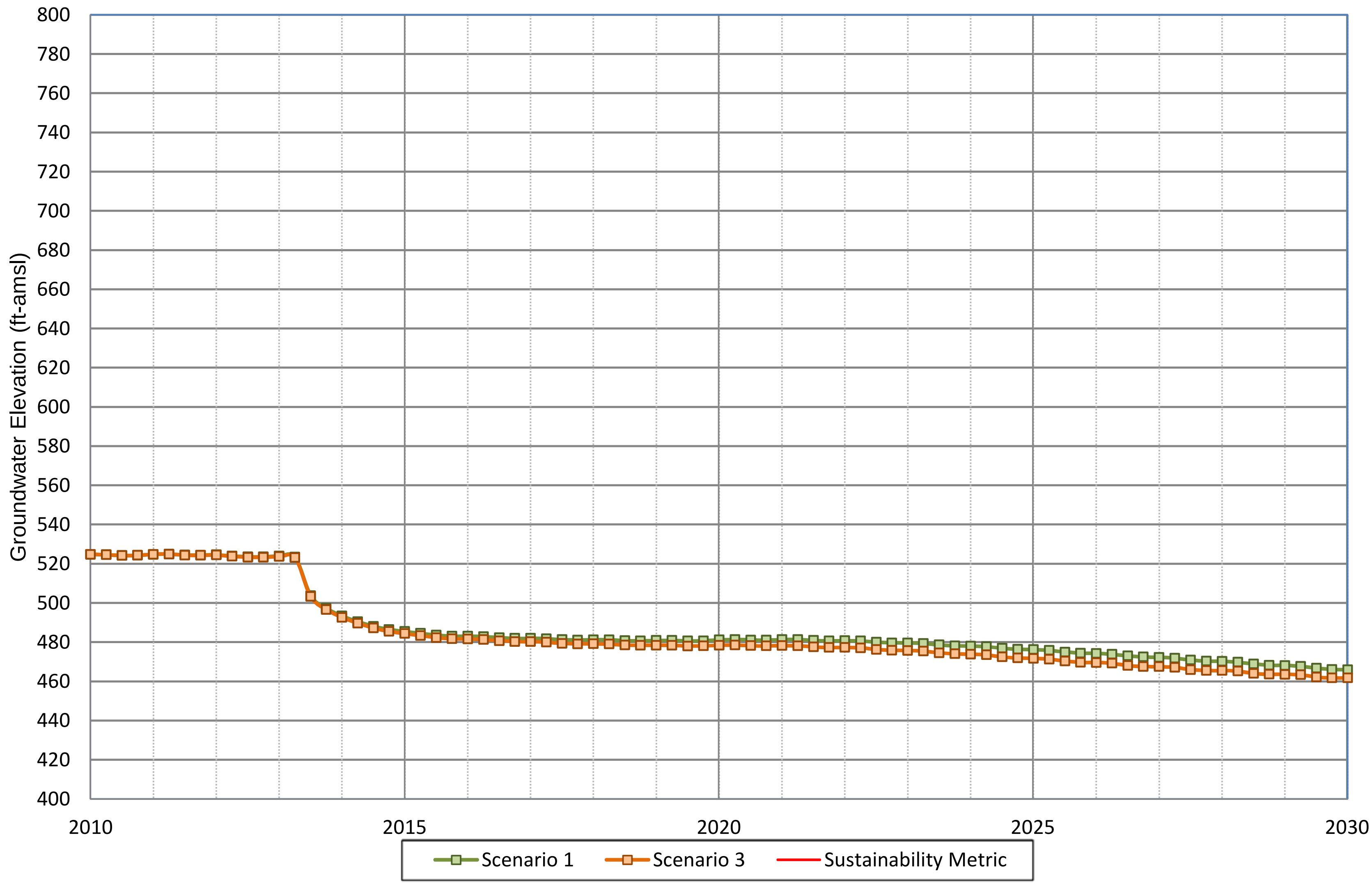


20120503_Projected_Hydrographs.xlsx

WILDERMUTH ENVIRONMENTAL INC.

Figure A-178
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-19



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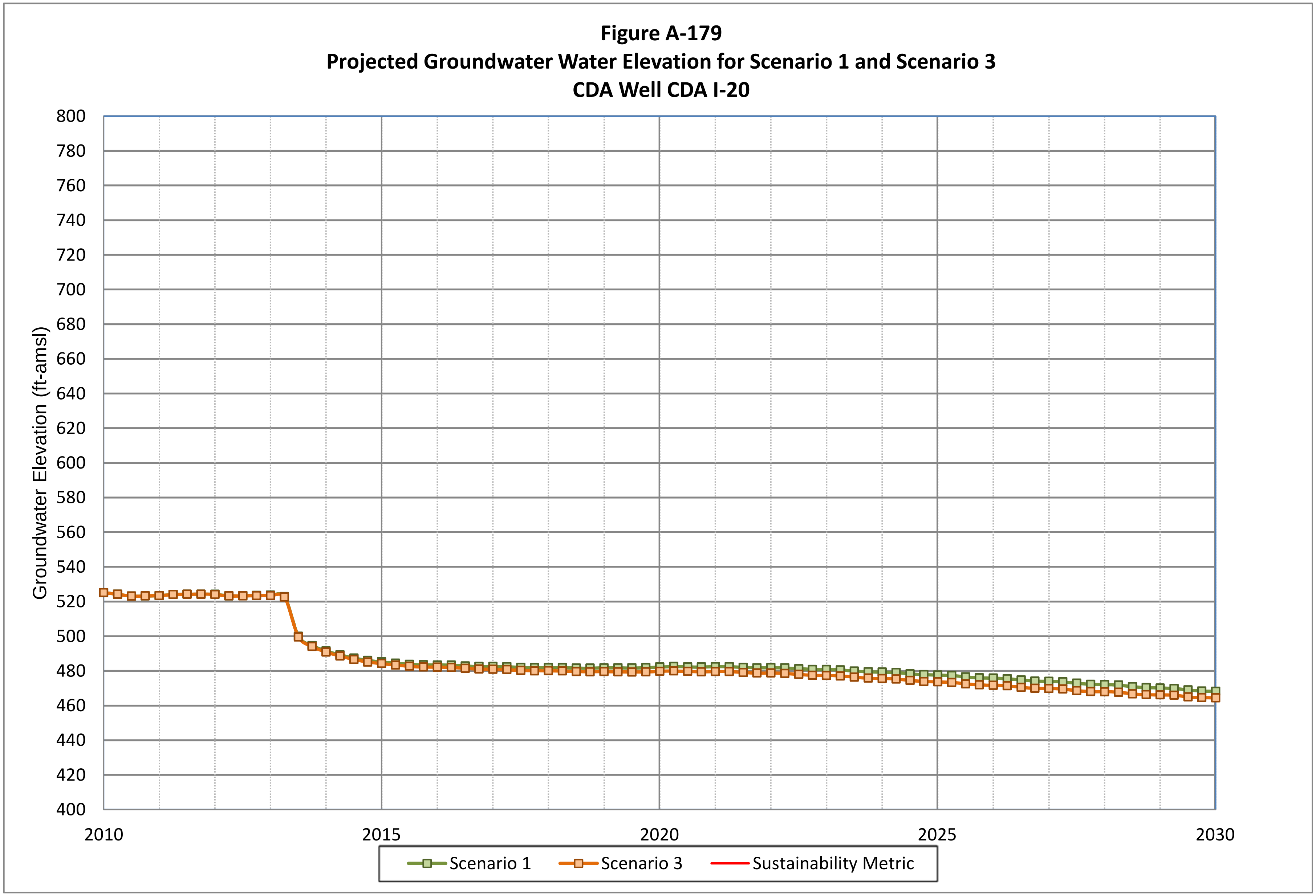
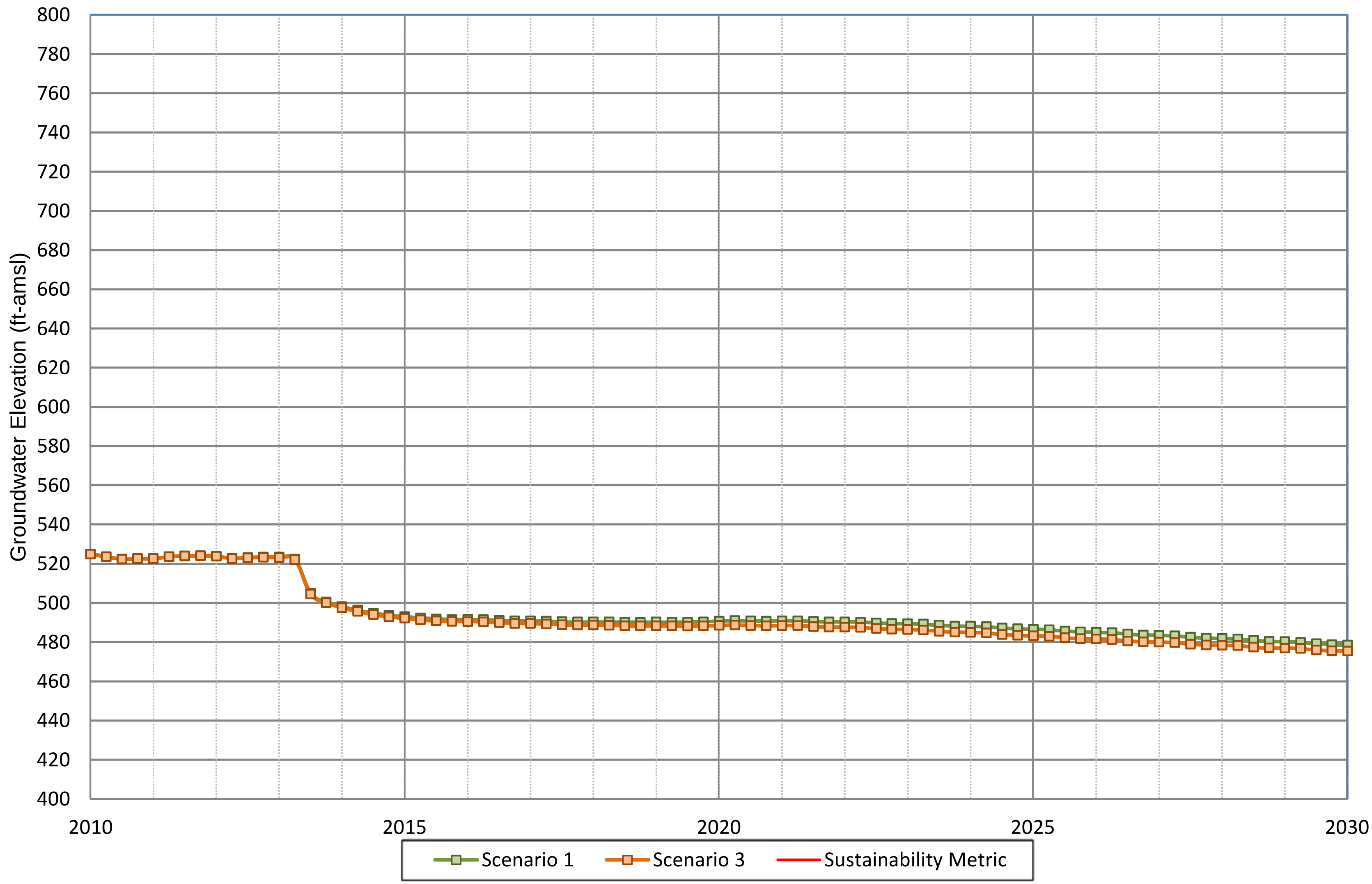


20120503_Projected_Hydrographs.xlsx

WILDERMUTH ENVIRONMENTAL INC.

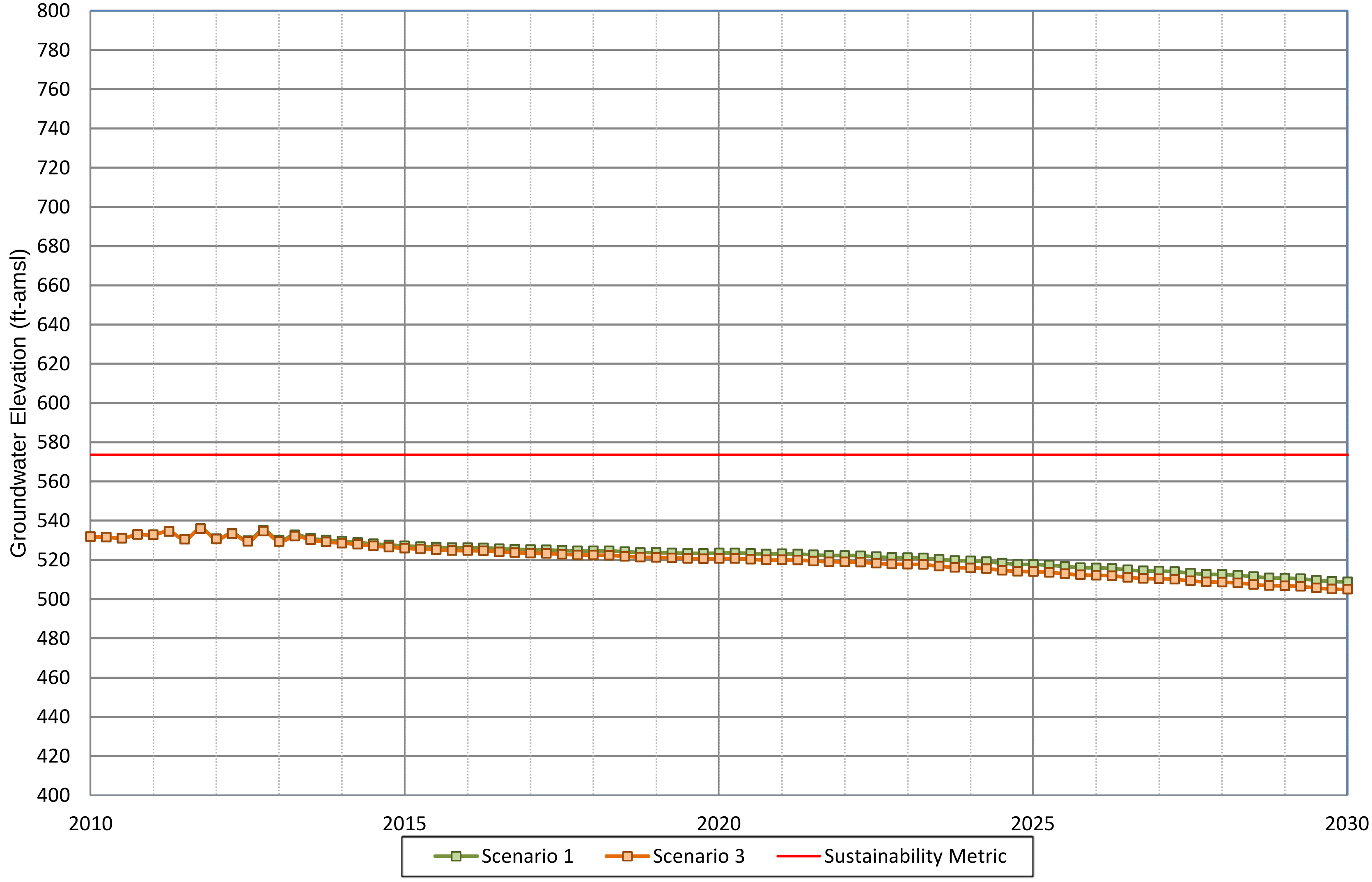
Figure A-180
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA I-21



20120503_Projected_Hydrographs.xlsx

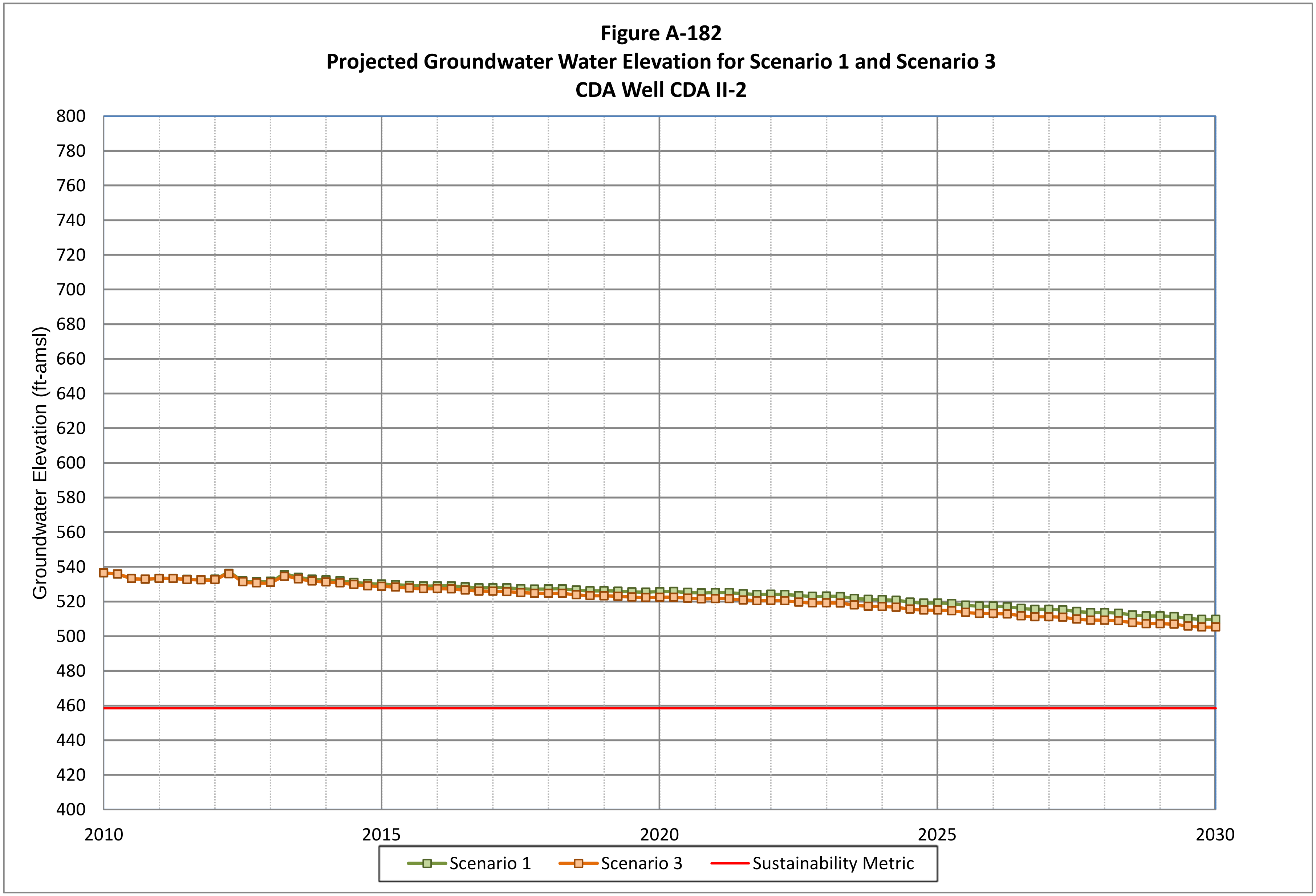
WILDERMUTH ENVIRONMENTAL INC.

Figure A-181
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA II-1



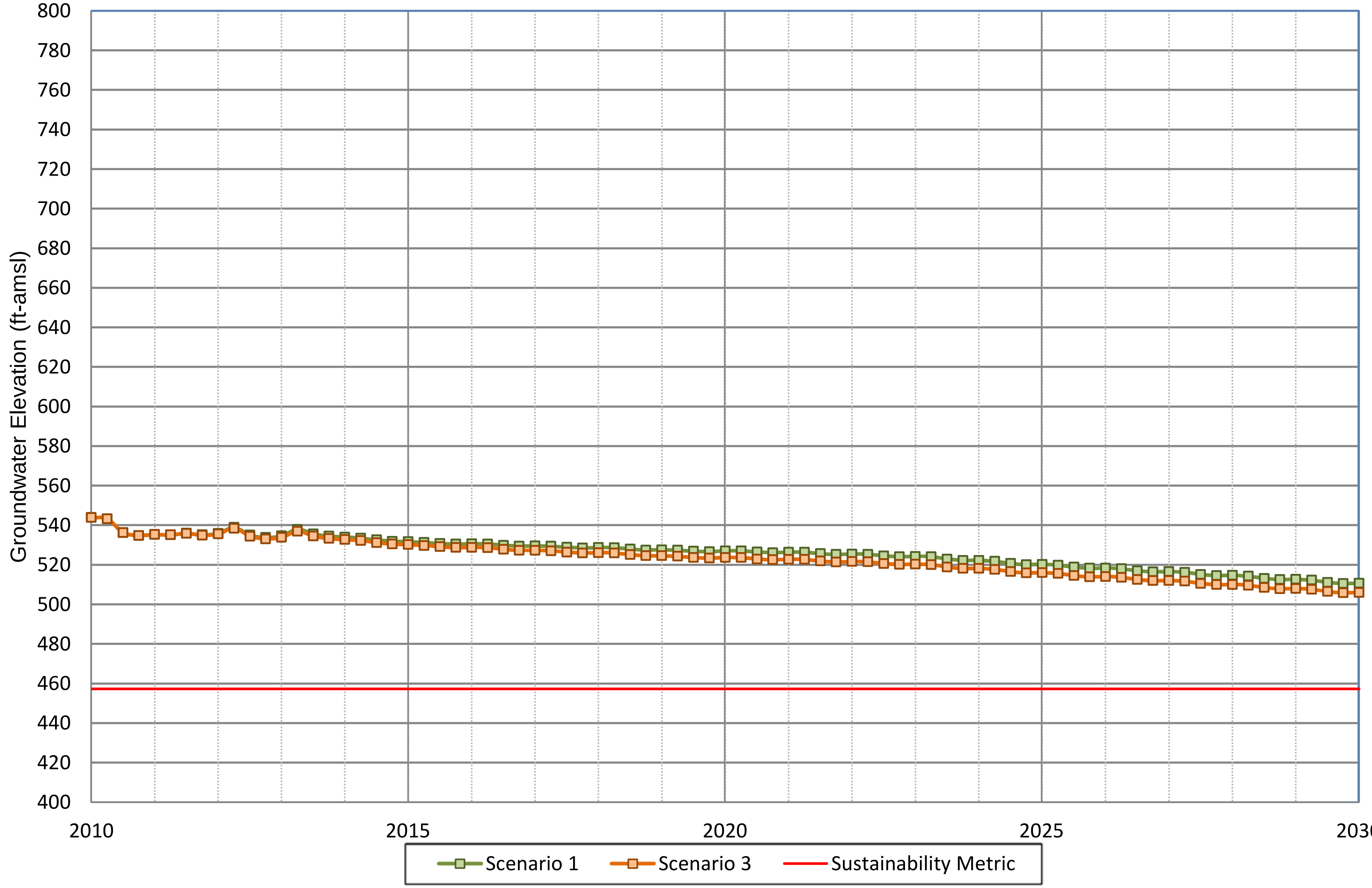
20120503_Projected_Hydrographs.xlsx

WILDERMUTH ENVIRONMENTAL INC.



20120503_Projected_Hydrographs.xlsx

Figure A-183
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA II-3



20120503_Projected_Hydrographs.xlsx

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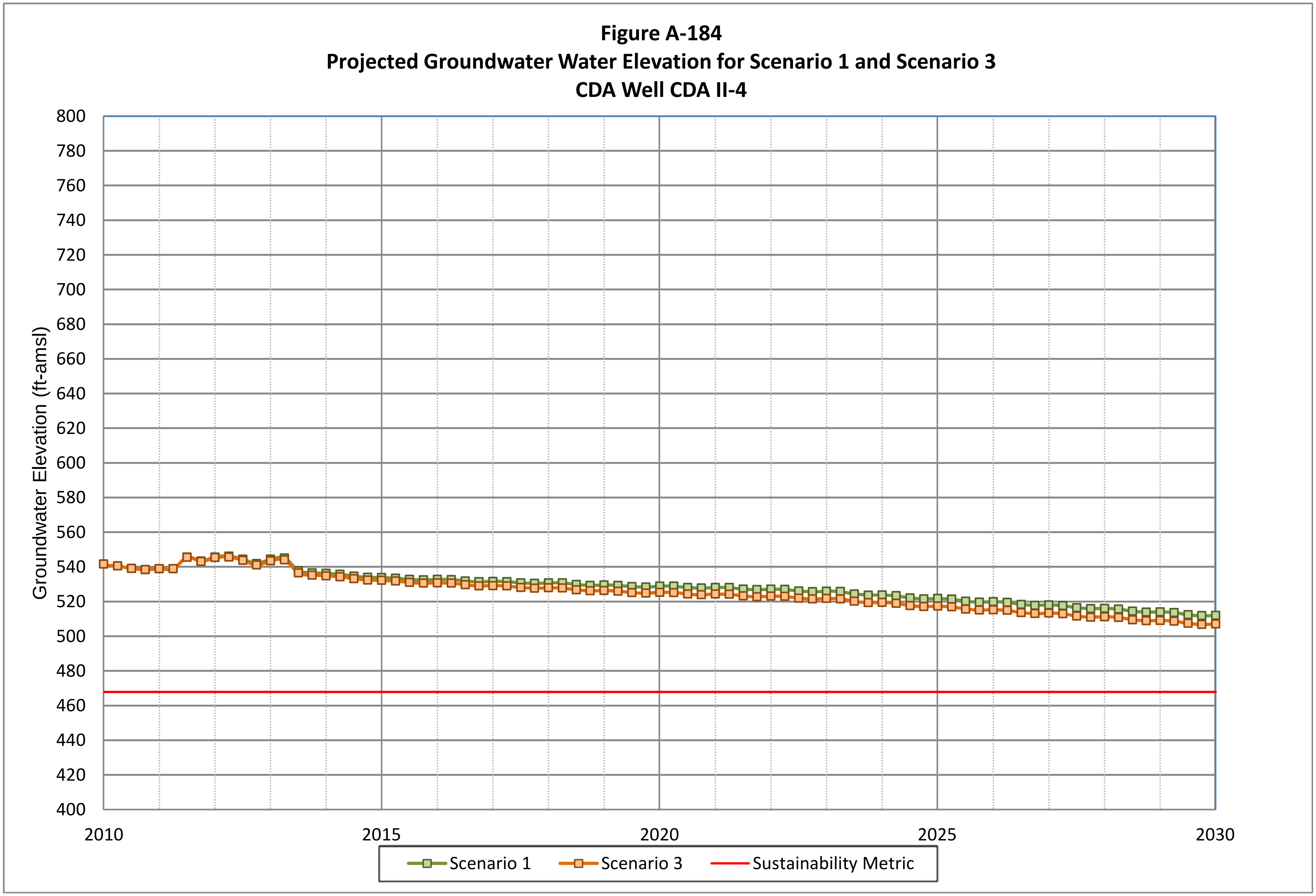
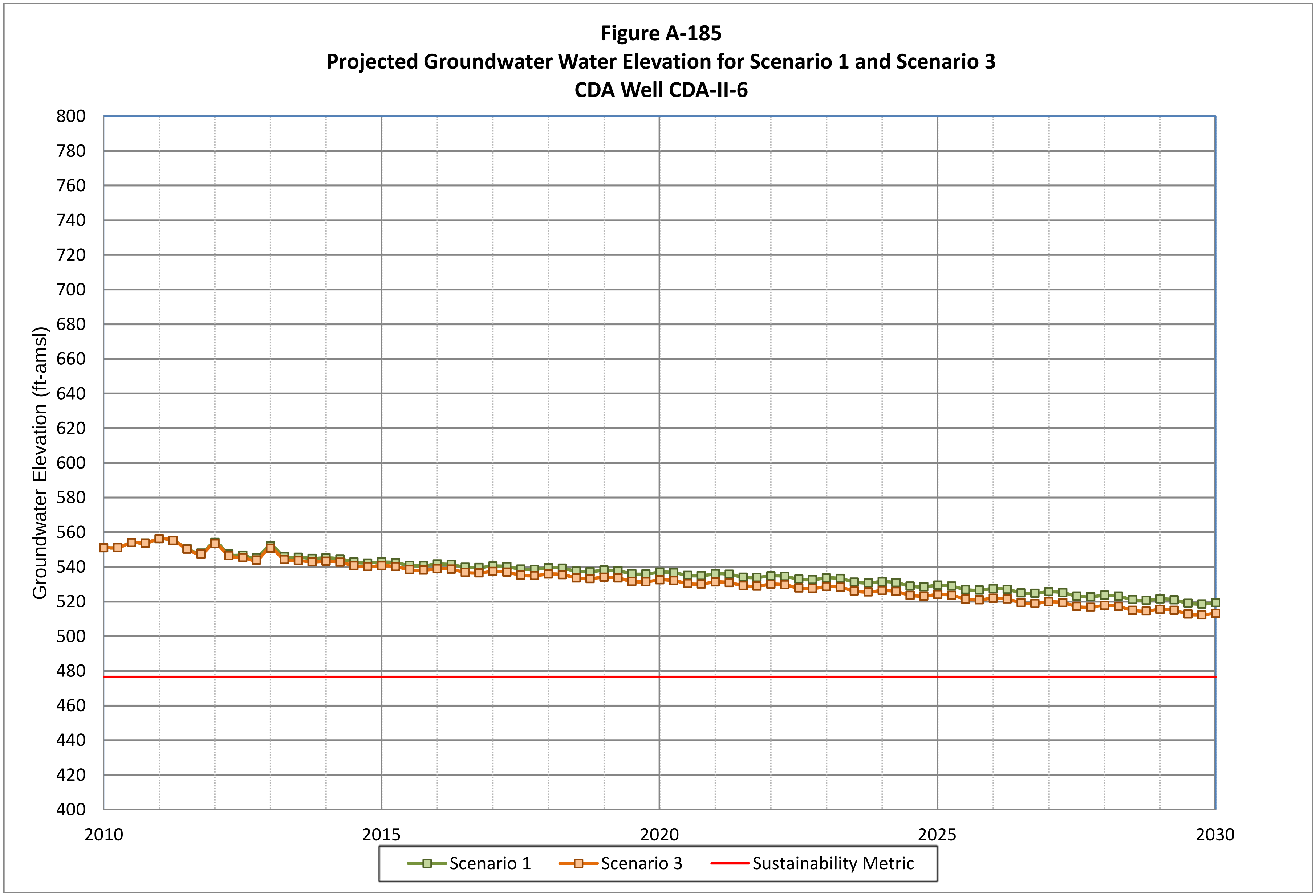
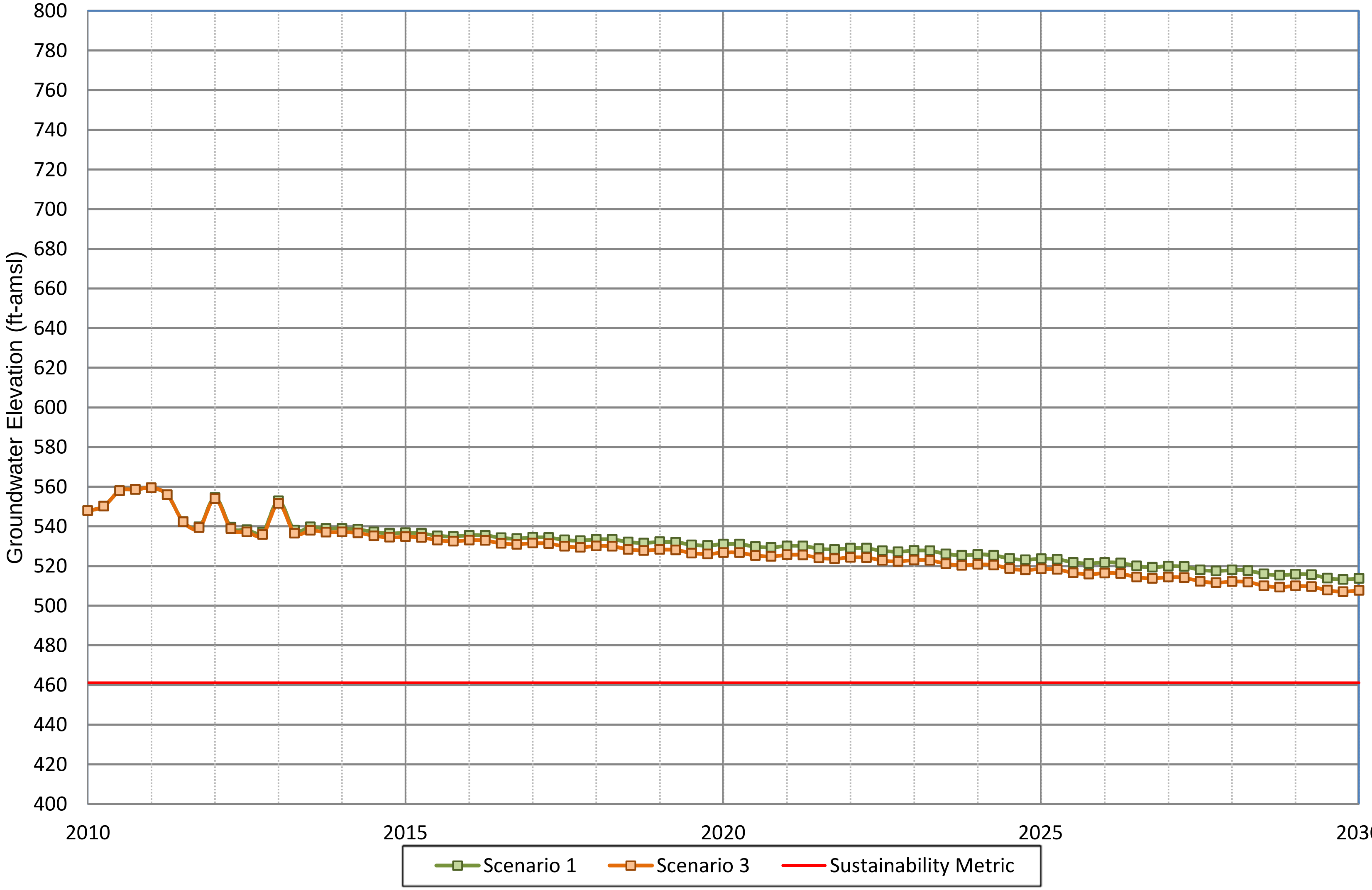


20120503_Projected_Hydrographs.xlsx



20120503_Projected_Hydrographs.xlsx

Figure A-186
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA II-7



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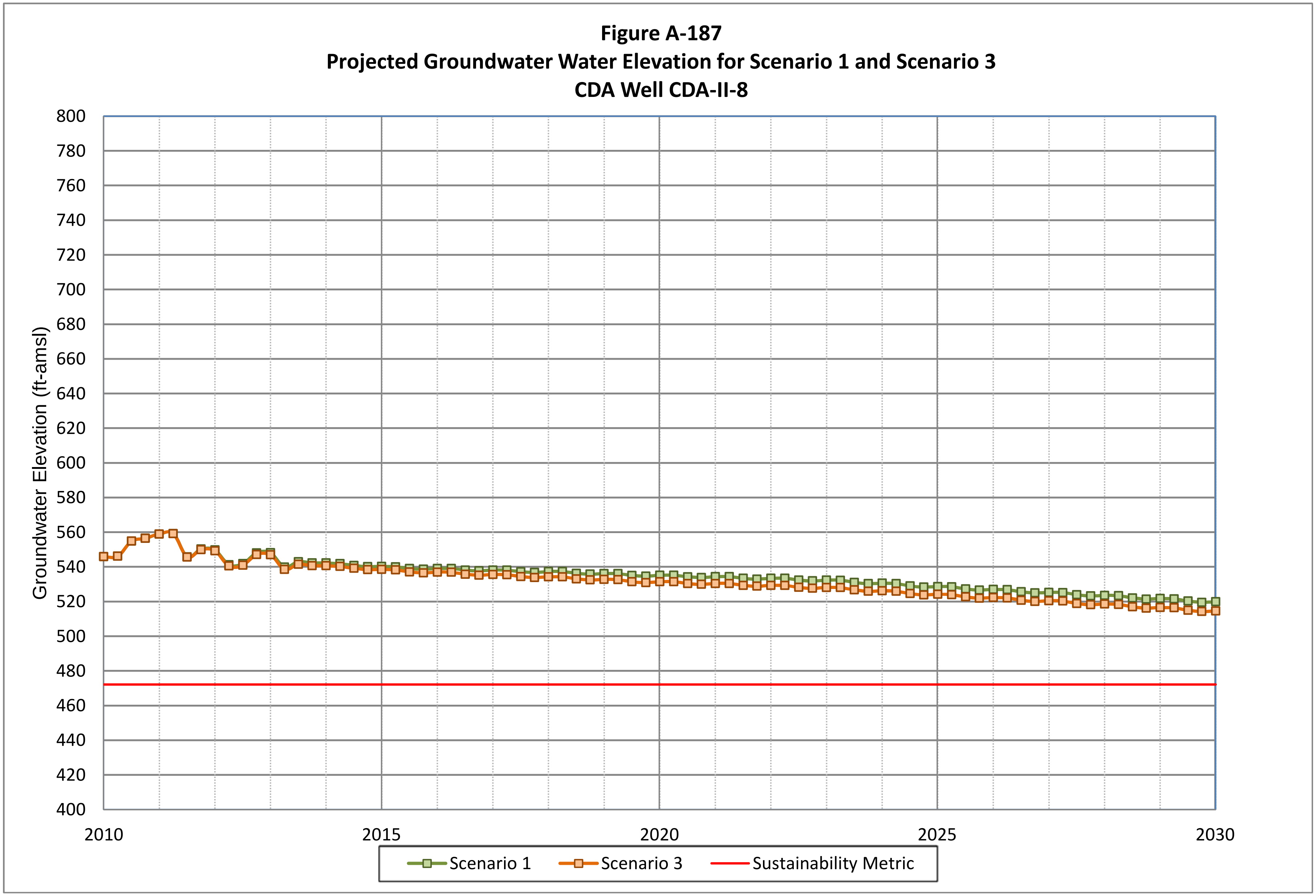
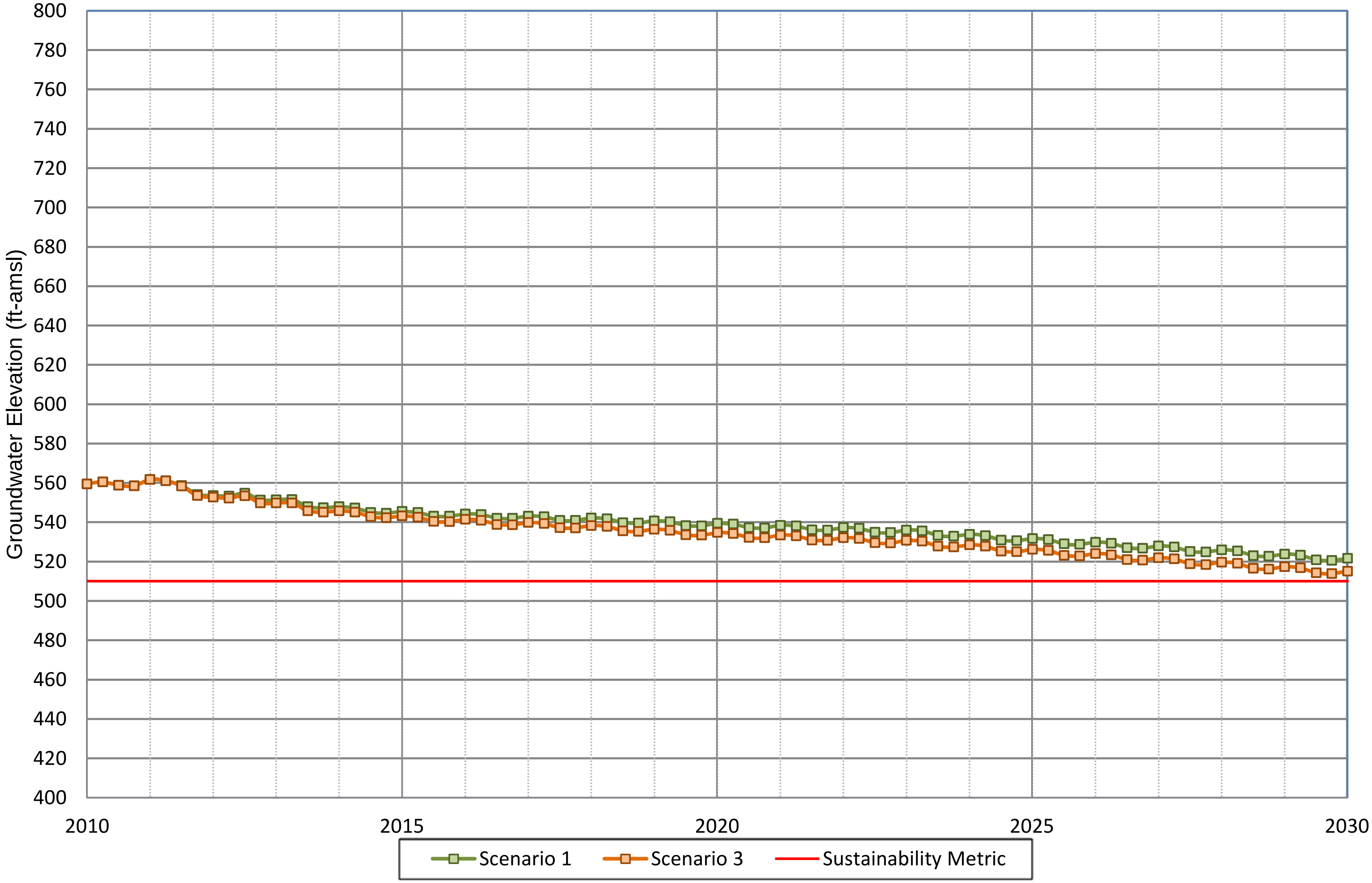


20120503_Projected_Hydrographs.xlsx

Figure A-188
Projected Groundwater Water Elevation for Scenario 1 and Scenario 3
CDA Well CDA-II-9a



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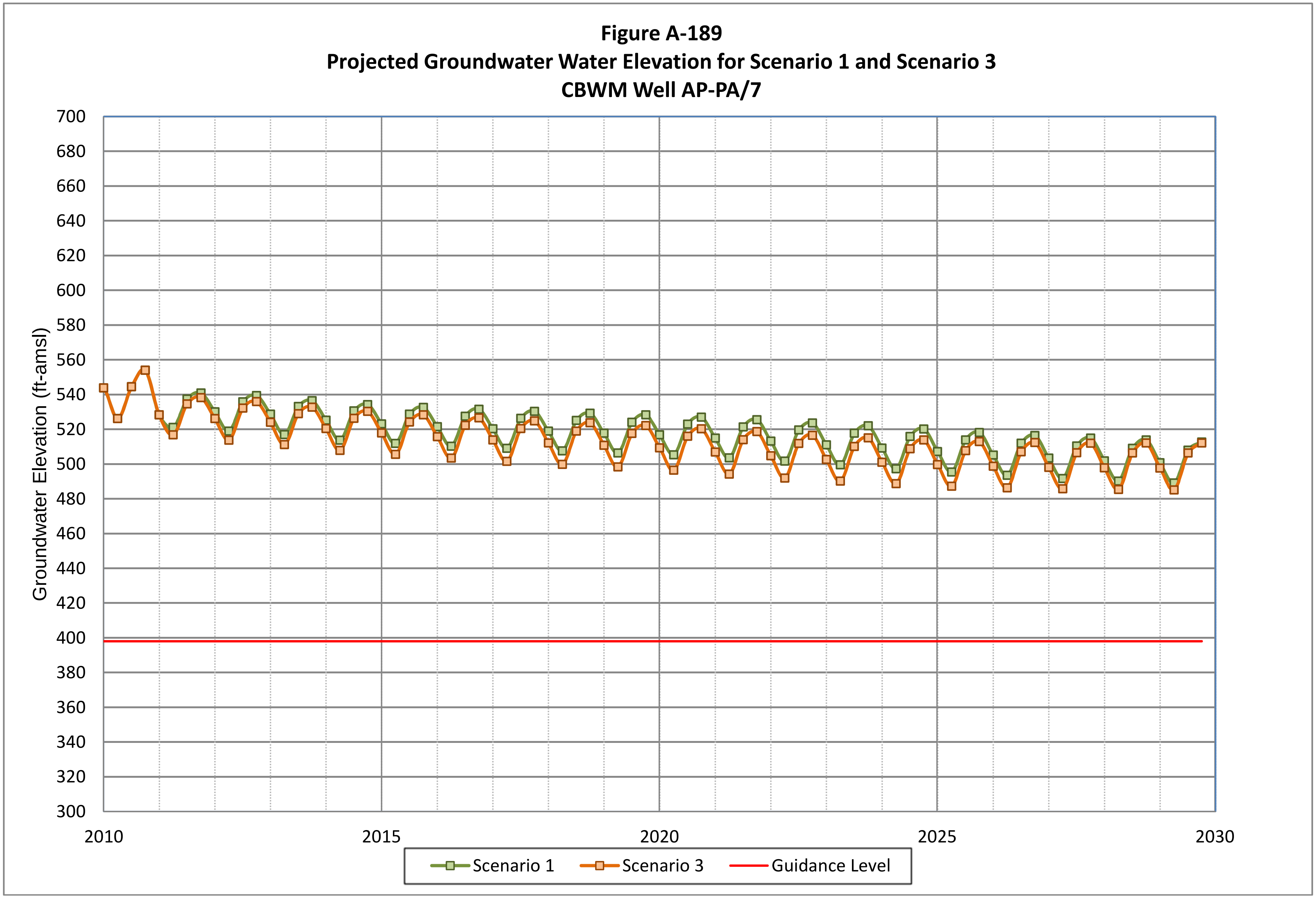
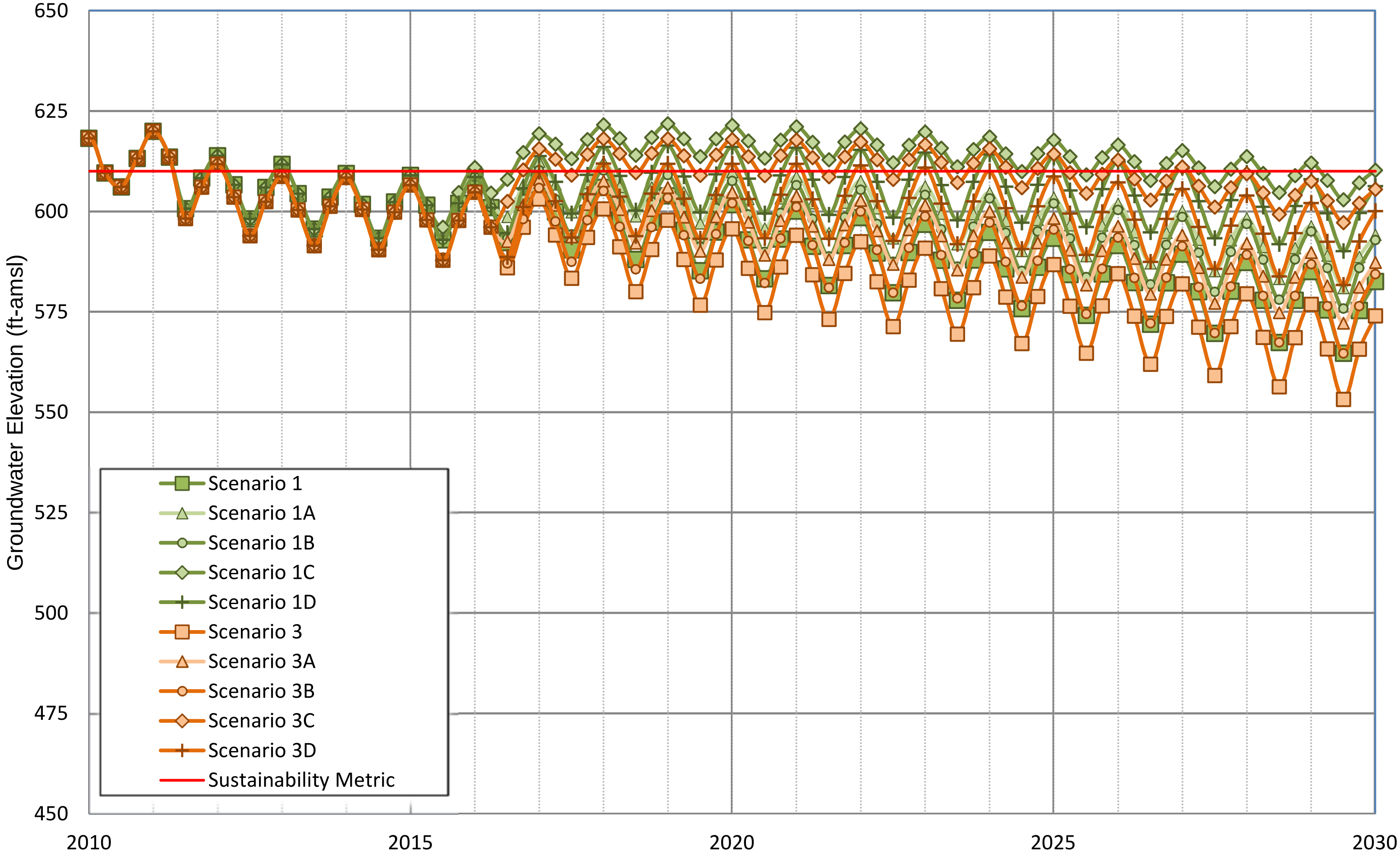


20120503_Projected_Hydrographs.xlsx

Appendix B

Projected Groundwater Elevation Time Series for JCSD Wells for Scenarios 1, 1A-1D, 3 and 3A-3D

Figure B-1
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 6



20120503_Projected_Hydrographs_JCSD .xlsx

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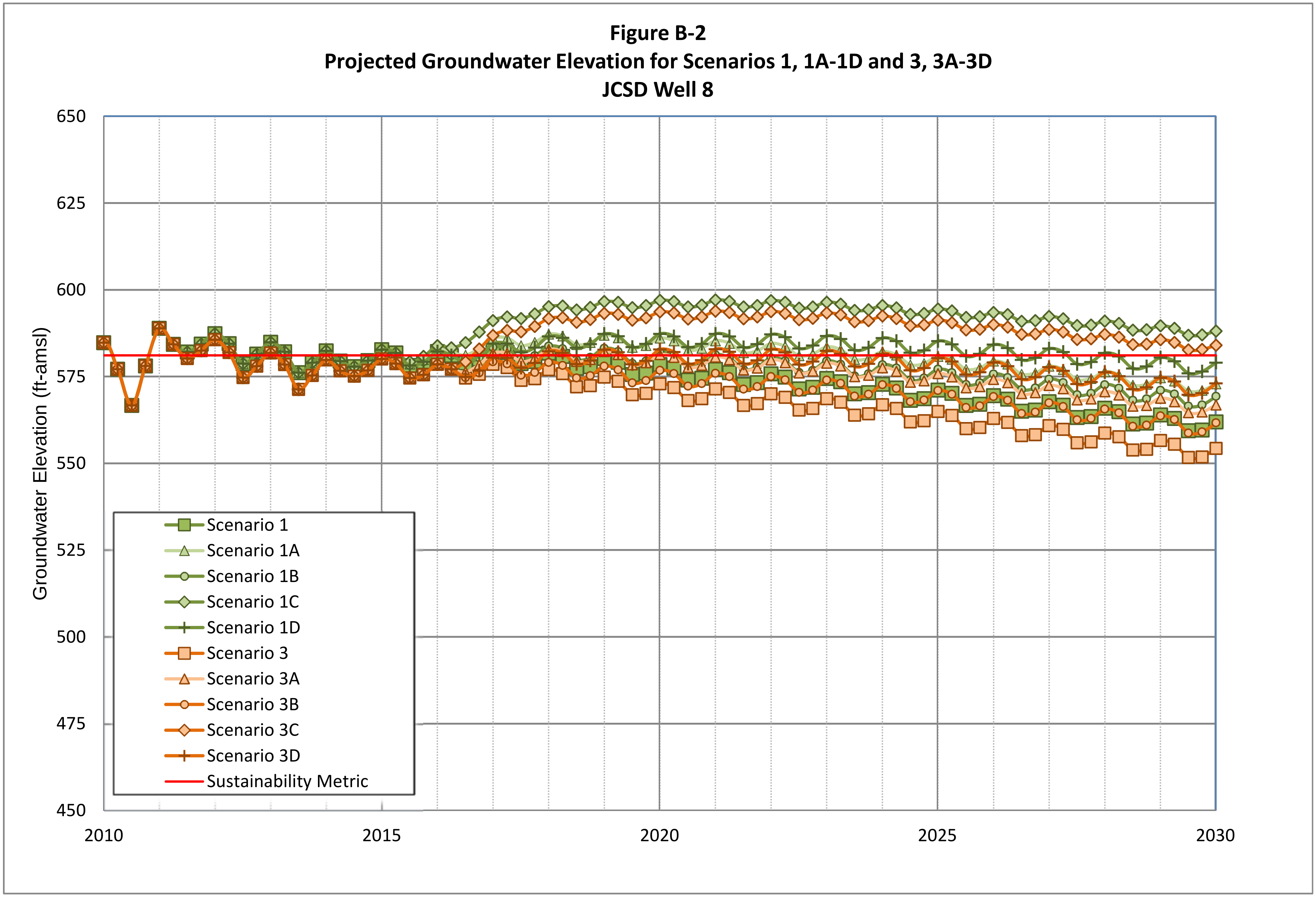

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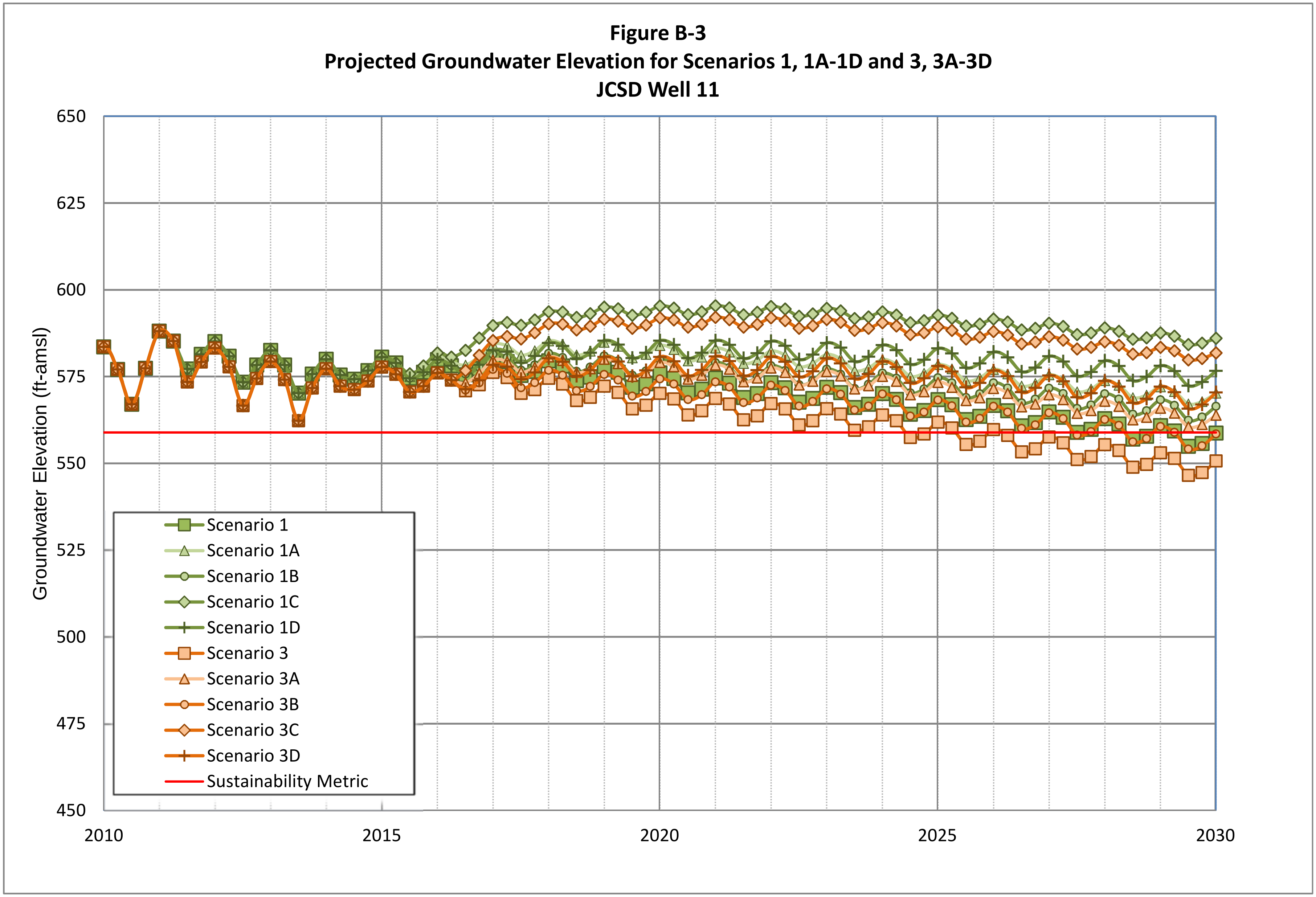

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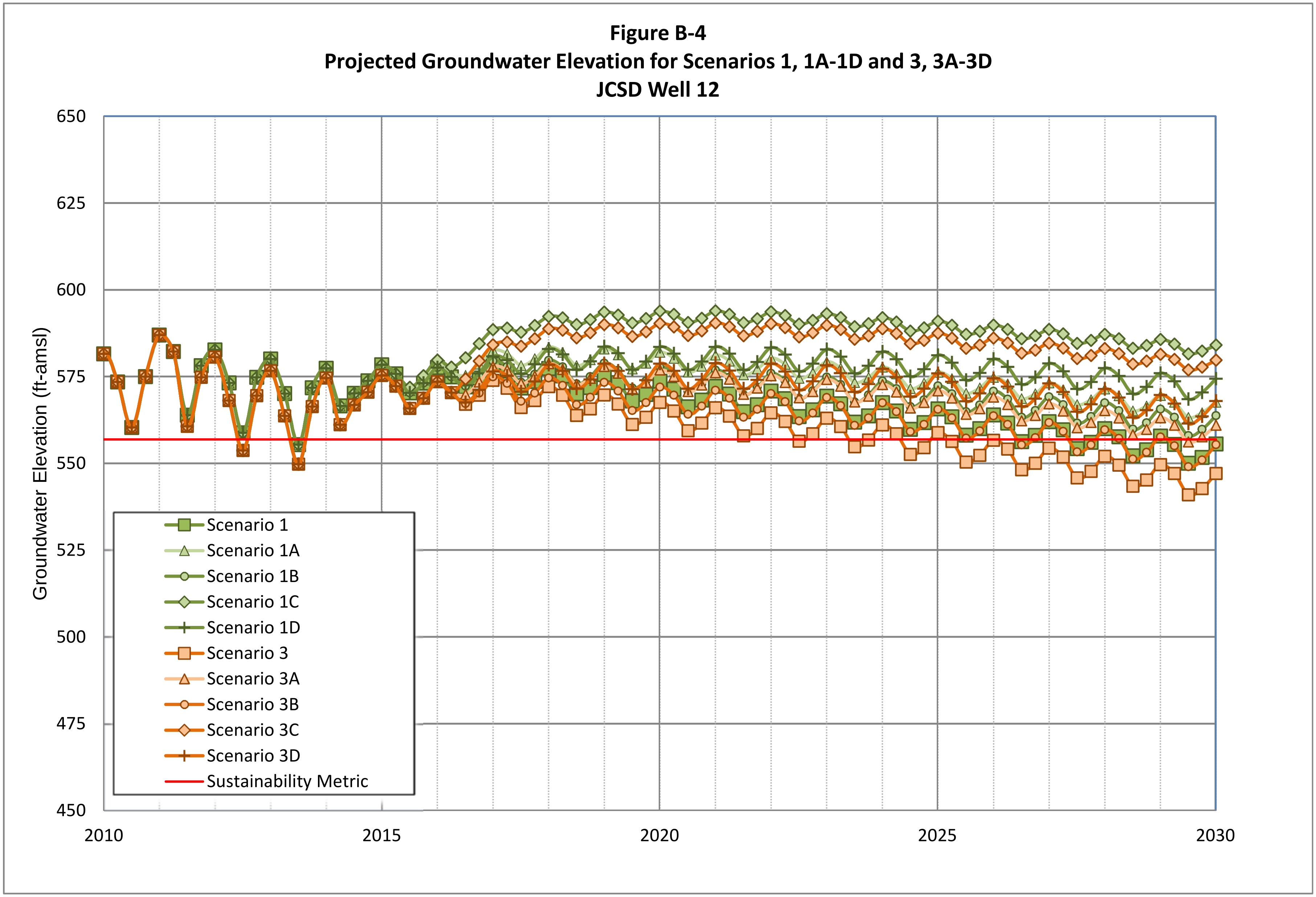

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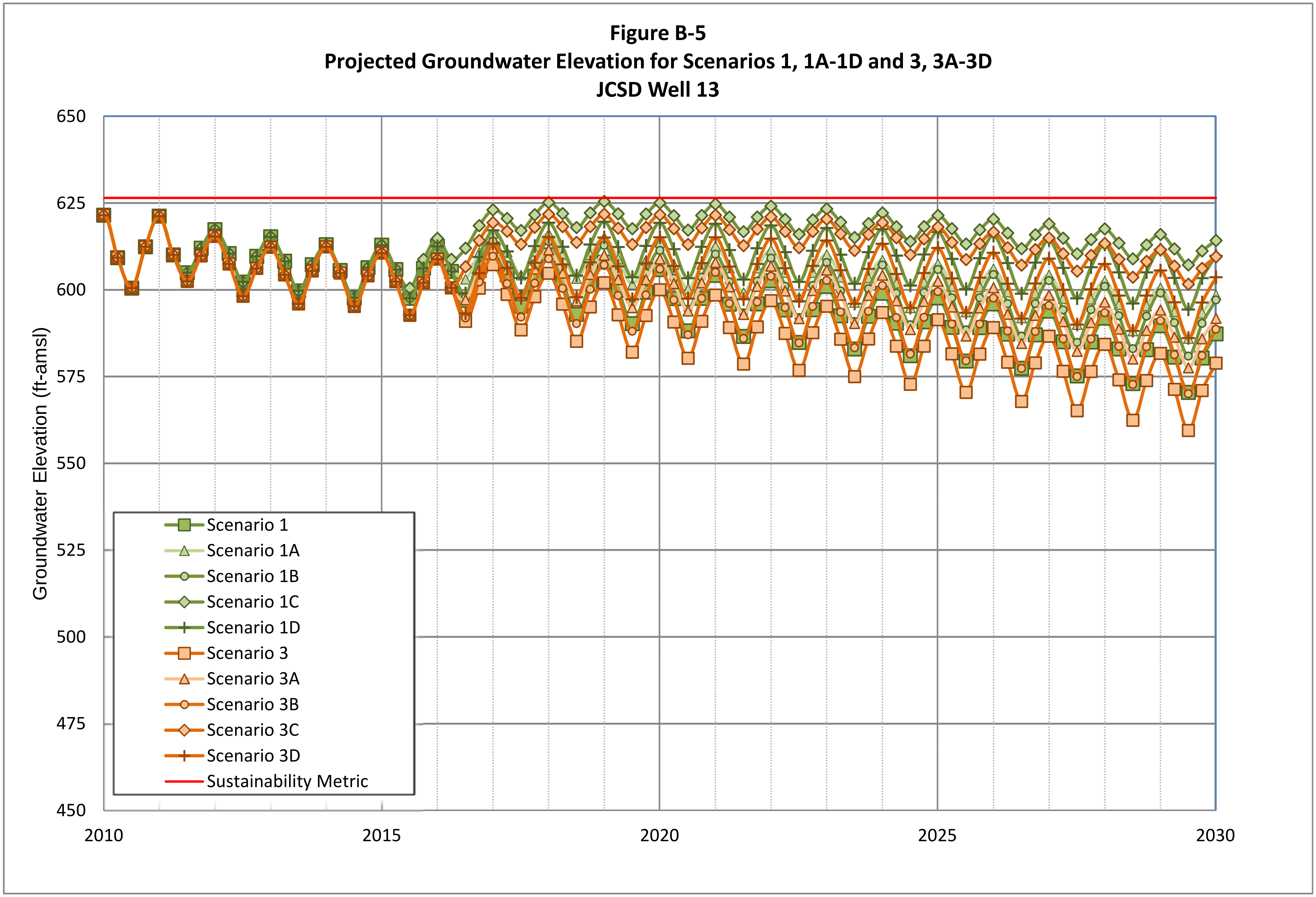

20120503_Projected_Hydrographs_JCSD .xlsx

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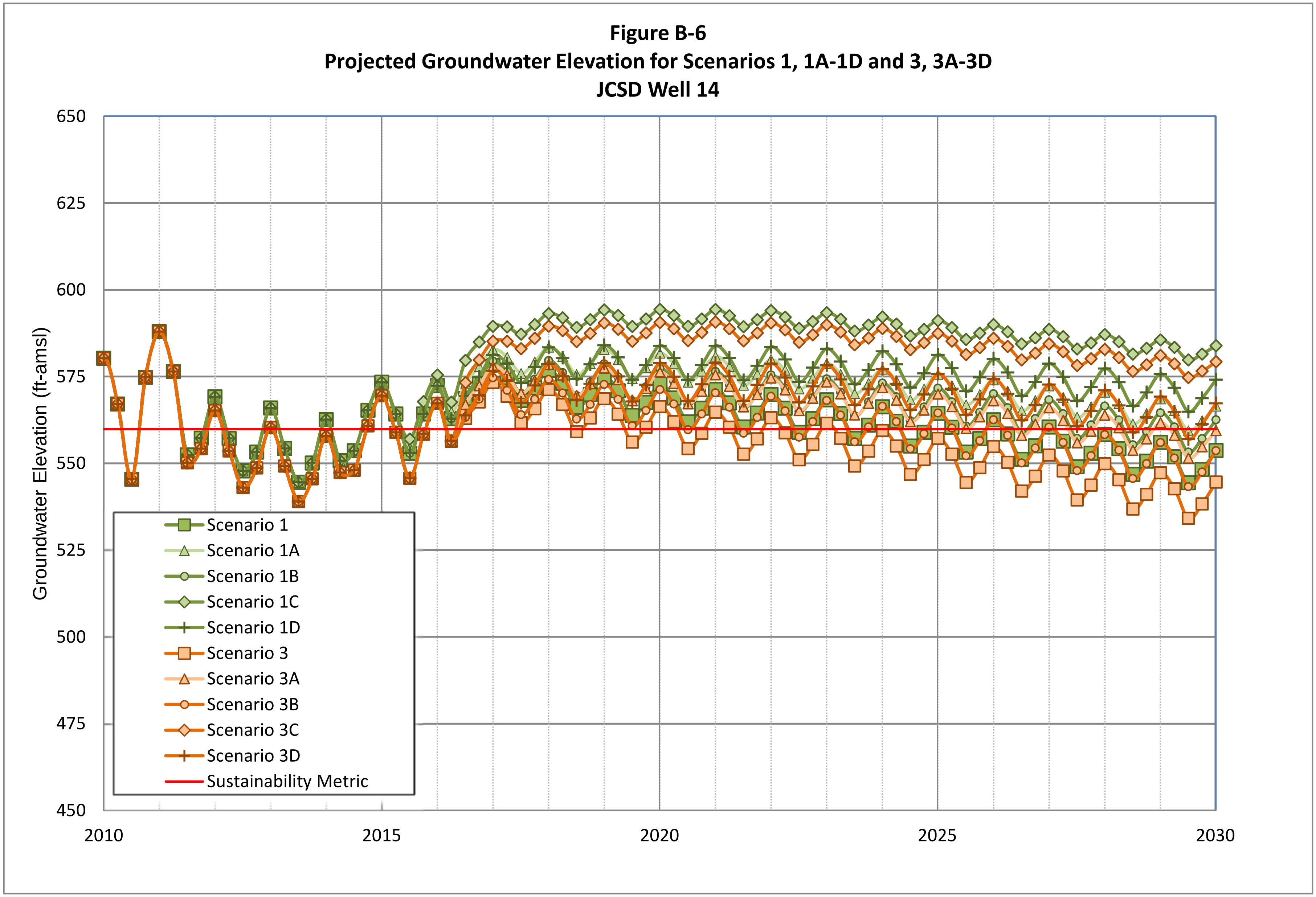


20120503_Projected_Hydrographs_JCSD .xlsx

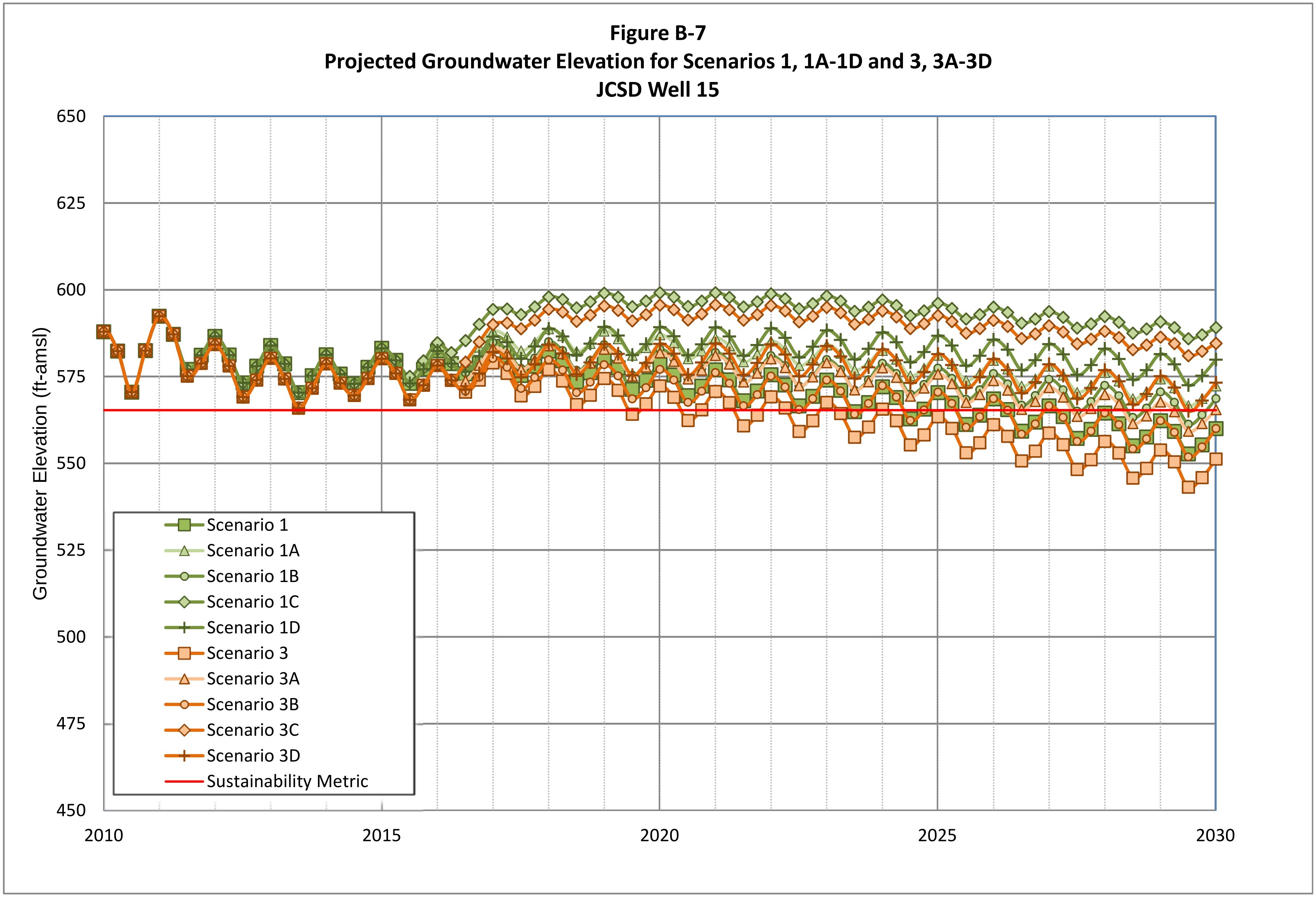


Figure B-7
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 15
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric

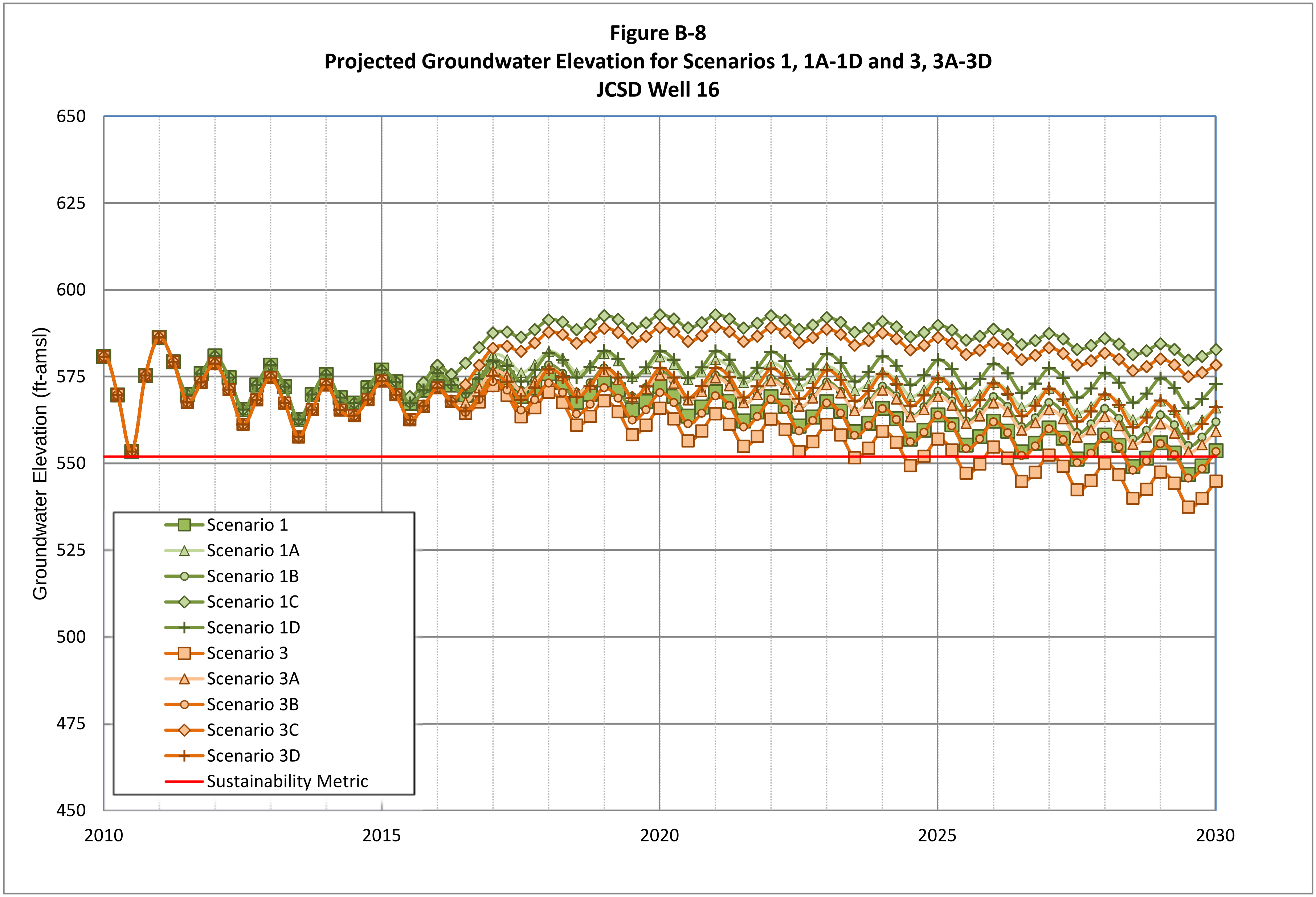
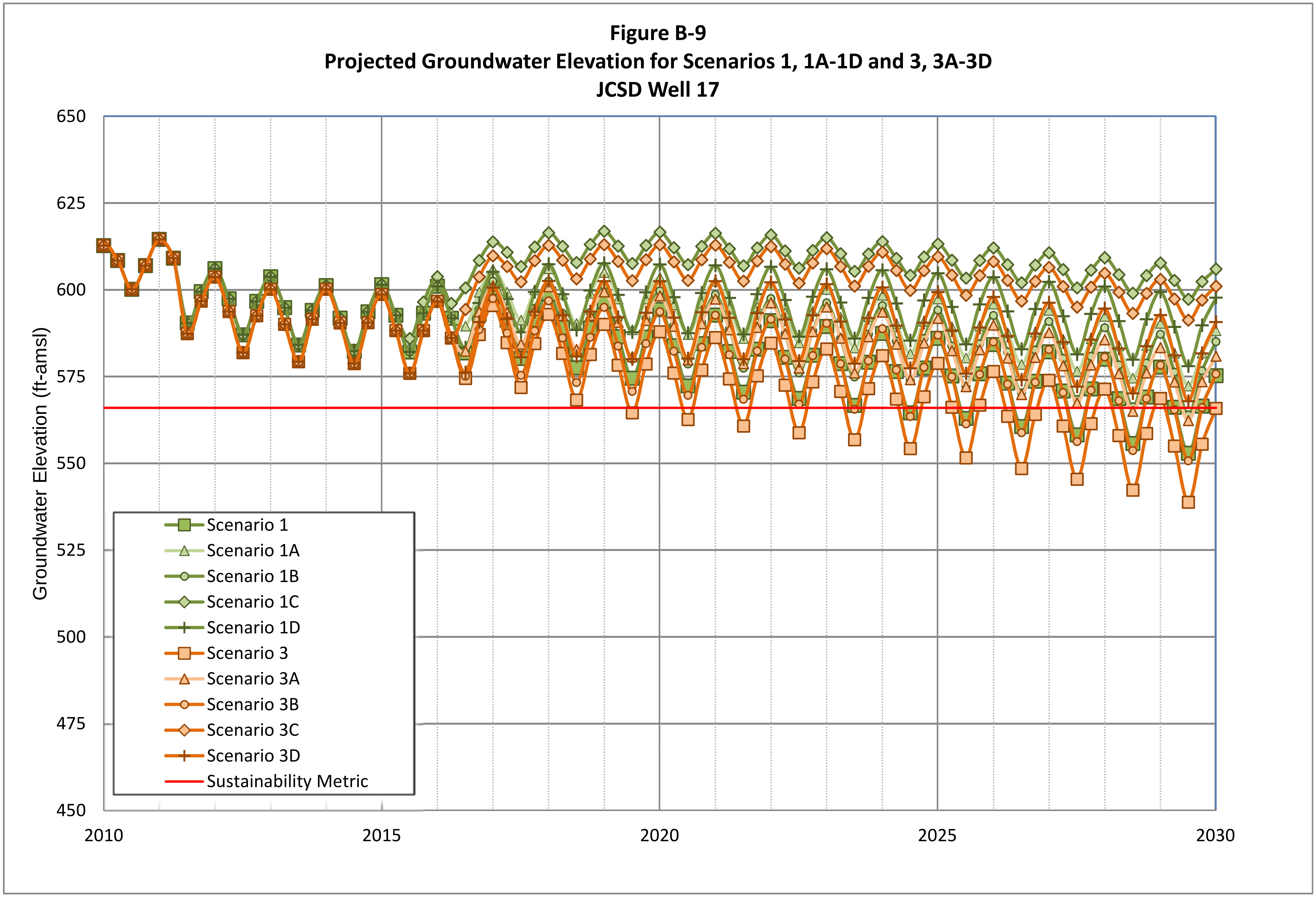


Figure B-8
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 16
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric



20120503_Projected_Hydrographs_JCSD .xlsx

WILDERMUTH ENVIRONMENTAL INC.

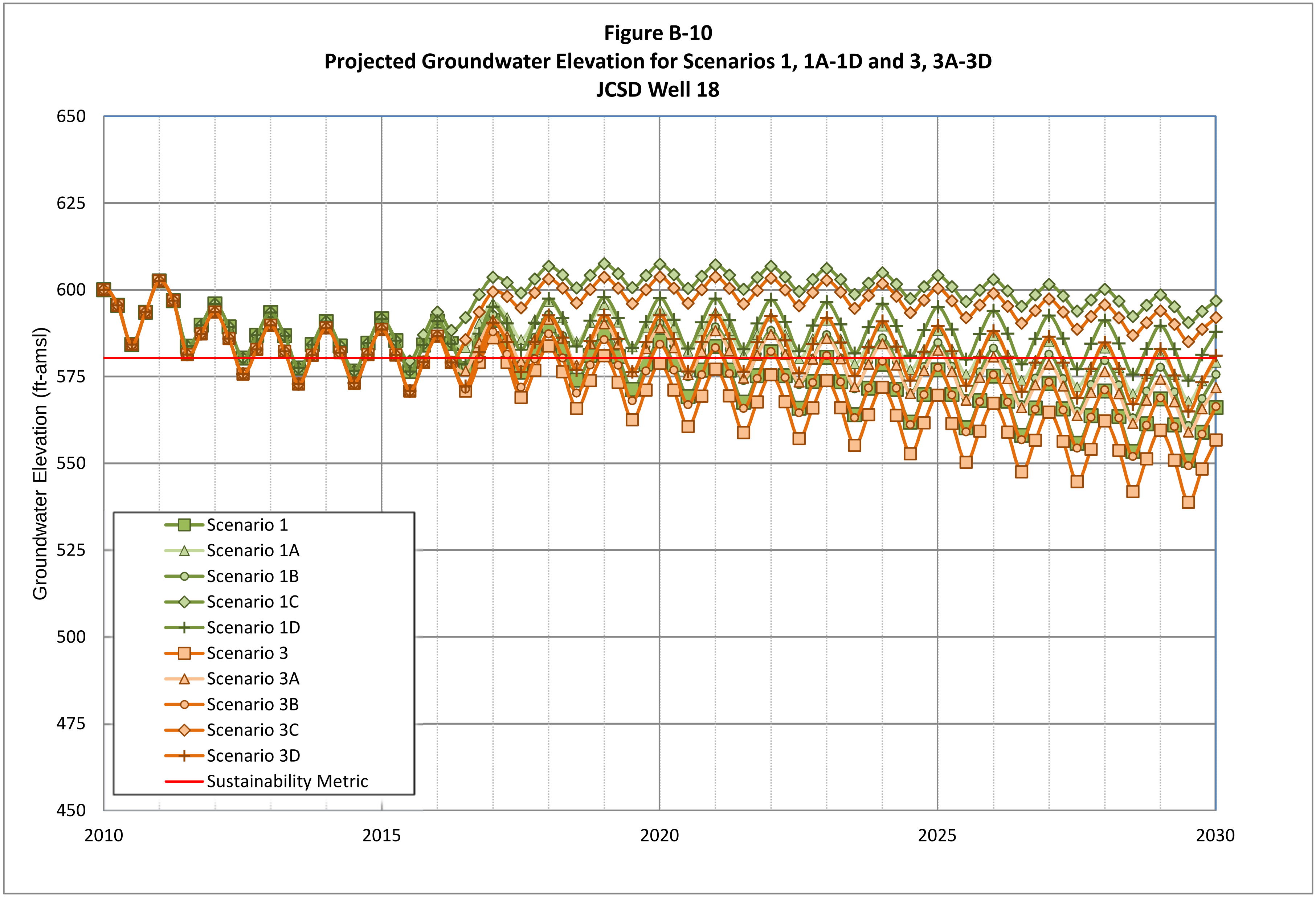


Figure B-10
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 18
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric

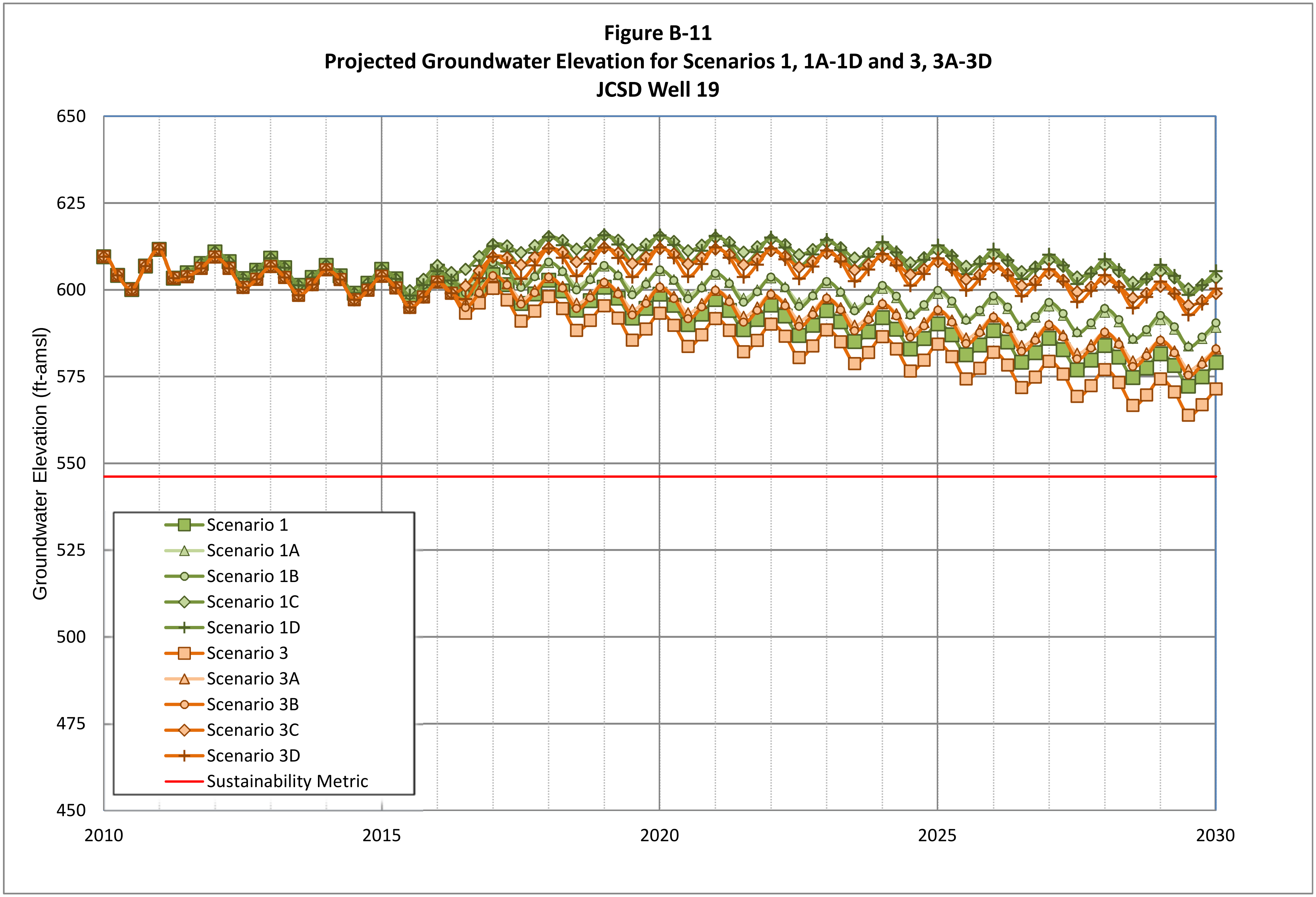


Figure B-11
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 19
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric

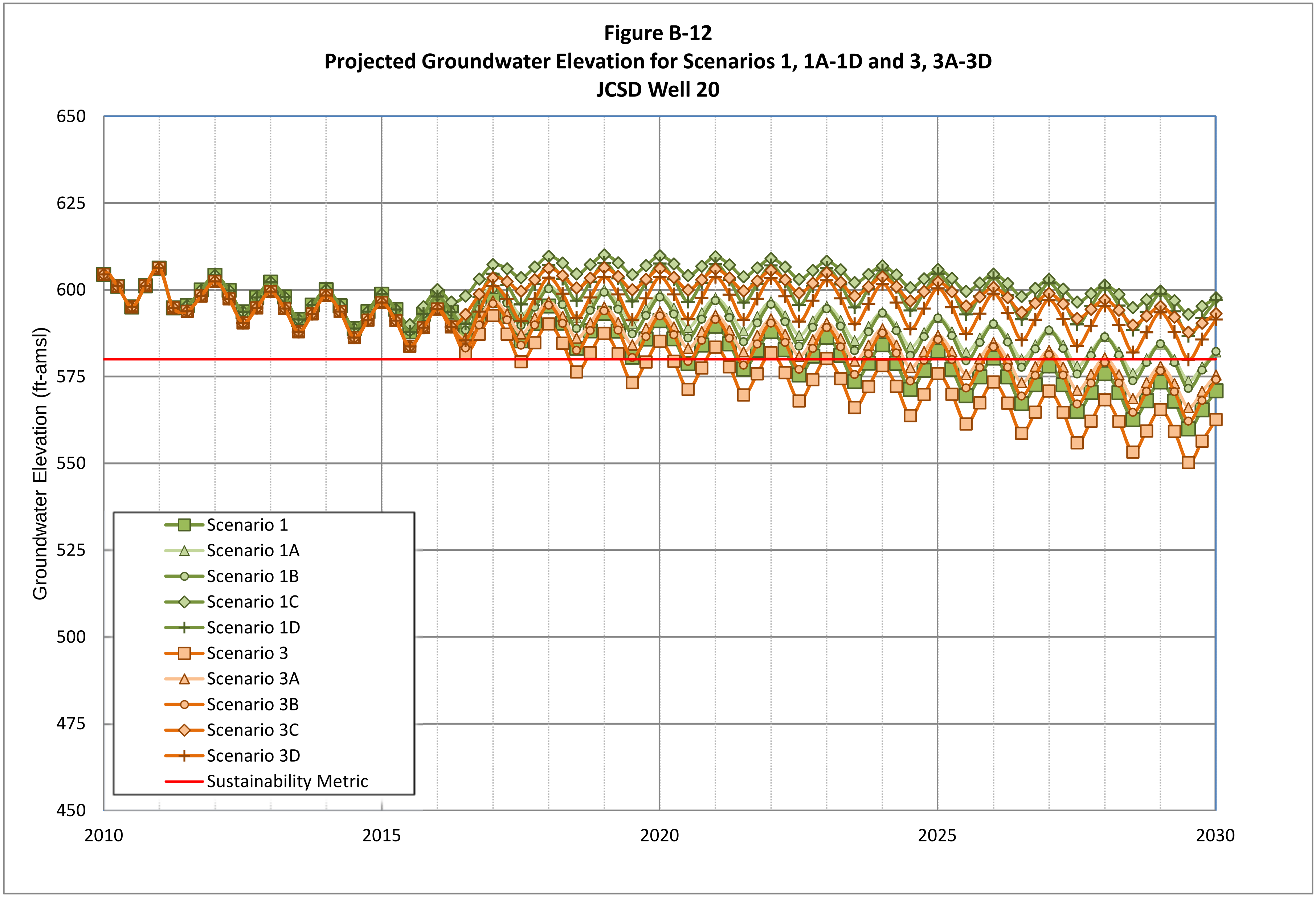
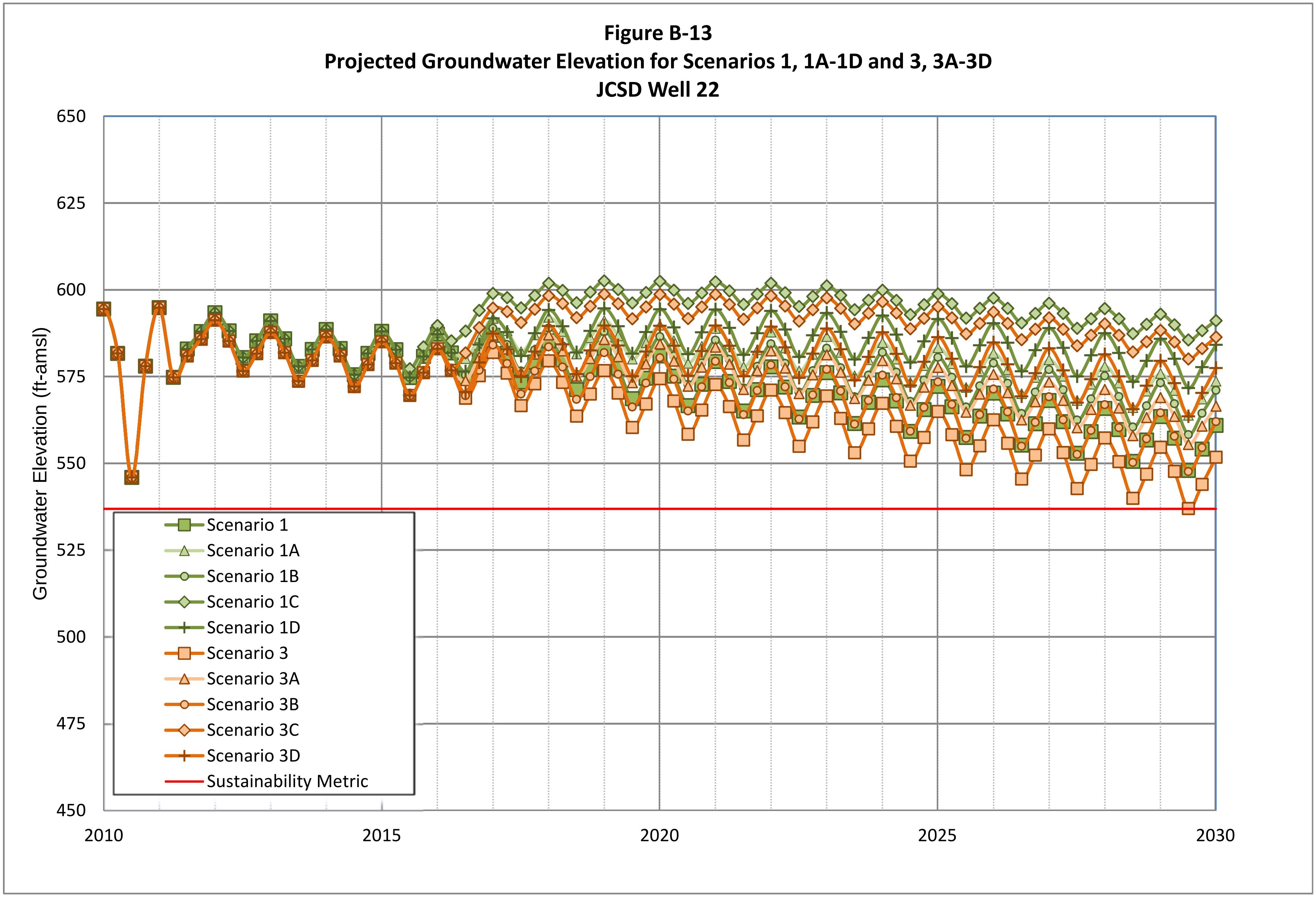


Figure B-12
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 20
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric



20120503_Projected_Hydrographs_JCSD .xlsx

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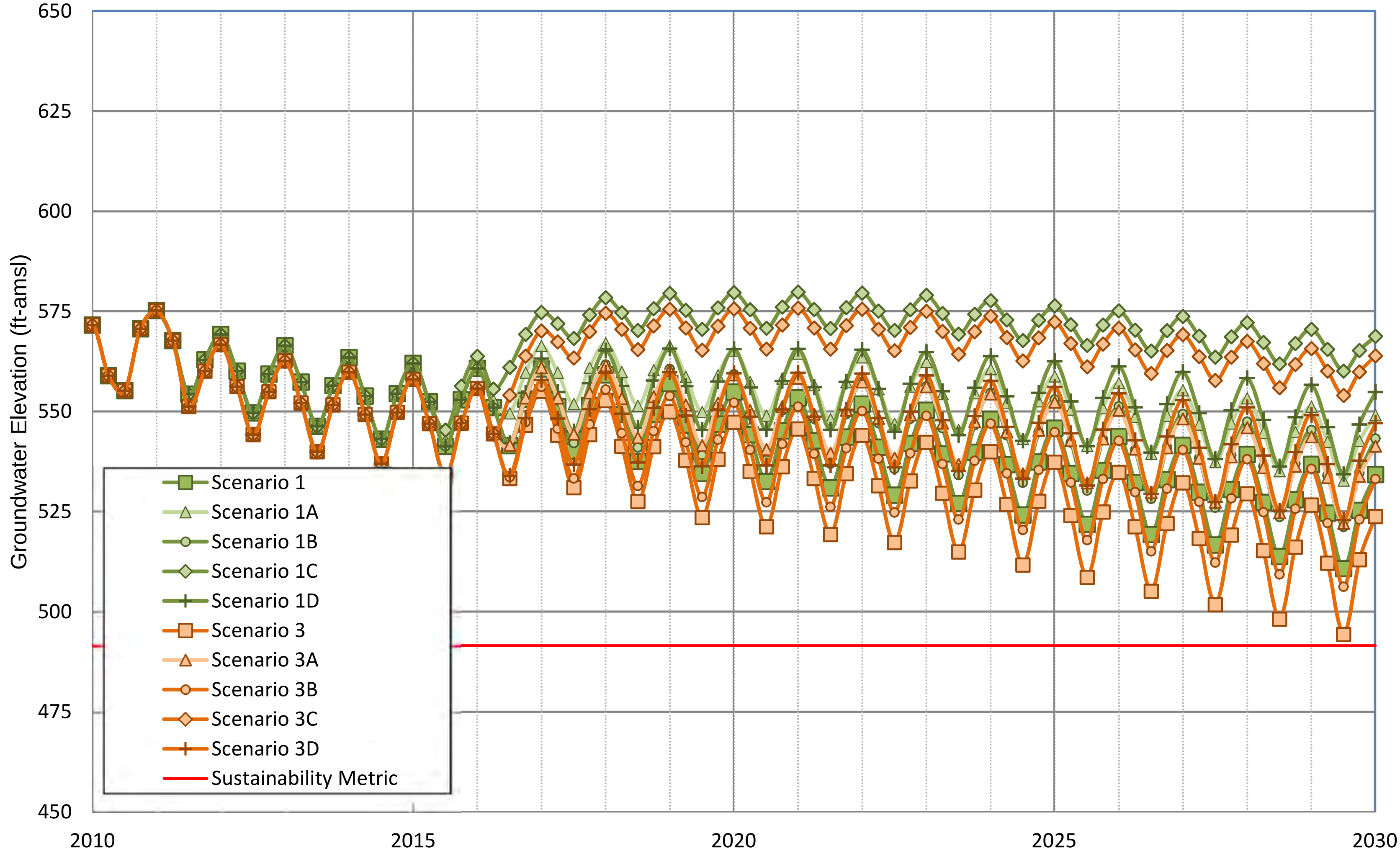
Figure B-14
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well 23



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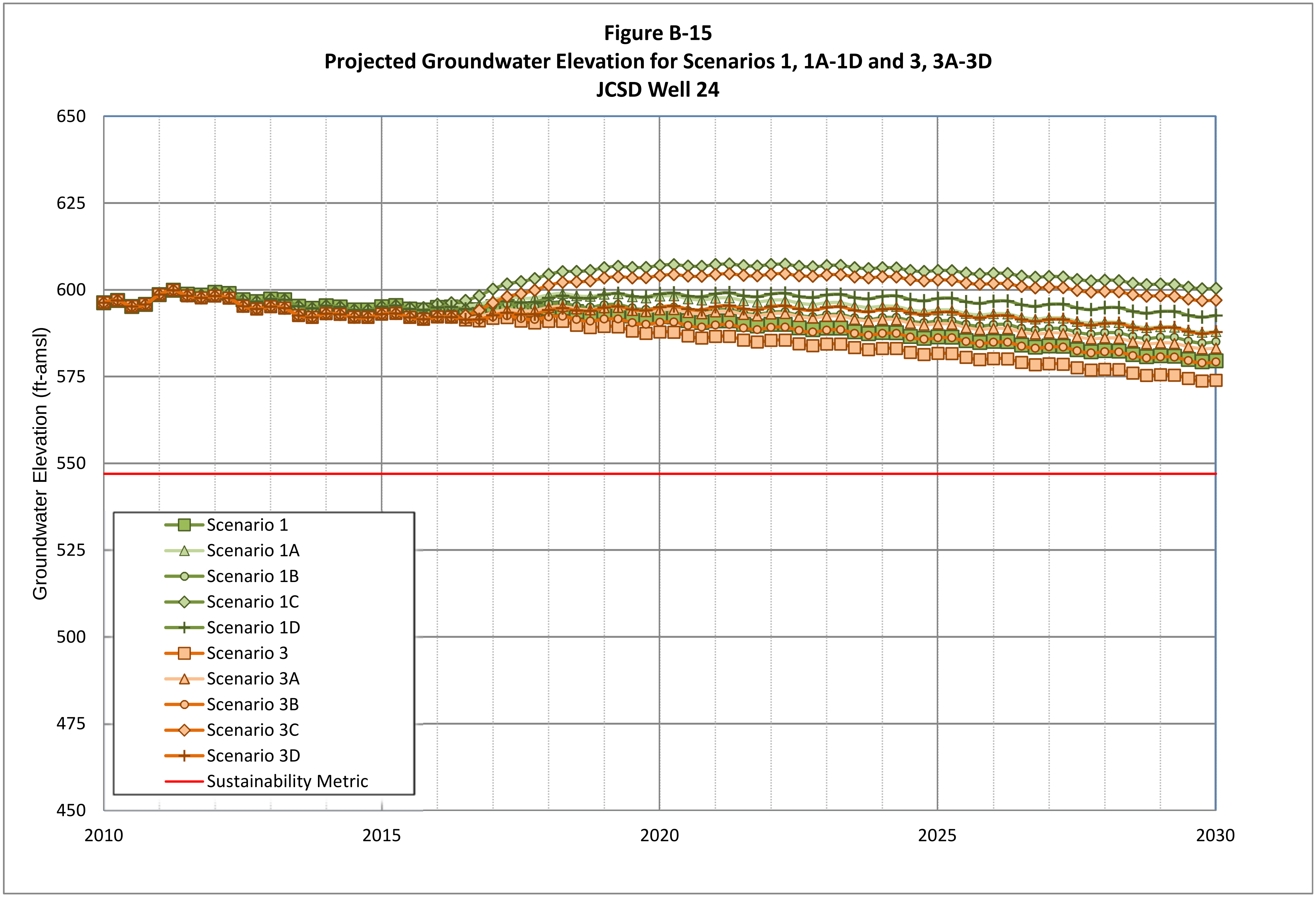

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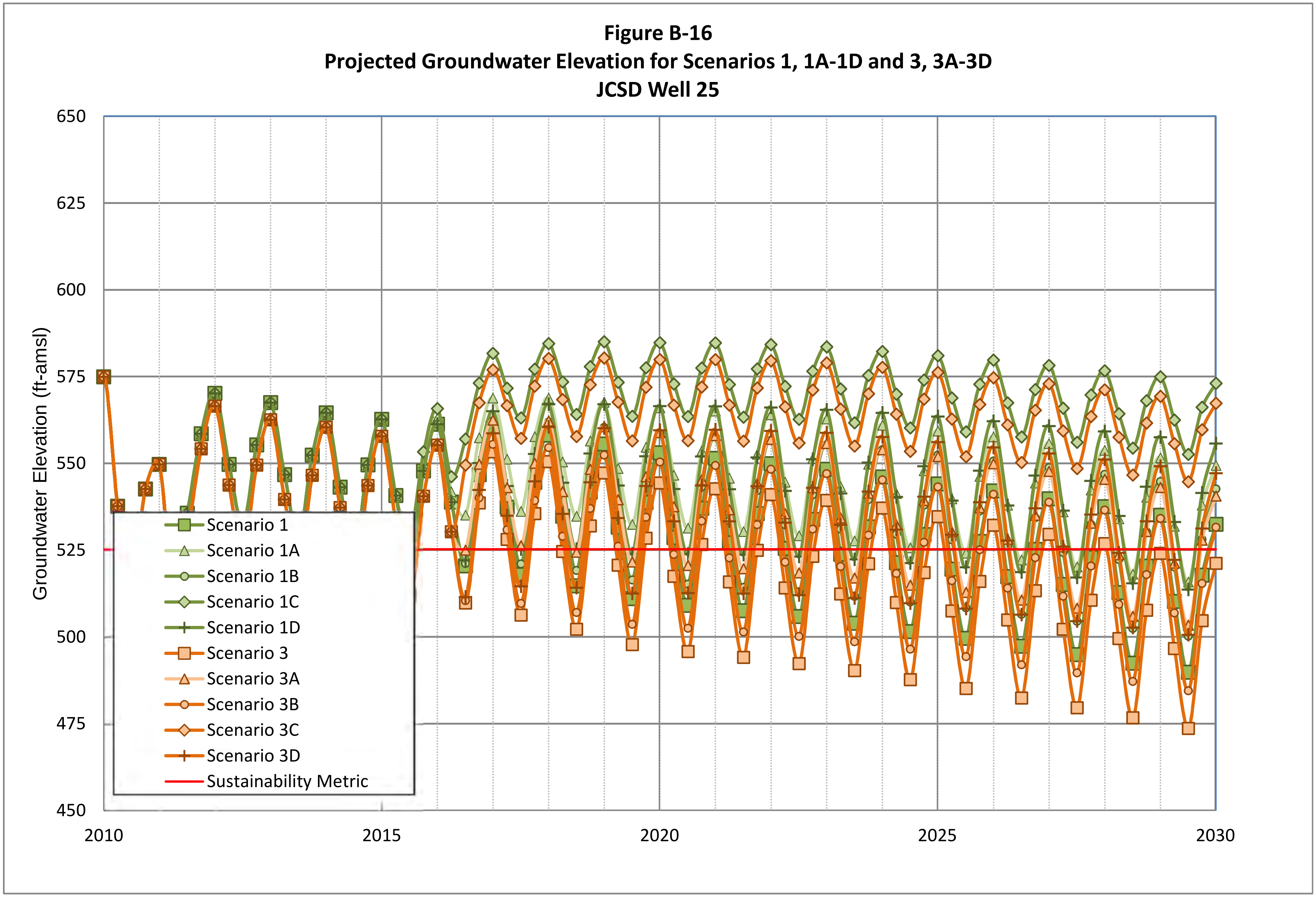
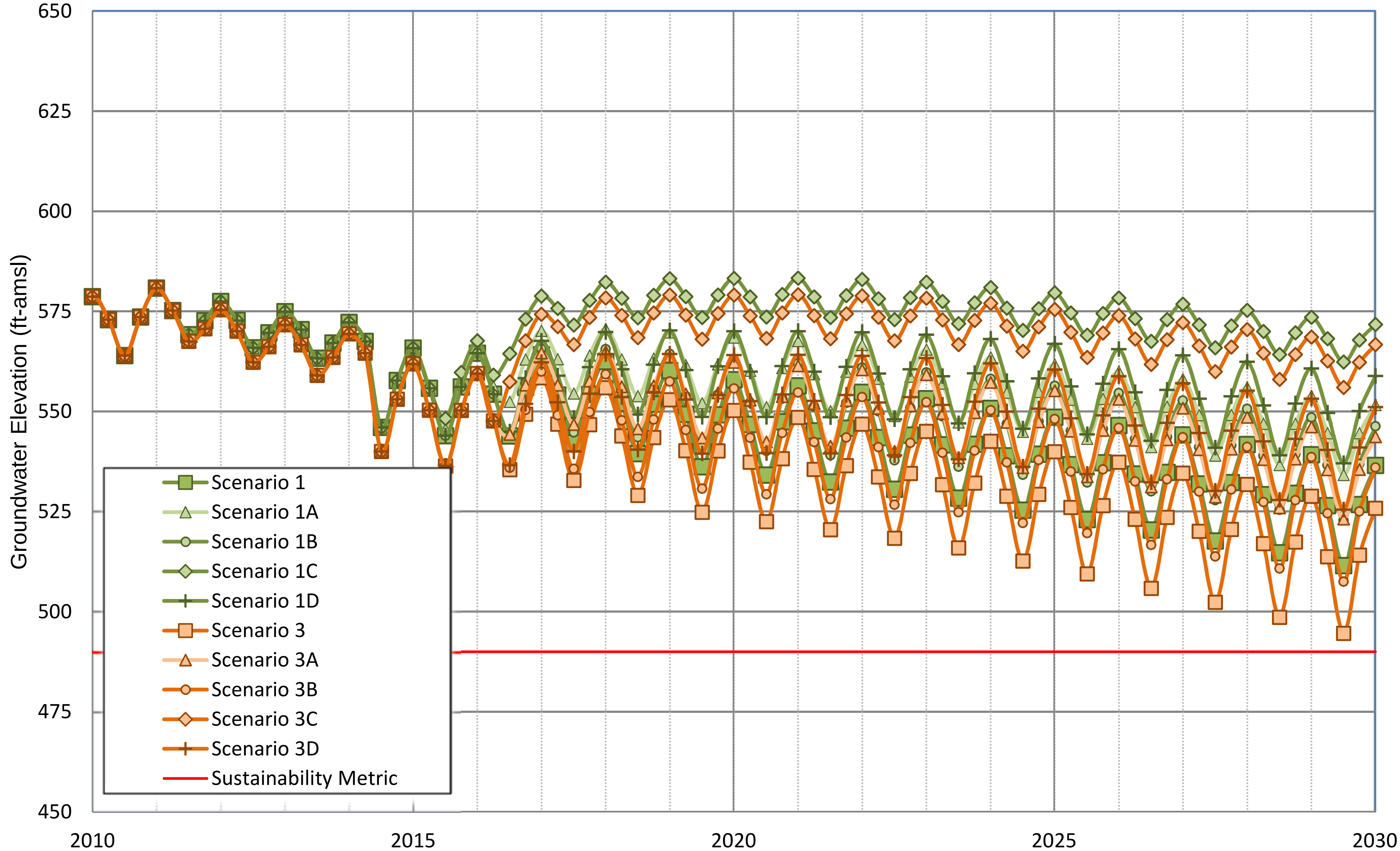


20120503_Projected_Hydrographs_JCSD .xlsx

WILDERMUTH ENVIRONMENTAL INC.

Figure B-17
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well Galleano



20120503_Projected_Hydrographs_JCSD .xlsx

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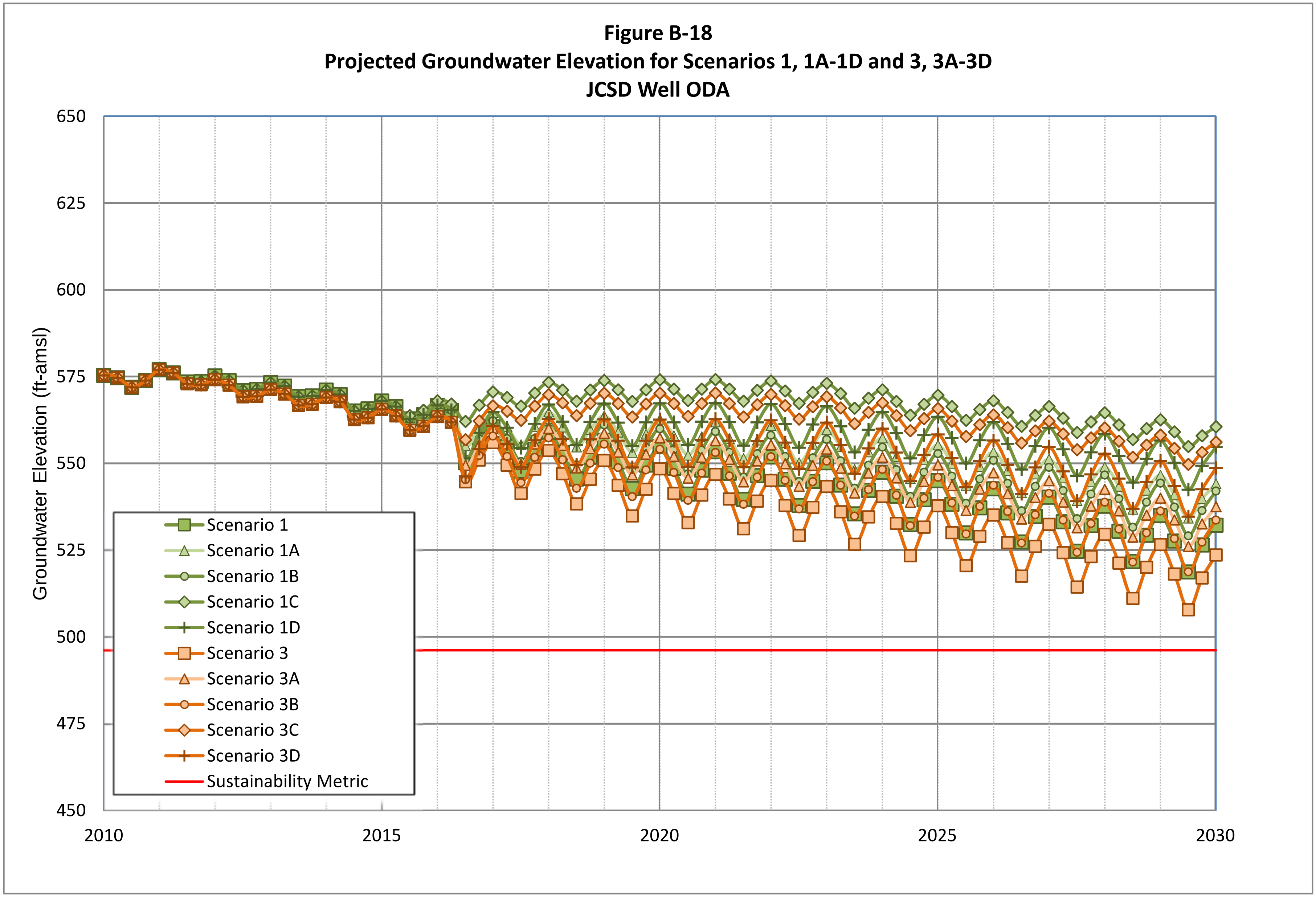

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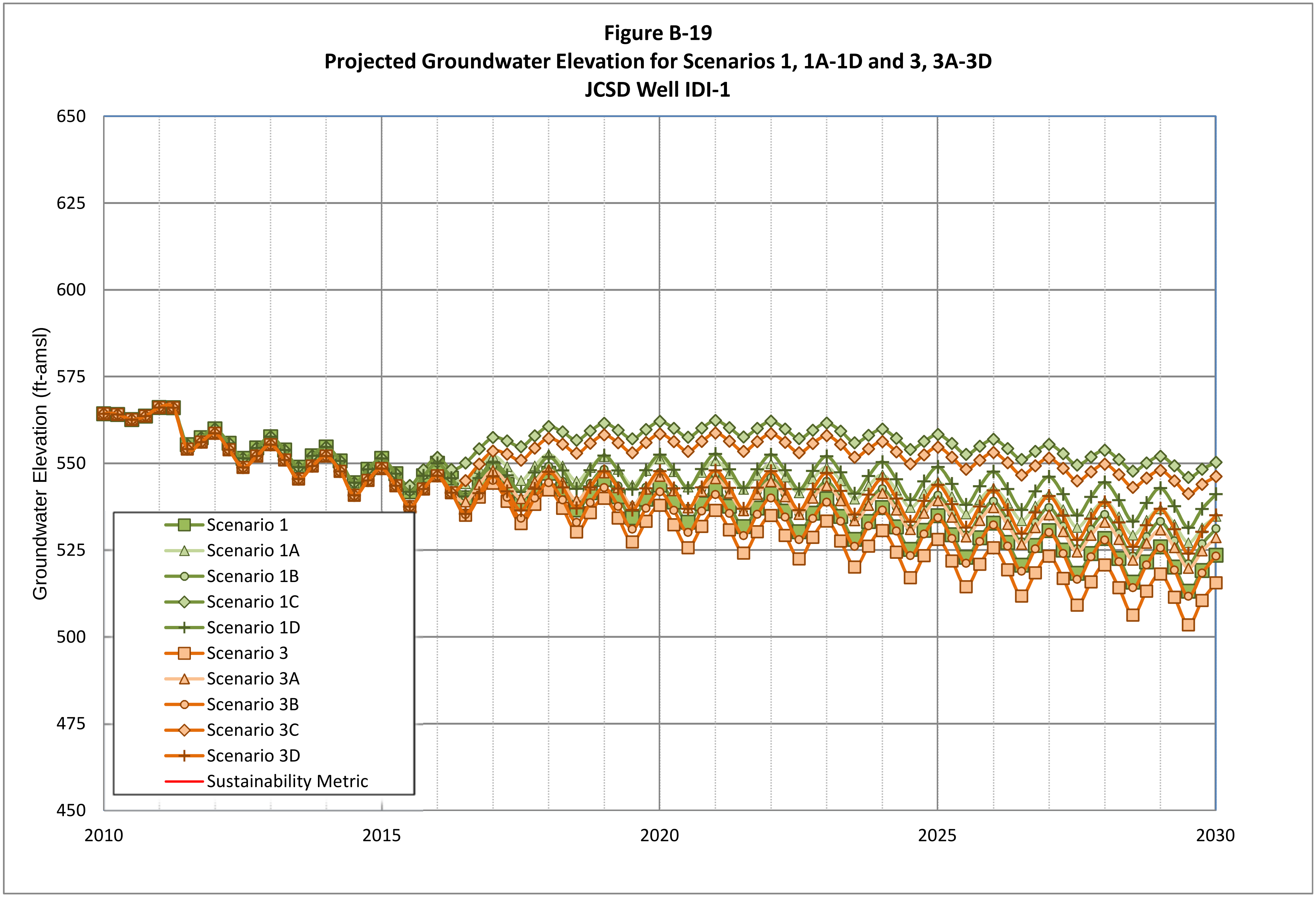
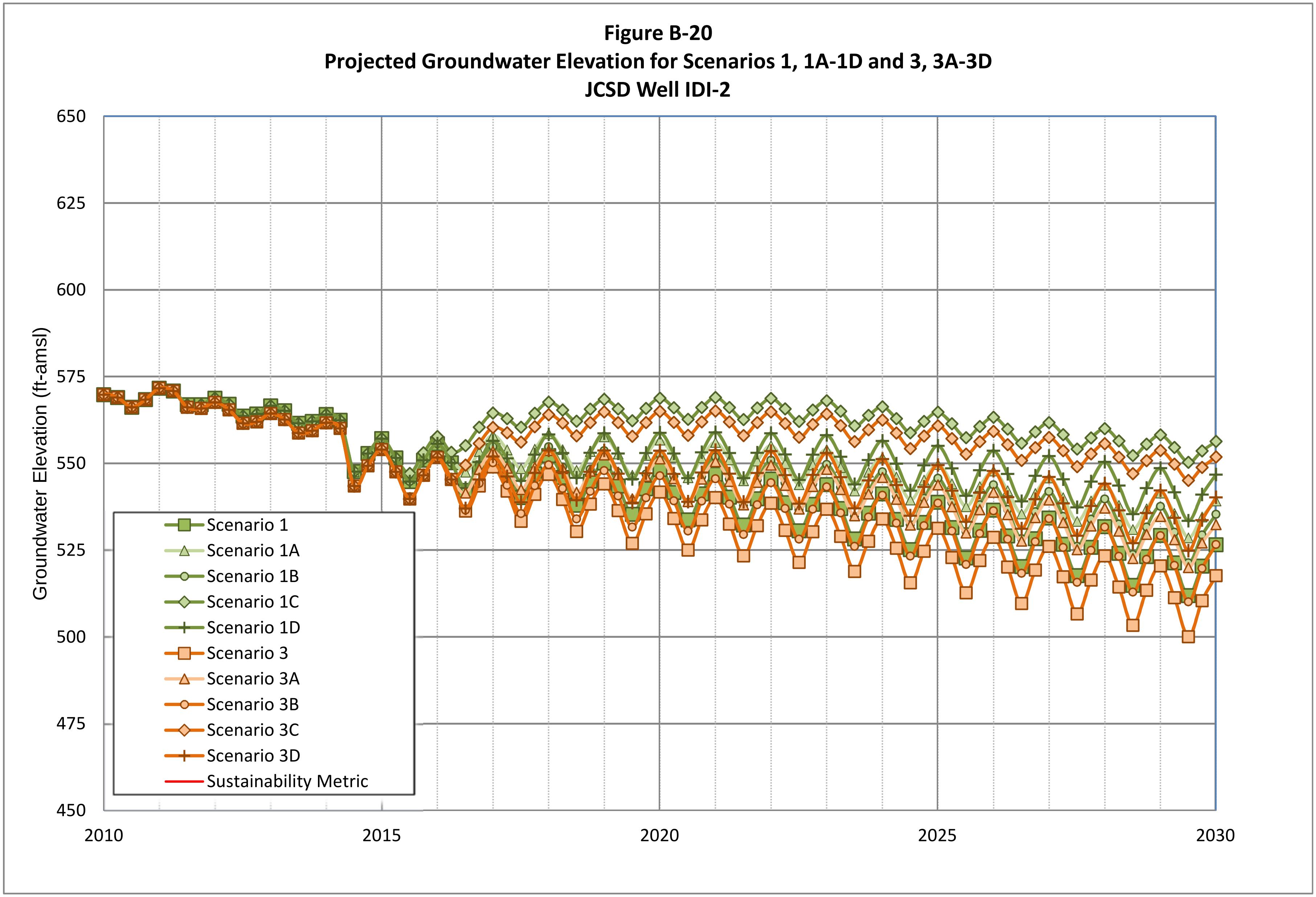


Figure B-19
Projected Groundwater Elevation for Scenarios 1, 1A-1D and 3, 3A-3D
JCSD Well IDI-1
Groundwater Elevation (ft-amsl)
650
625
600
575
550
525
500
475
450
2010
2015
2020
2025
2030
Scenario 1
Scenario 1A
Scenario 1B
Scenario 1C
Scenario 1D
Scenario 3
Scenario 3A
Scenario 3B
Scenario 3C
Scenario 3D
Sustainability Metric



20120503_Projected_Hydrographs_JCSD .xlsx

Appendix C

Stakeholder Comments on Sections 1 through 4 and Responses

C.1 CITY OF CHINO (DAVE CROSLEY)

Comment Number	Page Reference	Comment	Response
1	Section 2, top of page 22 and to Table 2-3	I thought I should touch base with you on one circumstance to make certain there is no mis-understanding. Refer to the top of page 22 and to Table 2-3, where projected Ag and Appropriator demands are described. The numbers described for Chino are correct ... we do plan to produce as described. However, because we supply a large amount of water to Ag folks, the WM accounting and assessment process regards Chino's production as having been produced by the Ag Pool. In other words, the summarized assessment package will not readily support the numbers (at least for Chino) in Table 2-3. One must dive deep into the assessment package back-up data to understand that water reported in the assessment package as having been produced by the Ag Pool was actually produced by Chino wells. (I think you already know this.)	Thank you for your comment. Table 2-3 shows actual and projected actual production. The fact that the City may provide recycled water to members of the agricultural pool in-lieu of the agricultural pool member's production of groundwater is not accounted for in Table 2-3 or Scenarios 1 through 4.

C.2 CITY OF CHINO HILLS (MIKE MAESTAS)

Comment Number	Page Reference in the December Draft	Comment	Response
1	Appendix A, Table A1 and associated tables and charts	Following is a list of our wells and the pump setting elevations to be used for your matrix. For sustainability. Please apply the pump setting elevations plus 20-feet. Thank you. Well 1A 383 Well 7A/7B 443 Well 15 383 Well 17 172	Thank you. The tables, charts and text have been updated to reflect this information.

C.3 CHINO DESALTER AUTHORITY (BRIAN DICKINSON)

Comment Number	Page Reference	Comment	Response
1	Appendix A, Table A1 and associated tables and charts	Today we had a TAC meeting to discuss our well sustainability criteria which was originally submitted to Wildermuth Environmental. Through group discussion we came to a consensus that the CDA criteria should be set at top of pump plus 40-feet.	Thank you. The tables, charts and text have been updated to reflect this information.

C.4 JURUPA COMMUNITY SERVICES DISTRICT (THOMAS HARDER AND COMPANY)

Comment Number	Page Reference	Comment	Response
1	Section 1 general comment	This section essentially duplicates Chapter 2 of the 2010 Recharge Master Plan. We appreciate the addition of the Watermaster Board directive from the December 15, 2011 Board meeting.	Comment noted. The intent of Section 1 is to present a complete introduction including the original intent of the 2007 Court Order regarding the 2010 Recharge Master Plan Update and the decisions and actions that led the Watermaster and the IEUA to the current effort.
2	Page 12, second paragraph.	This paragraph refers to groundwater elevation contour maps for fall 2000 and fall 2010. However, Figures 2-1a and 2-1b are labeled as spring 2000 and spring 2010, respectively.	Thank you for the observation. The text was revised to use spring instead of fall.
3	Figures 2-1a and 2-1b.	I recommend showing a groundwater flow direction arrow on these figures to illustrate the flow direction.	Comment noted.
4	Page 20, first full paragraph	It appears the reference to Figure 2-7 should be Figure 2-8 Storage in the Chino Basin.	Thank you for the observation. The text was revised.
5	Page 23	This section becomes the basis for basin operation scenarios analyzed with the groundwater flow model. However, it is not obvious which scenarios are being described and where. I suggest subheadings before the paragraphs that describe the scenarios so we have an easy reference. I would like the subheadings to clearly label the	Thank you for the observation. Headings were added. Text clarifying the location and magnitude of replenishment and recharge were added to Section 3.

Comment Number	Page Reference	Comment	Response
		scenario with descriptive information as appropriate (e.g. Scenario 1 – Baseline Scenario). I also recommend a summary table of the basin operation scenarios. Although Tables 2-4 through 2-7 provide great numerical detail of the scenarios, it would be beneficial to have a brief synopsis of each scenario on a single table. Somewhere in the description of scenarios, there needs to be a description of assumptions regarding artificial recharge amounts and distribution in the basin through the planning period (scenario-specific if appropriate).	
6	Page 26, third paragraph	It appears the reference to Figure 2-8 should be Figure 2-9.	Thank you for the observation. The text was revised.
7	Page 27, second bullet near the bottom of the page	I recommend revising the first sentence of this bullet to read, “For the Chino Basin as a whole, no new recharge facilities or new sources of replenishment water will be required to meet future replenishment obligations, as required by the Judgment.”	Comment noted.
8	Page 29, first paragraph, last sentence	This sentence is unclear.	Thank you for the observation. The figure number was changed from 2-9 to 2-10.

Comment Number	Page Reference	Comment	Response
9	Page 29, second paragraph	It is my understanding that the Metropolitan Water District (MWD) rate increase will be 5 percent in 2012/13, not 7.5 percent.	Thank you for the observation. The text was revised. The Metropolitan Board approved this lesser rate increase after this text was prepared.
10	Page 29, third paragraph	The last sentence appears to reference the wrong table (should be Table 2-10, not 2-11).	Thank you for the observation. The text was revised.
11	Page 29, bullet at the end of page	No. 5 is unclear.	The maximum infiltration rate occurs just post cleaning. A footnote has been added to make this clearer.
12	Page 30, Number 7	"…2012/12 10-yr Capital Improvement Program:" Should this be 2012/22?	Thank you for the observation. The text was revised.
13	Page 30, last bullet, Number 2	The reference should be to infiltration rates <0.5 ft/day.	Thank you for the observation. The text was revised.
14	Page 32, second paragraph, first bullet	Scenarios 1 and 3 are analyzed and presented in the report. However, Scenario 4, which results in the greatest decrease in groundwater storage at the end of the planning period (see Table 2-7) is not addressed or analyzed. It was my understanding that the four scenarios represented the "book-ends" of potential production sensitivity. If we are not going to analyze and present the worst-case scenario, then we should provide an explanation.	The stakeholders in the Watermaster-IEUA Steering Committee process agreed, without dissention, that Scenarios 1 and 3 would be used to bookend the production and replenishment projections. Text has been added to make this clearer.
15	Page 33,	Revise the last sentence to read "At some JCSD	The text of the report was revised in response to this

Comment Number	Page Reference	Comment	Response
	third paragraph under "Basin Response to Updated Groundwater Production and Replenishment."	wells, the groundwater elevation falls below the sustainability metric provided by the JCSD and the pumps cannot be lowered further because they are already in the bottom of the wells."	Thank you for the observation. The text has been revised to incorporate this refinement.
16	Series of bullets starting on page 33 and running through 35	Pgs. 33 through 35 bullets. This section is confusing. I suggest simplifying the discussion based on Figures 3-6a and 3-6b. It is noted from Figures 3-6a and 3-6b that groundwater levels are projected to decline throughout most of the basin for both scenarios. It is further noted that sustainability metrics are exceeded in various places of Ontario and Fontana in both scenarios. This needs to be more closely scrutinized when evaluating the option of relocating JCSD pumping in other parts of the basin. It is also noted that groundwater levels rise in the Pomona/Monte Vista Water District area in Scenario 3. Are the artificial recharge assumptions for this scenario different from those of Scenario 1 (see above comment regarding Pg. 23)?	Comment note. As to your specific question (and as stated above in response to comment number 5, text was added to describe the location and magnitude of replenishment and recharge. The algorithm used to establish the location and rate of recharge is consistent among all scenarios although the location and rate of recharge varies among the scenarios.

Comment Number	Page Reference	Comment	Response
	Page 35, bullet near bottom of the page	The last bullet references Chino Basin Desalter Authority (CDA) wells. However, it is noted that the CDA has developed new sustainability metrics that may increase the number of wells shown here.	We received revised sustainability metrics from the CDA on April 25, 2012 which was after the draft on which you are commenting. Text was revised as appropriate.
17	Page 35, last paragraph	Pg. 35, last paragraph. Revise 2nd sentence to read "Because the saturated thickness is thin in the JCSD well field and many of their pumps are already near the bottoms of the wells, it would be difficult, and in some cases impossible, to lower the pumping equipment to assure sustainable production."	Thank you for the observation. The text has been revised to incorporate this refinement.
18	Page 36, last paragraph, third sentence	As discussed above, supplying JCSD with groundwater pumped from another part of the basin may not be advised or even feasible.	It's not clear what discussion "above" the commenter is referring to The advisability and feasibility of producing groundwater elsewhere in the basin and conveying that water to JCSD may be an important management option and it will be addressed in Section 6 and subsequent sections of this report,
19	Page 37, last bullet	This statement is unclear.	Comment noted
20	Page 37, last paragraph	The sensitivity analysis does not address relocating production away from the JCSD well field because this production was not replaced elsewhere in the model during the scenario. If it was, please provide a description of the distribution of replacement production.	Forbearance by the JCSD was simulated by reducing production in the JCSD well field only. The location in the Chino Basin of the replacement production will be evaluated in Section 6 and subsequent sections of this report, The modeling results clearly show that most of the sustainable

Comment Number	Page Reference	Comment	Response
			production challenge faced by the JCSD is due to the location and density of the JCSD wells and the magnitude production at the JCSD wells.
21	Page 38, last paragraph, second to last sentence	This sentence is unclear. Furthermore, the inference that Aquifer Storage and Recovery (ASR) wells were evaluated in the sensitivity analysis is not true. It is my understanding that scenarios involved reducing JCSD production or increasing recharge in Wineville Basin, not injecting water at specific locations designated as ASR wells. Further, injecting at a rate that is half of JCSD's production (approximately 9,000 acre-ft/yr) may not be feasible or cost effective. At this point, ASR wells should only be mentioned as one option of an overall solution.	Thank you for the observation. . The text has been revised for clarity by replacing the phrase "fifty-percent of the total recharge" to "fifty-percent of JCSD production". The basis of the suggestion that recharge at the JCSD wells annually with up to fifty percent of the annual JCSD production comes from the fifty-percent forbearance simulations (Scenarios 1C and 3C, with fifty-percent forbearance of projected JCSD production). It is appropriate to include ASR in this section as a possible alternative that should be explored in Section 6 and subsequent sections of this report.
22	Page 47, first bullet	Suggest adding Fontana Water Company as a potential interconnection party.	Thank you for the observation. As titled, this subsection discuses in-lieu recharge. In-lieu recharge requires that a party have a supplemental supply and possession of groundwater production rights. The Fontana Water Company's share of operating safe yield is about .009 percent and is likely too small to affect significant in-lieu recharge. However an interconnection with the JCSD could be used for in-lieu recharge by the JCSD forgoing production of some of its production rights provide significant benefits to the JCSD.

Comment Number	Page Reference	Comment	Response
23	Page 47, second bullet	It appears that the intent of this is reallocation of desalter production and not an increase in overall desalter production. I suggest deleting the word "Additional" from the first sentence.	Thank you for the observation. The text has been revised to incorporate this refinement.
24	Section 6 Outline	Although it was suggested at the last Recharge Master Plan Steering Committee to address Section 6 after the June Court submittal, I recommend that we include in the submittal an outline of Section 6 that identifies concepts that are being considered for the implementation plan. The concepts submitted at the last meeting are a good start. I would like to reorder the topics to include 2010 Recharge Master Plan Update Phases I through III projects first as this was the directive of the Court. This list should also include the option of recharge using ASR wells.	Comment noted.
25	Section 6 Outline	Another topic that should also be included among the options is an evaluation of the possible redistribution of CDA pumping.	Comment noted.

C.5 MONTE VISTA WATER DISTRICT (MARK KINSEY AND JUSTIN SCOTT-COE)

Comment Number	Page Reference	Comment	Response
1	none	In general, we note that the results of the RMPU analysis demonstrate more than adequate capacity to support the long-term recharge and replenishment obligations of the parties to the Chino Basin Judgment. This is a success story for collaborative groundwater basin management and something in which all parties to the Judgment should collectively take great pride. The RMPU also demonstrates that the long-term issue faced by the Chino Basin is not inadequate recharge capacity but the need to secure additional sources of replenishment and recharge water.	Thank you. Comment noted.
2		We note that "sustainability" is a term employed repeatedly in this document. "Sustainability" is not a term that appears in the Judgment or Peace Agreements. Its specific use appears to have been introduced into the Watermaster process through Wildermuth's modeling work for well pumping parameters, e.g. "sustainability metrics." We would prefer that the term be used in this specific context only and not used more generally, as it potentially recharacterizes the parties' obligations under the Judgment and Peace Agreements (e.g., support of sustained groundwater pumping by individual	Comment noted. Sustainability as used in the report refers only to the ability to sustain production at a well at a desired amount. It has no nexus to the Judgment or the Peace Agreements. The sustainability metrics are defined and explained in two places in the draft report and are currently highlighted in yellow. Groundwater production at wells is presumed to be sustainable if the groundwater level at the well is greater than the sustainability metric. Sustainability metrics are defined for each well by well owner. If the groundwater level falls below the sustainability

Comment Number	Page Reference	Comment	Response
		parties rather than balancing the recharge and discharge within subareas of the basin). Instead, we request that descriptions of the general goals for the RMPU use terms such as "long-term hydrologic balance" which are defined and consistently used in the Judgment and Peace Agreements.	metric, the owner will either lower their pumping equipment in their well or will have to reduce production.
3		We would recommend, when discussing the specific solutions for subareas of the basin that are out of long-term hydrologic balance, that the RMPU look at past successful efforts to achieve balance in other subareas of the basin. We would suggest that MZ1 offers such a model of addressing significant issues of production constraints in a collaborative and cost-effective manner.	Comment noted. This will be addressed in Section 6 and subsequent sections of this report.
4		As mentioned above, the RMPU demonstrates that sufficient recharge capacity exists basin-wide to meet our collective replenishment and recharge obligations. We believe that increasing storm water capture in MZ3 is one of the potential approaches to addressing the long-term hydrologic imbalance in that basin subarea. A secondary benefit of such an approach is to increase new yield being introduced into the basin. Based on preliminary work already completed it would cost the parties several million dollars to implement these projects. To encourage all parties to participate in funding storm water recharge improvements, we recommend that firm	Comment noted. This concept will be considered in Section 6 and subsequent sections of this report.

Comment Number	Page Reference	Comment	Response
		new yield estimates be determined for each project and that these estimates not be adjusted downward during the period of repayment.	
5		Figure 2-6e shows significant groundwater recharge into MZ5 from the Santa Ana River and the City of Riverside WWTP (through the river). It is our understanding that one of purposes of installing desalter wells in MZ4, MZ3, and MZ2 is to induce inflow from the river into the basin. If this is the case, why is no recharge from the river reflected in Figures 2-6d, 2-6-c, and 2-6b for the period following the installation of these wells?	The recharge “bars” shown in each of the Figures 2-6a through 2-6e are specific to recharge through the surface of the management zone. Santa Ana River water recharge occurs in MZ5 through the streambed only in MZ5.
6		On page 20, the RMPU incorrectly presents carryover water as stored water. Under the Judgment, these are completely separate categories of water. We request that carryover water be excluded from the description of stored water on page 20 and the calculations of past, current, and projected future stored water in Tables 2-1 and 2-2 and Figures 2-8 (incorrectly labeled Figure 2-7 on page 20) and 2-9.	Thank you for the observation. The intent was to describe the amount of water in storage and the text, tables and charts were reviewed to remove the term “stored water”.
7		On pages 23 and 31, the RMPU cites prior studies by Wildermuth projecting a reduction of safe yield from its current 140,000 AFY to 130,000 AFY by 2035. We request that the RMPU discuss how its recommendations for increasing recharge would	Model projections based on historical and future groundwater management plans suggest that increasing recharge will not materially change the projected decline in safe yield. This concept will be discussed in Section 6 and subsequent sections of

Comment Number	Page Reference	Comment	Response
		impact these projected reductions.	this report
8		On page 21, last paragraph, second sentence, we request that the sentence be rewritten to read as follows: "Several appropriators have demonstrated that, given increased replenishment, power, and assessment costs, it is currently or will soon be more economical to purchase Metropolitan water directly than to produce groundwater in excess of their production rights."	Thank you for the observation. The text has been revised to incorporate this refinement.
9		On page 41, second paragraph, last sentence, we request that the sentence be rewritten to read as follows: "As evident in these figures, the MZ1 recharge requirement of 6,500 acre-ft/yr has been met on an average if not on an annual basis, and in recent years recharge within MZ3 has increased."	Thank you for the observation. The text has been revised to incorporate this refinement.
10		On page 43, fourth paragraph, first sentence, we request that the sentence be rewritten to read as follows: "Watermaster has an obligation under the Judgment to provide replenishment water for overproduction in the prior year." (You may want to add a citation to paragraph 45 of the Judgment; no other citation should be required.)	Thank you for the observation. The text has been revised to incorporate this refinement.
11		On page 44, first full paragraph, second sentence, we request that the sentence be rewritten to read as follows: "Instead, it is recharged into the basin and subsequently assigned to certain appropriator	Thank you for the observation. The text has been revised to incorporate this refinement.

Comment Number	Page Reference	Comment	Response
		parties' supplemental storage accounts, thereby potentially increasing the appropriators' production rights and reducing their future replenishment liabilities."	
12		On page 47, fifth full paragraph, fourth sentence, we request that the word "Typically" be added to the beginning of the sentence.	Thank you for the observation. The text has been revised to incorporate this refinement.
13		On Table 4-5, please note that these wells are owned by MVWD (except for Well 33 which is, as already noted, co-owned by City of Chino).	Comment noted. Table 4-5 contains a footnote that makes this statement.
14		On Figures 4-1 and 4-2, please add a footnote that explains that past and existing recharge levels in MZ1 are contractually required under Peace II and address a long-term hydrological imbalance that had historically occurred in this subarea of the basin.	Thank you for the observation. The text has been revised to incorporate this refinement.
15		Section 5 of the RMPU has not yet been drafted, but will seek to answer questions regarding ownership of new yield generated through the capture storm and urban runoff water from projects associated with MS4 permit compliance. We believe this is an appropriate conversation to have at this time, and that it needs to be addressed within the context of the net safe yield of the basin. Specifically, land use changes (both past and on-going) since the Judgment will have an impact on	Comment noted.

Comment Number	Page Reference	Comment	Response
		basin safe yield; seemingly any new yield associated with MS4 projects should first be contributed to addressing the reduction in safe yield associated with changes in land use practices.	
16		In Section 6, we would recommend that two additional alternatives to address production sustainability challenges be considered: namely, the relocation of CDA wells in order to stop their interference with JCSD wells, and/or the reduction in CDA well production if doing so would not impact hydraulic control. There might be an opportunity for the latter alternative to be accomplished in a way that will benefit all parties, both in helping to achieve JCSD's production goals and reducing the region's collective cost associated with desalter operations.	Comment noted.

Appendix D

Recharge Facilities Descriptions and Cost Opinions

Appendix D – Recharge Facilities Descriptions and Cost Opinions

Organization of this Appendix

This appendix contains table and figures that were used in the development of the 2013 Recharge Master Plan Update Amendment. The tables are grouped as follows in this appendix:

- Table D-1 *Project Data for Yield Enhancement Projects* contains a detailed characterization of all the yield enhancement projects that were analyzed in detail.
- Table D-2 *Summary of Unit Costs* contains the unit costs that were developed jointly by the Chino Basin Watermaster and the IEUA and that were subsequently used to estimate the capital cost of each project that passed the initial screening cost of $1,500 per acre-ft.
- Table D-3a through D-19 contain cost opinions for all the 2013 RMPU yield enhancement projects that passed the initial screening cost of $1,500 per acre-ft.
- Table D-20 through D-24 contains the rankings of the yield enhancement projects using evaluated using three thresholds: a marginal unit cost less than $600 per acre-ft, a melded unit cost less than $600 per acre-ft, and a melded unit cost less than $612 per acre-ft. The three unit cost thresholds were analyzed with and without the excavation discount.

The figures are grouped as follows in this appendix:

- Figure D-1 *Location of Projects that Were Analyzed in Detail* shows the location of all the projects that were evaluated in detail and supplemental water facilities.
- Figures D2a through D-15b contain charts that compare the stormwater recharge estimates of the calibrated Wasteload Allocation Model to the IEUA capture volume for selected basins. The “a” figure is a direct comparison by fiscal year and the “b” figure shows the same information in a scatter plot.
- Figures D16 through D-34 show the location and key features of the recharge projects that were evaluated in detail.

List of Tables

List of Figures

List of Figures

List of Figures

Ranking of Yield Enhancement Projects

Tables D-20 through D-24 contains the yield enhancement projects ranked using the Section 7 criteria and based on input from the Steering Committee. The projects are listed by management zone in order of increasing unit cost. The Project ID numbers with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project or leased to a mining operator.

The Steering Committee reached consensus that all projects with unit costs of less than $600 per acre-ft would be considered for implementation (Table D-20). There are seven projects recommended for construction that will increase stormwater recharge by 5,000 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $400 per acre-ft and the capital cost is about $26,000,000.

Keeping a unit cost threshold of less than $600 per acre-ft, the projects were also ranked if the excavation costs were not reduced (Table D-21); as a melded unit cost (Table D-22), and as a melded unit cost without the reduction of the excavation costs (Table D-23). A review of the melded unit costs revealed that an increase in the threshold from $600 to $612 per acre-ft resulted in an additional 1,200 acre-ft of stormwater recharge as shown on Table D-24. The melded unit cost of $612 per acre-ft without the discounted elevation cost is equivalent to Table D-23. The following describe the changes in the ranked project lists from Table D-20:

- **Without Discounted Excavation Costs (Table D-21).** Two projects in Management Zone 3 were eliminated from list; CSI Basin- PID 18 at $756 per acre-ft and Sierra Basin- PID 25 per $1,057 an acre-ft. Five projects would be recommended for construction that will increase stormwater recharge by about 4,900 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $430 per acre-ft and the capital cost is about $26,500,000.
- **Melded Unit Cost (Table D-22).** One project in Management Zone 3 and two projects in Management Zone 2 were added to the list; Declez Basin- PID 27, Turner Basin- PID 14, and Ely Basin – PID 15a. Ten projects would be recommended for construction that will increase stormwater recharge by about 5,560 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $474 per acre-ft and the capital cost is about $34,400,000.
- **Melded Unit Cost Without Discounted Excavation Costs (Table D-23).** One project in Management Zone 3 and one project in Management Zone 2 were added to the list; Declez Basin- PID 27, and Turner Basin- PID 14. Nine projects would be recommended for construction that will increase stormwater recharge by about 5,340 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $480 per acre-ft and the capital cost is about $33,400,000.
- **Melded Unit Cost of $612 per acre-ft (Table 8- D-24).** One project in Management Zone 3 and three projects in Management Zone 2 were added to the list; Declez Basin- PID 27, Turner Basin- PID 14, Ely Basin – PID 15a, and Lower San Sevaine Basin – PID 17a. Eleven projects would be recommended for construction that will increase stormwater recharge by about 6,780 acre-ft/yr and increase recycled water recharge capacity by 4,900 acre-ft/yr. The average unit cost of stormwater recharge is about $612 per acre-ft and the capital cost is about $57,000,000.

The total capital costs increased about $8,000,000 from about $26,000,000 to about $34,000,000 when the threshold changed to a melded unit cost less than $600 per acre-ft from a unit cost of less than $600 per acre-ft. The increase in the melded unit cost from $600 to $612 per acre-ft results in a capital cost increase of about $23,000,000 from about $34,000,000 to about $57,000,000. The differences between the recommended projects with and without the reduction in excavation costs did not significantly change the average unit or capital costs. The various alternatives of the unit cost thresholds described above are shown in the summary table below:

Threshold	Yield (acre-ft/yr)	Recycled Water (acre-ft/yr)	Unit Cost ($)	Capital Cost ($)	Total Annual Cost ($)	Reference Table
Marginal Unit Cost < $600 (excavation discount)	5,033	4,936	415	26,252,000	2,087,887	Table D-20
Marginal Unit Cost < $600 (w/o excavation discount)	4,888	4,936	430	26,542,000	2,101,312	Table D-21
Melded Unit Cost < $600 (excavation discount)	5,560	4,936	474	34,412,000	2,638,307	Table D-22
Melded Unit Cost < $600 (w/o excavation discount)	5,340	4,936	480	33,402,000	2,564,345	Table D-23
Melded Unit Cost < $612 (excavation discount)	6,781	4,936	612	56,962,000	4,150,372	Table D-24

Most of the new recharge is concentrated in Management Zone 3 and 2, which will contribute to production sustainability in these management zones and more specifically in the JCSD well field area.

Table D-1
Project Data for Yield Enhancement Projects

Project ID	Project Combinations	Group[1]	Project	Man. Zone	Summary of Key Project Features	Potential Cost Share if Mutually Agreed?	Storm Water Recharge									Production Sustainability Score[5]
							Baseline Storm Water Recharge (acre-ft/yr)	New Storm Water Recharge (acre-ft/yr)	Constructed for Regulatory Compliance?	Project Complete?	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	Storm Water Recharge Unit Cost[2]	
Proposed Projects in Table 6-1 that Were Analyzed in Detail																
1		i	Montclair Basins	1	Transfer water between Montclair Basins and deepen MC 4	N	1,188	71	N	N	$ 5,450,000	$ 354,500	$ 2,631	$ 357,131	$ 4,997	0
1a		i	Montclair Basins	1	Transfer water between Montclair Basins and deepen MC 4	N	1,188	71	N	N	$ 5,050,000	$ 328,500	$ 2,631	$ 331,131	$ 4,633	
2		i	Montclair Basins	1	New drop inlet structures to MC 2 and MC 3	N	1,188	248	N	N	$ 1,440,000	$ 93,700	$ 9,132	$ 102,832	$ 415	0
3		i	Montclair Basins	1	Automate inlet to MC 1[6]	N	1,188	0	N	N	$ 50,000	$ 3,300	$ (6,000)	$ (2,700)	$ -	0
4		i	Montclair Basins	1	Construct low-level drains from Basin 1 to 2 and 2 to 3	N	1,188	0	N	N	$ 790,000	$ 51,400	$ -	$ 51,400	$ -	0
5		i	North West Upland Basin	1	Increase drainage area and basin enlargement	N	29	93	N	N	$ 5,490,000	$ 357,100	$ 3,441	$ 360,541	$ 3,858	0
5a		i	North West Upland Basin	1	Increase drainage area and basin enlargement	N	29	93	N	N	$ 4,640,000	$ 301,800	$ 3,441	$ 305,241	$ 3,266	
6		i	Princeton Basin	2	Basin enlargement and increased drainage area[22]	N	48	0	N	N	$ -	$ -	$ -	$ -	$ -	0
7		ii	San Sevaine Basins	2	Construct pump station, pump water from SS 5 to SS 3, and construct internal berm in SS 5[7]	Y	1,177	642	N	N	$ 3,550,000	$ 230,900	$ 23,641	$ 254,541	$ 396	0
8		ii	San Sevaine Basins	2	Extend IEUA recycled water pipeline to SS 3 and construct internal berm in SS 5[7]	Y	1,177	345	N	N	$ 2,620,000	$ 170,400	$ 12,719	$ 183,119	$ 530	0
9		i	San Sevaine Basins	2	Construct internal berms in SS 1 and SS 2 and install a gate between SS 1 and SS 2	N	1,177	0	N	N	$ 300,000	$ 19,500	$ -	$ 19,500	$ -	0
10		i	San Sevaine Basins	2	Increase CB13T capacity and power supply	N	1,177	0	N	N	$ -	$ -	$ -	$ -	$ -	0
11		i	Victoria Basin	2	Abandon the mid-level outlet and extend the lysimeters	Y	439	43	N	N	$ 150,000	$ 9,800	$ 1,576	$ 11,376	$ 266	0
12		ii	Lower Day Basin (2010 RMPU)	2	Inlet improvements, rebuilding embankment, elimination of mid-level outlet	N	395	789	N	N	$ 2,480,000	$ 161,300	$ 29,041	$ 190,341	$ 241	0
13		ii	Lower Day Basin	2	Install gate on mid-level outlet	N	395	75	N	N	$ 600,000	$ 39,000	$ 2,777	$ 41,777	$ 554	0
14		i	Turner Basin	2	Raise Turner 2 spillway[8]	N	1,226	66	N	N	$ 890,000	$ 57,900	$ 2,426	$ 60,326	$ 916	1
15		i	Ely Basin	2	Basin enlargement and increased drainage area	N	1,103	221	N	N	$ 9,120,000	$ 593,300	$ 8,122	$ 601,422	$ 2,726	0
15a		i	Ely Basin	2	Basin enlargement and increased drainage area	N	1,103	221	N	N	$ 3,200,000	$ 208,200	$ 8,122	$ 216,322	$ 981	
16		i	Ontario Bioswale Project	2	New bioswale	N	0	8	Y	Y	$ 650,000	$ 42,300	$ 277	$ 42,577	$ -	0
17		i	Lower San Sevaine Basin (2010 RMPU)	2	New basin	Y	0	1,221	N	N	$ 22,715,000	$ 1,477,600	$ 44,947	$ 1,522,547	$ 1,247	0
17a		i	Lower San Sevaine Basin (2010 RMPU)	2	New basin	Y	0	1,221	N	N	$ 11,275,000	$ 733,500	$ 44,947	$ 778,447	$ 638	0
18		i	CSI Storm Water Basin	3	Deepen basin by 10 feet	N	72	81	N	N	$ 900,000	$ 58,500	$ 2,998	$ 61,498	$ 755	0
18a		i	CSI Storm Water Basin	3	Deepen basin by 10 feet	N	72	81	N	N	$ 440,000	$ 28,600	$ 2,998	$ 31,598	$ 388	0
19		iii	Wineville Basin (2010 RMPU)	3	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway[9]	Y	5	2,157	N	N	$ 6,280,000	$ 408,500	$ 79,438	$ 487,938	$ 226	2
19a		iii	Wineville Basin (2010 RMPU)	3	Gate the low-elevation outlet, replace embankment with dam, and construct a pneumatic gate on the spillway[9]	Y	5	2,157	N	N	$ 4,890,000	$ 318,100	$ 79,438	$ 397,538	$ 184	2
20		iii	Jurupa Basin	3	Inlet improvements and CB-18 turnout modifications	N	234	421	N	N	$ 2,150,000	$ 139,900	$ 15,516	$ 155,416	$ 369	2
21		ii	RP3 Basin Improvements (2010 RMPU)	3	Inlet improvements and enlargement	N	628	406	N	N	$ 22,044,000	$ 1,434,000	$ 14,931	$ 1,448,931	$ 3,573	2
21a		ii	RP3 Basin Improvements (2010 RMPU)	3	Inlet improvements and enlargement	N	628	406	N	N	$ 13,464,000	$ 875,900	$ 14,931	$ 890,831	$ 2,197	
22		ii, iii	RP3 Basin Improvements (2013 RMPU)	3	Increase conservation storage[10]	Y	628	137	N	N	$ 5,290,000	$ 344,100	$ 5,062	$ 349,162	$ 2,540	2
22a		ii, iii	RP3 Basin Improvements (2013 RMPU)	3	Increase conservation storage[10]	Y	628	137	N	N	$ 3,710,000	$ 241,300	$ 5,062	$ 246,362	$ 1,792	2
23	Includes PID's 19,20,22	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	2010 RMPU Proposed Wineville Basin Improvements, Wineville 20 cfs PS to Jurupa, Improved Jurupa Basin Inlet, 40 cfs PS to RP3 Basin with Proposed 2013 RMPU RP3	Y	867	3,166	N	N	$ 23,324,000	$ 1,517,300	$ 311,014	$ 1,828,314	$ 577	2
23a	Includes PID's 19,20,22	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin with 2013 Proposed RP3 Improvements	3	2010 RMPU Proposed Wineville Basin Improvements, Wineville 20 cfs PS to Jurupa, Improved Jurupa Basin Inlet, 40 cfs PS to RP3 Basin with Proposed 2013 RMPU RP3	Y	867	3,166	N	N	$ 21,314,000	$ 1,386,500	$ 311,014	$ 1,697,514	$ 536	2
24		i	Vulcan Pit	3	Construct new inflow and outflow structures[11]	Y	0	857	N	N	$ 27,700,000	$ 1,801,900	$ 31,548	$ 1,833,448	$ 2,140	1
25		i	Sierra	3	Deepen basin by 10 feet	N	12	64	N	N	$ 1,000,000	$ 65,100	$ 2,351	$ 67,451	$ 1,056	1
25a		i	Sierra	3	Deepen basin by 10 feet	N	12	64	N	N	$ 490,000	$ 31,900	$ 2,351	$ 34,251	$ 536	1
26		i	Sultana Avenue	3	Deepen basin by 10 feet	N	89	7	N	N	$ 1,026,200	$ 66,800	$ 258	$ 67,058	$ 9,556	1
26a		i	Sultana Avenue	3	Deepen basin by 10 feet	N	89	7	N	N	$ 502,200	$ 32,700	$ 258	$ 32,958	$ 4,697	1
27		i	Declez Basin	3	Reconstruct existing embankment and install a gate on the low level outlet[12]	N	674	241	N	N	$ 4,070,000	$ 264,800	$ 8,877	$ 273,677	$ 1,135	2
Operations and Maintenance[13]																
28		ii	Banana Basin (annual cleaning)	3	Increase frequency of basin maintenance (Increased infiltration rate to 0.6 ft/day)	Y	317	11	N	N			$ 3,183	$ 3,183	$ 294	0
29		ii	Banana Basin (semiannual cleanings)	3	Increase frequency of basin maintenance (Increased infiltration rate to 0.72 ft/day)	Y	317	31	N	N			$ 15,192	$ 15,192	$ 495	0
30		ii	Declez Basin (annual cleaning)	3	Increase basin maintenance frequency (Increased infiltration rate to 0.66 ft/day)	Y	674	16	N	N			$ 6,537	$ 6,537	$ 409	0
31		ii	Declez Basin (semiannual cleanings)	3	Increase basin maintenance frequency (Increased infiltration rate to 0.78 ft/day)	Y	674	47	N	N			$ 32,923	$ 32,923	$ 701	0
32		ii	Ely Basin (annual cleaning)	2	Increase maintenance frequency (Increased infiltration rate to 0.27 ft/day)	Y	1,103	44	N	N			$ 29,450	$ 29,450	$ 668	0
33		ii	Ely Basin (semiannual cleanings)	2	Increase maintenance frequency (Increased infiltration rate to 0.33 ft/day)	Y	1,103	128	N	N			$ 127,949	$ 127,949	$ 997	0

Table D-1
Project Data for Yield Enhancement Projects

Project ID	Project Combinations	Group[1]	Project	Man. Zone	Summary of Key Project Features	Potential Cost Share if Mutually Agreed?	Storm Water Recharge									Production Sustainability Score[5]
							Baseline Storm Water Recharge (acre-ft/yr)	New Storm Water Recharge (acre-ft/yr)	Constructed for Regulatory Compliance?	Project Complete?	Capital Cost ($)	Annualized Capital Cost ($)	Annual O&M Cost ($)	Total Annual Cost ($)	Storm Water Recharge Unit Cost[2]	
34		ii	Hickory Basin (annual cleaning)	2	Increase frequency of basin maintenance (Increased infiltration rate to 0.44 ft/day)	Y	353	7	N	N			$ 3,812	$ 3,812	$ 518	0
35		ii	Hickory Basin (semiannual cleanings)	2	Increase frequency of basin maintenance (Increased infiltration rate to 0.52 ft/day)	Y	353	20	N	N			$ 17,640	$ 17,640	$ 877	0
Proposed Projects in Table 6-1 that Were Not Analyzed																
36			Turner Expansion	2	Basin improvements to the basins east of Archibald Ave and new basins adjacent to Turner 4[14]											
37			Upland Basin	1	Construct low level drain[15]											
38			College Heights	1	Construct internal berms to reduce seepage to the Upland basin[16]											
39			Lower Cucamonga Basin	2	Basin enlargement for distribution[17]											
40			Management Zones 2 and 3 Capture, Pump and Recharge	2,3	Capture water in MZ-2 and 3 basins low in the system and pump to basins higher in the system[17]											
41			Jurupa Basin	3	Inlet improvements and basin enlargement[17]											
42			RP3 Basins	3	Inlet improvements[18]											
43			Alder Basin	3	Deepen basin[17]											

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; iv- the project is included in a "iii" group.

[2] The results of this table provide an estimate of the cost per acre-ft of recharge. These estimates are reconnaissance level (level 5) estimates, and additional technical work needs to be done to assure feasibility.

[3] The IEUA recycled water recharge rate was assumed to be $195/acre-ft per Table 2-9.

[4] The MWD imported water recharge rate was assumed to be untreated Tier 1 Service at a price of $621 an acre-ft per Table 2-9.

[5] The production sustainability score is a tool to characterize a project's contribution to production sustainability in areas with sustainability challenges. In simple terms, the score is as follows: 0 – does not contribute to production sustainability; 1 – contributes minimally to production sustainability (a necessary but not sufficient condition of sustainability); 2 – contributes significantly to production sustainability (a necessary and sufficient condition of sustainability).

[6] The automation of the inlet gate and flume data to MC 1 results in a reduction of O&M.

[7] With a 40-percent RWC limitation, an additional 1,911 acre-ft/yr of recycled water can be recharged.

[8] The baseline for the Turner 2 Spillway Project and the Turner Expansion includes the recharge from Turner 1, 2, 3, and 4.

[9] The results from the Wineville proof-of-concept project may render the project infeasible. Recycled water recharge was estimated to be 630 acre-ft/yr, assuming an infiltration rate of 0.10 ft/day over 30 acres

[10] The maximum amount of recycled water that can be recharged is 12,800 acre-ft/yr at RP3.

[11] Recycled water recharge based upon an estimated 0.1 ft/day infiltration at 40-acres for 7-months of operations. Actual RWC is unknown; recharge based upon an assumed RWC at 25% with the following flows: 840 AFY storm water, 1,800 AFY underflow, and diluent water the same at Banana Basin. The project includes the price of land at $14 million

[12] Recycled water recharge operations will not benefit from the increased operating level.

[13] Based on available information, it can be assumed that basin infiltration can be increased 10 to 20% with annual cleaning and 20 to 50 % with cleaning twice a year. Field data needs to be established to determine optimum cleaning frequencies per basin

[14] The Turner Basin expansion project was not included because it is currently under construction.

[15] The Upland Basin Project was removed by the IEUA because the basin performs well, and limited cleaning is needed.

[16] The College Heights project does not affect stormwater recharge.

[17] The projects did not pass the screening criteria and were not considered.

[18] The estimated total stormwater recharge gained by the 2010 RMPU RP3 inlet improvement is comparable to the currently achievable stormwater recharge at RP3 due to enhance stormwater recharge efforts by IEUA.

[19] Reduces the amount of lost water due to basin inlet constraints and clogging.

[20] Will increase the amount of time water can be recharged in SS-1 by solving the vector control issues.

[21] Will allow the Jurupa Basin to accept an additional 15 cfs from the CB 18 if Hickory and Banana Basins were offline.

[22] The SBCFCD did not allow the City of Ontario to connect the new 5th Street storm drain to the Princeton Basin. The SBCFCD required improvements to the Princeton Basin such as enlarging the basin by purchasing the adjacent property, deepening the basin, and enlarging the outlet structures in order to allow the diversion of the 15th St storm drain to the Princeton Basin. These costs made the improvement infeasible. The City of Ontario connected the 60" storm drain to the West Cucamonga channel to the south of the Princeton Basin. This information was not presented until after the model runs and cost estimates were completed.

a - The project includes excavation costs, and the capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-2
Summary of Unit Costs

Items	Unit	Unit Cost	Source
Financial Analysis Assumptions			
Mobilization @ 5% Other Direct Construction Cost	Rate	5%	d
Contingency > $2 million@ 10%	Rate	10%	d
Contingency $1 - $2 million @ 15%	Rate	15%	d
Contingency < $1 million@ 20%	Rate	20%	d
Engineering and Admin < $1 million@ 20%	Rate	20%	d
Engineering and Admin $1 - $2 million @ 15%	Rate	15%	d
Engineering and Admin > $2 million@ 10%	Rate	10%	d
Construction Management > $2 million@ 10%	Rate	10%	d
Construction Management $1 - $2 million @ 15%	Rate	15%	d
Construction Management < $1 million@ 20%	Rate	20%	d
Amortization Rate	Rate	5%	a
Amortization Period	Years	30	a
Conveyance Facilities			
Booster Pump Station	$ /HP	$ 5,000	a
Valve Actuator Adder	EA	$ 15,000	d
Sluice Gate	$/in-dia	$ 595	d
18" Diameter CMLC	Lin. Ft.	$ 279	b
18" Gate Valve	EA	$ 5,670	d
24" Diameter CMLC	Lin. Ft.	$ 330	b
24" Gate Valve	EA	$ 7,560	d
30" Diameter CMLC	Lin. Ft.	$ 379	b
30" Gate Valve	EA	$ 9,450	d
36" Diameter CMLC	Lin. Ft.	$ 429	b
42" Diameter CMLC	Lin. Ft.	$ 480	b
Recharge Basin Facilities			
Turnout Valve and Metering	LS	$ 25,000	d
36" Dia. RCP	Lin. Ft.	$ 303	b
48" Dia. RCP	Lin. Ft.	$ 376	b
60" Dia. RCP Outlet Conduit	Lin. Ft.	$ 673	b
8' x 10' RCB	Lin. Ft.	$ 930	b
Basin Discharge Concrete Structure	Cu. Yds.	$ 1,345	b
Basin Excavation & Haul Offsite	Cu. Yds.	$ 14	b
Material Haul Onsite	Cu. Yds.	$ 3.0	d
CMU Building	Sq. Ft.	$ 300	d
Berm Overflow Concrete Structure	Cu. Yds.	$ 1,345	b
Channel Demolition	Cu. Yds.	$ 62	b
Channel Demolition	Cu. Yds.	$ 27	b
Coarse Drain Material	Ton	$ 26	b
Compacted Embankment	Cu. Yds.	$ 6.7	b
Concrete Channel & Weir	Cu. Yds.	$ 560	b
Concrete Inlet Spillway Structure	Cu. Yds.	$ 785	b
Concrete Spillway Structure	Cu. Yds.	$ 897	b
Concrete Structure	Cu. Yds.	$ 1,345	b
Excavation	Cu. Yds.	$ 5.6	b
Trench Shoring	Lin. Ft.	$ 50	d
Backfill and Compaction (Native)	Cu. Yds.	$ 5.6	d
Backfill and Compaction (Import)	Cu. Yds.	$ 15	d
Import Pipe Bedding Material	Cu. Yds.	$ 15	d
Foundation Excavation	Cu. Yds.	$ 3.4	b
Interior Berm Compacted Fill	Cu. Yds.	$ 6.7	b
Interior Berm Excavation	Cu. Yds.	$ 3.4	b
Modify Channel for Conduit Inlet	Cu. Yds.	$ 1,200	b
Replace Compacted Fill	Cu. Yds.	$ 17	a
Mass Excavation	Cu. Yds.	$ 11	a
Fine Grading	Cu. Yds.	$ 17	a
Perimeter Fence	Lin. Ft.	$ 17	a
Surface Rehabilitation	Sq. Ft.	$ 25	d
Electrical @ 25%	Lump Sum	25%	d
Instrumentation and Controls @ 10% of Electrical	Lump Sum	10%	d
Instrumentation	Lump Sum	$ 112,000	a
Operations and Maintenance			
Basins Recharge SW/IW/RW	$/acre-ft	$ 24	c
Basins Recharge SW/RW	$/acre-ft	$ 37	c
Pipelines - general	$/mile	$ 4,500	a
Pump Stations - general	% construction cost	2%	a
Misc. well maintenance	$/year/well	$ 28,000	a

a - From the 2010 RMPU Technical Memorandum, Black & Veatch and WEI, March 19, 2009. Cost estimates were escalated from July 2009 to January 2013 using the Bureau of Reclamation Construction Cost trend.
b - From the 2010 RMPU Section 5, Wagner & Bonsignore and WEI, June 2010. Cost estimates were escalated from July 2009 to January 2013 using the Bureau of Reclamation Construction Cost trend.
c - Per Andy Campbell of IEUA, 2/11/2013.
d - Per IEUA March 2013.

Table D-3a
Cost Opinion for Montclair Basins -- PID 1

Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs					
Item #					
1 Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 196,665	$ 196,665
2 Basin 4 Material Removal					
Basin Excavation & Haul Offsite	32000	Cu. Yds.	$ 14	$ 448,387	$ 44,839
Fine Grading	650	Cu. Yds.	$ 17	$ 10,929	$ 10,929
3 Pump Station and Pipeline (Basin 4 to Basin 2 and 3)					
Basin Excavation & Haul Offsite	150	Cu. Yds.	$ 14	$ 2,102	$ 2,102
Interior Berm Excavation	3,000	Cu. Yds.	$ 3	$ 10,089	$ 10,089
Concrete Structure	150	Cu. Yds.	$ 1,345	$ 201,774	$ 201,774
24" Diameter	50	Lin. Ft.	$ 330	$ 16,478	$ 16,478
Sluice Gate	50	$/in-dia	$ 595	$ 29,750	$ 29,750
Booster Pump Station	150	$ /HP	$ 5,000	$ 750,000	$ 750,000
CMU Building	100	Sq. Ft.	$ 300	$ 30,000	$ 30,000
Backfill and Compaction (Native)	600	Cu. Yds.	$ 6	$ 3,363	$ 3,363
Compacted Embankment	1,650	Cu. Yds.	$ 7	$ 11,098	$ 11,098
Coarse Drain Material	50	Ton	$ 26	$ 1,289	$ 1,289
Basin Discharge Concrete Structure	20	Cu. Yds.	$ 1,345	$ 26,903	$ 26,903
Electrical @ 25%	1	LS	$ 195,000.00	$ 195,000	$ 195,000
Instrumentation and Controls @ 10% of Electrical	1	LS	$ 19,500	$ 19,500	$ 19,500
24" Diameter	2,400	Lin. Ft.	$ 330	$ 790,955	$ 790,955
Excavation	3,200	Cu. Yds.	$ 6	$ 17,935	$ 17,935
Backfill and Compaction (Native)	2,000	Cu. Yds.	$ 6	$ 11,210	$ 11,210
Import Pipe Bedding Material	700	Cu. Yds.	$ 15	$ 10,500	$ 10,500
Surface Rehabilitation	12,000	Sq. Ft.	$ 25	$ 300,000	$ 300,000
4 Pump Station and Pipeline (Basin 3 to Basin 2)					
Basin Excavation & Haul Offsite	150	Cu. Yds.	$ 14	$ 2,102	$ 2,102
Interior Berm Excavation	2,800	Cu. Yds.	$ 3	$ 9,416	$ 9,416
Concrete Structure	150	Cu. Yds.	$ 1,345	$ 201,774	$ 201,774
24" Diameter	50	Lin. Ft.	$ 330	$ 16,478	$ 16,478
Sluice Gate	50	$/in-dia	$ 595	$ 29,750	$ 29,750
Booster Pump Station	75	$ /HP	$ 5,000	$ 375,000	$ 375,000
CMU Building	200	Sq. Ft.	$ 300	$ 60,000	$ 60,000
Backfill and Compaction (Native)	600	Cu. Yds.	$ 6	$ 3,363	$ 3,363
Compacted Embankment	1,750	Cu. Yds.	$ 7	$ 11,770	$ 11,770
Coarse Drain Material	50	Ton	$ 26	$ 1,289	$ 1,289
Basin Discharge Concrete Structure	20	Cu. Yds.	$ 1,345	$ 26,903	$ 26,903
Electrical @ 25%	1	LS	$ 108,750.00	$ 108,750	$ 108,750
Instrumentation and Controls @ 10% of Electrical	1	LS	$ 10,875	$ 10,875	$ 10,875
24" Diameter	400	Lin. Ft.	$ 330	$ 131,826	$ 131,826
Excavation	500	Cu. Yds.	$ 6	$ 2,802	$ 2,802
Backfill and Compaction (Native)	300	Cu. Yds.	$ 6	$ 1,681	$ 1,681
Import Pipe Bedding Material	150	Cu. Yds.	$ 15	$ 2,250	$ 2,250
Surface Rehabilitation	2,000	Sq. Ft.	$ 25	$ 50,000	$ 50,000
SubTotal Direct Construction Costs				**$ 4,130,000**	**$ 3,726,000**
Contingency > $2 million@ 10%	1	LS	10%	$ 413,000	$ 413,000
Construction Management > $2 million@ 10%	1	LS	10%	$ 413,000	$ 413,000
Total Construction Cost				**$ 4,956,000**	**$ 4,552,000**
Engineering and Admin > $2 million@ 10%	1	LS	10%	$ 495,600	$ 495,600
Total Engineering and Administration				**$ 496,000**	**$ 496,000**
Total Estimated Project Cost				**$ 5,450,000**	**$ 5,050,000**
Annual Cost - 30 Years @ 5% Interest				**$ 354,500**	**$ 328,500**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-3b
Cost Opinion for Montclair Basins -- PID 2

	Description	Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
Item #					
1	Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 45,846
2	Basin Inlet Structure to Basin 2 and 3				
	Channel Demolition	250	Cu. Yds.	$ 62	$ 15,413
	Basin Excavation & Haul Offsite	3,800	Cu. Yds.	$ 14	$ 53,246
	Concrete Structure	250	Cu. Yds.	$ 1,345	$ 336,290
	Concrete Channel & Weir	75	Cu. Yds.	$ 560	$ 42,036
	Compacted Embankment	2,000	Cu. Yds.	$ 7	$ 13,452
	Backfill and Compaction (Native)	1,600	Cu. Yds.	$ 6	$ 8,968
	Trench Shoring	300	Lin. Ft.	$ 50	$ 15,000
	Coarse Drain Material	1,200	Ton	$ 26	$ 30,939
	Sluice Gate	72	$/in-dia	$ 595	$ 42,840
	36" Dia. RCP	300	Lin. Ft.	$ 303	$ 90,798
	Import Pipe Bedding Material	200	Cu. Yds.	$ 15	$ 3,000
	Basin Discharge Concrete Structure	100	Cu. Yds.	$ 1,345	$ 134,516
	Basin Discharge Concrete Structure	20	Cu. Yds.	$ 1,345	$ 26,903
	Surface Rehabilitation	1,200	Sq. Ft.	$ 25	$ 30,000
	Electrical @ 25%	2	LS	$ 33,410	$ 66,819
	Instrumentation and Controls @ 10% of Electrical	2	LS	$ 3,341	$ 6,682
SubTotal Direct Construction Costs					**$ 963,000**
	Contingency $1 - $2 million @ 15%	1	LS	15%	$ 144,450
	Construction Management $1 - $2 million @ 15%	1	LS	15%	$ 144,450
Total Construction Cost					**$ 1,251,900**
	Engineering and Admin $1 - $2 million @ 15%	1	LS	15%	$ 187,785
Total Engineering and Administration					**$ 188,000**
Total Estimated Project Cost					**$ 1,440,000**
Annual Cost - 30 Years @ 5% Interest					**$ 93,700**

Table D-3c
Cost Opinion for Montclair Basins -- PID 4

Description		Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
Item #					
1	Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 22,348.45
2	Basin Low Level Drain Outlet (Basin 1 to Basin 2)				
	Basin Excavation & Haul Offsite	100	Cu. Yds.	$ 14	$ 1,401
	Interior Berm Excavation	2,000	Cu. Yds.	$ 3	$ 6,726
	Concrete Structure	50	Cu. Yds.	$ 1,345	$ 67,258
	Sluice Gate	36	$/in-dia	$ 595	$ 21,420
	Backfill and Compaction (Native)	400	Cu. Yds.	$ 6	$ 2,242
	Compacted Embankment	1,250	Cu. Yds.	$ 7	$ 8,407
	Coarse Drain Material	50	Ton	$ 26	$ 1,289
	Basin Discharge Concrete Structure	10	Cu. Yds.	$ 1,345	$ 13,452
	36" Diameter	200	Lin. Ft.	$ 429	$ 85,866
	Excavation	400	Cu. Yds.	$ 6	$ 2,242
	Backfill and Compaction (Native)	300	Cu. Yds.	$ 6	$ 1,681
	Import Pipe Bedding Material	100	Cu. Yds.	$ 15	$ 1,500
	Surface Rehabilitation	400	Sq. Ft.	$ 25	$ 10,000
3	Basin Low Level Drain Outlet (Basin 2 to Basin 3)				
	Basin Excavation & Haul Offsite	100	Cu. Yds.	$ 14	$ 1,401
	Interior Berm Excavation	2,000	Cu. Yds.	$ 3	$ 6,726
	Concrete Structure	50	Cu. Yds.	$ 1,345	$ 67,258
	Sluice Gate	36	$/in-dia	$ 595	$ 21,420
	Backfill and Compaction (Native)	400	Cu. Yds.	$ 6	$ 2,242
	Compacted Embankment	1,250	Cu. Yds.	$ 7	$ 8,407
	Coarse Drain Material	50	Ton	$ 26	$ 1,289
	Basin Discharge Concrete Structure	10	Cu. Yds.	$ 1,345	$ 13,452
	36" Diameter	200	Lin. Ft.	$ 429	$ 85,866
	Excavation	400	Cu. Yds.	$ 6	$ 2,242
	Backfill and Compaction (Native)	300	Cu. Yds.	$ 6	$ 1,681
	Import Pipe Bedding Material	100	Cu. Yds.	$ 15	$ 1,500
	Surface Rehabilitation	400	Sq. Ft.	$ 25	$ 10,000
SubTotal Direct Construction Costs					**$ 469,000.00**
	Contingency < $1 million@ 20%	1	LS	20%	$ 93,800.00
Total Construction Cost					**$ 562,800.00**
	Engineering and Admin < $1 million@ 20%	1	LS	20%	$ 112,560.00
	Construction Management < $1 million@ 20%	1	LS	20%	$ 112,560.00
Total Engineering and Administration					**$ 225,000.00**
Total Estimated Project Cost					**$ 790,000.00**
Annual Cost - 30 Years @ 5% Interest					**$51,400.00**

Table D-4
Cost Opinion for North West Upland Basin -- PID 5

Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs					
1 Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$216,000	$216,000
2 Basin Construction					
Traffic Control and Safety	1	LS	$15,000.00	$15,000	$15,000
Utility Verification (potholing)	1	LS	$8,000.00	$8,000	$8,000
Survey	1	LS	$30,000.00	$30,000	$30,000
Swppp and Bmps	1	LS	$5,000.00	$5,000	$5,000
Clearing, Grubbing, Removals, Relocations, Restorations and Earthwork	1	LS	$400,000.00	$400,000	$40,000
Structure Excavation and Over Excavation	1	LS	$250,000.00	$250,000	$25,000
Structure Backfill and Grading	2,903	LF	$100.00	$290,300	$29,030
Riprap	6,690	SF	$25.00	$167,250	$167,250
Construct 24" RCP	80	LF	$120.00	$9,600	$9,600
Construct 30" RCP	14	LF	$170.00	$2,380	$2,380
Construct 36" RCP	601	LF	$175.00	$105,175	$105,175
Construct 42" RCP	1,784	LF	$225.00	$401,400	$401,400
Construct 66" RCP	97	LF	$700.00	$67,900	$67,900
Construct 84" RCP	2,236	LF	$780.00	$1,744,080	$1,744,080
Construct reinforced concrete plug	1	EA	$2,000.00	$2,000	$2,000
Construct curb opening catch basin per sppwc 300-3	22	EA	$13,000.00	$286,000	$286,000
Construct local depression at catch basin per sppwc 313-3	22	EA	$2,000.00	$44,000	$44,000
Construct manhole per sppwc 320-2	4	EA	$9,000.00	$36,000	$36,000
Construct manhole per sppwc 322-2	7	EA	$9,000.00	$63,000	$63,000
Construct manhole shaft safety ledge per sppwc 330-2	11	EA	$10,000.00	$110,000	$110,000
Construct junction structure per sppwc 331-3	13	EA	$6,000.00	$78,000	$78,000
Construct junction structure per sppwc 332-2	2	EA	$8,000.00	$16,000	$16,000
Construct concrete collar per sppwc 380-4	17	EA	$2,000.00	$34,000	$34,000
Construct junction structure per sppwc 340-2	2	EA	$8,500.00	$17,000	$17,000
Abandon exist. 4" water line	1	LS	$15,000.00	$15,000	$15,000
Construct 18'x9' conc. outlet	1	EA	$25,000.00	$25,000	$25,000
Remove existing 16" waterline	1	LS	$15,000.00	$15,000	$15,000
Construct energy dissipater	1	EA	$20,000.00	$20,000	$20,000
Construct 1 ft. wide concrete lined swale	1	LS	$6,000.00	$12,000	$12,000
Construct new curb and gutter	25	LF	$25.00	$625	$625
Concrete vaults and miscellaneous concrete	7	EA	$3,500.00	$24,500	$24,500
Paving	1	LS	$25,000.00	$25,000	$25,000
Subtotal Direct Construction				**$4,535,000**	**$3,689,000**
Contingency > $2 million@ 10%				$454,000	$454,000
Construction Management > $2 million@ 10%				$454,000	$454,000
Total Construction				**$4,989,000**	**$4,143,000**
Engineering and Administration Costs					
Engineering and Admin > $2 million@ 10%				$499,000	$499,000
Total Engineering and Administration				**$499,000**	**$499,000**
Total Estimated Cost				**$5,488,000**	**$4,642,000**
Total Estimated Cost - Rounded				**$5,490,000**	**$4,640,000**
Annual Cost - 30 Years @ 5% Interest				**$357,000**	**$302,000**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-5a
Cost Opinion for the San Sevaine Basins -- PID 7

	Description	Quantity	Unit		Unit Cost		Total Cost
Direct Construction Costs							
Item #							
1	Mobilization @ 5% Other Direct Construction Cost	1	LS		5%	$	126,281.18
2	StormWater Pipeline and Pump Station						
	Basin Discharge Concrete Structure	15	Cu. Yds.	$	1,345	$	20,177
	18" Diameter CMLC Steel	3700	Lin. Ft.	$	279	$	1,032,748
	18" Gate Vavle	1	EA	$	5,670	$	5,670
	Booster Pump Station	150	$ /HP	$	5,000	$	750,000
	CMU Building	300	Sq. Ft.	$	300	$	90,000
	Concrete Structure	45	Cu. Yds.	$	1,345	$	60,532
	Excavation	3600	Cu. Yds.	$	6	$	20,177
	Fine Grading	280	Cu. Yds.	$	17	$	4,708
	Backfill and Compaction (Native)	2800	Cu. Yds.	$	6	$	15,694
	Import Pipe Bedding Material	600	Cu. Yds.	$	15	$	9,000
	Basin Discharge Concrete Structure	10	Cu. Yds.	$	1,345	$	13,452
	Sluice Gate	20	$/in-dia	$	595	$	11,900
	Surface Rehabilitation	1500	Sq. Ft.	$	25	$	37,500
	Habitat Area Mitigation	1	LS	$	200,871	$	200,871
	Electrical @ 25%	1	LS	$	230,177.42	$	230,177
	Instrumentation and Controls @ 10% of Electrical	1	LS	$	23,018	$	23,018
	Interior Berm Excavation	300	Cu. Yds.	$	3	$	1,009
	Excavation	1500	Cu. Yds.	$	6	$	8,407
	Material Haul Onsite	1500	Cu. Yds.	$	3	$	4,500
	Interior Berm Compacted Fill	1500	Cu. Yds.	$	7	$	10,089
	Fine Grading	150	Cu. Yds.	$	17	$	2,522
	Basin Discharge Concrete Structure	5	Cu. Yds.	$	1,345	$	6,726
SubTotal Direct Construction Costs						**$**	**2,690,000.00**
	Contingency > $2 million@ 10%	1	LS		10%	$	269,000.00
	Construction Management > $2 million@ 10%	1	LS		10%	$	269,000.00
Total Construction Cost						**$**	**3,228,000.00**
	Engineering and Admin > $2 million@ 10%	1	LS		10%	$	322,800.00
Total Engineering and Administration						**$**	**323,000.00**
Total Estimated Project Cost						**$**	**3,550,000.00**
Annual Cost - 30 Years @ 5% Interest						**$**	**230,900.00**

Table D-5b
Cost Opinion for the San Sevaine Basins -- PID 8

	Description	Quantity	Unit		Unit Cost		Total Cost
Direct Construction Costs							
Item #							
1	Mobilization @ 5% Other Direct Construction Cost	1	LS		5%	$	83,465.92
2	Recycyled Water Pipeline (SSV 5 to SSV3)						
	Turnout Modifications	1	LS	$	15,000	$	15,000
	30" Diameter CMLC	3500	Lin. Ft.	$	379	$	1,326,105
	30" Gate Valve	2	EA	$	9,450	$	18,900
	Basin Discharge Concrete Structure	15	Cu. Yds.	$	1,345	$	20,177
	Sluice Gate	30	$/in-dia	$	595	$	17,850
	Excavation	4000	Cu. Yds.	$	6	$	22,419
	Fine Grading	550	Cu. Yds.	$	17	$	9,248
	Backfill and Compaction (Native)	3000	Cu. Yds.	$	6	$	16,815
	Import Pipe Bedding Material	600	Cu. Yds.	$	15	$	9,000
	Surface Rehabilitation	1400	Sq. Ft.	$	25	$	35,000
	Habitat Area Mitigation	1	LS	$	145,551	$	145,551
6	Construct Internal Berm in SS-5						
	Interior Berm Excavation	300	Cu. Yds.	$	3	$	1,009
	Excavation	1500	Cu. Yds.	$	6	$	8,407
	Material Haul Onsite	1500	Cu. Yds.	$	3	$	4,500
	Interior Berm Compacted Fill	1500	Cu. Yds.	$	7	$	10,089
	Fine Grading	150	Cu. Yds.	$	17	$	2,522
	Basin Discharge Concrete Structure	5	Cu. Yds.	$	1,345	$	6,726
SubTotal Direct Construction Costs						**$**	**1,750,000**
	Contingency $1 - $2 million @ 15%	1	LS		15%	$	262,500
	Construction Management $1 - $2 million @ 15%	1	LS		15%	$	262,500
Total Construction Cost						**$**	**2,275,000**
	Engineering and Admin $1 - $2 million @ 15%	1	LS		15%	$	341,250
Total Engineering and Administration						**$**	**341,000**
Total Estimated Project Cost						**$**	**2,620,000**
Annual Cost - 30 Years @ 5% Interest						**$**	**170,400**

Table D-6
Cost Opinion for the Victoria Basin -- PID 11

Description		Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
Item #					
1	Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 4,631
2	Remove Mid-Level Outlet				
	36" Steel Bulkhead	1	LS	$ 7,500	$ 7,500
	Existing Concrete Outlet Modifications (Concrete Deck and Fill)	1	LS	$ 15,000	$ 15,000
3	Lysimeter Relocation				
	Relocating Allowance	1	LS	$ 55,000	$ 55,000
	Electrical @ 25%	1	LS	$ 13,750	$ 13,750
	Instrumentation @ 10%	1	LS	$ 1,375	$ 1,375
SubTotal Direct Construction Costs					**$ 100,000**
	Contingency $1 - $2 million @ 15%	1	LS	15%	$ 15,000
	Construction Management $1 - $2 million @ 15%	1	LS	15%	$ 15,000
Total Construction Cost					**$ 130,000**
	Engineering and Admin $1 - $2 million @ 15%	1	LS	15%	$ 19,500
Total Engineering and Administration					**$ 19,500**
Total Estimated Project Cost					**$ 150,000**
Annual Cost - 30 Years @ 5% Interest					**$ 9,800**

Table D-7a
Cost Opinion for the Lower Day Basin -- PID 12

Description		Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$79,000
2	Compacted Embankment				
	Foundation Excavation	72,000	Cu. Yds.	$3.36	$242,129
	Compacted Embankment	72,000	Cu. Yds.	$6.73	$484,258
3	Day Creek Channel Modification				
	Channel Demolition	400	Cu. Yds.	$61.65	$24,661
	Gate	1	Job	$144,000	$144,000
	Gate Structure	1	Job	$165,000	$165,000
4	Basin Diversion Channel Inlet				
	Gate	1	Job	$144,000	$144,000
	Gate Structure	1	Job	$378,000	$378,000
	Subtotal Direct Construction				**$1,660,000**
	Contingency $1 - $2 million @ 15%				$249,000
	Construction Management $1 - $2 million @ 15%				$249,000
	Total Construction				**$2,158,000**
Engineering and Administration Costs					
	Engineering and Admin $1 - $2 million @ 15%				$324,000
	Total Engineering and Administration				**$324,000**
Total Estimated Cost					**$2,482,000**
Total Estimated Cost - Rounded					**$2,480,000**
Annual Cost - 30 Years @ 5% Interest					**$161,500**

Table D-7b
Cost Opinion for the Lower Day Basin -- PID 13

	Description	Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
Item #					
1	Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 17,080.60
2	Mid-Level Gate Structure				
	Sluice Gate	60	$/in-dia	$ 595	$ 35,700
	Basin Excavation & Haul Offsite	11,200	Cu. Yds.	$ 14	$ 156,935
	Concrete Structure	0	Cu. Yds.	$ 1,345	$ -
	Basin Discharge Concrete Structure	50	Cu. Yds.	$ 1,345	$ 67,258
	Coarse Drain Material	100	Ton	$ 26	$ 2,578
	Backfill and Compaction (Native)	5,600	Cu. Yds.	$ 6	$ 31,387
	Interior Berm Compacted Fill	5,600	Cu. Yds.	$ 7	$ 37,665
	Fine Grading	600	Cu. Yds.	$ 17	$ 10,089
SubTotal Direct Construction Costs					**$ 359,000.00**
	Contingency < $1 million@ 20%	1	LS	20%	$ 71,800.00
	Construction Management < $1 million@ 20%	1	LS	20%	$ 71,800.00
Total Construction Cost					**$ 502,600.00**
	Engineering and Admin < $1 million@ 20%	1	LS	20%	$ 100,520.00
Total Engineering and Administration					**$ 101,000.00**
Total Estimated Project Cost					**$ 600,000.00**
Annual Cost - 30 Years @ 5% Interest					**$39,000.00**

Table D-8
Cost Opinion for the Turner Basin -- PID 14

	Description	Quantity	Unit	Unit Cost		Total Cost	
Direct Construction Costs							
Item #							
1	Mobilization @ 5% Other Direct Construction Cost	1	LS		5%	$	25,163.10
2	Raise Turner 2 Spillway						
	Channel Demolition	350	Cu. Yds.	$	62	$	21,579
	Basin Excavation & Haul Offsite	2,500	Cu. Yds.	$	14	$	35,030
	Replace Compacted Fill	2,500	Cu. Yds.	$	17	$	42,036
	Concrete Spillway Structure	400	Cu. Yds.	$	897	$	358,710
	Compacted Embankment	1,250	Cu. Yds.	$	7	$	8,407
	Surface Rehabilitation	1,500	Sq. Ft.	$	25	$	37,500
SubTotal Direct Construction Costs						**$**	**528,000.00**
	Contingency < $1 million@ 20%	1	LS		20%	$	105,600.00
	Construction Management < $1 million@ 20%	1	LS		20%	$	105,600.00
Total Construction Cost						**$**	**739,200.00**
	Engineering and Admin < $1 million@ 20%	1	LS		20%	$	147,840.00
Total Engineering and Administration						**$**	**148,000.00**
Total Estimated Project Cost						**$**	**890,000.00**
Annual Cost - 30 Years @ 5% Interest							**$57,900.00**

Table D-9
Cost Opinion for the Ely Basins -- PID 15

	Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$329,000	$329,000
2	Reservoir Excavation					0
	Excavate & Haul Offsite	470,000	Cu. Yds.	$14.01	$6,585,685	$658,569
	Subtotal Direct Construction				**$6,910,000**	**$988,000**
	Contingency > $2 million@ 10%				$691,000	$691,000
	Construction Management > $2 million@ 10%				$691,000	$691,000
	Total Construction				**$8,292,000**	**$2,370,000**
Engineering and Administration Costs						
	Engineering and Admin > $2 million@ 10%				$829,000	$829,000
	Total Engineering and Administration				**$829,000**	**$829,000**
Total Estimated Cost					**$9,121,000**	**$3,199,000**
Total Estimated Cost - Rounded					**$9,120,000**	**$3,200,000**
Annual Cost - 30 Years @ 5% Interest					**$593,300**	**$208,100**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-10
Cost Opinion for the Lower San Sevaine Basin -- PID 17

Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs					
1 Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$1,201,000	$1,201,000
2 Compacted Embankment					
Foundation Excavation	30,000	Cu. Yds.	$3.36	$100,887	$100,887
Compacted Embankment	46,000	Cu. Yds.	$6.73	$309,387	$309,387
3 Reservoir Excavation					
Excavate & Haul Offsite	1,542,000	Cu. Yds.	$14.01	$21,606,653	$2,160,665
4 Existing Channel Demolition					
Channel Demolition	5,800	Cu. Yds.	$26.90	$156,039	$156,039
5 Basin Outlet to Etiwanda Channel					
60" Dia. RCP Outlet Conduit	300	Lin. Ft.	$673	$201,774	$201,774
Gates and Controls	1	Job	$50,000	$50,000	$50,000
6 Basin Outlet to San Sevaine Channel					
60" Dia. RCP Outlet Conduit	300	Lin. Ft.	$673	$201,774	$201,774
Gates and Controls	1	Job	$50,000	$50,000	$50,000
7 Basin Spillway/Discharge Structure					
Concrete Structure	650	Cu. Yds.	$1,345	$874,355	$874,355
8 Basin Inlet Structure					
Concrete Structure	350	Cu. Yds.	$1,345	$470,806	$470,806
9 Land Acquisition Cost					
Land Costs	40	$/acre-ft	$230,000	$9,200,000	$9,200,000
Subtotal Direct Construction				**$34,420,000**	**$14,980,000**
Contingency > $2 million@ 10%				$3,442,000	$3,442,000
Construction Management > $2 million@ 10%				$3,442,000	$3,442,000
Total Construction				**$41,304,000**	**$18,422,000**
Engineering and Administration Costs					
Engineering and Admin > $2 million@ 10%				$4,130,000	$4,130,000
Total Engineering and Administration				**$4,130,000**	**$4,130,000**
Total Estimated Cost				**$45,434,000**	**$22,552,000**
Total Estimated Cost - Rounded				**$45,430,000**	**$22,550,000**
Annual Cost - 30 Years @ 5% Interest				**$2,955,500**	**$1,467,000**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a

Table D-11
Cost Opinion for the CSI Basin -- PID 18

	Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$26,000	$26,000
2	Reservoir Excavation					
	Excavate & Haul Offsite	36,500	Cu. Yds.	$14.01	$511,442	$51,144
	Subtotal Direct Construction				**$537,000**	**$77,000**
	Contingency < $1 million@ 20%				$107,000	$107,000
	Construction Management < $1 million@ 20%				$107,000	$107,000
	Total Construction				**$751,000**	**$291,000**
Engineering and Administration Costs						
	Engineering and Admin < $1 million@ 20%				$150,000	$150,000
	Total Engineering and Administration				**$150,000**	**$150,000**
Total Estimated Cost					**$901,000**	**$441,000**
Total Estimated Cost - Rounded					**$900,000**	**$440,000**
Annual Cost - 30 Years @ 5% Interest					**$58,600**	**$28,600**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-12
Cost Opinion for the Wineville Basin -- PID 19

		Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$227,000	$227,000
2	Compacted Embankment					0
	Foundation Excavation	122,000	Cu. Yds.	$3.36	$410,274	$410,274
	Compacted Embankment	122,000	Cu. Yds.	$6.73	$820,548	$820,548
3	Basin Spillway/Discharge Structure					0
	Spillway Gate	1	Job	$720,000	$720,000	$720,000
	Concrete/Building Components	1	Job	$1,038,000	$1,038,000	$1,038,000
4	Basin Cleaning and Contouring					
	Basin Excavation	110,000	Cu. Yds.	$14.01	$1,541,331	$154,133
	Subtotal Direct Construction				**$4,760,000**	**$3,370,000**
	Contingency > $2 million@ 10%				$476,000	$476,000
	Construction Management > $2 million@ 10%				$476,000	$476,000
	Total Construction				**$5,712,000**	**$4,322,000**
Engineering and Administration Costs						
	Engineering and Admin > $2 million@ 10%				$571,000	$571,000
	Total Engineering and Administration				**$571,000**	**$571,000**
Total Estimated Cost					**$6,283,000**	**$4,893,000**
Total Estimated Cost - Rounded					**$6,280,000**	**$4,890,000**
Annual Cost - 30 Years @ 5% Interest					**$408,700**	**$318,300**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-13
Cost Opinion for the Jurupa Basin -- PID 20

	Description	Quantity	Unit	Unit Cost		Total Cost	
Direct Construction Costs							
Item #							
1	Mobilization @ 5% Other Direct Construction Cost	1	LS		5%	$	68,661
2	Basin Inlet Structure Improvements						
	Channel Demolition	400	Cu. Yds.	$	62	$	24,661
	Concrete Structure	200	Cu. Yds.	$	1,345	$	269,032
	Modify Channel for Conduit Inlet	200	Cu. Yds.	$	1,200	$	240,000
	Concrete Channel & Weir	200	Cu. Yds.	$	560	$	112,097
	48" Dia. RCP	100	Lin. Ft.	$	376	$	37,552
	Sluice Gate	48	$/in-dia	$	595	$	28,560
	Electrical @ 25%	1	LS	$	284,761	$	284,761
	Instrumentation and Controls @ 10% of Electrical	1	LS	$	28,476	$	28,476
3	Turnout CB-18 Modifications (Shall be completed only if Inlet Structure Capacity Increased						
	Turnout Modifications	1	LS	$	273,000	$	273,000
	Electrical @ 25%	1	LS	$	68,250	$	68,250
	Instrumentation and Controls @ 10% of Electrical	1	LS	$	6,825	$	6,825
SubTotal Direct Construction Costs						**$**	**1,440,000**
	Contingency $1 - $2 million @ 15%	1	LS		15%	$	216,000
	Construction Management $1 - $2 million @ 15%	1	LS		15%	$	216,000
Total Construction Cost						**$**	**1,872,000**
	Engineering and Admin $1 - $2 million @ 15%	1	LS		15%	$	280,800
Total Engineering and Administration						**$**	**281,000**
Total Estimated Project Cost						**$**	**2,150,000**
Annual Cost - 30 Years @ 5% Interest						**$**	**139,900**

Table D-14a
Cost Opinion for the RP3 Basins -- PID 21

Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs					
Item #					
1 Mobilization @ 5% Other Direct Construction Cost	1	LS	5%	$ 190,800	$ 190,800
2 Increase Conservation Storage - Inlet Structure					
Concrete Structure	250	Cu. Yds.	$ 1,345	$ 336,290	$ 336,290
Sluice Gate	48	$/in-dia	$ 595	$ 28,560	$ 28,560
Channel Demolition	100	Cu. Yds.	$ 62	$ 6,165	$ 6,165
Modify Channel for Conduit Inlet	100	Cu. Yds.	$ 1,200	$ 120,000	$ 120,000
Basin Excavation & Haul Offsite	7,000	Cu. Yds.	$ 14	$ 98,085	$ 98,085
48" Dia. RCP	48	Lin. Ft.	$ 376	$ 18,025	$ 18,025
Compacted Embankment	5,500	Cu. Yds.	$ 7	$ 36,992	$ 36,992
Import Pipe Bedding Material	700	Cu. Yds.	$ 15	$ 10,500	$ 10,500
Surface Rehabilitation	750	Sq. Ft.	$ 25	$ 18,750	$ 18,750
Inlet Channel Allowance - Misc	1	LS	$ 163,654	$ 163,654	$ 163,654
3 Increase Conservation Storage - Basin Excavation					
Basin Excavation & Haul Offsite	125,000	Cu. Yds.	$ 14	$ 1,751,512	$ 175,151
Compacted Embankment	95,000	Cu. Yds.	$ 7	$ 638,952	$ 638,952
Fine Grading	35,000	Cu. Yds.	$ 17	$ 588,508	$ 588,508
SubTotal Direct Construction Costs				**$ 4,010,000**	**$ 2,430,000**
Contingency > $2 million@ 10%	1	LS	10%	$ 401,000	$ 401,000
Construction Management > $2 million@ 10%	1	LS	10%	$ 401,000	$ 401,000
Total Construction Cost				**$ 4,812,000**	**$ 3,232,000**
Engineering and Admin > $2 million@ 10%	1	LS	10%	$ 481,200	$ 481,200
Total Engineering and Administration				**$ 481,000**	**$ 481,000**
Total Estimated Project Cost				**$ 5,290,000**	**$ 3,710,000**
Annual Cost - 30 Years @ 5% Interest				**$ 344,100**	**$ 241,300**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-14b
Cost Opinion for the RP3 Basins -- PID 22

	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs					
1 Mobilization @ 5% Other Direct Construction Co	1	Job	Lump Sum	$795,000	$795,000
2 Reservoir Excavation					
Excavate & Haul Offsite	762,000	Cu. Yds.	$14.01	$9,525,000	$952,500
3 Channel Modification					
Modify Channel for Conduit Inlet	35	Cu. Yds.	$1,200	$42,000	$42,000
Modify Channel for Pneumatic Gate	1	Job	$380,500	$380,500	$380,500
Pneumatic Gate	1	Job	$140,000	$140,000	$140,000
4 Conduit to Cell 1					
Excavation	22,200	Cu. Yds.	$5.60	$111,000	$111,000
Replace Compacted Fill	8,300	Cu. Yds.	$16.81	$124,500	$124,500
8' x 10' RCB	950	Lin. Ft.	$930	$788,500	$788,500
Coarse Drain Material	550	Ton	$26	$12,650	$12,650
Automated Gate	1	Job	$130,000	$130,000	$130,000
Concrete Inlet Structure	1	Job	$24,000	$24,000	$24,000
Energy Dissipation Structure	1	Job	$226,800	$226,800	$226,800
Road Demolition & Replacement	1	Job	$66,000	$66,000	$66,000
5 Conduit to Cell 3					
Excavation	66,500	Cu. Yds.	$5.60	$332,500	$332,500
Replace Compacted Fill	66,500	Cu. Yds.	$16.81	$997,500	$997,500
8' x 10' RCB	820	Lin. Ft.	$930	$680,600	$680,600
Coarse Drain Material	460	Ton	$26	$10,580	$10,580
Automated Gate	1	Job	$162,500	$162,500	$162,500
Concrete Inlet Structure	1	Job	$48,000	$48,000	$48,000
Energy Dissipation Structure	1	Job	$48,000	$48,000	$48,000
Channel Demolition & Replacement	1	Job	$218,000	$218,000	$218,000
6 Conduit to Cell 4					
Excavation	23,400	Cu. Yds.	$5.60	$117,000	$117,000
Replace Compacted Fill	23,400	Cu. Yds.	$16.81	$351,000	$351,000
48" Dia. RCP	420	Lin. Ft.	$376	$140,700	$140,700
Automated Gate	1	Job	$30,000	$30,000	$30,000
Concrete Inlet Structure	1	Job	$23,500	$23,500	$23,500
Energy Dissipation Structure	1	Job	$23,500	$23,500	$23,500
7 Spillway from Cell 1					
48" Dia. RCP	440	Lin. Ft.	$376	$147,400	$147,400
Concrete Inlet Structure	1	Job	$23,500	$23,500	$23,500
Energy Dissipation Structure	1	Job	$1,400	$1,400	$1,400
8 Spillway from Cell 3					$0
Excavate & Haul Offsite	300	Cu. Yds.	$14.01	$3,750	$3,750
Concrete Channel & Weir	125	Cu. Yds.	$560	$62,500	$62,500
Energy Dissipation Structure	1	Job	$17,000	$17,000	$17,000
9 Spillway from Cell 4					
Excavate & Haul Offsite	200	Cu. Yds.	$14.01	$2,500	$2,500
Concrete Channel & Weir	105	Cu. Yds.	$560	$52,500	$52,500
Energy Dissipation Structure	1	Job	$17,000	$17,000	$17,000
10 Tie-In to Jurupa Pipeline					$0
36" Dia. RCP	2,300	Lin. Ft.	$303	$621,000	$621,000
Butterfly Valve	3	Job	$19,700	$59,100	$59,100
Energy Dissipation Structure	3	Job	$46,200	$138,600	$138,600
Subtotal Direct Construction				**$16,700,000**	**$8,120,000**
Contingency > $2 million@ 10%				$1,670,000	$1,670,000
Construction Management > $2 million@ 10%				$1,670,000	$1,670,000
Total Construction				**$20,040,000**	**$11,460,000**
Engineering and Administration Costs					
Engineering and Admin > $2 million@ 10%				$2,004,000	$2,004,000
Total Engineering and Administration				**$2,004,000**	**$2,004,000**
Total Estimated Cost				**$22,044,000**	**$13,464,000**
Annual Cost - 30 Years @ 5% Interest				**$1,434,000**	**$876,000**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-15

Cost Opinion for the 2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements -- PID 23

		Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$842,000	$842,000
2	Conveyance System					
	Pipeline	10,400	$/LF	$330	$3,427,471	$3,427,471
	Pump	2	LS	$240,000	$480,000	$480,000
	Pump structure	1	LS	$3,200,000	$3,200,000	$3,200,000
3	2013 RMPU RP3 Project					
	Total direct construction cost	1	Job	$3,819,200	$3,819,200	$2,239,200
4	Jurupa Inlet Improvement					
	Total direct construction cost	1	Job	$1,371,339	$1,371,339	$1,371,339
5	2010 RMPU Wineville Project					
	Total direct construction cost	1	Job	$4,533,000	$4,533,000	$4,095,000
	Subtotal Direct Construction				**$17,670,000**	**$15,660,000**
	Contingency > $2 million@ 10%				$1,767,000	$1,767,000
	Construction Management > $2 million@ 10%				$1,767,000	$1,767,000
	Total Construction				**$21,204,000**	**$19,194,000**
Engineering and Administration Costs						
	Engineering and Admin > $2 million@ 10%				$2,120,000	$2,120,000
	Total Engineering and Administration				**$2,120,000**	**$2,120,000**
Total Estimated Cost					**$23,324,000**	**$21,314,000**
Annual Cost - 30 Years @ 5% Interest					**$1,517,300**	**$1,386,500**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-16

Cost Opinion for the 2010 RMPU Vulcan Basin Project[1]

	Description	Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs					
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$423,000
2	Basin Modification				
	Construction of Basin per County Requirements	1	LS	$6,401,250	$6,401,250
3	Spillway				
	200 ft Emergency Spillway	1	LS	$812,500	$812,500
	Inlet Spillway Upgrade	1	LS	$1,250,000	$1,250,000
4	Land Acquisition Cost				
	Land Costs	1	LS	$14,000,000	$14,000,000
	Subtotal Direct Construction				**$22,890,000**
	Contingency > $2 million@ 10%				$2,289,000
	Construction Management > $2 million@ 10%				$2,289,000
	Total Construction				**$25,179,000**
Engineering and Administration Costs					
	Engineering and Admin > $2 million@ 10%				$2,518,000
	Total Engineering and Administration				**$2,518,000**
Total Estimated Cost					**$27,697,000**
Total Estimated Cost - Rounded					**$27,700,000**
Annual Cost - 30 Years @ 5% Interest					**$1,801,700**

[1] Reconnaissance-Level Construction Cost Opinion Alternative 2 Flood Control Use with Maximum Storm Water Capture, WEI 2006.

Table D-17
Cost Opinion for the Sierra Basin -- PID 25

	Description	Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$28,000	$28,000
2	Reservoir Excavation					
	Excavate & Haul Offsite	40,500	Cu. Yds.	$14.01	$567,490	$56,749
	Subtotal Direct Construction				**$595,000**	**$85,000**
	Contingency < $1 million@ 20%				$119,000	$119,000
	Construction Management < $1 million@ 20%				$119,000	$119,000
	Total Construction				**$833,000**	**$323,000**
Engineering and Administration Costs						
	Engineering and Admin < $1 million@ 20%				$167,000	$167,000
	Total Engineering and Administration				**$167,000**	**$167,000**
Total Estimated Cost					**$1,000,000**	**$490,000**
Annual Cost - 30 Years @ 5% Interest					**$65,100**	**$31,900**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-18
Cost Opinion for the Sultana Basin -- PID 26

Description		Quantity	Unit	Unit Cost	Total Cost	Total Cost[1]
Direct Construction Costs						
1	Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$29,000	$29,000
2	Reservoir Excavation					
	Excavate & Haul Offsite	41,500	Cu. Yds.	$14.01	$581,502	$58,150
	Subtotal Direct Construction				**$611,000**	**$87,000**
	Contingency < $1 million@ 20%				$122,200	$122,200
	Construction Management < $1 million@ 20%				$122,000	$122,000
	Total Construction				**$855,200**	**$331,200**
Engineering and Administration Costs						
	Engineering and Admin < $1 million@ 20%				$171,000	$171,000
	Total Engineering and Administration				**$171,000**	**$171,000**
Total Estimated Cost					**$1,026,200**	**$502,200**
Annual Cost - 30 Years @ 5% Interest					**$66,800**	**$32,700**

[1] The capital cost shown assumes that the project's excavation costs would be reduced by 90%. The material excavated could be used for another construction site or leased to a mining operator.

Table D-19
Cost Opinion for the Declez Basin -- PID 27

Description	Quantity	Unit	Unit Cost	Total Cost
Direct Construction Costs				
1 Mobilization @ 5% Other Direct Construction Cost	1	Job	Lump Sum	$147,000
2 Compacted Embankment				
Foundation Excavation	70,600	Cu. Yds.	$3.36	$237,421
Compacted Embankment	70,600	Cu. Yds.	$6.73	$474,842
Interior Berm Excavation	40,000	Cu. Yds.	$3.36	$134,516
Interior Berm Compacted Fill	40,000	Cu. Yds.	$6.73	$269,032
3 Existing Spillway Demolition				
Channel Demolition	1,000	Cu. Yds.	$18.17	$18,170
4 Basin Spillway/Discharge Structure				
Basin Discharge Concrete Structure	1,000	Cu. Yds.	$1,345	$1,345,161
Berm Overflow Concrete Structure	300	Cu. Yds.	$1,345	$403,548
5 Outlet Gate				
Gates and Controls	1	Job	$50,000	$50,000
Subtotal Direct Construction				**$3,080,000**
Contingency > $2 million@ 10%				$308,000
Construction Management > $2 million@ 10%				$308,000
Total Construction				**$3,696,000**
Engineering and Administration Costs				
Engineering and Admin > $2 million@ 10%				$370,000
Total Engineering and Administration				**$370,000**
Total Estimated Cost				**$4,066,000**
Total Estimated Cost - Rounded				**$4,070,000**
Annual Cost - 30 Years @ 5% Interest				**$264,500**

Table D-20
Ranked Yield Enhancement Projects (Marginal Unit Cost < 600 per acre-ft)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
18a	i	CSI Storm Water Basin	81	0	$ 388	$ 440,000	$ 31,612
23a	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 500	$ 19,552,000	$ 1,582,914
25a	i	Sierra	64	0	$ 537	$ 490,000	$ 34,262
Total MZ3			**3,311**	**2,905**	**$ 498**	**$ 20,482,000**	**$ 1,648,788**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
Total MZ2			**1,474**	**2,031**	**$ 228**	**$ 4,330,000**	**$ 336,222**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**5,033**	**4,936**	**$ 415**	**$ 26,252,000**	**$ 2,087,887**
Other Projects							
19a	iii	Wineville Basin (2010 RMPU)	2,157	0	$ 184	$ 4,890,000	$ 397,924
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22a	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 915	$ 1,855,000	$ 125,787

Note - color shading within each MZ indicates mutually exclusive projects.

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

[2] At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

[3] Project ID 23a includes Project IDs 19a, 20, and 22a and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22a. The capital costs associated with Project IDs 19a and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22a. The recycled water recharge associated with Project ID 19a was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23a is about $21,300,000.

[4] The total capital cost for Project ID 11 is about $150,000.

[5] The total capital cost for Project ID 12 is about $3,550,000.

a - Project ID no.'s with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project.

Table D-21
Ranked Yield Enhancement Projects (Marginal Unit Cost < 600 per acre-ft Without Discounted Excavation Costs)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
23	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 525	$ 20,772,000	$ 1,662,214
Total MZ3			**3,166**	**2,905**	**$ 525**	**$ 20,772,000**	**$ 1,662,214**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
Total MZ2			**1,474**	**2,031**	**$ 228**	**$ 4,330,000**	**$ 336,222**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**4,888**	**4,936**	**$ 430**	**$ 26,542,000**	**$ 2,101,312**
Other Projects							
19	iii	Wineville Basin (2010 RMPU)	2,157	2,905	$ 226	$ 6,280,000	$ 488,324
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	0	$ 1,289	$ 2,645,000	$ 177,187

Note - color shading within each MZ indicates mutually exclusive projects.

1 The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

2 At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

3 Project ID 23 includes Project IDs 19, 20, and 22 and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22. The capital costs associated with Project IDs 19 and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22. The recycled water recharge associated with Project ID 19 was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23 is about $23,324,000.

4 The total capital cost for Project ID 11 is about $150,000.

5 The total capital cost for Project ID 12 is about $3,550,000.

Table D-22
Ranked Yield Enhancement Projects (Melded Unit Cost < $600 acre-ft)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
18a	i	CSI Storm Water Basin	81	0	$ 388	$ 440,000	$ 31,612
23a	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 500	$ 19,552,000	$ 1,582,914
25a	i	Sierra	64	0	$ 537	$ 490,000	$ 34,262
27	i	Declez Basin	241	0	$ 1,135	$ 4,070,000	$ 273,720
Total MZ3			**3,552**	**2,905**	**$ 541**	**$ 24,552,000**	**$ 1,922,509**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
14	i	Turner Basin	66	0	$ 916	$ 890,000	$ 60,338
15a	i	Ely Basin	221	0	$ 981	$ 3,200,000	$ 216,362
Total MZ2			**1,760**	**2,031**	**$ 348**	**$ 8,420,000**	**$ 612,922**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**5,560**	**4,936**	**$ 474**	**$ 34,412,000**	**$ 2,638,307**
Other Projects							
19a	iii	Wineville Basin (2010 RMPU)	2,157	0	$ 184	$ 4,890,000	$ 397,924
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22a	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 915	$ 1,855,000	$ 125,787

Note - color shading within each MZ indicates mutually exclusive projects.

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

[2] At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

[3] Project ID 23a includes Project IDs 19a, 20, and 22a and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22a. The capital costs associated with Project IDs 19a and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22a. The recycled water recharge associated with Project ID 19a was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23a is about $21,300,000.

[4] The total capital cost for Project ID 11 is about $150,000.

[5] The total capital cost for Project ID 12 is about $3,550,000.

a - Project ID no.'s with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project.

Table D-23
Ranked Yield Enhancement Projects (Melded Unit Cost < $600 acre-ft Without Discounted Excavation Costs)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
23	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 525	$ 20,772,000	$ 1,662,214
18	i	CSI Storm Water Basin	81	0	$ 756	$ 900,000	$ 61,512
25	i	Sierra	64	0	$ 1,057	$ 1,000,000	$ 67,462
27	i	Declez Basin	241	0	$ 1,135	$ 4,070,000	$ 273,720
Total MZ3			**3,552**	**2,905**	**$ 581**	**$ 26,742,000**	**$ 2,064,909**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
14	i	Turner Basin	66	0	$ 916	$ 890,000	$ 60,338
Total MZ2			**1,539**	**2,031**	**$ 258**	**$ 5,220,000**	**$ 396,560**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**5,340**	**4,936**	**$ 480**	**$ 33,402,000**	**$ 2,564,345**
Other Projects							
19	iii	Wineville Basin (2010 RMPU)	2,157	0	$ 184	$ 6,280,000	$ 488,324
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 1,289	$ 2,645,000	$ 177,187

Note - color shading within each MZ indicates mutually exclusive projects.

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

[2] At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

[3] Project ID 23 includes Project IDs 19, 20, and 22 and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22. The capital costs associated with Project IDs 19 and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22. The recycled water recharge associated with Project ID 19 was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23 is about $23,324,000.

[4] The total capital cost for Project ID 11 is about $150,000.

[5] The total capital cost for Project ID 12 is about $3,550,000.

Table D-24
Ranked Yield Enhancement Projects (Melded Unit Cost < $612 acre-ft)

Project ID	Group[1]	Project	Yield	Recycled Water	Storm Water Recharge Unit Cost	Capital Cost	Total Annual Cost
Recommended MZ3 Projects							
18a	i	CSI Storm Water Basin	81	0	$ 388	$ 440,000	$ 31,612
23a	iv	2013 RMPU Proposed Wineville PS to Jurupa, Expanded Jurupa PS to RP3 Basin, and 2013 Proposed RP3 Improvements[2,3]	3,166	2,905	$ 500	$ 19,552,000	$ 1,582,914
25a	i	Sierra	64	0	$ 537	$ 490,000	$ 34,262
27	i	Declez Basin	241	0	$ 1,135	$ 4,070,000	$ 273,720
Total MZ3			**3,552**	**2,905**	**$ 541**	**$ 24,552,000**	**$ 1,922,509**
Recommended MZ2 Projects							
11	i	Victoria Basin[2, 4]	43	120	$ 151	$ 75,000	$ 6,484
7	ii	San Sevaine Basins[2, 5]	642	1,911	$ 217	$ 1,775,000	$ 139,256
12	ii	Lower Day Basin (2010 RMPU)	789	0	$ 242	$ 2,480,000	$ 190,482
14	i	Turner Basin	66	0	$ 916	$ 890,000	$ 60,338
15a	i	Ely Basin	221	0	$ 981	$ 3,200,000	$ 216,362
17a	i	Lower San Sevaine Basin (2010 RMPU)	1,221	0	$ 1,239	$ 22,550,000	$ 1,512,065
Total MZ2			**2,981**	**2,031**	**$ 713**	**$ 30,970,000**	**$ 2,124,987**
Recommended MZ1 Projects							
2	i	Montclair Basins	248	0	$ 415	$ 1,440,000	$ 102,876
Total MZ1			**248**	**0**	**$ 415**	**$ 1,440,000**	**$ 102,876**
Total Recommended Projects			**6,781**	**4,936**	**$ 612**	**$ 56,962,000**	**$ 4,150,372**
Other Projects							
19a	iii	Wineville Basin (2010 RMPU)	2,157	0	$ 184	$ 4,890,000	$ 397,924
20	iii	Jurupa Basin	421	0	$ 369	$ 2,150,000	$ 155,491
22a	ii, iii	RP3 Basin Improvements (2013 RMPU)	137	2,905	$ 915	$ 1,855,000	$ 125,787

Note - color shading within each MZ indicates mutually exclusive projects.

[1] The project group column was created to determine the total yield from different combinations of projects. The group was determined as follows: i- the project can be standalone; ii- the project is mutually exclusive; iii- the project can be standalone but is also included in a multi-project scenario; and iv- the project includes the "iii" group.

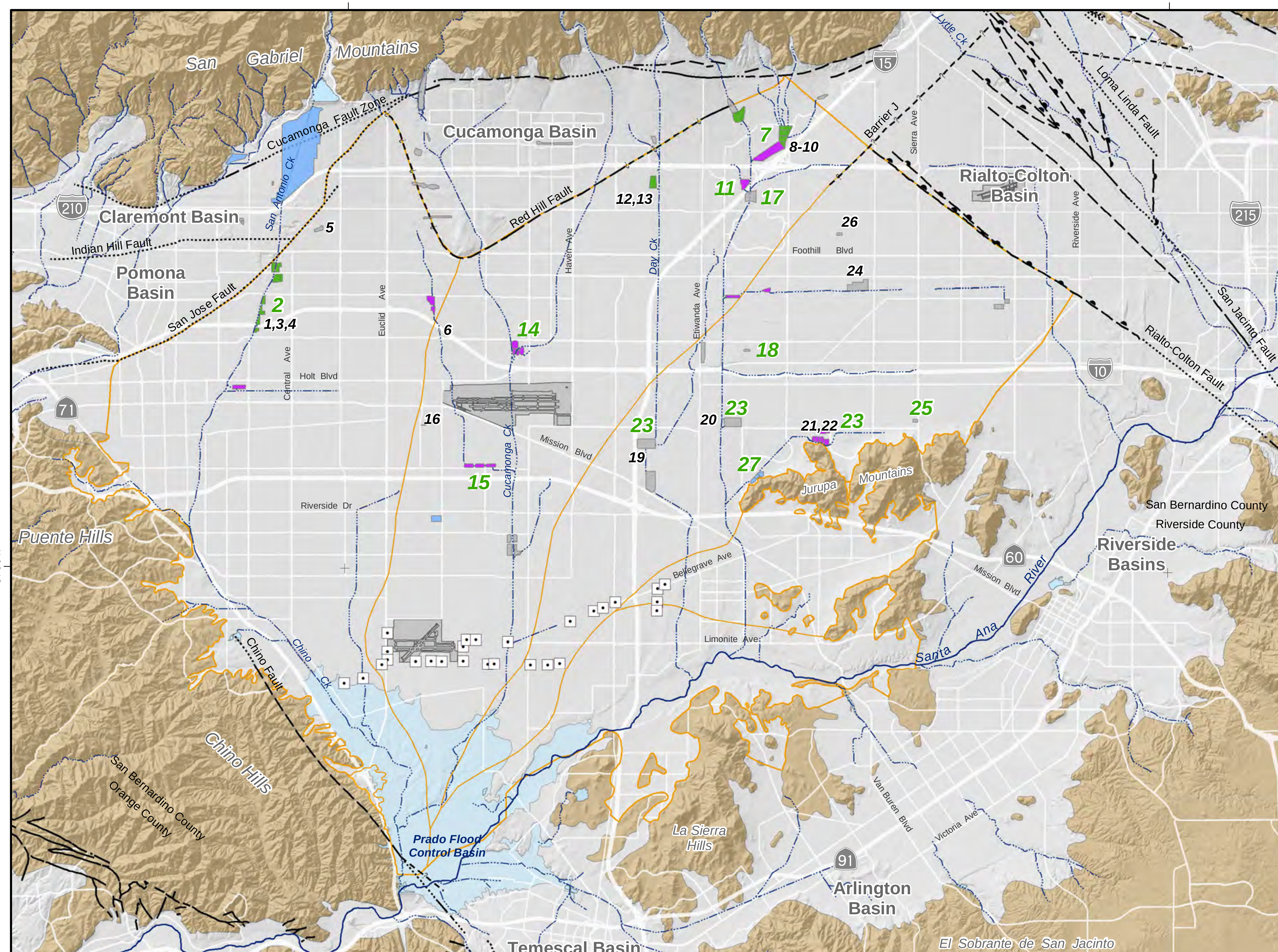
[2] At the July 18, 2013 Steering Committee Meeting, Ryan Shaw (IEUA) indicated that Project IDs 7, 11, and 22a are being recommended to be cost shared and the capital cost shown assumes a 50/50 split of the capital cost per Peace II Agreement Article VIII.

[3] Project ID 23a includes Project IDs 19a, 20, and 22a and associated conveyance facilities. The total capital cost represents an IEUA capital cost share for only Project ID 22a. The capital costs associated with Project IDs 19a and 20 and the associated conveyance facilities were not cost shared. The recycled water recharge shown represents the increase in Project ID 22a. The recycled water recharge associated with Project ID 19a was not included because the project was not recommended to be cost shared by IEUA. The total capital cost of Project ID 23a is about $21,300,000.

[4] The total capital cost for Project ID 11 is about $150,000.

[5] The total capital cost for Project ID 12 is about $3,550,000.

a - Project ID no.'s with an "a" extension indicate that the project includes excavation and haul-off costs, and the capital cost shown assumes that the project's excavation and haul-off costs are reduced by 90 percent with the excavated materials being used in another construction project.



Yield Enhancement Project
(Project ID is for locational reference from Table D-1)

A Project ID with a green label is a recommended project (See Table D-24)

Recharge Basins
(Symbolized by Recharged Water Type)

- Storm, Imported and Recycled Water
- Storm and Imported Water
- Storm Water
- Incidental Stormwater Only

OBMP Management Zones

Chino Desalter Well

Streams & Flood Control Channels

Geology

Water-Bearing Sediments

Quaternary Alluvium

Consolidated Bedrock

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

Faults

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

Produced by:

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Author: MJC

Date: 20130612

File: Figure_8-_WQ.mxd

0 1 2 3 4 5 Miles

0 2 4 6 8 KM

2013 Amendment to the 2010 RMPU

Location of the Projects that Were Analyzed in Detail

Figure D-1

Figure D-2a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Upland Basin

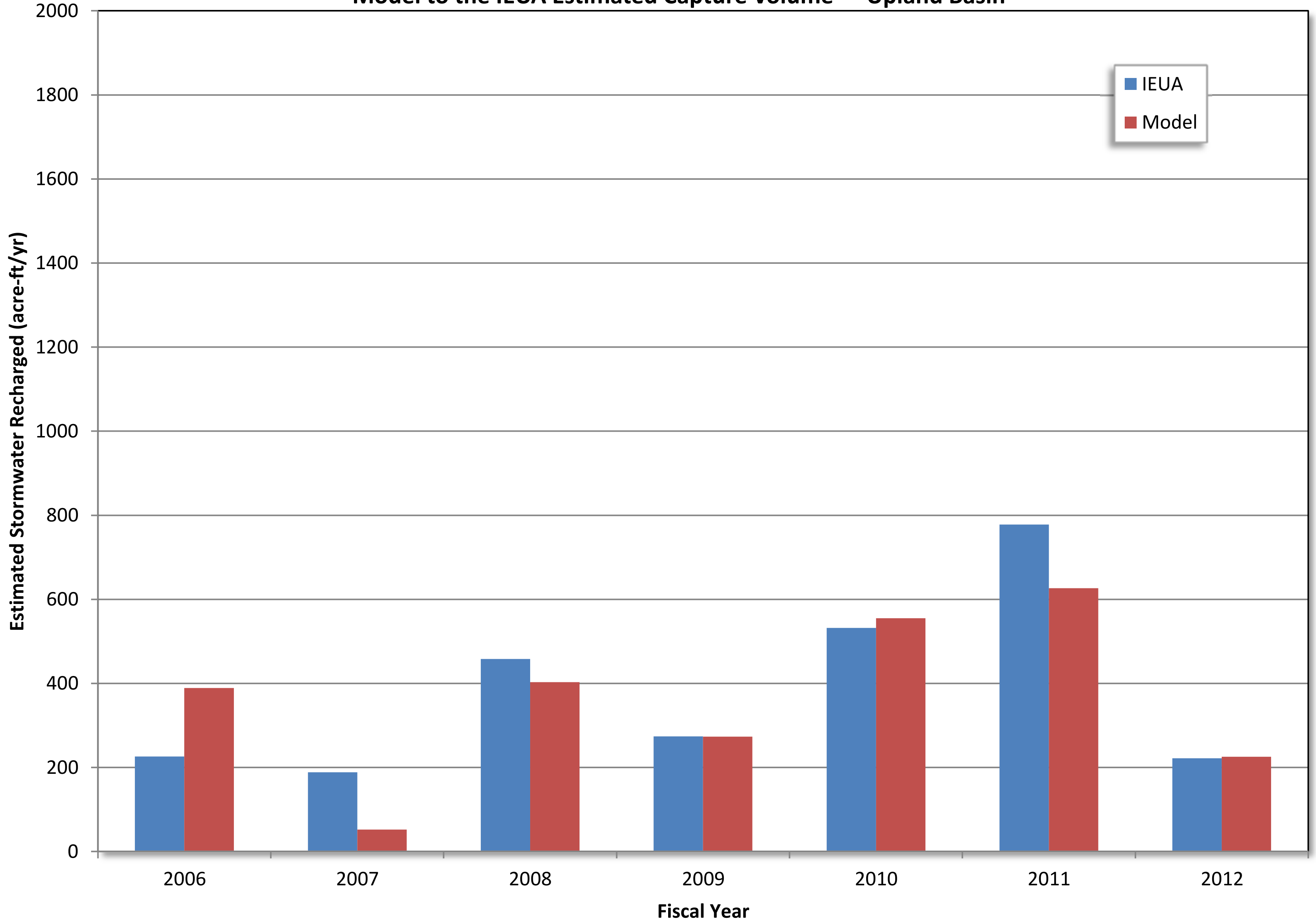
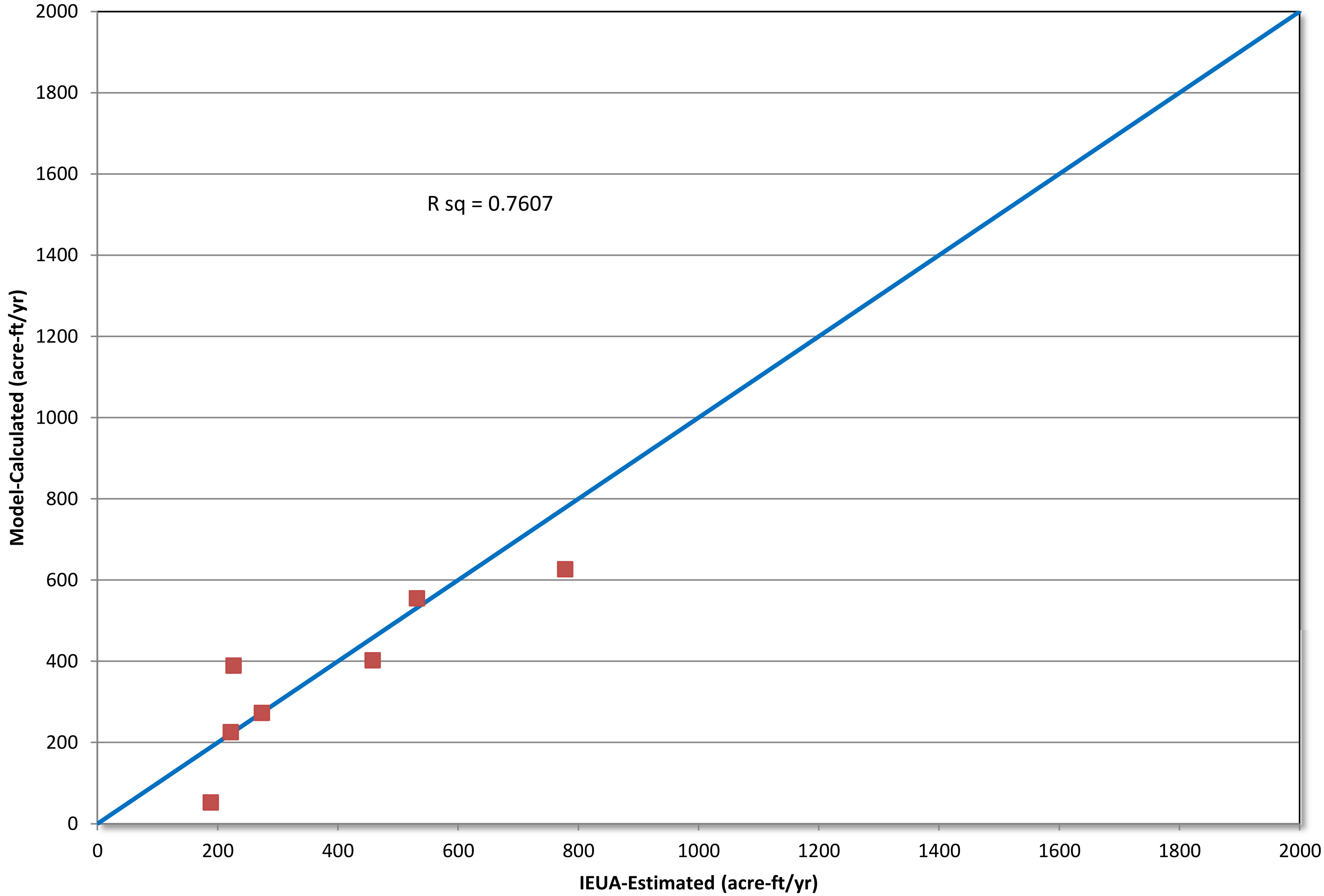


Figure D-2b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Upland Basin



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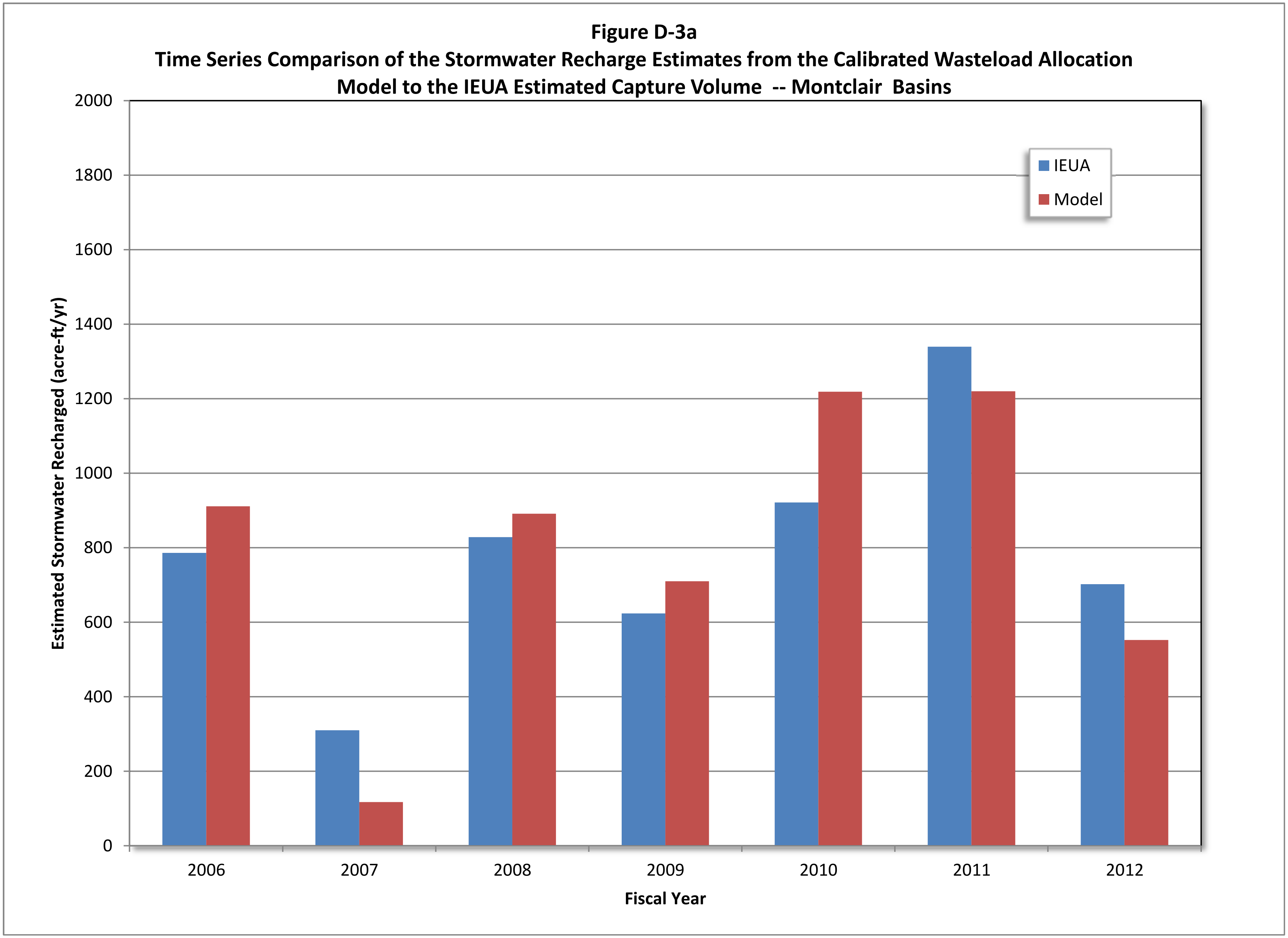

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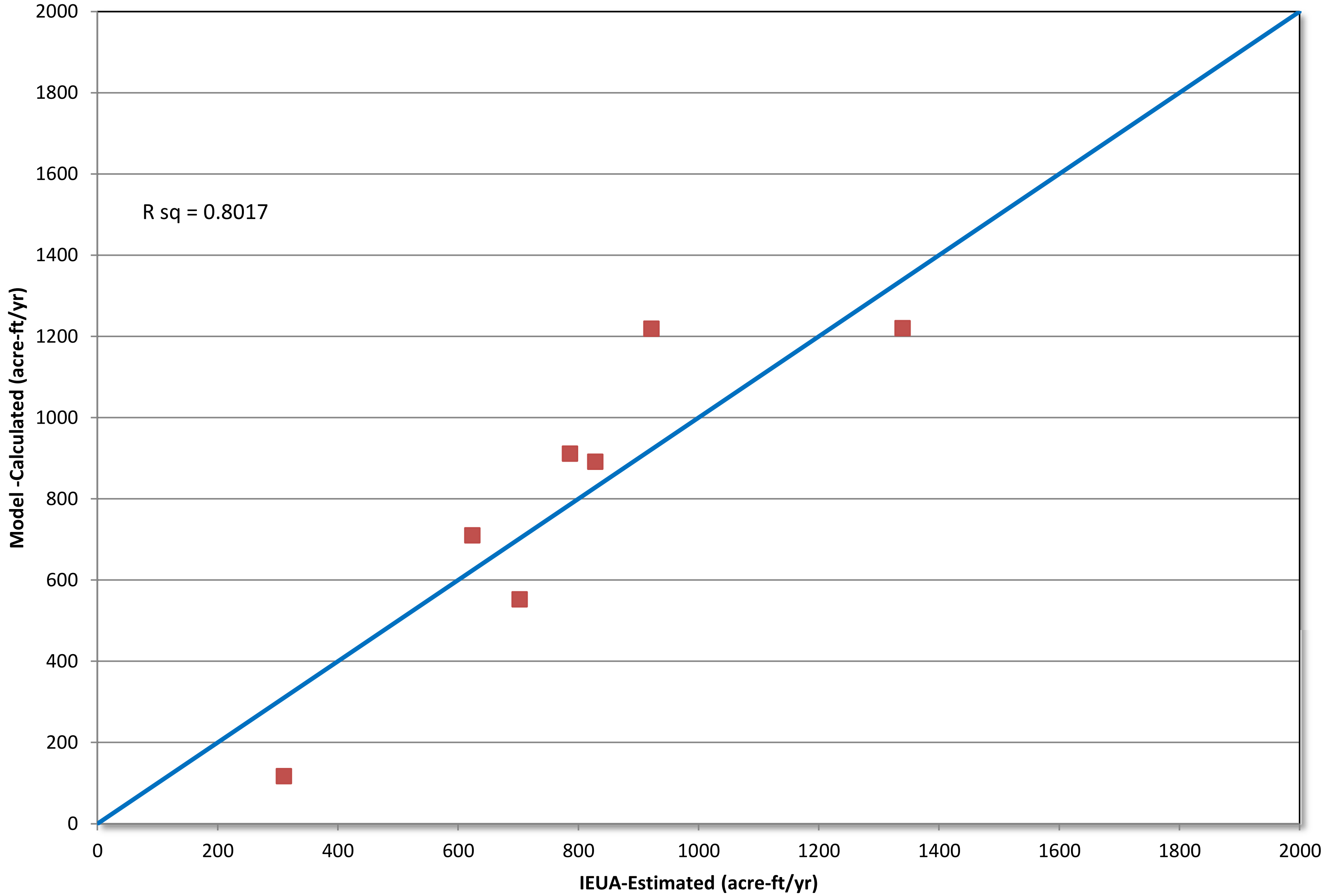
WILDERMUTH ENVIRONMENTAL INC.

Figure D-3b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Montclair Basins



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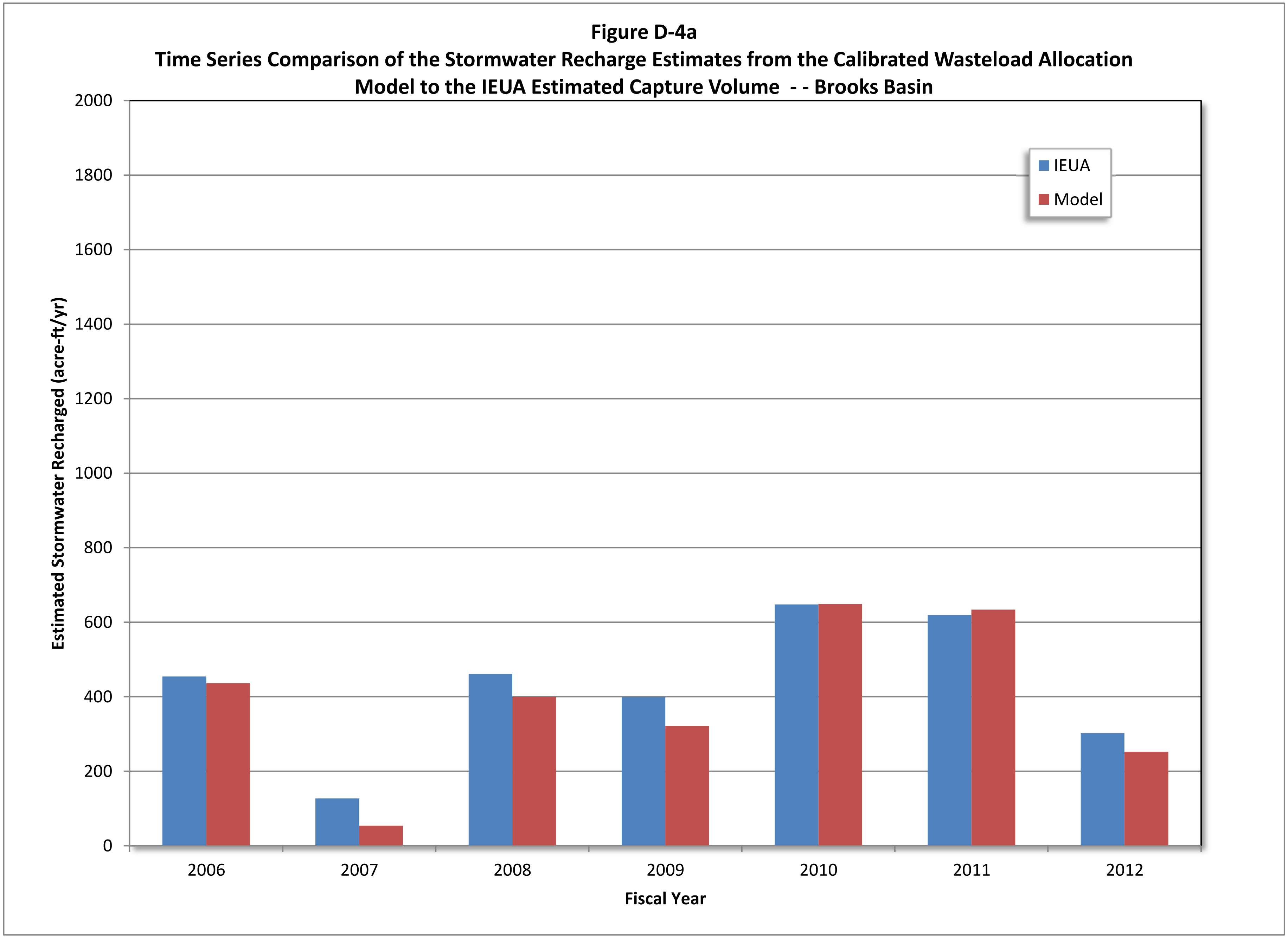
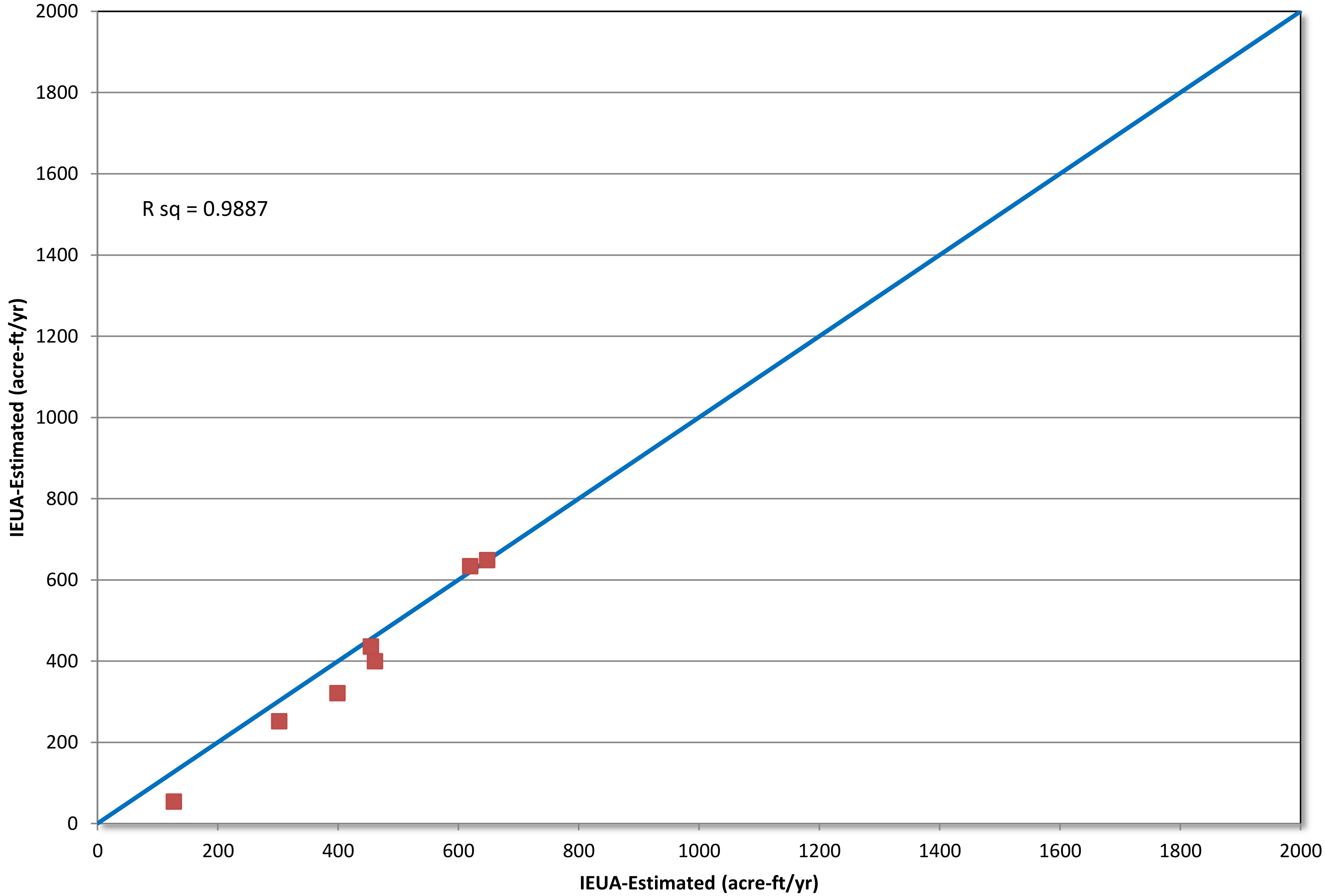


Figure D-4a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume - - Brooks Basin
IEUA
Model
Estimated Stormwater Recharged (acre-ft/yr)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
2006
2007
2008
2009
2010
2011
2012
Fiscal Year

Figure D-4b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Brooks Basin



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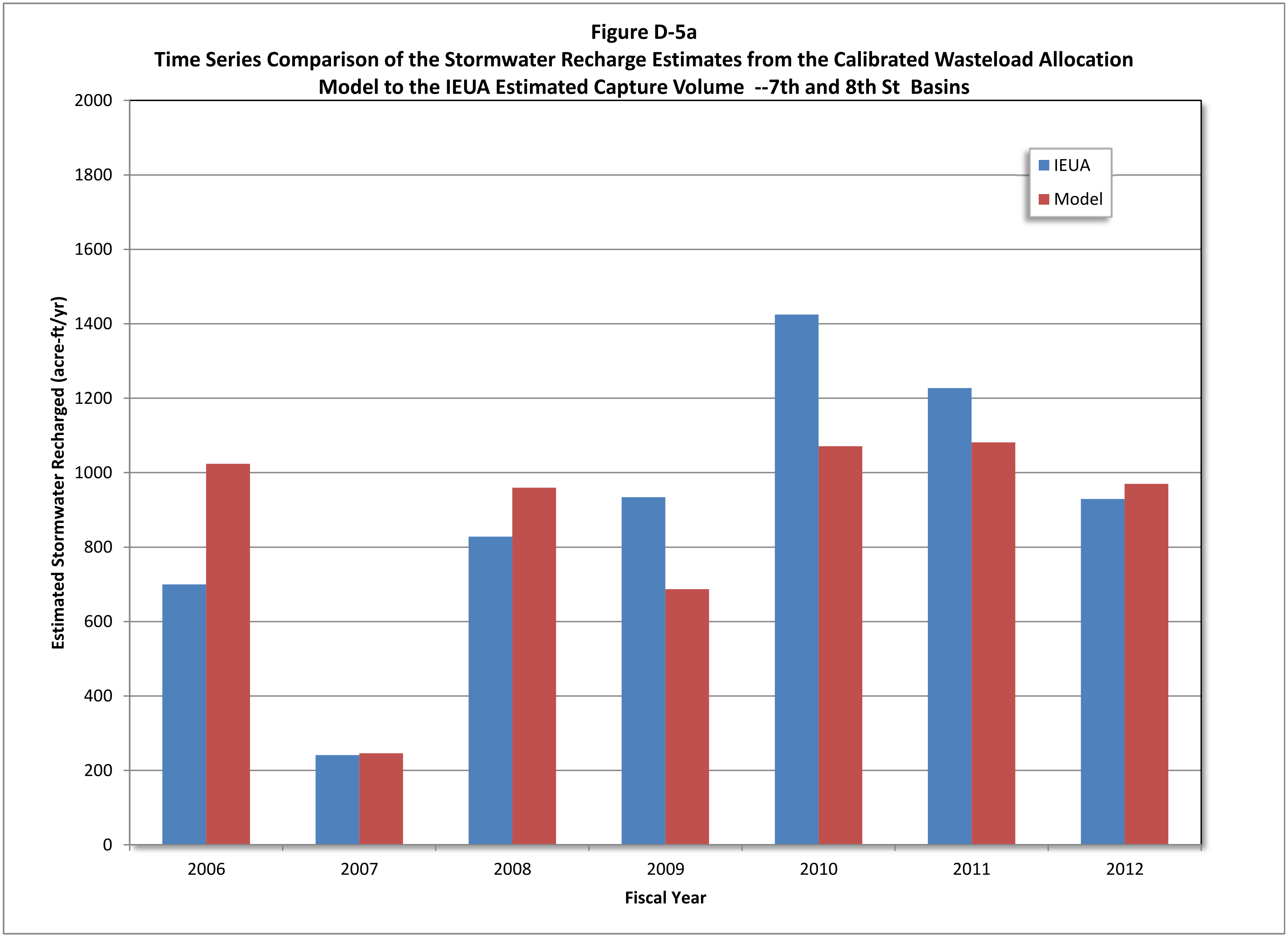
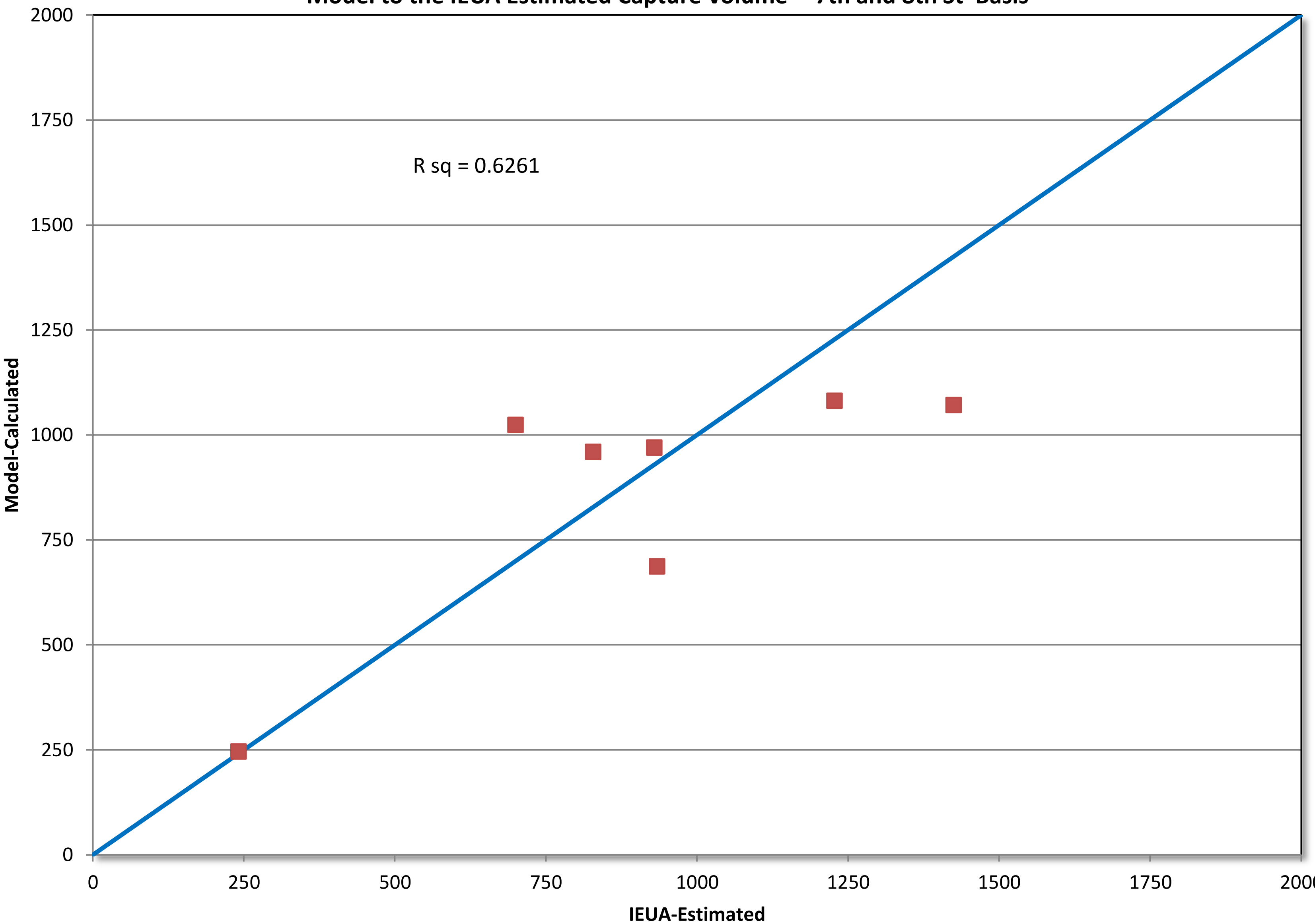


Figure D-5a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --7th and 8th St Basins
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Estimated Stormwater Recharged (acre-ft/yr)
IEUA
Model
2006
2007
2008
2009
2010
2011
2012
Fiscal Year

Figure D-5b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- 7th and 8th St Basis



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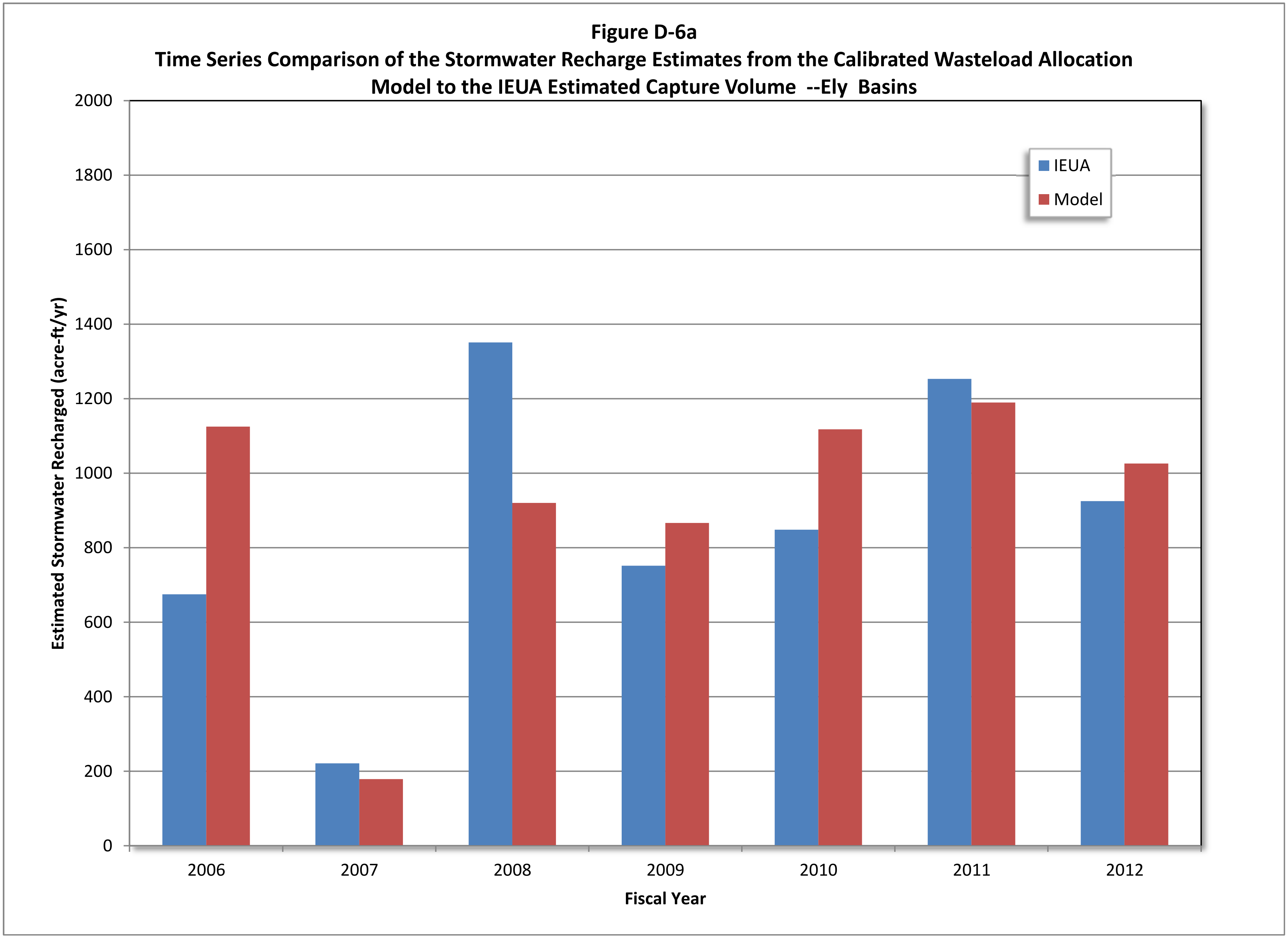

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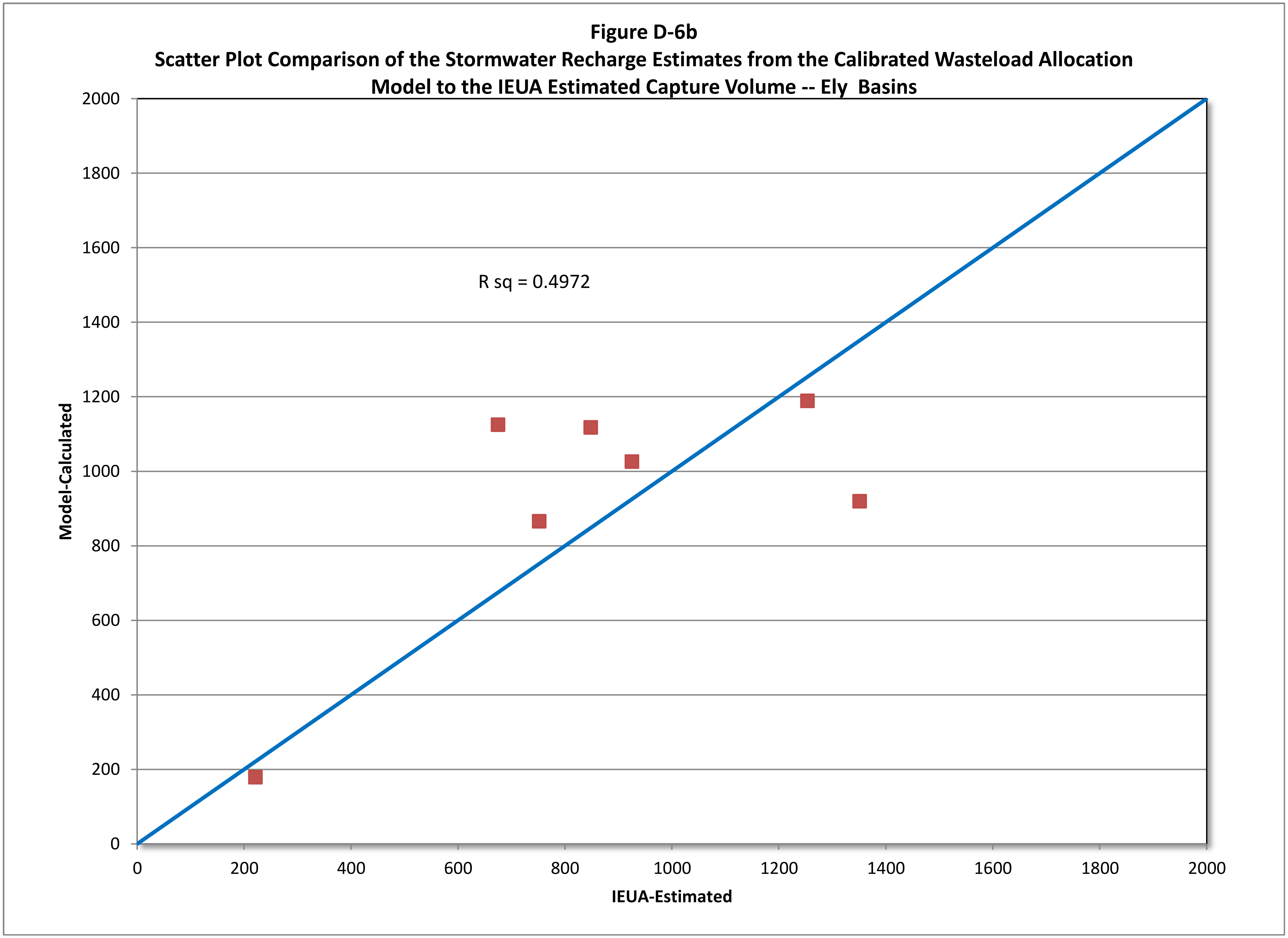
Figure D-6b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Ely Basins
R sq = 0.4972
Model-Calculated
IEUA-Estimated
0
200
400
600
800
1000
1200
1400
1600
1800
2000

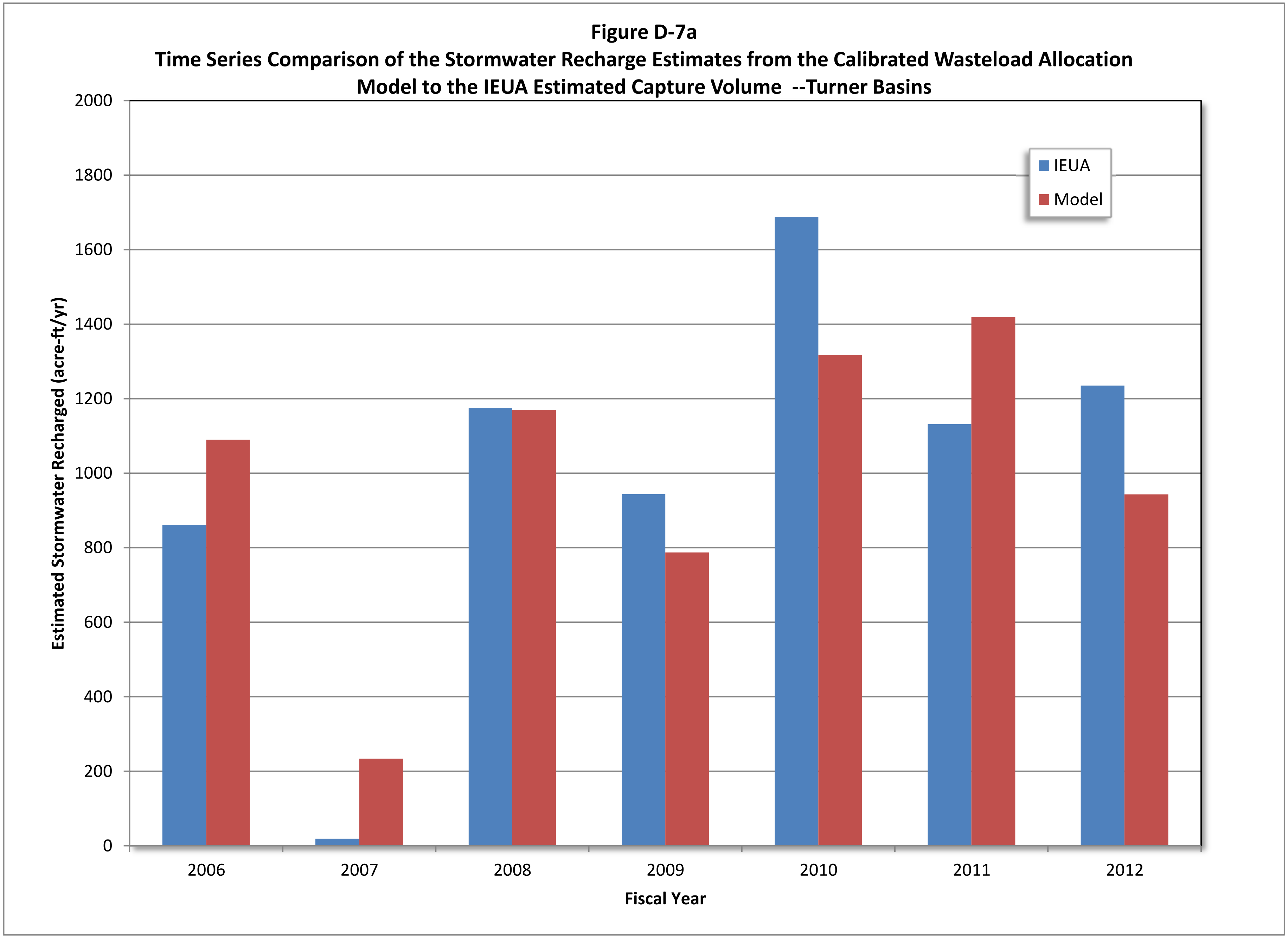

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Figure D-7b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Turner Basins

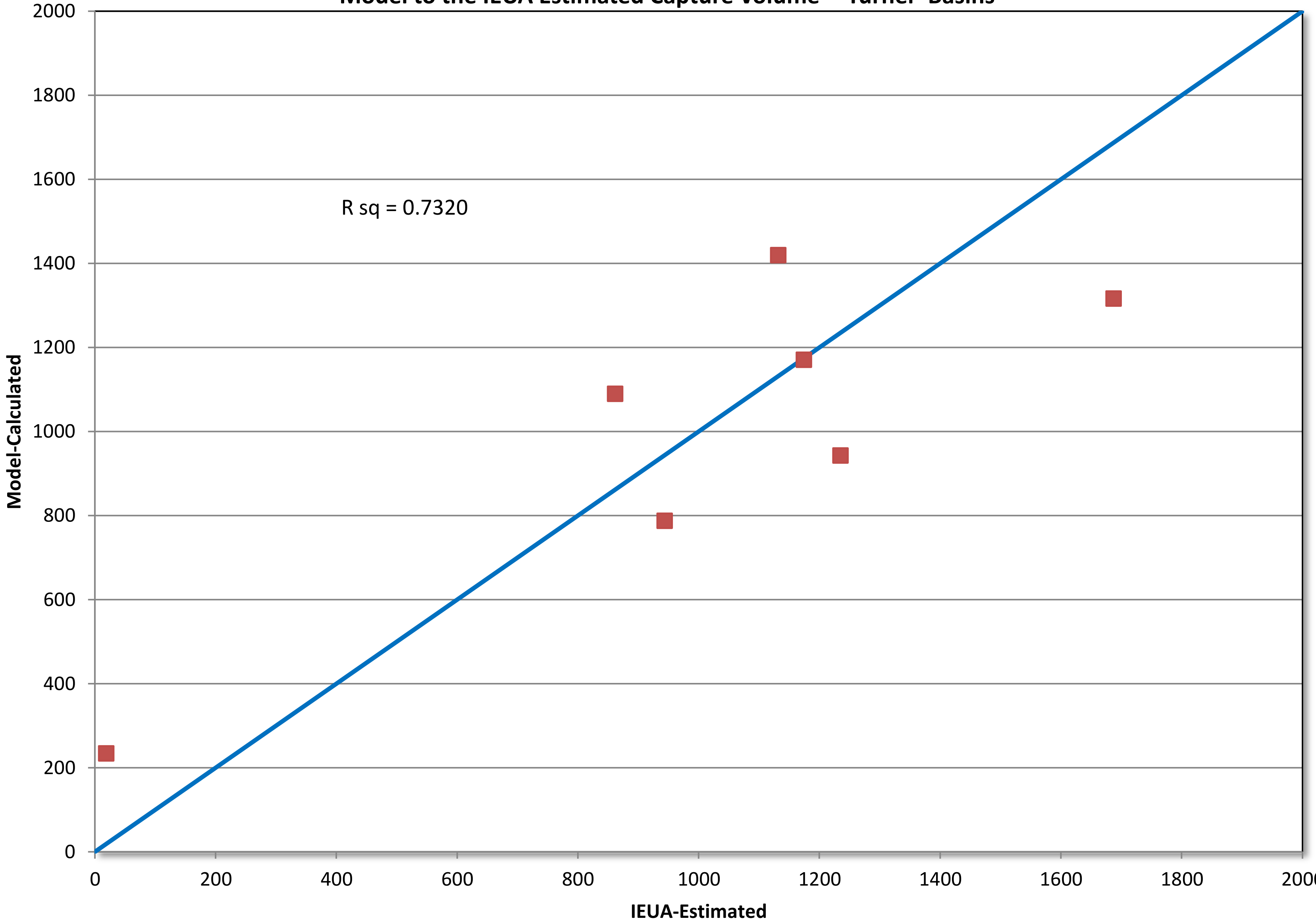

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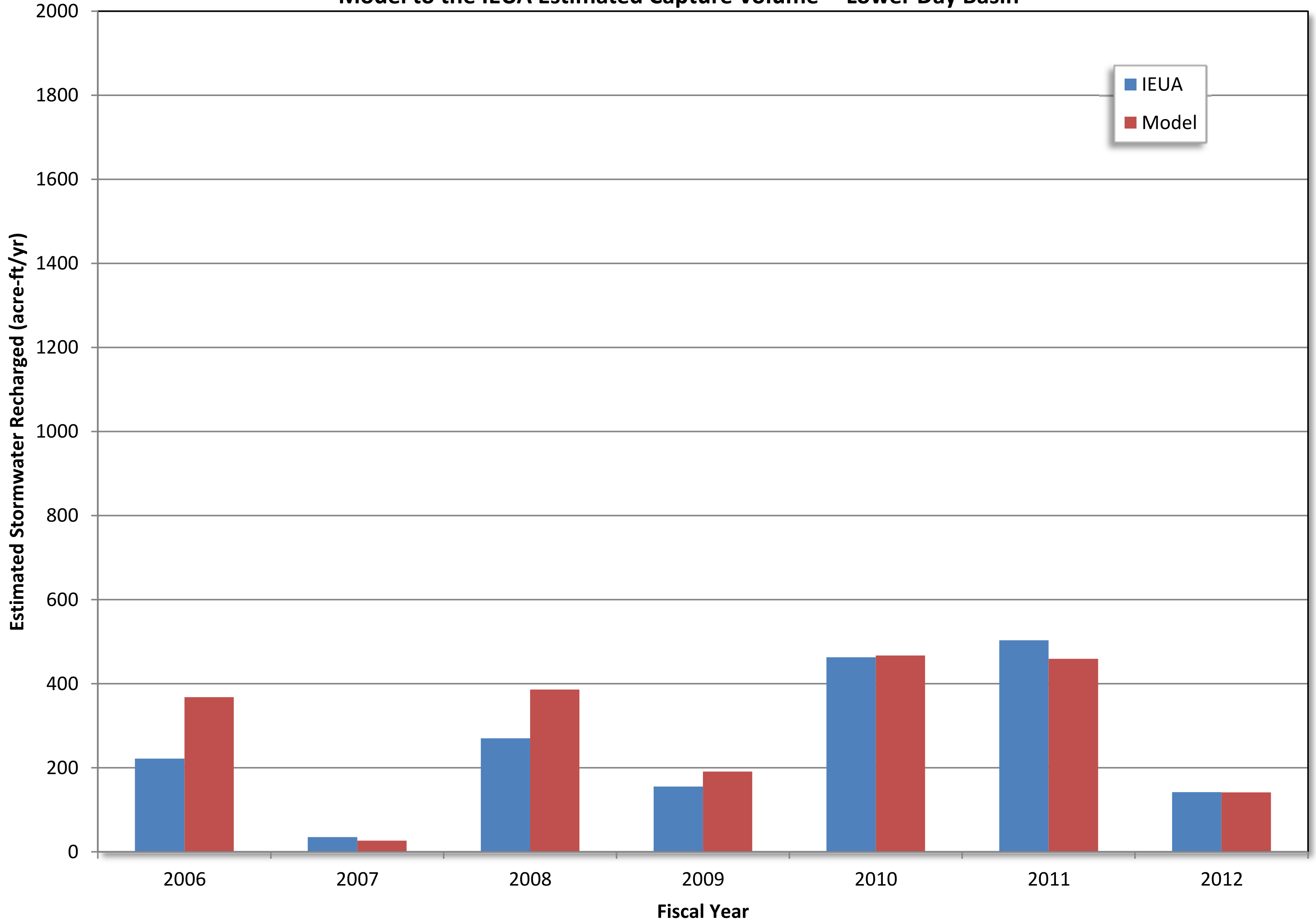
Figure D-8a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Lower Day Basin



WILDERMUTH ENVIRONMENTAL INC.

Figure D-8b

Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Lower Day Basin

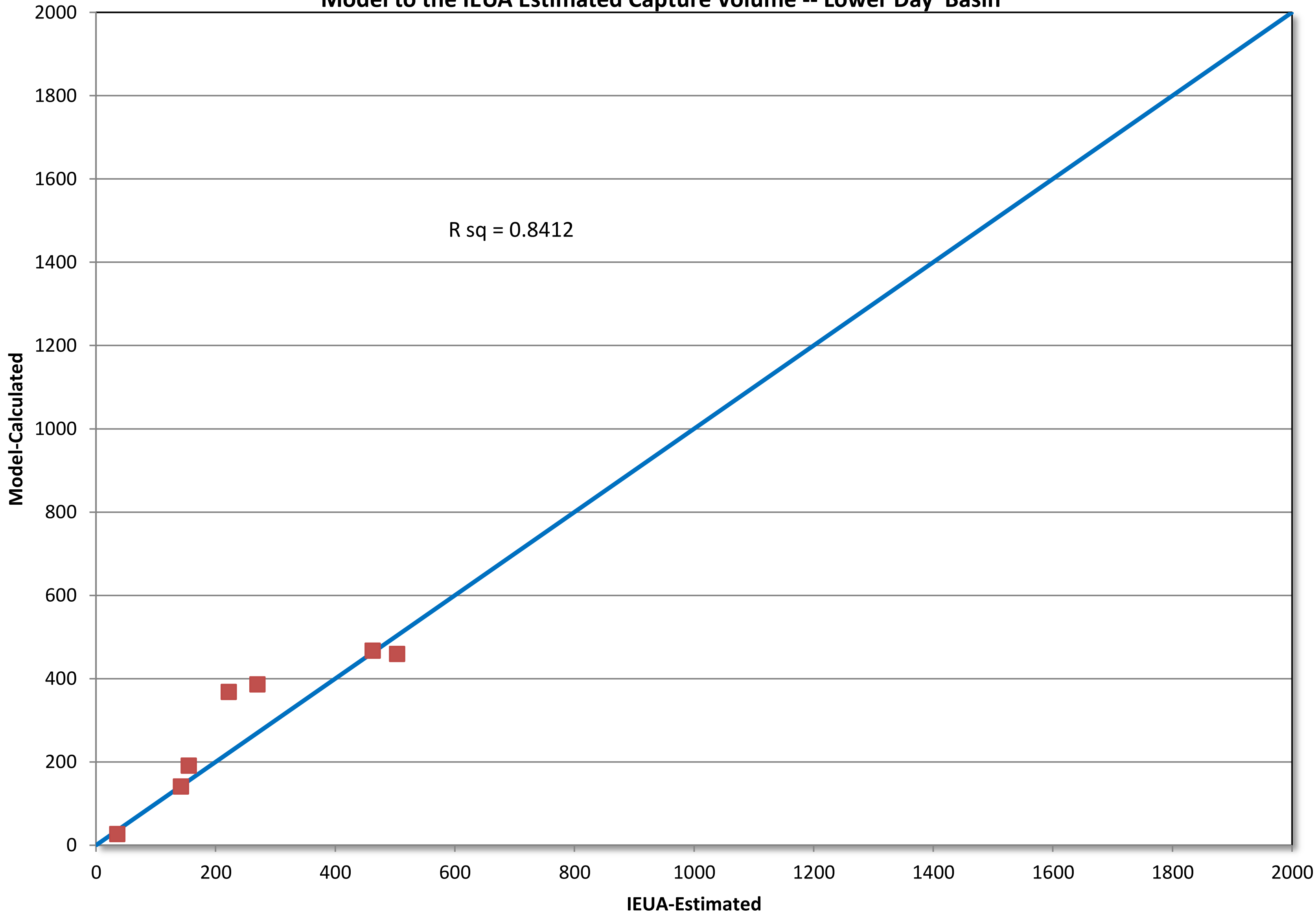


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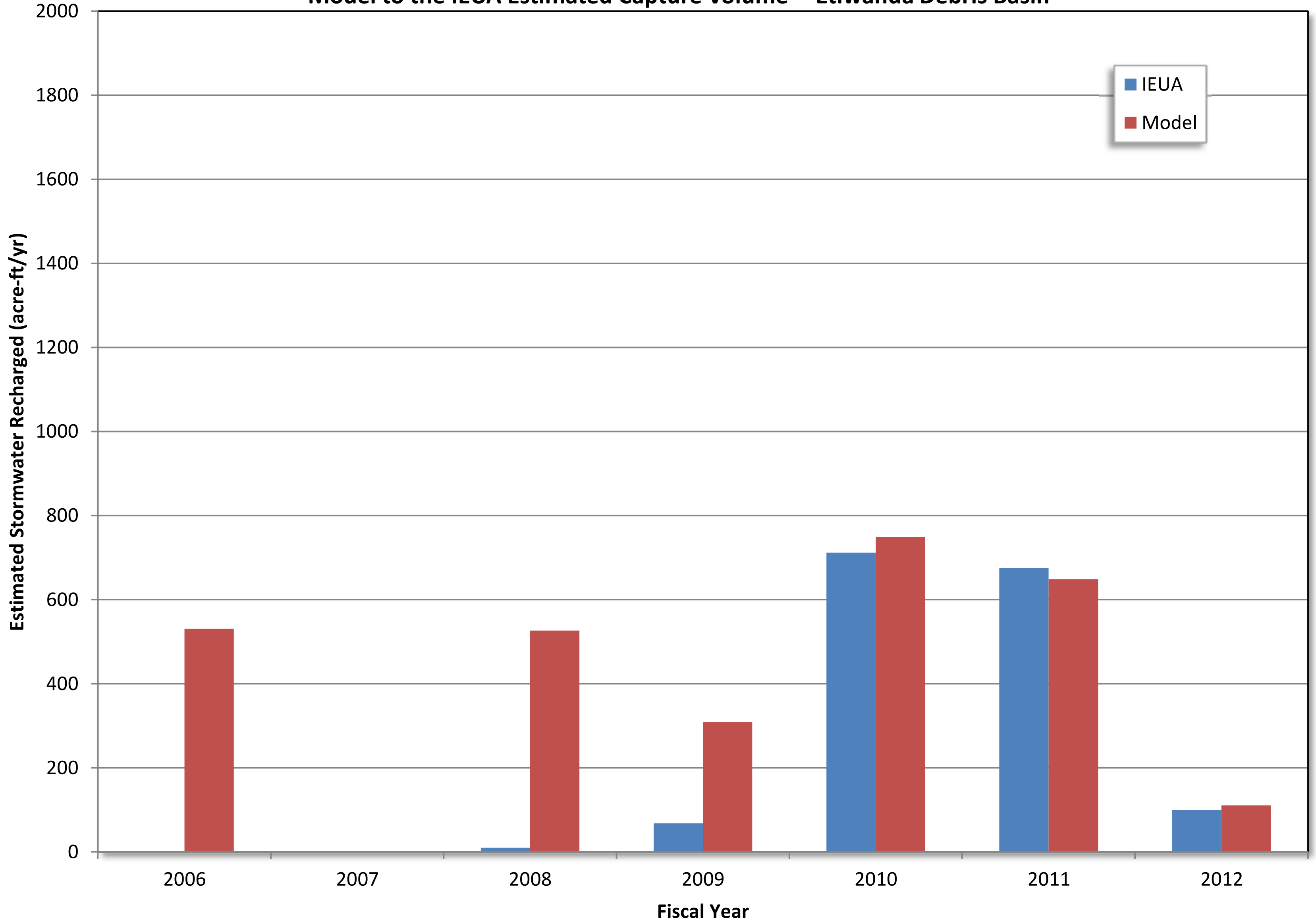
Figure D-9a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Etiwanda Debris Basin



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WILDERMUTH ENVIRONMENTAL INC.

Figure D-9b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Etiwanda Debris Basin

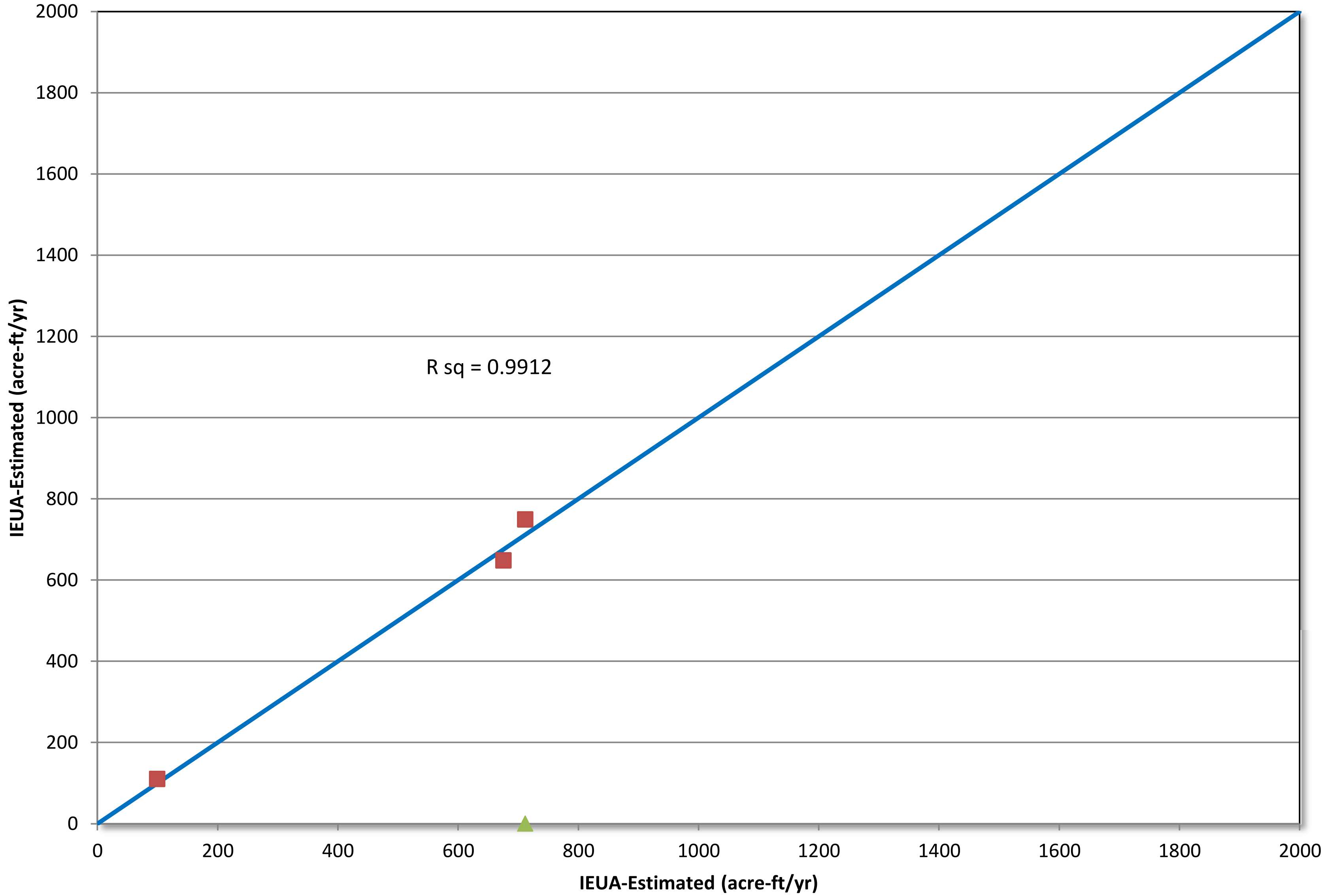

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Figure D-10a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Victoria Basin

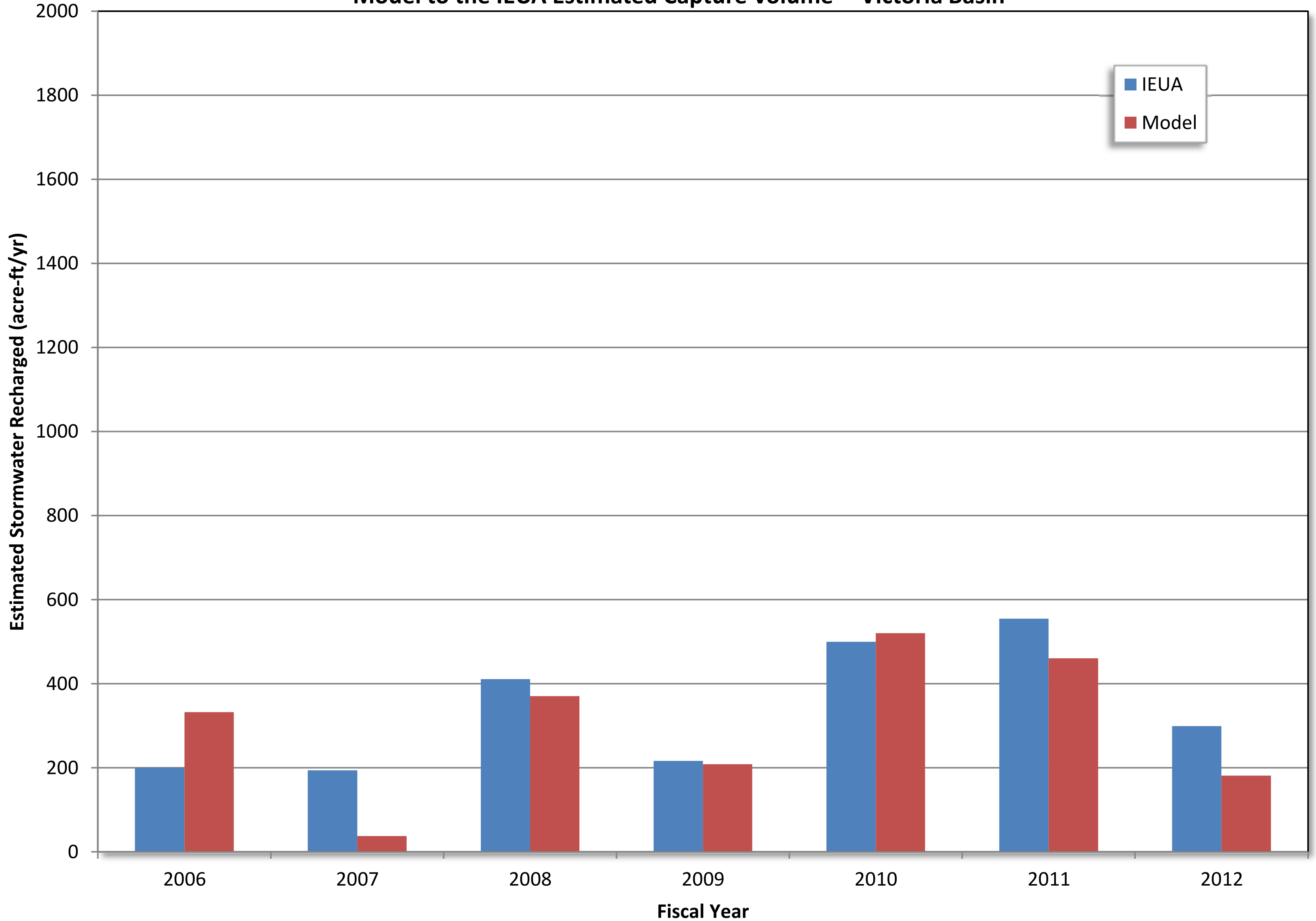
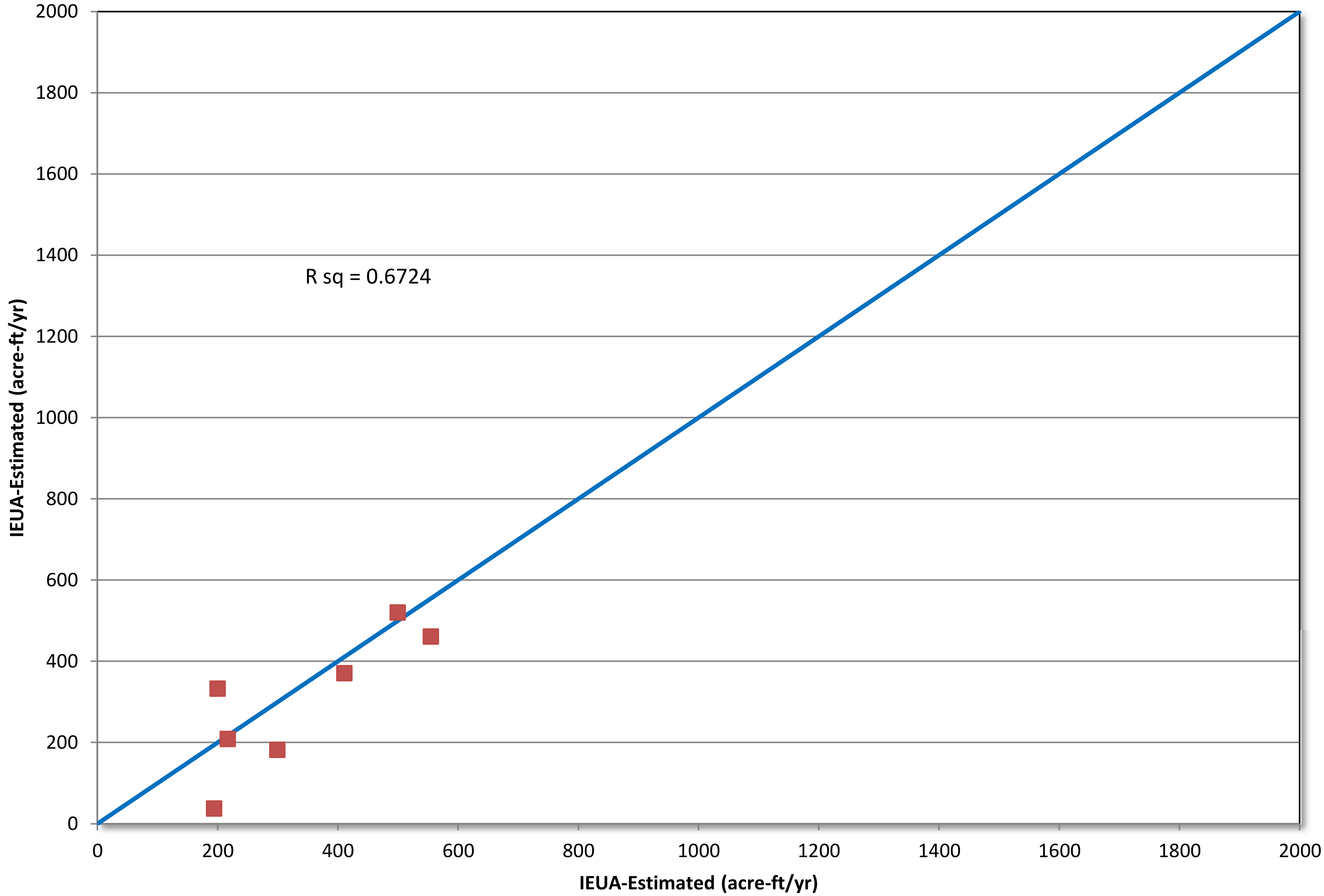


Figure D-10b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Victoria Basin



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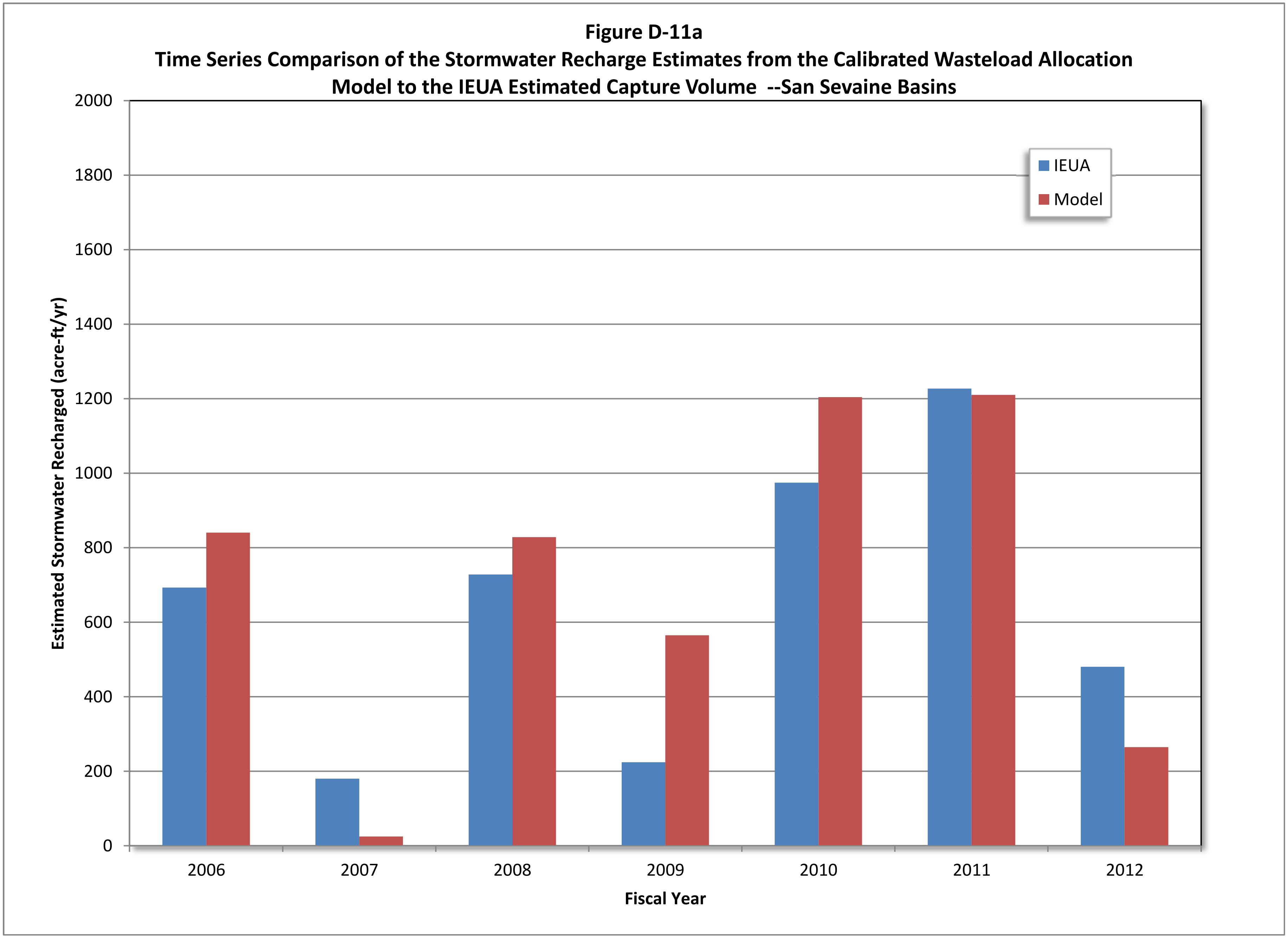

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Figure D-11b

Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- San Sevaine Basins

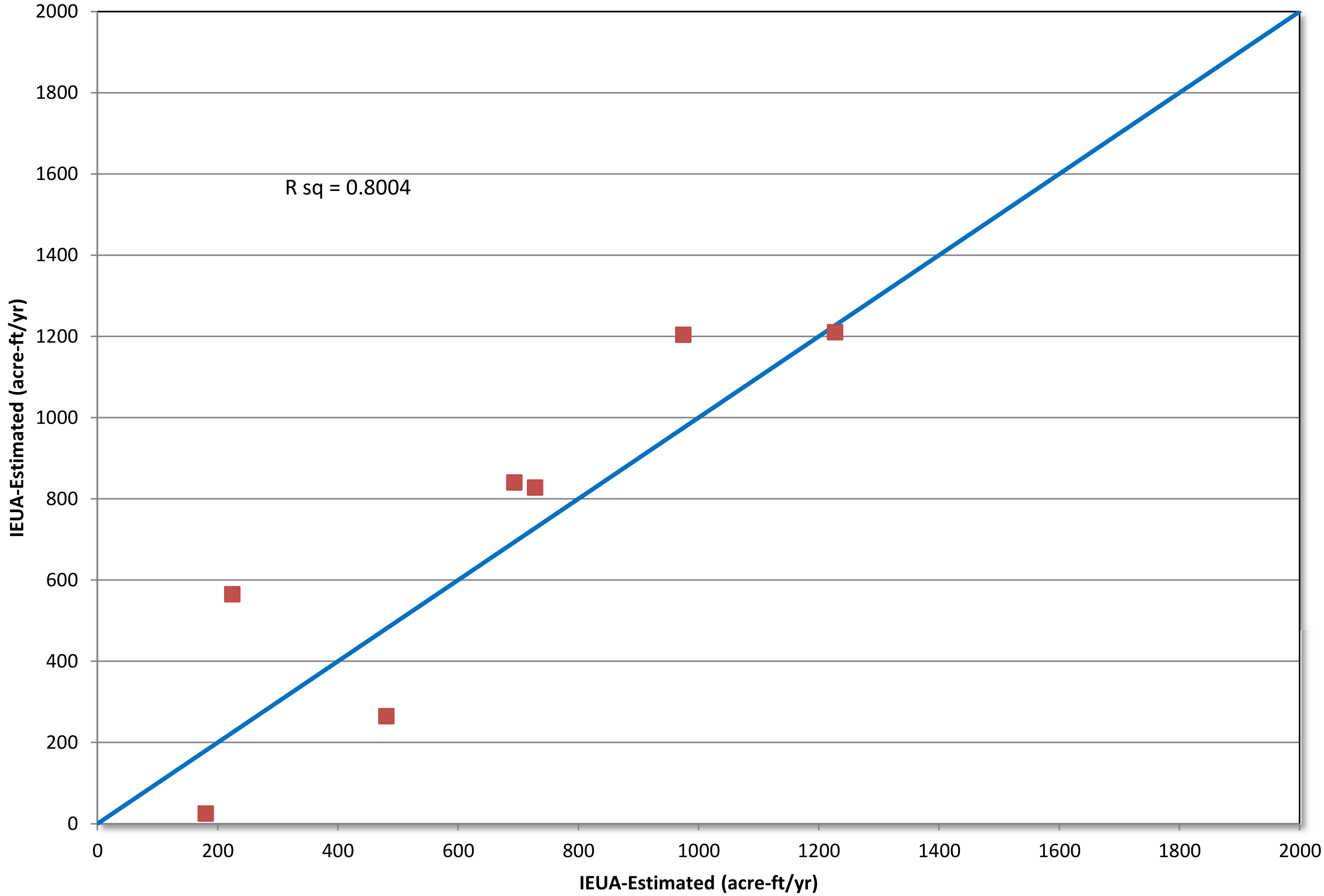
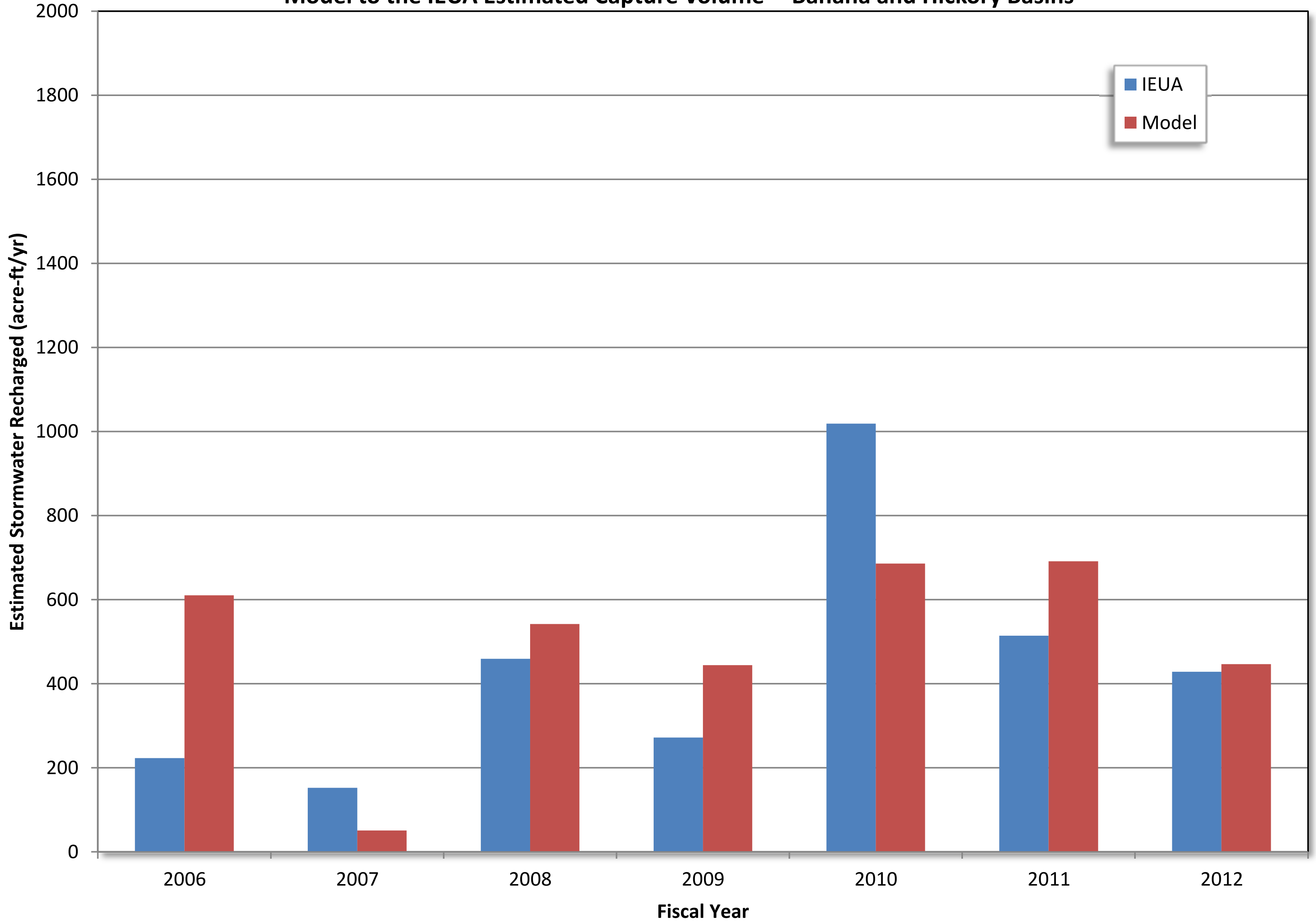


Figure D-12a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Banana and Hickory Basins



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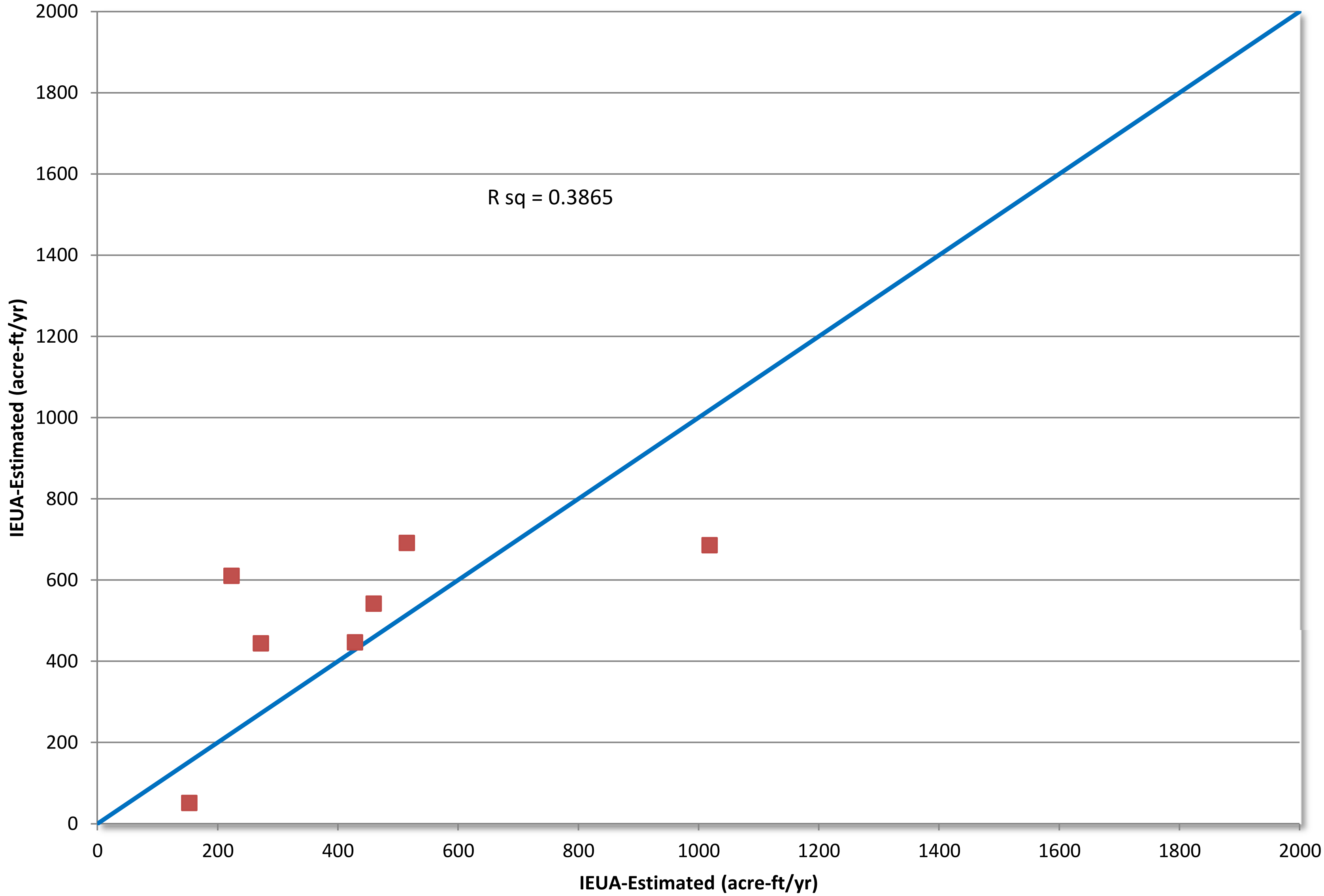
WILDERMUTH ENVIRONMENTAL INC.

Figure D-12b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- Banana and Hickory Basins



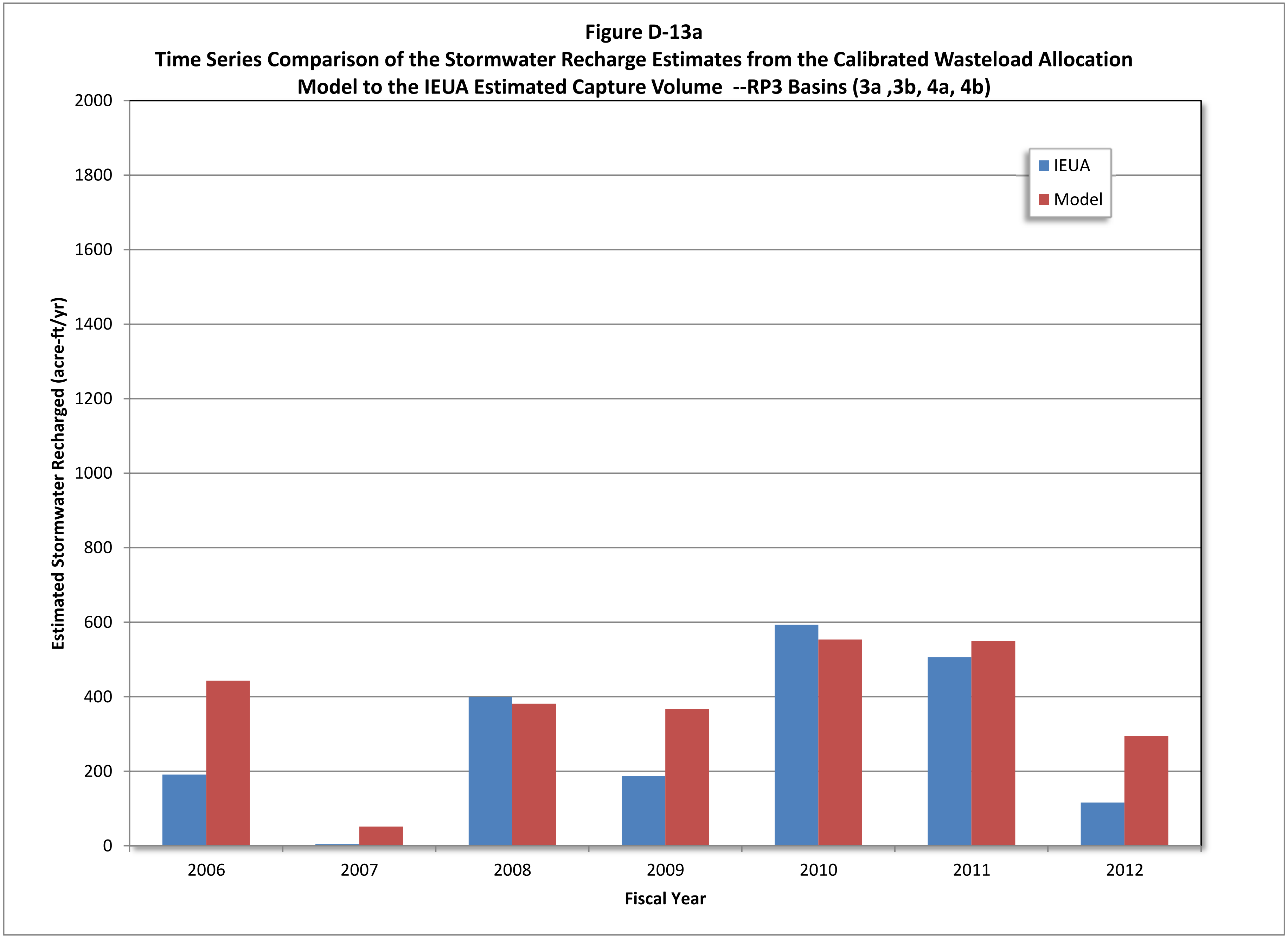


Figure D-13a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --RP3 Basins (3a ,3b, 4a, 4b)
Estimated Stormwater Recharged (acre-ft/yr)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
IEUA
Model
2006
2007
2008
2009
2010
2011
2012
Fiscal Year

Figure D-13b

Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume -- RP3 Basins (3a ,3b, 4a, 4b)

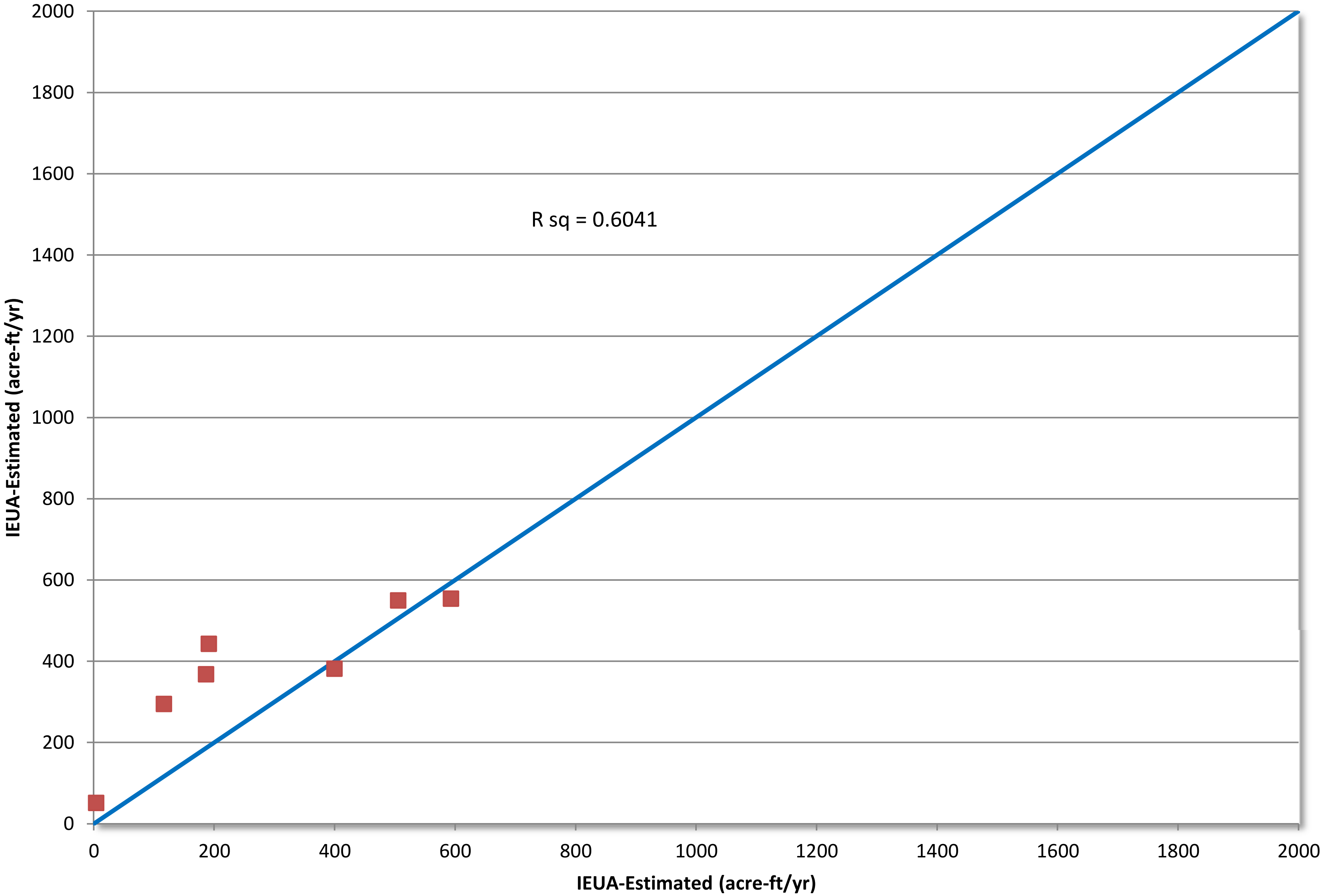


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Figure D-14a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Declez Basin

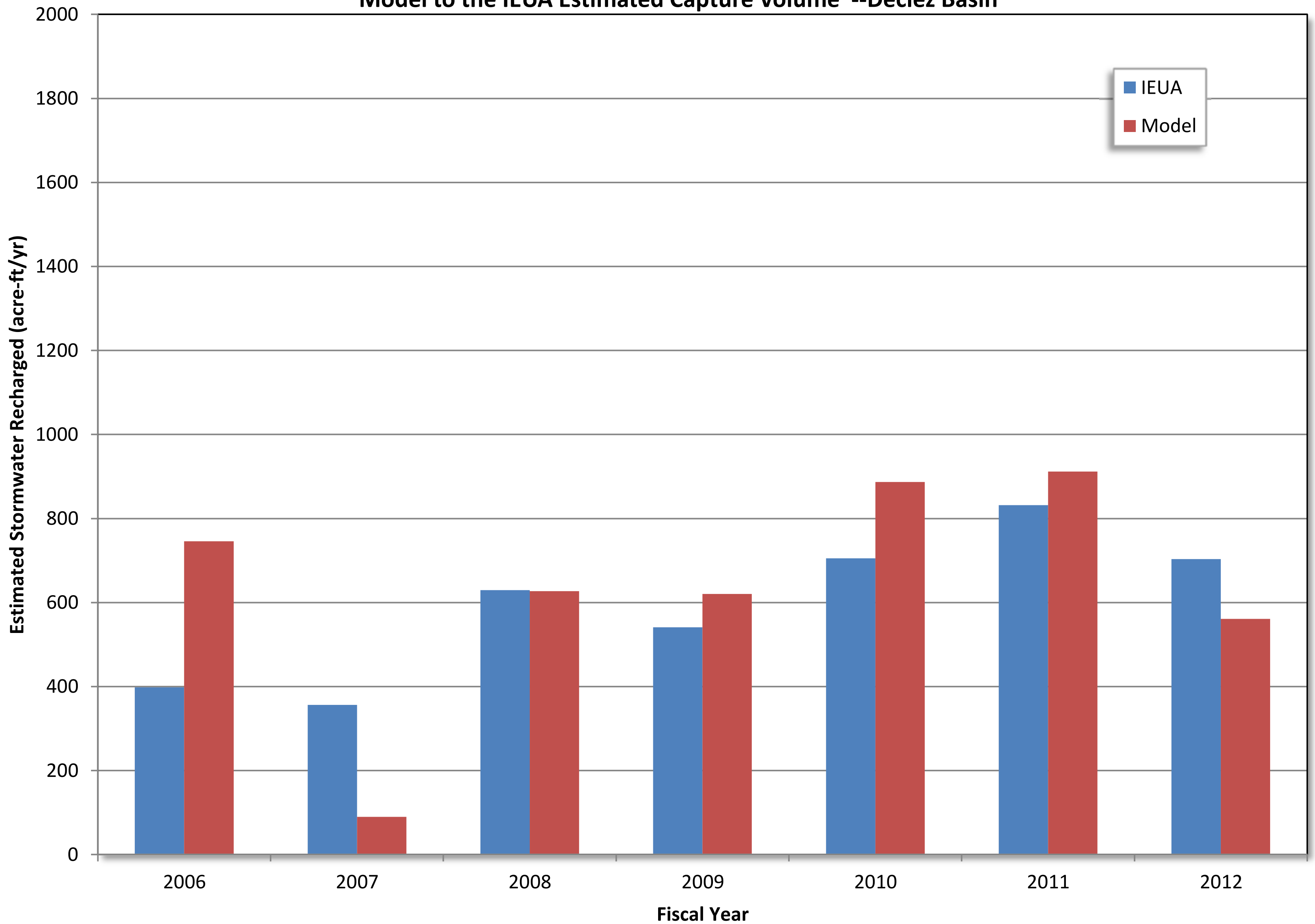
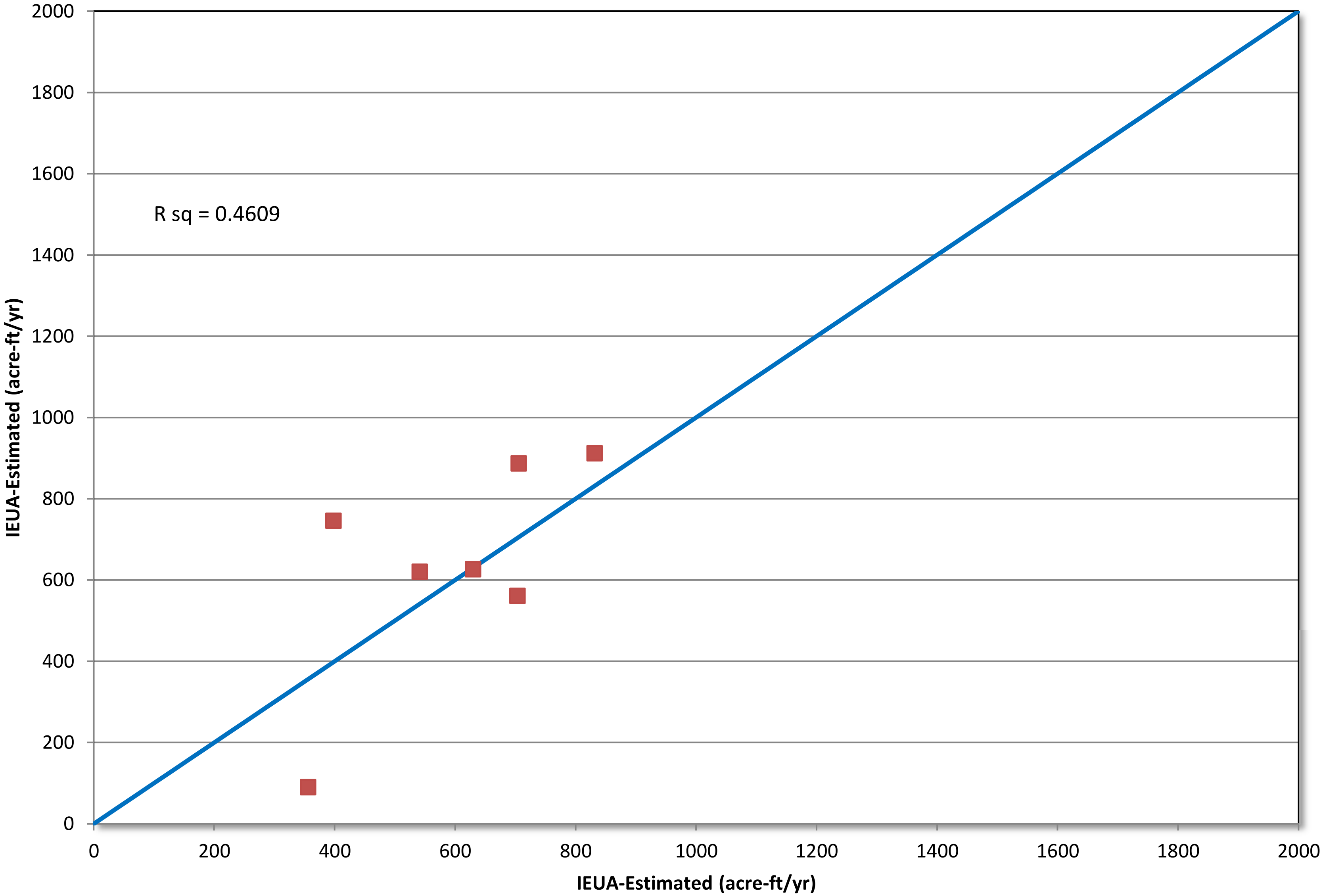


Figure D-14b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Declez Basin



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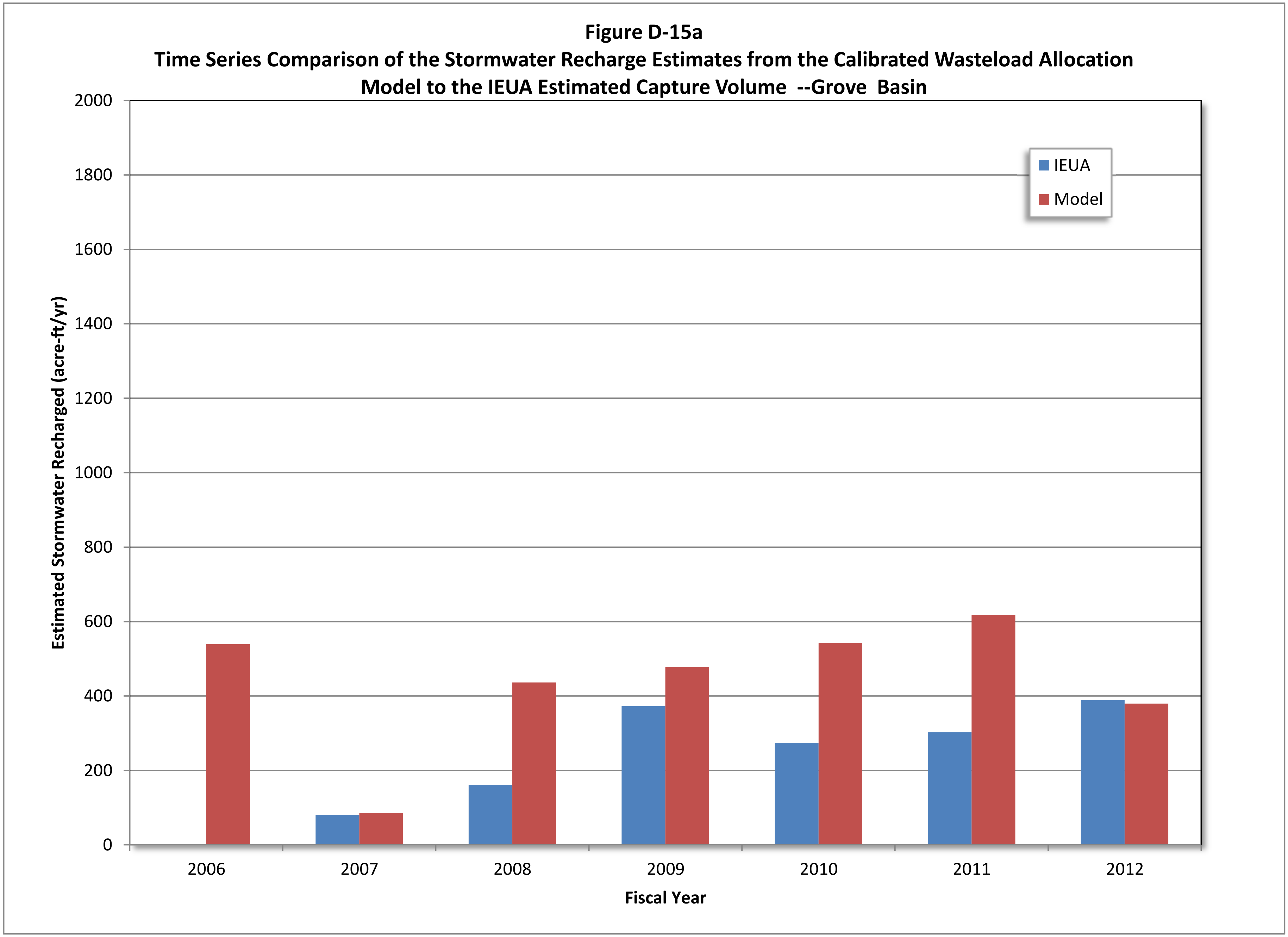
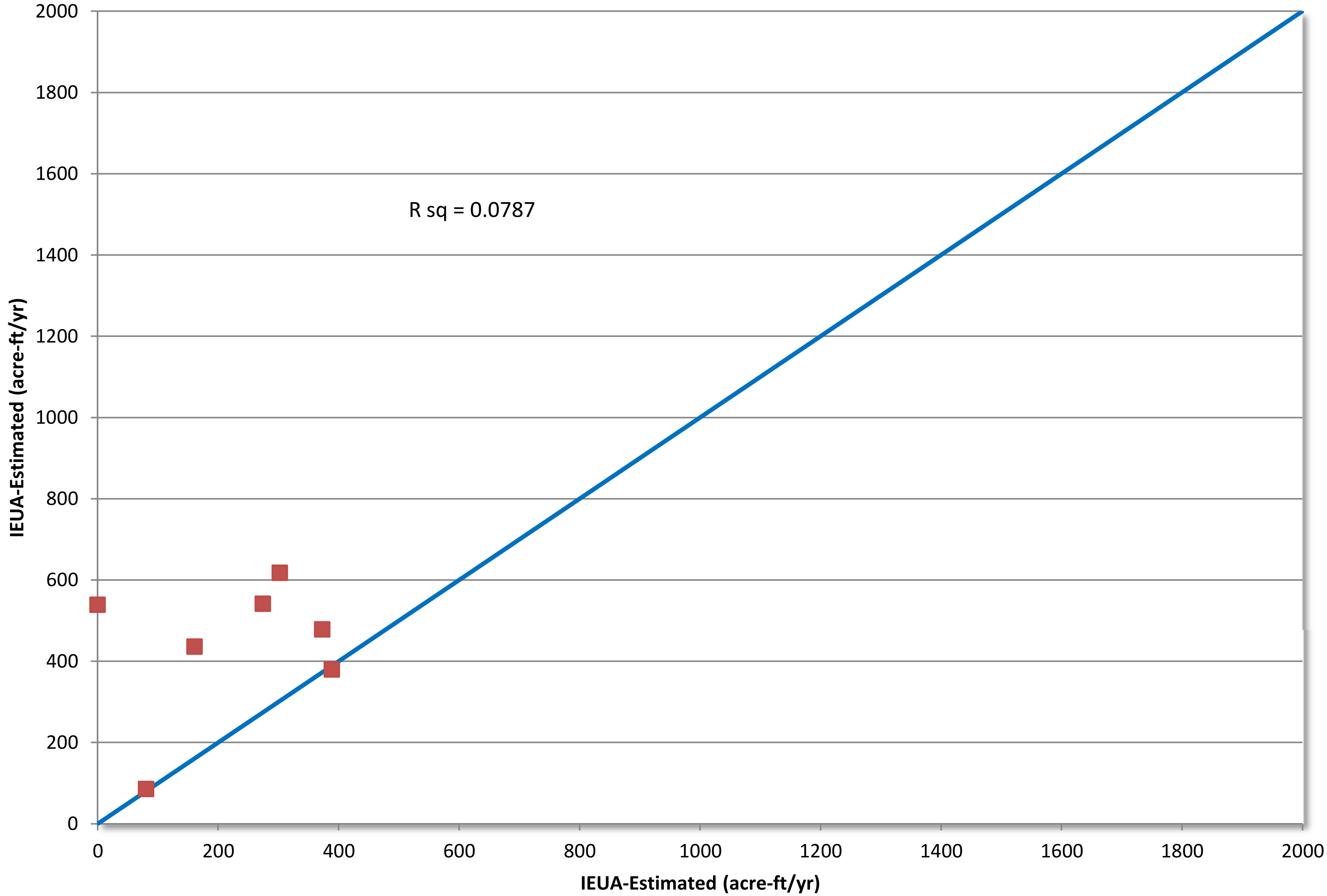


Figure D-15a
Time Series Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Grove Basin
Estimated Stormwater Recharged (acre-ft/yr)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2006
2007
2008
2009
2010
2011
2012
Fiscal Year
IEUA
Model

Figure D-15b
Scatter Plot Comparison of the Stormwater Recharge Estimates from the Calibrated Wasteload Allocation Model to the IEUA Estimated Capture Volume --Grove Basin



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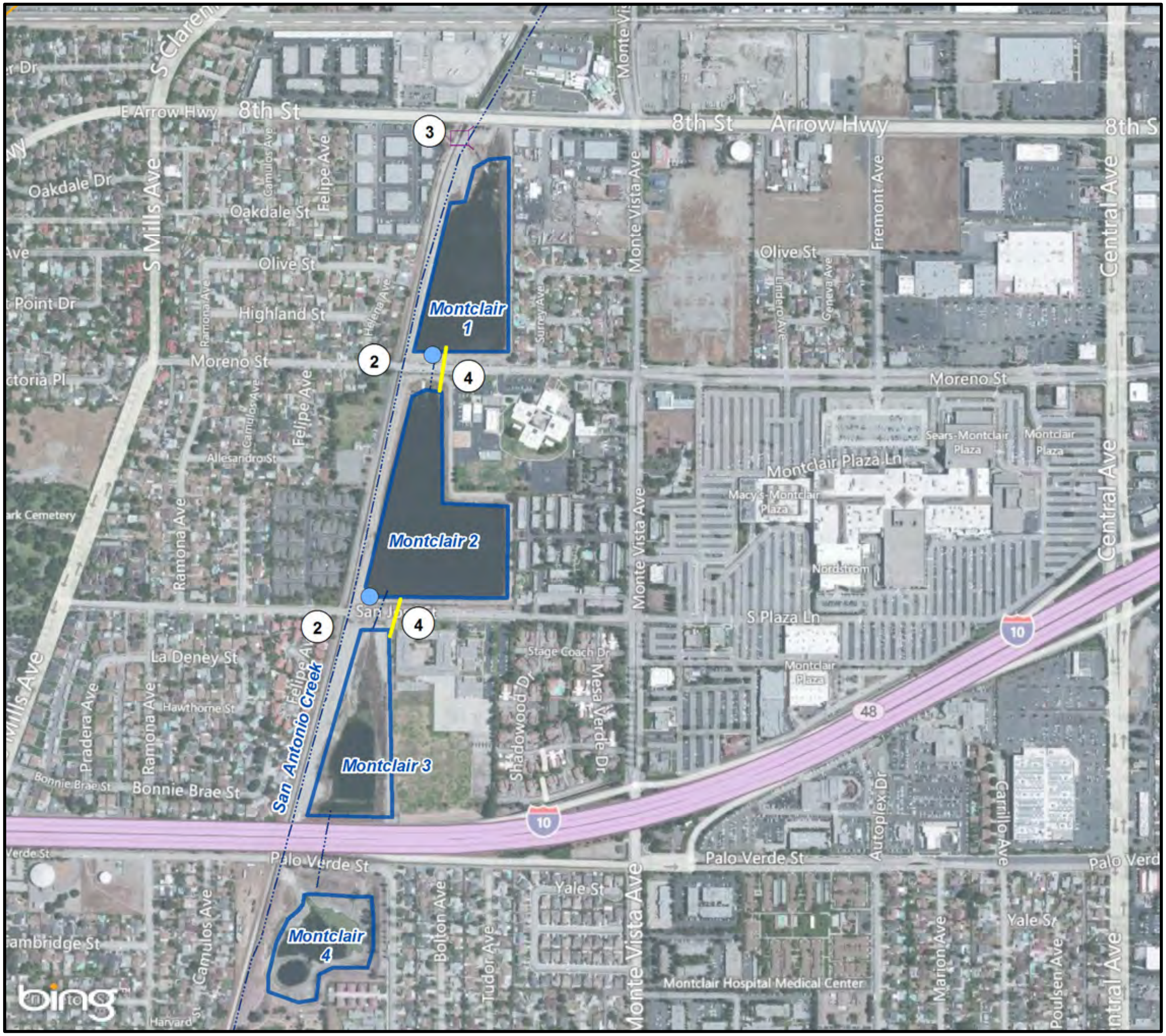


Montclair Basins

Streams & Flood Control Channels

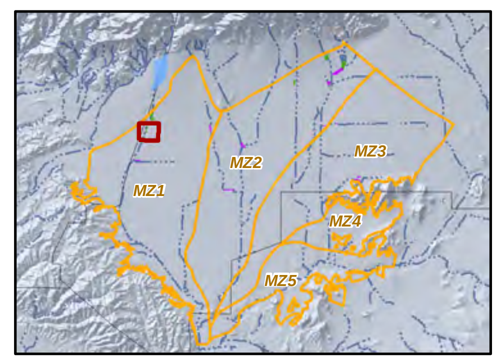
Water Diversion Structures

Drop Inlet

Sluice Gate

PID 2, 3, and 4
(See Table D-1 for
Project Description)

Low Level Drains



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Author: MJC
Date: 9/3/2013
Name: Figure_D-16a

0 500 1,000 Feet
0 100 200 400 Meters

2013 Amendment to the
2010 RMPU

**Location of the Montclair Basins
Alternatives Schematic
PID 2, 3, and 4**

Figure D-16a

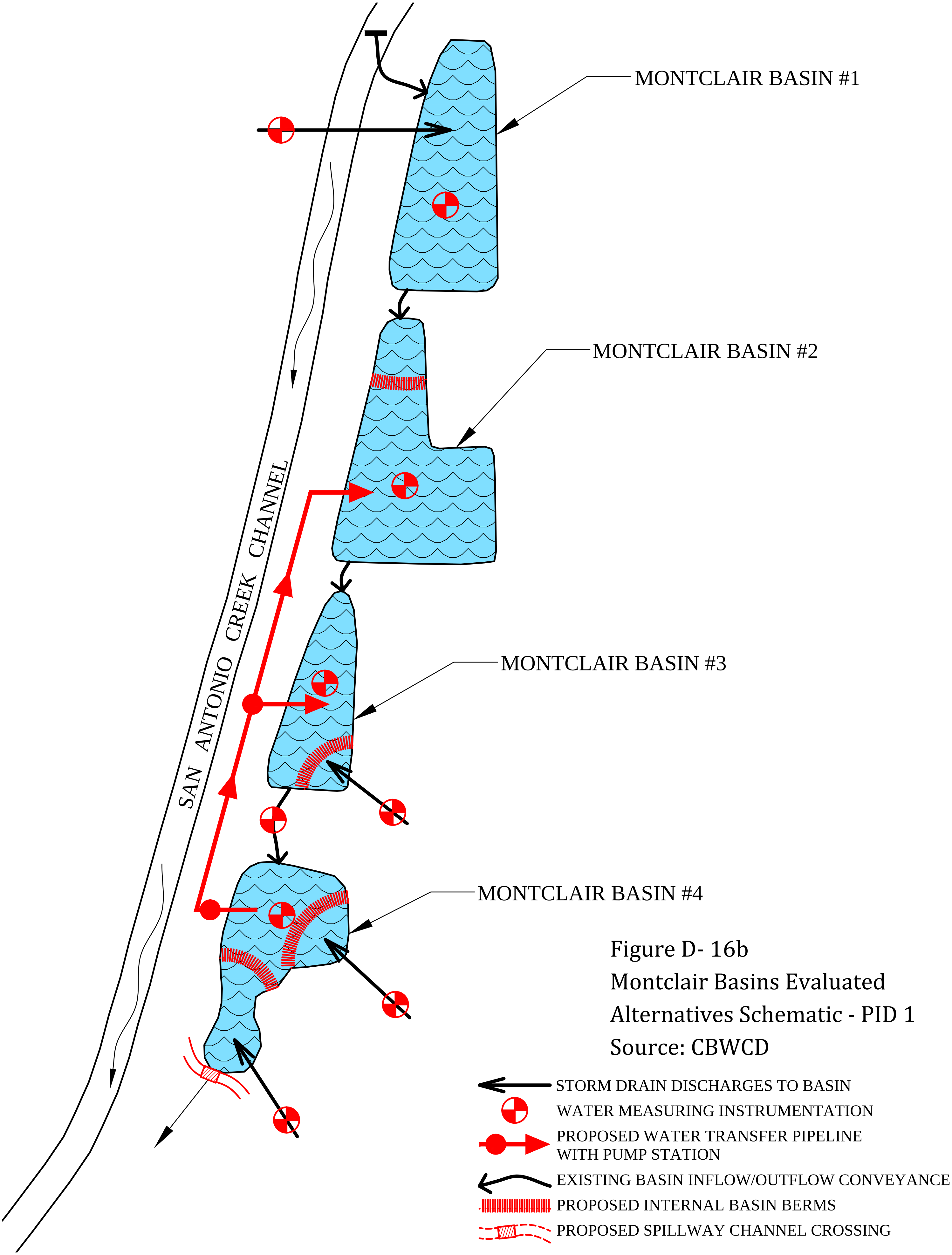
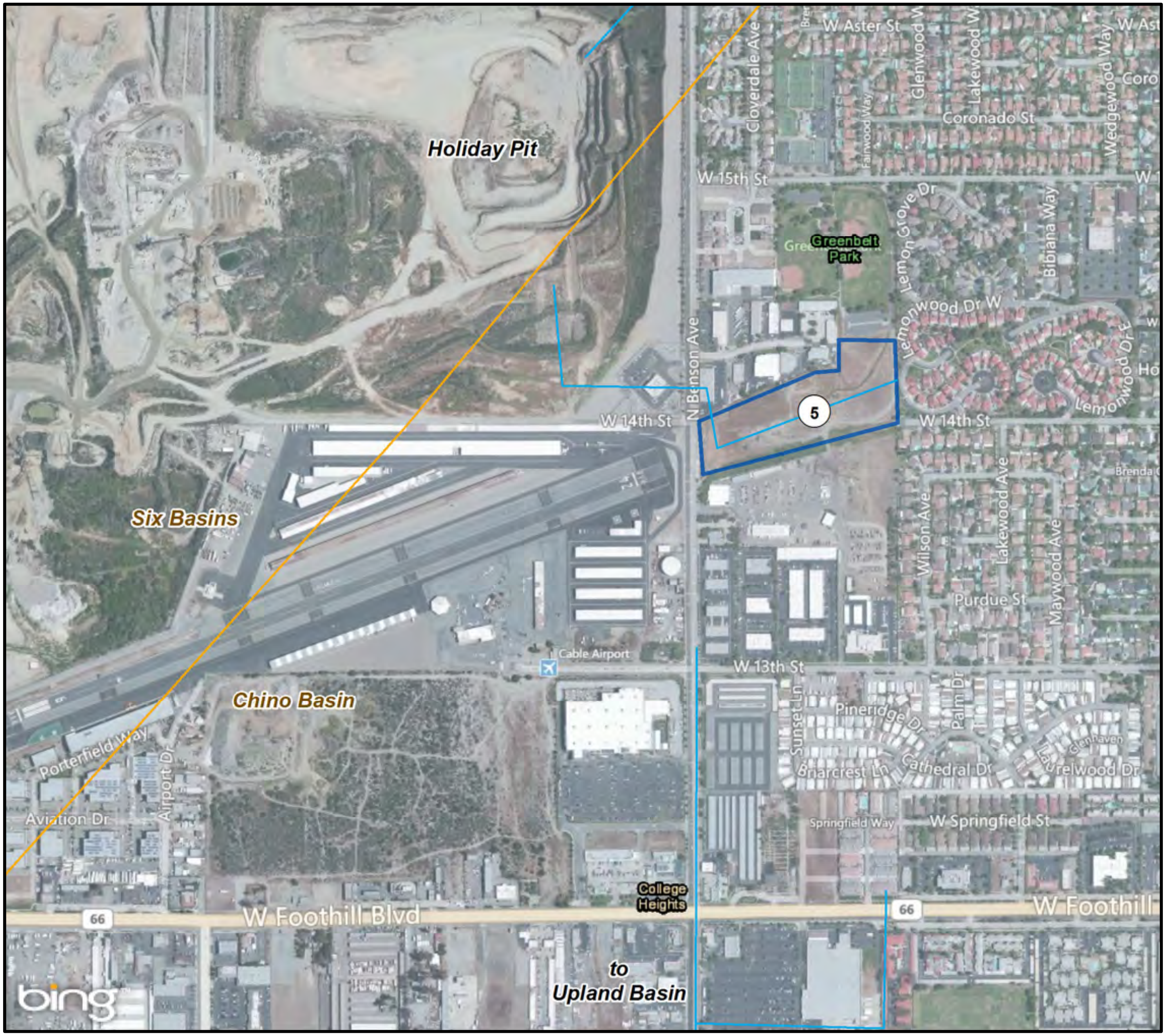


Figure D- 16b
Montclair Basins Evaluated
Alternatives Schematic - PID 1
Source: CBWCD

Q:\Drawings\Chino Basin Water Conservation District\Montclair Basin #4\Power Point Exhibit.dwg

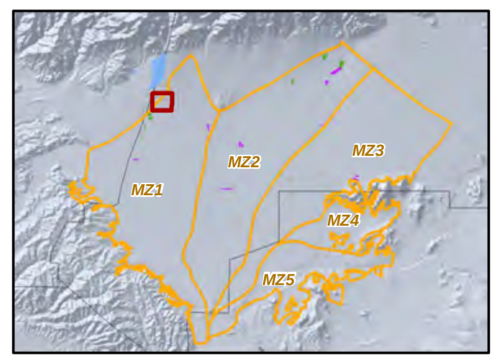
June 2012



Proposed North West Upland Basin

Existing Storm Drain

(5) PID 5
(See Table D-1 for Project Description)



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Author: MJC
Date: 9/4/2013
Name: Figure_D-17a

0 500 1,000 Feet
0 100 200 400 Meters

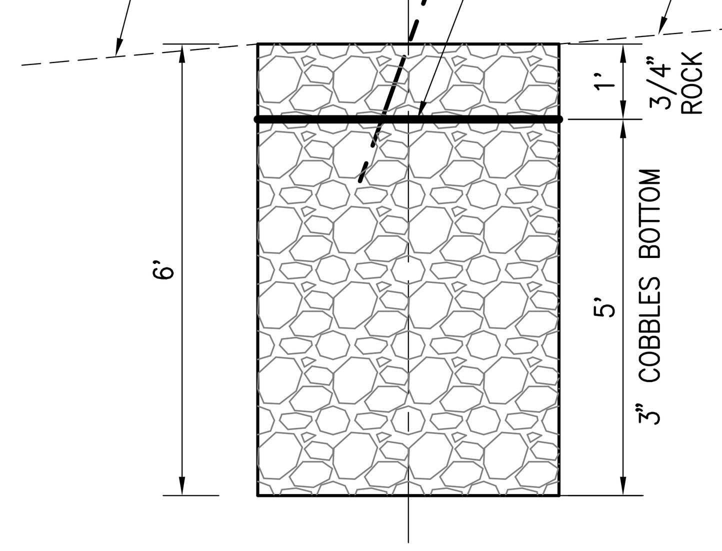
2013 Amendment to the 2010 RMPU

Location of the North West Upland Basin PID 5

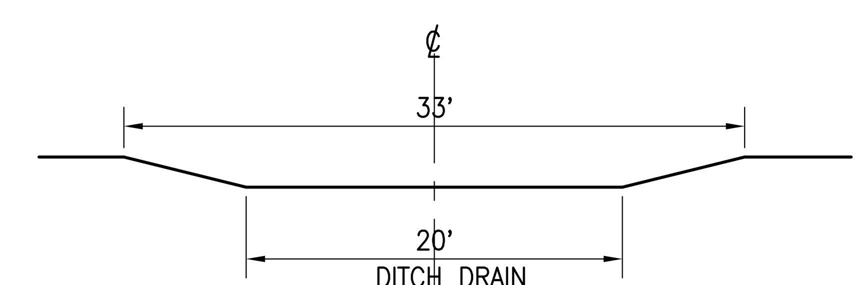
Figure D-17a

CONSTRUCTION NOTES:

4. CONSTRUCT 42" RCP. SEE PROFILE FOR D-LOAD. PIPE BEDDING PER LACFCD STD DWG NO 3080-2, CASE 3.
5. CONSTRUCT 66" RCP. SEE PROFILE FOR D-LOAD. PIPE BEDDING PER LACFCD STD DWG NO 3080-2, CASE 3.
6. CONSTRUCT 84" RCP. SEE PROFILE FOR D-LOAD. PIPE BEDDING PER LACFCD STD DWG NO 3080-2, CASE 3.
17. CONSTRUCT 18' X 9' CONC. OUTLET PER DETAIL 2 ON SHT 14.
19. CONSTRUCT ENERGY DISSIPATOR – IMPACT BASIN W/ VERTICAL BAFFLE WALL SPPWC STD DWG. 302-2. WIDTH (W) PER PLAN.
20. CONSTRUCT 24" R.C.P. SEE PROFILE FOR D-LOAD.
21. CONSTRUCT 1 FT WIDE CONCRETE LINED SWALE PER DETAIL C-206 ON SHT NO. 17.
24. CONSTRUCT NEW CURB AND GUTTER, MATCH IN-KIND.



ROCK TRENCH DETAIL 1
SCALE: NTS



DITCH DRAIN SECTION B
SCALE: NTS

GRAPHIC SCALE:
1" = 40'
40 20 0 40 80
SCALE FEET

IMPORTANT NOTICE
Section 4216/4217 of the Government Code requires a Dig Alert Identification Number to be issued before a "Permit to Excavate" will be valid. For your Dig Alert I.D. Number call
CALL TOLL FREE
TWO WORKING DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT
1-800-227-2600

BENCH MARK NO. BM9F-86
ELEV.

REVISIONS					
MARK	DATE	INITIAL	DESCRIPTION	DATE	APP'VD

REGISTERED PROFESSIONAL ENGINEER ZACK ISNASIOUS No. C065544 Exp. 9/30/11 CIVIL STATE OF CALIFORNIA — NOT FOR CONSTRUCTION

AECOM
AECOM Technical Services, Inc.
1501 QUAIL ST
Newport Beach, CA 92658-9020
PHONE (949) 476-3300
FAX (949) 721-7141

DRAWN BY:
DESIGNED BY: E. LONG
CHECKED BY: Z. ISNASIOUS
RECOMMENDED BY:

REVIEWED BY CITY STAFF		
DEPARTMENT	INITIAL	DATE
PUBLIC WORKS (OPER.)		
PUBLIC WORKS (ENV.)		
PUBLIC WORKS (WATER)		
PUBLIC WORKS (TRAF.)		
FIRE DEPT.		

APPROVED BY:
PUBLIC WORKS DIRECTOR / CITY ENGINEER DATE
R.C.E. 53382 EXP. DATE 6/30/11
RECOMMENDED BY: ENGINEERING STAFF
RECOMMENDED BY: DEVELOPMENT SERVICES

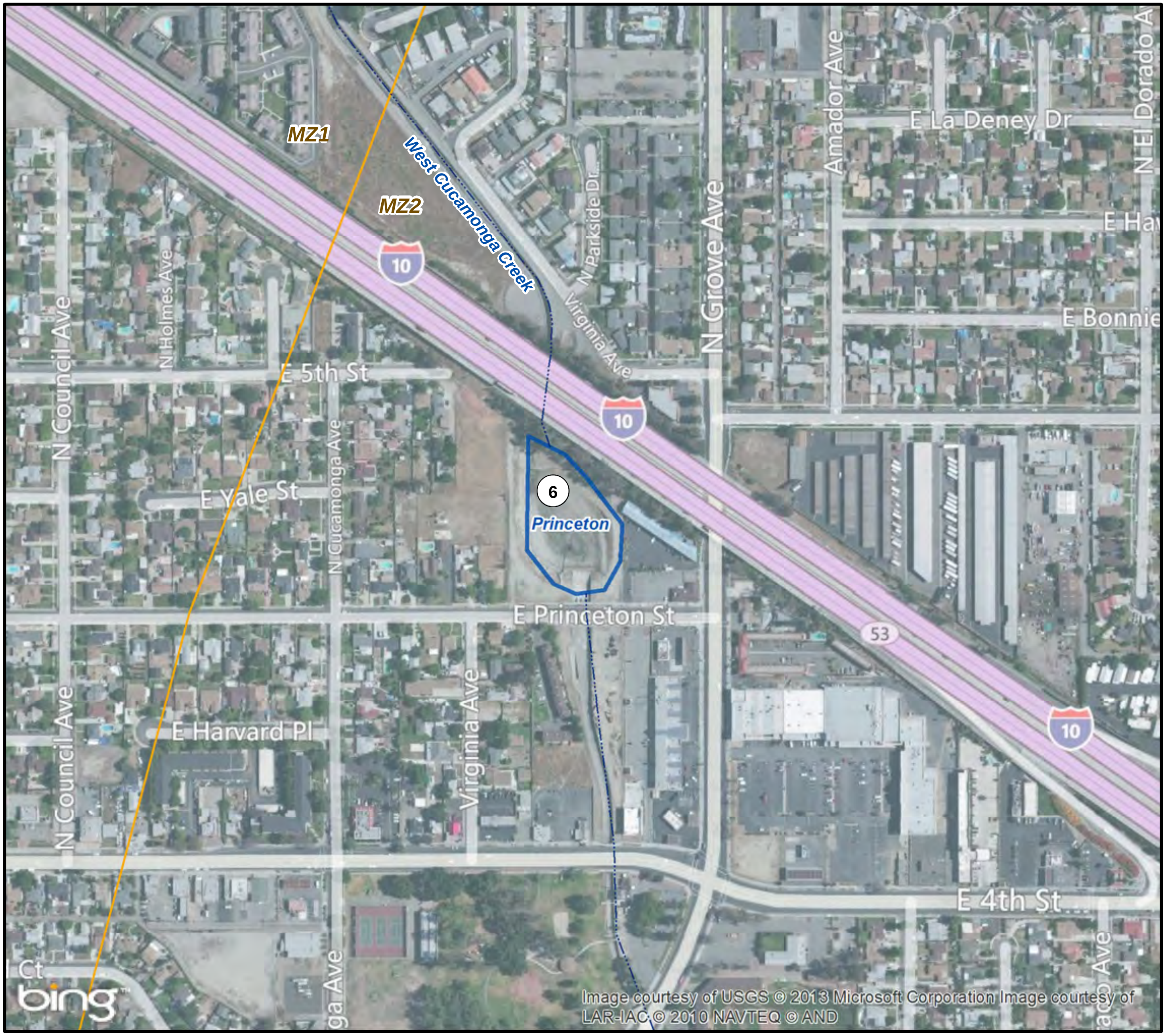
14TH STREET WATER QUALITY REGIONAL FACILITY

Figure 17b
North West Upland Basin Alternative- PID 5
Source: City of Upland

STORM DRAIN DWG NO. C-104
SHEET 6 OF 18 SHEETS
DRAWING NO.

PLAN NO: W-XXXX
PROJECT: XXXX

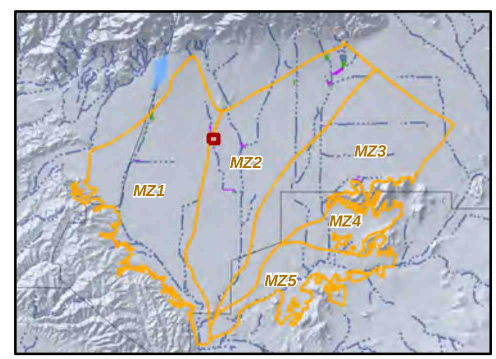
DWG: \\usnpb1fp003\on-proj\UplandCityof\60159017 14 St\900 CAD\904 PlanSet\14TH ST\C-104.dwg USER: longe2
DATE: Apr 05, 2011 2:49pm XREFS: G-BD-14TH C-IM-14TH C-RP-14TH C-HA-Benson C-UP-14TH 548-0285 C-UP-Benson Zisnasious_CA_C



Princeton Basin

Streams & Flood Control Channels

6 PID 6
(See Table D-1 for
Project Description)



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Author: MJC
Date: 9/6/2013
Name: Figure_D-18

0 500 1,000 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

Location of the Princeton Basin PID 6

Figure D-18

San Sevaine Basins

Streams & Flood Control Channels

Storm Drain Inlet

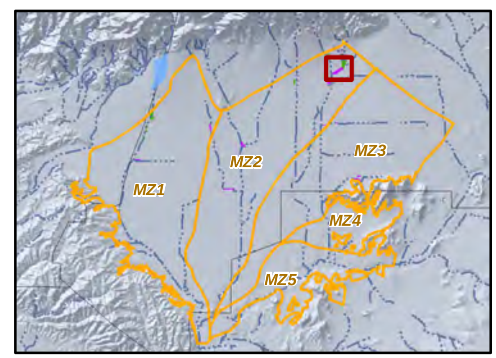
Recycled Water Pipelines

Operating

Planning

7 PID 7, 8, 9, and 10 (See Table D-1 for Project Description)

Conveyance Pipeline



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Author: MJC
Date: 9/6/2013
Name: Figure_D-19

0 1,000 2,000 Feet
0 150 300 600 Meters

2013 Amendment to the 2010 RMPU

Location of the San Sevaine Basins Evaluated Alternatives Schematic PID 7 - 10

Figure D-19

Victoria Basin

Streams & Flood Control Channels

Water Diversion Structures

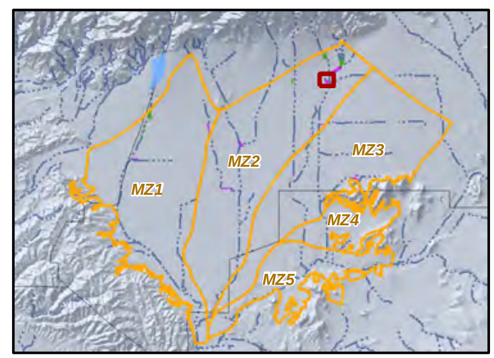
Sluice Gate

Recycled Water Pipelines

Operating

Planning

11 PID 11
(See Table D-1 for
Project Description)



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www.wildermuthenvironmental.com

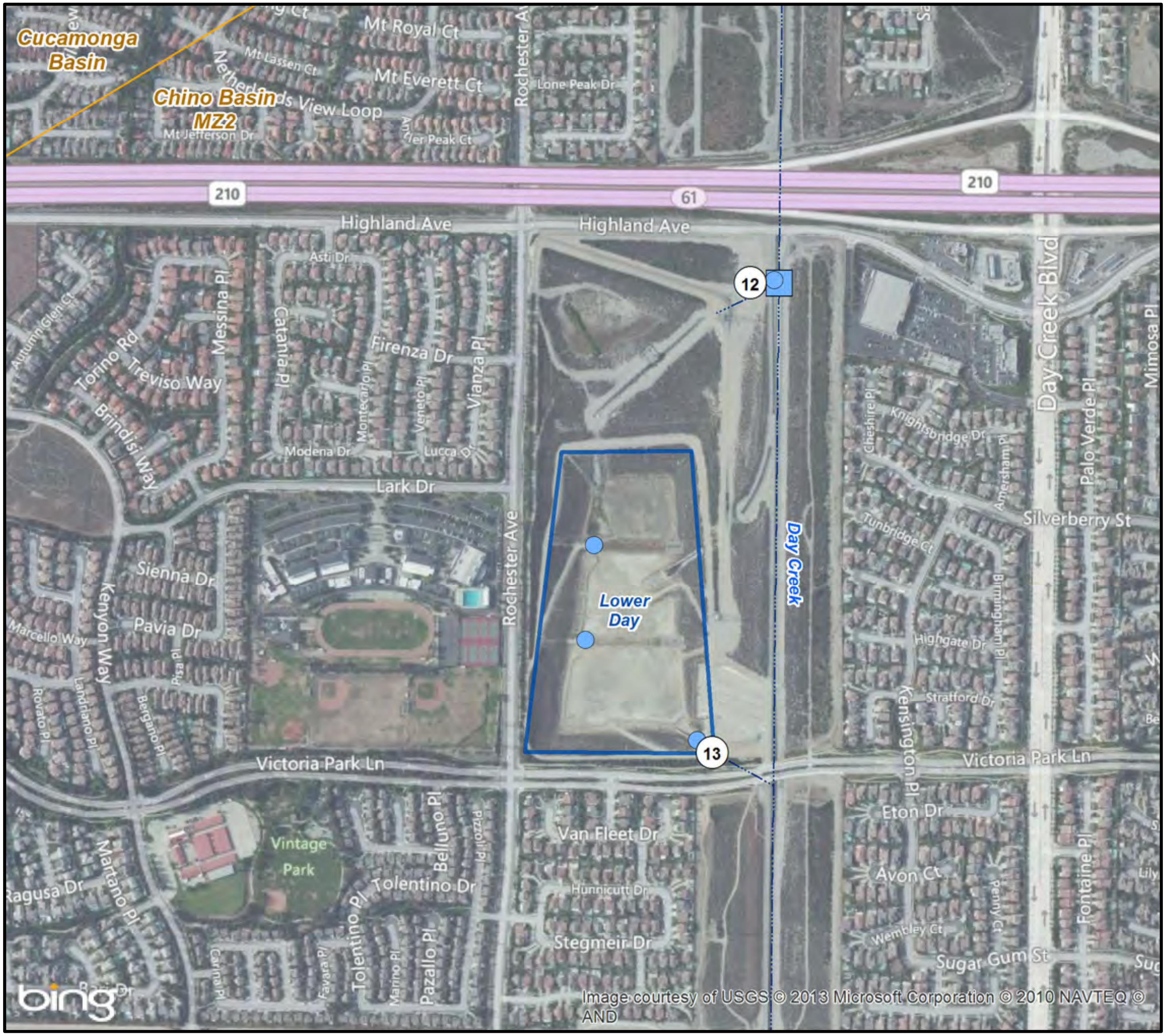
Author: MJC
Date: 9/6/2013
Name: Figure_D-20

0	500	1,000 Feet
0	75 150	300 Meters

2013 Amendment to the
2010 RMPU

Location of the Victoria Basin Evaluated Alternatives Schematic PID 11

Figure D-20



Lower Day Basin

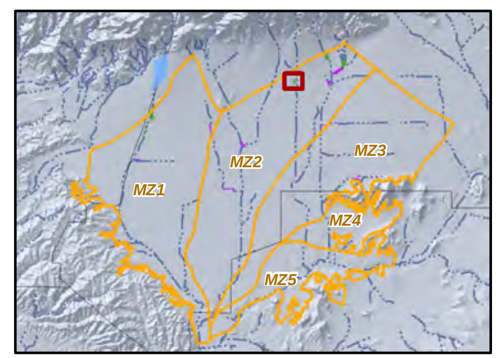
Streams & Flood Control Channels

Water Diversion Structures

Rubber Dam

Sluice Gate

PID 12 and 13
(See Table D-1 for
Project Description)



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Author: MJC
Date: 9/6/2013
Name: Figure_D-21a

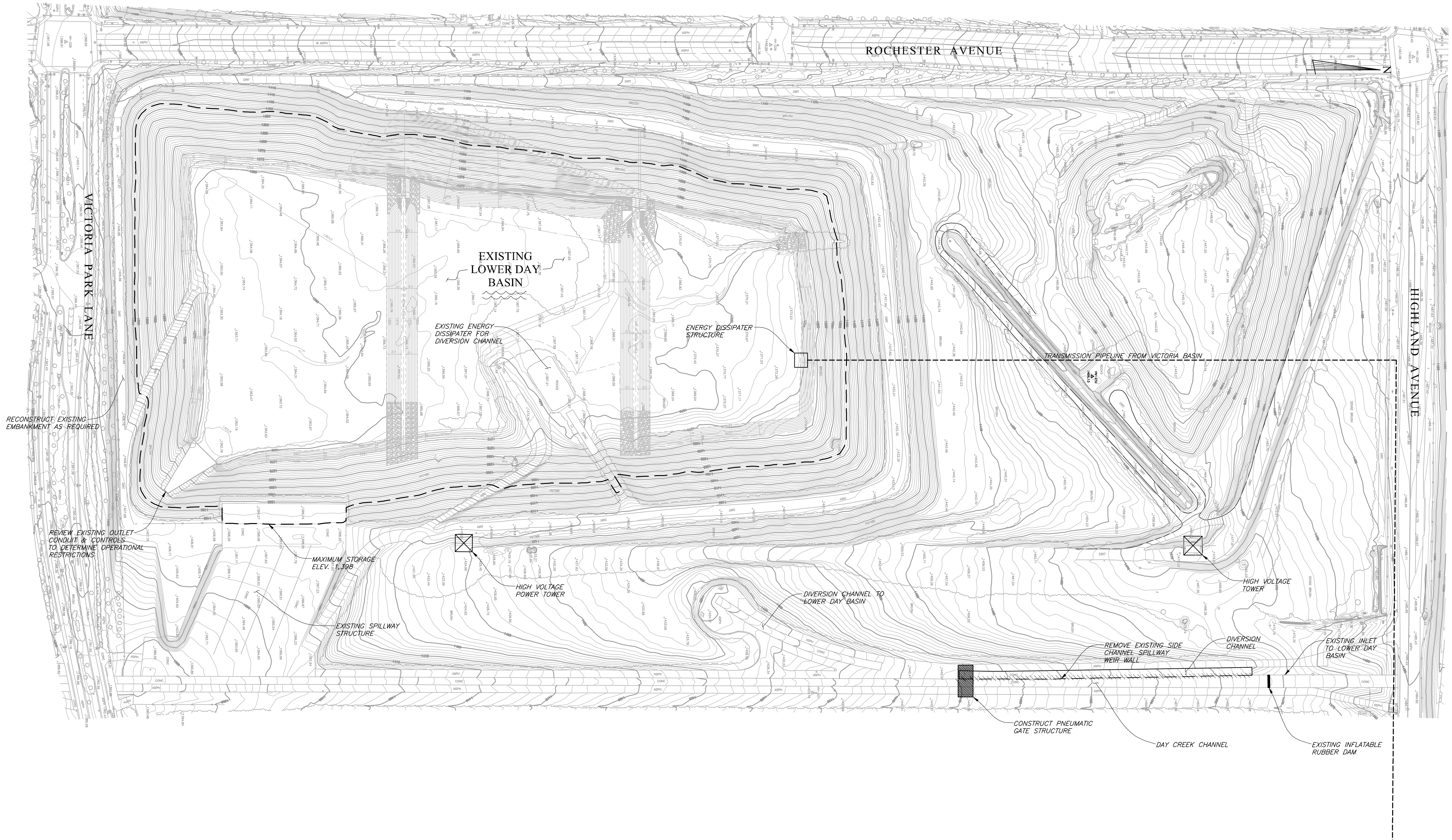
0 500 1,000 Feet

0 100 200 400 Meters

2013 Amendment to the 2010 RMPU

Location of the Lower Day Basin PID 12 and 13

Figure D-21a



NOTE:

TOPOGRAPHY PROVIDED BY WILDERMUTH ENVIRONMENTAL, INC., NOVEMBER 2009.

File Name	Scale Factor	Plot Date
Preliminary Lower Day Basin Enhancement Rev4.dwg	1	05-21-2010

PRELIMINARY NOT FOR CONSTRUCTION AND SUBJECT TO REVISION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

DRAFT

Designed By	D.P. LOUNSBURY
Drawn By	J. HERBERT/ P. INTHARATH
Checked By	R.C. WAGNER
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CHINO BASIN WATER CONSERVATION DISTRICT

CHINO BASIN RECHARGE MASTER PLAN UPDATE

SHEET 1 OF 2 SHEETS

Figure D-21b
Site Plan of the Existing Lower Day Basin - PID 12
Source: 2010 RMPU

GURE 5-44

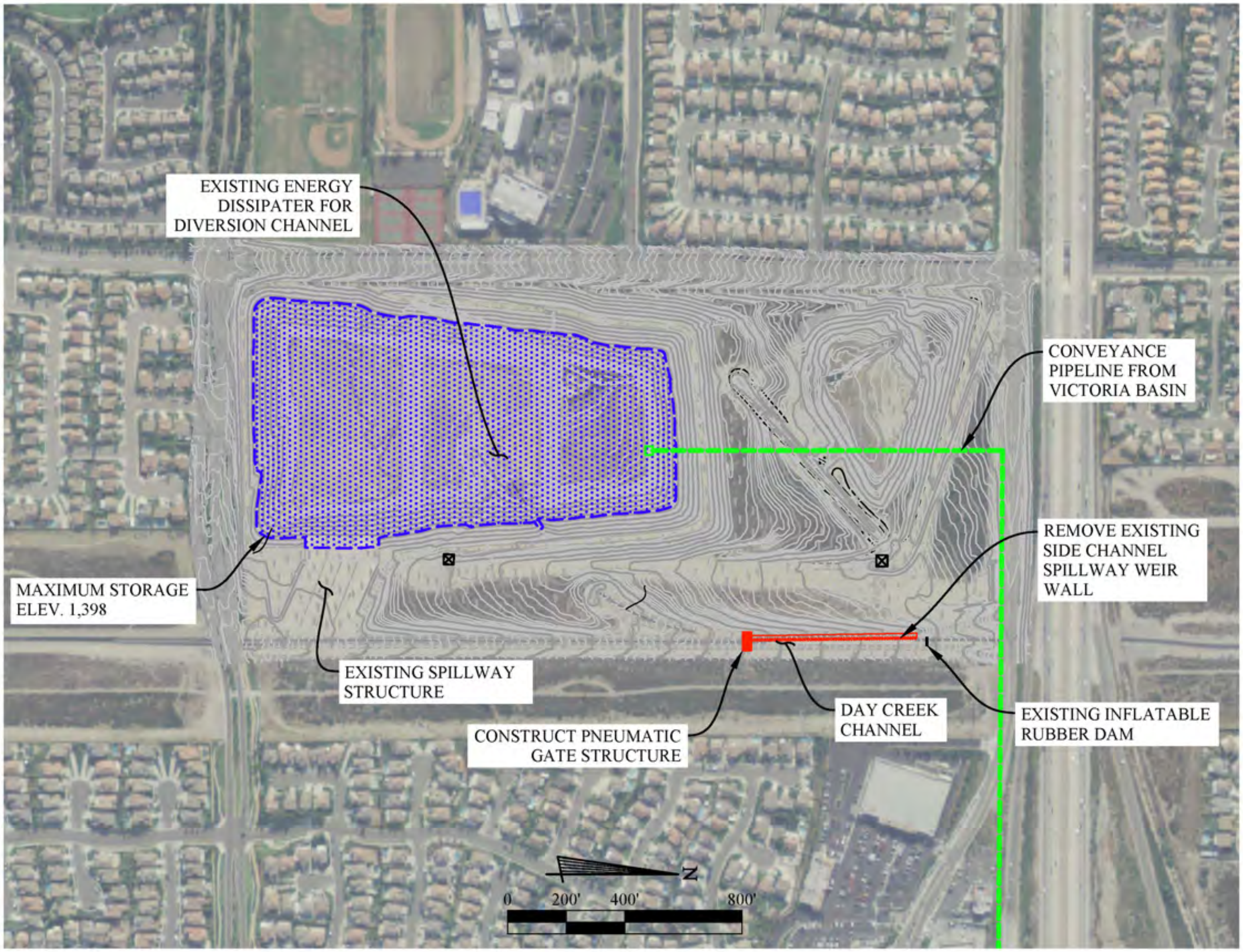
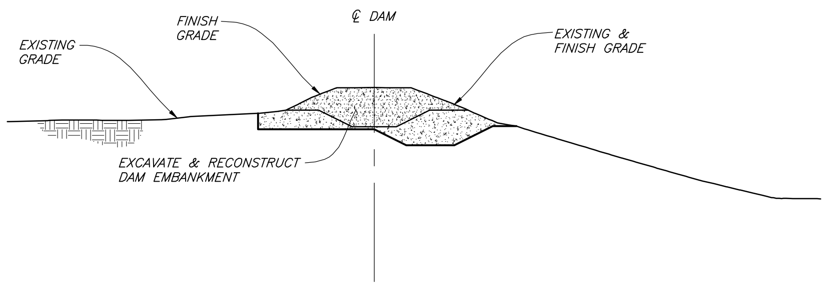
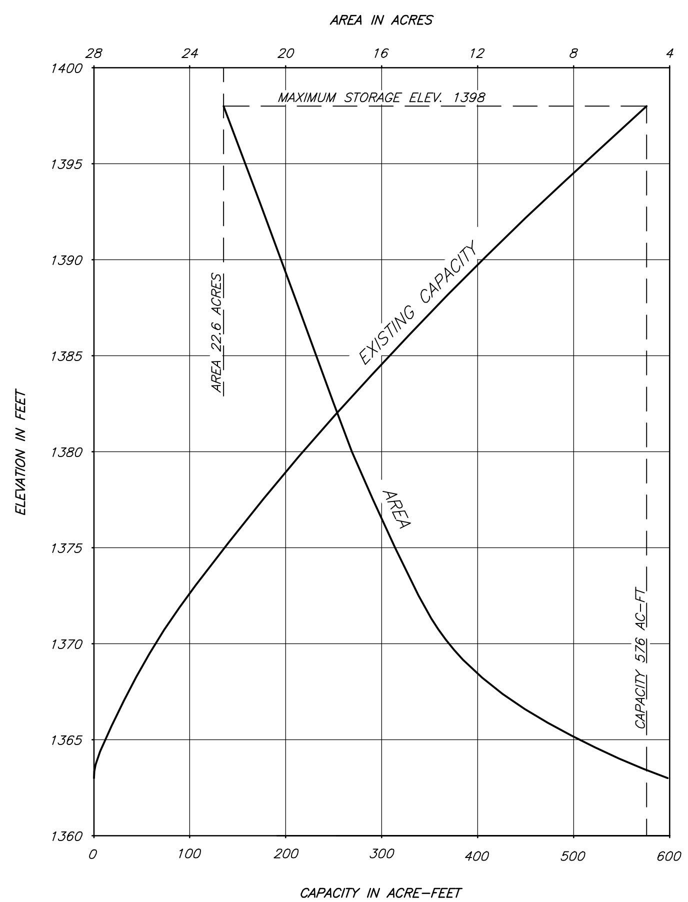


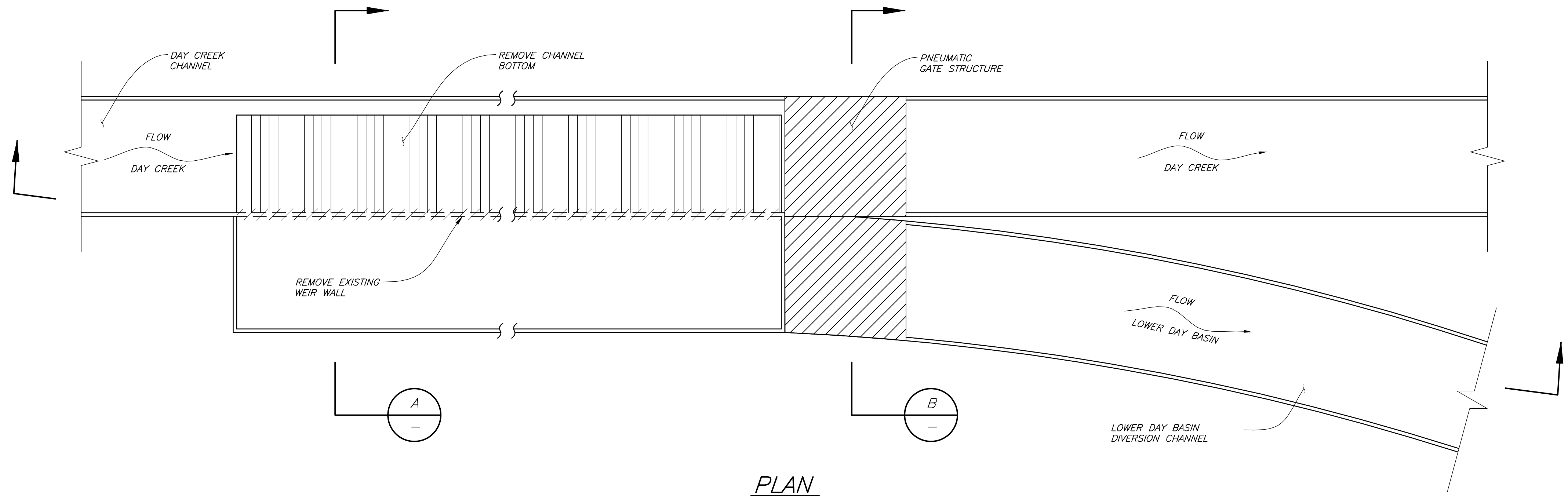
Figure D-21c
Lower Day Basin Evaluated Schematic - PID 12
Source: 2010 RMPU



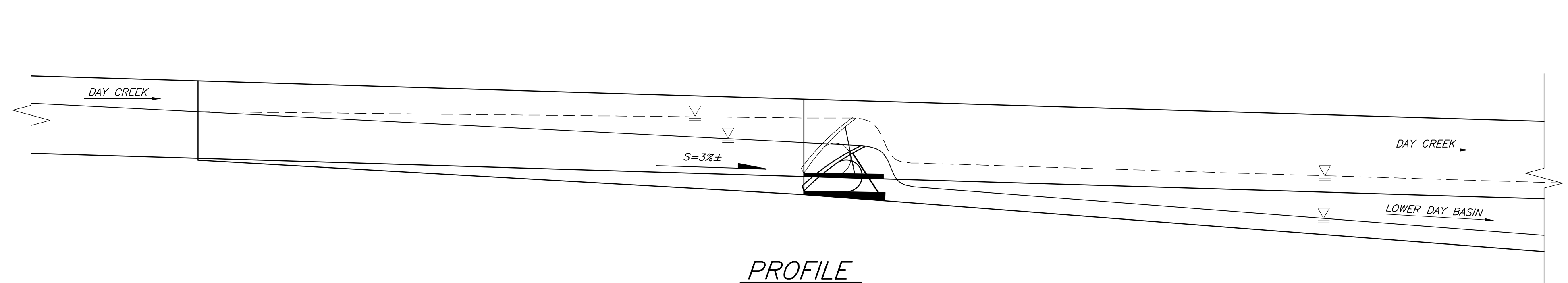
TYPICAL EMBANKMENT RECONSTRUCTION SECTION



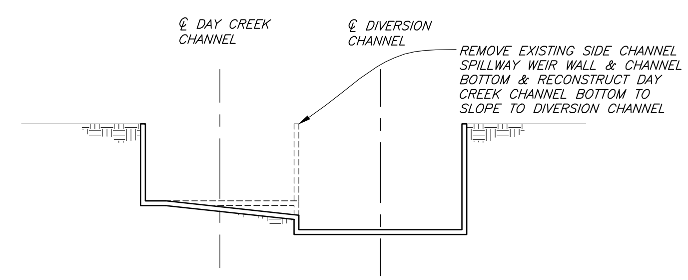
AREA/CAPACITY CURVES



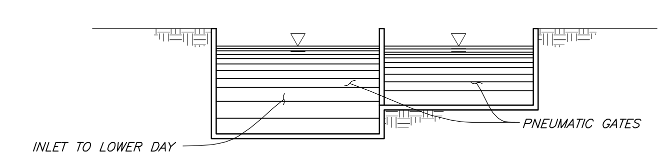
PLAN



PROFILE



SECTION A



SECTION B

DIVERSION CHANNEL IMPROVEMENTS

0' 10' 20' 40'

File Name	Preliminary Lower Day Basin Enhancement Rev4.dwg
Scale Factor	1
Plot Date	05-21-2010

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

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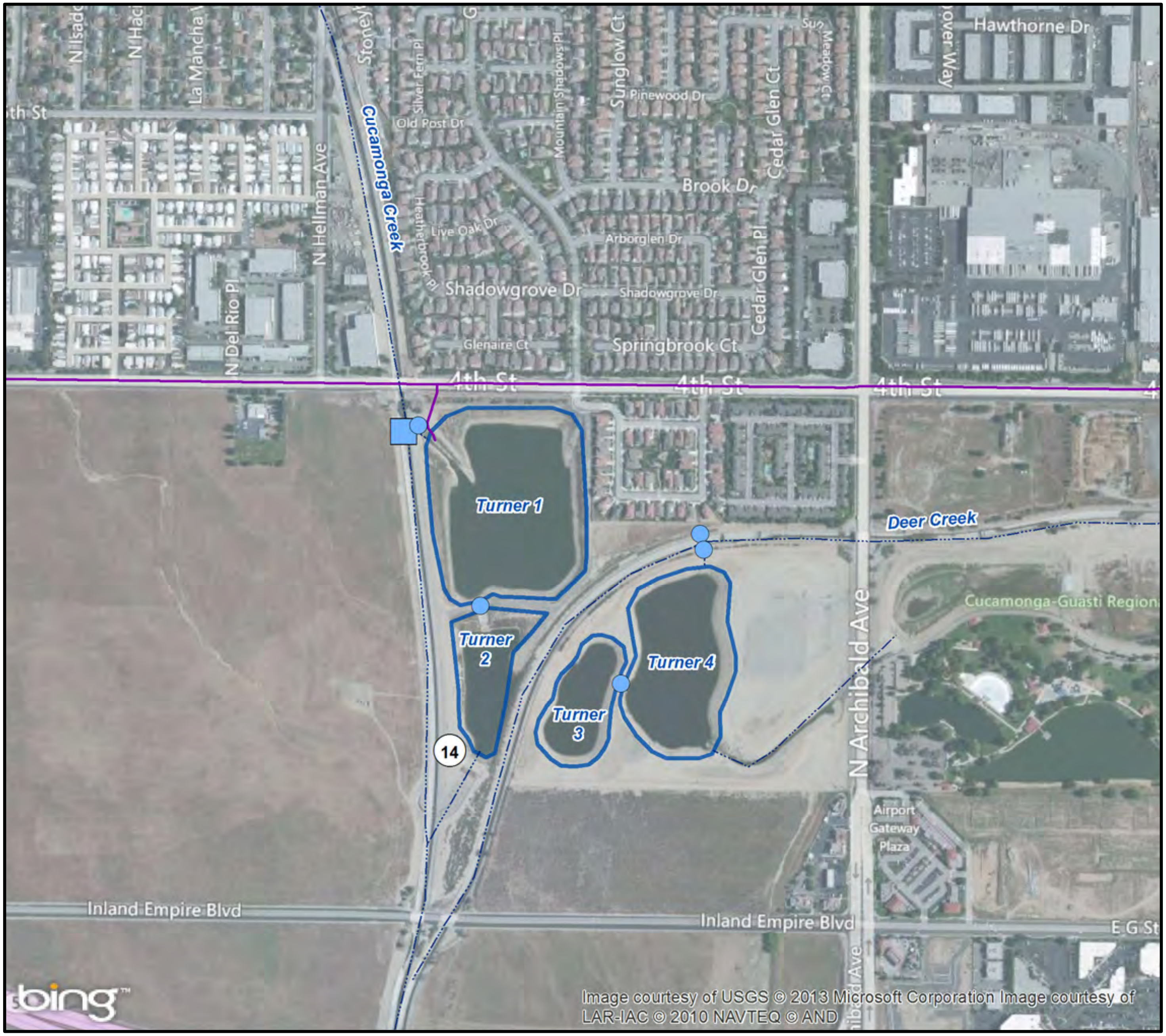
CHINO BASIN WATER CONSERVATION DISTRICT

Figure D-21d

Lower Day Creek Inlet Details - PID 12

Source: 2010 RMPU

SHEET 2 OF 2 SHEETS



Turner Basins

Streams & Flood Control Channels

Water Diversion Structures

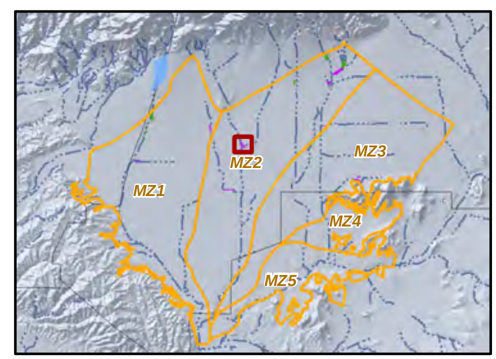
Rubber Dam

Sluice Gate

Recycled Water Pipelines

Operating

PID 14
See Table D-1 for
Project Description



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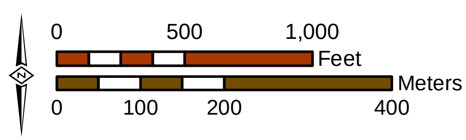
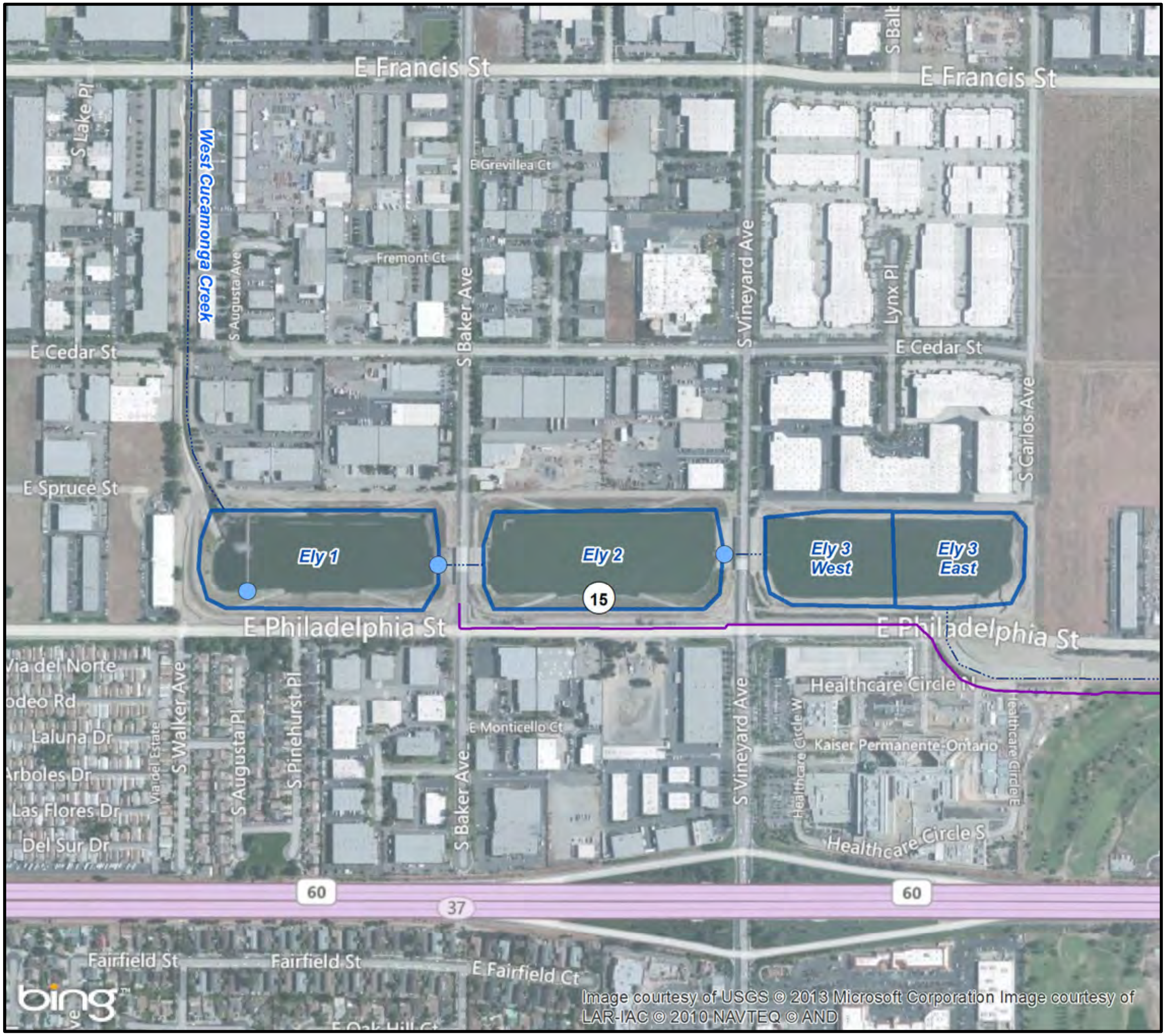
Date: 9/6/2013
Name: Figure_D-22



2013 Amendment to the 2010 RMPU

Location of the Turner Basins Evaluated Alternatives Schematic PID 14

Figure D-22



Ely Basins

Streams & Flood Control Channels

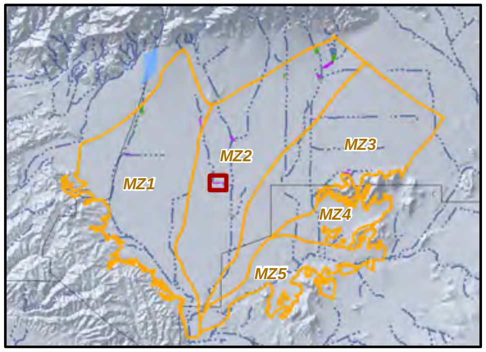
Water Diversion Structures

Sluice Gate

Recycled Water Pipelines

Operating

15 PID 15
See Table D-1 for
Project Description



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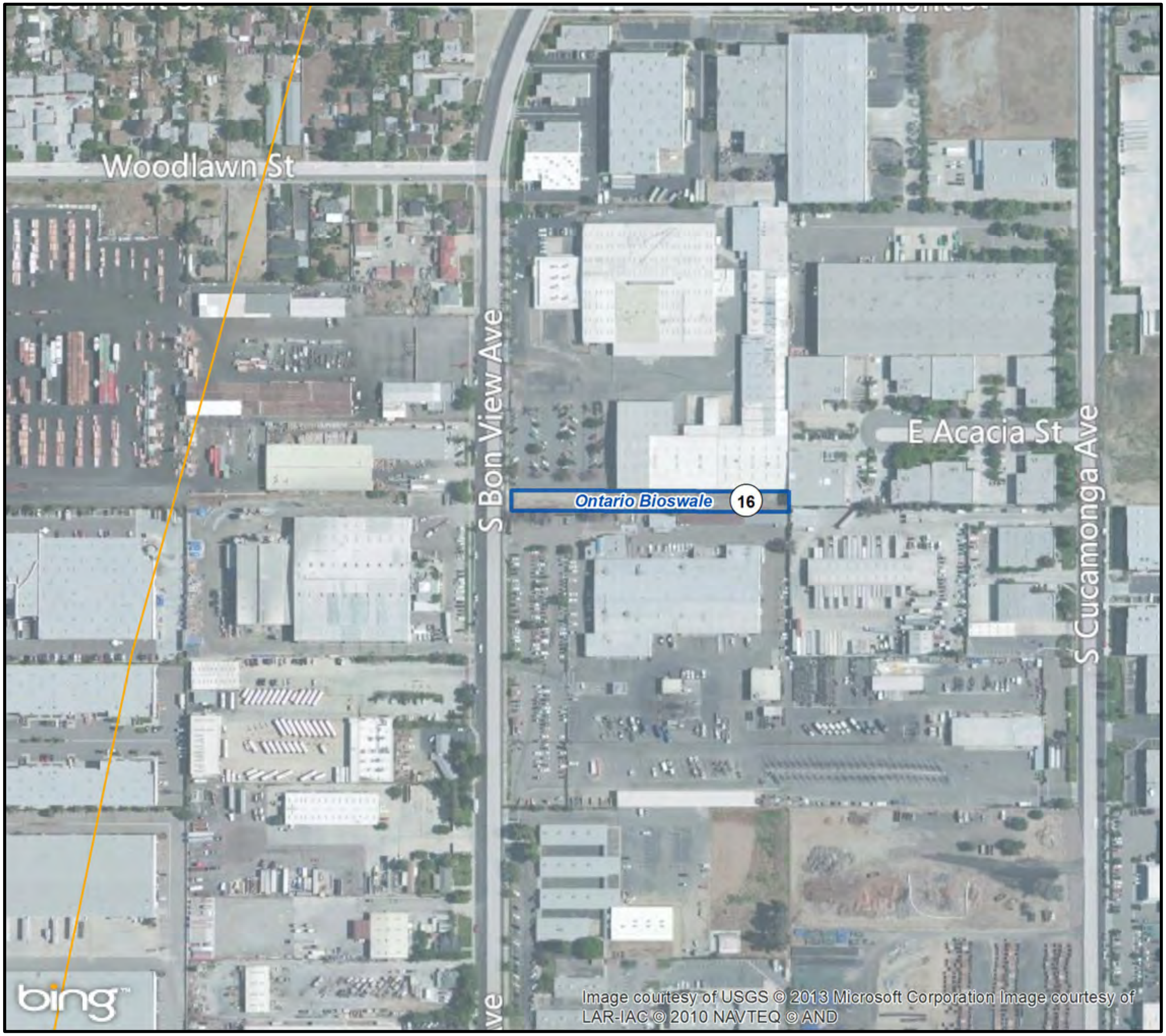
Author: MJC
Date: 9/6/2013
Name: Figure_D-23

0 500 1,000 Feet
0 75 150 300 Meters

2013 Amendment to the
2010 RMPU

Location of the Ely Basins
Evaluated Alternatives Schematic
PID 15

Figure D-23

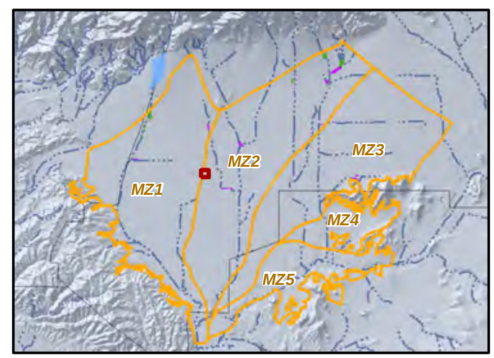


Ontario Bioswale

Water Diversion Structures

Sluice Gate

16 PID 16
See Table D-1 for
Project Description



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Author: MJC
Date: 9/6/2013
Name: Figure_D-24a

0 400 800 Feet
0 50 100 200 Meters

2013 Amendment to the
2010 RMPU

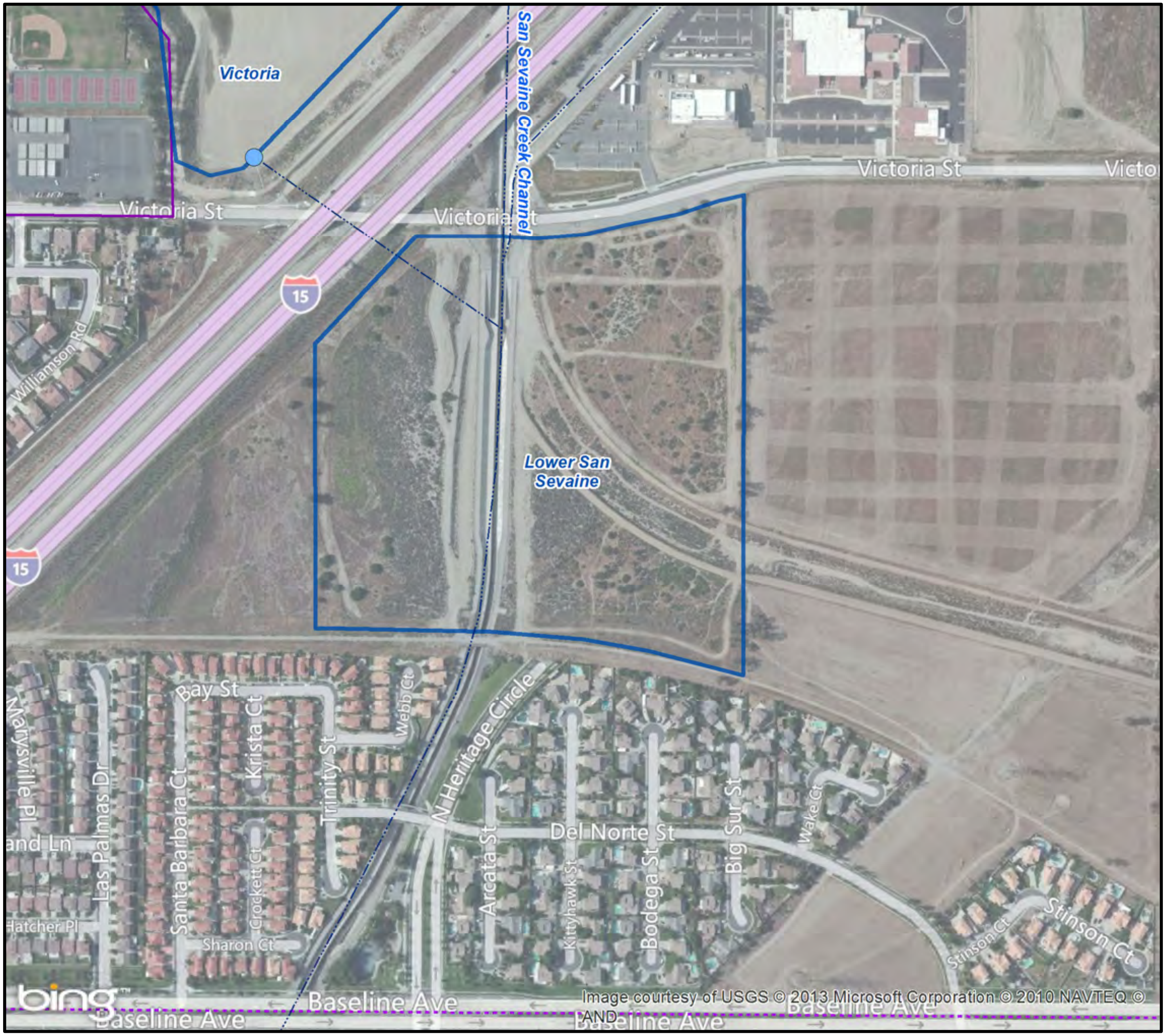
Location of the Ontario Municipal Services Center Bioswale Project Evaluated Alternatives Schematic PID 16

Figure D-24a

Figure D-24b

Ontario Bioswale Grading Plan - PID 16

Source: City of Ontario



Lower San Sevaine Basin

Streams & Flood Control Channels

Water Diversion Structures

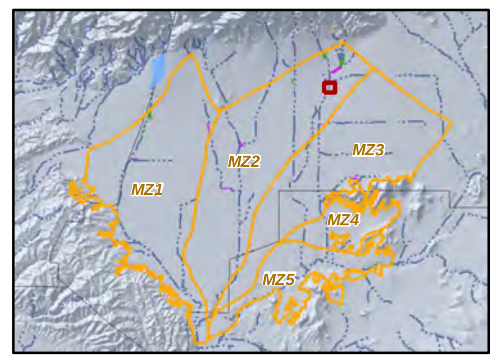
Sluice Gate

Recycled Water Pipelines

Operating

Planning

11 PID 17
(See Table D-1 for Project Description)



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Author: MJC
Date: 9/6/2013
Name: Figure_D-25a

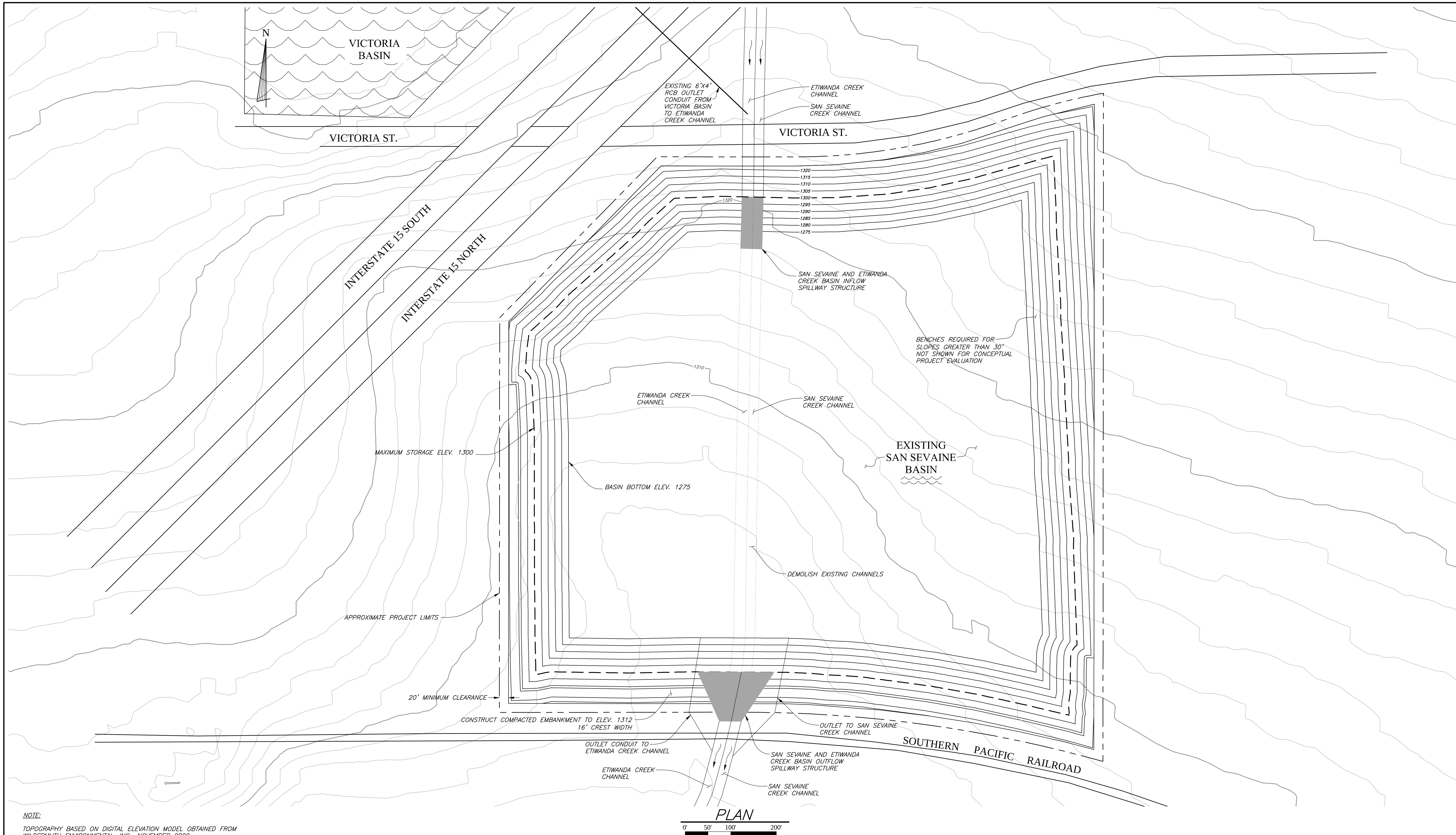
0 500 1,000 Feet
0 75 150 300 Meters

2013 Amendment to the 2010 RMPU

Location of the Lower San Sevaine Basin PID 11

Figure D-25a

Figure D-25b
Lower San Sevaine Basin Alternative Schematic - PID 12
Source: 2010 RMPU



NOTE:

TOPOGRAPHY BASED ON DIGITAL ELEVATION MODEL OBTAINED FROM WILDERMUTH ENVIRONMENTAL, INC., NOVEMBER 2009.

File Name	Scale Factor	Plot Date
Proposed San Sevaine Channel Basin Rev3.dwg	1	04-21-2010

PRELIMINARY NOT FOR CONSTRUCTION AND SUBJECT TO REVISION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

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Checked By	R.C. WAGNER
Approved By	

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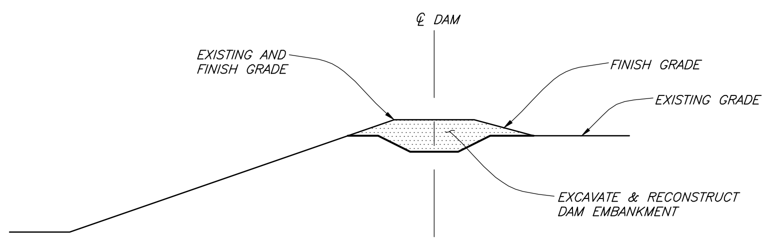
CHINO BASIN WATER CONSERVATION DISTRICT

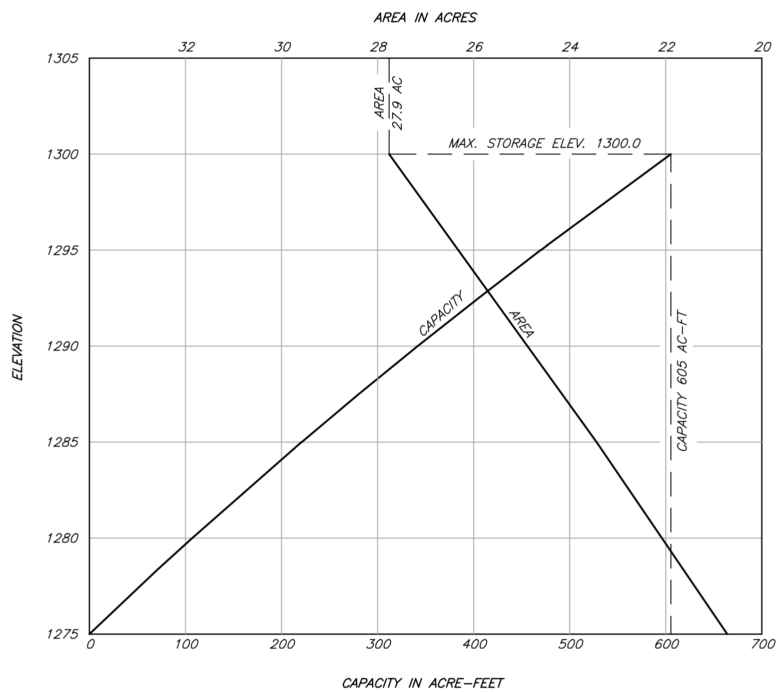
SHEET 1 OF 2 SHEETS

Figure D-25c
Grading Plan of the Lower San Sevaine Basin - PID 17
Source: 2010 RMPU

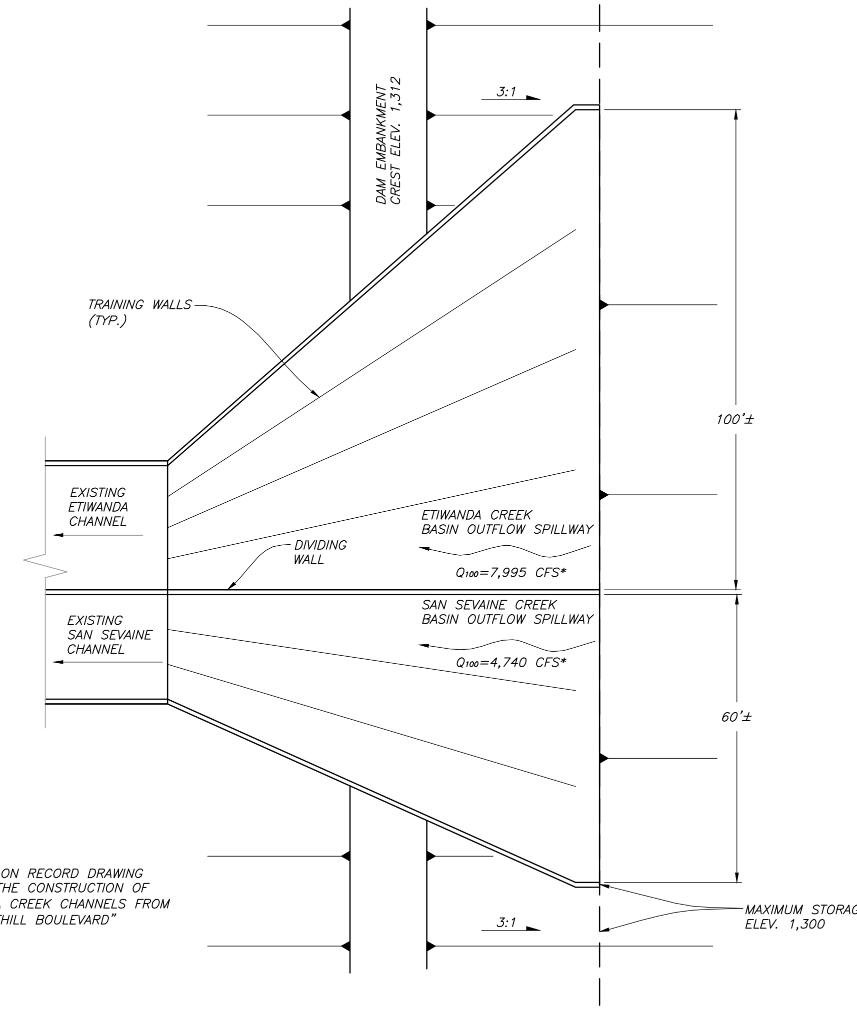
GURE 5-55



TYPICAL SECTION

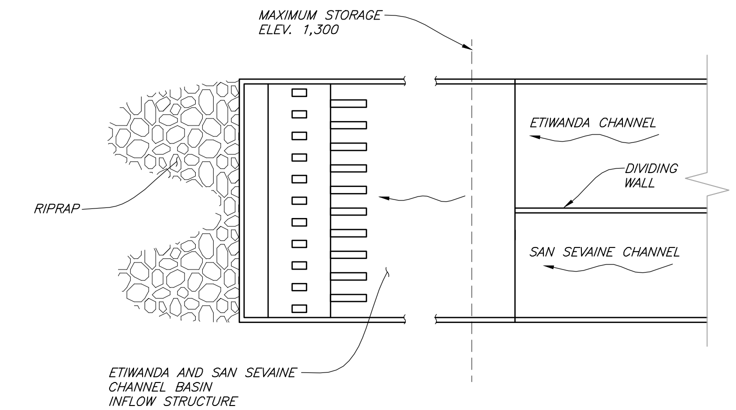


AREA/CAPACITY CURVES

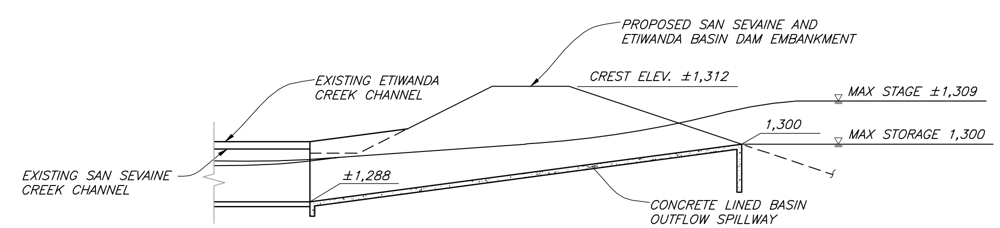


* FLOW VALUES AS SHOWN ON RECORD DRAWING OF SBCFCD, PLANS FOR THE CONSTRUCTION OF "SAN SEVAINE & ETIWANDA CREEK CHANNELS FROM VICTORIA AVENUE TO FOOTHILL BOULEVARD"

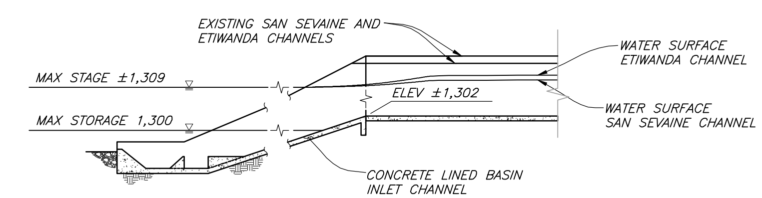
PLAN OF BASIN OUTFLOW SPILLWAY



PLAN OF BASIN INLET CHANNEL ENERGY DISSIPATION STRUCTURE



BASIN OUTFLOW SPILLWAY HYDRAULIC SCHEMATIC



BASIN INLET CHANNEL HYDRAULIC SCHEMATIC

File Name: Proposed San Sevaine Channel Basin Rev3.dwg
Scale Factor: 1
Plot Date: 04-21-2010

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REVISIONS			
REF.	DESCRIPTION	APVD.	DATE

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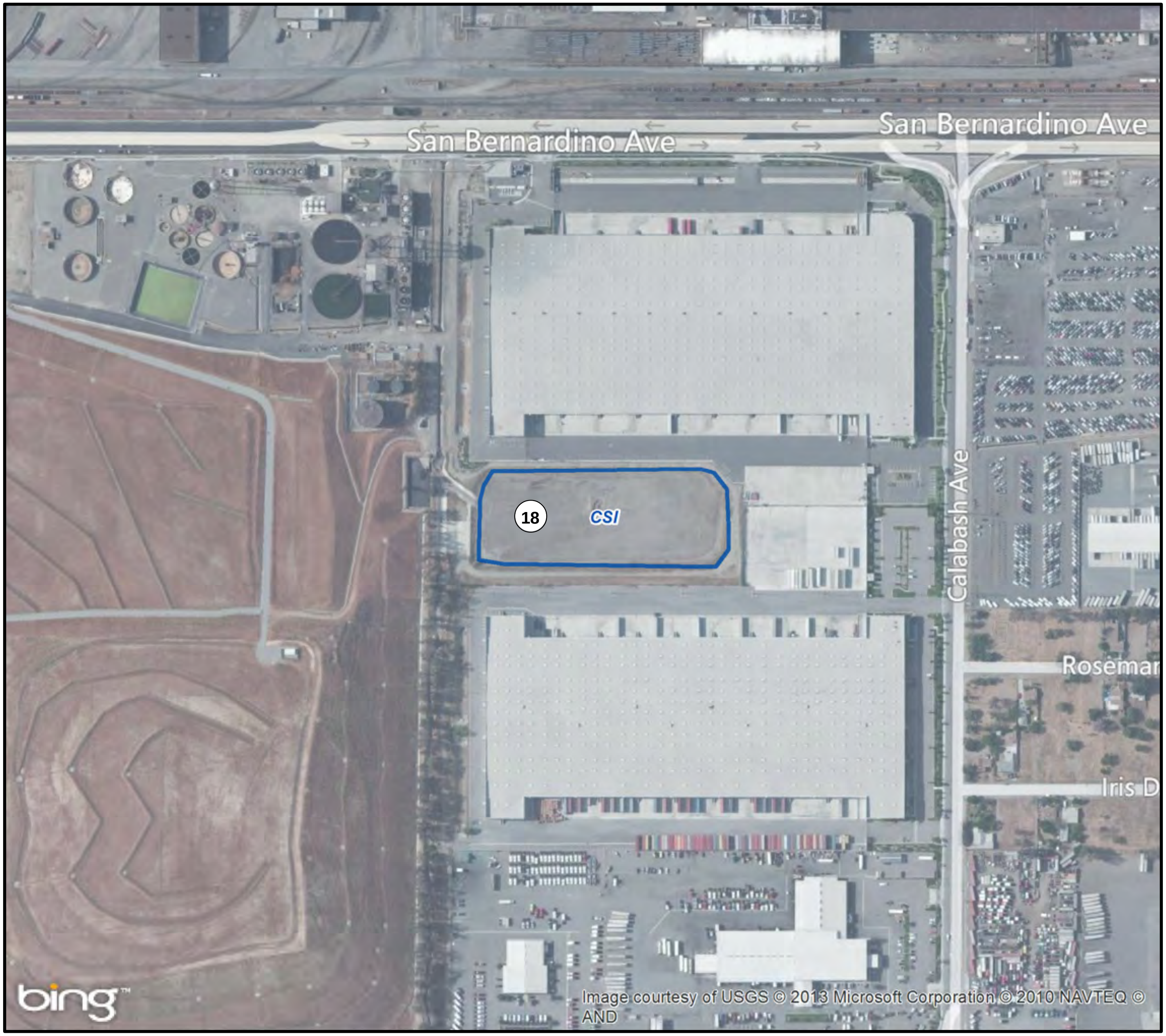
CHINO BASIN WATER CONSERVATION DISTRICT

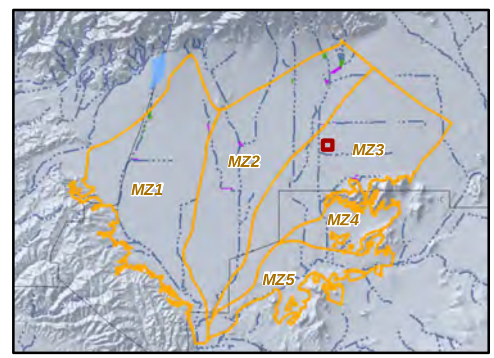
SHEET

Figure D-25d
Inlet and Outlet Details for the Lower San Sevaine Basin - PID 17
Source: 2010 RMPU



CSI Storm Water Basin

(18) PID - 18
See Table D-1 for
Project Description



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Author: MJC
Date: 9/6/2013
Name: Figure_D-26

0 400 800 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

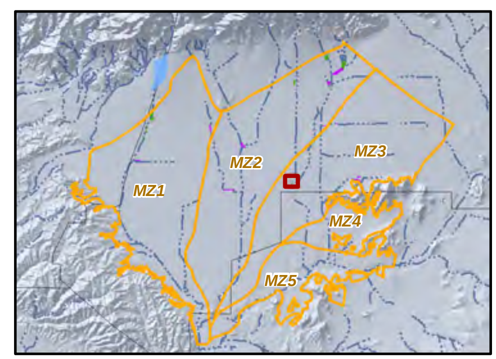
Location of the CSI Storm Water Basin Evaluated Alternatives Schematic PID 18

Figure D-26

Wineville Basin

18 PID - 19
See Table D-1 for
Project Description

Recycled Water Pipeline (In Design)



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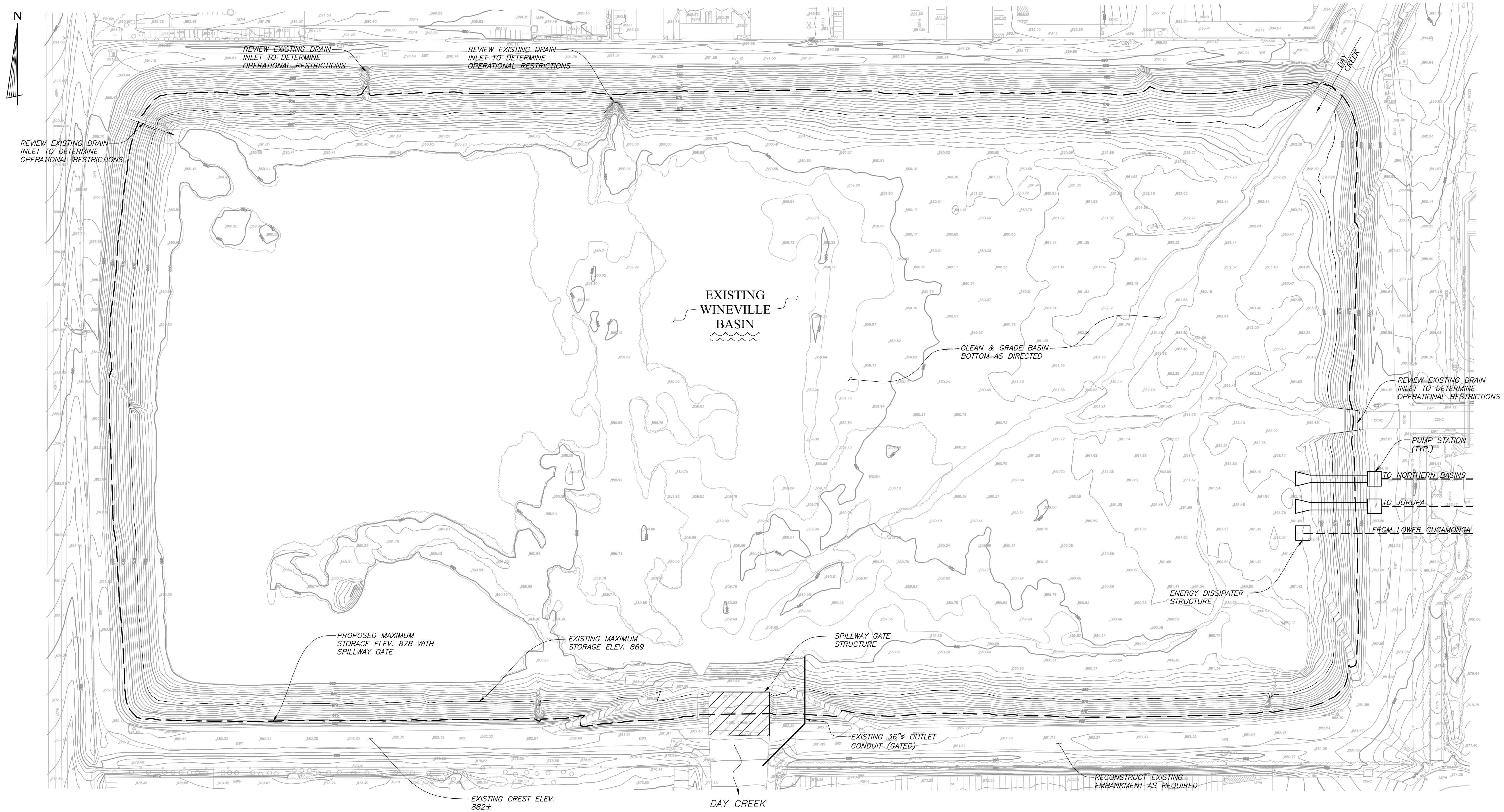
Author: MJC
Date: 9/6/2013
Name: Figure_D-27a

0 400 800 Feet
0 50 100 200 Meters

2013 Amendment to the
2010 RMPU

Location of the Wineville Basin
PID 19

Figure D-27a



PLAN

0' 50' 100' 200'

NOTE:

TOPOGRAPHY PROVIDED BY WILDERMUTH ENVIRONMENTAL INC., NOVEMBER 2009.

File Name	Preliminary Wineville Basin Enlargement Rev2.dwg
Scale Factor	1
Plot Date	04-21-2010

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SUBJECT TO REVISION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

DRAFT

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Approved By	

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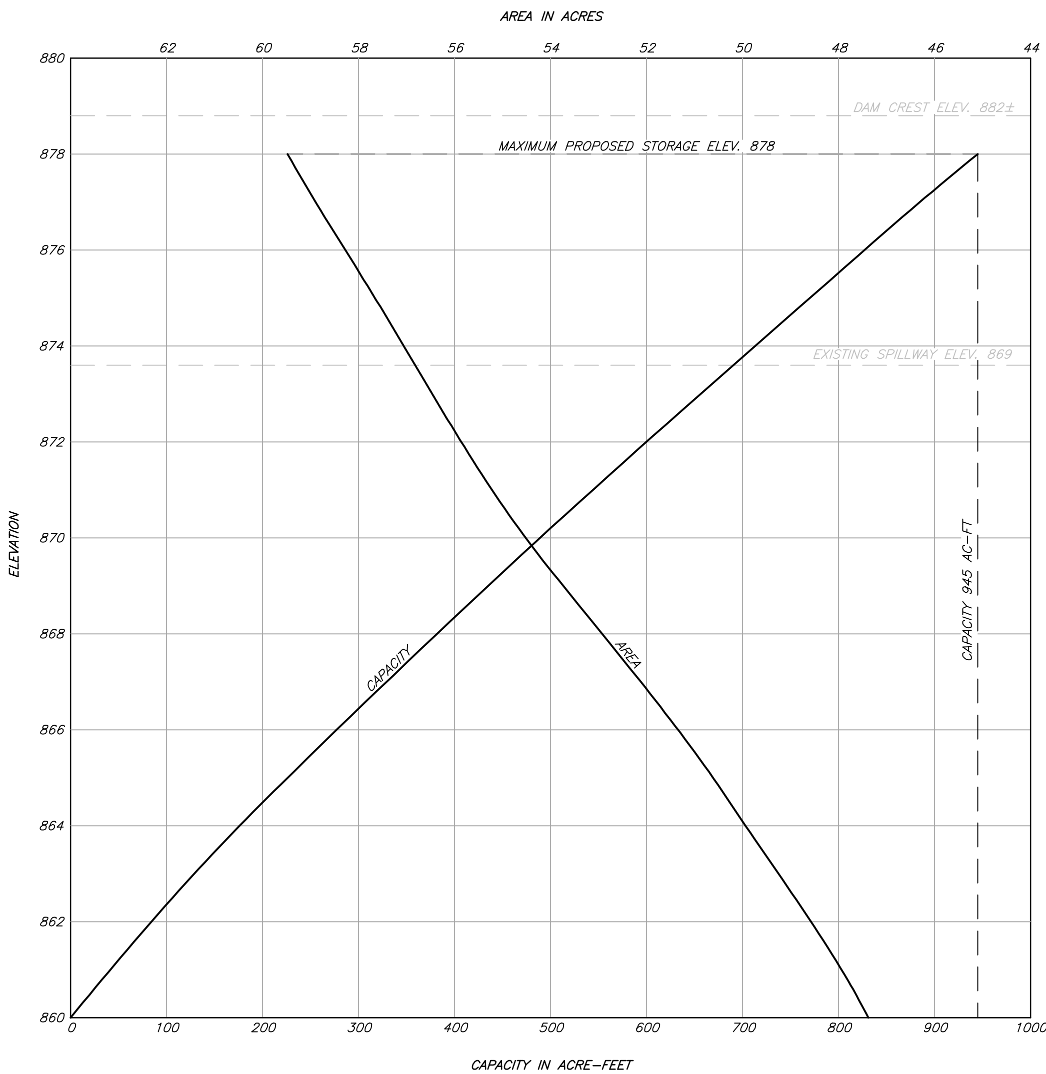
CHINO BASIN WATER CONSERVATION DISTRICT

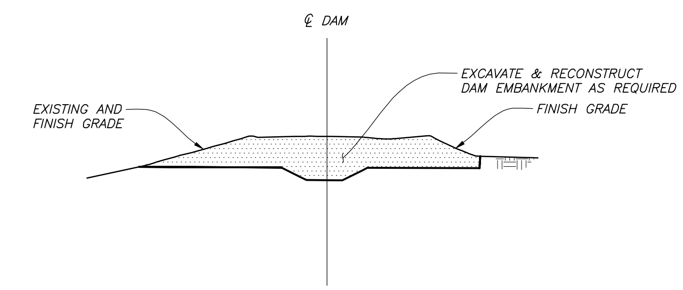
SHEET

Figure D-27b
Site Plan of the Existing Wineville Basin - PID 19
Source: 2010 RMPU

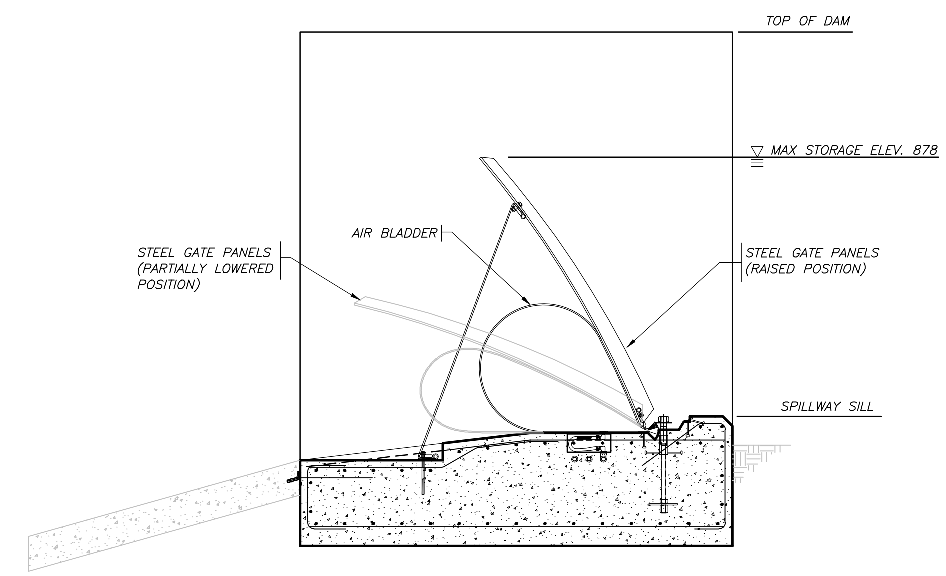
Figure D-27c
Wineville Basin Alternative Schematic - PID 19
Source: 2010 RMPU



AREA/CAPACITY CURVE



TYPICAL EMBANKMENT RECONSTRUCTION SECTION



CONCEPTUAL SPILLWAY GATE SECTION

NOT TO SCALE

File Name: Preliminary Wineville Basin Enlargement Rev2.dwg
Scale Factor: 1
Plot Date: 04-21-2010

PRELIMINARY
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AND
SUBJECT TO REVISION

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

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CHINO BASIN WATER CONSERVATION DISTRICT

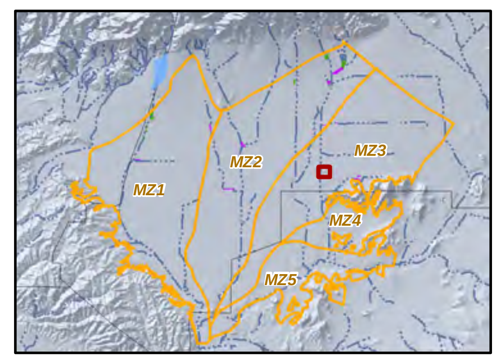
SHEET

Figure D-27d
Wineville Basin Spillway Details - PID 19
Source: 2010 RMPU

Wineville Basin

(18) PID - 20
See Table D-1 for Project Description

Recycled Water Pipeline (In Design)



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Author: MJC
Date: 9/6/2013
Name: Figure_D-28a

0 400 800 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

Location of the Jurupa Basin PID 20

Figure D-28a

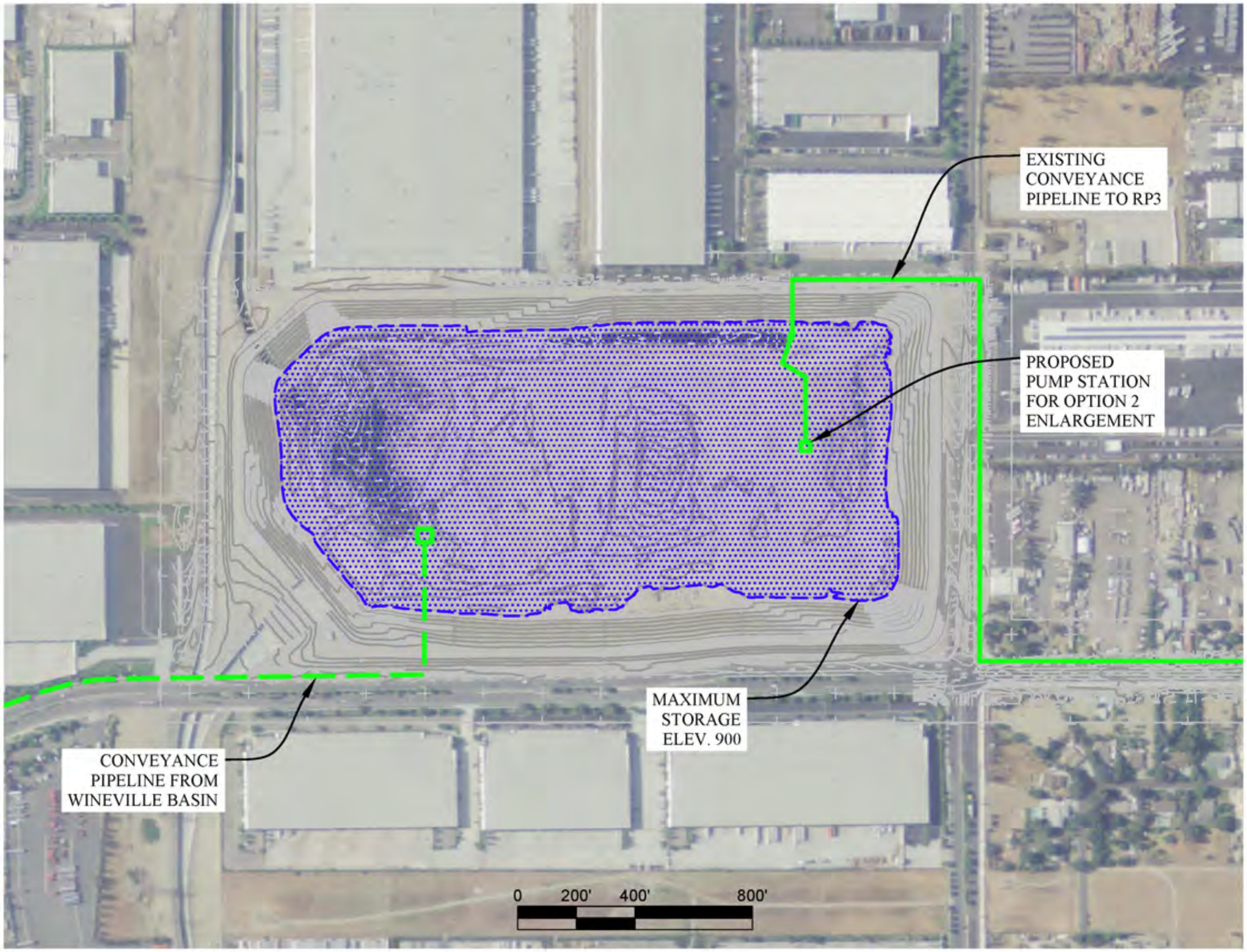


Figure D-28b
Jurupa Basin Alternative Schematic - PID 20
Source: 2010 RMPU

RP3 Basins

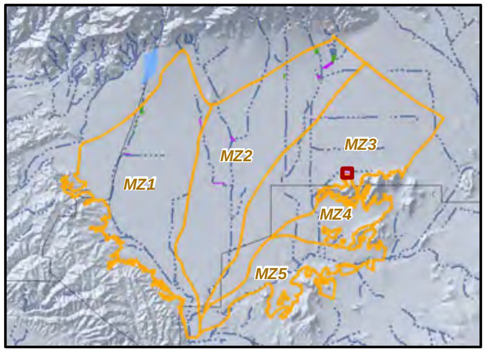
Proposed RP3 Cell

(22) PID 21 and 22
See Table D-1 for
Project Description

Water Diversion Structures

Rubber Dam

Sluice Gate



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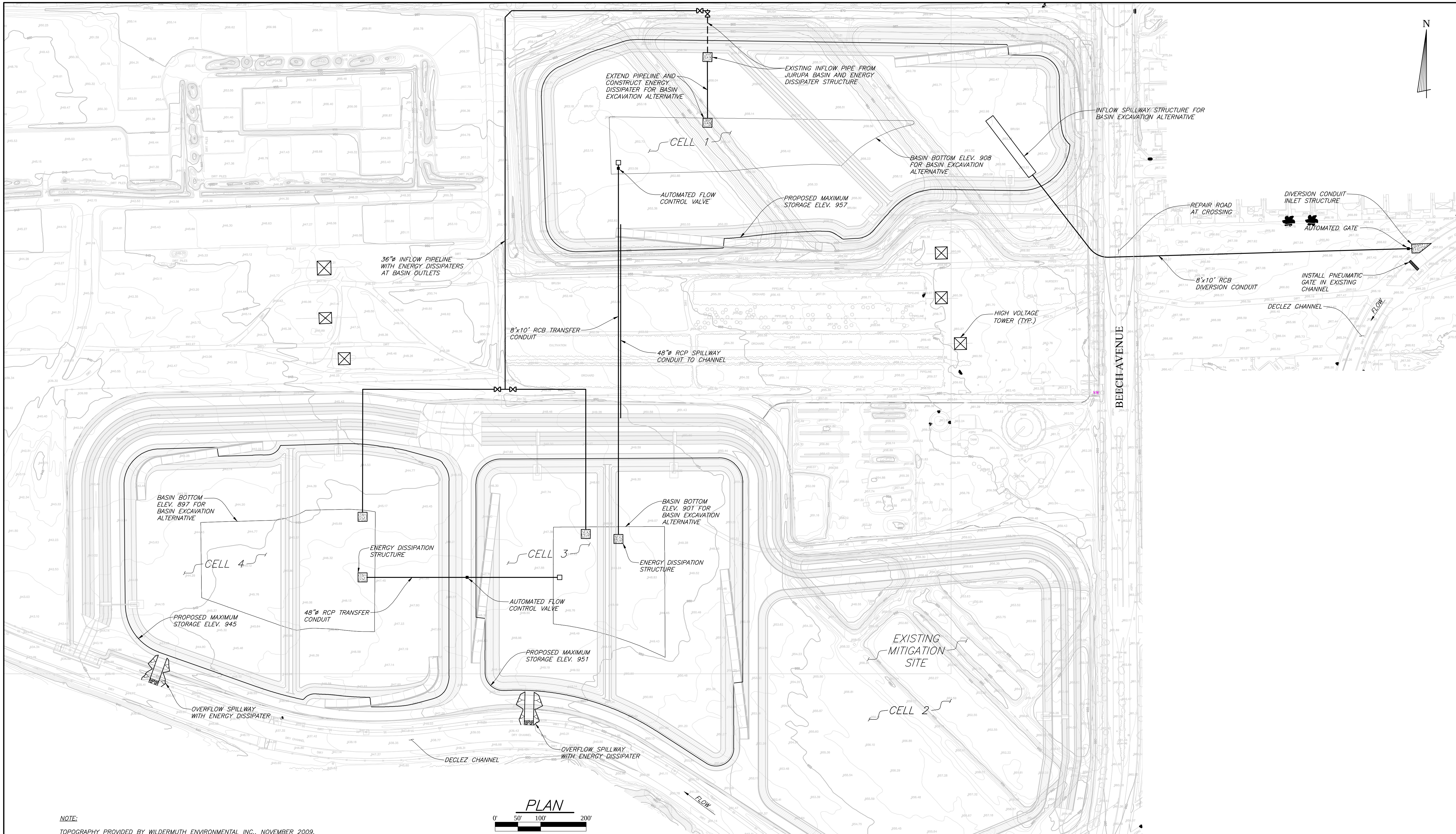
Author: MJC
Date: 9/8/2013
Name: Figure_D-29a

0 250 500 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

Location of the RP3 Basins PID 21 and 22

Figure D-29a



NOTE:

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File Name: RP3 Design Rev3.dwg
Scale Factor: 1
Plot Date: 04-21-2010

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REVISIONS

REF.	DESCRIPTION	APVD.	DATE

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Checked By: R.C. WAGNER
Approved By:

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CHINO BASIN WATER CONSERVATION DISTRICT

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Figure D-29b
Site Plan of the Existing RP3 Basins - PID 21
Source: 2010 RMPU

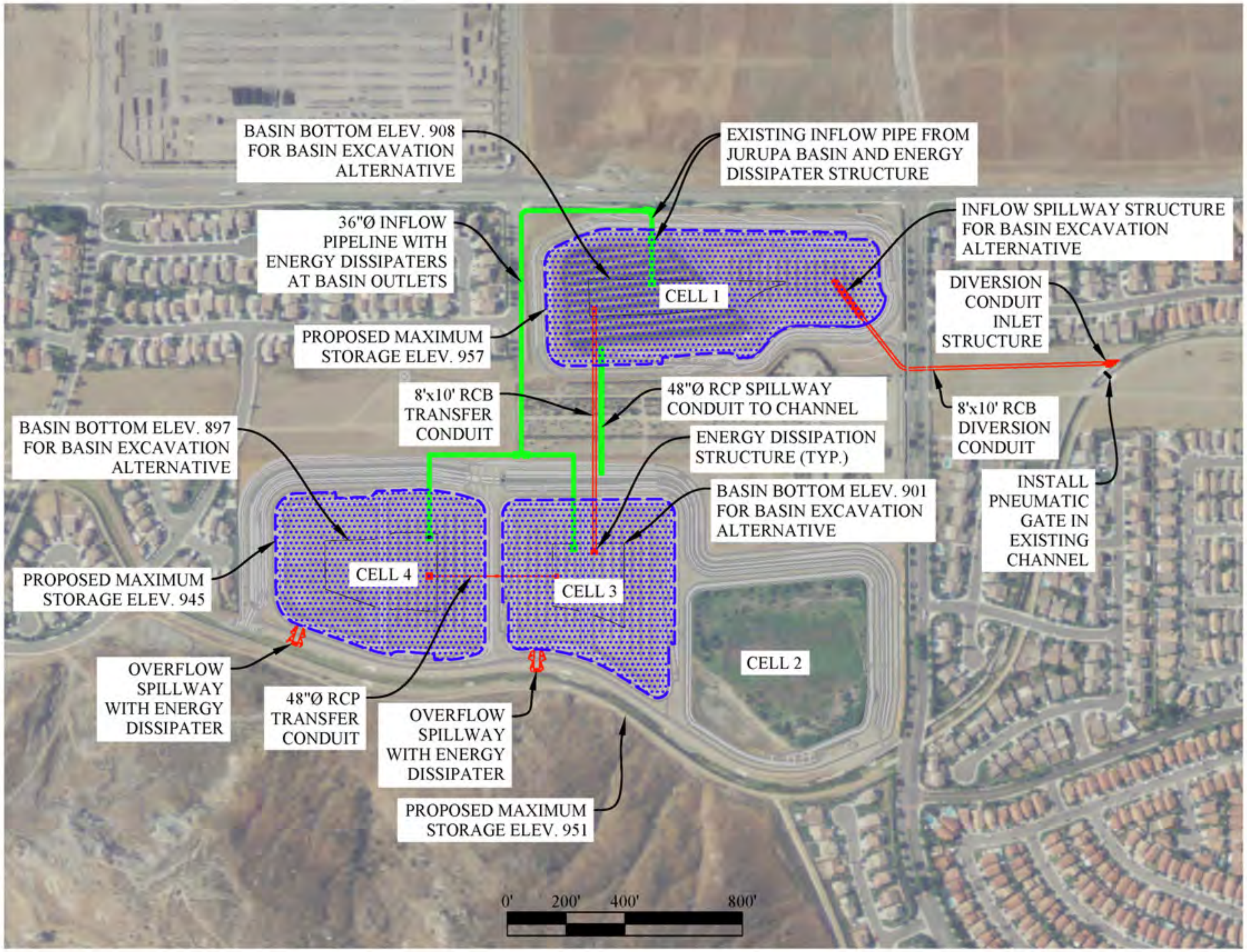
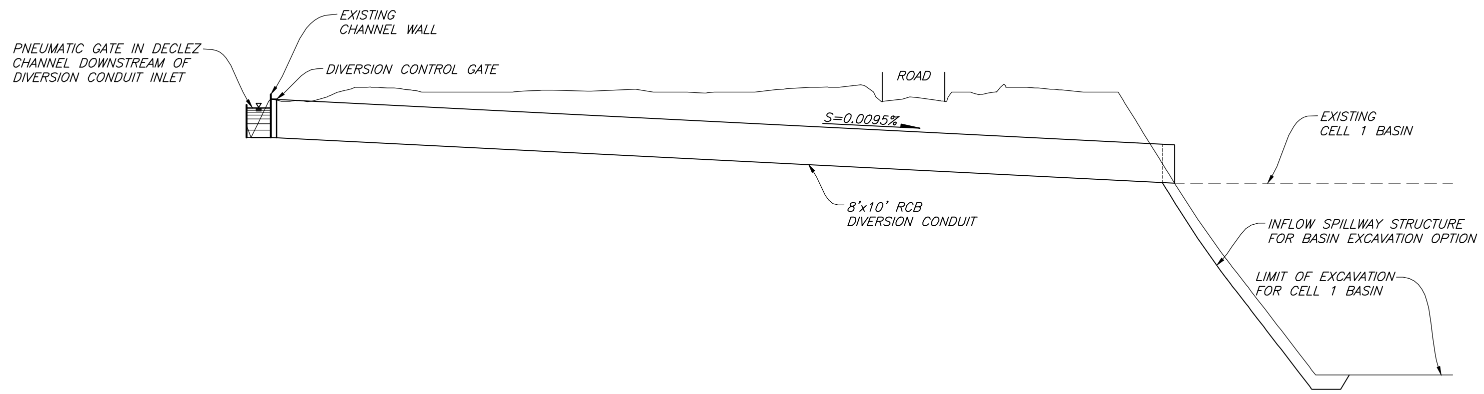


Figure D-29c
RP3 Basins Alternative Schematic- PID 21
Source: 2010 RMPU



PROFILE OF DECLEZ CREEK DIVERSION CONDUIT
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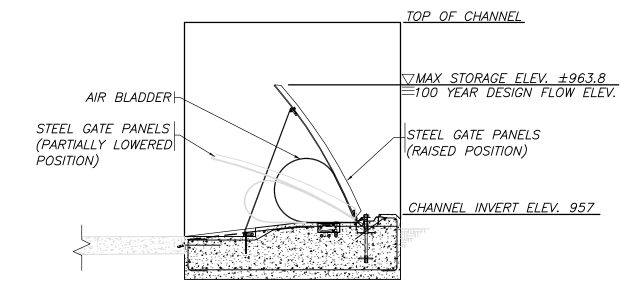

CONCEPTUAL DECLEZ CHANNEL GATE SECTION
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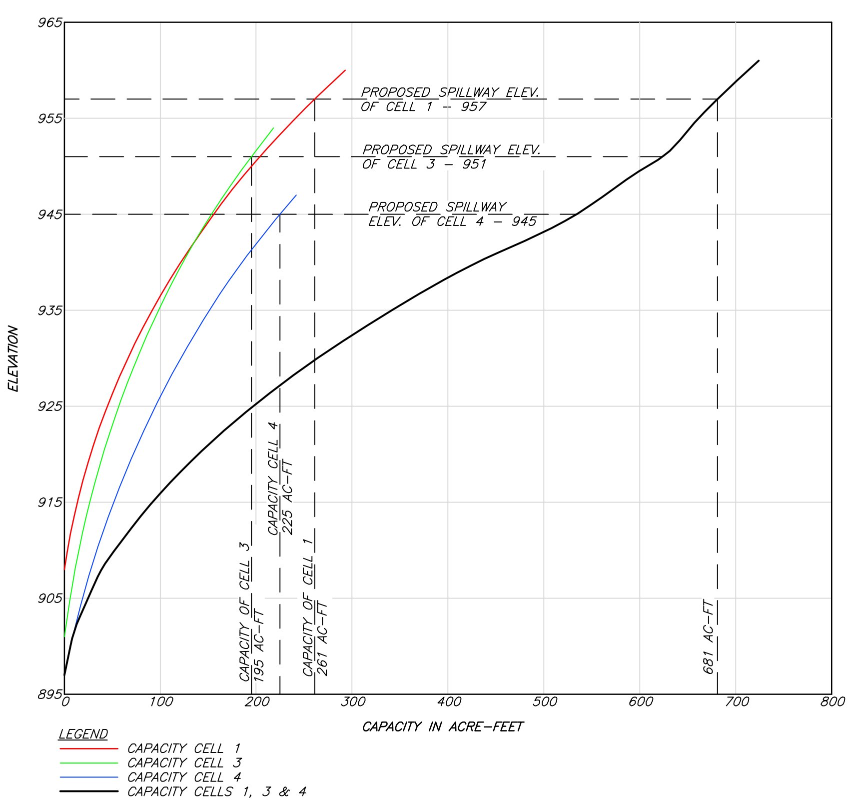
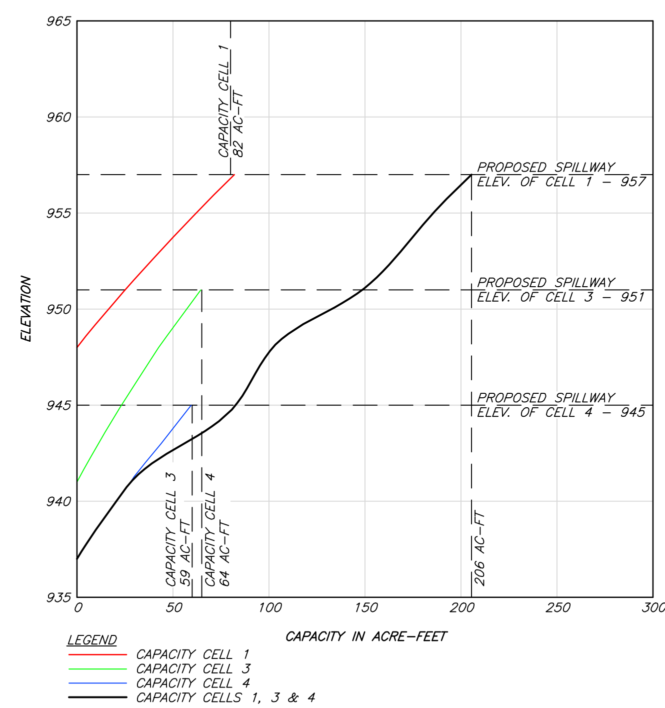


CAPACITY CURVES (WITH BASIN EXCAVATION)



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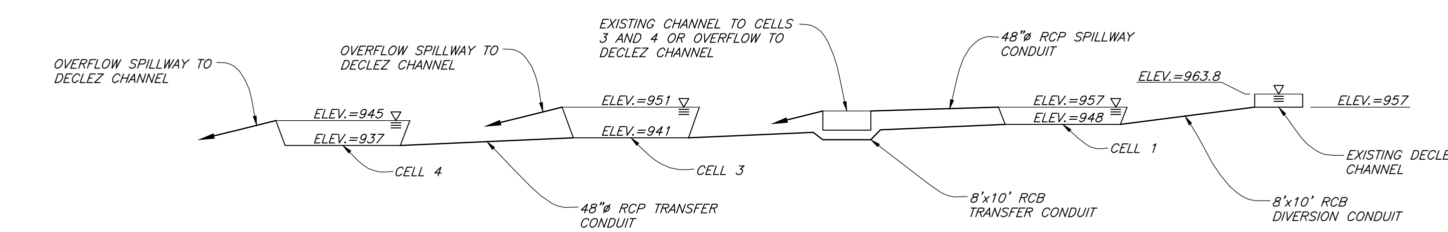

CONVEYANCE SYSTEM SCHEMATIC – NO EXCAVATION
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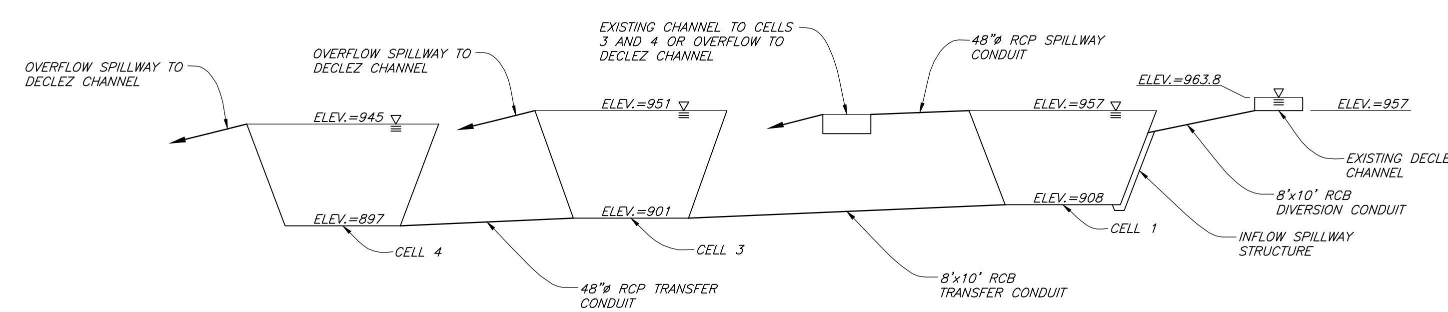

CONVEYANCE SYSTEM SCHEMATIC – WITH EXCAVATION
NOT TO SCALE

File Name: RP3 Design Rev3.dwg
Scale Factor: 1
Plot Date: 04-21-2010

**PRELIMINARY
NOT FOR CONSTRUCTION
AND
SUBJECT TO REVISION**

REVISIONS

REF.	DESCRIPTION	APVD.	DATE

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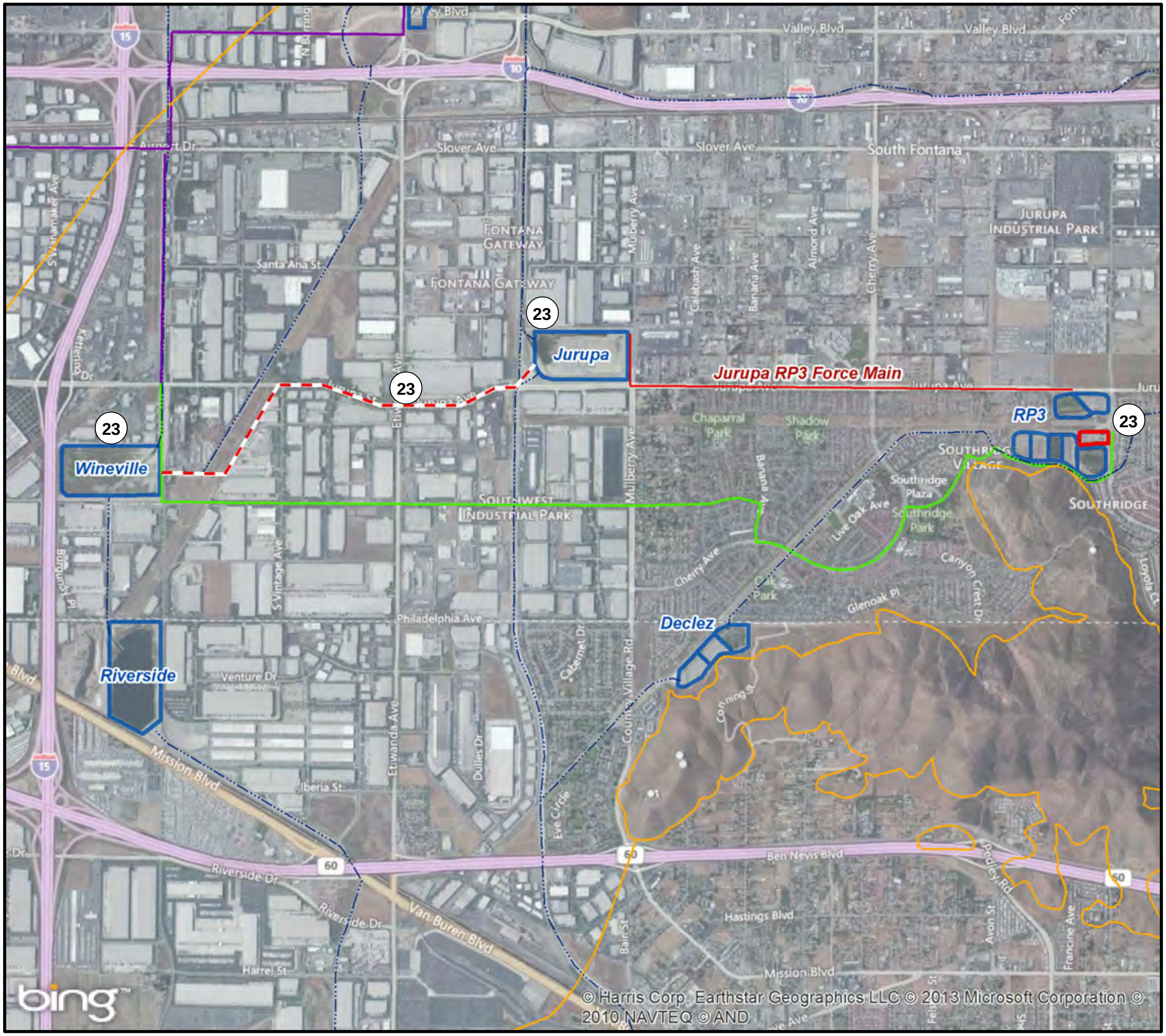
CHINO BASIN WATER CONSERVATION DISTRICT

SHEET

Figure D-29d
RP3 Basins Internal Conveyance Details - PID 21
Source: 2010 RMPU



RP3 Basins

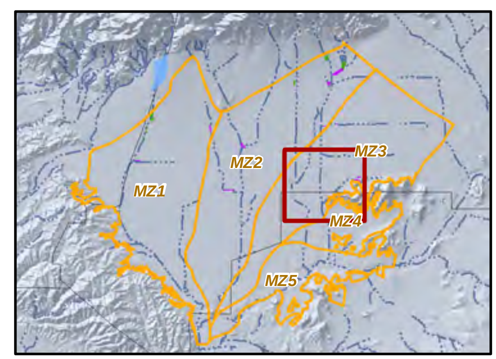
Proposed RP3 Cell

23 PID - 23
See Table D-1 for
Project Description

Proposed Conveyance Pipeline

Recycled Water Pipelines
(Symbolized by Status)

Existing
In Construction
Planned
In Design



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Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

Author: MJC
Date: 9/8/2013
Name: Figure_D-30

0 3,000 6,000 Feet
0 500 1,000 2,000 Meters

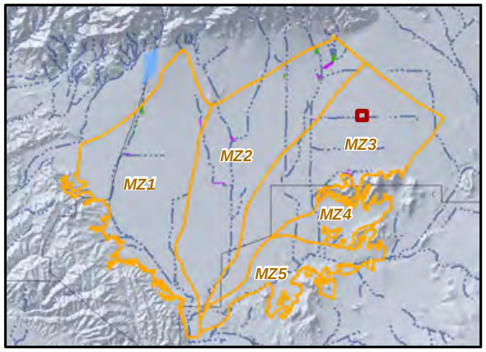
2013 Amendment to the
2010 RMPU

**2013 RMPU Proposed Wineville PS to Jurupa,
Expanded Jurupa PS to RP3 Basin,
and 2013 Proposed RP3 Improvements
PID 23**

Figure D-30

Wineville Basin

(27) PID - 24
See Table D-1 for
Project Description



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Author: MJC
Date: 9/8/2013
Name: Figure_D-31a_

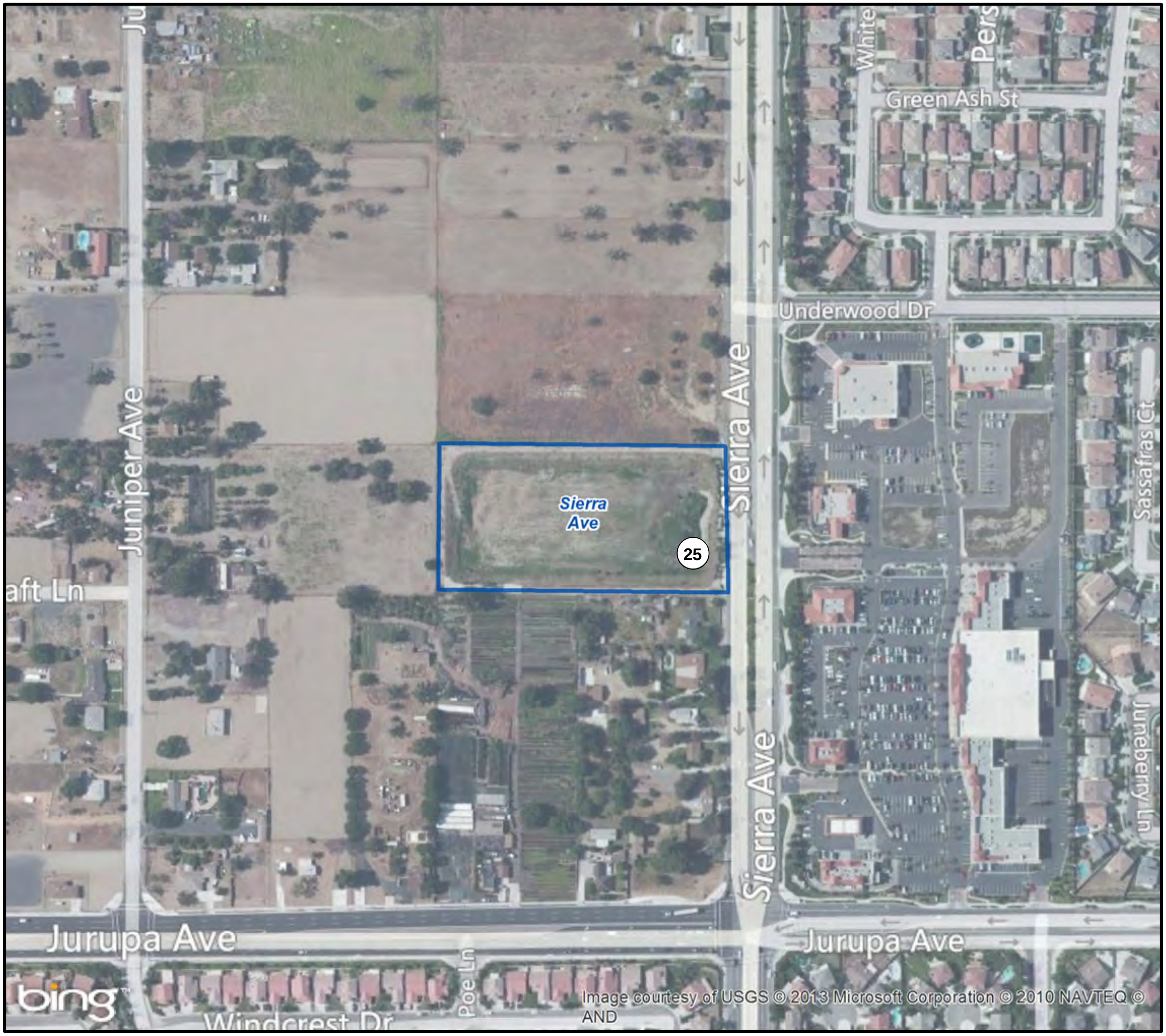
0 400 800 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

Location of the Vulcan Pit
PID 24

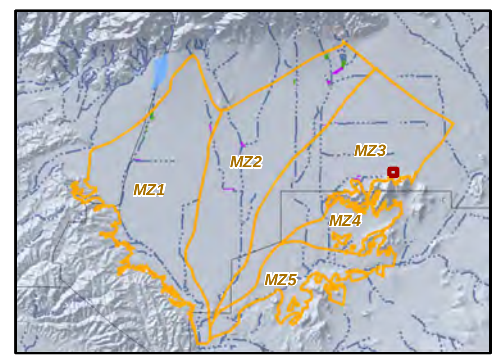
Figure D-34a

Figure D-31b
Vulcan Pit Alternative Schematic- PID 24
Source: 2010 RMPU



Sierra Ave Basin

25 PID 25
See Table D-1 for Project Description



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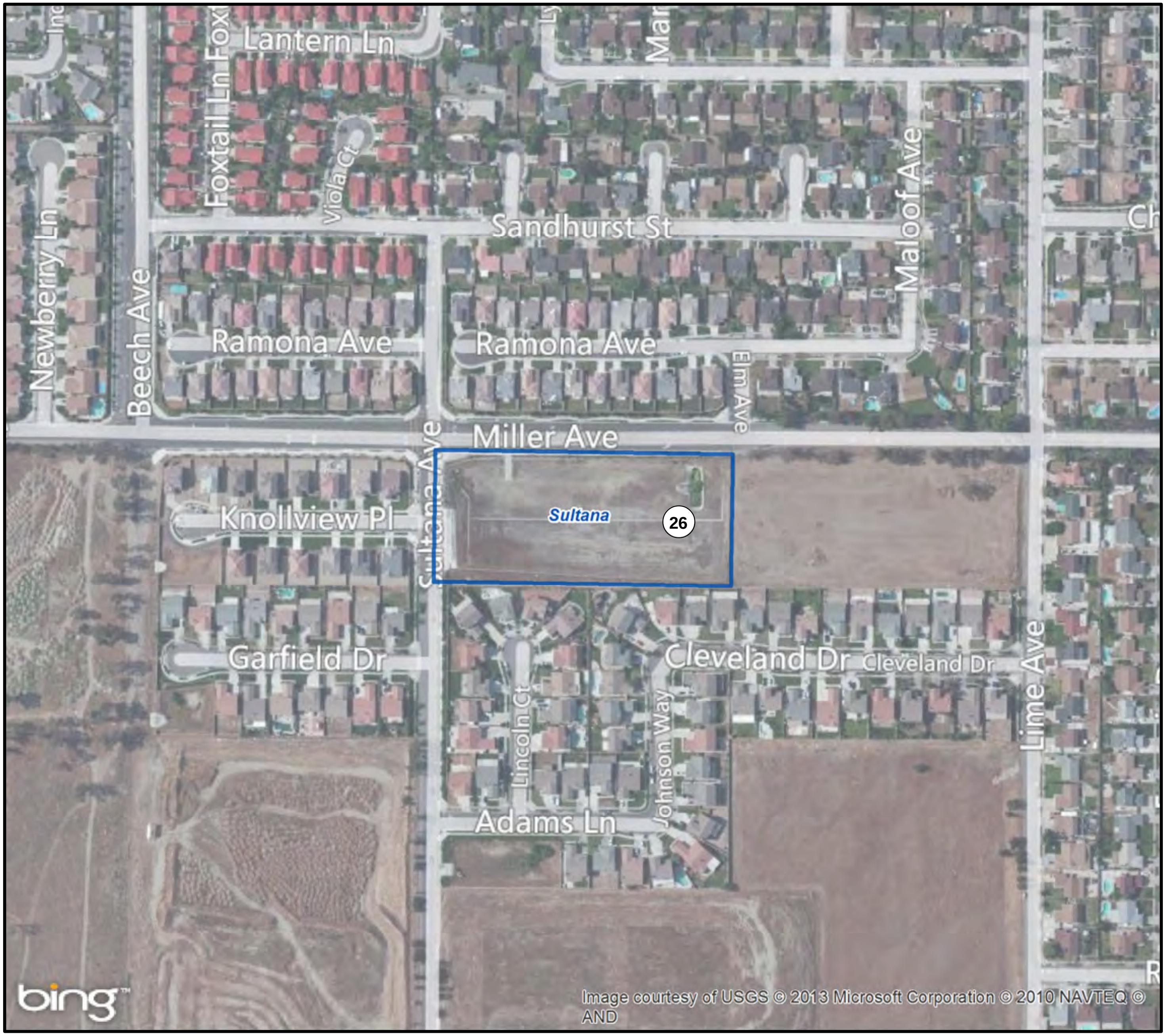
Author: MJC
Date: 9/11/2013
Name: Figure_D-32

0 250 500 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

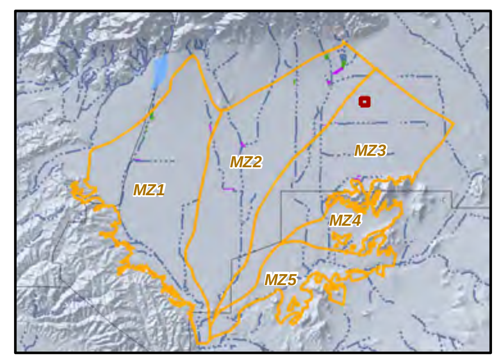
Location of the Sierra Basin PID 25

Figure D-32



Sultana Basin

26 PID 26
See Table D-1 for
Project Description



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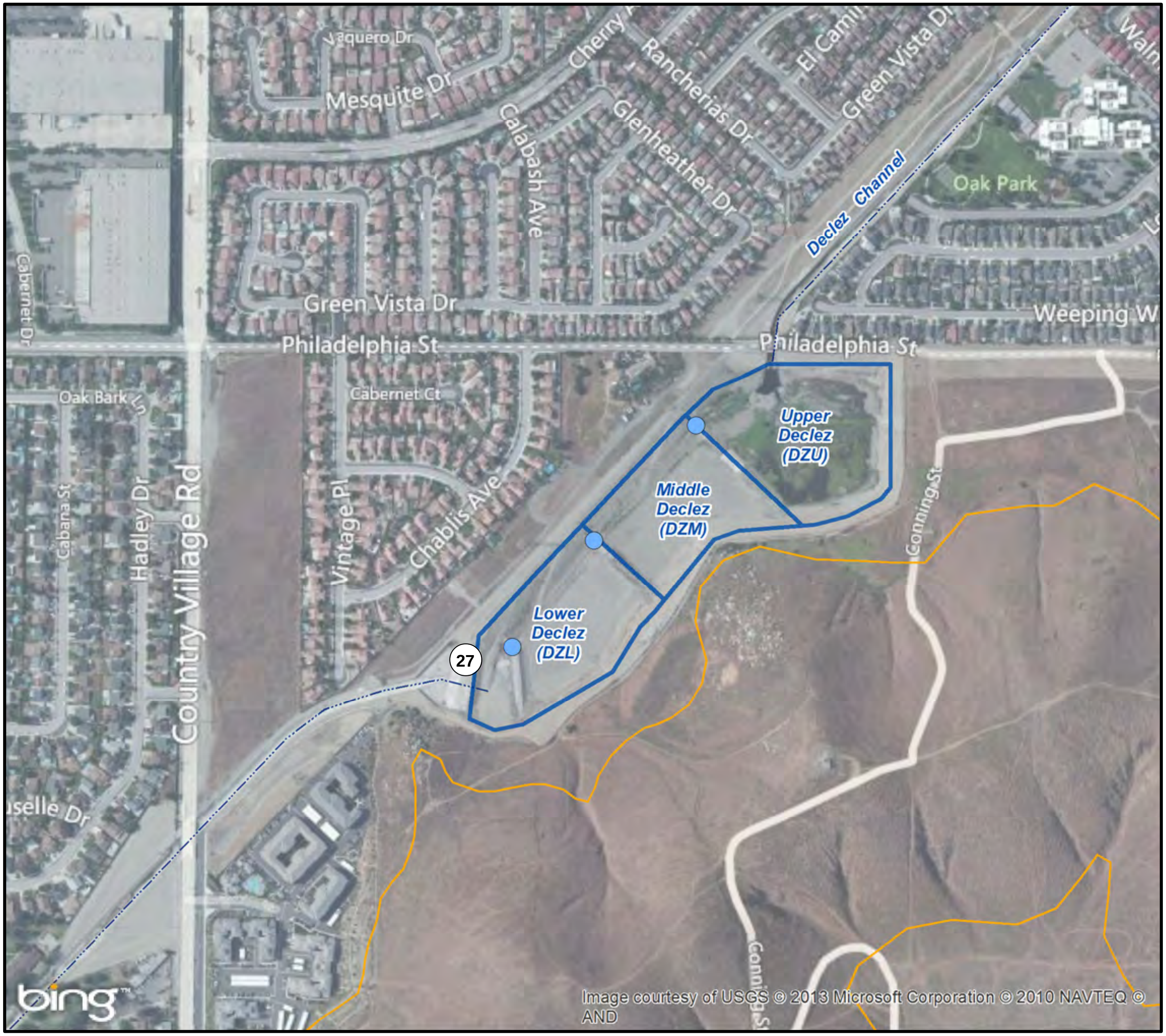
Author: MJC
Date: 9/11/2013
Name: Figure_D-33

0 250 500 Feet
0 50 100 200 Meters

2013 Amendment to the 2010 RMPU

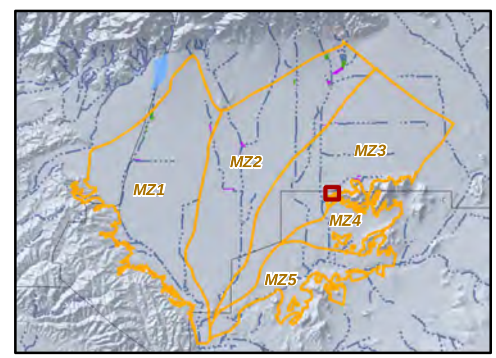
Location of the Sultana Basin
PID 26

Figure D-33



Wineville Basin

(27) PID - 27
See Table D-1 for
Project Description



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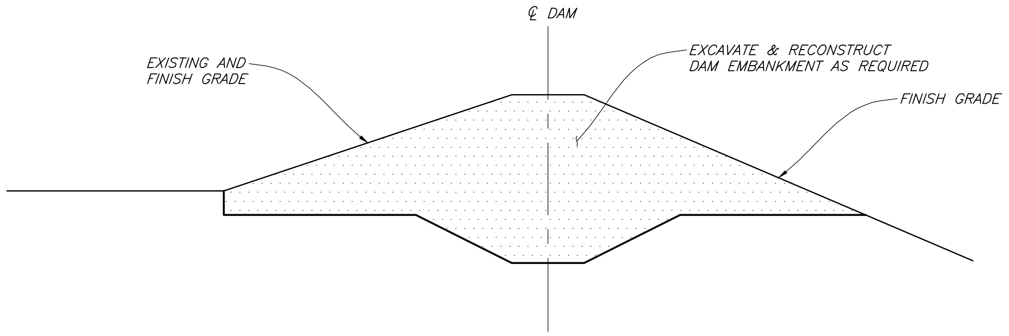
Author: MJC
Date: 9/6/2013
Name: Figure_D-34a

0 400 800 Feet
0 50 100 200 Meters

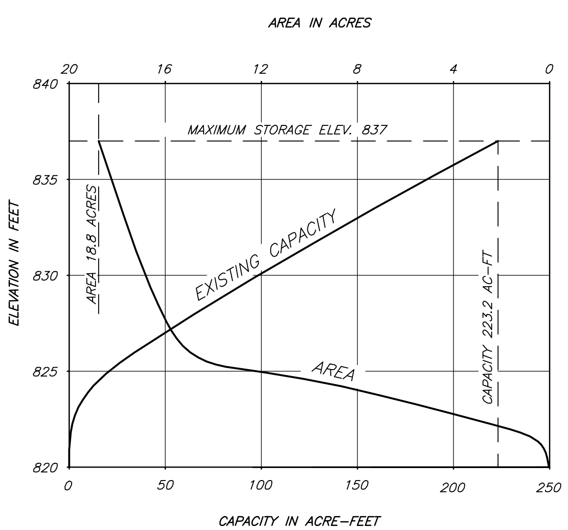
2013 Amendment to the 2010 RMPU

Location of the Declez Basin
PID 27

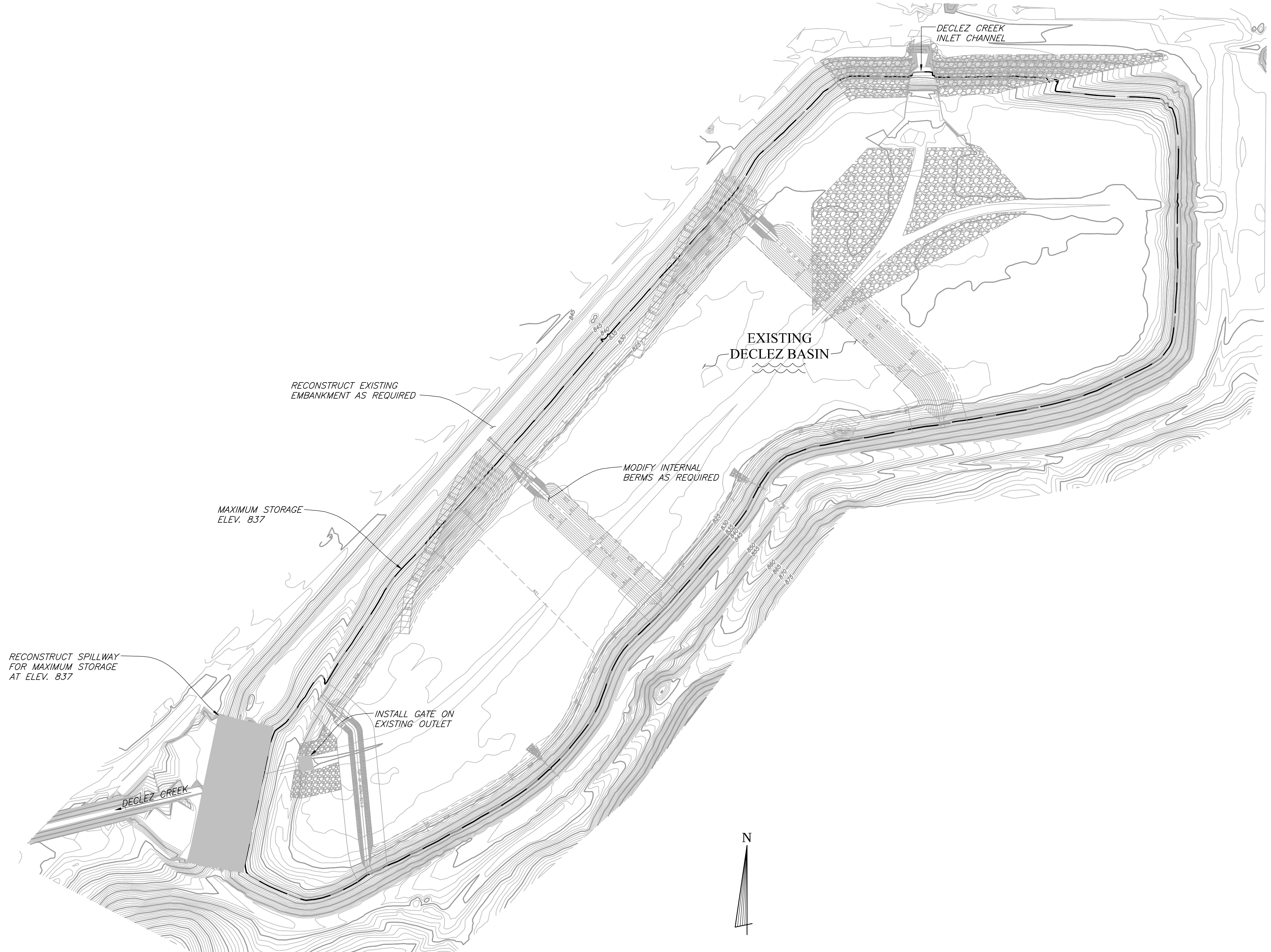
Figure D-34a



TYPICAL EMBANKMENT RECONSTRUCTION SECTION



AREA/CAPACITY CURVES



PLAN

REF.	DESCRIPTION	APVD.	DATE

REVISIONS

File Name Declez.dwg
Scale Factor 1
Plot Date 04-21-2010

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Drawn By J. HERBERT/ P.INTHARATH
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CHINO BASIN WATER CONSERVATION DISTRICT

SHEET

Figure D-34b

Site Plan of the Existing Declez Basin - PID 27

Source: 2010 RMPU

Figure D-34c
Declez Basin Alternative Schematic- PID 27
Source: 2010 RMPU

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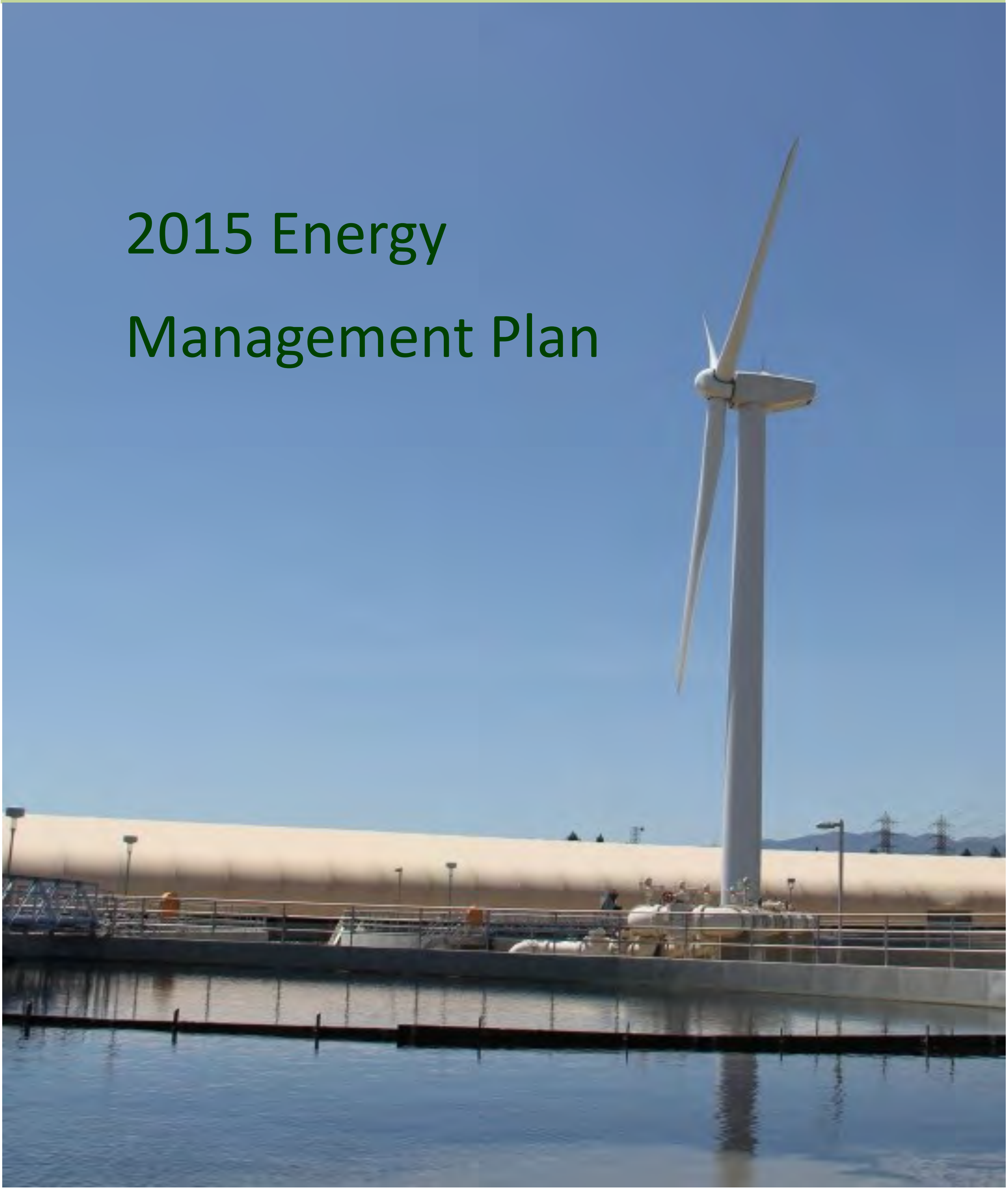
Appendix I

2015 Energy Management Plan

ESA

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

2015 Energy Management Plan



Inland Empire Utilities Agency
2015
Energy Management Plan

Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

Executive Summary

The Southern California water industry is currently operating within a burdensome climate, as adverse environmental conditions are driving policy change during a time of continued population growth and socioeconomic decline. Meeting both water and energy demands in this region in a reliable and environmentally responsible manner have converged to form a substantive challenge for water agencies. The Inland Empire Utilities Agency has addressed this challenge through the development of an Energy Management Plan (EMP) that will focus on resource optimization and sustainable operations.

This EMP analyzes historical energy usage, defines a current energy and Greenhouse Gas emissions baseline, forecasts future demands, examines procurement strategies, and proactively explores measures that can ease the Agency's load on the utility while cultivating a reliable and sustainable energy infrastructure across its facilities. This plan also aims to identify projects and business practices that can improve the Agency's Integrated Demand Side Management (IDSM) and work in concert with energy utilities whenever possible to benefit grid management.

As detailed in past planning documents, grid independence during peak periods has been a central goal within the Agency. Though IEUA has taken advantage of its renewable resources by developing a diverse energy portfolio, further planning is needed to address changing environmental regulations that may dictate available technologies. The EMP introduces a new initiative to assist the member agencies in complying with the organic diversion goals, by diverting food waste to the agency's anaerobic digesters and composting facility. The EMP also establishes a new Business Goal that will require 100 percent of IEUA's electricity needs to be procured from carbon neutral sources by 2030 through strategic planning and renewable resource optimization.

Wastewater flow projections are utilized to forecast anticipated seasonal demands at each IEUA facility. The EMP relies on forecasting to evaluate the feasibility of site-specific energy projects, which resulted in a total of 11 projects that are estimated to require approximately $38 million in capital expenditures. These projects will undergo more detailed analyses to determine whether they will be implemented into IEUA's Ten Year Capital Improvement Plan (TYCIP).

The EMP outlines economic, operational, environmental, and regulatory factors that influence new project implementation at the Agency's wastewater treatment plants, as well as current aspects that tend to impede new project development. Costly and time-intensive grid interconnections, generating capacity limitations on Net Energy Metering (NEM) eligible renewable installations, and limited economic incentives are all identified as elements that can negatively impact new energy management projects. This EMP also offers recommendations that would address each obstacle for regulatory consideration.

Focused business practices, such as energy procurement strategies and improved energy monitoring are discussed within the plan, as cost saving measures can extend beyond conservation projects. Through prudent planning that considers past performance and anticipates regional needs, this EMP attempts to construct a blueprint to shape a reliable and efficient energy profile for the Agency and open communication with energy utilities to enhance the water-energy relationship.

Table of Contents

TABLE OF CONTENTS

Acronyms

AMP	Asset Management Plan
AF	Acre-foot
BAC	Bioenergy Association of California
BCE	Business Case Evaluation
BTU	British Thermal Unit
CARB	California Air Resources Board
CASA	California Association of Sanitation Agencies
CBWM	Chino Basin Watermaster
CBWCD	Chino Basin Water Conservation District
CEC	California Energy Commission
CCWRF	Carbon Canyon Wastewater Recycling Facility
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	Methane
CO2	Carbon Dioxide
CO_2e	CO_2 Equivalent
CPUC	California Public Utilities Commission
CWCCG	California Wastewater Climate Change Group
DA	Direct Access
DG	Distributed Generation

DOE	Department of Energy
DR	Demand Response
EMP	Energy Management Plan
EMS	Energy Management System
ESP	Energy Service Provider
FY	Fiscal Year
GHG	Greenhouse Gas
GWP	Global Warming Potential
HVAC	Heating/Ventilation/Air Conditioning
ICE	Internal Combustion Engine
IDSM	Integrated Demand Side Management
IE	Inland Empire
IERCF	Inland Empire Regional Composting Facility
IOU	Investor-Owned Utility
KW	Kilowatt
KWH	Kilowatt-hour
MW	Megawatts
MWH	Megawatt-hour
MWD	Metropolitan Water District of Southern California
N_2O	Nitrous Oxide
NEM	Net Energy Metering
NGOM	Net Generation Output Meter
O&M	Operations & Maintenance

PPA	Power Purchase Agreement
REC	Renewable Energy Certificate
REEP	Renewable Energy Efficiency Project
RES-BCT	Renewable Energy Self-Generation Bill Credit Transfer
RFP	Request for Proposal
RP-1	Regional Plant No.1 in the City of Ontario
RP-2	Regional Plant No.2 in the City of Chino
RP-4	Regional Plant No.4 in the City of Rancho Cucamonga
RP-5	Regional Plant No.5 in the City of Chino
RP-5 SHF	RP-5 Solids Handling Facility
RPS	Renewable Portfolio Standard
RWRPs	Regional Water Recycling Plants
RWQCB	Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SBCFCD	San Bernardino County Flood Control District
SCAQMD	South Coast Air Quality Management District
SCAP	Southern California Alliance of Publicly Owned Treatment Works
SCE	Southern California Edison
SCF	Standard cubic feet
SCGC	Southern California Gas Company
SGIP	Self-Generation Incentive Program
SLCP	Short-Lived Climate Pollutant
SWP	State Water Project

TA/TI	Technical Assistance and Technology Incentives
TCR	The Climate Registry
TOU	Time of Use
TYCIP	Ten-Year Capital Improvement Plan
VFD	Variable Frequency Drives
VOC	Volatile Organic Compounds

Introduction

WATER-ENERGY NEXUS

Tightening environmental regulations and increasing electrical demand has brought significant challenges to Southern California electrical utilities. Meeting the electrical demands of millions of consumers becomes more difficult during periods of peak activity (generally between 12:00 p.m. and 6:00 p.m., and highest in summer months), as reflected in increased utility rates during these times. The water industry is not only one of the electrical utilities' largest consumers, but is also subject to the same temporal variability in demand.

The water sector is subject to many energy-intensive processes, including water extraction, conveyance, treatment, distribution, and wastewater treatment. Since population growth drives demand for water and energy usage, both are expected to continue increasing in parallel. The wastewater treatment industry is in a unique position to positively impact both water and energy sectors through improved efficiency and using renewable resources from the process.

IEUA has taken advantage of its position by focusing efforts to reduce energy consumption and ease demand on the local electric utility. In 2012, IEUA developed an energy management plan with the goal of going "gridless" by 2020, with the intent of generating enough electricity on site that Agency facilities would be independent from the already taxed Southern California power grid system. IEUA has explored various power generating technologies in pursuit of this goal since its inception. Although IEUA prioritizes the utilization of renewable digester gas produced on site, a spectrum of renewable energy systems have been pursued to develop a robust portfolio across all facilities. While securing renewable technologies along the way, IEUA has also learned lessons that altered the roadmap to meet the 2012 goal.

In order to achieve grid independence with renewable technologies, IEUA must build an energy infrastructure that is capable of handling the full demand of each facility at any given time. Realistically, this would result in the daily export of energy back to the grid when generation exceeded demand. Furthermore, Southern California Edison (SCE) policies dictate that renewable installations are subject to standby and/or departing load charges that rise as the nameplate rating increases, hindering the cost effectiveness of renewable technologies as the generating capacity grows. Since one of the pillars of the "Gridless by 2020" initiative was to hedge against market volatility, IEUA adjusted its focus on achieving relative independence from the grid during peak periods, when electricity costs are highest. This effort aligns with IEUA's Business Goals (included in Appendix A), adopted by the Board of Directors in 2013 as part of the Agency's Strategic Plan.

REGIONAL PROGRAMS & FACILITIES OVERVIEW

IEUA is a regional wastewater treatment agency and wholesale distributor of imported water. Today the Agency is responsible for serving approximately 830,000 people[1] over 242 square miles in western San Bernardino County. The Agency is focused on providing three key services: (1) treating wastewater, developing recycled water, local water resources, and conservation programs to reduce the region's dependence on imported water supplies and drought-proof the service area; (2) converting biosolids and waste products into a high-quality compost made from recycled materials; and (3) generating electrical energy from renewable sources.

Industrial and municipal wastewater collections are provided through regional wastewater interceptors and two non-reclaimable wastewater pipeline systems. Recycled water is produced at four regional water recycling plants (RWRPs). In addition, the Agency has three facilities where the biosolids produced at the water recycling plants are handled: RP-1 Solids Handling Facility, RP-2 Solids Handling Facility, and the Inland Empire Regional Composting Facility. The Agency also has a solids handling facility at RP-5 which is leased to a private enterprise that intends to produce biogas and energy from food waste.

Although the Agency is a wholesale water provider, the Agency has very little infrastructure or assets related to potable water treatment, conveyance, or use. Water resources-related assets are primarily connected to the recycled water program. In addition to recycled water and wastewater services, the Agency operates a network of groundwater recharge facilities in partnership with Chino Basin Watermaster (CBWM), San Bernardino County Flood Control District (SBCFCD), Chino Basin Water Conservation District (CBWCD). The Agency also operates the Chino Desalter I facility in coordination with the Chino Desalter Authority. The Agency also manages an extensive regional water use efficiency program, and collaborates with Santa Ana Watershed Project Authority (SAWPA), Metropolitan Water District of Southern California (MWD), and the Regional Water

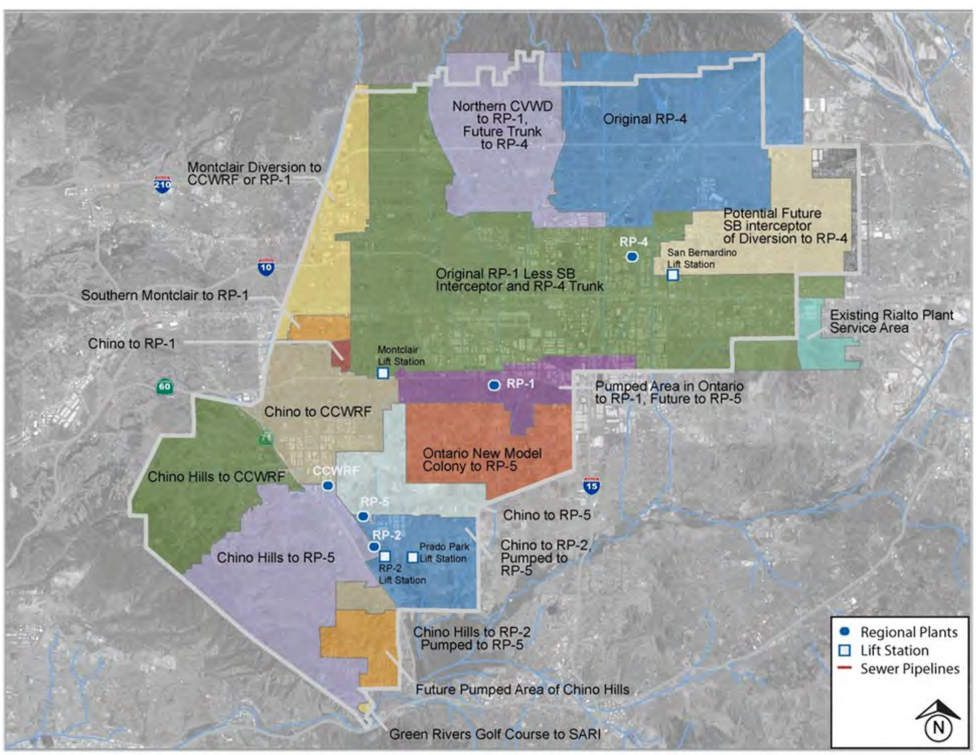
[1] *Source: California Department of Finance, April 2013 census projection.*

Quality Control Board (RWQCB) to develop regional planning documents.

Regional Wastewater Facilities

The Agency has four RWRPs which produce recycled water that meets Title 22 standards for indirect reuse and groundwater recharge. All of the RWRPs have primary, secondary, and tertiary treatment and recycled water pumping facilities and are interconnected in a regional network. Agency staff routinely uses the Agency's bypass and diversion facilities, such as the San Bernardino Lift Station, Montclair Diversion Structure, Etiwanda Trunk Line, and Carbon Canyon bypass, to optimize the Agency's flows and capacity utilization. In general, flows are routed between regional plants in order to maximize recycled water deliveries while minimizing overall pumping and treatment costs. Figure 1 illustrates the service area boundaries for the Agency's four RWRPs.

FIGURE 1. REGIONAL PLANT SERVICE AREA BOUNDARIES



The four

Regional facilities are: Regional Water Recycling Plant No. 1 (RP-1), Regional Water Recycling Plant No. 4 (RP-4), Regional Water Recycling Plant No. 5 (RP-5), and Carbon Canyon Wastewater Recycling Facility (CCWRF). The biosolids produced at RP-4 and RP-1 are thickened, digested, and dewatered at solids handling facilities located at RP-1. Similarly, the CCWRF and RP-5 biosolids are treated at Regional Water Recycling Plant No. 2 (RP-2). The stabilized and dewatered solids are then transported to the Inland Empire Regional Composting Facility (IERCF) for processing into soil amendment.

The Agency has a network of regional interceptor sewers that can be used to bypass flow from one water recycling plant to another to balance and optimize the use of treatment capacity. Currently, the regional interceptors can bypass flow from RP-4 to RP-1 and from CCWRF to RP-5. In addition, primary effluent can be bypassed from the RP-1 equalization basins to RP-5.

The Agency also has four wastewater lift stations, which are used to shift flows that would naturally flow from one portion of the service area to a different treatment plant. The lift stations are instrumental in balancing flows and keeping water in the northern portion of the service area to maximize potential recycled water use.

Recycled Water Distribution System

The Agency has been serving recycled water to its member agencies since formation of the Regional Sewerage Service Contract in 1973. Initially, recycled water was delivered to Whispering Lakes Golf Course and Westwind Park in the city of Ontario, as well as to Prado Regional Park and El Prado Golf Course in San Bernardino County. In the early 1990's, the Agency planned and built the first phase of the Carbon Canyon Recycled Water Project, which now serves several customers in Chino and Chino Hills. The connected demand for the recycled water has more than tripled since FY 2006/07 from 13,000 AFY to over 43,800 AFY. Recycled water and groundwater recharge sales have nearly tripled as well.

Groundwater Recharge Basins

The Agency, in conjunction with the CBWM is implementing the groundwater recharge program to increase artificial groundwater recharge within Chino Basin using storm water, recycled water, and imported water. By enhancing the recharge capacity in the Chino Basin, greater quantities of high quality water can be captured and stored during wet years. Subsequently, the stored water can be drawn from the Basin during droughts and shortages of imported water. Annual recharge varies due to weather patterns, and the availability of imported water and recycled water supplies.

Inland Empire Regional Composting Facility

The IERCF, constructed in Rancho Cucamonga in 2007 under a Joint Powers Authority agreement between the Agency and the CSDLAC, is completely enclosed to control odors and meet stringent air quality regulations. It is the nation's largest indoor biosolids composting facility. The IERCF uses the Aerated Static Pile composting process to recycle approximately 150,000 wet tons per year of dewatered and stabilized biosolids from the Agency and CSDLAC's wastewater treatment processes, as well as wood waste from local communities. It

The facility is currently operating at its design capacity, receiving nearly 600 tons per day of combined biosolids and recycled waste amendments and producing over 230,000 cubic yards of high quality compost each year for local landscaping and horticultural use. For energy management purposes, RP-4 and IERCF are considered to be a single entity, as they share the same electrical meter.

WORK COMPLETED SINCE 2008

Renewables

IEUA began the renewable energy procurement process by issuing Requests for Proposals (RFPs) for solar, wind, fuel cell, and in-conduit hydroelectric projects in 2008. The RFPs offered vendors the ability to propose outright sale of equipment or Power Purchase Agreements (PPAs) that would eliminate up front capital costs, aside from labor, for the Agency. Multiple proposals were received for solar, wind, and fuel cell projects, while no in-conduit hydroelectric proposals were received. IEUA performed Business Case Evaluations (BCEs) for the proposals received to determine the most economical projects for each facility. In addition to cost and operational reliability, site variations such as digester gas production, land use, and electrical load were important factors in determining the site-specific feasibility of each project.

The first product of the RFP process was a PPA, signed in June 2008, for 3.5 MW of solar energy across four Agency facilities. The solar installations were completed in

December of the same year. Through the agreement, IEUA purchases the energy produced by the solar panels at a competitive rate with fixed escalation over a 20-year period.

This rate structure, typical for all PPAs that the Agency has since entered into, allows the Agency to avoid capital outlay while still receiving the benefit of on-site renewable energy. In each PPA project, the private entity has financed, designed, constructed, operated, and maintained the generation equipment. In return, the private entity receives any incentives available through government funding programs and sells the energy generated to IEUA at a fixed rate.

In March 2010, IEUA entered into a second public-private partnership to install a 1 MW wind turbine at Regional Plant No. 4. The PPA is structured similarly to the solar agreement, with the Agency purchasing 100 percent of the energy produced by the equipment at a fixed escalating rate over 20 years. The turbine installation was completed in December 2011.

In September 2010, IEUA entered into a third public-private partnership with an environmental engineering consulting firm to develop IEUA's RP-5 Solids Handling Facility (RP-5 SHF) as a food waste digestion site. The facility, initially designed as a manure digestion site, has been diverting food waste regionally since 2012 with the goal of producing enough digester gas to fuel two 1.5 MW cogeneration engines that will provide power for the facility. The project is still under development, with engine commissioning expected in June 2015.

The Agency has historically employed cogeneration engines to combust the digester gas and produce heat and power to be used on-site. However, the 2008 amendment to South Coast Air Quality Management District (SCAQMD) Rule 1110.2 required cogeneration engines to be retrofitted with costly pollution control technologies in order to achieve stringent emissions limits. The Agency issued another RFP to evaluate potential alternatives that could utilize the digester gas in a more cost-effective manner.

In October 2010, IEUA entered into a PPA with a third party to install, maintain, and operate a 2.8 MW molten carbonate fuel cell operating on digester gas at Regional Plant No. 1. The fuel cell is also equipped with a 4.1 MMBtu/hr heat recovery unit to increase overall plant efficiency. As with other PPAs, the Agency agreed to purchase all renewable electricity generated by the fuel cell at a fixed escalation rate over 20 years. The agreement not only provided the Agency with the ability to procure clean renewable energy with no capital costs, but it also mitigated risk associated with the fuel cell technology by combining the digester gas cleaning system and fuel cell power plant under a single entity. In researching the feasibility of a fuel cell system, IEUA staff discovered that previous installations suffered from ineffective gas conditioning that resulted in prolonged shutdowns and reduced equipment lifecycles. IEUA's fuel cell agreement is structured to ensure that downtime is minimized and equipment maintenance is optimized.

Conservation

In addition to the renewable installations, IEUA worked with third parties to perform energy audits at Agency facilities. Select recommendations from these audits were implemented to reduce energy consumption. Lighting retrofits and controls were installed across several facilities, along with variable frequency drives (VFDs) on many pumps and motors. Damper installation on high volume air blowers also resulted in significant electricity savings at the Agency's composting facility. Furthermore, a project is currently underway to improve the aeration basin air handling system at Regional Plant No. 1 to minimize air leaks. This project is expected to reduce electricity consumption at the plant by approximately 1,500 MWh annually.

Demand Response

IEUA has also been involved in Demand Response (DR) programs to reduce Agency costs and to ease pressure on the electrical grid during times of high usage. The Agency's first involvement in DR was in a Time-of-Use Base Interruptible Program (TOU-BIP) from 2008 to 2010. However, because of the financial risk associated with the BIP, the Agency terminated the TOU-BIP contract, and since July 2011, has participated in a Demand Response (DR) program through EnerNOC (a SCE authorized third-party DR provider), a private entity providing energy intelligence software that displays real-time electricity usage. In addition to facilitating DR events, EnerNOC software is used to track consumption from facility processes over time.

The Agency has agreed to provide EnerNOC a total cumulative curtailment of 1,230 kW for all facilities enrolled in the program (RP-1, RP-2, RP-4/IERCF, RP-5 and CCWRF) at a value of approximately $74,000 per year. Reduced energy import from the grid during demand response events is primarily achieved by shutting down some of the recycled water pump stations and through reduced ventilation at the IERCF. These temporary energy conservation techniques do not have any negative impact to the recycled water customers (operations staff was able to increase the reservoir level prior to the event) or to the indoor air quality at IERCF.

Table 1 shows the results of the six DR events that SCE dispatched during FY 13/14. Each facility enrolled in the DR program has a curtailment target, but the IEUA combined total of 1,230 kW is used to determine whether the Agency will be compensated for its performance during each event. IEUA's DR contract with EnerNOC contains a provision that requires the delivered load capacity to be at least 75 percent of the target reduction. If the delivered capacity falls below 75 percent, IEUA does not receive any credit for reducing load during the DR event. However, IEUA strives to reduce its load to match 100 percent of the target reductions at each plant during every event. In FY 13/14, IEUA reached its overall reduction goal in three of the six DR events.

Table 1 shows that IEUA's facilities generally perform better during DR events that occurred in warm months. The reason for this seasonal difference stems from reduced recycled water demand during winter months. Because each DR reduction target is calculated using a baseline averaging energy usage from the previous ten working days, reducing energy usage from RW pumping is difficult, or even impossible, during periods in winter months when pumping is limited or stopped completely due to low demand. The table also shows that RP-1 consistently

TABLE 1. FY 13/14 IEUA DEMAND RESPONSE RESULTS

Event Date	Percentage of Target Reduction Achieved					
	RP-1	RP-2	RP-4/IERCF	RP-5	CCWRF	Overall
7/31/2013	552	130	81	422	4	96
8/29/2013	484	90	95	974	6	125
8/30/2013	1,550	120	91	968	-20	160
2/6/2014	666	0	86	-636	-68	43
2/6/2014	1,608	0	44	-108	4	91
5/29/2014	786	0	114	428	80	145
Average	**941**	**57**	**85**	**341**	**1**	**110**

performed above expectations, while CCWRF had difficulty meeting its target goal. The DR capabilities of each facility will be examined in detail later in the EMP.

Monitoring

ENERNOC's software also allows IEUA to track electricity usage at each facility in real time. The Agency invested in sub-meters that gauge electricity usage from individual processes within the treatment facilities. Sub-metering involves the use of digital meters connected to the SCADA system as a resource to help monitor kW, kWh, amperes, load factor and other units of energy consumption.

A combination of sub-meters and load profiling data can help staff understand operating patterns, increase operating efficiency, assist in identifying malfunctioning equipment and reduce energy demand charges. In addition, this electronic data can be brought into the treatment plant control systems, which will enhance operational control of the facilities, reduce maintenance costs, and prolong equipment operating life.

As of April 2015, the sub-metering installation was complete, but various pieces of equipment were undergoing modifications to improve performance and reliability. Once the modifications are complete, IEUA intends to compare the energy usage of each process to industry metrics to gauge levels of efficiency. Continuous energy tracking of treatment processes will also allow Agency staff to measure the effectiveness of energy projects that are implemented.

SHORT-TERM GOALS

This EMP establishes goals aimed to improve the Agency's energy management through various means, including renewable portfolio diversification, increased monitoring, resource optimization, and strategic procurement. This section focuses on goals that are to be achieved within the next five years.

Procurement

IEUA's renewable PPAs benefit IEUA by establishing energy rates for the next 20 years and eliminating uncertainty that comes with purchasing imported electricity. Nevertheless, IEUA is continuously evaluating the economic landscape of its renewable resources, and is in the process of evaluating the option of purchasing the solar installations that were procured through a PPA in 2008. If the purchase value is economical, IEUA could benefit over the remaining term of the agreement . As the owner of the solar arrays, IEUA would assume responsibility for any required Operations and Maintenance (O&M) expenses, but would also avoid electricity expenses for the energy generated from the panels moving forward.

In addition to renewable installations, IEUA is consistently evaluating procurement options for imported purchases. IEUA purchases both electricity and natural gas from an Energy Service Provider (ESP) through the Direct Access (DA) program. These services are procured via an agreement that has a one-year term. The term length is designed to allow the Agency flexibility to adapt to market changes. IEUA will continue to evaluate its procurement options on an annual basis and extend the DA agreement in one-year increments, as necessary.

Integrated Demand Side Management

The California Public Utilities Commission (CPUC) has funded programs designed to help Investor-Owned Utilities (IOUs) develop Integrated Demand Side Management (IDSM) programs that focus on energy efficiency, conservation, demand response, and distributed generation (DG). With an array of renewable resources at its disposal, IEUA has plenty of opportunity to assist the IOUs by improving demand side management at all of its facilities.

IEUA's solar, wind, and fuel cell installations provide a DG portfolio with a total nameplate capacity of 7.3 MW. IEUA will track the generation profiles of these resources to optimize their integration into the grid. Further expansion of the

Agency's renewable portfolio will consider current and future load demands to determine the impact on imported needs and potential for export. IEUA is also pursuing energy storage technology, which would add significant flexibility to the Agency's energy usage profile. By integrating energy storage into its renewable installations, IEUA could temporally manage its load on the grid at each facility. Storage would also impact procurement, as IEUA could take advantage of TOU rates by purchasing and storing electricity when grid demand and tariffs are lowest.

Integrating energy storage into IEUA's energy infrastructure would also benefit the DR capabilities of each facility. During DR events, facilities with energy storage maximize electricity consumption from batteries in order to offset grid demand. Unlike typical DR load reduction techniques, which require turning off equipment otherwise used for normal operations, integrating energy storage into IEUA's DR program would reduce imported electricity levels without interrupting operations. Combining both techniques could result in significantly more load reduction capacity to offer SCE during DR events.

Increasing energy efficiency at IEUA facilities is another component of improving IDSM. IEUA has partnered with The Energy Network, which is part of the Energy Coalition and funded by the California Public Utilities Commission (CPUC), to conduct comprehensive energy audits of IEUA's treatment plants and identify efficiency measures that can reduce energy consumption. Results from these audits will provide direction on the potential reductions that can be achieved at each site.

Each of these IDSM concepts will require collaboration with SCE. New distributed generation projects will require interconnection agreements with SCE, as will incorporating battery storage into IEUA's energy infrastructure. Efficiency projects may also be eligible for SCE's incentive programs, so IEUA will coordinate with The Energy Network and SCE to ensure that all available funding resources are properly utilized.

Resource Management

RP-1 and RP-2 generate renewable digester gas. Gas produced at RP-1 is either consumed by a fuel cell, boilers, or an emergency flare. Gas produced at RP-2 is either consumed by an internal combustion engine (ICE), boilers, or an emergency flare. Both sites utilize anaerobic digestion processes to generate the gas. The first phase of this process produces a low quality acid phase gas that has a heat content between 200 and 300 Btu/scf. Due to its reduced quality, this acid phase gas cannot be directly consumed by the boilers, ICE, or fuel cell. At RP-1, this acid phase gas is constantly flared. At RP-2, the acid phase gas is injected in the digester gas mixing system, blended with the high BTU gas, and beneficially used.

IEUA will conduct an evaluation to determine the most effective method of utilizing the acid phase gas at RP-1. Even with a low heat content, continuous flaring of this gas amounts to wasted energy that could otherwise be beneficially used. IEUA Engineering, Technical Services, and Operations staff will collaborate to identify projects that can utilize the acid phase gas through mixing, conditioning, or storage.

In addition, this EMP establishes a goal of reducing the total digester gas consumed by the flares at RP-1 and RP-2 by 50 percent within the next five years. Integrating acid phase gas into the gas loop will significantly reduce the amount of gas flared at RP-1, but IEUA will also pursue projects that optimize gas usage.

LONG-TERM GOALS

Long-term goals, discussed in the following section, are expected to be completed within the next 20 years. These goals typically require significant modifications to the Agency's infrastructure and coordination with multiple utilities, which requires considerable planning and engineering efforts.

Peak Independence

IEUA's Business Goals state that peak power independence will be achieved by 2020. This EMP details the Agency's current sustainable capacity during peak periods. Achieving peak power independence will require further distributed generation projects and improved energy management capabilities. New projects that can take advantage of IEUA's renewable resources will be evaluated to determine the most cost effective and prudent path to accomplishing this goal.

Carbon Neutrality

In FY 13/14, approximately 36 percent of the electricity consumed at IEUA facilities was generated by carbon neutral sources. This includes IEUA's solar, wind, fuel cell, and biogas ICE installations, as well as a portion of imported electricity that was procured from Renewable Portfolio Standard (RPS) certified sources. By continuing to improve the Agency's renewable portfolio, optimizing digester gas utilization, increasing energy efficiency, and procuring greater amounts of RPS-certified electricity as needed, IEUA intends to procure 100 percent of its electricity needs from carbon neutral sources by the year 2030.

Table 2 summarizes the short and long-term goals established in this EMP. Each goal is evaluated in greater detail in following sections of the EMP.

TABLE 2. IEUA ENERGY MANAGEMENT GOALS

Type	Goal	Description	Estimated Completion
Energy Management	Provide Energy Management Training to Staff	Educating IEUA's Operations and Maintenance teams will not only increase awareness of the Agency's energy demands and usage, but also empower employees to consider new ways to conserve.	2nd Quarter of FY 15/16 and once annually thereafter
Energy Management	Incorporate Energy Efficiency Measures Into Project Solicitation	Whenever new projects are solicited, IEUA issues RFPs that detail the scope of work and equipment required. Beginning in FY 15/16, RFPs issued by IEUA will require high-efficiency equipment that reduces energy consumption. Furthermore, the energy impacts of each proposal will be considered in the review and selection process.	End of FY 15/16
Energy Management	Develop Sub-meter Tracking Program	IEUA's sub-metering data contains valuable information that can be used to identify potential areas of improvement and provide a blueprint for each facility's demand side management. In order to take advantage of these resources, IEUA will need to develop a program to record and monitor the data on a regular basis.	End of FY 15/16
Operational Efficiency	Facility Energy Audits	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	End of FY 15/16
Operational Efficiency	Establish Efficiency Reduction Targets	Based on the results of the energy audits and existing energy usage baselines, IEUA will establish efficiency goals and target reductions in consumption for each Agency facility.	2nd Quarter of FY 16/17
Energy Management	Evaluate Purchase of Existing Solar Installations	IEUA currently procures electricity from 3.5 MW of solar arrays through a PPA. Solar technology economics indicate that an outright purchase of the installations could benefit the Agency, although cooperation of the PPA provider and owner of the solar installations is required.	2nd Quarter of FY 16/17

Type	Goal	Description	Estimated Completion
Operational Efficiency	Implement Efficiency Projects	IEUA will consider the recommendations from the energy audits and implement projects deemed to be cost effective.	End of FY 16/17
Renewable Resources	Digester Gas Optimization	Acid phase digester gas produced at RP-1 is currently sent directly to the flare due to its low quality and BTU content. IEUA will investigate options for incorporating the acid phase gas into facility's gas loop so that the renewable acid phase gas can be used beneficially. Options will include, but not be limited to, gas conditioning, mixing, and storage.	End of FY 16/17
Energy Management	Install Energy Storage at IEUA Facilities	Energy storage would significantly improve IEUA's IDSM capabilities. Traditional procurement strategies have shown current technology to be cost prohibitive, but IEUA will pursue alternative procurement strategies, including PPAs, grant subsidization, and Demand Response Energy Storage Agreements to cost effectively install energy storage at IEUA facilities.	End of FY 17/18
Renewable Resources	Reduce Flaring by 50 Percent	RP-1 and RP-2 operate emergency flares to combust digester gas that cannot be otherwise used beneficially. IEUA aims to reduce flaring at these treatment plants by 50 percent by the end of FY 18/19.	End of FY 18/19
Energy Management	Peak Power Independence by 2020	Aligning with IEUA's Business Goals, the Agency aims to achieve a level of sustainability that will ensure grid independence during peak periods.	2nd Quarter of FY 20/21
Renewable Resources	100 percent Carbon Neutrality by 2030	IEUA's renewable portfolio and production of digester gas provide a blueprint for carbon neutrality. In 2013, IEUA established a carbon footprint by reporting GHG emissions to the Climate Registry. Annual emissions reporting will continue, and IEUA will strive to pursue projects with the goal of achieving 100 percent carbon neutrality by 2030.	2nd Quarter of FY 30/31

POLICY RECOMMENDATIONS

Inland Empire Utilities Agency

Improving energy management requires effort in many facets of an organization. In addition to monitoring and analyzing energy data, IEUA staff must raise awareness within the Agency of energy conservation opportunities. Training will be given to IEUA employees to bring attention to current consumption trends and highlight areas or strategies that can improve efficiency. This training will be conducted annually to foster and maintain continued awareness.

Additionally, IEUA's procurement strategy will be revised to include standard language requiring high-efficiency equipment whenever possible. Proposals received are typically weighed by selection criteria such as cost, experience, and operational impact. IEUA will add another criterion that evaluates the impact on energy consumption. Proposals that reduce energy consumption will be judged more favorably than those with negligible or adverse impacts.

Southern California Edison

Any substantial energy improvements at IEUA will rely on coordination with SCE. Each project is subject to the CPUC's policies, and interconnection of new projects requires significant effort from both SCE and IEUA staff. IEUA has secured interconnection agreements for all of the renewables at Agency facilities. Overall, IEUA has generally experienced difficulties during the interconnection process. Significant staff time and costs have been devoted to completing the agreements.

IEUA concedes that interconnecting large DG projects with the capacity for intermittent export presents complexities that must be addressed to ensure uninterrupted grid service. Interconnection agreements at RP-5 SHF and RP-1 saw marked progress improvement when twice-weekly conference calls were held with SCE staff, though SCE is assuredly not capable of offering this level of service for every interconnection agreement. IEUA believes that improving communication and policy understanding can streamline the interconnection process, and IEUA is committed to maintaining a dialogue with SCE and assist as needed.

IEUA's IDSM improvements rely on participation in SCE's DR program. IEUA is enrolled in SCE's Aggregator-Managed Portfolio DR program through EnerNOC. Increasing the Agency's load reduction capacity will benefit SCE during periods of high grid demand. IEUA's contract with EnerNOC contains a provision that requires the delivered load capacity to be at least 75 percent of the target reduction. If the delivered capacity falls below 75 percent, IEUA does not receive any credit for reducing load during the DR event. As a result, IEUA is hesitant to increase the curtailment target until reliable load reduction measures can be identified.

Furthermore, the current DR program does not provide any incentive for additional power that is exported to the grid during DR events. Adding energy storage could further increase reduction capacities, but current DR program language is unclear regarding integration of energy storage. Modifying the DR program to include incentives for exported power above a baseline export level could result in higher DR commitments.

California Public Utilities Commission

IEUA has relied on PPAs to install renewable technologies, each of which has a purchase rates between $0.08 and $0.13 per kWh. Since exported is compensated at a rate between $0.04 and $0.06 per kWh, IEUA's DG projects are typically sized to maximize on-site use of the electricity generated and avoid export. Increasing export rates would benefit IEUA, but are unlikely to occur.

An alternative solution to improving renewable economics would rely on modifications to the RPS, which mandates that all electric service suppliers provide at least 33 percent of their energy from renewable sources by 2020. These suppliers can achieve the mandated limits by purchasing Renewable Energy Certificates (RECs) that satisfy one of three content categories, often referred to as buckets:

- ◊ Bucket 1: Energy and RECs (bundled) from an RPS-eligible facility that is directly connected to the transmission grid
- ◊ Bucket 2: RECs are purchased and renewable energy is firmed and shaped with substitute electricity that is scheduled into a California Balancing Authority within the same calendar year as the RPS generation
- ◊ Bucket 3: Unbundled RECs from RPS-eligibly facility

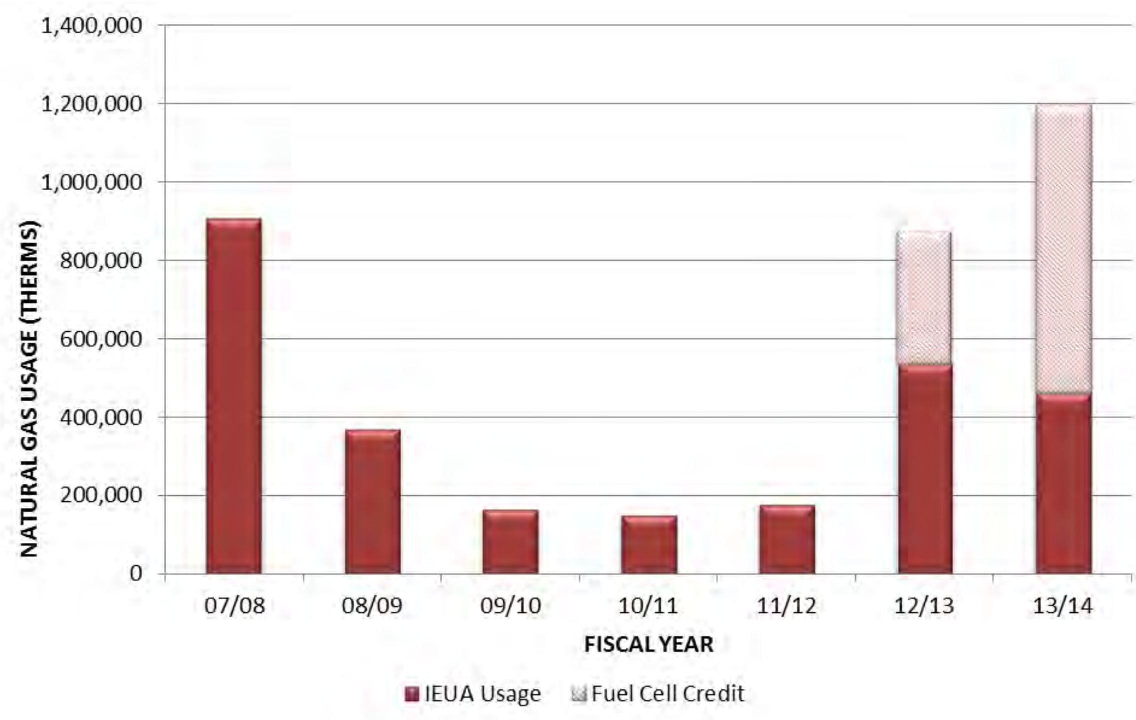
Because IEUA uses the renewable energy it generates on site, any RECs generated fall into Bucket 3, which carries the lowest value on the trading market. IEUA's experience in pursuing RECs for its renewable installations found that the cost of obtaining the certificates often negated the potential profits of any sale. However, the California assembly, with assistance from the California Association of Sanitation Agencies (CASA) and the Bioenergy Association of California (BAC), is pursuing legislation that would allow for renewable installations at wastewater facilities to be eligible for Bucket 1 status as part of Assembly Bill 1144. This designation could drastically improve renewable project economics. IEUA is in support of AB 1144 and will track its progress closely.

Energy Data

NATURAL GAS

Figure 2 shows the Agency's wide fluctuation in natural gas usage in recent years. The changes are mainly due to the renewable self-generation technologies employed at the biosolids handling facilities. Beginning in 2001, IEUA operated natural-gas fired engines which generated electricity during peak periods to assist the SCE grid. A blend of natural gas and digester gas was also used in the cogeneration engines at RP-1. However, the peaking engines were removed from service in 2008, and SCAQMD Rule 1110.2 curbed natural gas usage in digester gas-fueled cogeneration engines in the same year, resulting in a dramatic reduction in natural gas consumption.

FIGURE 2. AGENCY-WIDE NATURAL GAS USAGE FROM FY 07/08 TO 13/14

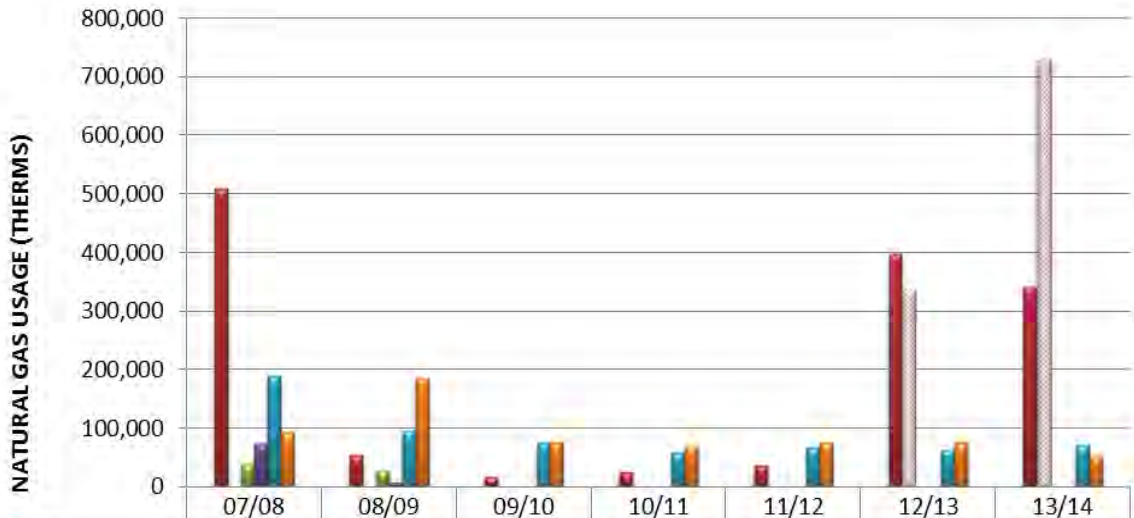


Between FY 09/10 and FY 11/12, the natural gas usage at the Agency was limited to hot water boilers used to meet the anaerobic digestion thermal demand and a minimal amount needed to maintain temperature in the digester gas-fueled cogeneration engines. The usage increase since FY 12/13 is due to the fuel cell installation, which is operated on a blend of digester gas and natural gas. Since the fuel cell catalyst is highly sensitive to air contaminants, the blend may vary depending on the status of the gas conditioning system. As such, natural gas can account for anywhere from 25 to 100 percent of the total fuel cell gas blend.

The fuel cell agreement structure contains provisions that outline IEUA's natural gas responsibility depending on the operating condition of the power plant. Under normal conditions, the fuel cell is expected to operate on a blend of approximately 75 percent digester gas and 25 percent natural gas by flow. As such, IEUA is responsible for the procurement of 25 percent of the natural gas utilized by the fuel cell. Natural gas usage on site is heavily dependent on the operational status of the fuel cell and digester gas conditioning systems. The figures included in this plan distinguish the natural gas used at IEUA's discretion and any supplemental natural gas required by the PPA provider to maintain operation of the fuel cell while the gas conditioning system is down ("Fuel Cell Credit").

A breakdown of natural gas usage by facility is shown on Figure 3. This data further elucidates the point that natural gas usage at the Agency is driven by the requirements of the technologies installed. Natural gas usage was effectively terminated at RP-4 and CCWRF when the natural gas peaking engines were removed from service in 2008. Since the fuel cell was installed at RP-1 in 2012, the facility has accounted for approximately 87 percent of the Agency's total natural gas consumption.

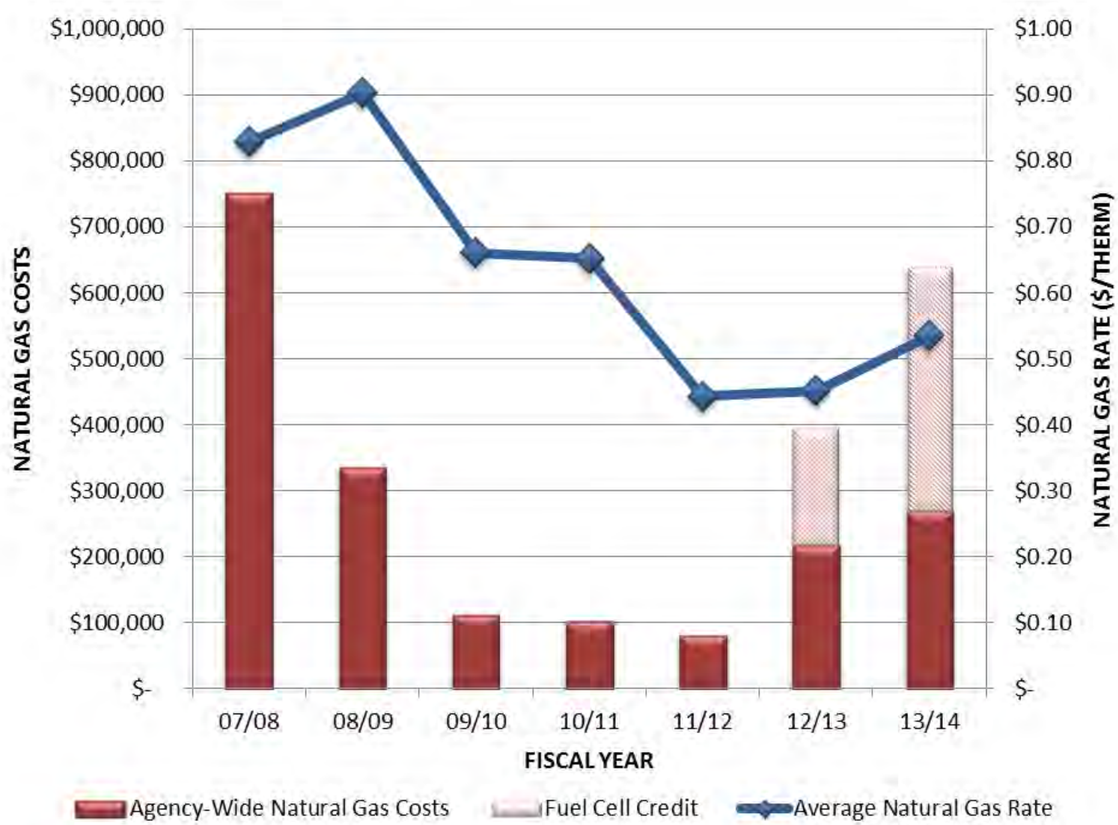
FIGURE 3. NATURAL GAS USAGE FROM FY 07/08 TO 13/14 BY FACILITY



	07/08	08/09	09/10	10/11	11/12	12/13	13/14
RP-1	509,800	54,200	17,500	25,000	36,400	398,181	340,581
Fuel Cell Credit	0	0	0	0		337,819	730,919
RP-4/IERCF	37,800	28,000	0	0	0	0	0
CCWRF	74,700	8,200	0	0	0	0	0
RP-2	190,100	95,100	74,900	59,100	67,800	63,500	71,200
RP-5/HQ	93,900	184,600	76,100	69,500	75,200	75,300	52,500

As aforementioned, one of the core goals of the Energy Management Plan is to reduce energy costs as well as usage. Figure 4 shows the Agency's overall costs for natural gas consumption from FY 07/08 to FY 13/14 with the average rate, on a $/therm basis, tracked alongside. The recent decline in natural gas pricing resulted in lower natural gas costs for FY 13/14 when compared to FY 07/08, despite the fact that gas usage was approximately 31 percent higher in FY 13/14. Consequently, IEUA routinely analyzes energy rate trends in addition to overall cost.

FIGURE 4. AGENCY-WIDE NATURAL GAS COSTS FROM FY 07/08 TO 13/14

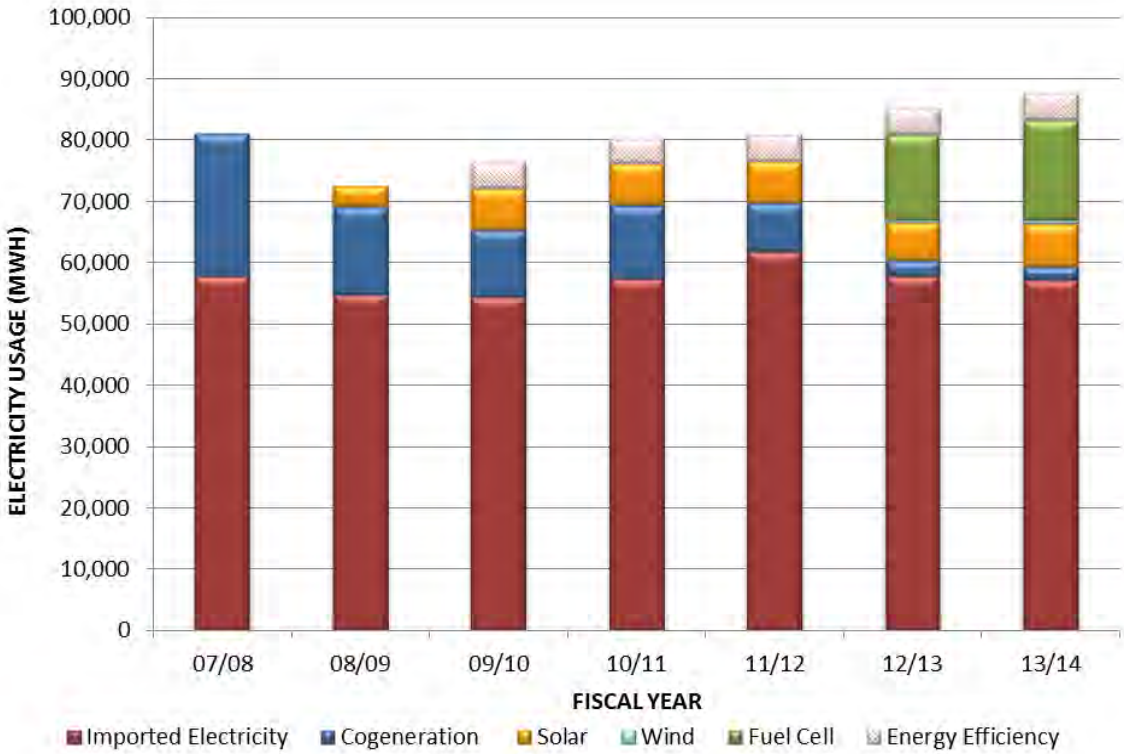


While the decreased price of natural gas has contributed to lower rates in recent years, IEUA has also reduced costs by procuring natural gas through an Energy Service Provider, rather than SCGC. The ESP offers both fixed and variable rates for natural gas that are based on market trends. By utilizing these variable rate structures through an ESP, IEUA has seen consistent cost savings when compared to SCGC rates.

ELECTRICITY

The Agency's efforts to optimize electricity consumption by increasing energy efficiency and expanding its renewable portfolio are evident on Figure 5. The figure shows the total electricity usage for the regional wastewater facilities, composting facility, recycled water pumping stations, and groundwater recharge basins between FY 07/08 and FY 13/14, as well as the energy efficiency projects certified by SCE over the same time period. Efficiency projects included damper installations at the IERCF and VFD installations and chiller replacement at RP-1.

FIGURE 5. AGENCY-WIDE ELECTRICITY USAGE FROM FY 07/08 TO 13/14



In FY 08/09, IEUA installed its solar generation systems and began implementing energy efficiency projects, resulting in lower electricity usage when compared to FY 07/08. Electricity usage has climbed incrementally since FY 09/10. This can be attributed to expansions of the Agency's Recycled Water and Groundwater Recharge programs, which require significant pumping demand to move water regionally. Despite the increase in energy demand to the Agency, these practices play a vital role in sustainable water management in the region and significantly reduce the global energy consumed in importing water from the State Water Project (SWP). In FY 13/14 alone, the electricity used by IEUA to distribute 38,252 acre-feet (AF) of recycled water to end users and groundwater recharge basins resulted in the conservation of approximately 91,000 MWh that would have been required to pump the equivalent amount of water from the SWP.[2]

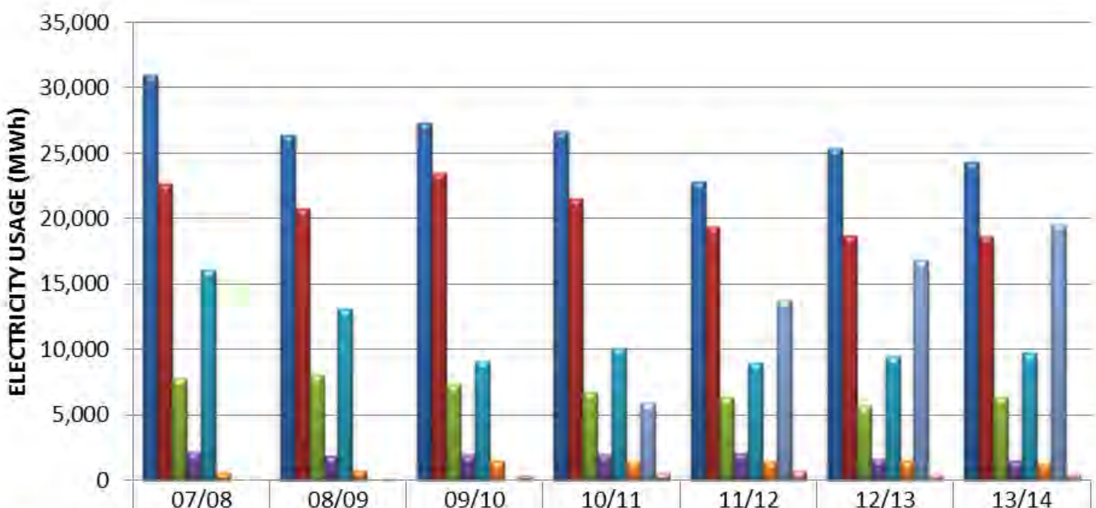
The amount of renewable energy utilized by the Agency has fluctuated annually, with electricity produced by cogeneration engines decreasing and low-emitting renewables (solar, wind, and fuel cells) steadily increasing each year. Due to increasingly stringent air quality regulations, the Agency has decreased reliance on the cogeneration engines in favor of technologies with lower emissions. The fuel cell installation at RP-1 resulted in a reduction of the facility's criteria pollutant

[2]*Source: California's Water-Energy Relationship, Final Staff Report. California Energy Commission, 2005.*

emissions by approximately 90 percent while matching the nameplate generation capacity, maintaining the ability to utilize digester gas, and recovering waste heat for the anaerobic digestion process.

Figure 6 shows the annual electricity usage at each facility, including lift stations, recycled water pumping stations, and groundwater recharge facilities. In 2011, IEUA began to separately track electricity consumed by the recycled water pumps at each RWRP. Prior to 2011, the lack of data availability prevented IEUA staff from separating electricity usages from treatment and RW processes, so the RW pumping power consumption is embedded in the totals for each plant. RP-1, RP-4, RP-5, and CCWRF all employ RW pumping stations on site. For the purposes of this Energy Management Plan, energy consumption in Fiscal Year 13/14 will be considered the baseline value when calculating potential future energy savings.

FIGURE 6. ELECTRICITY USAGE FROM FY 07/08 TO 13/14 BY FACILITY



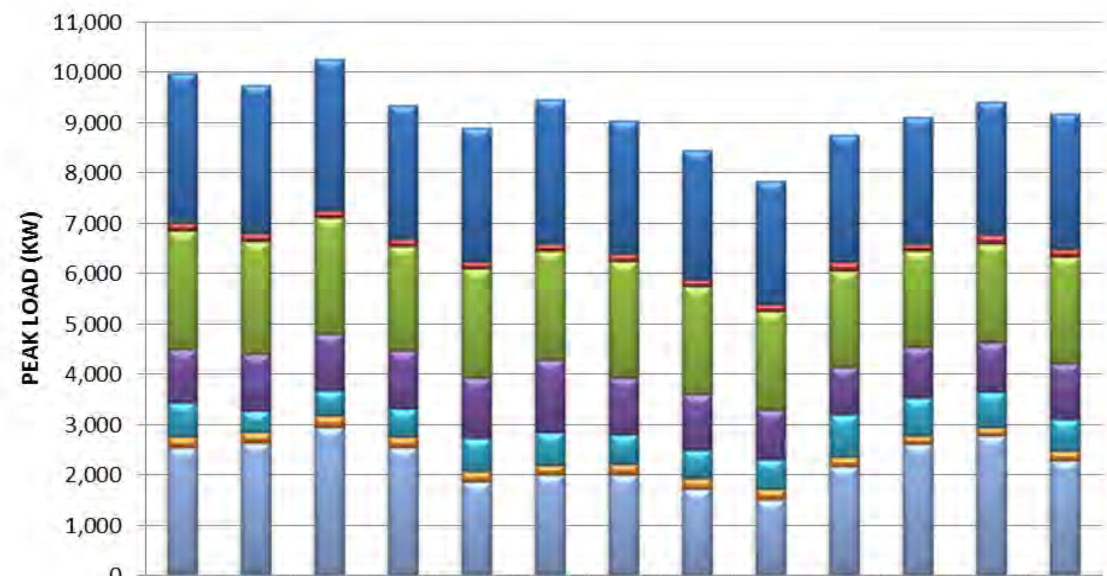
	07/08	08/09	09/10	10/11	11/12	12/13	13/14
RP-1	30,990	26,392	27,372	26,702	22,811	25,333	24,337
RP-4/IERCF	22,666	20,795	23,515	21,569	19,423	18,760	18,589
CCWRF	7,782	8,046	7,314	6,789	6,340	5,738	6,415
RP-2	2,198	1,924	1,950	2,019	2,035	1,635	1,541
RP-5/HQ	16,081	13,134	9,129	10,131	9,016	9,440	9,746
PS	616	748	1,483	1,438	1,445	1,496	1,343
RW	0	0	0	5,944	13,731	16,840	19,517
GWR	63	119	393	549	743	463	436

This figure illustrates the high energy intensity of RP-1 and RP-4/IERCF. In FY 2013/2014, these two sites combine to account for approximately 53 percent of the total Agency energy demand. As such, IEUA's Energy Management Plan has particularly focused on these facilities when exploring potential efficiency projects.

Recycled water pumping also contributes significantly to the Agency's electrical demand. RW usage in the region has grown steadily in recent years, and is expected to continue increasing moving forward. Due to the region's reliance on the Agency's RW distribution system, IEUA has begun to investigate projects that can optimize electrical consumption in the energy intensive process.

In addition to total electricity usage, the Agency monitors the electrical demand of each facility on an hourly basis. This information is required to assess the level of self -generation needed to pursue grid independence during peak periods. The electrical demand at IEUA's facilities fluctuates throughout the day and also varies by plant. As shown on Figure 7, the average hourly electrical demand across all IEUA facilities varies seasonally as well.

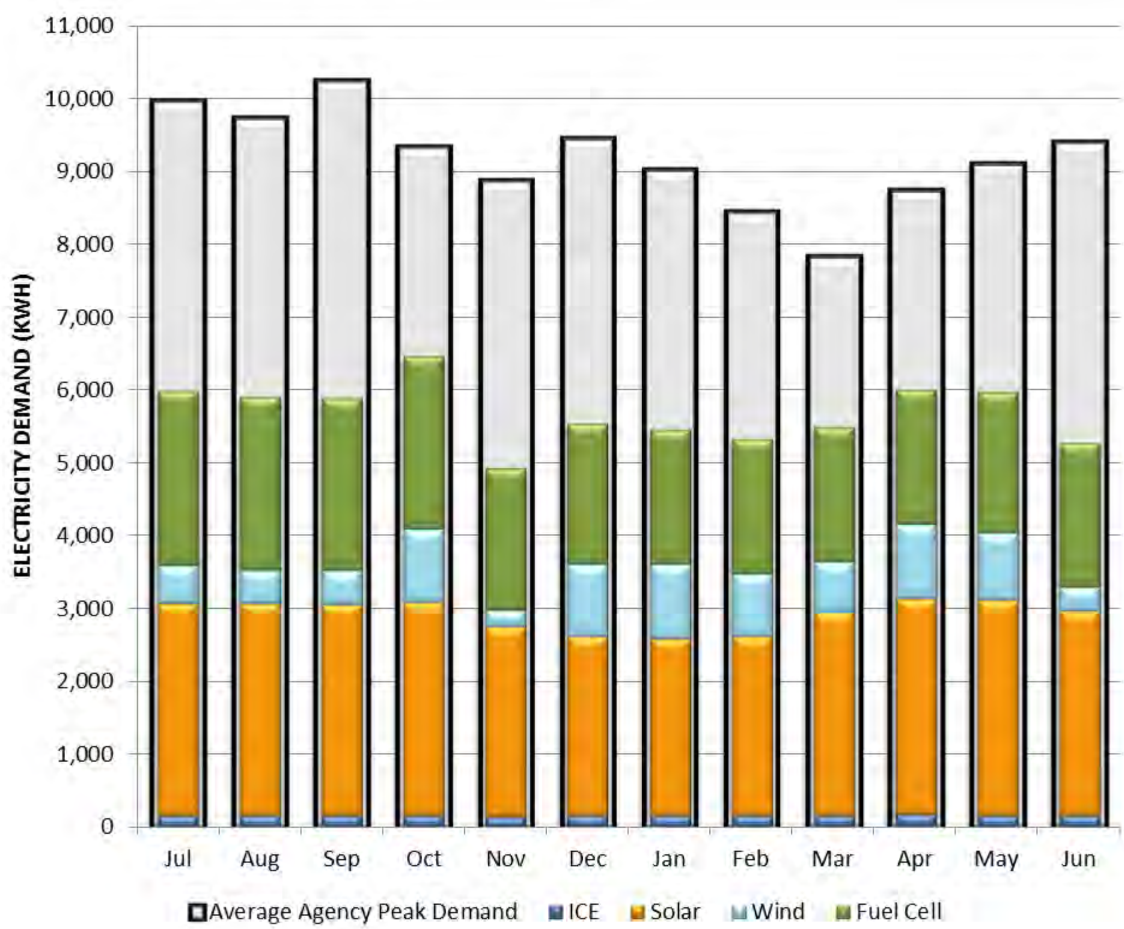
FIGURE 7. FY 13/14 AVERAGE PEAK FACILITY ELECTRICAL LOAD



	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Ave.
RP-1	2,954	2,949	3,007	2,646	2,651	2,851	2,638	2,560	2,443	2,530	2,509	2,634	2,698
RP-2	173	153	153	161	146	155	152	147	152	171	149	186	158
RP-4/IERCF	2,364	2,235	2,307	2,061	2,148	2,163	2,320	2,132	1,941	1,912	1,911	1,962	2,121
RP-5	1,050	1,127	1,115	1,155	1,211	1,426	1,116	1,101	980	950	1,000	979	1,101
CCWRF	681	438	501	559	664	663	588	575	594	831	765	721	632
PS	213	213	222	212	202	201	207	216	217	192	165	166	202
RW	2,548	2,633	2,959	2,555	1,873	1,999	2,015	1,723	1,513	2,177	2,611	2,774	2,282

For reasons explained in the following section, the Agency does not intend to install enough renewable energy technology to export electricity back to the grid. Instead, the goal of IEUA's Energy Management Plan is to procure sufficient renewable technology to meet the average load identified through historical and projected demand. Figure 8 compares the maximum hourly electrical generation by renewable sources during each month of FY 2013/2014 to the average peak load for all Agency facilities.

FIGURE 8. FY 13/14 MAXIMUM PEAK RENEWABLE GENERATION

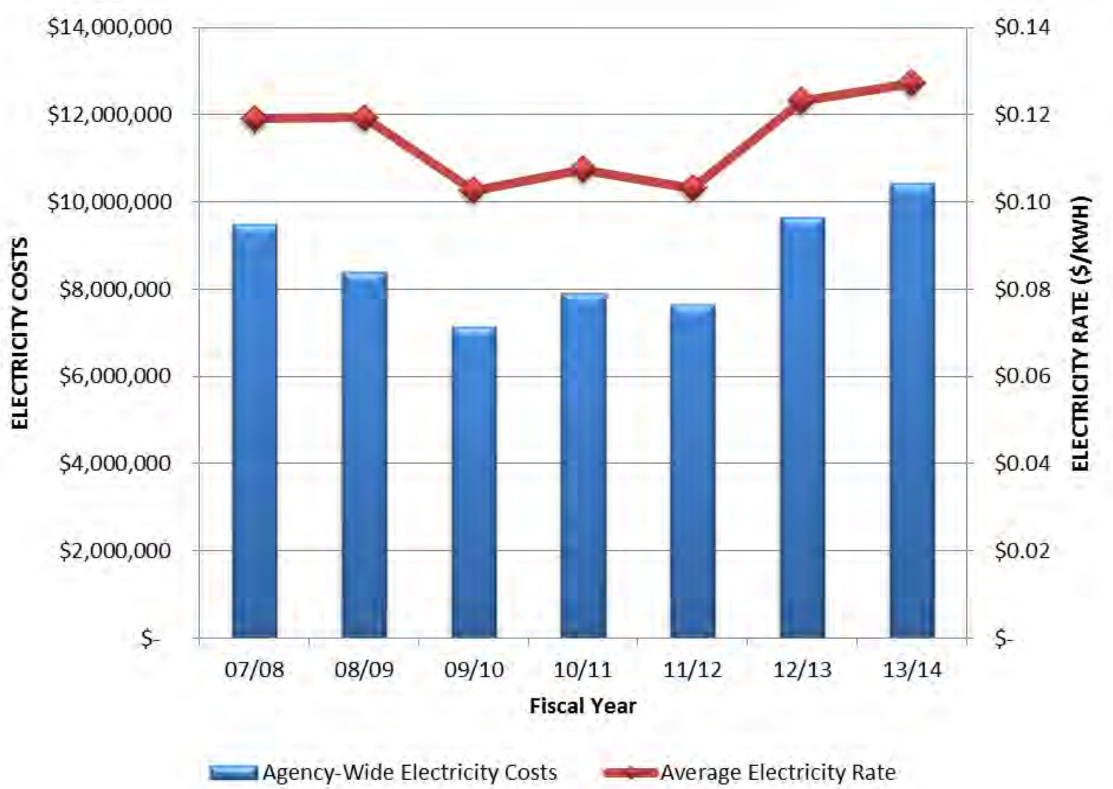


In FY 2013/2014, the Agency's renewable portfolio was capable of providing approximately 59 percent of the peak electrical demand for all facilities during summer months, and approximately 62 percent over the course of the entire year. Future energy efficiency projects and new technologies will be needed to grow the renewable portfolio and progress toward sustainability.

Unlike natural gas procurement, IEUA's electricity purchases are procured through a mixture of Direct Access and bundled service through SCE. The advantages of bundled service (paying the local utility for both transmission and generation charges) through the IOU or DA (paying the local utility for transmission charges and a competing ESP for generation charges) vary greatly depending on many facility-specific factors.

Typically, ESPs offer cost savings opportunities with simplified rates that vary with market trends and do not include expensive demand charges. SCE's electricity rates, although fixed, vary with time of use, and can include standby and departing load charges that vary by facility and inflate (or in some cases, decrease) costs. Due to the temporal and site-specific variability in energy rates, the Agency closely evaluates the procurement options at each facility regularly. Figure 9 displays cost data beginning in FY 07/08, including the overall average electricity rate, on a $/kWh basis, that the Agency paid. This rate is inclusive of all renewable, IOU, and ESP costs. Since there is no significant change over the years, the rate and usage data track each other fairly closely.

FIGURE 9. AGENCY-WIDE ELECTRICITY COSTS FROM FY 07/08 TO 13/14



Figures 10 and 11 outline IEUA's overall energy costs for FY 07/08 and FY 13/14 respectively. In both bases, electricity costs account for over 90 percent of the total energy costs. Furthermore, current natural gas usage is almost exclusively tied to fuel cell consumption, which is highly sensitive to operational adjustments. Electricity usage, on the other hand, is widespread across all facilities and offers more opportunities for optimization and efficiency increases. Therefore, much of the focus of this Energy Management Plan and projects discussed herein will be on reducing electricity consumption or increasing on-site electricity generation through various means.

FIGURE 10. FY 07/08 AGENCY-WIDE ENERGY COSTS

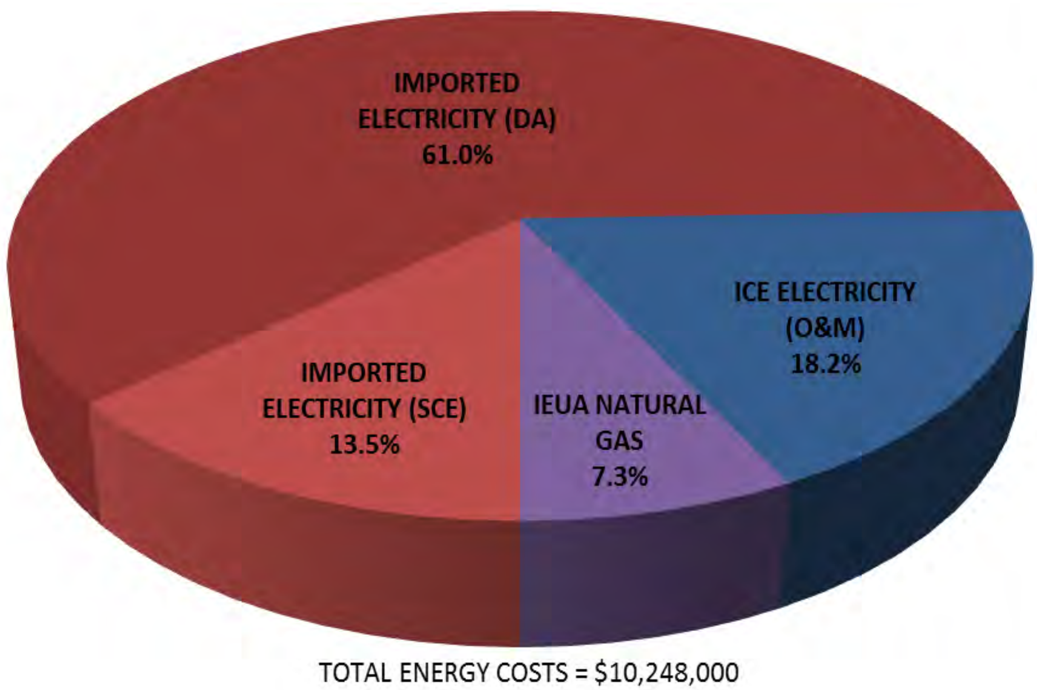
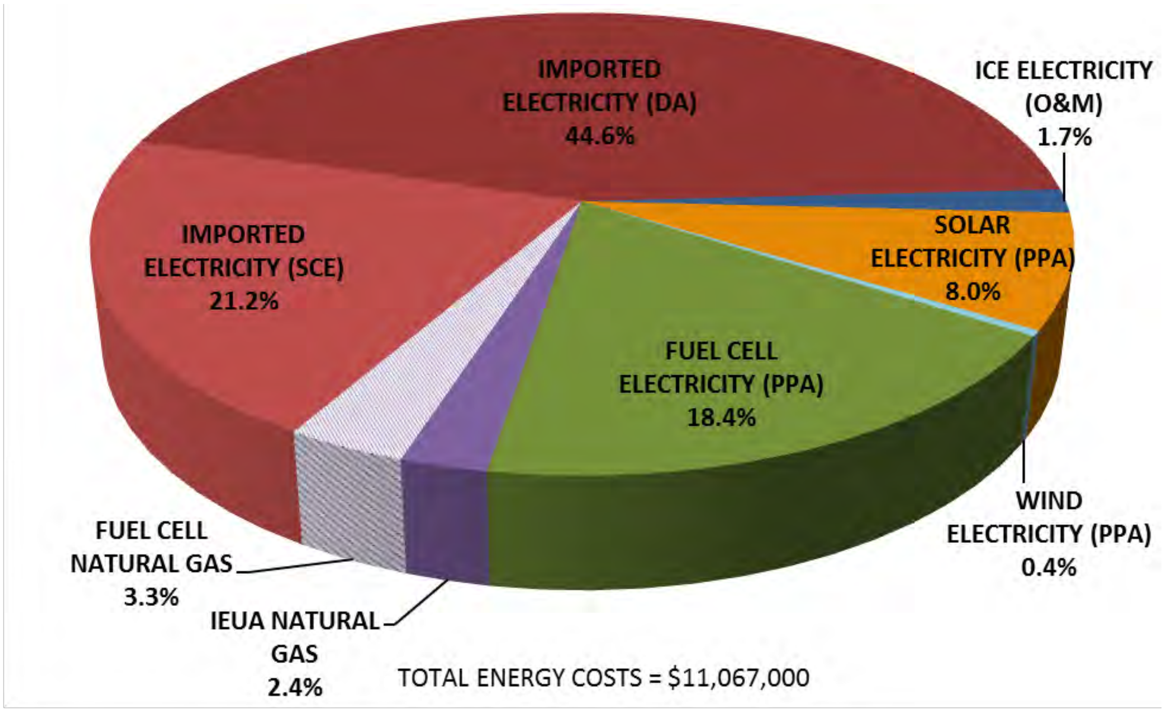


FIGURE 11. AGENCY-WIDE ENERGY COSTS FOR FY 13/14



The financial impact of renewable installations is apparent when comparing the two fiscal years. In FY 13/14, approximately 30 percent of all energy procurement came from PPA sources (including natural gas paid for by PPA provider). Imported electricity costs were reduced by approximately 10 percent, though the percentage of bundled electricity purchased increased. The changes seen since FY 07/08 are the result of several factors, including energy tariffs and procurement options. To better understand the variance with each facility, the following section includes details on each site.

GREENHOUSE GAS EMISSIONS

Greenhouse Gases (GHGs) emitted in the state are regulated by the California Air Resources Board (CARB). CARB has also developed the Climate Change Scoping plan, most recently updated in March 2014, which targets industries and large facilities with high global warming potential and mandates reduction measures to in an effort to steadily decrease GHG emission levels. Wastewater treatment plants and composting facilities are not subject to the reduction measures addressed in the Scoping Plan. Furthermore, no IEUA facility emits GHGs at a level high enough to reach the regulated threshold for GHG reporting.

Despite the lack of any GHG reporting requirements, in February 2014, IEUA became a member of The Climate Registry (TCR), a nonprofit organization that develops standards and protocols for GHG calculations and reporting. Membership in TCR is voluntarily, and is a result of the Agency's aim to practice environmental stewardship as a regional leader. As a member of TCR, IEUA has committed to publicly report annual GHG emissions. The first Agency-wide reported inventory, spanning the 2013 calendar year, is shown in Table 3.

TABLE 3. 2013 GREENHOUSE GAS EMISSIONS BY SOURCE

Source	GHG Emissions (Metric Tons CO_2e)	Percentage of Total
Heavy Duty vehicles	10	0.0
Fleet vehicles	297	0.9
Biosolids Hauling	124	0.4
Emergency Generators	99	0.3
LPG Combustion	33	0.1
Digester Gas Combustion	9,341	27.9
Natural Gas Combustion	6,735	20.1
Purchased Electricity	16,868	50.3
Total	**33,506**	**100.0**

The reported emissions use TCR protocols to calculate the metric tons of carbon dioxide equivalents ($CO\text{-}_2e$, a combination of CO_2, $CH_{\text{-}4\text{-}}$, and N_2O) emitted by IEUA processes. Both direct (i.e., stack emissions) and indirect (i.e., emissions associated with services procured by IEUA, such as purchased electricity) emissions were included in the calculations. 2013 GHG emissions were reported through TCR but not verified. IEUA has committed to pursuing verification for 2014 emissions.

In addition to annual reporting, IEUA aims to reduce these annual emissions moving forward in order to align with state and federal GHG reduction goals. An analysis of the reported data shows that an overwhelming majority of the Agency's GHG emissions came from electricity purchases and stationary combustion. Identifying the largest contributor to GHG emissions will also assist IEUA in determining where reductions can be most effectively achieved. Figures 12 and 13 compare the percentage of GHG emissions and electricity usage, respectively, for each facility.

FIGURE 12. 2013 GHG EMISSIONS BY FACILITY

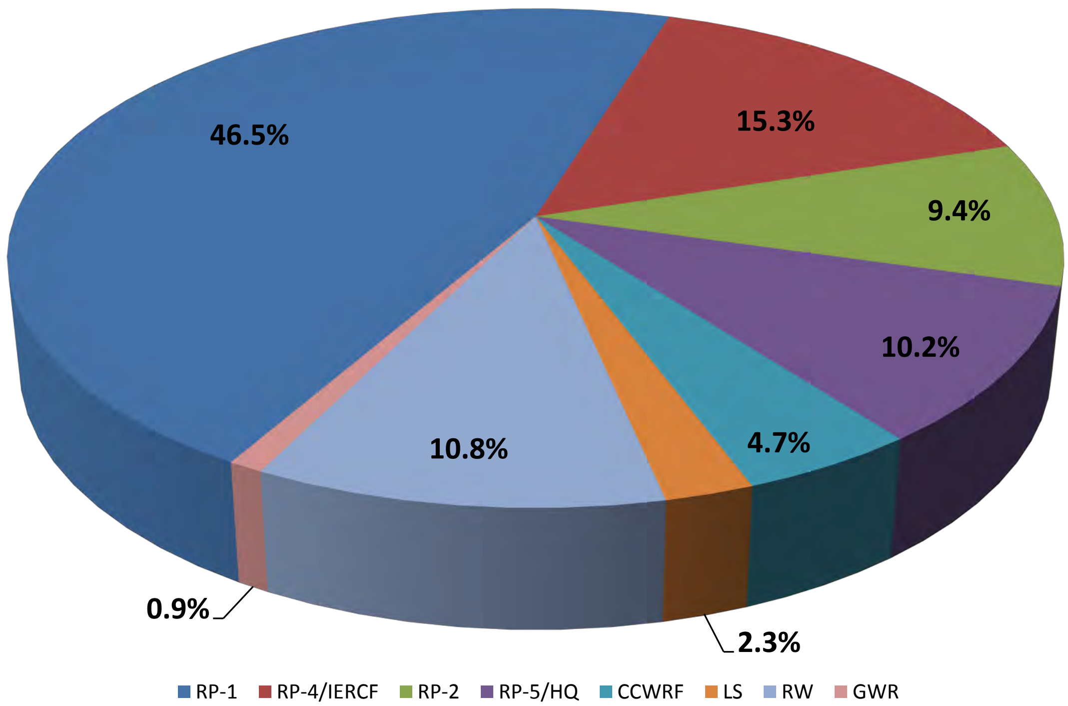
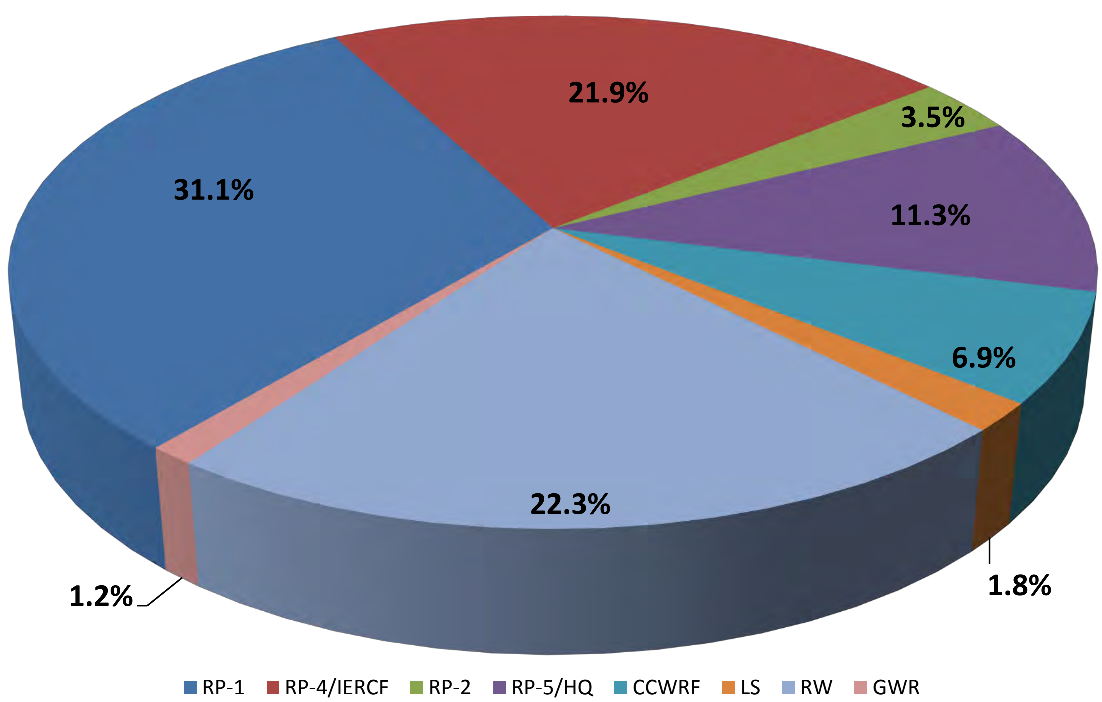


FIGURE 13. 2013 ELECTRICITY USAGE BY FACILITY



The contribution of gas combustion to GHG emissions is apparent when comparing the figures above. Three IEUA facilities (RP-1, RP-2, and RP-5) consume digester gas produced on-site. These facilities combine to account for approximately 66 percent of the Agency-wide GHG emissions. However, the same facilities accounted for only 46 percent of the electricity usage during the same time period.

RP-4/IERCF and the RW program, on the other hand, used a combined 46 percent of the Agency's electricity consumption in 2013, but only produced 29 percent of the GHG emissions. These data indicate that digester gas consumption is the major contributing factor to IEUA's carbon footprint.

The renewable installations and efficiency projects have had a significant impact on IEUA's GHG emissions profile. Although the Agency only began reporting GHG emissions in 2013, historical fuel usage and electricity purchase data can be used to determine emissions in previous years under the same standards. Due to the increase in on-site renewable generation and reduced cogeneration engine operation, IEUA has reduced GHG emissions by approximately 36 percent since 2008. Neither the 2008 or 2013 emissions have been verified by a certified third party.

TABLE 4. GREENHOUSE GAS EMISSIONS COMPARISON

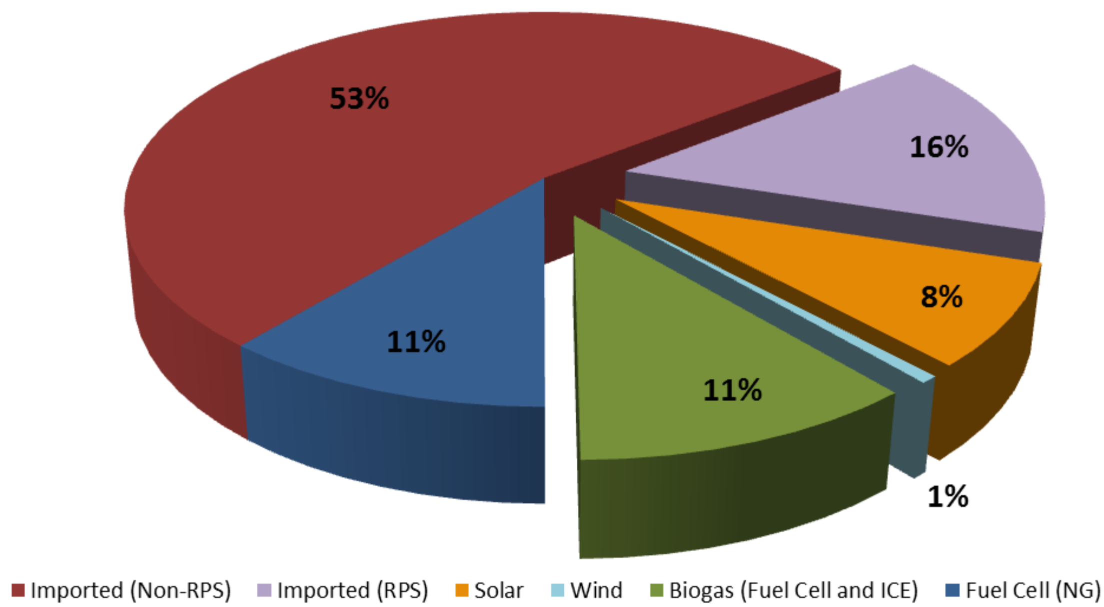
2008 GHG Emissions (Metric Tons CO_2e)	2013 GHG Emissions (Metric Tons CO_2e)	Percent Reduction
52,400	33,506	36.1

It should be noted that these emissions totals also include biogenic emissions, or GHGs that were recently contained in living organisms and are therefore considered carbon neutral. The Climate Registry requires these emissions to be reported, though they are distinguished from anthropogenic source emissions. Of the reported 2013 GHG emissions, approximately 28 percent are from biogenic sources.

Overall, approximately 36 percent of the electricity consumed at IEUA facilities during FY 2013/2014 was generated by carbon neutral sources (Figure 14). This value only considers the digester gas usage in the RP-1 fuel cell. Natural gas consumption in the equipment, though nearly devoid of criteria pollutant emissions, does result in anthropogenic GHG emissions. The carbon neutrality figure also accounts for the proportion of imported electricity that is obtained from renewable or hydroelectric sources, which were obtained from the IOU or DA provider directly. As previously stated in the Introduction, IEUA strives to increase the carbon neutrality of electricity procurement to 100 percent by 2030. The long term is needed to account for the significant planning and engineering efforts involved in changing IEUA's generation and procurement strategies to permit 100 percent neutrality.

IEUA has developed a preliminary Carbon Management Plan, included in Appendix B, that identifies a proposed path to achieve 100 percent carbon neutrality. IEUA will work with third party consultants to further develop the Carbon Management Plan to include GHG reduction strategies and monitoring efforts.

FIGURE 14. CARBON NEUTRAL SOURCES OF FY 13/14 ELECTRICITY USAGE



Evaluations for new projects will consider potential GHG reductions that benefit the Agency's carbon footprint. Due to the relative infancy of the reporting protocols and emergence of new technologies, emission factors are not always readily available through TCR. In these cases, IEUA must perform independent research to estimate potential GHG emissions reductions.

Furthermore, IEUA has committed to assisting The Climate Registry to develop Water-Energy GHG Reporting Protocols. With the advent of these protocols, quantifying and verifying GHG emissions reductions can be standardized, an essential component in establishing GHG credits and measuring reductions.

IEUA is also aware of the impact its facilities can have in reducing emissions of methane, a short-lived climate pollutant (SLCP). In May 2015, CARB released a concept paper documenting the importance of decreasing SLCP emissions and potential measures that could achieve reductions. Wastewater treatment plants have the potential to reduce methane emissions through effective resource recovery. IEUA already utilizes anaerobic digestion and co-composting to minimize methane emissions at its facilities. In addition, the RP-5 SHF diverts organic food waste from landfills to further reduce methane emissions. This Energy Management Plan will consider additional ways that IEUA's facilities can minimize fugitive methane emissions from equipment and potentially divert more organic waste in a cost effective and reliable manner.

Facility Descriptions

REGIONAL PLANT NO. 1

RP-1 is IEUA's largest treatment plant and is capable of treating an average of 44 MGD of wastewater flow. The facility employs primary, secondary, and tertiary treatment to produce Title 22 compliant recycled water that is provided to end users and groundwater recharge basins. RP-1 contains anaerobic digesters and dewatering facilities that generate renewable digester gas from the sludge removed during the liquids phase wastewater treatment process.

Gas Production

RP-1 has seven digesters operated in a three-phase thermophilic process. In FY 13/14, the digestion operation produced an average of 560 standard cubic feet per minute (scfm) of digester gas, or approximately 800,200 scf per day. Approximately 14 percent of total gas production was acid phase gas, which is the product of the first phase of thermophilic digestion with a heat rating ranging from 200 to 300 Btu/scf. Due to its low quality, the acid phase gas is not consumed in the boiler or fuel cell. Instead, the gas is continuously flared.

The heating value of the remaining 86 percent of digester gas typically measures between 575 and 625 Btu/scf. The preferred destination for this gas is the 2.8 MW fuel cell operated on site. Prior to introduction to the fuel cell, the gas is directed through an extensive gas conditioning system that is designed to remove Volatile Organic Compounds (VOC), sulfides, and siloxanes that may prove harmful to the fuel cell catalyst. As part of the PPA, IEUA is required to deliver a minimum of 612,000 scf of digester gas per day to the fuel cell, averaged annually. This requirement accounts for approximately 90 percent of the total consumable (high Btu) gas produced at the facility daily.

RP-1's hot water boilers are the second option for the digester gas. The boilers are required to produce heat for the digestion process, and are capable of operating on either digester gas or natural gas, but not a blend. The boilers are operated on digester gas when production is high enough to operate both the fuel cell and boiler, or when the fuel cell is operating exclusively on natural gas. In instances when the digester gas production exceeds both the fuel cell and boiler demands, the excess gas is combusted in the flare. The frequency of flare operation heavily depends on the status of the fuel cell's gas conditioning system. If the gas conditioning system is inoperable, the boilers can combust up to 420,000 scf per day, with the excess digester gas being flared.

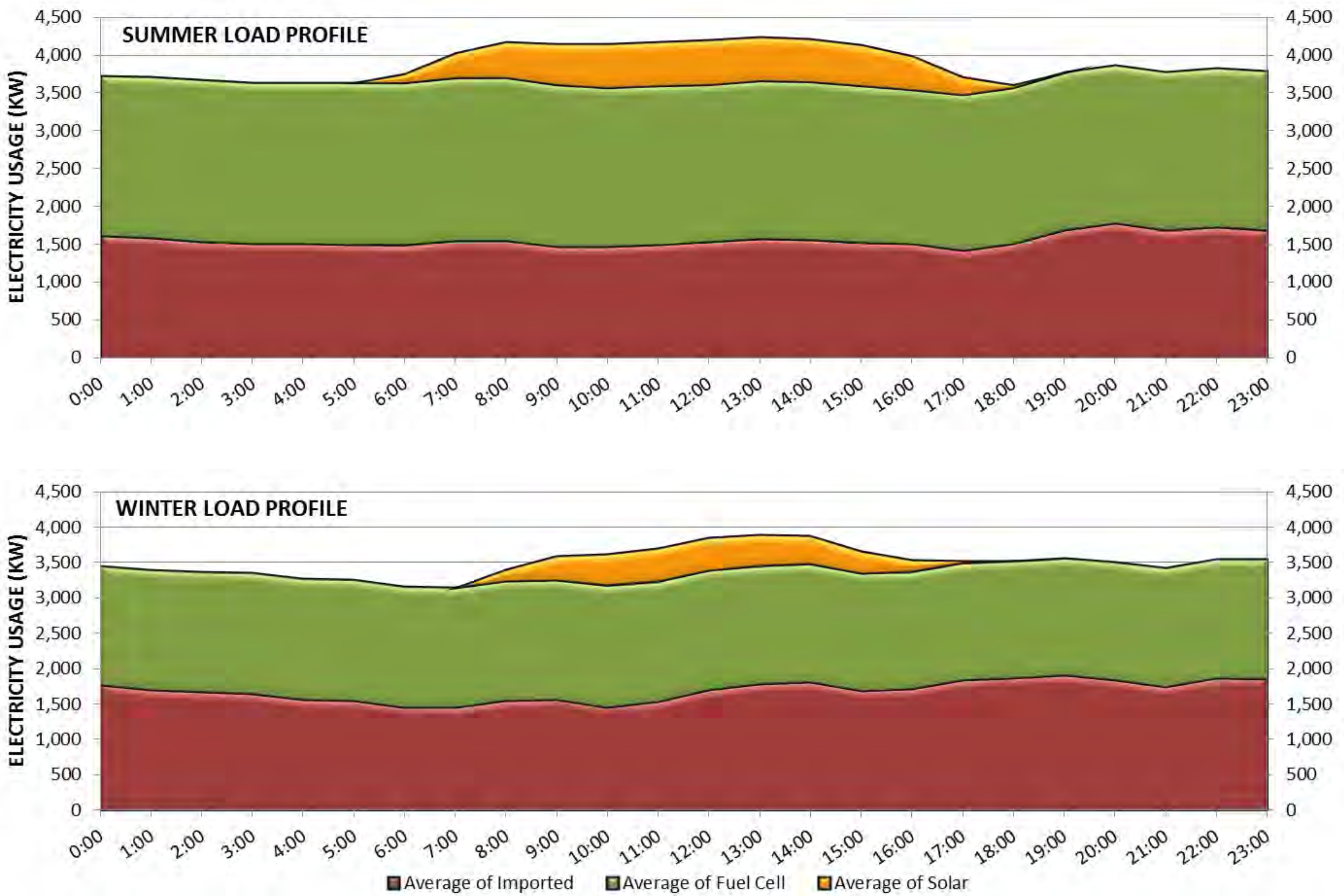
Facility Load

The average hourly electrical load for summer (June through September) and winter (December through February) months at RP-1 are shown on Figure 15. Imported electricity, fuel cell generation, and solar generation are all included on these two load profiles. The figure shows a slight reduction in overall load during colder months, with peak consumption is approximately 4.2 MW in summer and approximately 3.9 MW in the winter. In both cases, the peak electrical load occurs around 13:00 in the afternoon. The generated solar electricity also varies between seasons, as days are longer and sunnier in summer than winter.

The figure also shows that imported electricity consumption is fairly steady throughout the day, with RP-1 purchasing approximately 1.4-1.7 MW throughout the year. The amount of electricity imported was higher than expected, as the generation capacities of the fuel cell and solar systems should have accounted for more of the total facility load. In September 2013, a sulfides breakthrough in the fuel cell's gas conditioning system diminished the catalyst performance and constrained fuel cell operation to a reduced load. In FY 13/14, the fuel cell generated, on average, approximately 420 kW less during winter months than during summer months. However, since this limitation was operational in nature, the power output of the fuel cell is not expected to vary seasonally in the future.

The data charted on Figure 15 includes electricity used by the recycled water distribution pumps located on site. These pumping demands were removed in previous sections to highlight the increasing power requirements that IEUA faces in distributing recycled water. However, these recycled water distribution pumping demands must be included when considering the overall facility load because they impact the procurement and self-generation opportunities that IEUA can pursue (as described below).

FIGURE 15. FY 13/14 AVERAGE RP-1 LOAD PROFILE DURING SUMMER AND WINTER MONTHS



Electricity Procurement

RP-1 receives electricity from a mix of generation sources, which are listed in Table 5. RP-1's imported electricity purchases are obtained through Direct Access at day-ahead market pricing. The cost of generation is paid to an ESP, which means that RP-1 is not subject to high generation demand charges from SCE. Transmission costs, paid to SCE for the imported power, are determined by the applicable tariffs imposed by the IOU for large commercial customers with standby service (TOU-8-B-Standby). The facility is assessed demand charges as part of the transmission costs, although the demand is reduced by the nameplate rating of the fuel cell each month. RP-1 is also subject to departing load charges as a result of the on-site generation from the fuel cell.

TABLE 5. FY 13/14 RP-1 ELECTRICITY PROCUREMENT

Generation Source	Service Type	Rate Type	Percentage of Facility Load
Imported (as needed)	Direct Access	Market-priced	45
Fuel Cell (2.8 MW)	PPA	Fixed w/ annual escalator	50
Solar (0.83 MW)	PPA	Fixed w/ annual escalator	5

In FY 13/14, on-site generation, consisting of the fuel cell and solar array, accounted for 55 percent of the total facility load. This generation is lower than expected due to the fuel cell's extended operation at a reduced load. Table 6 shows the anticipated electricity procurement scenario assuming full operation from the fuel cell and 95 percent uptime.

TABLE 6. ANTICIPATED RP-1 PROCUREMENT WITH FULL FUEL CELL OPERATION

Generation Source	Service Type	Rate Type	Percentage of Facility Load
Imported (as needed)	Direct Access	Market-priced	34
Fuel Cell (2.8 MW)	PPA	Fixed w/ annual escalator	61
Solar (0.83 MW)	PPA	Fixed w/ annual escalator	5

From data graphed on Figure 15, the average hourly winter load at RP-1 varies from 3.1 – 3.8 MW, which means that RP-1's renewable installations are periodically capable of producing more than 100 percent of the facility's electrical demand during peak generation periods. As such, RP-1 was required to secure an export agreement with SCE to enable transmission of power back to the grid.

RP-1 was granted a multiple-tariff agreement that only compensates for power export from the solar array. The export agreement was completed by utilizing SCE's Net Energy Metering (NEM) program. However, because SCE's NEM program limits inclusion of fuel cells to systems below 1 MW, Since RP-1 is a DA customer, only the transmission portion of the power exported and attributed to the solar array will be compensated by SCE. The entire generation portion will be sold by the ESP at market price, effectively debiting the total electricity amount provided by the ESP per the DA contract.

Demand Response

RP-1 participates in the Demand Response program through ENERNOC. During a DR event, RP-1 staff is tasked with reducing the facility load by 50 kW through reduced operation of the recycled water pumps. This drop in load represents approximately four percent of the overall load reduction target of 1,230 kW that IEUA has agreed to across all Agency facilities. In FY 13/14, RP-1 exceeded 100 percent of its target in all six DR events and averaged a load reduction of 470 kW per event. The load reductions were achieved through limiting RP-1's recycled water pumping. In FY 13/14, RP-1's recycled water distribution increased to counteract the recycled water distribution that was lost due to a construction project at CCWRF. As a result, RP-1 had more flexibility to curtail RW load during DR events.

IEUA's DR contract with ENERNOC contains a provision that requires the delivered load capacity to be at least 75 percent of the target reduction. If the delivered capacity falls below 75 percent, IEUA does not receive any credit for reducing load during the DR event. As a result, IEUA is hesitant to increase the curtailment target until reliable load reduction measures can be identified.

Furthermore, the current DR program does not provide any incentive for additional power that is exported to the grid during DR events. RP-1's potential to export power is increased if load reductions are achieved during DR events. However, since only a portion of the power exported is compensated by SCE, generating more energy than needed to meet the facility load provides no cost benefit to IEUA. If the DR program were to also incentivize power that is exported above the facility's baseline, IEUA could evaluate the potential for further reductions without fear of triggering cost prohibitive exports during DR events.

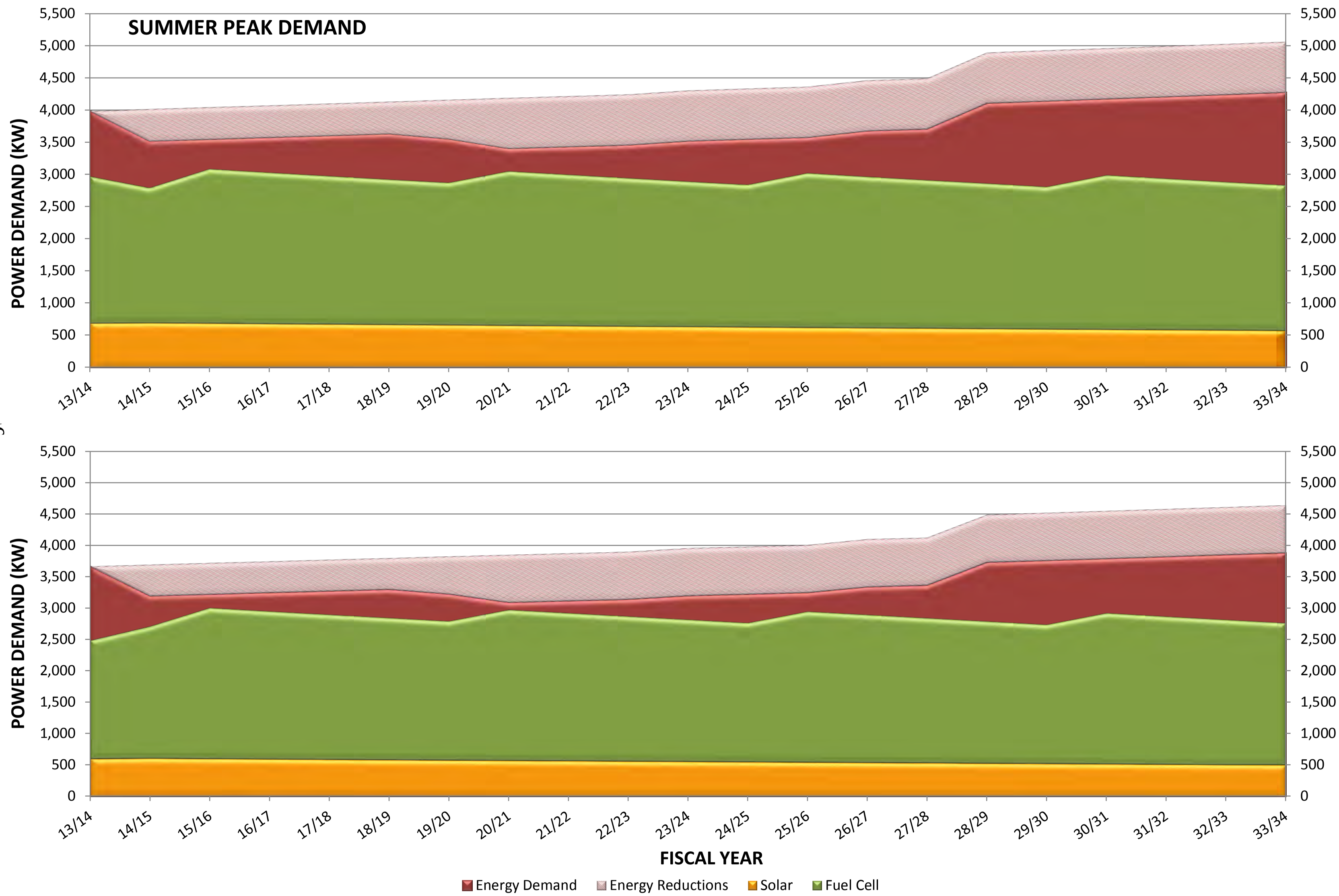
Energy forecast

IEUA's Wastewater Facilities Master Plan (WFMP) was developed to strategically prepare Agency facilities for forecasted flow demands. The WFMP is also used to recommend engineering projects that will modernize facilities to more effectively treat influent flows. The current WFMP forecasts flow projections and facility improvements through the year 2035. This EMP uses the same projections to forecast energy demands over the next 20 years to meet the anticipated flow increases and process changes. Figure 16 shows the forecasted demand for the summer and winter months, respectively.

The figure incorporates the expected renewable generation from the solar arrays and fuel cell with expected performance degradation and equipment (fuel cell catalyst) replacement factored in. The demand growth is proportional to expected flow increases of approximately 1 percent each year. The WFMP includes three major projects to be implemented at RP-1 within the 20-year period. The first two projects are modifications to the flow equalization process and installation of two additional anaerobic digesters, which will command a small increase in electrical demand. The third project involves the replacement of RP-1's aeration system with a membrane bioreactor (MBR) system and will result in a higher energy demand estimated at 10 percent. TYCIP projects included for implementation at RP-1 also considered in these projections.

The red shaded area in each figure represents the RP-1 demand exceeding the generation capabilities of RP-1's renewable portfolio. The red hatched area represents the anticipated energy reductions to be achieved through efficiency projects that are either under construction or included in the WFMP or TYCIP. The excess summer load ranges from approximately 500 kW in FY 15/16 to 1,400 kW in FY 33/34. The excess winter load fluctuates from approximately 200 kW in FY 15/16 to 1,100 kW in FY 33/34.

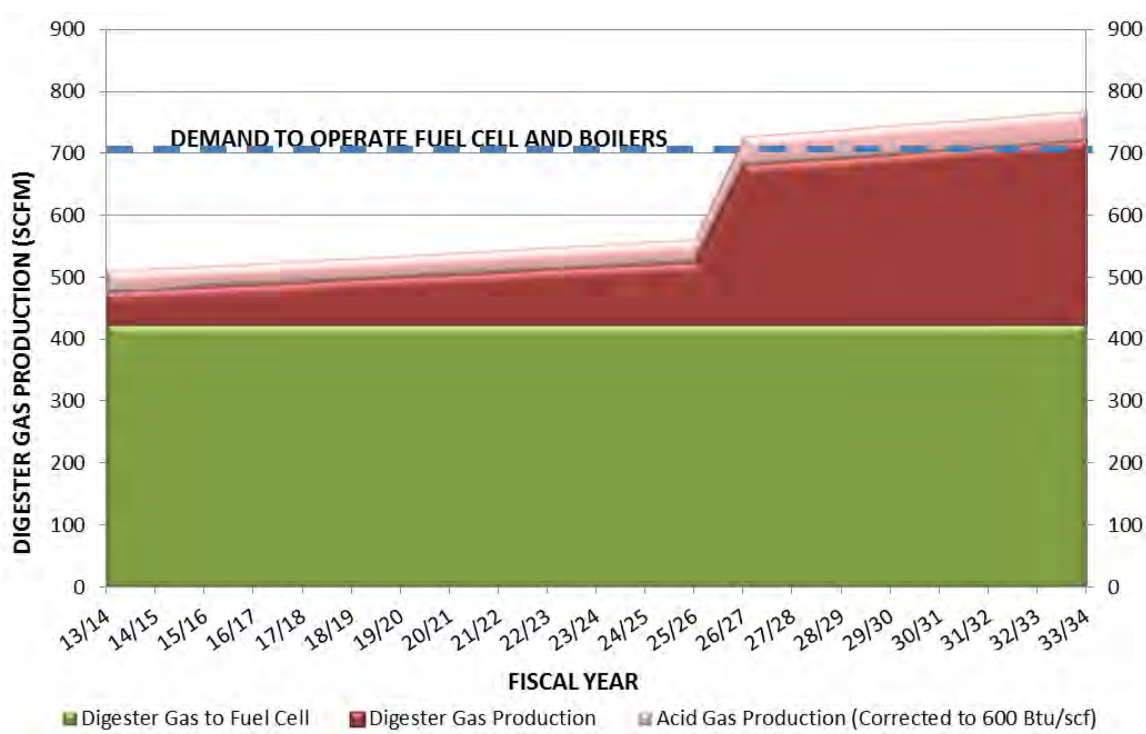
FIGURE 16. RP-1 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS



for a public agency with limited capital, it is essential to pursue self-generation projects that are cost effective. Renewable energy projects are typically cost effective at higher capacities and when the energy generated is used on-site. RP-1's renewable portfolio may be stagnant until the excess load during winter months approaches 1 MW, which is expected to coincide with the MBR installation. Alternatively, installing new distributed generation systems may make sense in the near term if IEUA can secure an export agreement with SCE that is economically favorable to power export from renewable sources. For these reasons, the focus on energy management at RP-1 over the next 10 years will be placed on conservation and efficiency projects.

RP-1's digester gas production also plays a vital role in the energy potential of the facility. In FY 13/14, the treatment plant produced an average of 560 scfm of digester gas. However, low BTU acid gas accounted for approximately 80 scfm of the production total. Figure 17 charts RP-1's anticipated gas production with expected flow increases, sludge thickening upgrades in the TYCIP, and two new digesters coming online over the next 20 years.

FIGURE 17. RP-1 20-YEAR GAS PRODUCTION FORECAST



Currently, the acid gas is combusted in the flare and only digester gas produced in the second of third phases of the thermophilic process are utilized in the fuel cell. While there may be potential to use the acid gas phase in a future process, Figure 17 accounts for the difference in heat rating between the gases by converting the amount of acid gas to an equivalent quantity of digester gas with a heat rating of 600 Btu/scf (the average heat rating of digester gas used in the fuel cell).

The green shaded area represents the amount of digester gas that IEUA is contractually obligated to provide for the fuel cell operator. The dashed line shows the level of gas production needed to simultaneously operate the boiler and fuel cell at full load. Since RP-1's boilers are not currently capable of operating on a natural/digester gas blend, digester gas is only utilized in the boilers when the fuel cell is operating solely on natural gas due to gas conditioning restrictions. As a result, the facility is producing excess digester gas that cannot be used for energy generation. This EMP will explore several projects that can take advantage of the energy content in the digester gas.

Potential New Projects

RP-1's large electrical load and digester gas production offer a multitude of opportunities for additional self-generation and efficiency projects. Table 7 outlines projects that are being considered for implementation at RP-1 and discusses the feasibility of each. These projects may or may not align with the goals introduced in Table 2. The objective of this section is to evaluate any concept that could potentially result in energy conservation at IEUA facilities. Select projects in the table were evaluated in separate fact sheets, which are included in Appendix C.

TABLE 7. POTENTIAL RP-1 ENERGY PROJECTS

Project Type	Name	Description	Feasibility
Operational Efficiency	Energy Audit	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	IEUA has seen benefits from past audits, but has never committed to comprehensive evaluations of each facility. The Energy Network offers a no-cost audit service designed to assist public agencies with these types of evaluations. RP-1 would likely be the first facility considered for this service.
Operational Efficiency	Lighting Upgrades	RP-1 has extensive indoor and outdoor lighting systems that can be replaced with low-usage LEDs or outfitted with controls to increase efficiency.	The high volume of lighting systems at RP-1 means that energy conservation opportunities are likely to be cost effective. A comprehensive audit of existing lighting infrastructure will be required to assess the potential savings and cost effectiveness.
Operational Efficiency	HVAC Controls and Upgrades	The RP-1 facility houses many buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	An assessment of RP-1's existing HVAC units is underway to identify which pieces of equipment can be replaced. Controls to limit HVAC operation to non-peak periods is not currently considered cost effective, since RP-1 imports electricity through DA and therefore is not subject to the high TOU charges that these controls are de-
Operational Efficiency	Compressed Air Optimization	Many of the treatment processes require compressed air. As a result, the facility contains multiple compressed air systems located throughout the facility. It is possible that energy savings could be achieved through centralizing or even downsizing the facility's compressed air systems.	An audit of the facility's compressed air system would be needed to assess the current infrastructure and determine if energy conservation measures are cost effective. This type of assessment could be achieved through a comprehensive energy audit.

Project Type	Name	Description	Feasibility
Operational Efficiency	Condense Operations Buildings	Operations and maintenance staff are scattered across the facility property, which requires multiple buildings, each requiring separate lighting and HVAC systems. The facility could potentially reduce overall electricity usage by condensing all staff offices into one building.	This measure would require significant planning and capital costs. IEUA will evaluate potential savings and operational impacts to determine feasibility.
Operational Efficiency	Aeration Basin Upgrades	Aeration is an energy intensive process, as it requires significant continuous air flow. Energy conservation could be achieved by upgrading the existing aeration system to higher efficiency blowers or diffusers with higher oxygen transfer efficiency.	IEUA would need to evaluate potential replacement options, identify cost effectiveness of the new equipment, and adjust operation schedules accordingly to allow for aeration retrofits.
Renewable Resources	Digester Mixing Optimization	The anaerobic digesters at RP-1 currently utilize gas mixing introduced at the base of the digesters to produce biogas. Alternative technologies or mixing strategies can be evaluated to determine if energy savings and/or increased gas production can be achieved.	Retrofitting the seven anaerobic digesters at RP-1 would be an expensive undertaking, and would potentially require subsidization from grants or other sources. Increased gas production could be used to eliminate natural gas in the boilers or to open an opportunity for further renewable technologies on site.
Renewable Resources	Digester Retrofit	Emerging technology focuses on retrofitting existing digesters with proprietary sludge mixing and thickening processes that are designed to increase the digestion capacity without increasing the digester footprint.	This retrofit project would require significant capital, unless pursued as a public-private partnership similar to existing PPAs. The innovative technology was recently implemented at other treatment facilities, so this project will be considered as further data becomes available.

Project Type	Name	Description	Feasibility
Renewable Resources	Install Gas Storage	The facility currently does not have the ability to store digester gas on site. Any gas that is not combusted in the boilers or processed in the fuel cell is combusted in the flare. Installation of low pressure gas storage tanks could provide cost effective storage and better utilize the facility's renewable resources. High pressure tanks could provide greater storage capacity, but would require more infrastructure for usage in facility equipment. This project could also include blending of the acid gas in order to increase the beneficial use of biogas.	Gas storage tanks would provide greater operational flexibility in utilizing the renewable digester gas at RP-1. However, an engineering evaluation would need to be conducted to determine how the additional stored gas would be utilized. This project may need to be considered in parallel with other projects that focus on increased gas production. Acid gas blending would require an evaluation of the gas quality to determine if the blended gas could meet the specifications required at the fuel cell. Any feasibility study conducted will also need to include potential gas compression costs.
Renewable Resources	Co-Digestion Project	RP-1 currently only accepts sludge from treated wastewater in its digestion process. Gas production could be increased with the introduction of food waste or Fats, Oils, and Greases (FOG) into the anaerobic digesters as well.	IEUA has explored food waste projects in the past and encountered operational challenges due to the lack of an appropriate automated food waste receiving and feeding station. Recent projects completed by other wastewater treatment facilities have shown positive results with co-digestion. Further evaluation would be required to identify influent sources, capacities, concentrations, and a potential receiving station.
Renewable Resources	Compressed Natural Gas (CNG) Installation	In addition to using digester gas in the boiler or fuel cell, IEUA staff has considered converting the biogas to CNG to be used in the Agency's fleet vehicles. Such a project would require retrofit of the fleet vehicles to operate on CNG. A CNG installation could take advantage of RP-1's location near several major highways and provide CNG for commercial use.	The scale of this project is currently not feasible, as a high majority of the biogas produced at RP-1 is processed in the fuel cell. IEUA is evaluating the viability of converting the acid phase gas to CNG as well. This project may become viable in the future with an increase in digester gas production and/or subsidized grant funding.

Project Type	Name	Description	Feasibility
Renewable Resources	Acid Phase Gas Turbine	The low heat content of the acid phase digester gas presents difficulties in producing renewable power. An emerging technology packages thermal oxidizers and gas turbines that can cost effectively utilize low quality biogas while producing electricity and heat.	While the technologies have been developed, there is little data indicating reliability. Unless such a project is heavily subsidized through grant funding, this project is likely infeasible until the technology is proven.
Renewable Resources	Expand Solar Installation	RP-1 currently has 0.83 MW of solar panels installed on site. The facility can evaluate the potential to install more solar on available land.	Any increase in solar generation at the facility would require a modified net metering agreement with SCE, which could take time considering the complexity of RP-1's current agreement. Additionally, the facility is subject to departing load charges, which would decrease the cost effectiveness of the technology. A feasibility study should consider that any new generation may result in power export at a low rate.
Renewable Resources	Electric Vehicle Charging Station	RP-1 can take advantage of its central location near major highways to install and operate an electric vehicle (EV) charging station powered by the on-site renewable installations. The station could be used by public and Agency fleet vehicles.	This project would require grant funding, as the charging station alone is not cost effective. The most viable route for project implementation would be as a component of a larger renewable energy project at the site or across Agency facilities.
Renewable Resources	Equalization Basin Cover and Solar Array	RP-1 currently uses flow equalization to temporarily store primary effluent during the treatment process, which can create odors. This project would install a cover over the basin with a solar array affixed atop the cover to generate electricity on-site.	Covering the equalization basin will require significant capital. Although costs may be offset by the solar installation, increasing the solar generating capacity of the facility could increase departing load charges and reduce the cost benefit.

Project Type	Name	Description	Feasibility
Energy Management	Purchase Existing Solar Installations	The power generated from the 0.83 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering purchasing the panels at fair market value to eliminate future electricity costs from solar generation.	IEUA has inquired about the potential purchase with the current project owner. However, the owner must be willing to sell the arrays at a value that is cost effective for the Agency. IEUA will continue to work with the PPA parties on this evaluation.
Energy Management	Convert Equalization Basin	RP-1 currently uses flow equalization to temporarily store primary effluent during the treatment process, which can create odors. Modifying the basins to store secondary or tertiary treated effluent may reduce odors while maintaining operational flexibility.	This project would require significant changes to the facility's piping infrastructure. Energy savings could be seen with reduced or off-peak pumping, though construction costs may be too high to be considered economical.
Energy Management	Energy Storage Installations	With the variation in load throughout the day and the potential for export during periods of peak renewable generation, RP-1 may benefit from the installation of energy storage technology to assist with load management. Storage could ensure that electricity purchases are minimized during peak periods and stored for later use on site when export would otherwise be required.	Current energy storage technology is not cost effective at RP-1 due to the facility's status as a DA customer. Load shifting, achieved through storing electricity during off-peak periods, has the potential to save on electricity costs by avoiding TOU demand charges. However, since RP-1 is not subject to these charges as a DA customer, the cost benefit is not enough to make the project viable without subsidization.

Project Type	Name	Description	Feasibility
Energy Management	Demand Response Energy Storage Installation	Energy storage as a demand response tool is an innovative approach that is currently in initial stages of development. The project would involve a third party installing battery storage at host sites that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times. Capital expenditures for the storage installations would be covered by the third party.	IEUA has been approached by a third party to develop Demand Response Energy Storage projects at Agency facilities. The lack of capital costs and benefit of load flexibility and cost savings are attractive. IEUA will evaluate the potential agreement to determine the project's impact on the Agency's existing infrastructure.

Project Forecasts

RP-1's procurement strategy, current demand, and limited capital eliminate many of these projects in the near term. Projects focusing on increasing operational efficiencies are more favorable to current conditions, assuming cost effective measures are identified. Table 7 includes broad areas of operation where energy reductions could be realized, but further work will need to be conducted to isolate and quantify savings from specific conservation measures. Tracking electrical demand with the facility's sub-meters will assist Agency staff IEUA in this endeavor. IEUA will work with a third party energy consultant within the next year to conduct a comprehensive energy audit of the RP-1 facility to develop a list of energy efficiency projects.

Despite the fact that RP-1 imported approximately 45 percent of the total electricity usage in FY 13/14, the potential to export power during periods of peak generation impacts the facility's ability to install new renewable generation projects. A revision of IEUA's net energy metering agreement with SCE would be required. Previous agreement revisions have proven to be costly and time consuming for Agency staff. Furthermore, any renewable technology utilizing digester gas would require an increase in gas production, as over 90 percent of RP-1's gas production is reserved for use in the fuel cell. The acid phase digester gas presents an opportunity for renewable technology on-site, but no reliable, cost effective solution has yet been found to properly utilize this gas.

Cost savings opportunities and operational flexibility could be achieved through gas storage projects. IEUA will conduct further evaluations to determine the potential savings opportunities from storing the gas, which will impact project viability. Energy storage projects that require IEUA to purchase battery storage are currently not cost effective because the facility purchases electricity through Direct Access. IEUA will continue to monitor energy storage technologies and pursue grant funding opportunities though, as the technology does present the benefit of operational flexibility and improved demand side management.

RP-1 contains a significant portion of the Agency's renewable portfolio that contributes toward the goal of peak power independence by 2020. Further evaluations will need to be conducted to determine the viability of expanding the facility's portfolio through increased digester gas production. In the short term, IEUA will commit to an energy audit to identify efficiency projects that can reduce the facility load and optimize the treatment processes.

REGIONAL PLANT NO. 4 AND INLAND EMPIRE REGIONAL COMPOSTING FACILITY

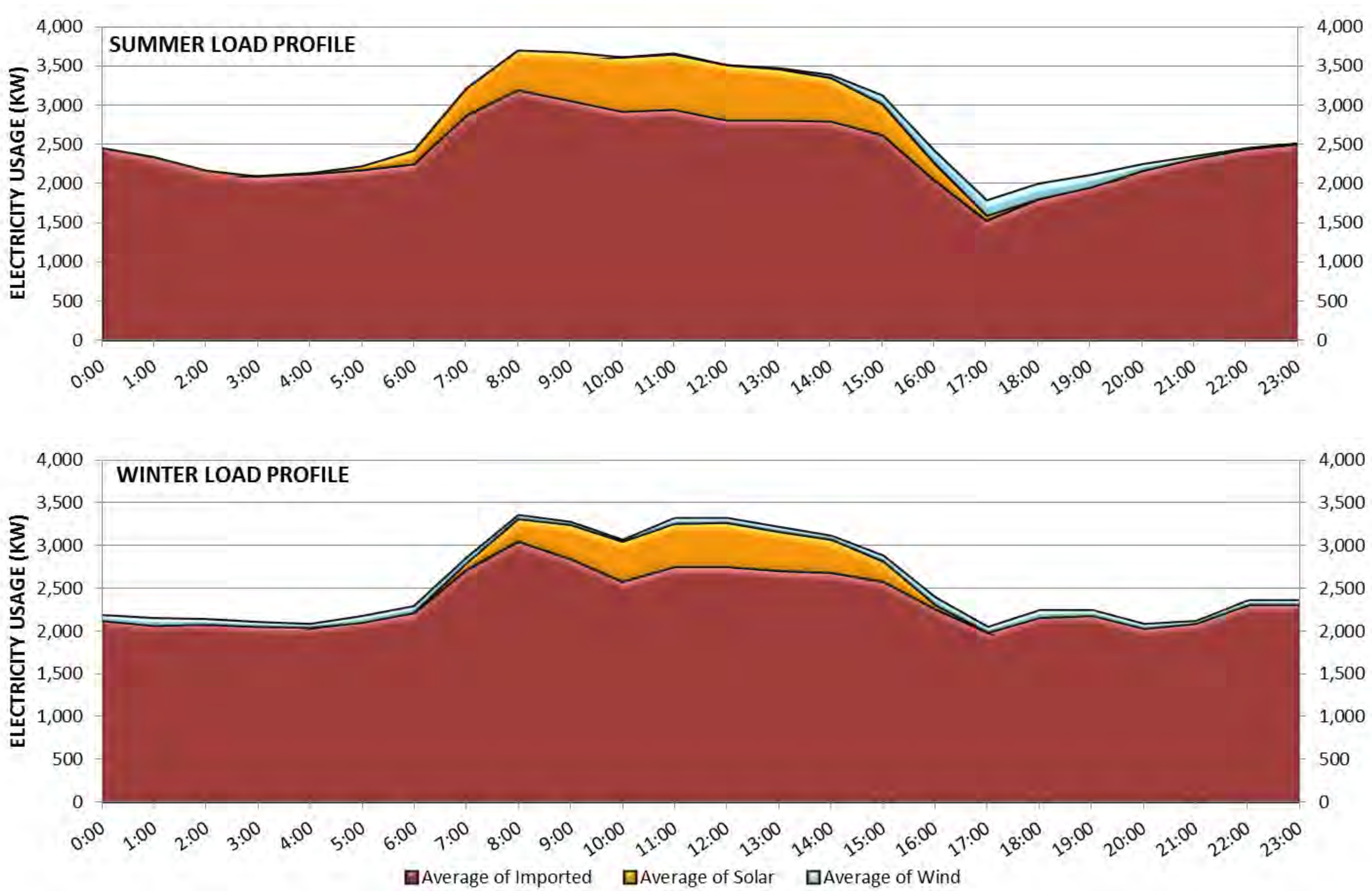
RP-4 and the IERCF are located adjacent to one another on 6th Street in Rancho Cucamonga. RP-4 is designed to treat an average of 14 MGD of wastewater flow. The treatment plant employs primary, secondary, and tertiary treatment to produce Title 22 compliant recycled water that is provided for direct use and groundwater recharge basins. Biosolids removed from the RP-4 treatment process are conveyed by gravity through the regional sewer system as influent to RP-1.

The IERCF is capable of recycling approximately 210,000 wet tons of biosolids and amendment per year into high quality compost. Although RP-4 and the IERCF operate independently of one another, the two facilities share the same electricity utility meter. For this reason, the EMP considers RP-4 and the IERCF together.

Facility Load

The average hourly electrical load for summer (June through September) and winter (December through February) months at RP-4 and the IERCF are shown on Figure 18. Imported electricity, wind turbine generation, and solar generation are all included in the load profiles. The figure shows a slight reduction in overall load during colder months, with peak consumption at approximately 3.7 MW in summer and approximately 3.3 MW in the winter. In both seasons, the peak electrical load is generally stable between 8:00 and 15:00. The generated solar electricity also varies between the two seasons, as generation increases in summer months having more sunlight hours each day. During winter months in FY 13/14, the wind turbine produced more consistently. However, the maximum power generated occurred during summer months from the late afternoon to early evening.

FIGURE 18. FY 13/14 AVERAGE RP-4/IERCF LOAD DURING SUMMER AND WINTER MONTHS



The figure also shows that imported electricity demand peaks between the hours of 7:00 15:00. This coincides with typical operations at the IERCF. Large fans are used to continuously exhaust the fully enclosed composting process. These fans operate at a higher flow rate during the day to achieve more frequent air exchanges for staff working within the enclosed facility. As a result, the facility experiences peak demand during the middle of the day.

The RP-4/IERCF load charts include electricity used by the recycled water pumps at RP-4. These pumping demands were not included in previous sections to illustrate IEUA's increasing power requirements in distributing recycled water. However, these demands must be included when considering the overall facility load because they influence the power procurement and self-generation opportunities that IEUA can pursue.

The existing single electricity meter for RP-4/IERCF requires that the two facilities be considered as a single power entity. However, load management of RP-4/IERCF varies due to operational differences and can be improved by using the sub-metering equipment installed in 2014. Future versions of the EMP will use the sub-meter data to analyze the demand at each facility independently and focus on specific site opportunities.

Electricity Procurement

RP-4/IERCF receives electricity from a mix of generation sources, as summarized in Table 8. Until April 2014, RP-4/IERCF received imported electricity through Direct Access at day-ahead market pricing. These facilities were required to withdraw from the Direct Access program as a result of the interconnection agreement for RP-5 that was obtained through the Renewable Energy Self-Generation Bill Credit Transfer (RES-BCT) program. As part of that agreement, exported power is compensated with bill credits on other utility accounts owned by the generating Agency. In order to qualify, IEUA had to identify non-RP-5 bundled accounts with sufficient load to credit the full RP-5 generation capacity. RP-4/IERCF was selected as a credit account and removed from the DA program.

Switching to bundled service has resulted in high generation demand charges from SCE during peak periods. Transmission costs, paid to SCE for the imported power, are determined by the applicable tariffs imposed by the IOU for large commercial customers with standby service (TOU-8-B-Standby). The facility is assessed demand charges as part of the transmission costs, although the demand is reduced by the nameplate rating of the wind turbine each month. RP-4/IERCF is also subject to departing load charges as a result of the on-site generation from the wind turbine.

TABLE 8. FY 13/14 RP-4/IERCF ELECTRICITY PROCUREMENT

Generation Source	Service Type	Rate Type	Percentage of Facility Load
Imported	Bundled	TOU-8-B Standby	90
Solar (1 MW)	PPA	Fixed with annual escalator	8
Wind (1 MW)	PPA	Fixed with annual escalator	2

In FY 13/14, on-site generation, consisting of the wind turbine at RP-4 and solar array at the IERCF, accounted for 10 percent of the total load of these facilities. As shown on Figure 18, the minimum load at RP-4/IERCF was approximately 2.1 MW. Even assuming peak generation, the wind turbine and solar array are not capable of matching the minimum RP-4/IERCF load. As such, RP-4/IERCF is not required to have an export agreement with SCE.

Demand Response

RP-4/IERCF participates in the DR program through EnerNOC. During a DR event, RP-4 staff reduces operation of the recycled water pumps and IERCF staff reduces fan operation. These practices aim to achieve reductions of 830 kW, which represents 67 percent of the overall Agency DR target. Additional reliable load reductions at RP-4 have been difficult to identify. IEUA's DR contract with EnerNOC contains a provision that requires the delivered load capacity to be at least 75 percent of the target reduction. If the delivered capacity falls below 75 percent, IEUA does not receive any credit for reducing load during the DR event. In FY 13/14, RP-4/IERCF reached 100 percent of their target in only one of six DR events. On average, RP-4/IERCF achieved 85 percent of its reduction goal, which is enough to achieve the minimum delivered capacity, but too low to commit to any additional reductions in the near future.

Energy forecast

Figure 19 shows 20 years of forecasted demands at RP-4/IERCF for the summer and winter months, based on the WFMP projections. The figure includes the expected renewable generation from the solar arrays and wind turbine with expected performance degradation factored in. The demand growth is proportional to an expected flow increase of approximately 2 percent each year at RP-4 and an expected 0.5 percent increase in energy demand each year at the IERCF. TYCIP and WFMP projects expected to affect the power demand were included in the forecast. However, the only significant project demand involves the replacement of RP-4's aeration system with a membrane bioreactor (MBR) system. This installation will result in a higher energy demand estimated at 10 percent.

The red shaded area in the two graphs represents the facility demand exceeding the generation capabilities of the solar and wind turbine installations. The red hatched area represents the anticipated energy reductions to be achieved through efficiency projects that are either under construction or included in the WFMP or TYCIP. The excess summer load ranges from approximately 1,500 kW in FY 14/15 to 3,700 kW in FY 33/34. The excess winter load fluctuates from approximately 1,400 kW in FY 14/15 to 3,600 kW in FY 33/34. Figure 19 shows that the peak demand at RP-4/IERCF does not have much seasonal difference.

FIGURE 19. RP-4/IERCF 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS

Despite the rated capacity of the solar and wind turbine installations, data have shown that RP-4/IERCF relies heavily on imported electricity during peak periods. This reliance is expected to increase steadily over the next 20 years. The amount of imported power indicates that the facility is capable of increasing the amount of renewable generation on site. Depending on the size and timing of any new renewable technology installed, it is possible that SCE would require an export agreement to be established. If the rated capacity of new distributed generation installations, when combined with the 2 MW generation capacity of the existing solar and wind installations, is more than or equal to the minimum demand of the facility at the time of installation, then IEUA will need to secure an export agreement with SCE.

Potential New Projects

The large electrical load and bundled service at RP-4/IERCF offer an array of opportunities for further self-generation, energy management, and efficiency projects. Table 9 outlines projects that have been considered for implementation at RP-4 and IERCF and discusses the feasibility of each.

TABLE 9. POTENTIAL RP-4/IERCF ENERGY PROJECTS

Project Type	Name	Description	Feasibility
Operational Efficiency	Energy Audit	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	IEUA has seen benefits from past audits, but has never committed to comprehensive evaluations of each facility. The Energy Network offers a no-cost audit service designed to assist public agencies with these evaluations. This service could yield several cost-saving measures at RP-4.
Operational Efficiency	Lighting Upgrades	RP-4 has extensive indoor and outdoor lighting systems that can be replaced with low-usage LEDs or outfitted with controls to increase efficiency. Lighting within the IERCF may not be as conducive to retrofit. Worker safety is paramount within the composting building, as visibility can be diminished without enough light.	A comprehensive audit of the existing lighting infrastructure will be required to assess the potential savings and cost effectiveness.
Operational Efficiency	HVAC Controls and Upgrades	RP-4 and IERCF have many buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	An assessment of RP-4's existing HVAC units is underway to identify equipment that can be replaced. Controls to limit HVAC operation to non-peak periods can be cost effective because RP-4/IRCF is subject to high demand charges as a bundled service customer. IEUA will pursue an HVAC control project at the site.
Operational Efficiency	Compressed Air Optimization	Many of the RP-4 treatment processes require compressed air. As a result, the facility contains multiple compressed air systems located throughout the facility. It is possible that savings could be achieved through centralizing or even downsizing the facility's compressed air systems.	An audit of the facility's compressed air system would be needed to assess the current infrastructure and determine if energy conservation measures are cost effective. This type of assessment could be achieved through a comprehensive energy audit.

Project Type	Name	Description	Feasibility
Operational Efficiency	Aeration Basin Upgrades	Aeration is an energy intensive process, as it requires significant continuous air flow. Energy conservation could be achieved at RP-4 by upgrading the existing aeration system to higher efficiency blowers or diffusers with higher oxygen transfer efficiency.	IEUA would need to evaluate potential replacement options, identify cost effectiveness of the new equipment, and adjust operation schedules accordingly to allow for aeration retrofits.
Renewable Resources	Expand Solar Installation	The IERCF currently has 1 MW of solar panels installed on the roof of the composting building. There is additional space available for further arrays to be installed. The facility can evaluate the potential to expand the existing solar system using available roof space. Land space at RP-4 could also be utilized for additional arrays.	Any increase in solar generation at the facility would require a modified net metering agreement with SCE. Additionally, the facility is subject to departing load charges, which would decrease the cost effectiveness of the technology. A feasibility study will be conducted to determine the cost effectiveness of adding more solar panels to the site.
Renewable Resources	RP-4 Electric Vehicle Charging Station	RP-4 can take advantage of its central location near major highways to install and operate an electric vehicle (EV) charging station powered by the on-site renewable installations. The station could be used by public and Agency fleet vehicles.	This project would require grant funding, as the charging station alone is not cost effective. The most viable route for project implementation would be as a component of a larger renewable energy project at the site or across Agency facilities.
Energy Management	IERCF Purchase Existing Solar Installations	The power generated from the 1 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering purchasing the panels at fair market value to eliminate future electricity costs from solar generation.	IEUA has inquired about the potential purchase with the current project owner. However, the owner must be willing to sell the arrays at a value that is cost effective for the Agency. IEUA will continue to work with the PPA parties on this evaluation.

Project Type	Name	Description	Feasibility
Energy Management	Energy Storage Installations	Considering the facility load is highest during the middle of the day, when TOU pricing is highest from the IOU, RP-4/IERCF may benefit from the installation of energy storage technology to assist with load management. Storage could ensure that renewable installations could be used to charge batteries (or similar storage technology) outside of peak periods and then used on site when IOU rates are highest.	IEUA has received proposals from energy storage vendors and found that current technology is not cost effective at RP-4/IERCF. IEUA will continue to pursue the technology, as storage can provide invaluable management flexibility. The project may be viable with grant subsidization.
Energy Management	Separate RP-4 and IERCF with two utility meters	RP-4 and IERCF operate independently of one another but share an electrical utility meter. Separating the sites into two metered facilities could improve resource management and renewable incentive opportunities.	IEUA has received cost estimates from SCE for metering the two facilities independently and found the project to be cost prohibitive. However, the cost effectiveness would be different since the switch to bundled service. Separating the facilities would also mean the elimination of departing load charges, but also reduced benefit from standby demand pricing. Further evaluation is required to determine the cost impact of this project.
Energy Management	Increase Service Voltage	RP-4/IERCF currently operates on a 12 kV system. Facilities operating at service voltages above 50 kV can purchase electricity from SCE at tariffs that have lower transmission and generation rates.	Retrofitting the electrical distribution system at RP-4 and IERCF would require significant engineering and capital. A feasibility study would need to be conducted to evaluate the cost savings that could be achieved through such a project. Future cost savings would decrease with the implementation of additional renewable installations or energy storage.

Project Forecasts

Based on RP-4/IERCF's high electrical demand, current generation capacity, and status as a bundled service customer, there are many opportunities to improve energy management at these sites. Cost effectiveness will be the main consideration when determining the feasibility of potential new projects. Available space can also be a limiting factor when considering expansion of the solar system.

As RP-4/IERCF is IEUA's second largest user of electricity, IEUA will work with a third party energy consultant to conduct a comprehensive energy audit of the RP-4 and IERCF facilities once the RP-1 audit has been completed. Such an audit would be required to develop focused energy efficiency measures and reduce power consumption cost effectively.

RP-4/IERCF, as a bundled service customer, is an ideal candidate for energy management technologies that reduce load during peak periods. The load profile shows that IERCF's peak usage coincides with SCE's on-peak rates. Reducing imported electricity during these periods could result in savings from time-related generation and demand charges.

Improved HVAC controls could improve energy management and reduce the overall consumption across the facility during peak hours. IEUA staff intends to pursue the HVAC control technology for implementation at RP-4 and IERCF. Based on the project results, the technology could be used at other facilities as well.

Energy storage could have a large impact on load and cost management. As mentioned in Table 6, current storage technologies have proven cost prohibitive in IEUA's BCEs. IEUA is pursuing grant opportunities that will utilize energy storage with existing or new renewable technologies. Implementing energy storage on site is considered a valuable asset that can improve energy management capabilities, reduce operating costs, and provide relief for the grid during peak periods.

Solar costs and land-use efficiency have changed considerably since IERCF entered into its PPA in 2008. As a result, there may be the potential to add up to 1 MW of additional capacity between IERCF and RP-4. IEUA will pursue proposals for new solar installations at each site.

CARBON CANYON WATER RECYCLING FACILITY

CCWRF is designed to treat an average of 11.4 MGD of wastewater flow. The treatment plant employs primary, secondary, and tertiary treatment to produce Title 22 compliant recycled water that is provided to end users. Biosolids removed from the treatment process are pumped to RP-2 for processing.

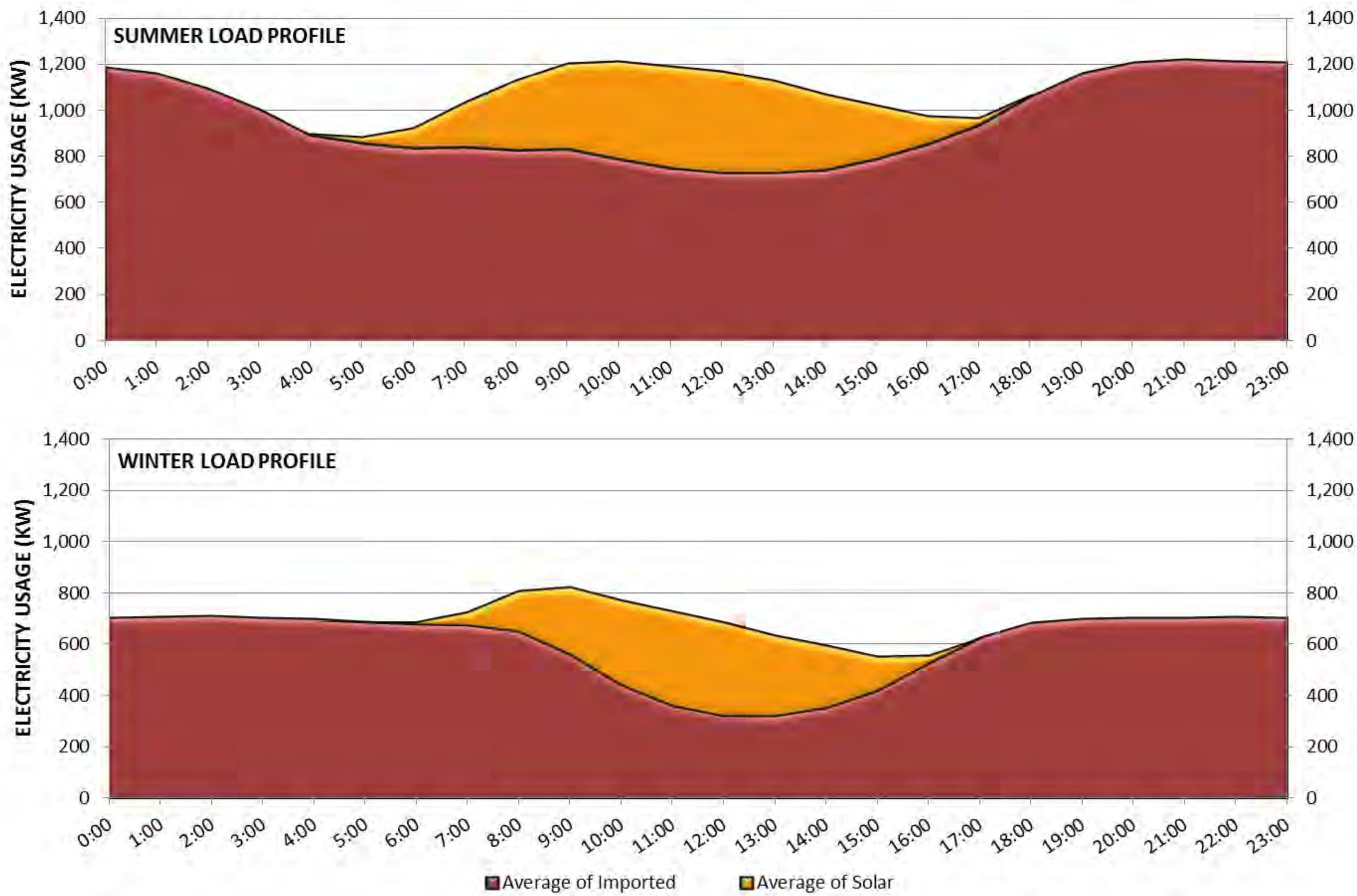
Facility Load

The average hourly electrical load for summer (June through September) and winter (December through February) months at CCWRF are shown on Figure 20. Imported electricity and solar generation are included in the load profiles. The figure shows energy consumption is 30 to 40 percent lower during winter months than summer months. Peak summer consumption is approximately 1,200 kW and peak winter consumption is approximately 820 kW.

The variation is due to the operation of CCWRF's recycled water pumps. During the winter months in FY 13/14, the RW distribution system at CCWRF was under construction and did not operate. However, the operation of these pumps typically varies seasonally because RW direct usage is lower during winter months. When RW demand is low, IEUA is able to satisfy direct use customer needs through RP-1's supply system. As a result, the CCWRF RW pump distribution system can be non-operational for weeks or months at a time. Therefore, despite the lack of pump station operation, the FY 13/14 facility load is considered characteristic of operations during the summer and winter months.

The CCWRF load profiles are unique in that two peak usage periods occur, one during the morning (between 8:00 and 9:00) and the other during the evening (20:00 to 24:00). During summer months, the daily electrical load varies based on recycled water pumping demand. The load profile shows peak usage around 1,200 kW at 10:00 and a minimum consumption of approximately 880 kW at 5:00. During winter months, when the recycled water pumps are typically non-operational, the electrical load is consistent during the evening, then peaks in the morning. Peak usage (approximately 820 kW) occurs between 8:00 and 10:00, and the facility load is at a minimum (approximately 560 kW) between 15:00 and 16:00.

FIGURE 20. FY 13/14 AVERAGE CCWRF LOAD DURING SUMMER AND WINTER MONTHS



CCWRF receives electricity from two generation sources, as listed in Table 10. CCWRF purchases imported electricity through Direct Access at day-ahead market pricing. In FY 13/14, imported purchases accounted for approximately 83 percent of the total electricity consumed. The remaining consumption was generated from the solar array.

TABLE 10. FY 13/14 CCWRF ELECTRICITY PROCUREMENT

Generation Source	Service Type	Rate Type	Percentage of Facility Load
Imported	Direct Access	Market-priced	83
Solar (625 kW)	PPA	Fixed with annual escalator	17

As shown on Figure 20, CCWRF's winter power demand can drop below 600 kW in the afternoon. This demand could potentially be met with peak generation of the solar array, which would result in a small amount of power being exported. CCWRF does not currently have an export agreement with SCE. No export agreement will be pursued considering the infrequency and small amount of power that could be exported. However, if any additional distributed generation projects were installed at CCWRF, IEUA would need to enter into an export agreement with SCE.

Demand Response

CCWRF participates in the DR program through EnerNOC. During a DR event, CCWRF staff reduces operation of the recycled water pumps. The load reduction goal of 290 kW represents 24 percent of the overall Agency DR target. Due to the seasonal nature of CCWRF's recycled water operations, IEUA's ability to meet the reduction target varies. The DR program uses data from the ten working days immediately prior to a DR event to calculate the baseline for each DR event. If CCWRF did not utilize its recycled water pumps during these times, which is likely during winter months, then meeting a winter reduction goal at CCWRF is impossible.

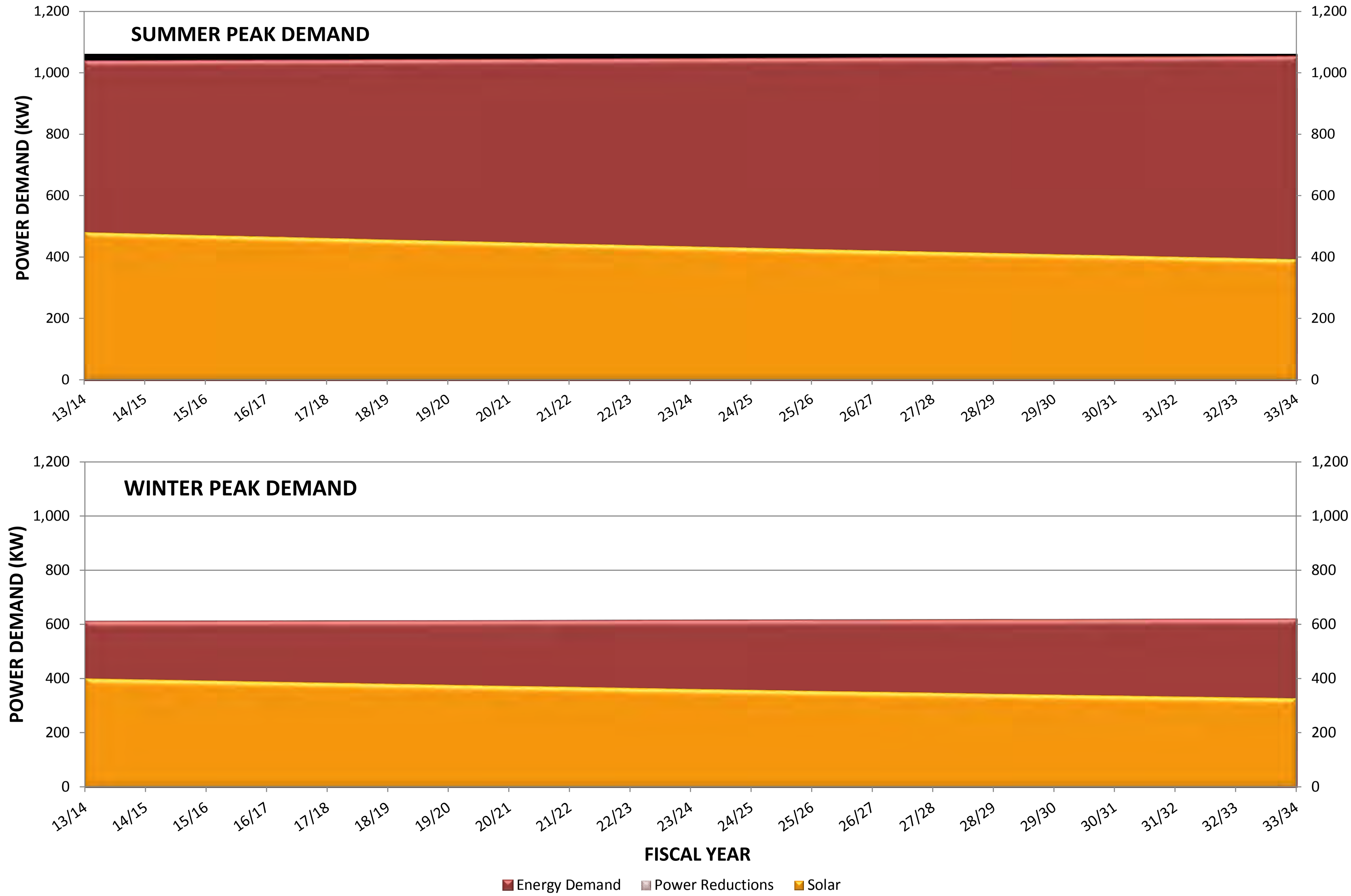
In FY 13/14, CCWRF failed to reach 100 percent of its target in all six DR events and actually saw a load increase in two events. This was a result of the recycled water pumping system's non-operation during reconstruction. The Agency's total cumulative curtailment of 1,230 kW can be achieved through a combination of the enrolled facilities. In FY 13/14, RP-1 reduced recycled water pumping loads to compensate for CCWRF's inability to drop load.

Energy forecast

Figure 21 shows the 20-year forecasted demand at CCWRF for the summer and winter months, respectively, based on the WFMP projections. The figure incorporates the expected renewable generation from the solar arrays, with expected performance degradation factored in. Flow projections at CCWRF are consistent with current operation, as the WFMP only predicts a cumulative increase of 0.1 MGD over the 20-year period. As such, there are no significant demand reduction projects expected at CCWRF. Existing equipment is expected to be capable of providing the treatment necessary to produce and distribute Title 22 quality water until at least 2034.

The red shaded area in each graph represents the facility demand exceeding the generation capabilities of the solar installation. There is no red hatched area on the figure because IEUA has not yet identified efficiency projects to reduce energy consumption. The seasonal difference in load at CCWRF is again apparent on Figure 21. Imported power demand during summer months ranges from approximately 560 kW in FY 14/15 to 660 kW in FY 33/34. The excess winter load fluctuates from approximately 130 kW in FY 14/15 to 220 kW in FY 33/34. The increase in these demands over the 20-year period is not a result of increased flow projections. Rather, it reflects the amount of imported electricity that is expected to increase each year because of the expected performance degradation of the solar arrays (estimated to be 1 percent annually).

FIGURE 21. CCWRF 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS



CCWRF projections indicate a reliable demand over the next 20 years. The amount of imported electricity during winter months is not well-suited toward adding additional renewable power projects, as installations in the 100-200 kW range are typically cost prohibitive. Furthermore, expansion of the current solar system on site is infeasible due to a lack of available space. Should a cost-effective distributed generation project be identified, it would almost certainly require an export agreement with SCE.

Potential New Projects

Opportunities for further self-generation, energy management, and efficiency projects at CCWRF are limited due to the consistent electrical load, existing solar generation, and status as a Direct Access customer. Table 11 lists projects that have been considered for implementation at CCWRF and discusses the feasibility of each.

TABLE 11. POTENTIAL CCWRF ENERGY PROJECTS

Project Type	Name	Description	Feasibility
Operational Efficiency	Energy Audit	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	IEUA has seen benefits from past audits, but has never committed to comprehensive evaluations of each facility. The Energy Network offers a no-cost audit service designed to assist public agencies with these types of evaluations. This service could yield cost-saving measures at CCWRF.
Operational Efficiency	Lighting Upgrades	CCWRF has indoor and outdoor lighting systems that can be replaced with low-usage LEDs or outfitted with controls to increase efficiency.	A comprehensive audit of the existing lighting infrastructure will be required to assess the potential savings and cost effectiveness.
Operational Efficiency	HVAC Controls and Upgrades	CCWRF has a handful of buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	An assessment of CCWRF's existing HVAC units is underway to identify equipment that can be replaced. Controls to limit HVAC operation to non-peak periods will likely not be cost effective because CCWRF is a Direct Access customer and is not subject to high demand charges from SCE.
Operational Efficiency	Compressed Air Optimization	Many of the CCWRF treatment processes require compressed air. As a result, the facility contains multiple compressed air systems located throughout the facility. It is possible that energy savings could be achieved through centralizing or even downsizing the facility's compressed air systems.	An audit of the facility's compressed air system would be needed to assess the current infrastructure and determine if energy conservation measures are cost effective. This type of assessment could be achieved through a comprehensive energy audit.

Project Type	Name	Description	Feasibility
Operational Efficiency	Aeration Basin Upgrades	Aeration is an energy intensive process, as it requires significant continuous air flow. Energy conservation could be achieved by upgrading the existing aeration system to higher efficiency blowers or diffusers with higher oxygen transfer efficiency.	IEUA would need to evaluate potential replacement options, identify cost effectiveness of the new equipment, and adjust operation schedules accordingly to allow for aeration retrofits.
Energy Management	Purchase Existing Solar Installations	The power generated from the 625 kW solar array is currently sold to IEUA through a PPA. IEUA is considering purchasing the panels at fair market value to eliminate future electricity costs from solar generation.	IEUA has inquired about the potential purchase with the current project owner. However, the owner must be willing to sell the arrays at a value that is cost effective for the Agency. IEUA will continue to work with the PPA parties on this evaluation.
Energy Management	Energy Storage Installations	CCWRF may benefit from the installation of energy storage technology to assist with load management. Storage could ensure that electricity purchases are minimized during peak periods and stored for later use on site when export would otherwise be required.	Load shifting, achieved through storing electricity during off-peak periods, has the potential to save on electricity costs by avoiding TOU demand charges. Current energy storage technology is not cost effective at CCWRF due to the facility's status as a DA customer. However, subsidization or modifying the DA rate could potentially yield a cost effective project. IEUA will continue to evaluate potential energy storage projects.
Energy Management	Demand Response Energy Storage Installation	Energy storage as a demand response tool is an innovative approach that is currently in initial stages of development. The project would involve a third party installing battery storage at host sites that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times. Capital expenditures for the storage installations would be covered by the third party.	IEUA has been approached by a third party to develop Demand Response Energy Storage projects at Agency facilities. The lack of capital costs and benefit of load flexibility and cost savings are attractive. CCWRF would likely need to switch to bundled service to take advantage of peak period cost savings. IEUA will evaluate the potential agreement to determine the project's impact on the Agency's existing infrastructure.

Project Forecasts

IEUA's ability to install new renewable energy projects at CCWRF is limited by available land and low import demand. In the near term, IEUA will focus on energy efficiency projects to optimize the treatment process and minimize the electrical demand. IEUA will work with a third party energy consultant to conduct a comprehensive energy audit of CCWRF that will identify potential efficiency projects.

REGIONAL PLANT NO. 2

RP-2 has been in operation since 1960. Originally designed to treat both liquids and solids, the facility has exclusively treated biosolids since 2002. At RP-2, all solids removed from RP-5 and CCWRF are thickened and digested. RP-2 contains digesters and dewatering facilities that generate renewable digester gas from the solids that have been removed during the liquids phase wastewater treatment process.

RP-2 is operated under a lease with the United States Army Corps of Engineers. With the lease term set to expire in 2035, IEUA plans to remove RP-2 from service within the next eight to ten years and relocate the solids processing to RP-5. As a result, the energy management opportunities at RP-2 are limited to projects with short payback periods without significant infrastructure.

Gas Production

RP-2 has three anaerobic digesters in operation and an aerobic digester that is only put in service during emergencies. In FY 13/14, the digestion operation produced an average of 160 standard cubic feet per minute (scfm) of digester gas, or approximately 229,100 scf per day. The acid phase gas, which is the product of the first phase of mesophilic digestion, cannot be consumed in the boiler or cogeneration engine due to its low quality. Unlike RP-1, RP-2's acid phase gas is not continuously flared. The acid phase gas is sent to gas mixers and injected into the second phase of the digestion system. After assisting with solids mixing, the acid phase gas is combined with the digester gas from the second phase and is combusted as needed in RP-2's boilers, engine, or flare. The acid phase gas can also be sent directly to the flare if operating pressures of the second phase digesters are too high.

The heating value of the digester gas typically measures between 550 and 625 Btu/scf. The preferred destination for this gas is RP-2's 580 kW cogeneration engine. This ICE is operated and maintained by IEUA staff on site. In FY 13/14, the ICE consumed an average of 116 scfm. The ICE is subject to SCAQMD Rule 1110.2, which requires that stationary digester gas-fueled engines meet stringent emissions limits by January 1, 2016 for VOC, nitrogen oxides (NO_x), and carbon monoxide (CO). While there has been discussion of extending this implementation deadline to January 1, 2017, no rule language has been promulgated indicating as such. Retrofitting the RP-2 ICE with sufficient emissions control technology to meet these standards would prove to be cost prohibitive. Therefore, IEUA plans to remove the ICE from service by the end of the 2015 calendar year.

RP-2's hot water boilers are the second option for the digester gas. The boilers are required to produce heat for the digestion process, and are capable of operating on either digester gas or natural gas, but not a blend. The boilers are operated on digester gas when production is high enough to operate both the ICE and boiler, or when the ICE is down for maintenance. When the digester gas production exceeds both the ICE and boiler demands, the excess digester gas is combusted in the flare.

Facility Load

The average hourly electrical load at RP-2 for summer (June through September) and winter (December through February) months are shown on Figure 22. Imported electricity and ICE generation are included on these two load profiles. The figure shows a slight reduction in overall load during summer, with peak consumption around 180 kW in summer and approximately 165 kW during winter. The load at RP-2 is so low that approximately 40 percent of the electricity generated from the ICE was used on site in FY 13/14, while 60 percent was exported.

FIGURE 22. FY 13/14 AVERAGE RP-2 LOAD PROFILE DURING SUMMER AND WINTER MONTHS

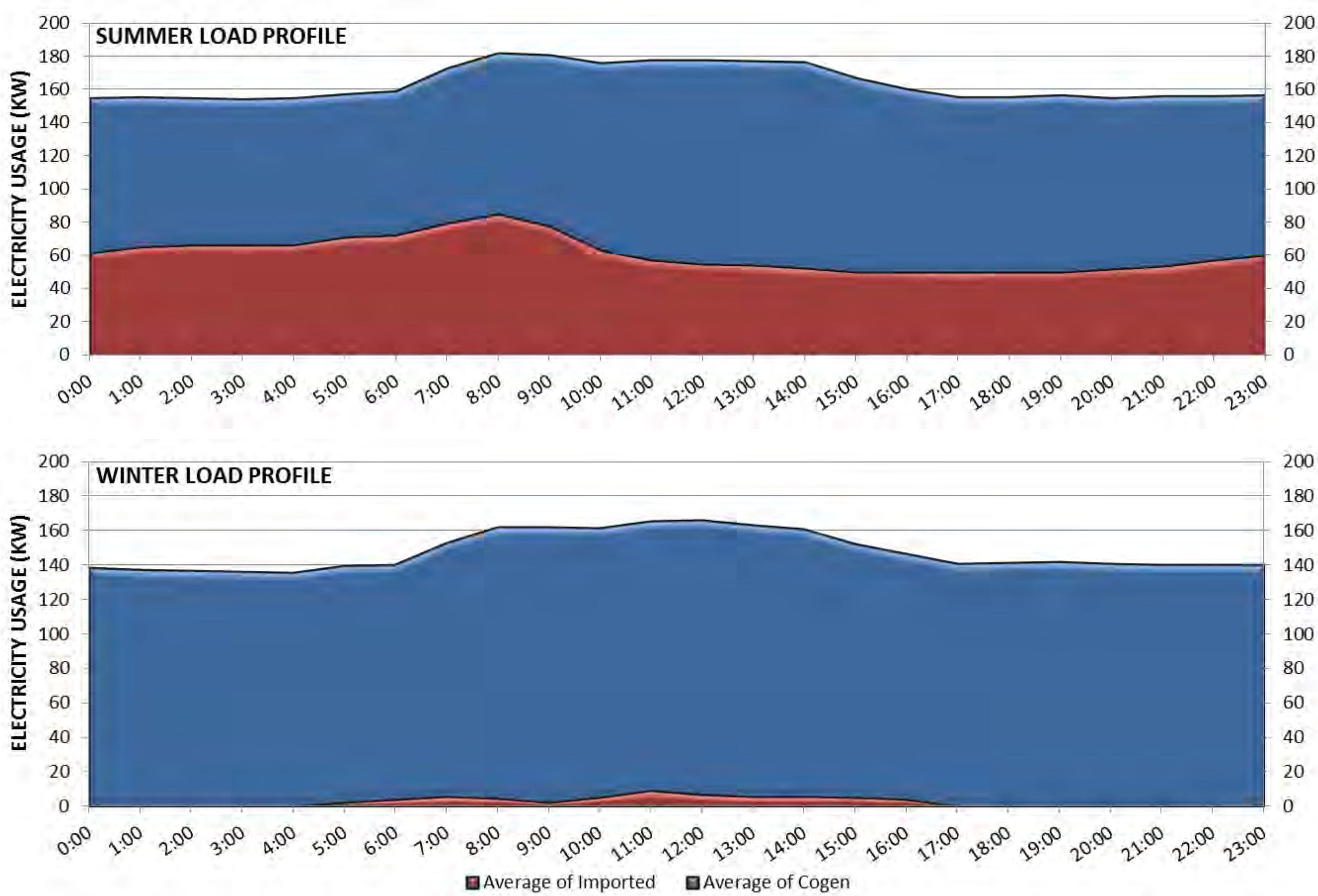


Figure 22 also shows that imported electricity consumption is much higher at RP-2 during summer months. RP-2 has two electrical meters with SCE. One meter serves the control room building, which typically imports electricity to power the lighting and HVAC needs of the building. The second meter services the rest of the treatment plant. With the two meter configuration, the ICE may be exporting power while RP-2 still receives imported electricity for the control room needs. Imported electricity is significantly lower during winter months, when the HVAC system is not operated as frequently.

Electricity Procurement

Table 12 lists the two sources of electricity at RP-2. Imported electricity purchases are obtained through general bundled service with SCE. The cost of the electricity generated by the ICE is determined by the average O&M costs IEUA spends to keep the ICE in operation divided by the total electricity produced. Electricity costs generated by the ICE have historically been estimated at $0.08/kWh. The compensation that IEUA receives for exported power fluctuates each month. In FY 13/14, SCE paid IEUA an average of $0.052/kWh for electricity exported from RP-2.

TABLE 12. FY 13/14 RP-2 ELECTRICITY PROCUREMENT

Generation Source	Service	Rate	Percentage of Facility Load
Imported	Bundled	General Service	22
ICE (580 kW)	-	O&M Costs	78

In FY 13/14, on-site generation accounted for 78 percent of the total facility load. As expected with the engine size, the amount of electricity generated on site regularly exceeds RP-2's total consumption. However, power generated by the ICE cannot be used in the control room building due to the separate utility metering. As a result, 22 percent of RP-2's power needs are met through importing electricity.

Demand Response

RP-2 participates in the DR program through EnerNOC. During a DR event, RP-2 staff is tasked with reducing the facility load by 10 kW, a nominal value that was selected in order to include RP-2 in the Agency's DR portfolio. This drop in load represents less than one percent of the overall load reduction target of 1,230 kW that IEUA has agreed to across all Agency facilities. In FY 13/14, RP-2 exceeded 100 percent of its target in two of the six DR events and averaged a load reduction of 6 kW per event.

RP-2 could contribute additional load during demand response events in the form of exported power. Increasing the ICE output could have the same grid effect as dropping load at the facility, but exported power is not compensated in the current DR program. If the DR program were to incentivize power that is exported above the facility's baseline, IEUA could temporarily increase ICE load to maximize the power output.

Energy forecast

Figure 23 shows the 20-year energy forecast for RP-2. There are no significant energy demand projects planned for the facility because the solids processing is expected to be relocated within ten years. Figure 23 incorporates the expected renewable generation from the ICE through December 2015. The demand growth is assumed to be proportional to expected flow increases at CCWRF and RP-5.

The blue shaded area in each figure represents the anticipated generation from the RP-2 ICE, which exceeds the RP-2 demand when operational. With the ICE operation terminated by the end of 2015, RP-2 will import electricity for all of its power needs beginning in 2016. The maximum summer load of approximately 180 kW occurs in FY 23/24, RP-2's expected final year of operation. The maximum winter load of approximately 170 kW occurs in FY 23/24 also. RP-2 is expected to remain in full operation until the solids processing operation is complete and active at RP-5.

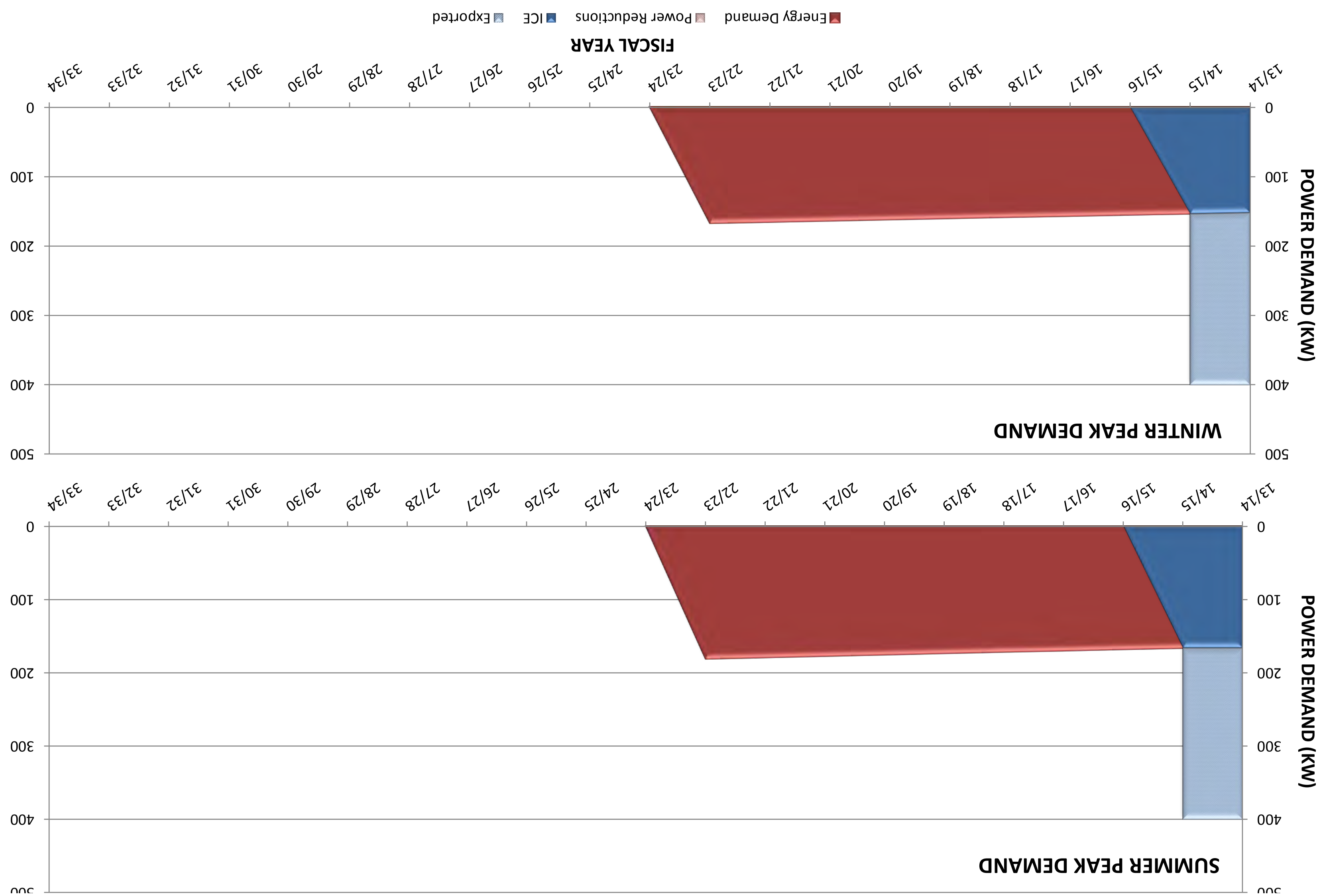
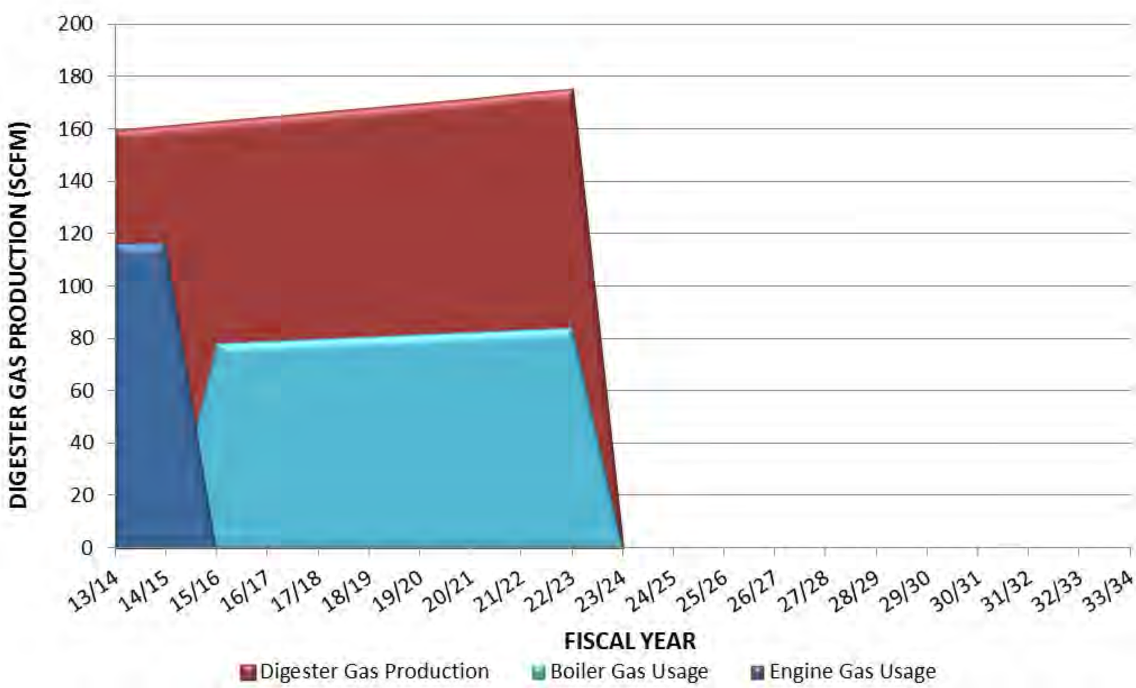


FIGURE 23. RP-2 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS

Despite the ICE shutdown at the end of 2015, RP-2 will continue to produce digester gas. In FY 13/14, the treatment plant produced an average of 160 scfm of digester gas. Figure 24 charts RP-2's anticipated gas production based on expected flow increases to RP-5 and CCWRF. The projected ICE gas usage is shown in dark blue. Once the ICE is shut down, digester gas will primarily be consumed by the boiler. Boiler gas usage, shown in light blue, is estimated to meet the average heat demand of the facility beginning in 2016. RP-2's digestion process does not require the amount of heat generated by the boilers operating at full load, so there will be a portion of digester gas combusted in the flare as well.

FIGURE 24. RP-2 20-YEAR GAS PRODUCTION FORECAST



RP-2 is in a unique position as a generator of renewable digester gas as it will no longer be able to operate the existing ICE due to environmental restrictions. IEUA's Business Goals identify the need to beneficially use digester gas and strive toward energy independence during peak periods. However, these goals must be achieved cost effectively. New self-generation projects are difficult to justify for a facility that is only expected to be in operation for an additional eight to nine years.

Potential New Projects

RP-2's digester gas production offers several opportunities for distributed generation and efficiency projects, as shown in Table 13.

TABLE 13. POTENTIAL RP-2 ENERGY PROJECTS

Project Type	Name	Description	Feasibility
Operational Efficiency	Lighting Upgrades	RP-2 has many indoor lighting systems that can be replaced with low-usage LEDs or outfitted with controls to increase efficiency.	It is likely that lighting upgrades or retrofits would only be pursued if they carried a short payback and did not require significant work for staff. An audit of existing lighting infrastructure will be required to assess the potential savings and cost effectiveness.
Renewable Resources	Install Post-Combustion Control on ICE	This project would take advantage of the existing ICE by installing a gas conditioning system upstream of the ICE and emissions control technology downstream. Currently, only selective reduction catalyst (SCR) systems coupled with catalytic oxidizers have been proven to be effective at reducing emissions low enough to meet the 2016 emissions limits imposed by AQMD Rule 1110.2.	The facility layout, gas quality, and engine size all present complications when considering an SCR/catalytic oxidizer installation for the RP-2 engine. IEUA received proposals for such installations in the past and determined that the project would be cost prohibitive. Alternative control technologies are currently being demonstrated on digester gas-fueled engines, but nothing has yet proven to be effective.
Renewable Resources	Fuel Cell Installation	Once the ICE is shut down at the end of 2015, IEUA could install a digester gas fuel cell to generate heat and power from the gas produced on site. Based on proposals provided, a 300 kW fuel cell would be the optimal size for operation at RP-2. Emissions from the fuel cell would be low enough that they would not be regulated by the SCAQMD.	IEUA received a proposal for a 300 kW fuel cell installation. The estimate was determined to be cost prohibitive, even with government incentives. The technology would also be very difficult to relocate once the solids processing is moved to RP-5. This project was determined to be infeasible for implementation at RP-2.

Project Type	Name	Description	Feasibility
Renewable Resources	Microturbine Installation	This project would replace the cogeneration engine with a 600 kW microturbine and gas conditioning system. The microturbine would not be subject to emissions limitations under SCAQMD Rule 1110.2, and could utilize all of the gas produced by the facility to generate electricity and heat.	IEUA received a proposal for a 600 kW microturbine installation and is currently evaluating the feasibility of the project. Installation of the microturbine and gas conditioning systems would be designed with the intent of relocating after 7 to 8 years.
Renewable Resources	Compressed Natural Gas (CNG) Installation	IEUA staff has considered converting the biogas to CNG to be used in the Agency's fleet vehicles. Such a project would require retrofit of the fleet vehicles to operate on CNG. Based on the amount of digester gas available, RP-2 would generate enough CNG to develop a fueling station on site.	Although digester gas utilization is preferred, developing a CNG fueling station does not necessarily fit within IEUA's typical operations. Furthermore, relocating a fueling station would carry significant costs and difficulties. This project is currently infeasible at RP-2.
Renewable Resources	Natural Gas Pipeline Injection	This project would require conditioning the digester gas produced at the facility to a quality sufficient for direct injection into the Southern California Gas Company's (SCGC) pipeline. Significant sampling and recordkeeping would be required to document the gas quality. Costs of pipeline injection include gas conditioning, interconnection, and ongoing maintenance costs.	SCGC previously provided a biomethane injection evaluation to POTWs. Injection costs were considered so costly that only treatment plants consistently producing in excess of 1,000 scfm of digester gas were incentivized. As a result, IEUA facilities did not qualify for the proposed project. However, several grant opportunities are being considered, so IEUA will continue to evaluate this option.

Project Forecasts

The relocation of solids processing from RP-2 to RP-5 within the next ten years eliminates many energy projects from consideration. Efficiency projects with short paybacks may be warranted, but the introduction of large pieces of equipment is difficult to justify. Removing the cogeneration engine from service by the end of December 2015 complicates RP-2's energy forecast. RP-2 will continue to generate renewable biogas with valuable energy content, but investing capital into a facility expecting to cease operation within ten years has limited value.

IEUA evaluated several projects that could utilize RP-2's existing digester gas production and comply with the stringent air quality regulations. Of the projects identified, installation of a microturbine appears to be the most feasible based on cost and portability. However, project success would rely on meeting strict schedules and budgets. Deviating from either could drastically affect the cost effectiveness of the microturbine installation. IEUA will consider all aspects of this project before determining whether to invest in the technology.

REGIONAL PLANT NO. 5 AND IEUA HEADQUARTERS

RP-5 is designed to treat an average of 15 MGD of wastewater flow. The treatment plant employs primary, secondary, and tertiary treatment to produce Title 22 compliant recycled water that is provided to direct use end users. Biosolids removed from the RP-5 treatment process are pumped to RP-2 for thickening, digestion, and dewatering.

RP-5 SHF is located adjacent to the RP-5 treatment plant and is designed to process up to 705 tons per day of food waste and dairy manure. IEUA currently leases the RP-5 SHF property and equipment to Inland Bioenergy, LLC (IBE). IBE operates and maintains the facility with the goal of producing sufficient biogas to operate two 1.5 MW cogeneration engines. IEUA has the option to purchase all of the power purchased by the engines. Any excess power produced will be exported to SCE. Currently, RP-5 SHF only processes food waste in two anaerobic digesters. The first cogeneration engine began to produce power in February 2015. Currently, IBE plans to operate only one ICE at any time.

IEUA's two Headquarters (HQ) buildings are located directly west of the treatment plant. The electricity used at the buildings and Central Plant (designed for heating and cooling the HQ) is metered with the same utility meter as RP-5. For this reason, energy efficiency projects considered for implementation in the HQ buildings and Central Plant will be considered with RP-5.

Facility Load

The average hourly electrical load for summer (June through September) and winter (December through February) at RP-5 are shown on Figure 25. Imported electricity and solar generation are included in the load profiles. The figure shows a slight reduction in average load during winter, with peak consumption at approximately 2.0 MW in summer and approximately 1.7 MW in the winter. The load reduction during winter months is a result of reduced HVAC operation and recycled water pumping. The generated solar electricity also varies between the two seasons, as generation increases in summer months, which have more sunlight hours each day than winter months.

FIGURE 25. FY 13/14 AVERAGE RP-5 LOAD DURING SUMMER AND WINTER MONTHS

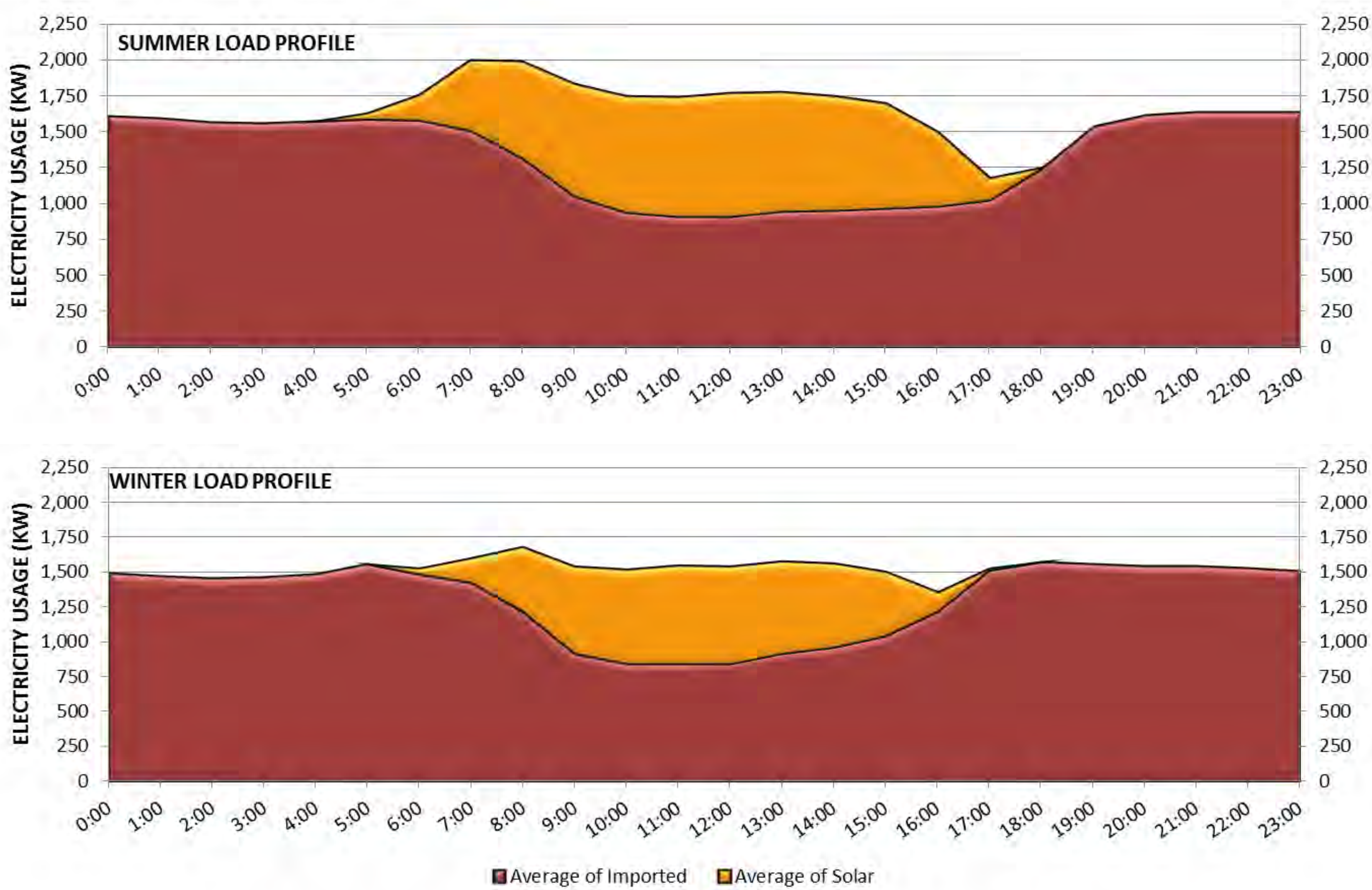


Figure 25 also shows that total electricity consumption is fairly steady throughout the day with the exception of a peak between the hours of 6:00 and 8:00 and a drop in consumption between 16:00 and 18:00. The variability in overall electrical consumption is more dramatic in summer months, as the average load fluctuates between 1,200 – 2,000 kW. In winter months, the average load varies between 1,400 – 1,700 kW. The amount of electricity imported is expected to decrease in FY 14/15 with the introduction of the cogeneration engines at RP-5 SHF.

Figure 25 includes electricity used by the recycled water pumps. These pumping demands were not included in previous sections to illustrate IEUA's increasing power requirements in distributing recycled water. However, these demands must be included when considering the overall facility load because they influence the power procurement and self-generation opportunities that IEUA can pursue.

Electricity Procurement

RP-5 receives electricity from the mix of generation sources listed in Table 14. Electricity imported to RP-5 is procured through bundled service with SCE. RP-5 also utilizes two distributed generation sources in addition to SCE import. The combination of 3 MW from the ICEs and the existing 1 MW of generation from the solar array results in a renewable generation capacity that exceeds the typical facility load. SCE required IEUA to obtain an interconnection agreement through the RES-BCT program, which compensates exported electricity through bill credits at other Agency facilities that are on bundled service. RP-5 distributed generation projects began to export power in March 2015.

TABLE 14. FY 13/14 RP-5 ELECTRICITY PROCUREMENT

Generation Source	Service Type	Rate Type	Percentage of Facility Load
Imported	Bundled	TOU-8-B Standby	82
Solar (1 MW)	PPA	Fixed with annual escalator	18
ICEs (3 MW)	PPA	89% of equivalent Import cost	0

IEUA did not purchase power from IBE in FY 13/14 because the ICEs were not yet operational. The procurement rate under the PPA with IBE allows IEUA to purchase the electricity generated by the engines at a rate equal to 89 percent of what IEUA would have otherwise paid SCE. A third-party energy service contractor developed the appropriate tariff structure for power generated from the engines.

The contractor will also annually reconcile the billing to ensure that the PPA provisions are met.

Demand Response

RP-5 participates in the SCE DR program through EnerNOC. During a DR event, RP-5 staff reduce operation of the recycled water pumps. The RP-5 reduction target of 50 kW represents 4 percent of the Agency's DR obligation. Achieving the DR target is difficult during winter months because RW pumping and demands are already reduced. In FY 13/14, RP-5 participated in four summer DR events and two winter DR events. During the summer events, RP-5 reached 100 percent of its target in all four events and averaged load reductions of 349 kW. However, during the winter events, RP-5's load increased by an average of 186 kW. Due to the seasonal demand variations, it is unlikely that IEUA will commit to additional load reduction measures.

If the ICEs are operated at full load, RP-5 will likely consistently export to the grid. Under this scenario, RP-5's participation in the DR program would be minimal because reductions could not be achieved from a facility with no appreciable load. Until the operational nature of the ICEs is known, RP-5's DR contribution will remain static.

Energy forecast

Figure 26 shows 20 years of forecasted average demands at RP-5 for the summer and winter months, based on the WFMP projections. The figure includes the expected renewable generation from the cogeneration engines and solar array including expected solar performance degradation. Although the engines have a combined capacity of 3 MW, their actual generation is limited by RP-5 SHF's digester gas production from the food waste feedstock available for processing. Because RP-5 SHF has yet to achieve full operation, this plan assumes a consistent output of 500 kW at the end of FY 14/15 and an increase of 500 kW every two years thereafter until reaching a maximum sustained generation of 1.5 MW in FY 18/19.

The energy demand growth at RP-5 is proportional to an expected flow increase of approximately 1 percent each year. TYCIP and WFMP projects expected to affect the power demand were included in the forecast. The relocation of RP-2 solids processing is expected to be completed in FY 23/24. This project is expected to

increase the facility load by over 50 percent. There are currently no energy reduction projects planned at RP-5.

Figure 26 shows that the peak energy demand at RP-5 does not have much seasonal difference. The red shaded area in the two graphs represents the facility demand exceeding the generation capabilities of the solar and cogeneration installations. Assuming the food waste digestion project is capable of generating approximately 800 kW, RP-5's renewable portfolio is expected to result in continuous energy export. Once RP-5 is expanded to include RP-2's solids processing, the facility load is expected to exceed the energy generated on site.

FIGURE 26. RP-5 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS

Potential New Projects

RP-5's imported electricity consumption depends heavily on the success of IEUA's food waste digestion project with IBE. With no generation from the engines, RP-5 will continue to import electricity and be subject to high SCE demand charges during peak periods. If the engines consistently produce more than 800 kW, RP-5 will likely become a continuous exporter of electricity.

Due to the high variability of RP-5's energy forecast, RP-5 would be best served by taking a cautious approach to new energy projects. Potential projects will also be evaluated as part of the RP-5 expansion and RP-2 relocation Pre-design Reports. Cost effective efficiency measures are most likely to be implemented in the short term. Table 15 outlines projects that have been considered for implementation at RP-5 and discusses the feasibility of each.

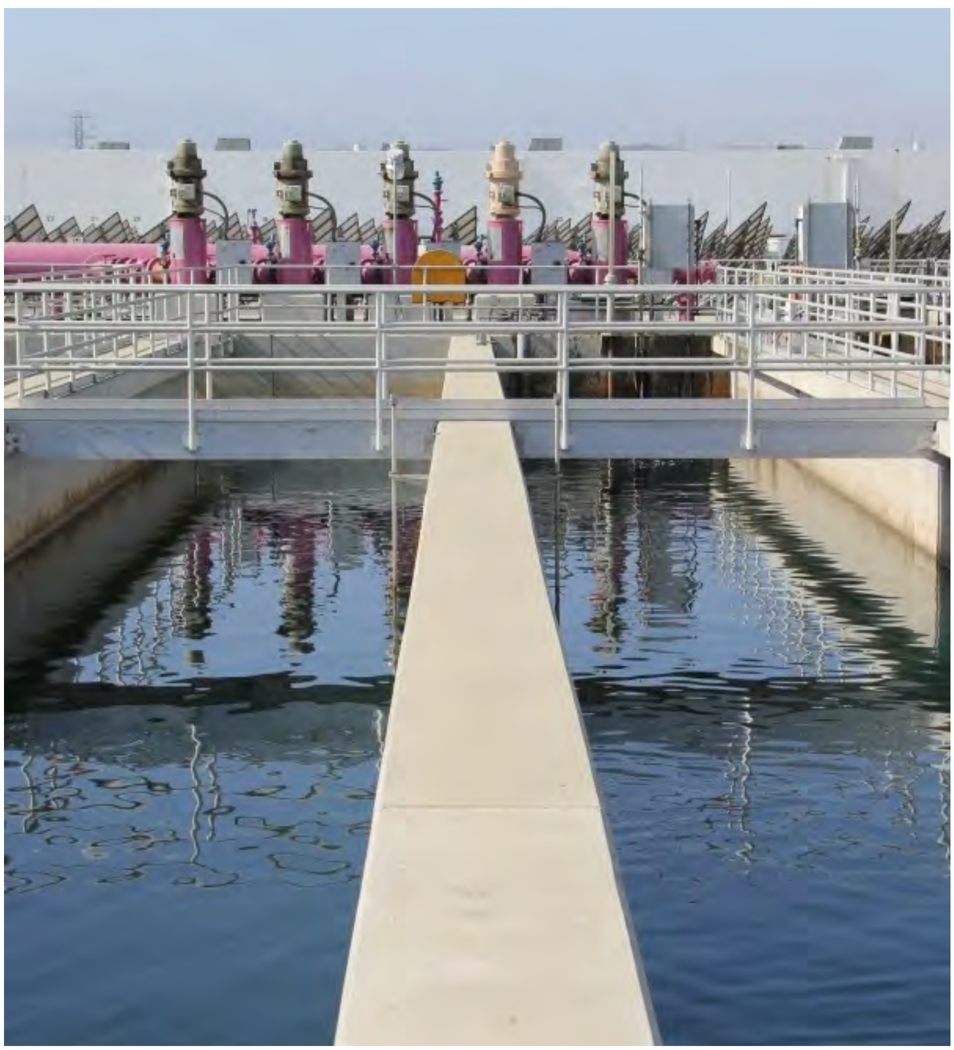


TABLE 15. POTENTIAL RP-5 ENERGY PROJECTS

Project Type	Name	Description	Feasibility
Operational Efficiency	Energy Audit	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	IEUA has seen benefits from past audits, but has never committed to comprehensive evaluations of each facility. The Energy Network offers a no-cost audit service designed to assist public agencies with these types of evaluations. This service could yield cost-saving measures at RP-5.
Operational Efficiency	RP-5/HQ Lighting Upgrades	RP-5 and HQ have extensive indoor and outdoor lighting systems that can be replaced with low-usage LEDs or outfitted with controls to increase efficiency. IEUA HQ buildings were designed as a LEED Platinum building, which required a level of lighting efficiency measures. However, a retrofit to LED technology could result in more energy savings.	A comprehensive audit of the existing lighting infrastructure will be required to assess the potential savings and cost effectiveness.
Operational Efficiency	HQ Central Plant Improvements	The heating and cooling for HQ is achieved through a central plant located at RP-5. Improving the efficiency of the plant through retrofits, controls, or modified operation could result in energy savings.	A project focusing on improving the reliability of the central plant was completed in 2014. As part of this project, a new, efficient electric chiller was installed. Due to the recent investment, retrofits are not likely to be considered, but an evaluation of the current operation is recommended to determine if the process can be optimized.

Project Type	Name	Description	Feasibility
Operational Efficiency	RP-5 Compressed Air Optimization	Many of the RP-5 treatment processes require compressed air. The facility contains multiple compressed air systems located throughout the facility. It is possible that energy savings could be achieved through optimizing the facility's compressed air systems.	An audit of the facility's compressed air system would be needed to assess the current infrastructure and determine if energy conservation measures are cost effective. This type of assessment could be achieved through a comprehensive energy audit.
Operational Efficiency	RP-5 Aeration Basin Upgrades	Aeration is an energy intensive process, as it requires significant continuous air flow. Energy conservation could be achieved by upgrading the existing aeration system to higher efficiency blowers or diffusers with higher oxygen transfer efficiency.	IEUA would need to evaluate potential replacement options, identify cost effectiveness of the new equipment, and adjust operation schedules accordingly to allow for aeration retrofits.
Renewable Resources	RP-5 Decrease Solar Installation	RP-5 currently has 1 MW of solar panels installed on the southwest portion of the facility, covering nearly 10 acres of land. With the relocation of solids processing to RP-5, land use is expected to be a concern when designing the plant modifications. An understanding of IEUA's options to remove or relocate a portion of the solar panels would be beneficial prior to project design.	Because the solar array is owned by a third party, IEUA will need to coordinate with the PPA provider to determine the feasibility of removing or relocating the panels. An option to retrofit existing panels with new, more efficient panels with smaller footprints should also be explored.
Renewable Resources	HQ Electric Vehicle Charging Stations	IEUA HQ is already equipped with several EV charging stations that can be used by public vehicles. IEUA can take advantage of the increased renewable energy by installing more EV charging stations powered by RP-5's distributed generation projects. Retrofitting the Agency vehicle fleet to EVs would also result in GHG reductions.	This project would require grant funding, as the charging station alone is not cost effective. The most viable route for project implementation would be as a component of a larger renewable energy project at the site or across Agency facilities.

Project Type	Name	Description	Feasibility
Energy Management	RP-5 Purchase Existing Solar Installations	The power generated from the 1 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering purchasing the panels at fair market value to eliminate future electricity costs from solar generation. Ownership of the solar panels would also expand the Agency's options once solids processing is relocated to RP-5.	IEUA has inquired about the potential purchase with the current project owner. However, the owner must be willing to sell the arrays at a value that is cost effective for the Agency. IEUA will continue to work with the PPA parties on this evaluation.
Energy Management	RP-5 Energy Storage Installations	As a bundled service facility, RP-5 may benefit from the installation of energy storage technology to assist with load management. Storage could ensure that renewable installations could be used to charge batteries (or similar storage technology) outside of peak periods and then used on site when IOU rates are highest.	IEUA has received proposals from energy storage vendors and found that current technology is not cost effective at RP-5. IEUA will continue to pursue the technology, as storage can provide invaluable management flexibility. The project may be viable with grant subsidization.
Energy Management	RP-5 Demand Response Energy Storage Installation	Energy storage as a demand response tool is an innovative approach that is currently in initial stages of development. The project would involve a third party installing battery storage at host sites that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times. Capital expenditures for the storage installations would be covered by the third party.	IEUA has been approached by a third party to develop Demand Response Energy Storage projects at Agency facilities. The lack of capital costs and benefit of load flexibility and cost savings are attractive. IEUA will evaluate the potential agreement to determine the project's impact on the Agency's existing infrastructure.

Project Forecasts

Forecasting the energy future of RP-5 is difficult with the uncertainty surrounding the food waste digestion project at RP-5 SHF. The cogeneration engines fueled by the digester gas from RP-5 SHF are rated at 3 MW. The facility has secured an interconnection agreement with SCE that compensates the Agency for exported power, but the food waste project has yet to prove that sustained operation.

Projects focusing on energy efficiency and load flexibility should yield positive results regardless of the food waste digestion project's success. IEUA will work with a third party energy consultant to conduct a comprehensive energy audit of the RP-5 and HQ facilities to develop energy efficiency measures and reduce power consumption cost effectively.

As a bundled service customer with distributed generation, RP-5 is an ideal candidate for energy storage that could reduce utility costs during peak periods and optimize load management. Pursuing the Demand Response Energy Storage project could improve RP-5's resource flexibility and lower utility bills without committing capital outlay.

The relocation of RP-2's solids processing and RP-5 expansion will significantly impact RP-5's infrastructure and energy profile. The pre-design phase of the relocation project is expected to begin in July 2015. Given the large area currently dedicated to the solar array, IEUA will evaluate the available options for modifying the array if the land is needed for new solids processing equipment.

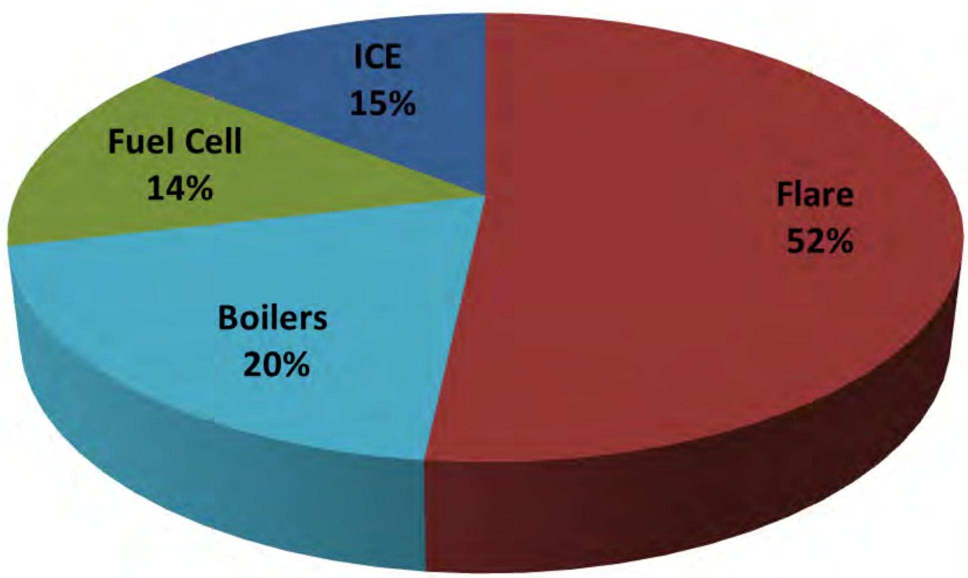
ALL IEUA FACILITIES

Overall, IEUA has the capacity to treat an average of 84.4 MGD of wastewater flow. In FY 13/14, the RP-1, RP-4, RP-5, and CCWRF combined to produce 38,252 AF of Title 22-compliant recycled water for indirect reuse and groundwater recharge and the biosolids processed at RP-1 and RP-2 accounted for approximately 36 percent of the 147,800 wet tons of biosolids composted at the IERCF. In addition to the treatment plants and composting facility, electrical consumption from the pump stations and GWR facilities are included in this section as well.

Gas Production

IEUA generates renewable digester gas from solids processing at RP-1 and RP-2. In FY 13/14, the two facilities combined to produce over 375 million cubic feet of biogas at an average of 715 scfm. One of the Agency's energy goals is to effectively manage the renewable digester gas by maximizing its beneficial use. Figure 27 categorizes the gas consumption at IEUA facilities in FY 13/14.

FIGURE 27. FY 13/14 DIGESTER GAS CONSUMPTION BY EQUIPMENT

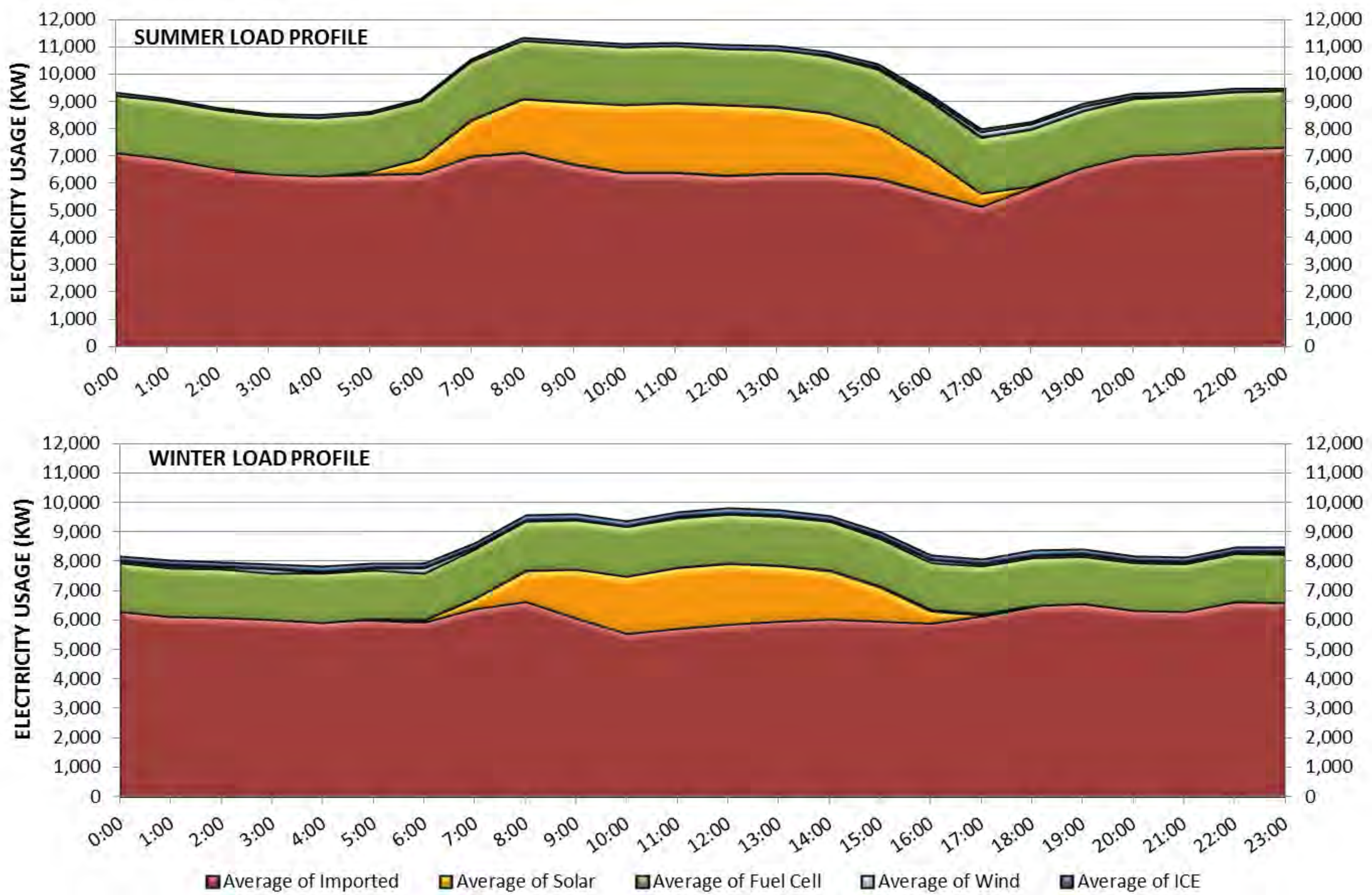


In FY 13/14, over half of the digester gas produced by IEUA facilities was flared. Ideally, the flares at RP-1 and RP-2 should be utilized as emergency relief valves for the gas loop, rather than serving as the primary consumer. However, the amount of gas flare in FY 13/14 was largely due to the complications with the fuel cell's gas conditioning system. Because the gas conditioning system was unable to sufficiently treat the digester gas for consumption in the fuel cell, the fuel cell operated strictly on natural gas during the majority of year. At RP-2, the ICE proved more reliable as a consumer of digester gas. In FY 13/14, only 34 percent of the digester gas produced at RP-2 was flared, while 58 percent of RP-1's gas was consumed by the flare. Predicting the Agency's gas consumption with full fuel cell operation will be shown in the Energy Forecast section of this plan.

Agency Load

The average hourly electrical load for summer (June through September) and winter (December through February) months at all IEUA facilities are shown on Figure 28. Imported electricity, energy reductions, and generation from solar, wind, fuel cell, and ICE installations are included on these two load profiles. Beginning in 2016, the RP-2 ICE will no longer operate, but the two 1.5 MW ICEs at RP-5 SHF are expected to be operational. The figure shows an average load reduction of 1.1 MW during colder months. Peak consumption is around 11,300 kW in summer and approximately 9,800 kW in the winter. In FY 13/14, on average, approximately 68 percent of the Agency's summer load was imported from the grid, and approximately 72 percent of the electricity consumed during winter months was imported. During peak periods, imported electricity accounted for 62 percent and 70 percent, respectively.

FIGURE 28. FY 13/14 AVERAGE IEUA LOAD PROFILE DURING SUMMER AND WINTER MONTHS



Electricity Procurement

IEUA's diverse generation portfolio results in a number of procurement strategies and sources. Table 16 lists the various sources of generation that provide power to the Agency. The fuel cell costs in Table 16 include IEUA's natural gas costs that are required for the fuel cell operation. The cost of the electricity generated by the cogeneration engines is determined by the average O&M costs IEUA spends to keep the ICE in operation. These costs have historically been estimated at $0.08/ kWh.

TABLE 16. FY 13/14 IEUA ELECTRICITY PROCUREMENT

Generation Source	Service Type	Rate Type	Percentage of Overall Load	Percentage of Overall Costs
Imported	Bundled	Various	23.0	21.7
Imported	Direct Access	Market-prices	45.8	45.7
Fuel Cell (2.8 MW)*	PPA	Fixed with annual escalator	19.6	22.3
Solar (3.5 MW)	PPA	Fixed with annual escalator	8.2	8.0
Wind (1 MW)	PPA	Fixed with annual escalator	0.6	0.4
ICE (0.58 MW)	-	O&M Costs	2.8	1.7

*Includes IEUA's natural gas costs for fuel cell operation.

In FY 13/14, on-site generation accounted for 31 percent of the total facility load and 33 percent of the Agency's electrical costs. The load from each generation source only includes electricity. Thermal generation from the fuel cell and cogeneration engine is not included in this table. The table shows that the fuel cell electricity costs are the most expensive generation sources in IEUA's portfolio. It is likely that the proportionate cost of power generated from the fuel cell will decrease in future years because the PPA's annual escalation rate is lower than historically averaged imported rate increases.

Demand Response

IEUA participates in the DR program through EnerNOC. During a DR event, IEUA staff is tasked with reducing the overall Agency load by 1,230 kW. In FY 13/14, IEUA exceeded 100 percent of its target in three of the six DR events and averaged

a load reduction of 1,355 kW per event. IEUA's ability to meet its reduction target depended heavily on the time of year. Over the four warm weather DR events, IEUA facilities averaged a load reduction of 1,619 kW per event. Over two events during colder months, the average load reduction was 828 kW. The difference is reduction ability is due to the seasonal RW pumping demands to which IEUA is subject.

IEUA will further refine its demand response capabilities by evaluating the treatment processes that can be turned off during DR events. In coordination with Operations staff, IEUA's Energy Management group will use the sub-metering data to quantify the load required for each process, then formulate a DR plan that details which processes can be called upon for load reductions throughout the year. Seasonal variation will be avoided to the extent possible to ensure that DR load reduction targets can be reliably met.

For the time being, IEUA's inability to meet its DR reduction targets during colder months means that the Agency is unlikely to increase the target in the next DR contract. However, if SCE would consider compensating facilities for increased export during DR events, IEUA could optimize its renewable resources to increase the load available to the grid during demand response events.

IEUA will also evaluate Demand Response Energy Storage projects at several facilities. Using energy storage to reduce grid demand is a favorable alternative to taking facility processes offline. Stored electricity not used for grid dispatches can then be used for peak shaving, resulting in cost savings for the Agency. The proposed concept would also allow for more frequent demand response events, which means the IOU would benefit as well.

Energy forecast

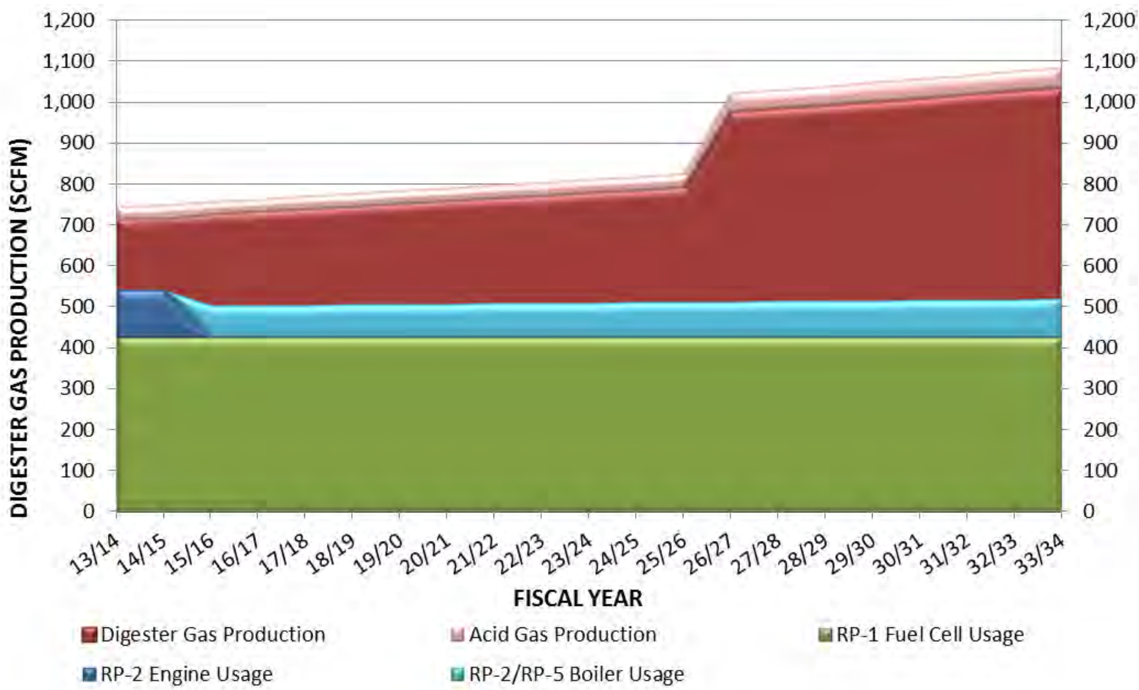
Figure 29 shows the 20-year energy forecast for the treatment plants, pump stations, and composting facility. Energy efficiency projects currently planned are anticipated to reduce peak consumption by approximately 875 kW. On site renewable generation is expected to account for a minimum of 49 percent of the Agency's load in FY 33/34, and a maximum of 72 percent of Agency load in FY 18/19.

The difference between summer and winter demand ranges from 830 kW to 920 kW. The minimum Agency load over the next 20 years is expected to occur in the winter of FY 14/15. In both summer and winter forecasts, the Agency demand is expected to increase by approximately 4 MW over the course of the next 20 years, with the largest demand increases coinciding with the solids expansion and MBR installation projects.

FIGURE 29. IEUA 20-YEAR POWER DEMAND FORECAST FOR SUMMER AND WINTER MONTHS

Gas production forecasts for the entire agency are shown on Figure 30. The figure estimates changes in gas production at RP-1, RP-2, and RP-5, as well as anticipated gas usages in the RP-1 fuel cell, RP-2 engine, and RP-2 boiler. The relocation of RP-2's solids handling process to RP-5 will result in the removal of the RP-2 boiler. However, because the heat demand is not expected to change with the solids handling relocation, an equivalently sized boiler is expected to begin operation at RP-5. For this forecast, the RP-2 and RP-5 boilers are estimated to use the same amount of digester gas.

FIGURE 30. IEUA 20-YEAR GAS PRODUCTION FORECAST



The dark red shaded area on the figure shows the average digester gas production that exceeds the needs of the digester gas-consuming equipment on site. IEUA will evaluate potential projects that can utilize this digester gas beneficially in order to minimize flaring and optimize renewable resources.

Potential New Projects

This EMP has presented and assessed the feasibility of potential new projects at each facility. Table 17 summarizes the potential projects considered to be feasible based on available resources, facility load, and cost effectiveness. The projects listed in this table will be evaluated further for implementation at IEUA's facilities.

TABLE 17. IEUA ENERGY PROJECTS TO BE CONSIDERED FOR IMPLEMENTATION

Facility	Name	Project Type	Description	Path to Implementation	Estimated Budget
All	Comprehensive Energy Audits	Operational Efficiency	Third party energy service companies can conduct comprehensive energy audits that not only evaluate potential savings from equipment retrofits, but also process modifications that can result in higher operational efficiencies.	IEUA has signed up with The Energy Network and initiated the audit process in February 2015. IEUA engineering, operations, maintenance, and planning staff will coordinate efforts with The Energy Network to identify cost-effective energy conservation measures that can be implemented at each facility.	None (measures identified in audits will require future funding)
All	Lighting Upgrades	Operational Efficiency	All IEUA facilities can benefit from lighting retrofits and increased controls. A preliminary evaluation showed that retrofitting indoor and outdoor lighting systems with LEDs could reduce demand by over 550 kW and yield a payback of five years or less.	An audit of existing lighting infrastructure will be required to assess the potential areas of retrofit and/or control and identify the optimal equipment. Lighting efficiency will be a priority of the audits conducted by The Energy Network.	$400,000
All	Purchase Existing Solar Installations	Energy Management	All of the existing solar arrays at IEUA are owned and maintained by a third party. If IEUA would like to purchase the arrays at fair market value in order to terminate ongoing costs of purchasing the power generated by the solar systems.	IEUA inquired with the PPA provider regarding a potential purchase of the arrays, but has not received any proposals. IEUA staff will continue to reach out to the PPA provider to pursue the purchase option. Once a proposal is received, IEUA will perform a cost-benefit analysis to determine if the arrays will be purchased.	$7,500,000

Facility	Name	Project Type	Description	Path to Implementation	Estimated Budget
All	Install 5 MW Solar Array	Renewable Resources	SCE's RES-BCT program allows for exported electricity from renewable energy projects to act as credits on other accounts held by the same organization. This project would involve the installation of a solar array at one IEUA facility that could export enough electricity to offset utility costs at IEUA's other facilities.	IEUA will evaluate potential sites that can accommodate large solar arrays. Following site selection, a request for proposals will be issued to solar energy providers. A Business Case Evaluation will be conducted to determine the feasibility of the proposals received.	$20,000,000
RP-1, RP-5, and CCWRF	Demand Response Energy Storage Installation	Energy Management	The DRES project would involve a third party installing battery storage at IEUA facilities (at no cost to IEUA) that could be used by IOUs for demand response during periods of peak consumption a portion of the time, and by the host site for peak shaving at other times.	IEUA entered into a Memorandum of Understanding with a third party to develop DRES projects at IEUA facilities. IEUA planning, engineering, maintenance, and contract services staff will collaborate to develop an agreement for a DRES project that meets IEUA's needs.	None (staff time only)
RP-1	Digester Gas Mixing	Renewable Resources	Acid phase gas produced at RP-1 is currently directed to the flare. Projects utilizing the gas for beneficial use have shown to be cost prohibitive. An evaluation will be conducted to determine the most cost efficient way to mix the acid phase gas with the digester gas loop so that all of the gas produced at RP-1 is beneficially used. The project could involve gas storage,	IEUA engineering, planning, operations, and technical services staff will collaborate to identify several options designed to incorporate the acid phase gas into the digester gas loop. Once all options have been assembled, a business case evaluation will be conducted to determine the cost effectiveness and operational feasibility of each option.	$1,500,000

Facility	Name	Project Type	Description	Path to Implementation	Estimated Budget
RP-4/ IERCF	HVAC Controls and Upgrades	Operational Efficiency	RP-4 and IERCF have many buildings that use HVAC units for climate control. Many of these units can be upgraded to more efficient models or outfitted with controls that limit HVAC operation to non-peak periods.	An assessment of RP-4's existing HVAC units is underway to identify equipment that can be replaced. IEUA has met with a vendor to supply controls designed to limit HVAC operation to non-peak periods. IEUA will continue to work with the vendor to pursue implementation at RP-4 and IERCF.	$125,000
RP-4/ IERCF	Expand Solar Installation	Operational Efficiency	The power generated from the 1 MW of solar panels on site is currently sold to IEUA through a PPA. IEUA is considering installing additional panels on the roof of IERCF or on available land at RP-4 to expand the solar generation capacity.	IEUA will consult with vendors to determine the potential generation capacity that could be achieved with the available land use. Following this consultation, a request for proposals will be issued and a Business Case Evaluation performed.	$4,000,000
RP-4/ IERCF	Energy Storage Installation	Energy Management	Considering the facility load is highest during the middle of the day, when TOU pricing is highest from the IOU, RP-4/IERCF can benefit from the installation of energy storage technology to assist with load management. Storage could ensure that renewable installations could be used to charge batteries (or similar storage technology) outside of peak periods and then used on site when IOU rates are highest.	Previous proposals for the purchase of energy storage installations were cost prohibitive. IEUA has continued to pursue energy storage options and found energy service providers that offer cost share agreements or utilize government subsidies to make projects cost effective. IEUA will continue to discuss options with these providers to identify potential energy storage projects.	$1,500,000

Facility	Name	Project Type	Description	Path to Implementation	Estimated Budget
RP-2	Microturbine Installation	Renewable Resources	This project would replace the RP-2 ICE with a 600 kW microturbine and gas conditioning system. The microturbine would not be subject to emissions limitations under SCAQMD Rule 1110.2, and could utilize all of the gas produced by the facility to generate electricity and heat.	IEUA received a proposal for a 600 kW microturbine installation and is currently conducting a Business Case Evaluation of the project. Installation of the microturbine and gas conditioning systems would be designed with the intent of relocating after 7 to 8 years.	$3,000,000
RP-5	Decrease Solar Installation	Renewable Resources	RP-5 currently has 1 MW of solar panels installed on the southwest portion of the facility, covering nearly 10 acres of land. With the relocation of solids processing to RP-5, land use is expected to be a concern when designing the plant modifications. An understanding of IEUA's options to remove or relocate a portion of the solar panels would be beneficial prior to project design.	Assuming the solar panels cannot be purchased, IEUA will coordinate with the PPA provider to determine the feasibility of removing or relocating the panels. Available options will be evaluated in parallel with the predesign phase of the solids handling facility relocation project, which is expected to begin in July 2015.	TBD

Project Forecasts

Implementing all of the projects listed in Table 13 is estimated to require $38,025,000 in capital expenditures. However, these projects will require further evaluation before funds can be committed to the Agency's budget. Efficiency projects with low payback periods are most likely to be implemented. IEUA will depend on The Energy Network's comprehensive energy audits to identify potential efficiency projects at each facility. Measures identified will be assessed by IEUA staff for feasibility and operational impacts prior to implementation.

IEUA will investigate several new solar projects. Evaluating the cost effectiveness of purchasing the existing solar arrays is a current priority, although it requires collaboration from the PPA provider and equipment owner. Purchasing the existing panels will also impact the Agency's ability to remove or relocate a portion of RP-5's solar array, if deemed necessary as part of the RP-2 solids processing relocation project. Potential solar system expansion will be considered at RP-4/IERCF, in addition to a new multi-megawatt capacity array that can benefit from SCE's RES-BCT program by crediting IEUA's SCE costs at Agency's facilities through export.

Energy storage will be heavily pursued to improve IEUA's demand side management capabilities. IEUA will pursue energy storage installations through two separate avenues: 1) as a demand response tool employed collaboratively with SCE, and 2) through direct purchase with subsidization. Introducing energy storage to IEUA's portfolio would allow progression toward the goal of peak period independence without devoting resources to new distributed generation projects.

Retrofitting inefficient HVAC equipment and installing controls to limit peak period operation will target cost reductions at RP-4/IERCF. This project will be closely monitored to determine actual savings based on system performance. If the project proves to be a success, it will be considered for implementation at other IEUA facilities that experience high demand charges.

Optimizing digester gas utilization will be addressed at RP-1 by evaluating options to allow for the beneficial use of acid phase gas. IEUA staff will coordinate with industry professionals to investigate several operational modifications that would permit RP-1's equipment to operate on a fuel mixture that includes the acid phase gas. At RP-2, removal of the ICE by the end of 2015 signals the end of distributed generation using digester gas. IEUA evaluated several projects that could utilize RP-2's existing digester gas production and comply with the stringent air quality regulations. Of the projects identified, installation of a microturbine appears to be the most feasible based on cost and portability. IEUA will perform a detailed BCE of this project before determining whether to invest in the technology.

Path to Implementation

Evaluating potential energy projects at each IEUA facility produced several viable projects to be considered for implementation. The process also uncovered complexities that frequently affected the viability of potential projects. This section aims to foster understanding of new project implementation by delineating the typical incentives and disincentives.

NEW PROJECT DRIVERS

Electrical Demand

Any energy project considered for implementation should cost effectively achieve at least one of two goals: 1) reduce the facility load through efficiency measures, process modification, or new technology, and/or 2) increase the Agency's self-generation capacity. These goals can be achieved in several ways, but in each case, the facility demand must be considered. Furthermore, recognition of the facility's electrical requirements alone is not enough. Since new projects are typically evaluated for feasibility over a ten to twenty year period, each evaluation must include current and future electrical loads. Forecasts should include anticipated demand increases as well as efficiency measures. The EMP also considers facility demands during summer and winter months because of seasonal variation in operations. For reasons described below, new project may be designed to avoid power export. In such cases, the lowest facility demand must be considered when determining the facility's available load.

The scope of potential projects at IEUA facilities will vary widely depending on the percentage of electrical load at each facility that is being supplied by an external source (through either bundled or Direct Access service). Evaluations conducted in this EMP have shown that projects focused on efficiency measures alone are more likely to be considered when the imported contribution to facility load is below 1 MW. Distributed generation projects below 1 MW typically carry long payback periods and/or risks that hinder viability.

Available Resources

New project implementation, especially for distributed generation projects, is also driven by the facility resources available. Renewable digester gas production at RP -1 and RP-2 opens up a multitude of projects that can take advantage of the heat content in the gas or optimize its use through more efficient processing. Increasing IEUA's renewable portfolio through additional solar or wind installations would require available land space, which is increasingly more difficult to attain as regional development grows.

Regulatory Impact

Environmental regulations must also be considered when evaluating a potential project. As a public agency located in Southern California, IEUA is located in a region that contains some of the more stringent regulatory air and water quality measures in the country. IEUA's ability to install renewable energy projects has been greatly affected by air quality regulations for digester gas-fueled engines. SCAQMD Rule 1110.2 played a role in IEUA's decision to pursue fuel cell technology at RP-1, and compliance with the rule will also factor into future ICE operations at RP-2 and RP-5 SHF.

Assembly Bill 32 (AB 32), the California Global Warming Solutions Act of 2006, requires industries to implement GHG reduction measures in order to achieve 1990 emissions levels by 2020 in the state. Although wastewater treatment plants have not been identified in the state's scoping plans and no IEUA facility emits GHGs above the reporting thresholds identified in the bill, the Agency has proactively begun to track GHG emissions and consider global warming potential of new projects. IEUA recently joined the Climate Registry to voluntarily report GHG emissions across the agency on an annual basis.

Cost Effective Sustainability

While each of these factors can drive potential projects toward or away from feasibility, IEUA's Business Goals dictate that new projects must be cost effective. This EMP strives to work within the confines of Southern California's environmental regulations and modest capital as a public agency to achieve sustainability at peak periods through efficiency projects and renewable generation. New projects often require subsidization from outside sources to be considered cost effective. As such, IEUA staff is continually pursuing grant opportunities that can be applied toward beneficial projects.

IEUA has utilized several sources of grant funding since 2002 to develop energy efficiency projects. Both SCE and SCGC offer incentives for efficiency projects, although IEUA has partnered with SCE more regularly due to the amount of electricity usage at the Agency and greater potential for reductions. IEUA also received funding from the Department of Energy (DOE) and the Natural Resources Conservation Service to complete renewable generation projects in the past. The most significant source of grant funding has historically come from the California Energy Commission, which has provided nearly $20 million to fund various energy projects across Agency facilities over the past 12 years.

NEW PROJECT BARRIERS

In its experience installing and evaluating energy projects, IEUA has observed several barriers that can detrimentally affect project feasibility. Identifying these difficulties and offering solutions is imperative to fostering sustainable growth and a key component of this EMP.

Grid Interconnection

Generating facilities in SCE's service area are required to obtain an interconnection agreement under SCE's Rule 21 tariff. All of IEUA's renewable energy installations have interconnection agreements, each achieved with varying levels of difficulty depending on the level of project complexity.

The 3.5 MW of solar arrays were granted interconnection with SCE in 2008. Interconnection of the 1 MW wind turbine was approved in 2010. The installations were not complex, so the interconnection agreements were obtained quickly and without difficulty. Because the nameplate capacities were designed to use 100 percent of the generated electricity on site, the interconnection agreements did not contain export provisions, which simplified the process.

RP-1's fuel cell installation proved to be a more complex interconnection process than previous agreements. The combined nameplate capacities of the fuel cell and solar array resulted in potential export during times of peak generation. In December 2012, IEUA submitted an interconnection application for the fuel cell and solar installations that would compensate IEUA for any electricity exported. SCE's NEM program allows for export from solar electrical generating facilities with capacities below 1 MW. However, SCE's fuel cell NEM schedule contains the same 1 MW limit, which means that IEUA cannot export electricity from the fuel cell installation.

The combination of two renewable energy installations at the same facility with opposing export capabilities presented difficulties in the interconnection process. In April 2014, following extensive discussions with SCE staff, IEUA executed a multiple tariff interconnection agreement that would allow IEUA to export a maximum of 3.5 MW; however, only the portion generated by the solar facility would be eligible for compensation. Tracking the electricity from the renewable installations would be achieved through Net Generation Output Meters (NGOMs).

IEUA evaluated the proposed NGOM project and determined that installing the meters would be cost prohibitive. Considering RP-1's load and renewable generation capacity, the amount of electricity exported is expected to be minimal and sporadic. As of April 2015, IEUA was in discussions with SCE to allow for export from RP-1 without compensation, while maintaining the ability to install NGOMs in the future if the project is later deemed to be cost effective.

IEUA also encountered difficulties obtaining an interconnection agreement at RP-5 that would allow for export from the REEP ICEs. IEUA initially applied for an interconnection agreement for the ICEs in 2006 under SCE's biogas NEM program, but the agreement was never finalized because the ICEs were never commissioned. As a result, IEUA was required to submit a new application for interconnection under SCE's RES-BCT program, which would allow for exported electricity to be compensated as bill credits on IEUA's other SCE accounts. IEUA submitted the RES-BCT application in June 2013 and executed the interconnection agreement in May 2014. The REEP ICEs were commissioned in January 2015 and first exported to the grid the following month.

Based on these experiences, IEUA considers the process of obtaining interconnection agreements with SCE to be unfavorable toward new renewable projects. When progress stalled on both RP-1's NEM and RP-5's RES-BCT agreements, IEUA held conference calls with SCE staff twice per week to ensure that information was processed as quickly as possible and that the application evaluation continued in a timely manner. The recommendations and requirements provided by SCE to comply with interconnection standards were costly, and in the case of RP-1, were considered cost prohibitive. For a public agency attempting to expand renewable generation with a limited project budget, the interconnection process contains significant expenditures, both in capital outlay and staff time.

In both experiences at RP-1 and RP-5, the interconnection process was complicated because one renewable installation exceeded the 1 MW limit established in the NEM tariff. Increasing this limit to allow for larger renewable installations to be considered in the NEM program could reduce the time and costs involved in obtaining interconnection agreements. Furthermore, IEUA noticed a marked improvement in progress once regular conference calls were scheduled to maintain communication with SCE staff. Although this contributed to the considerable staff time devoted to the interconnection process, the conference calls reduced the overall duration of the application evaluation. Establishing frequent communication with SCE staff during the entirety of the evaluation process will be considered an essential component of any future interconnection agreement.

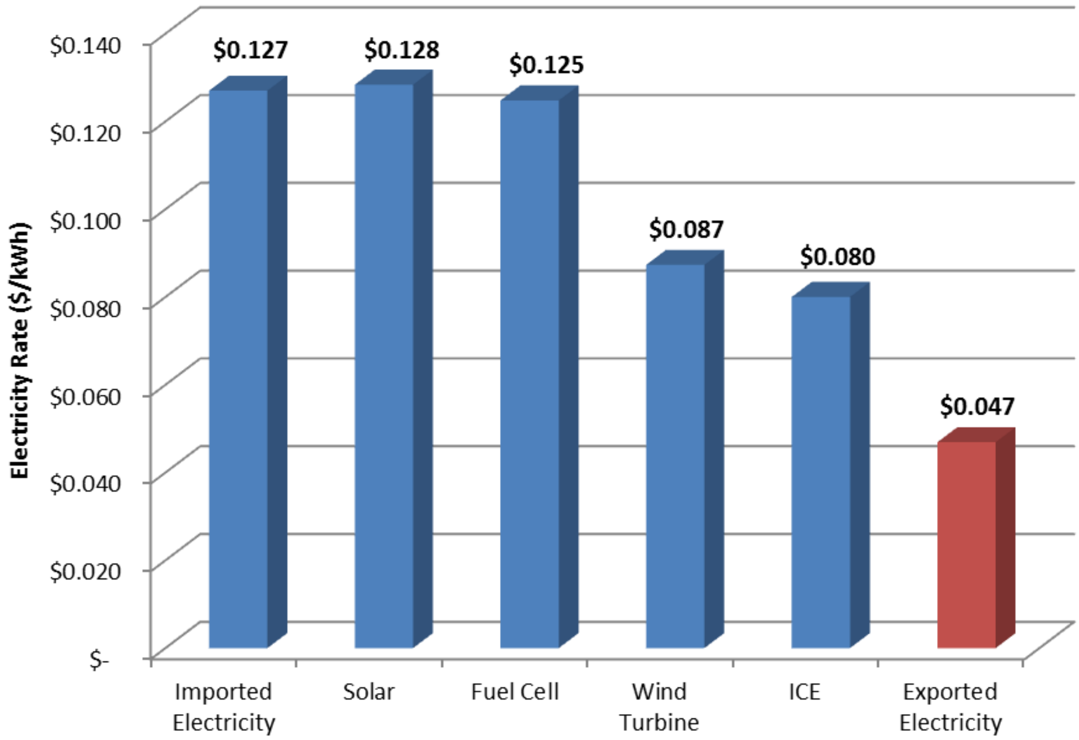
IEUA is currently working with BAC and CASA to open a dialogue with the CPUC regarding interconnection concerns. By communicating past difficulties to the CPUC, the IEUA is attempting to help identify straining areas of the interconnection process and hopefully foster discussion on potential paths to improvement.

Renewable Energy Economics

Consistent with IEUA's Business Goals, projects that improve sustainability during peak periods will only be pursued if they are determined to be cost effective after thorough analysis and evaluation. Most of the renewable installations at IEUA's facilities were designed to avoid exporting electricity when facility demand is lowest. Although inadvertent export is allowed under SCE's Rule 21 and IEUA is compensated for electricity exported at RP-2 and RP-5, the economics of exporting electricity to the grid are not favorable to IEUA. IEUA's average costs of electricity, on a $/kWh basis, in FY 13/14 are shown on Figure 31. For comparison, SCE's average compensation rate for exported electricity from NEM customers is shown in red on the same figure.

The figure shows that current renewable installations are cost effective because they supplement imported electricity at a lower rate. Although the average cost of solar was $0.001 higher per kWh in FY 13/14, the fact that solar panels generate power during SCE's peak periods means that the solar installations are cost effective on a TOU basis since they supplement imported electricity that would otherwise carry high demand charges.

FIGURE 31. FY 13/14 AVERAGE ELECTRICITY COST BY SOURCE



Because the export compensation rate is anywhere from $0.033-0.081 lower per kWh than IEUA's electricity procurement rate (based on FY 13/14 data), IEUA cannot recover the procurement costs of exported electricity through compensation alone. Compensation rates for NEM customers are calculated using a market-based mechanism derived from hourly day-ahead electricity pricing, similar to the mechanism used by ESPs that provide electricity to IEUA through the Direct Access program. The rate reflects the costs that SCE avoids in procuring power during the time that it is produced by the generating facility. It is unlikely that SCE will substantially increase the compensation rate to accommodate facilities desiring more robust renewable portfolios with the ability to regularly export. As such, revised economic models must focus efforts elsewhere.

An alternative solution would rely on modifications to the CEC's RPS, which mandates that all electric service suppliers provide at least 33 percent of their energy from renewable sources by 2020. These suppliers can achieve the mandated limits by purchasing RECs that satisfy one of three content categories, often referred to as buckets. Because IEUA uses the renewable energy it generates on site, any RECs generated fall into Bucket 3, which carries the lowest value on the trading market.

IEUA's experience in pursuing RECs for its renewable installations found that the cost of obtaining the certificates often negated the potential profits of any sale. However, the California assembly, with assistance from CASA, is pursuing legislation that would allow for renewable installations at wastewater facilities to be eligible for Bucket 1 status as part of Assembly Bill 1144. This designation could drastically improve renewable project economics. IEUA is in support of AB 1144 and will track its progress closely.

In addition to export compensation, project economics also depend heavily on the capital expense required for installation. Although IEUA was able to avoid capital expenditures for the solar, wind, and fuel cell installations by entering into PPAs, the cost of installation was factored into the electricity procurement rate for each agreement. The procurement rate was also affected by potential government incentives, grant subsidizations, and for the wind and fuel cell installations, transfer of RECs to the PPA provider.

Whether IEUA pursues PPAs or outright purchase, the cost of installing renewable technologies greatly affects the project feasibility. In the past, IEUA evaluated several technologies for implementation that were determined to be cost prohibitive, including gas storage, energy storage, fuel cells, biogas conversion to compressed natural gas, small hydropower, geothermal, and biogas conditioning to inject into the natural gas pipeline. IEUA's resources allow for a wide array of energy projects, many of which are simply too expensive to implement at present. However, with additional government incentives or further subsidization opportunities, some of these technologies may be considered cost effective if the capital required is sufficiently reduced.

Furthermore, greater incentive and subsidization opportunities could result in more applications of new technology across the industry. The renewable resources utilized at IEUA are not unique to its facilities. With wider application of new technologies leading to greater market saturation, projects that were once cost prohibitive could now be considered cost effective.

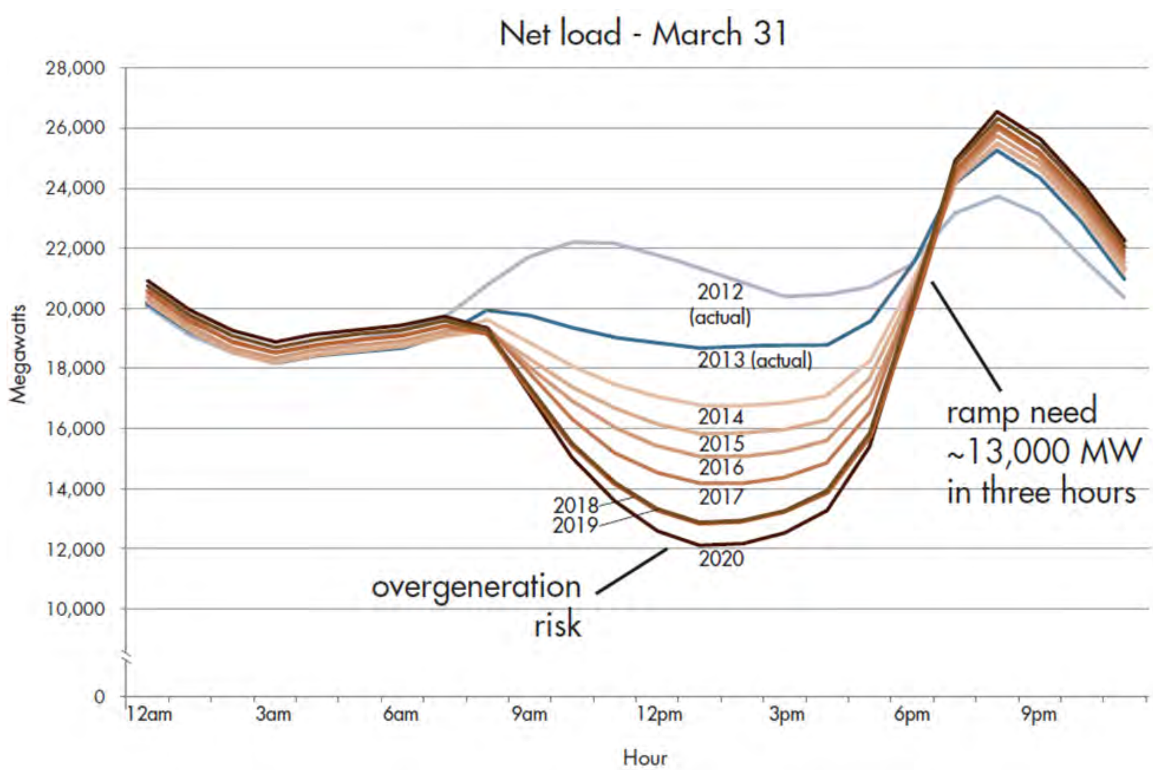
Energy Forecasting

IEUA's BCEs rely on energy forecasts to determine potential savings over the life of the project being evaluated. IEUA uses the historical rates published by SCE to estimate average rate increases moving forward. Historically, SCE's rates for commercial customers have increased by an average of six percent per year, which includes the rate of inflation. To remain conservative, IEUA uses annual utility increases of four and six percent when evaluating new projects, which provides a range of potential savings.

The California Independent System Operator (CAISO) operates the bulk of the state's wholesale energy market. CAISO's operation of the power grid allows insight and open access into the energy industry. As part of its activities, CAISO tracks the average net load for the state each day. In 2013, CAISO identified that California's solar installations have had a combined effect on the net load that could significantly influence the energy needs of the state in years to come.

Figure 32, often referred to as the "duck curve," shows CAISO's actual net loads for March 31 in 2012 and 2013, along with projections each year until 2020[3]. Between the hours of 7:00 p.m. and 7:00 a.m., the figure shows slight energy increases that closely track the previous year. Between the hours of 7:00 a.m. and 7:00 p.m., or during daylight hours, the demand on the grid declines sharply each year. Figure 32 estimates that mid-day grid demand in 2020 could be as much as 9,000 MW less than the actual demand in 2012. The reason for the drop in demand is the widespread installation of solar energy systems across the state, which will further reduce grid demand during daylight hours if solar installation trends continue.

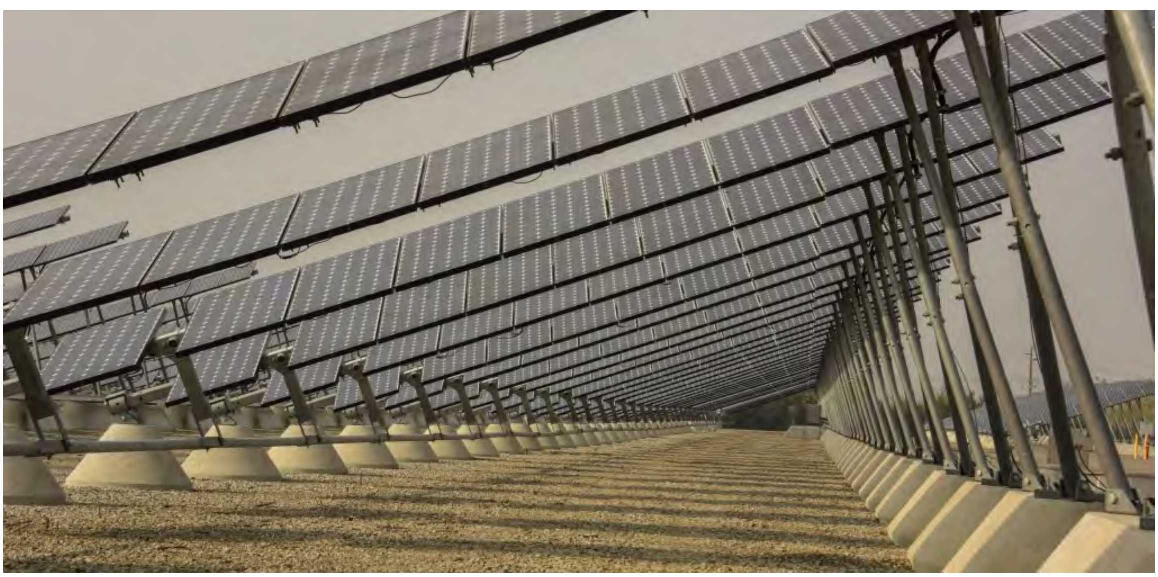
FIGURE 32. CA'S NET LOAD PROJECTIONS THROUGH 2020 (DUCK CURVE)



[3]*Source: "What the Duck Curve Tells us about Managing a Green Grid," CAISO, 2013 .*

This new load profile carries significant concern for the state's energy generators. Between the hours of 5:00 p.m. and 8:00 p.m. in 2020, grid demand is expected to increase by 80 percent over the course of three hours. The problems presented by this curve will require creative solutions by energy generators, and will involve employment of energy storage in large quantities. Nevertheless, the scope of this concern extends beyond IEUA's influence.

However, the Agency could be impacted by the resulting change in tariffs that utilities can implement in response to the duck curve. New projects are evaluated under the assumption that tariffs structures will be similar over the next 20 years. Certain potential projects, such as solar installations, rely on avoiding or reducing demand charges from the electrical utility to achieve an economic benefit. If the peak period is shifting from mid-day to late evening to match the expecting net load peak, project economics could be greatly affected. Other projects that increase efficiency or can be programmed to adjust to varying peak periods may not be affected by potential modifications to SCE's tariffs. IEUA will continue to monitor discussion of the duck curve, as well as SCE's plan to respond to the changing net load.



Management Practices

In addition to tracking energy usage and evaluating potential projects, IEUA's EMP includes several measures that are applied throughout the year to optimize resources and better understand the Agency portfolio.

PROCUREMENT

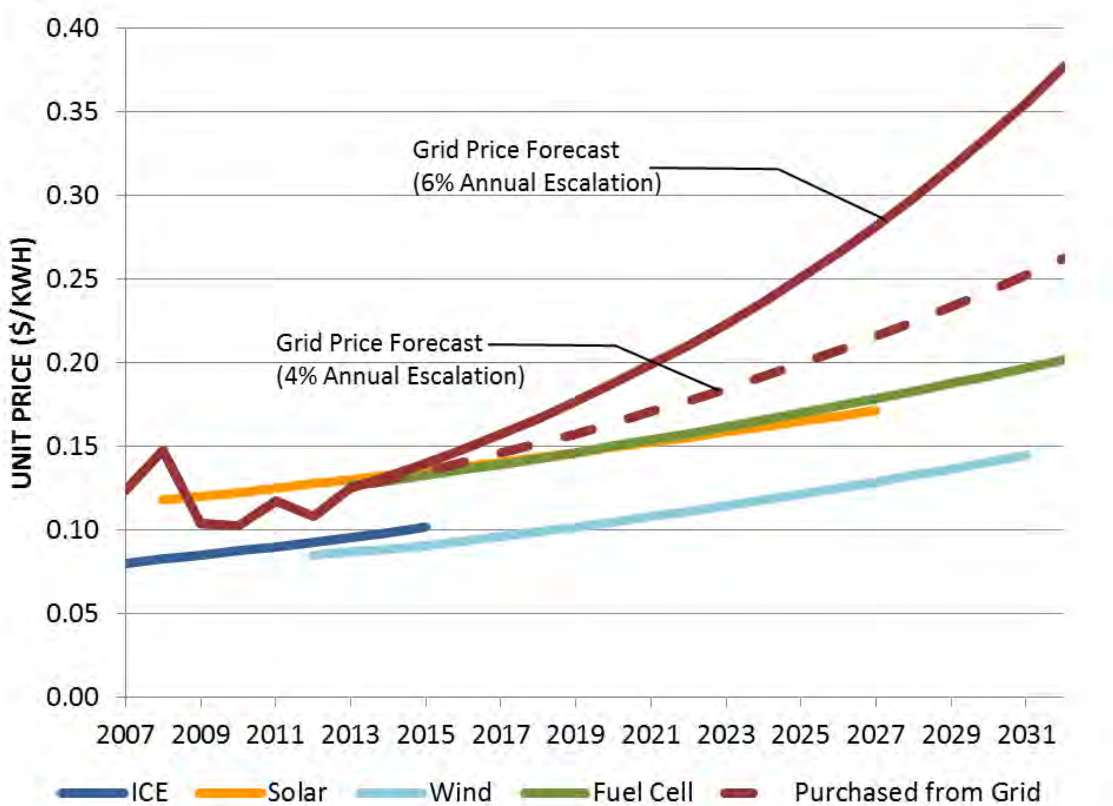
With the exception of RP-4 and RP-5, IEUA has the option of procuring electricity through IOUs or separate ESPs. Natural gas is procured through an ESP for IEUA's larger usage needs (core accounts), as well as its smaller accounts (non-core). IEUA currently purchases electricity through unbundled service, or DA, at three of its five largest accounts, and bundled service at the remaining two and all smaller

accounts (standalone RW and GWR facilities). The Agency has realized considerable savings during the summer months utilizing direct access (DA) agreement.

The pricing structure for electricity generated from IEUA's renewable installations varies between each agreement. The PPA rates are structured similarly, with fixed rates and annual escalators that were negotiated to produce long-term financial benefits for the Agency. Considering the large historical variation in grid pricing from year to year, establishing a fixed energy pricing forecast for much of the Agency's demand is a valuable planning tool for energy management.

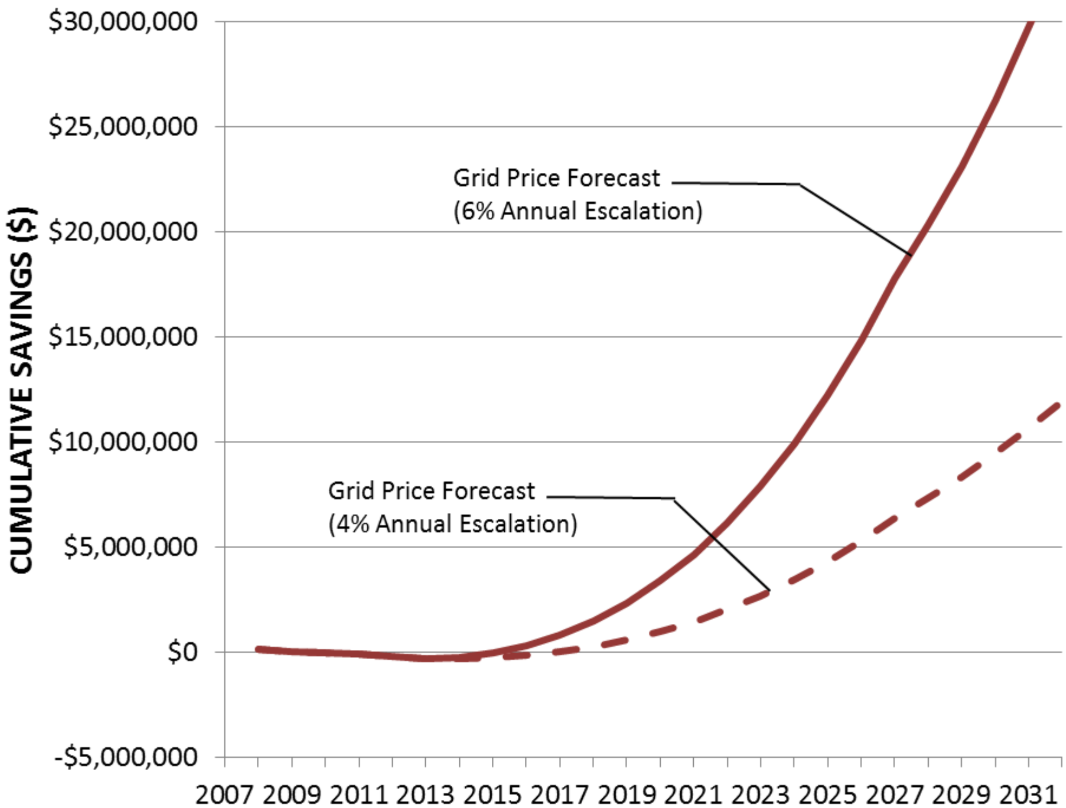
Prospective cost savings depend on the negotiated electricity purchase price of each PPA, anticipated rate increases from the electrical grid, and expected power generation from the installations. The negotiated purchase pricing (Figure 33), on a $/kWh basis, generally compares favorably to grid purchase pricing.

FIGURE 33. PPA RATE COMPARISON TO GRID FORECASTS



Current PPA purchase rates are competitive with the grid purchase rates, but the long-term benefits become apparent when comparing the annual escalating scales between the two costs. Based on energy industry forecasts, grid electricity costs are expected to increase between four and six percent, on average, over the next 20 years. Since each PPA's annual escalation rate is below four percent, the Agency anticipates that all PPA installations will realize annual savings within the next two to three years. The amount of savings achieved can vary widely, as shown on Figure 34.

FIGURE 34. CUMULATIVE SAVINGS ESTIMATE FROM RENEWABLES



Each agreement also contains the option of purchasing the equipment rather than continue as a PPA customer. IEUA is continually evaluating this opportunity, as well as imported energy procurement options, annually to determine the most cost effective solution in both the short and long term.

INCREASED MONITORING

With the advent of sub-metering at each facility, IEUA will have the capability of tracking electricity usage by process. As of April 2015, the Agency's sub-meter equipment was still undergoing modifications to reliably provide electrical usage data. Once the installation is complete, IEUA will be able to identify the energy intensity of each treatment process. As aforementioned, the sub-meters will be used to quantify energy usage for each process and identify potential load reductions that can be incorporated in the DR program.

Several resources have made strides in recent years in establishing energy metrics for wastewater treatment processes. The Agency can use these resources to compare the sub-meter data and gauge potential areas for improvement. Rather than targeting processes that are simply energy-intensive, efficiency projects should focus on processes that use more energy than is considered necessary or standard within the industry.

Moreover, tracking energy usage from each process will benefit IEUA's Operations and Maintenance staff, as sudden variations in energy usage can signal the need for repair or replacement. To the extent allowed by currently available data, performance management tools (i.e., Key Performance Indicators (KPI) and Unit Production Costs (UPC)) are being used to monitor energy use and energy generation at the facilities. These tools are important components of an effective energy management program. As more data on energy use become available through sub-metering, the KPI and UPC tools will be expanded to take full advantage of the information collected from the meters. IEUA staff will be tasked with incorporating the process energy usage into regular Operations and Maintenance staff responsibilities.

EDUCATION

In addition to tracking data and identifying programs, the Agency must educate its employees on their role in improving energy management. Raising awareness of energy usage and cost impacts can empower staff to conserve and even recommend process changes that might otherwise be overlooked by an auditor unfamiliar with process details.

IEUA's external affairs staff produces a monthly newsletter that is distributed to all employees at the Agency. Beginning in May 2015, the monthly newsletter will include a regular update focusing on energy management, conservation opportunities, or education. Additionally, IEUA Operations and Maintenance employees will be given annual training that explains IEUA's energy procurement strategy, cost impacts, and how they can help reduce energy usage.

NEW PROJECT SOLICITATION

IEUA has the ability to include specific standards or performance objectives in project scopes whenever issuing RFPs. Beginning in FY 15/16, RFPs issued by IEUA will require vendors to include high-efficiency equipment in any project, as warranted. New project evaluations will also consider the impact on energy consumption and management. Proposals that improve energy management will be prioritized over similar proposals that are neutral or adverse to energy management.

AUDITING

Along with sub-metering information data, an energy audit can help identify efficiency opportunities within the treatment plants. Agency staff regularly audits equipment through the Asset Management Plan to determine if processes can be optimized through equipment retrofit/replacement or operational adjustments. IEUA will utilize The Energy Network to conduct comprehensive energy audits of each of the treatment plants by the end of FY 15/16.

Furthermore, the Energy Management Plan, updated every two years, will serve as an annual analysis of energy usage with the goal of targeting energy intensive processes and uncovering potential conservation opportunities.

Appendix A

IEUA Business Goals

IEUA Business Goals

October 2013

Business Goal Development

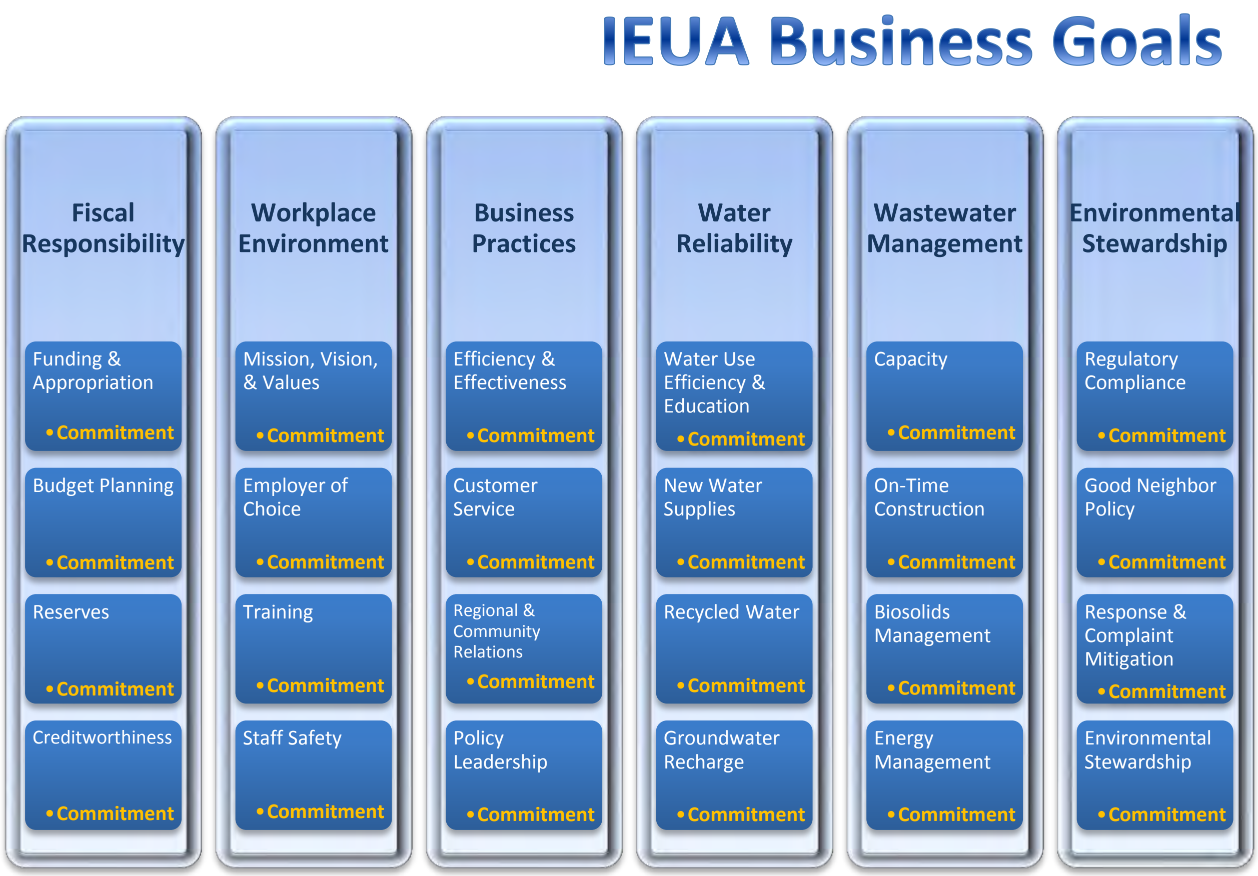
PURPOSE: It is critical that IEUA Business Goals align with the Agency's Mission, Vision & Values which are defined by the needs of our Stakeholders and the value provided to the Public. The Business Goal Development process includes a review of existing Agency-wide policy goals and their refinement based on current and future needs. It is also critical in setting the framework for the development of the IEUA Strategic Plan that will shape and guide the Agency's fundamental decisions and actions over the next several years.

BACKGROUND: Over the last several years, the Agency-wide policy goals, which have guided the Agency's decisions and actions in executing its mission and attaining its vision, have been categorized into nine major thematic areas: Conservation & Water Quality, Technological Innovation, Rate Stabilization and Cost Effectiveness, Operational and Maintenance Efficiency, Strategic Planning and Capital Implementation, Waste Management and Resource Utilization, Interagency Relationships and Community Partnerships, Fiscal Accountability and Regulatory Compliance, and Staff Training, Development and Well Being.

These Agency-wide policy goals guide the development of the capital improvement program, operational budget, and organizational goals and objectives each budget cycle. As a way to further define the Agency's levels of service (LOS), several workshops were held with the IEUA Board of Directors in 2011. However, the LOS developed as part of these workshops were primarily focused on the Agency's operational functions. In early 2013 staff recommended the LOS be expanded into more broad based IEUA Business Goals to also include the following topics: water reliability, fiscal accountability and employee wellbeing. It was also determined that the development of the IEUA Business Goals should include input from Stakeholders including: IEUA Board of Directors, IEUA staff, Technical Committee members and Policy Committee members.

BUSINESS GOALS FUNCTION: For any organization to remain relevant and effective, its ability to adapt and prepare for change is essential. As illustrated below, the IEUA Business Goals must be must be continually evaluated as part of the planning process to ensure that they meet the current and future needs of the Region.

BUSINESS GOALS STRUCTURE: The IEUA Business Goals were categorized into six main areas: *Fiscal Responsibility, Workplace Environment, Business Practices, Water Reliability, Wastewater Management and Environmental Stewardship.* Within each Business Goal (i.e. Water Reliability), several Objectives were established to support the Business Goal (i.e. beneficial use of recycled water, etc.). For each Objective, a Commitment was developed to define the level of service that IEUA will provide (i.e. develop recycled water infrastructure to reuse 50,000 AFY). The structure of the Business Goals is shown in the following figure:



DOCUMENT STRUCTURE: Included within this narrative is one page for each Business Goal – which outlines the Business Goal intent, each Objective and the corresponding recommended Commitment. Background on each Objective/Commitment is included within the Appendix.

A. Business Goal: Fiscal Responsibility — Business Goal

IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability.

1. Funding & Appropriation *[Agency Management, Financial Planning, Accounting & Fiscal Management]* — Key Objective

Objective: IEUA will appropriately fund operational, maintenance and capital investment costs.

Recommended Commitment: IEUA will adopt service rates and charges that fully support the costs of service and provide a reliable and steady flow of operating revenue to support all operational expenses, capital replacement and debt service costs. In addition, IEUA will ensure that service rates and charges support the Agency's commitment to sustain high quality levels of service. — Commitment Level

Reference Material: Appendix A.1 — Background Information Location

SCHEDULE: The development, review and approval of Business Goals entails a sequence as indicated in the schedule below:

4/30	• IEUA Staff Workshop I
5/16	• IEUA Staff Workshop II
6/5	• IEUA Board Workshop I
7/23	• Water Managers'/Technical Committee Workshop
8/7	• IEUA Board Workshop II
8/15	• Water Managers'/Technical Committee Workshop II
9/23	• Joint IEUA Board/Policy Member Workshop
10/16	• IEUA Board Approval

Following the completion of this process, the adopted Business Goals will be used as the basis for the development of several planning documents, including the Strategic Plan, Integrated Water Resources Plan, Facilities Master Plan Update and the Asset Management Plan.

DEFINITIONS: The following list is provided to define key terms utilized in the Business Goals Narrative.

Board of Directors – Five elected officials providing the governance of Inland Empire Utilities Agency and representing the following Divisions:

- Division 1: Terry Catlin
- Division 2: Gene Koopman
- Division 3: Steve Elie
- Division 4: Vacant
- Division 5: Michael Camacho

Chino Groundwater Basin – 5,000,000 AF of groundwater storage encompassing approximately 235 square miles of the upper Santa Ana River Watershed within San Bernardino, Riverside and Los Angeles Counties. A substantial portion of the Chino Groundwater Basin overlaps with the IEUA Service Area.

IEUA Service Area – 242 square miles located in the southwest corner of San Bernardino County incorporating: the City of Chino, the City of Chino Hills, the City of Fontana, the City of Montclair, the City of Ontario, the City of Upland and unincorporated areas of San Bernardino County.

Imported Water – A supplemental water source to local water supplies generally purchased through the State Water Project.

Member Agencies – Cities, agencies and districts that contract with IEUA for regional wastewater services and Imported Water deliveries (* denotes member agencies who also are signatories to the Regional Sewage Contract):

- City of Chino*
- City of Chino Hills*
- Cucamonga Valley Water District*
- City of Fontana*
- Fontana Water Company
- City of Montclair*
- Monte Vista Water District
- City of Ontario*
- San Antonio Water Company
- City of Upland*

Policy Committee – A committee comprised of policy members from Regional Sewage Contract member agencies and IEUA.

Public – The approximately 850,000 residents within the IEUA Service Area who receive the benefits of the services provided by the Member Agencies and IEUA.

Region – The geographical location where IEUA maintains a sphere of influence which is broader than the IEUA Service Area.

Regional Water Agencies – Agencies and districts having water interests within the Region but are not Member Agencies. These include but are not limited to:

- Chino Basin Watermaster
- Jurupa Community Services District
- Los Angeles County Sanitation District
- Metropolitan Water District
- Orange County Sanitation District
- Orange County Water District
- San Bernardino Flood Control and Water Conservation District
- Santa Ana Watershed Project Authority
- Western Municipal Water District

Stakeholders – A general term to define all interested parties including: Board of Directors, Policy Committee, Technical Committee, Member Agencies and Regional Water Agencies.

Supplemental Water – An additional water supply originating from outside the IEUA Service Area that may offset the demand for Imported Water – may include outside groundwater, recycled water, etc.

Technical Committee – A committee comprised of public works/water managers from the Member Agencies and IEUA.

A. Business Goal: Fiscal Responsibility

IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability. Furthermore, IEUA will provide open and transparent communication to educate the Member Agencies on the fiscal policies of the Agency.

1. **Funding & Appropriation** *[Agency Management, Financial Planning, Accounting & Fiscal Management]*

   Objective: IEUA will appropriately fund operational, maintenance and capital investment costs.

   Commitment: IEUA will adopt service rates and fees that fully support the costs of service and provide a reliable and steady flow of operating revenue to support all operational expenses, capital replacement and debt service costs. In addition, IEUA will ensure that service rates and fees support the Agency's goal to sustain high quality Commitment Levels.

   Reference Material: Appendix A.1

2. **Budget Planning** *[Agency Management, Financial Planning, & Accounting & Fiscal Management]*

   Objective: IEUA will accurately forecast future operational, repair & replacement, capital improvement and debt service costs as needed for the creation of multiyear budgets and rate resolutions that create fiscal stabilization for IEUA and the Member Agencies.

   Commitment: IEUA will provide multiyear forecasts for operational, repair & replacement, capital investment and debt service costs to support the adoption of multiyear budgets and rates enhancing dependability and stability.

   Reference Material: Appendix A.2

3. **Reserves** *[Financial Planning, Accounting & Fiscal Management]*

   Objective: IEUA will preserve fund reserves that sustain the Agency's long term fiscal health, high quality credit rating and ensure its ability to effectively address economic variability.

   Commitment: IEUA will adopt financial policies to establish and preserve fund reserves above legally or contractually mandated levels to maintain Commitment Levels. In addition, IEUA will support short and long term funding requirements and sustain the Agency's long term fiscal health and high quality credit rating to reduce future borrowing costs.

   Reference Material: Appendix A.3

4. **Creditworthiness** *[Financial Planning, Accounting & Fiscal Management]*

   Objective: IEUA will sustain a high quality credit rating and debt service coverage ratio to safeguard the Agency's fiscal health and reduce future borrowing costs.

   Commitment: IEUA will reinstate the Agency's credit rating to AAA by FY 17/18 to reduce borrowing costs anticipated for the expansion and improvement of existing facilities to meet future growth in the Agency's service area.

   Reference Material: Appendix A.4

B. Business Goal: Workplace Environment

IEUA is committed to provide a positive workplace environment by recruiting, retaining and developing a highly skilled team dedicated to the Agency's Mission, Vision and Values.

1. Mission, Vision & Values *[All Agency Staff & Board]*

Objective: IEUA will uphold Business Goals, Objectives and Commitment Levels that support and advance the Agency's Mission, Vision and Values.

Commitment: IEUA will maintain the highest standard of ethical conduct from all Agency staff by promoting values of prudent leadership, integrity, collaboration, open communication, respect, accountability, high quality, passion and efficiency to support the Agency's Mission, Vision and Values.

Reference Material: Appendix B.1

2. Employer of Choice *[Human Resources, & Agency Management]*

Objective: IEUA will be an Employer of Choice.

Commitment: IEUA will provide a work environment that will attract and retain highly skilled, motivated, professional and committed employees.

Reference Material: Appendix B.2

3. Training *[Agency Management & Human Resources]*

Objective: IEUA will provide employees with state-of-the-art skills and knowledge to meet current and anticipated Agency needs.

Commitment: IEUA will facilitate and provide opportunities for staff to further their personal/professional development in support of maintaining a highly skilled workforce.

Reference Material: Appendix B.3

4. Staff Safety *[Safety, Human Resources, & Agency Management]*

Objective: IEUA will promote and ensure a safe and healthy work environment to protect employees and Stakeholders.

Commitment: IEUA will have no more than 1 day of lost time due to work related illness or injury per 1,000 days worked.

Reference Material: Appendix B.4

C. Business Goal: Business Practices

IEUA is committed to applying ethical, fiscally responsible and environmentally sustainable principles to all aspects of business and organizational conduct.

1. Efficiency & Effectiveness *[All Departments]*

Objective *IEUA will promote standards of efficiency and effectiveness in all Agency business practices and processes.*

Commitment: IEUA will integrate ***Lean*** techniques to evaluate its current business practices and processes and identify ways to improve the quality, cost and value of the services the Agency provides to the Member Agencies and the Public.

Reference Material: Appendix C.1

2. Customer Service *[All Departments]*

Objective: IEUA will provide excellent customer service that is cost effective, efficient, innovative and reliable.

Commitment: IEUA will respond to and meet the Member Agencies expectation for enhanced value added services. IEUA will solicit Stakeholder feedback on performance and goal alignment on an annual basis.

Reference Material: Appendix C.2

3. Regional Leadership and Community Relations *[Agency Management, Planning, & Engineering]*

Objective: IEUA will cultivate a positive and transparent relationship with its Stakeholders to enhance quality of life, preserve our heritage and protect the environment.

Commitment: IEUA will partner with its Stakeholders on common issues to create and implement integrated and innovative solutions, minimize duplication of efforts and support education and outreach to the Public. Furthermore, IEUA will incorporate Member Agencies and Regional Water Agencies into various IEUA related projects and programs to ensure that a transparent and broader regional representation is achieved.

Reference Material: Appendix C.3

4. Policy Leadership *[Agency Management, Planning, & Engineering]*

Objective: IEUA will effectively advocate, campaign and guide the development of policies and legislation that benefit the Region IEUA serves.

Commitment: IEUA will promote a collaborative approach for the development of positions on policies, legislation and regulations that impact Agency policy objectives.

Reference Material: Appendix C.4

D. Business Goal: Water Reliability

IEUA is committed to the development and implementation of an integrated water resource management plan that promotes cost-effective, reliable, efficient and sustainable water use along with economic growth within the IEUA Service Area.

1. Water Use Efficiency & Education *[Planning, Engineering, & Public Information]*

Objective: IEUA will promote education and water use efficiency to enhance water supplies within the Region and exceed State goals for reductions in per capita water use within the IEUA Service Area.

Commitment: IEUA will promote to reduce water use in the IEUA Service Area to less than 200 gallons per capita per day (gpcd) by 2018.

Reference Material: Appendix D.1

2. New Water Supplies *[Planning &, Engineering]*

Objective: IEUA will support the Member Agencies and Regional Water Agencies with the development of reliable, drought-proof and diverse local water resources and Supplemental Water supplies in order to reduce dependence on Imported Water supplies.

Commitment: IEUA will promote reducing demand for Imported Water during dry and normal years and storing Imported Water into the Chino Groundwater Basin during wet years. In addition, IEUA will support maximizing the beneficial use of existing water infrastructure, while meeting future increased demands through investment in local water resources, Supplemental Water supplies and conservation efforts.

Reference Material: Appendix D.2

3. Recycled Water *[Planning, Engineering, Operations, & Maintenance]*

Objective: IEUA will support maximizing beneficial reuse of recycled water to enhance reliability and reduce dependence on Imported Water.

Commitment: IEUA will complete the development of recycled water infrastructure and will support the Member Agencies in achieving reuse of 50,000 AFY by 2025.

Reference Material: Appendix D.3

4. Groundwater Recharge *[Planning, Engineering, Operations, & Maintenance]*

Objective: IEUA will maximize all sources of groundwater recharge.

Commitment: IEUA will support the recharge of all available stormwater and maximize the recharge of recycled water within the Chino Groundwater Basin. Furthermore, IEUA will pursue the purchase and storage of cost-effective Supplemental Water supplies.

Reference Material: Appendix D.4

E. Business Goal: Wastewater Management

IEUA systems will be master planned, managed and constructed to ensure that when expansion planning is triggered, designs/construction can be completed to meet regulatory/growth needs in an expeditious, environmentally responsible and cost effective manner.

1. Capacity *[Planning, Engineering, & Construction Management]*

Objective: IEUA will maintain capacity within systems and facilities to meet essential service demands and to protect public health and environment.

> ***Commitment***: IEUA will ensure that systems are managed and constructed so that 90% of capacity is never exceeded.
>
> ***Reference Material***: Appendix E.1

2. On-Time Construction *[Engineering, & Construction Management]*

Objective: IEUA will ensure capital projects are designed and implemented in a timely and economically responsible manner.

> ***Commitment***: IEUA will design and construct facilities through efficient project management to ensure that 80% of projects are completed on schedule and 90% of projects are on budget.
>
> ***Reference Material***: Appendix E.2

3. Biosolids Management *[Operations & Maintenance]*

Objective: IEUA will manage all Agency produced biosolids in a compliant, fiscally prudent and environmentally sustainable manner.

> ***Commitment***: IEUA will ensure that 95% of the Inland Regional Compost Facility's capacity is utilized, all biosolids produced by IEUA are treated at IERCF, Agency solids generation is minimized through efficient dewatering operations and all compost is marketed for beneficial use.
>
> ***Reference Material***: Appendix E.3

4. Energy Management *[Planning, Engineering, Operations, & Maintenance]*

Objective: IEUA will optimize facility energy use and effectively manage renewable resources to achieve peak power independence, contain future energy costs, achieve statewide renewable energy, distributed generation and greenhouse gas reduction goals, and provide for future rate stabilization.

> ***Commitment***: IEUA will achieve peak power independence by 2020 through the implementation of renewable projects, energy management agreements and operational efficiencies.
>
> ***Reference Material***: Appendix E.4

F. Business Goal: Environmental Stewardship

IEUA is committed to the responsible use and protection of the environment through conservation and sustainable practices.

1. Regulatory Compliance *[Compliance, Operations, & Maintenance]*

Objective: IEUA will comply with all federal, state and local laws at each Agency facility.

> ***Commitment***: IEUA will have no more than 2 notices of violation annually from the State Water Resources Control Board, Air Quality Management District, or Non-Reclaimable Waste System for all Agency owned and operated facilities.
>
> ***Reference Material***: Appendix F.1

2. Good Neighbor Policy *[Compliance, Operations, & Maintenance]*

Objective: IEUA will control odors at all Agency facilities for the purpose of improving the environment and being a good neighbor to the local community.

> ***Commitment***: IEUA will perform a quarterly odor monitoring assessment to develop actual and acceptable baseline odor thresholds. Acceptable baseline thresholds will be used to measure treatment plant performance and drive necessary capital improvements.
>
> ***Reference Material***: Appendix F.2

3. Response & Complaint Mitigation *[Compliance, Operations, & Maintenance]*

Objective: IEUA will investigate and appropriately respond in a timely manner to any environmental issue or complaint received at any Agency Facility.

> ***Commitment***: IEUA will immediately respond to any event that threatens public health and safety and will respond within 5 working days to any non-emergency complaint or suggestion.
>
> ***Reference Material***: Appendix F.3

4. Environmental Responsibility *[Agency Management, Planning, & Engineering]*

Objective: IEUA will strive to implement actions that enhance or promote environmental sustainability and the preservation of the region's heritage.

> ***Commitment***: IEUA will consider and assess environmental sustainability, public use and heritage preservation options for all of its programs and projects.
>
> ***Reference Material***: Appendix F.4

Appendix

Reference Materials

A. Fiscal Responsibility

A.1 – Funding & Appropriation
A.2 – Budget Planning
A.3 – Reserves
A.4 – Creditworthiness

B. Workplace Environment

B.1 – Mission, Vision & Values
B.2 – Employer of Choice
B.3 – Training
B.4 – Staff Safety

C. Business Practices

C.1 – Efficiency & Effectiveness
C.2 – Customer Service
C.3 – Regional Leadership & Community Relations
C.4 – Policy Leadership

D. Water Reliability

D.1 – Water Use Efficiency & Education
D.2 – New Water Supplies
D.3 – Recycled Water
D.4 – Groundwater Recharge

E. Wastewater Management

E.1 – Capacity
E.2 – On-Time Construction
E.3 – Biosolids Management
E.4 – Energy Management

F. Environmental Stewardship

F.1 – Regulatory Compliance
F.2 – Good Neighbor Policy
F.3 – Response & Complaint Mitigation
F.4 – Environmental Responsibility

Appendix A.1

Fiscal Responsibility – Funding & Appropriation

Business Goal: *IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability. Furthermore, IEUA will provide open and transparent communication to educate the Member Agencies on the fiscal policies of the Agency.*

Objective: *IEUA will appropriately fund operational, maintenance and capital investment costs.*

Commitment: *IEUA will adopt service rates and fees that fully support the costs of service and provide a reliable and steady flow of operating revenue to support all operational expenses, capital replacement and debt service costs. In addition, IEUA will ensure that service rates and fees support the Agency's goal to sustain high quality Commitment Levels.*

Commitment Level Background

- Historically, the Agency's operating revenues (net of property tax supplement) have been lower than operating expenses (i.e., services provided by the Agency do not generate revenues needed to pay for total cost of operations), resulting in an operating structural deficit. The operating structural deficit has been supported by a combination of property tax receipts and fund reserves.
- The allocation of property tax receipts and fund reserves to support operating activities reduced the amount of property taxes available to support capital investment, and over time, diminished the Agency's fund reserve balances.
- Given the uncertainty of property taxes, it is essential for the Agency to reduce its reliance on this funding source to support recurring expenditures (O&M and debt service costs) over time.
- In 2013, IEUA will release the first Asset Management Plan, which will provide management strategies and funding requirements to repair and replace aging equipment at each of the treatment facilities based on condition assessments. Funding of R&R is essential to ensuring facilities are maintained to support the Agency's Commitment Levels.
- IEUA is committed to ultimately having rates that fully support recurring costs, including O&M,R&R, and debt service costs. Achieving this goal will allow the Agency to fully allocate property tax receipts to support capital investment, including future expansion of existing facilities, and reduce future borrowing costs.
- Fiscal Year 2013/14 is the second year of a three-year rate resolution adopted by the Agency's Board of Directors in February 2012 for the Regional Wastewater and Recycled Water programs. The multi-year rate increases begin to address the net operating structural deficit resulting from rates not fully recovering program costs.

Appendix A.2

Fiscal Responsibility – Budget Planning

Business Goal: *IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability. Furthermore, IEUA will provide open and transparent communication to educate the Member Agencies on the fiscal policies of the Agency.*

Objective: *IEUA will accurately forecast future operational, repair & replacement, capital improvement and debt service costs as needed for the creation of multiyear budgets and rate resolutions that create fiscal stabilization for IEUA and the Member Agencies.*

Commitment: *IEUA will provide multiyear forecasts for operational, repair & replacement, capital investment and debt service costs to support the adoption of multiyear budgets and rates enhancing dependability and stability.*

Commitment Level Background

- In addition to the annual adoption of the Operating Budget and TYCIP, the Agency also prepares a Long Range Plan of Finance (LRPF).
- The LRPF aligns the Agency's financial capacity with long-term service objectives. The LRPF uses forecasts to provide insight into the Agency's future financial capacity so that Agency strategies can achieve long term sustainability of financial and service objectives. It provides the most cost-effective funding strategy to support the operations and capital requirements in line with established policies and goals.
- Based upon the LRPF and other financial documents, the Agency is committed to adopting multiyear budgets and rates to facilitate the integration of the financial and strategic planning.
- Adoption of multiyear budgets and rates will provide a more strategic approach to resource allocation, as well as streamline the Agency's rate increase process and provide long term stability.

Appendix A.3

Fiscal Responsibility – Reserves

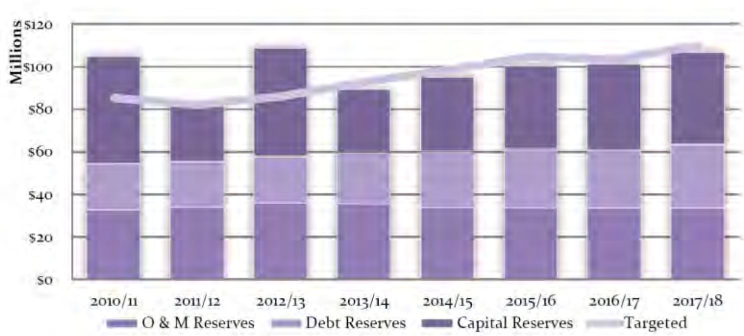
Business Goal: *IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability. Furthermore, IEUA will provide open and transparent communication to educate the Member Agencies on the fiscal policies of the Agency.*

Objective: *IEUA will preserve fund reserves that sustain the Agency's long term fiscal health, high quality credit rating and ensure its ability to effectively address economic variability.*

Commitment: *IEUA will adopt financial policies to establish and preserve fund reserves above legally or contractually mandated levels to maintain Commitment Levels. In addition, IEUA will support short and long term funding requirements and sustain the Agency's long term fiscal health and high quality credit rating to reduce future borrowing costs.*

Commitment Level Background

- Fund balance is a measure of the net worth (total assets minus total liabilities) of an organization and is a strong indicator of its financial health. In addition to consolidated fund balance at the Agency-wide level, IEUA also maintains fund balances at the individual program level.
- The fund balance reserves are designated for specific purposes, and include four month operating contingency and debt service as prescribed by the current bond covenants, capital construction, improvement and replacement, rate stabilization, self-insured workers' compensation and liability insurance, retiree medical benefits, and other short term and long term requirements.
- The figure below compares the Agency's actual and projected total fund balance to the "targeted" amount from FYs 2009/10 through 2016/17. Targeted fund balance as defined in the Agency's 2012 LRPF is the sum of 50 percent of operating revenues, and total fund balance reserves designated to support debt service costs.



- An update of the Agency's financial policies adopted in 2005 is planned in 2013 as part of the implementation of a long range financial model. A key objective will be to align reserves and thresholds to meet the Agency's short term and long term needs and develop a funding strategy.

Appendix A.4

Fiscal Responsibility – Creditworthiness

Business Goal: *IEUA will safeguard the Agency's fiscal health through organizational efficiency, adoption of balanced multiyear budgets and rates that meet full cost-of-service targets, maintain a high quality credit rating and preserve established fund balance reserves to effectively address short term and long term economic variability. Furthermore, IEUA will provide open and transparent communication to educate the Member Agencies on the fiscal policies of the Agency.*

Objective: *IEUA will sustain a high quality credit rating and debt service coverage ratio to safeguard the Agency's fiscal health and reduce future borrowing costs.*

Commitment: *IEUA will reinstate the Agency's credit rating to AAA by FY 17/18 to reduce borrowing costs anticipated for the expansion and improvement of existing facilities to meet future growth in the Agency's service area.*

Commitment Level Background

- As part of the 2012 multi-year rate increase, IEUA established minimum debt coverage ratio targets for the upcoming fiscal years. The following table shows the DCR targets, the actual DCR's and forecasted DCR's (F):

DCR	FY 11/12	FY 12/13	FY 13/14	FY 14/15	FY 15/16
	Actual	Projected		Forecasts	
Target		1.43x	1.50x	1.70x	
Actual/Forecast	1.69x	1.92x	1.75x	2.01x	2.18x

- The FY 2011/12 Comprehensive Annual Financial Report (CAFR) reported an Agency DCR of 1.69x and the following credit ratings: AA- (S&P), Aa2 (Moody's), and AA- (Fitch).
- The adopted FY 2014-2023 Ten Year Capital Improvement (TYCIP) includes expansion of the Agency's southern service area facilities in FY 2018/19 where most of the future population growth is anticipated. This expansion is projected to be financed with new debt. Improvement of the Agency's long term credit rating to AAA and DCR to 2.70x (DCR is the ratio of net revenue available to meet debt service costs). In the current market, the differential cost of borrowing between AA and AAA is about 20 basis points. On a $40 million bond issue, this equates to a borrowing-cost-savings of over $2.4 million over a 30 year term.
- Lower borrowing costs equate to lower fees.

Appendix B.1

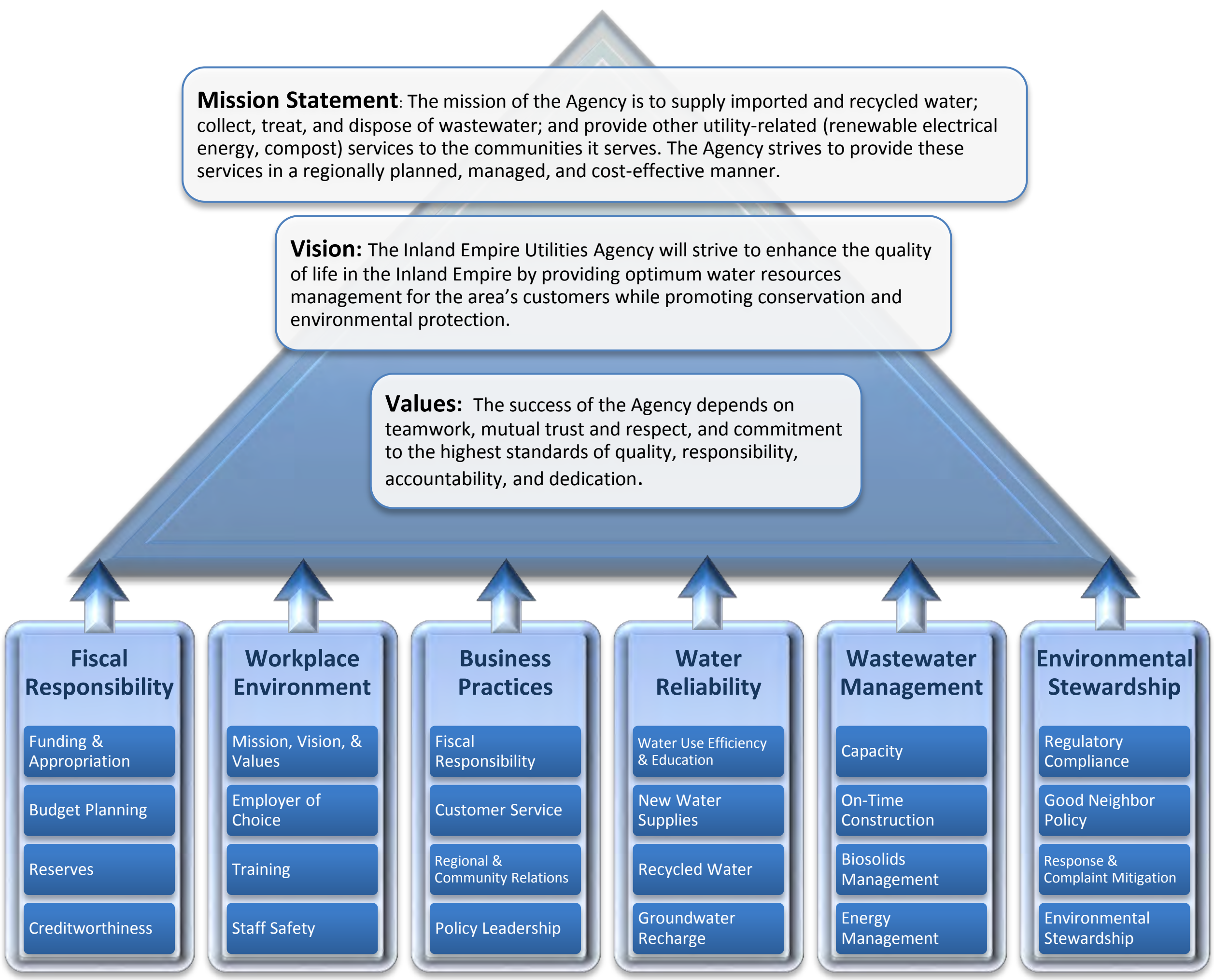
Workplace Environment – Mission, Vision & Values

Business Goal: *IEUA is committed to provide a positive workplace environment by recruiting, retaining and developing a highly skilled team dedicated to the Agency's Mission, Vision and Values.*

Objective: *IEUA will uphold Business Goals, Objectives and Commitment Levels that support and advance the Agency's Mission, Vision and Values.*

Commitment: *IEUA will maintain the highest standard of ethical conduct from all Agency staff by promoting values of prudent leadership, integrity, collaboration, open communication, respect, accountability, high quality, passion and efficiency to support the Agency's Mission and Vision.*

Commitment Level Background



- Management will ensure that principles, policies and practices support the Business Goals, Mission, Vision and Values of the Agency.

Appendix B.2

Workplace Environment – Employer of Choice

Business Goal: *IEUA is committed to provide a positive workplace environment by recruiting, retaining and developing a highly skilled team dedicated to the Agency's Mission, Vision and Values.*

Objective: *IEUA will be an Employer of Choice.*

Commitment: *IEUA will provide a work environment that will attract and retain highly skilled, motivated, professional and committed employees.*

Commitment Level Background

- IEUA will recruit, retain, and promote a diverse and qualified workforce committed to the Agency's Mission, Vision and Values. This will be achieved by utilizing modern recruitment practices that provide flexible and responsive recruiting solutions to assist with filling positions in a timely and effective manner.
- IEUA will encourage and maintain a highly motivated and trained staff by designing, implementing, and supporting a learning environment which encourages growth and development of Agency staff.
- IEUA will strive to align project/work tasks with the skills of its employees to create a rewarding and successful work environment.
- IEUA will create a culture that recognizes a dedicated staff and attracts qualified individuals through the use of creative communication methods and continued education of available employee benefits to increase knowledge of these programs and services. In addition, IEUA will update the Agency's various award recognition programs to reflect the Agency's cost containment strategies.
- IEUA will reduce stress from work-life imbalance by promoting partnerships, cross training, shared responsibilities, and a culture of teamwork to allow any and all employees recuperative time away from work activities.
- IEUA will inspire trust and confidence in Management by: clearly defining the Agency's Mission/Vision/Values, by creating Business Goals that support the Mission/Vision/Values, outlining a Strategic Plan to achieve those goals, communicating how the Agency is accomplishing these goals, and effectively linking these goals to each employee objectives and performance.

Appendix B.3

Workplace Environment – Training

Business Goal: *IEUA is committed to provide a positive workplace environment by recruiting, retaining and developing a highly skilled team dedicated to the Agency's Mission, Vision and Values.*

Objective: *IEUA will provide employees with state-of-the-art skills and knowledge to meet current and anticipated Agency needs.*

Commitment: *IEUA will facilitate and provide opportunities for staff to further their personal/professional development in support of maintaining a highly skilled workforce.*

Commitment Level Background

- All Agency employees have access to online training:
  - Leadership, Team Building, and Mentoring Skills Training
  - Microsoft Office Training
  - OSHA Required Safety Trainings

  Employees are provided with login information, which allows the employee to perform trainings at the most optimum time to fit their daily schedule.
- Selected Agency employees have the ability to attend onsite classroom trainings. The following onsite classroom trainings are going to be provided for Fiscal Year 2013/2014: "7 Habits of Highly Effective People", (4) specialized onsite workshops, (12) 4-hour Microsoft Office trainings and policies and procedures training.
- Three types of offsite training are going to be provided for Fiscal Year 2013/2014:
  - Southern California Local Government Supervisory Program – This is a 3 day training course to provide skills for new supervisors.
  - Southern California Local Government Leadership Academy – This is a 7 day training program for Managers provided by current or retired City Managers.
  - Liebert Cassidy Whitmore Training – Legal Counsel provides workshops to Managers, Supervisors, and aspiring Supervisors on relational issues.
- IEUA also provides tuition reimbursement up to $2,500 per year for employee educational expenses that increase their job knowledge and skills. Additionally, certification and degree incentives are awarded to employees who earn Associates, Bachelor's and Master's Degree, and specific program certification.
- Each Agency Department has training budgets to perform trainings on specialized skill sets for their employees.

Appendix B.4

Workplace Environment – Staff Safety

Business Goal: *IEUA is committed to provide a positive workplace environment by recruiting, retaining and developing a highly skilled team dedicated to the Agency's Mission, Vision and Values.*

Objective: *IEUA will promote and ensure a safe and healthy work environment to protect employees and Stakeholders.*

Commitment: *IEUA will have no more than 1 day of lost time due to work related illness or injury per 1,000 days worked.*

Commitment Level Background

- IEUA will sustain a clean, safe, and healthy working environment for all Agency employees at all facilities. This will be achieved by:
  - Administering and monitoring required safety and regulatory trainings;
  - Conducting annual intra-department safety audits; and
  - Conducting annual emergency response drills, such as HAZWOPER training, fire drills, and earthquake drills
- IEUA has maintained an outstanding employee workplace injury record. For Fiscal Year 2012/2013 the Agency had no lost time due to work related illness or injury. Most employee workplace injury events that occur at IEUA are typically due to cuts, scrapes, and bruises. Rarely does a workplace injury incident result in lost time.
- Occupational Safety and Health Administration (OSHA) categorizes work related illnesses or injuries by: recordable cases (a case that resulted in medical treatment beyond 1st aid, loss of consciousness, or a significant injury diagnosed by a physician), transfers or restrictions (a case that resulted in an employee not being able to perform their job duties; however, their job duties were modified to meet the requirement of the illness or injury), lost time (a case that resulted in an employee not being able to work for one day after the date of injury), and death. For 2010 through 2012, IEUA had the following work injury statistics:

By Case

Calendar Year	Recordable Cases	Transfers or Restrictions	Lost Time	Deaths
2010	9	6	1	0
2011	12	6	1	0
2012	13	12	0	0

By Days

Calendar Year	Transfers or Restrictions	Lost Time
2010	81	180
2011	235	56
2012	390	0

Appendix C.1

Business Practices – Efficiency & Effectiveness

Business Goal: *IEUA is committed to applying ethical, fiscally responsible and environmentally sustainable principles to all aspects of business and organizational conduct.*

Objective: *IEUA will promote standards of efficiency and effectiveness in all Agency business practices and processes.*

Commitment: *IEUA will integrate **Lean** techniques to evaluate current business practices and processes and identify ways to improve the quality, cost and value of the services the Agency provides to the Member Agencies and the Public.*

Commitment Level Background

- IEUA is committed to providing its Stakeholders with high quality service in a cost effective, regionally planned manner. Continued assessment and improvement of our business processes and practices is essential to ensure optimization of efficiency and effectiveness.
- ***Lean*** was originally developed to reduce waste in manufacturing and evolved from Total Quality Management (TQM); the manufacturing practices of the Toyota Motor Corporation. However, rather than focusing on mass production, ***Lean*** focus on the elimination of waste while providing the same, or enhanced, value to the customer.
- Application of ***Lean*** techniques will help define key performance indicators (KPIs) to more effectively measure, monitor, and realign processes to meet the Agency's business goals and objectives.
- In April 2013, the second phase of the Agency's Enterprise Resource Planning (ERP) business system, first implemented in 2007, went live to streamline the recording, tracking and reporting of employee and payroll data. This enhancement helps support the Agency's efficiency and effectiveness initiative by eliminating redundant systems, enhancing data integrity, and supporting more transparent and timely reporting.
- The Agency's ERP system and integrated format also helps support the transition from a reactive to a condition based monitoring (CBM) maintenance philosophy strategy; a key initiative of the Agency. Under CBM, the 45 percent of resources currently allocated to reactive maintenance (unplanned or emergency repairs) will shift to support a predictive strategy denoted by improved planning and scheduling and more effective diagnosis of equipment functionality.
- The same integrated approach is being applied to the Agency's existing Supervisory Control & Data Acquisition (SCADA) System network which is currently comprised of a wide variety of equipment and applications located throughout the various facilities. Significant effort went into documenting the current state and analyzing the Agency's SCADA systems resulting in the 2012 Board adoption of the Recycled Water, Groundwater Recharge and Facilities SCADA Master Plans.

Appendix C.2

Business Practices – Customer Service

Business Goal: *IEUA is committed to applying ethical, fiscally responsible and environmentally sustainable principles to all aspects of business and organizational conduct.*

Objective: *IEUA will provide excellent customer service that is cost effective, efficient, innovative and reliable.*

Commitment: *IEUA will respond to and meet the Member Agencies expectation for enhanced value added services. IEUA will solicit Stakeholder feedback on performance and goal alignment on an annual basis.*

Commitment Level Background

- IEUA is committed to providing excellent customer service by:
    - ♦ Providing the primary services of the Agency – water management, wastewater management, biosolids management, and other resources management disciplines.
    - ♦ Ensuring that these services are offered in an effective, sustainable and cost efficient method.
    - ♦ Providing clear and direct responses to customer suggestions, inquiries, and complaints.
    - ♦ Maintaining open sources of communication to ensure stakeholder's interests are discussed and opportunities are pursued.
- IEUA will optimize customer service by ensuring alignment and management of core procurement business functions, roles and responsibilities.
- Media relations will continue to be cultivated and press releases will remain a major effort along with the Agency internal and external newsletter and updates.
- Social networking and website maintenance will remain a top priority for Agency outreach and communication initiatives.
- IEUA will collaborate with all Stakeholders to ensure open communication and discussion of issues and policies that affect the IEUA Service Area, (i.e. topics such as imported water rates and deliveries, development and availability of local water supplies.)

Appendix C.3

Business Practices – Regional Leadership & Community Relations

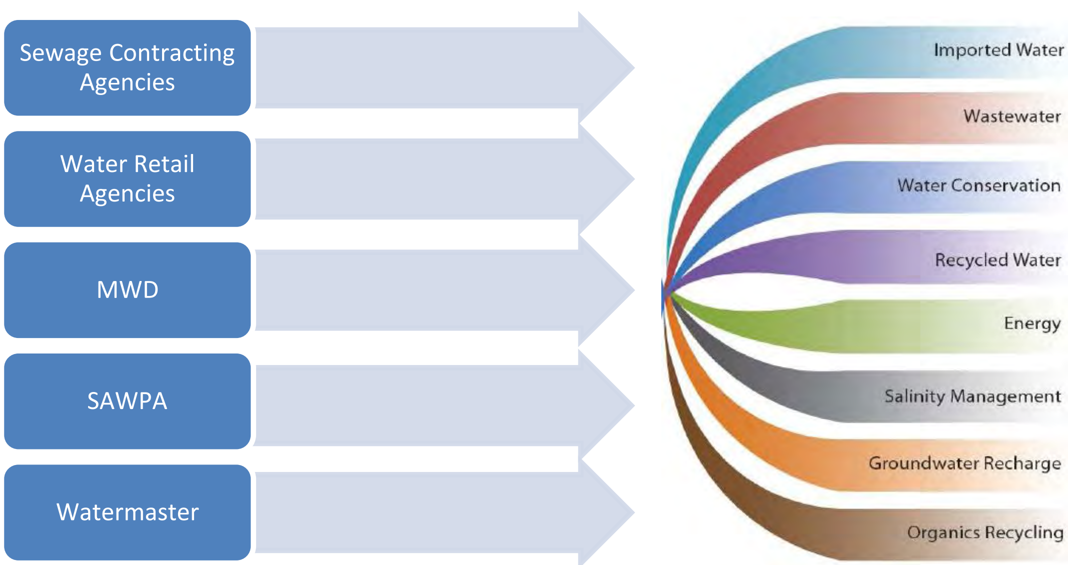
Business Goal: *IEUA is committed to applying ethical, fiscally responsible and environmentally sustainable principles to all aspects of business and organizational conduct.*

Objective: *IEUA will cultivate a positive and transparent relationship with its Stakeholders to enhance quality of life, preserve our heritage and protect the environment.*

Commitment: *IEUA will partner with its Stakeholders on common issues to create and implement integrated and innovative solutions, minimize duplication of efforts and support education and outreach to the Public. Furthermore, IEUA will incorporate Member Agencies and Regional Water Agencies into various IEUA related projects and programs to ensure that a transparent and broader regional representation is achieved.*

Commitment Level Background

- IEUA will promote and sustain effective communication between the Agency and its Stakeholders through use of various methods, including frequent meetings/workshops, newsletters and electronic media.
- Incorporating the Agency's branding initiatives, staff will create a recognizable standard to educate the public about water recycling, water conservation and capital infrastructure/replacement investments.
- IEUA is committed to taking actions that consider the cost, quality and value of service for communities we serve.
- The Agency strives to foster open, positive and collaborative relationships with all Stakeholders to meet the water needs of the Region now and in the future.



Appendix C.4

Business Practices – Policy Leadership

Business Goal: *IEUA is committed to applying ethical, fiscally responsible and environmentally sustainable principles to all aspects of business and organizational conduct.*

Objective: *IEUA will effectively advocate, campaign and guide the development of policies and legislation that directly benefit the Region IEUA serves.*

Commitment: *IEUA will promote a collaborative approach for the development of positions on policies, legislation and regulations that impact Agency policy objectives.*

Commitment Level Background

- IEUA will provide leadership on legislative solutions and regulatory standards for water reliability, water quality, energy management, wastewater collection, treatment and reuse, organics management, and stormwater and watershed management.
- IEUA will continue to effectively seek State and Federal grant funding for Agency and regional projects that achieve IEUA's policy objectives; (e.g. the Recharge Master Plan, Renewable Energy, the Optimum Basin Management Plan, and the Recycled Water Program).
- IEUA will actively research, monitor, review, and adopt positions on federal and state legislation that benefit the IEUA's and the Member Agencies policy objectives. This information will be shared and discussed with all Stakeholders.
- IEUA will support the development of public affairs, public awareness, community education and outreach, media relations and legislative programs on issues that address the policy objectives of IEUA. Open communication and collaboration among the Agency and its Stakeholders is of prime importance.
- IEUA will work with Member Agencies to formulate methods and approaches for addressing community and agency concerns and ensure that concerns, needs, and requests are responded to in a timely manner.
- IEUA will actively review and provide recommendations on procedures and processes to improve the efficiency, cost effectiveness, customer responsiveness, quality and environmental sustainability of Agency programs and projects.
- IEUA will coordinate intergovernmental activities with Stakeholders, industry associations, and regulatory agencies and will appear before local and state bodies on public affairs and other matters.
- IEUA will comply with the Brown Act requirements, and other laws pertaining to special districts.
- IEUA will navigate and implement the regulatory changes as a result of pension reform.

Appendix D.1

Water Reliability – Water Use Efficiency & Education

Business Goal: *IEUA is committed to the development and implementation of an integrated water resource management plan that promotes cost-effective, reliable, efficient and sustainable water use along with economic growth within the IEUA Service Area.*

Objective: *IEUA will promote education and water use efficiency to enhance water supplies within the Region and exceed State goals for reductions in per capita water use within the IEUA Service Area.*

Commitment: *IEUA will promote to reduce water use in the IEUA Service Area to less than 200 gallons per capita per day (gpcd) by 2018.*

Commitment Level Background

- The Water Conservation Act of 2009 (SBX 7-7) requires urban retail water suppliers to continue demand management measures to reduce water use, as measured by gpcd, by 10% by December 31, 2015 and by 20% by December 31, 2020 to maintain eligibility to receive state water management grants and loans.
- The baseline water use for the region from 1999 - 2008 was calculated to be 251 gpcd.
- The reduced water use targets can be achieved through: water use efficiency (WUE) active programs, WUE passive policy initiatives, and recycled water use. The current goal of the Urban Water Management Plan and the Water Use Efficiency Business Plan is to achieve the 20 x 2020 per capita water use reduction in the following manner:

	2015 Reduction	2020 Reduction
Projected Reduction from WUE Activities	5 gpcd	13 gpcd
Projected Reduction from Recycled Water Use	38 gpcd	45 gpcd
TOTAL Projected Reduction	**43 gpcd**	**58 gpcd**
10 Year Baseline	**251 gpcd**	
Target	226 gpcd	201 gpcd
Projected Achievement	208 gpcd	193 gpcd

- Additional per capita water use reductions can be achieved within the IEUA Service Area. IEUA's policy goal is to strive to achieve the 20 by 2020 reduction through conservation measures alone. IEUA will collaborate with all Member Agencies to review and update the Water Use Efficiency Business Plan to achieve this goal and will support the reduction of water use below 200 gpcd by 2018.
- IEUA will continue to expand regional water efficiency educational, outreach and rebate programs.

Appendix D.2

Water Reliability – New Water Supplies

Business Goal: *IEUA is committed to the development and implementation of an integrated water resource management plan that promotes cost-effective, reliable, efficient and sustainable water use along with economic growth within the IEUA Service Area.*

Objective: *IEUA will support the Member Agencies and Regional Water Agencies with the development of reliable, drought-proof and diverse local water resources and Supplemental Water supplies in order to reduce dependence on Imported Water supplies.*

Commitment: *IEUA will promote reducing demand for Imported Water during dry and normal years and storing Imported Water into the Chino Groundwater Basin during wet years. In addition, IEUA will support maximizing the beneficial use of existing water infrastructure, while meeting future increased demands through investment in local water resources, Supplemental Water supplies and conservation efforts*.

Commitment Level Background

- As part of the 2010 Urban Water Management Plan (UWMP), IEUA has set a goal to maximize use of local water supplies and minimize the need for Imported Water, especially during dry years and other emergency shortages from Metropolitan Water District (MWD).
- Unless additional water reductions are achieved or new local water supplies are developed, current projections show that regionally an additional 10,000 AFY of costly Imported Water will be required by year 2025.
- It is understood that future Imported Water reliability will be lower and costs will be higher. Over the next ten years, it is estimated that the IEUA/Member Agencies will purchase $600 million in Imported Water. A 10,000 AFY water supply shift from Imported Water would reduce MWD purchases by approximately $100 million over the same ten year period.
- IEUA is in the process of preparing an Integrated Resources Plan (IRP), which will provide an achievable long-term strategy to meet current and future water needs. The IRP will evaluate existing water supplies and demands, forecast future water supplies and demands, and evaluate additional water efficiency and alternative sources of new water supply that will reduce future reliance on Imported Water.

Appendix D.3

Water Reliability – Recycled Water

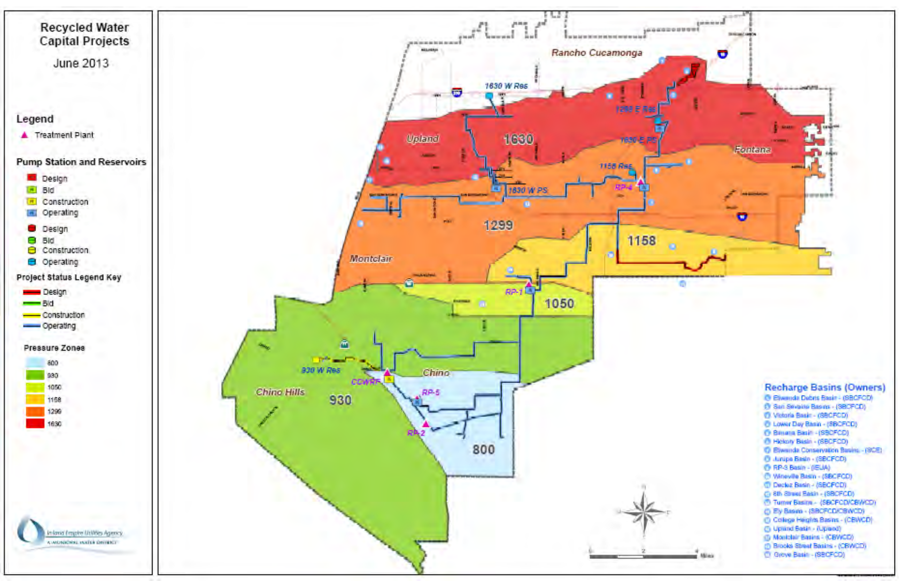
Business Goal: *IEUA is committed to the development and implementation of an integrated water resource management plan that promotes cost-effective, reliable, efficient and sustainable water use along with economic growth within the IEUA Service Area.*

Objective: *IEUA will support maximizing beneficial reuse of recycled water to enhance reliability and reduce dependence on Imported Water.*

Commitment: *IEUA will complete the development of recycled water infrastructure and will support the Member Agencies in achieving reuse of 50,000 AFY by 2025.*

Commitment Level Background

- IEUA has a current wastewater flow of approximately 60,000 AFY. Based upon wastewater forecasts and potential future interconnections, IEUA is targeting a reliable recycled water supply of 50,000 AFY for direct use and groundwater recharge by 2025.
- As outlined in the Recycled Water Business Plan, IEUA is in the process of expanding recycled water infrastructure to meet the 50,000 AFY delivery target. IEUA will release the Recycled Water Plan Update in 2014.
- In addition, the IRP will have specific focus on the development of additional direct recycled water connections and a specific emphasis on recycled water interties and enhanced groundwater recharge capabilities.



- Estimated Fiscal Year 2012/2013 recycled water delivery for direct use and groundwater recharge is 31,500 AFY. Increasing recycled water deliveries to 50,000 AFY is key to meeting the other three Objectives/Commitment Levels (Water Use Efficiency & Education, New Water Supplies, and Groundwater Recharge) for the Water Reliability Business Goal.

Appendix D.4

Water Reliability – Groundwater Recharge

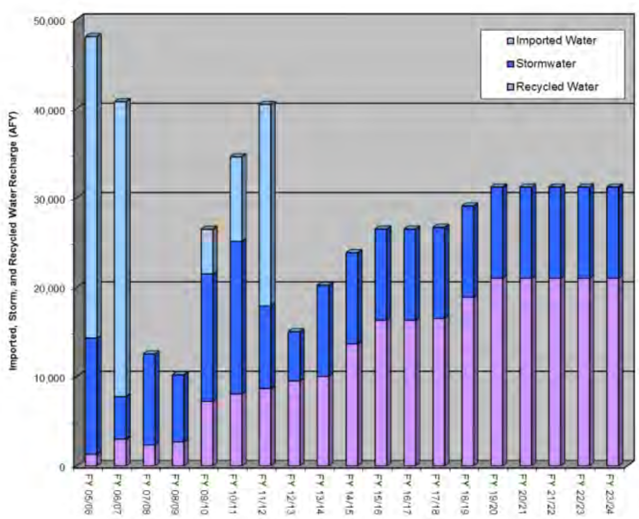
Business Goal: *IEUA is committed to the development and implementation of an integrated water resource management plan that promotes cost-effective, reliable, efficient and sustainable water use along with economic growth within the IEUA Service Area.*

Objective: *IEUA will maximize all sources of groundwater recharge.*

Commitment: *IEUA will support the recharge of all available stormwater and maximize the recharge of recycled water within the Chino Groundwater Basin. Furthermore, IEUA will pursue the option to purchase and store cost-effective surplus Imported Water supplies.*

Commitment Level Background

- Groundwater currently comprises about 60% of the water supply needed to meet urban water demand for the region.
- The Chino Groundwater Basin contains approximately 5 million AF of water storage with an additional 1 million AF in unused storage capacity. The current safe-yield of the Basin is 145,000 AFY and declining. Historically, discounted Imported Water has been available and utilized to recharge the Basin when pumping has exceeded the safe-yield. The MWD discounted replenishment water was discontinued in 2012, changing the economic impacts of over-production of groundwater.
- The Chino Basin Groundwater Recharge Program developed new sources of replenishment water: local stormwater and recycled water.
- IEUA has been shifting the need to buy Imported Water to meet replenishment needs, to the cost-effective use of stormwater and recycled water.



- IEUA will continue to partner with CBWM to maximize the recharge of all available stormwater and recycled water and will only recharge imported water proactively when economically viable or as necessary to meet replenishment requirements.

Appendix E.1

Wastewater Management – Capacity

Business Goal: *IEUA systems will be master planned, managed and constructed to ensure that when expansion planning is triggered, designs/construction can be completed to meet regulatory/growth needs in an expeditious, environmentally responsible and cost effective manner.*

Objective: *IEUA will maintain capacity within systems and facilities to meet essential service demands and to protect public health and environment.*

Commitment: *IEUA will ensure that systems are managed and constructed so that 90% of capacity is never exceeded.*

Commitment Level Background

- Economic development of the region is dependent upon well planned public works infrastructure in place prior to land development. Wastewater collection and treatment are critical components of this infrastructure.
- IEUA has and will continue to utilize operational flexibilities provided through flow diversion and bypass systems to maximize beneficial use and capacity of the integrated collection system, wastewater treatment system, recycled water system, and organics management system.
- For Fiscal Year 2012/2013, all four IEUA Wastewater Recycling Facilities have a Percent Capacity Utilization between 60% - 70%. The Ten-Year Percent Capacity Utilization projection shows slight increases for RP-1, RP-4, and CCWRF; however, RP-5 has a substantial increase to 95%:

	FY 2012/13 Actual*			FY 2022/23 Projection		
Regional Water Recycling Plant	Treated Influent Flow	Plant Rated Capacity	Percent Capacity Utilization	Treated Influent Flow	Plant Rated Capacity	Percent Capacity Utilization
RP-1	27.7	44.0	63%	30.4	44.0	69%
RP-4	9.8	14.0	70%	10.8	14.0	77%
CCWRF	7.4	11.4	65%	8.0	11.4	70%
RP-5	10.5	16.3**	64%	15.5	16.3	95%
IEUA Total	**55.3**	**85.7**	**65%**	**64.7**	**85.7**	**76%**

- For Fiscal year 2013/2014, IEUA will be updating the Facilities Master Plan, which will considered future growth patterns, alternatives for expansion of the Wastewater Recycling Facilities, and impacts to the Recycled Water and Organics Management systems.
- IEUA will ensure that all planning, design, construction, and start-up activities for treatment system expansions are scheduled and completed before the 90% Percent Capacity Utilization is reached.

Appendix E.2

Wastewater Management – On-Time Construction

Business Goal: *IEUA systems will be master planned, managed and constructed to ensure that when expansion planning is triggered, designs/construction can be completed to meet regulatory/growth needs in an expeditious, environmentally responsible, and cost effective manner.*

Objective: *IEUA will ensure capital projects are designed and implemented in a timely and economically responsible manner.*

Commitment: *IEUA will design and construct facilities through efficient project management to ensure that 80% of projects are completed on schedule and 90% of projects are on budget.*

Commitment Level Background

- IEUA is committed to ensuring that projects are completed: on-time to obtain the beneficial use of required equipment as required by Operations, Maintenance, and Compliance, and on budget to contain costs and accurately project Agency future expenditures.
- Constructability reviews, which will include technical input from Construction, Operations, Maintenance, and DCS staff, will be included as a standard design element with the goal of reducing the number of change orders experienced during construction.
- Construction Management staff have received schedule training to allow for detailed reviews of contractor construction schedules. Staff will effectively analyze contractor schedules to highlight deficiencies in critical paths that may result in extended project schedules.
- At the completion of a project pre-design report (PDR), budgets will be created with well-defined scopes of work that include all project costs: design/construction consultants, construction contract award, and all Agency labor costs (Engineering, Construction Management, Operations, Maintenance, DCS, Finance, and Accounting).
- A project will be deemed on budget if all design, construction, and start-up activities are completed and expenditures on the project are between 90-100% of the project budget.
- Schedules for duration of design and construction/start-up will be created at the time the project budget is created (completion of the PDR).
- The Engineering schedule metric will be based upon the project design kickoff meeting and the Award of Construction Contract. The Engineering activities will be deemed on schedule if the duration between the Award of Construction Contract and design kickoff meeting is +/- 10% of the initial estimate.
- The Construction Management schedule metric will start at the preconstruction meeting and conclude with the Operations acceptance of the project. The Construction activities will be deemed on schedule if the duration between the project acceptance and preconstruction meeting is +/- 10% of the initial estimate.

Appendix E.3

Wastewater Management – Biosolids Management

Business Goal: *IEUA systems will be master planned, managed and constructed to ensure that when expansion planning is triggered, designs/construction can be completed to meet regulatory/growth needs in an expeditious, environmentally responsible, and cost effective manner.*

Objective: *IEUA will manage all Agency produced biosolids in a compliant, fiscally prudent and environmentally sustainable manner.*

Commitment: *IEUA will ensure that 95% of the Inland Regional Compost Facility's capacity is utilized, all biosolids produced by IEUA are treated at IERCF, Agency solids generation is minimized through efficient dewatering operations, and all compost is marketed for beneficial use.*

Commitment Level Background

- In 2001, the Chino Basin Organics Management Business Plan set a goal for the region to divert organic solids from landfills and to consume locally generated recycled organic material. Under a Joint Powers Agreement, IEUA in partnership with Los Angeles County Sanitation District constructed the Inland Empire Regional Composting Facility (IERCF) to meet this goal.
- IERCF has an operating capacity of approximately 400 wet tons per day for wastewater biosolids. IEUA's owned portion of this operating capacity is equivalent to 50% or approximately 200 wet tons per day of biosolids material. IEUA currently generates approximately 190 wet tons per day of biosolids.
- IEUA's goal is to send all biosolids generated at its wastewater facilities to IERCF; however, IERCF requires one shutdown day per month to perform preventative maintenance on operating equipment. On maintenance days, IEUA will utilize the use of storage at RP-1 and RP-2, while maintaining contracts with third party composting facilities as a contingency.
- IEUA supports reducing solids generation at its wastewater facilities. Currently, start-up activities for the new RP-1 Centrifuge Dewatering Building are commencing and full operation should be achieved by the end of 2013. The new centrifuges will increase the biosolids total solids percentage from the current 16% up to 24%. This will decrease the IEUA biosolids generation by approximately 50 wet tons per day, resulting in excess IEUA capacity at IERCF.
- All biosolids and wood amendment sent to IERCF are processed and treated to produce a Class A exceptional quality compost. IERCF compost, which is created and marketed as SoilPro Premium Compost, is beneficially used by contracting agencies and sold as a soil conditioner that improves water retention, resulting in better plant growth and reduces water requirements.

Appendix E.4

Wastewater Management – Energy Management

Business Goal: *IEUA systems will be master planned, managed and constructed to ensure that when expansion planning is triggered, designs/construction can be completed to meet regulatory/growth needs in an expeditious, environmentally responsible, and cost effective manner.*

Objective: *IEUA will optimize facility energy use and effectively manage renewable resources to achieve peak power independence, contain future energy costs, achieve statewide renewable energy, distributed generation and greenhouse gas reduction goals, and provide for future rate stabilization.*

Commitment: *IEUA will achieve peak power independence by 2020 through the implementation of renewable projects, energy management agreements and operational efficiencies.*

Commitment Level Background

- IEUA facilities currently use approximately 75,000 MWh of electricity annually at an annual cost of approximately $9,000,000. This is 26% of the non-labor Operations and Maintenance budget and the highest, non-labor cost of the Agency.
- The region's population is forecasted to increase by 50% by 2030, which will further increase demand and cost for electricity. Electricity prices are volatile; however, historically, the average annual increase has been between 4% - 6%.
- IEUA has created a preliminary Energy Management Plan to reach energy independence from the grid during peak energy use/pricing period (noon – 6:00 PM) by 2020 through increased energy efficiency, increased on-site energy generation, a diversified energy portfolio and energy demand response.
- Through Power Purchase Agreements (PPA's), IEUA has expanded its renewable energy portfolio to include 3.5 MW of solar, 1.0 MW of wind, and 2.8 MW of biogas fuel cell production.
- IEUA will develop an updated energy management plan that will focus on integrating energy efficiency, demand response, and renewable energy generation programs to contain future energy costs and contribute to achieving statewide renewable energy and greenhouse gas reduction goals.

Appendix F.1

Environmental Stewardship – Regulatory Compliance

Business Goal: *IEUA is committed to the responsible use and protection of the environment through conservation and sustainable practices.*

Objective: *IEUA will comply with all federal, state and local laws at each Agency facility.*

Commitment: *IEUA will have no more than 2 notices of violation annually from the State Water Resources Control Board, Air Quality Management District, or Non-Reclaimable Waste System for all Agency owned and operated facilities.*

Commitment Level Background

- IEUA has set Key Performance Indicators (KPI) at each Agency facility to monitor compliance with all regulations stipulated in the NPDES, AQMD, and NRWS permits.
- When compliance KPI's are exceeded, incident reports are created to outline the facts and causes of any noncompliant event. The incident reports are reviewed and corrective action is taken to prevent future KPI noncompliance.
- It is up to the discretion of AQMD to issue NOV's; however, in general a NOV is issued for: operation of equipment without a valid permit to operate, excessive exceedance of a permit stipulated emissions requirement, or operations resulting in a nuisance to the public.
- For Calendar Year 2012, IEUA had the following AQMD notices of violation:

Date	Incident	Comments
9/5/12	Ammonia Tank Level Exceedance (greater than permitted capacity)	NOV issued (item resolved)
9/5/12	Unpermitted Pilot Unit Installation	NOV issued (item appealed)

- SWRCB defines violations as "serious" and "non-serious" and each type of violation may be subject to a minimum liability penalty (MMP). In addition, sewage spills, including large recycled water spills, are subject to administrative civil liability penalties (ACL). Any MMP or ACL would be considered a notice of violation. For Calendar Year 2012, IEUA had the following SWRCB incidents; however, no incidents were deemed serious:

Date	Incident	Comments
1/10/12	Turner Basin RW Release	
4/3/12	SB Lift Station Sewer Overflow	Spill was contained and cleaned before reaching surface water
4/12/12	CalPoly Pomona RW Release	
5/8/12	Philadelphia NRW Sewer Overflow	Spill was contained and cleaned before reaching surface water
12/19/12	CCWRF 7-d Median Coliform	Investigation identified issue as sample contamination.

Appendix F.2

Environmental Stewardship – Good Neighbor Policy

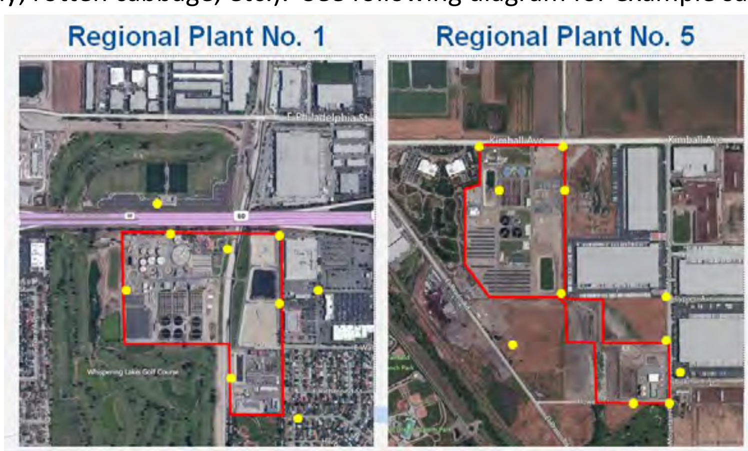
Business Goal: *IEUA is committed to the responsible use and protection of the environment through conservation and sustainable practices.*

Objective: *IEUA will control odors at all Agency facilities for the purpose of improving the environment and being a good neighbor to the local community.*

Commitment: *IEUA will perform a quarterly odor monitoring assessment to develop actual and acceptable baseline odor thresholds. Acceptable baseline thresholds will be used to measure treatment plant performance and drive necessary capital improvements.*

Commitment Level Background

- IEUA facilities and processes have the potential to produce odors.
- Each facility is operated under AQMD permits that include odor control requirements.
- AQMD has a rule that prohibits odor impacts to the community.
- Substantial funding has been made into odor control technologies at Agency Facilities.
- IEUA routinely performs odor circuits around each facility to measure for hydrogen sulfide. Hydrogen sulfide has an odor described as smelling similar to rotten eggs and is generally used as a surrogate for wastewater odor presence.
- IEUA will review extending similar odor circuits to all Agency Facilities and will review expanding measurements to include ammonia (pungent smell) and mercaptans (rotten cabbage smell).
- In addition, IEUA will perform a quarterly odor profile analysis at each of the treatment facilities. An odor profile analysis is completed by inviting participants from Member Agencies and IEUA staff to survey facility odors and grade them by intensity (week to strong) and characteristic (rotten eggs, fishy, rotten cabbage, etc.). See following diagram for example sample locations.



- Based upon the odor circuits and odor profile analysis, odor baselines will be created and thresholds will be set for each facility. An odor control plan will be created to determine any capital expenditures required to meet the established thresholds. Based upon the required capital expenditures, the odor thresholds may be adjusted to provide the most efficient odor control strategy.

Appendix F.3

Environmental Stewardship – Response & Complaint Mitigation

Business Goal: *IEUA is committed to the responsible use and protection of the environment through conservation and sustainable practices.*

Objective: *IEUA will investigate and appropriately respond in a timely manner to any environmental issue or complaint received at any Agency Facility.*

Commitment: *IEUA will immediately respond to any event that threatens public health and safety and will respond within 5 working days to any nonemergency complaint or suggestion.*

Commitment Level Background

- Generally, all Agency facilities have Operations & Maintenance staff onsite 10 hours per day, 7 days a week to respond to any compliance or public health & safety events. During hours when facilities are unmanned, Operations & Maintenance staff are on-call and receive alarm notifications for any compliance or public health and safety event.
- For Calendar Year 2012, IEUA had 17 onsite compliance related incidents, 2 emergency response events due to recycled water releases, and 2 response events to sanitary sewer overflows. Each event was responded to immediately.
- For Calendar Year 2012, IEUA received 4 odor complaints from members of the Public. Each complaint was thoroughly investigated by Agency staff and incident reports were created. Most complaints cannot be substantiated; however, the Agency has modified operations in an attempt to reduce the potential of creating odors.

Appendix F.4

Environmental Stewardship – Environmental Responsibility

Business Goal: *IEUA is committed to the responsible use and protection of the environment through conservation and sustainable practices.*

Objective: *IEUA will strive to implement actions that enhance or promote environmental sustainability and the preservation of region's heritage.*

Commitment: IEUA will consider and assess environmental sustainability, public use and heritage preservation options for all of its programs and projects.

Commitment Level Background

- IEUA constructed a new headquarters building and committed to design standards that ensured prudent use of natural resources and proactive conservation measures. This project has enabled the Agency to achieve recognition and leadership in support of building a sustainable environment. This recognition was presented to the Agency through the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED™) program earning the "Platinum" level rating by meeting specific requirements. IEUA will take actions to sustain the Platinum LEED status of its facilities.
- In 2007, IEUA opened the Chino Creek Wetlands and Educational Park, one portion of the overall efforts being taken in the watershed under the Chino Creek Integrated Plan (CCIP). The general function of the CCIP is to focus planning attention on the lower Chino Creek area of the Prado Basin in a process of preserving and restoring the Prado Basin, maximizing value to the community, improving water-quality and flood control, and providing habitat restoration, recreation, water conservation and public education. The park is open to the public during daytime hours and consists of: 22,000 various drought tolerant plants, 1.7 miles of nature trails, 22 acres of habitat, and 6 ponds.
- The 1630 West Recycled Water Pump Station was constructed at Vineyard Park in Ontario. As part of the project, new park bathroom facilities were constructed and improvements of the parking lot, electrical, and irrigation systems were completed providing benefit to the local residents.
- IEUA will expand its environmental and education programs including: annual Earth Day activities, Garden in Every School and Inland Empire Garden Friendly. IEUA will collaborate with all Stakeholders (including Cal State San Bernardino Water Resource Institute and Home Depot) on the Inland Empire Garden Friendly program to promote sustainable environmental principles and incorporate the history and tradition of the Region.
- IEUA completed construction of the wetlands mitigation area in Basin 2 of the RP-3 Recharge Facility in July 2004. Basins 1, 3 and 4 are used actively for groundwater recharge, while most of Basin 2 is occupied by the mitigation wetlands. The vegetation was planted and the irrigation system installed in May 2005.

Appendix B

Carbon Management Plan

CARBON MANAGEMENT PLAN

INTRODUCTION

IEUA's Business Goals discuss the need for effective energy management in order to meet California's Greenhouse Gas (GHG) reduction goals. This Carbon Management Plan intends to provide a baseline for future reduction goals and introduce specific carbon management efforts that will be further developed and expanded upon in successive plans. Effective carbon management is instrumental in sustainably and efficiently treating wastewater and providing recycled water for the Chino Basin.

GHG REPORTING

IEUA became a member of The Climate Registry (TCR) in 2013. TCR membership is voluntary, and requires an annual inventory of GHG emissions. IEUA's 2013 GHG emissions were reported, but not verified by an independent third party. IEUA has committed to pursue verification for the 2014 reported GHG emissions.

Figure 1 shows the breakdown of IEUA's 2013 GHG emissions by source. A more detailed categorization is shown in Table 1. GHG emissions reported through TCR are divided into Scope 1 (direct emissions) and Scope 2 (indirect) emissions. Approximately 21 percent of IEUA's GHG emissions are emitted directly from fossil fuel combustion at IEUA facilities (Scope 1). The remainder of the inventory is made up of indirect electricity purchases, emissions from mobile combustion related to biosolids hauling, or emissions from biogenic sources (Scope 2).

FIGURE 1. IEUA'S 2013 GHG EMISSIONS BY SOURCE

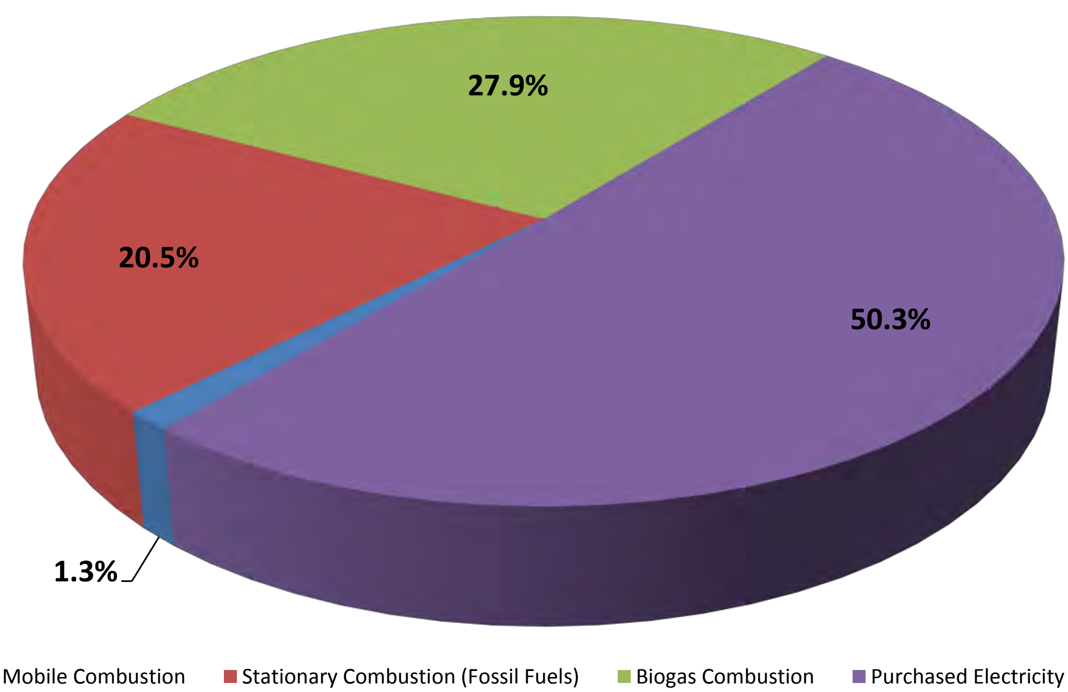


TABLE 1. IEUA'S 2013 GHG EMISSIONS BY SCOPE AND FACILITY

Source	**Scope 1 (Direct Emissions)**					**Scope 2 (Indirect Emissions)**			**Scope 1 Total**	**Scope 2 Total**	**Total GHG Emissions**
	Stationary Combustion			**Mobile Combustion**		**Purchased Electricity**	**Biogas Combustion**	**Mobile Combustion (Diesel)**			
	Natural Gas	**Diesel**	**LPG**	**Gasoline**	**Diesel**						
RP-1	5,671	33	33	-	-	3,066	6,559	-	5,737	9,625	15,362
RP-4/IERCF	1	14	-	-	-	5,033	-	-	14	5,033	5,047
RP-2	372	21	-	-	-	224	2,475	-	392	2,698	3,091
RP-5/HQ	688	9	-	-	-	2,365	307	-	697	2,672	3,370
CCWRF	3	23	-	-	-	1,519	-	-	26	1,519	1,544
LS	-	-	-	-	-	775	-	-	0	775	775
RW	-	-	-	-	-	3,559	-	-	0	3,559	3,559
GWR	-	-	-	-	-	304	-	-	0	304	304
Fleet Vehicles	-	-	-	297	10	-	-	-	307	0	307
Biosolids Hauling	-	-	-	-	-	-	-	124	0	124	124
Dechlorination Station	-	-	-	-	-	23	-	-	0	23	23
Total	***6,735***	***99***	***33***	***297***	***10***	***16,868***	***9,341***	***124***	***7,173***	***26,310***	***33,506***

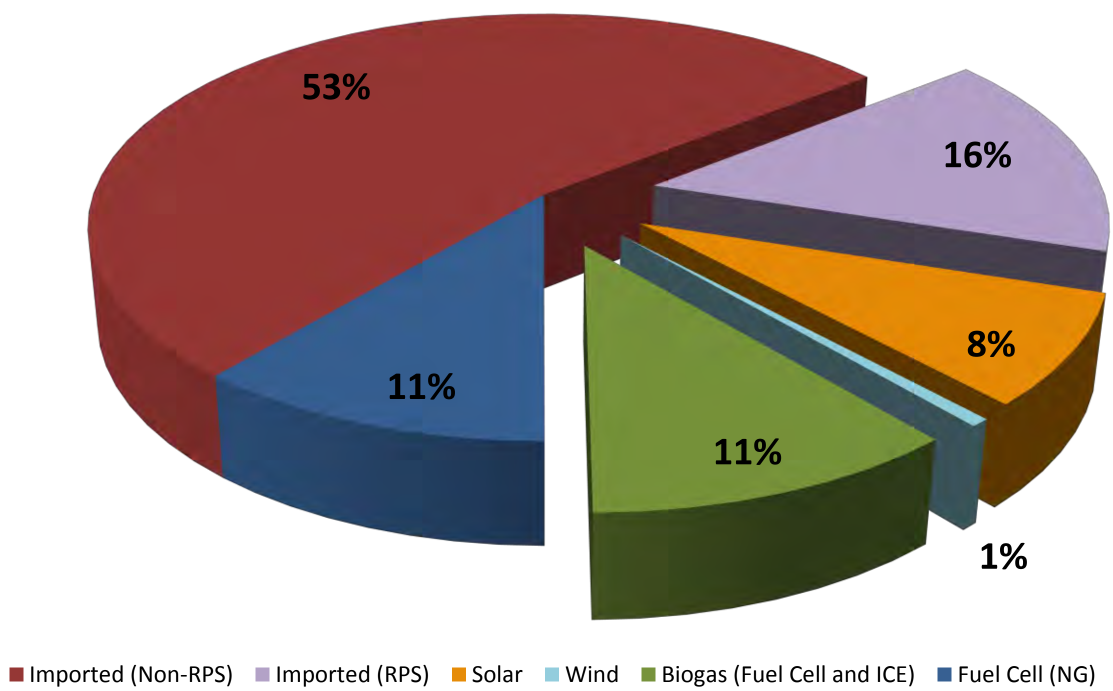
Note: GHG emissions from electricity used for recycled water pumping at RP-1, RP-4, RP-5, and CCWRF are included under "RW."

CARBON NEUTRALITY BY 2030

In recent years, IEUA has worked to develop a diverse portfolio of renewable energy technologies. Since 2008, 3.5 MW of solar panels, a 1 MW wind turbine, and a 2.8 MW biogas fuel cell have been installed at IEUA facilities, which adds to a 580 kW biogas engine that has been in operation since 1990. In 2010, IEUA entered into a public-private partnership to operate a food waste digestion process designed to provide renewable fuel for two 1.5 MW biogas engines at IEUA's RP-5 facility. These biogas engines began to generate power in early 2015.

As shown in Figure 1, electricity purchases account for half of IEUA's GHG emission profile. Through renewable resource optimization and expansion, IEUA aims to procure 100 percent of its electricity through carbon neutral sources by 2030. In Fiscal Year 2013/2014, 36 percent of electricity purchases were procured from carbon neutral sources (Figure 2). It should be noted that only biogas used in the fuel cell was considered to be carbon neutral. Natural gas usage in the fuel cell was separately included in the 64 percent of procurement from non-carbon neutral sources.

FIGURE 2. IEUA FY 13/14 ELECTRICITY PROCUREMENT SOURCES



Achieving a goal of 100 percent carbon neutrality will require significant planning and engineering effort. Biogas optimization, increased plant efficiencies, and new renewable projects will all be pursued to work toward the 2030 goal. IEUA used information from the Wastewater Facilities Master Plan (WFMP) to project electrical needs over the next 20 years based on the anticipated increase in influent flows. IEUA also used the following assumptions to estimate the contribution of renewable resources toward meeting the 2030 electrical needs.

- Food Waste Digestion Operations – IEUA estimates that the cogeneration engines powered by the food waste digestion process will generate at 90 percent capacity by 2030.

- Microturbine Installation – IEUA is currently evaluating the installation of a microturbine that would operate on biogas and serve as a replacement of the 580 kW engine at RP-2.

- Fuel Cell Operations – IEUA assumes that the fuel cell at RP-1 will maintain operation on a 75/25 mixture of biogas and natural gas, respectively. Equipment degradation rates specified by the manufacturer are included in the projection.

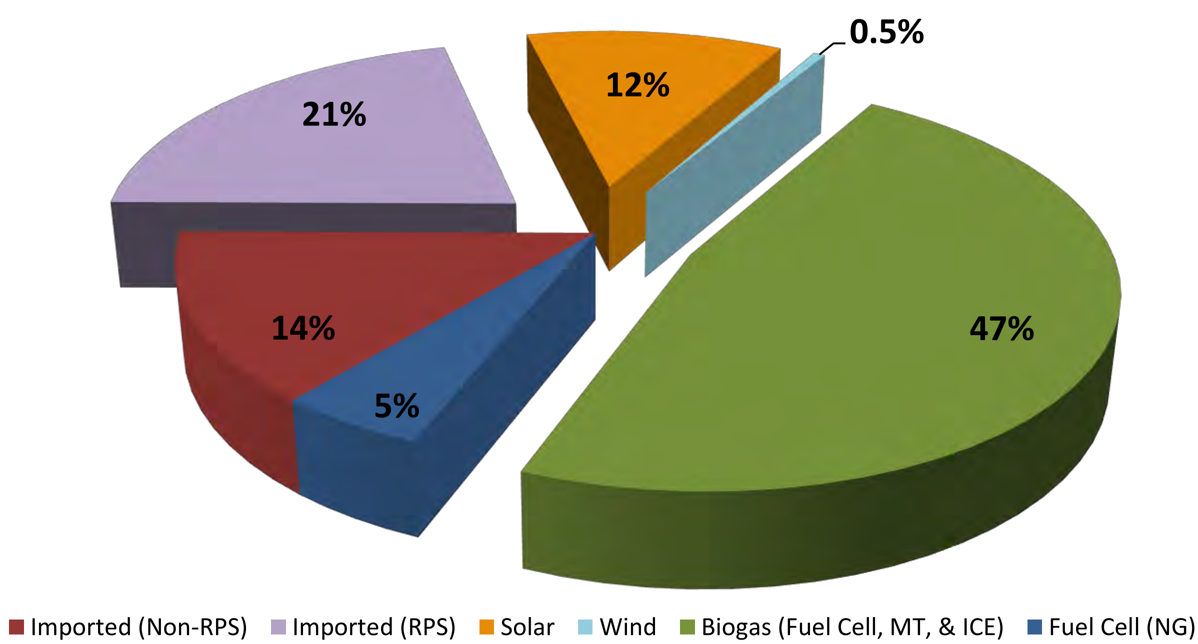
- Solar Installations – IEUA is currently evaluating the installation of an additional 1 MW of solar generation, which was incorporated into the projection. Generation capabilities of the solar were estimated to decrease at a rate of one percent per year, consistent with manufacturer specifications.

- Increased RPS – Based on current legislation, IEUA anticipates that by 2030, 50 percent of electricity procured through import will come from renewable sources.

- Increased Energy Efficiency – Based on preliminary energy audit results, implementing energy efficiency measures at IEUA facilities is expected to reduce energy usage by 15 percent on average.

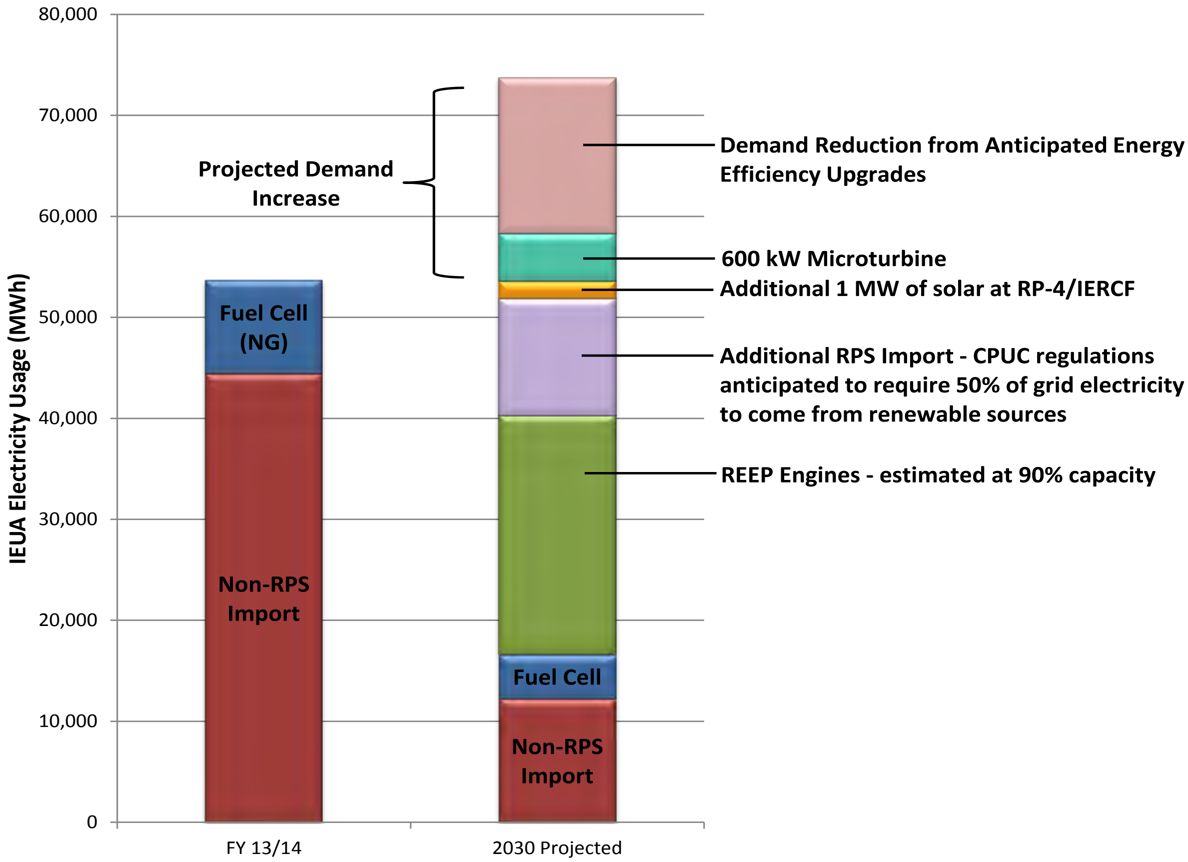
Using these assumptions and the projections from the WFMP, IEUA has estimated that 81 percent of its electricity needs in 2030 will be generated from renewable resources (Figure 3).

FIGURE 3. PROJECTED 2030 ELECTRICITY PROCUREMENT SOURCES



To better understand where the carbon neutral electricity will be coming from, Figure 4 breaks down the anticipated generation from carbon neutral sources in the 2030 projections. These estimates account for projected demand increases from the WFMP, as well as expected efficiency upgrades. Existing renewable resources (3.5 MW of solar, 1 MW wind turbine, 2.8 MW fuel cell, and 580 kW engine) are not included in either column.

FIGURE 4. PROJECTED 2030 CARBON NEUTRAL RESOURCES



Future planning efforts will be focused on tracking the performance of renewable installations, researching new opportunities to increase the procurement of electricity from carbon neutral sources, and identifying potential avenues of bridging the gap between the current level of carbon neutrality and the 2030 goal.

GHG MANAGEMENT

In addition to achieving carbon neutrality, IEUA will evaluate and implement measures to improve GHG management. Beginning in FY 15/16, GHG reductions will be considered favorably in the selection criteria for proposals received for new engineering projects.

The Carbon Management Plan will also be revised in parallel with IEUA's Energy Management Plan to ensure continuous evaluation and improvement toward GHG goals. Future planning efforts will enlist the assistance of third party consultants to generate a more robust management plan that evaluates potential GHG monitoring and reduction measures such as the carbon neutrality of fleet vehicles, tracking GHG impacts in various water supplies, and expansion of IEUA's GHG inventory to include Scope 3 emissions.

Appendix C

Organics Diversion

ORGANICS DIVERSION

INTRODUCTION

California has adopted several policies to reduce the short-lived climate pollutants (SLCP) and Greenhouse Gas (GHG) emissions by 2030, like the California Global Warming Solutions Act of 2006 (AB 32), and the mandatory commercial organics recycling law (AB 1826) in 2014. AB 1826 requires business to recycle organic waste by April 1, 2016, based on the amount of waste generated per week, and expects local governments to adopt and implement a mandatory commercial organic waste recycling program by January 1, 2016. Since composting and anaerobic digestion are acceptable alternatives to organics landfill disposal, Agency's facilities and staff know-how may represent a valuable resource to IEUA's Member Agencies required to comply with AB 1826.

FEASIBILITY STUDY

The Agency's "Organics Diversion" initiative was introduced in support of IEUA's Member Agencies and local businesses, in complying with the State's organics diversion requirements. As result, staff is conducting a feasibility study in the Agency's service area, to evaluate the amount and the current processing and disposal practices of:

- fat, oil and grease (FOG)
- domestic and commercial food waste
- high strength industrial waste.

A critical element of the feasibility study is the digester gas production estimate associated with the amount and type of organic waste available in the Agency's service area, and the development of a business case evaluation related to co-digestion and digester gas utilization facilities. Potential beneficial use of the biogas generated is:

- electricity generation (internal combustion engine, microturbine, fuel cell)
- conversion to natural gas pipeline quality (pipeline injection and/or vehicle fuel)

Because of the significant energy value associated with food waste, the implementation of an organics diversion program and food waste co-digestion will be essential in supporting the Agency long term goals of peak power independence and carbon neutrality.

PROJECT BARRIERS

Social, political, economic and regulatory barriers can adversely affect the implementation of the Organics Diversion initiative at IEUA. Community support is essential to ensure proper disposal and prevent food waste contamination; as well the full support of the Member Agencies directly responsible for providing waste management, or contracting the waste collection and disposal to a third party. Lack of funding, slow return on investments, uncertain revenue stream and incentives may be too risky for the Agency; and, delaying the implementation and enforcement of organic recycling laws may limit the amount of waste available for co-digestion, preventing the development of a competitive organic waste market, with tipping fees comparable to other disposal options.

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Appendix J

Integrated Water Resources Plan

ESA

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

AF	Acre-Feet
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
ET	Evapotranspiration
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
M&I	Municipal and Industrial
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
RMPU	Recharge Master Plan Update
RTP	Regional Transportation Plan
SAWPA	Santa Ana Watershed Project Authority
SARCCUP	Santa Ana River Conservation and Conjunctive Use Project
SBCFCD	San Bernardino County Flood Control District
SCAG	Southern California Association of Governments
SFR	Single Family Residential
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
WEAP	Water Evaluation And Planning Model
WFMP	Wastewater Facilities Master Plan
WUE	Water Use Efficiency
WUEBP	Water Use Efficiency Business Plan

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 2015 "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 2002 IEUA Facilities Master Plan Programmatic 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 the 2002 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 illustrate 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 vulnerable 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

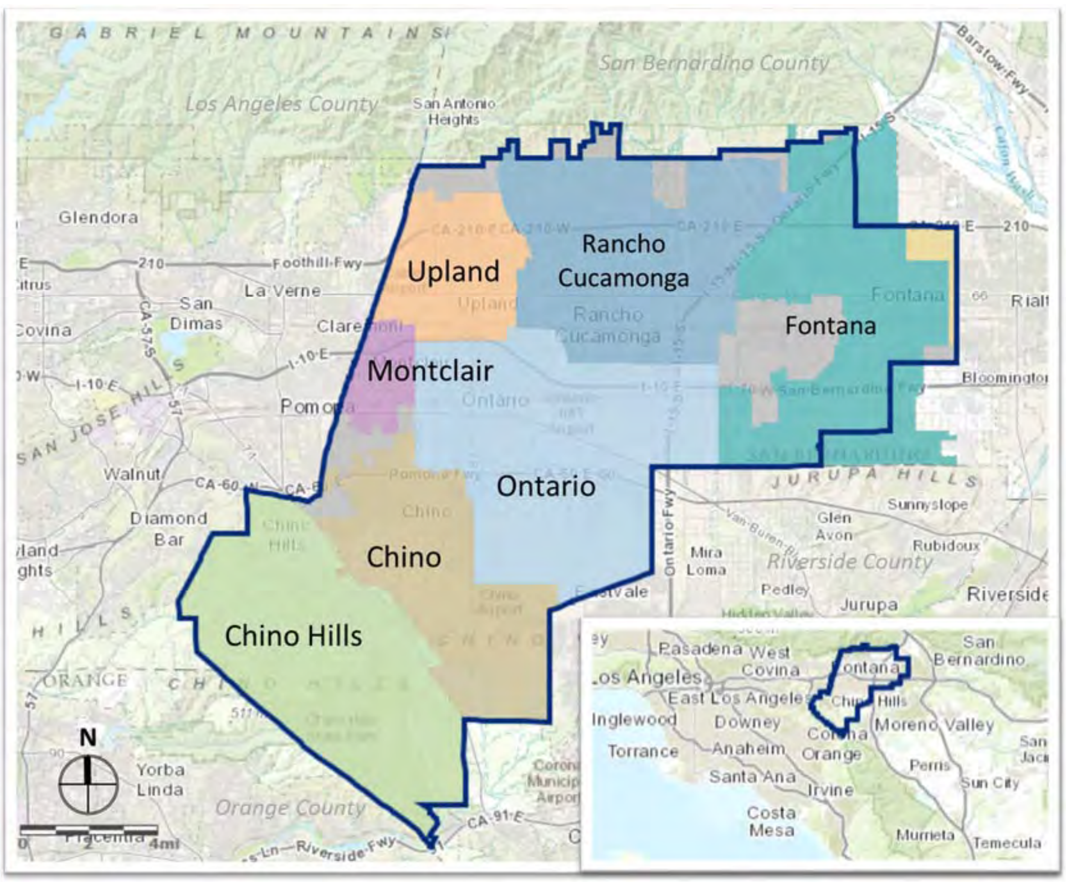
Climate change impacts have already started to create critical challenges for water resources management in Southern California. More intense storm events and the changing frequency and duration of drought years are becoming evident throughout the State and the West. This makes future water supplies 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 1 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.

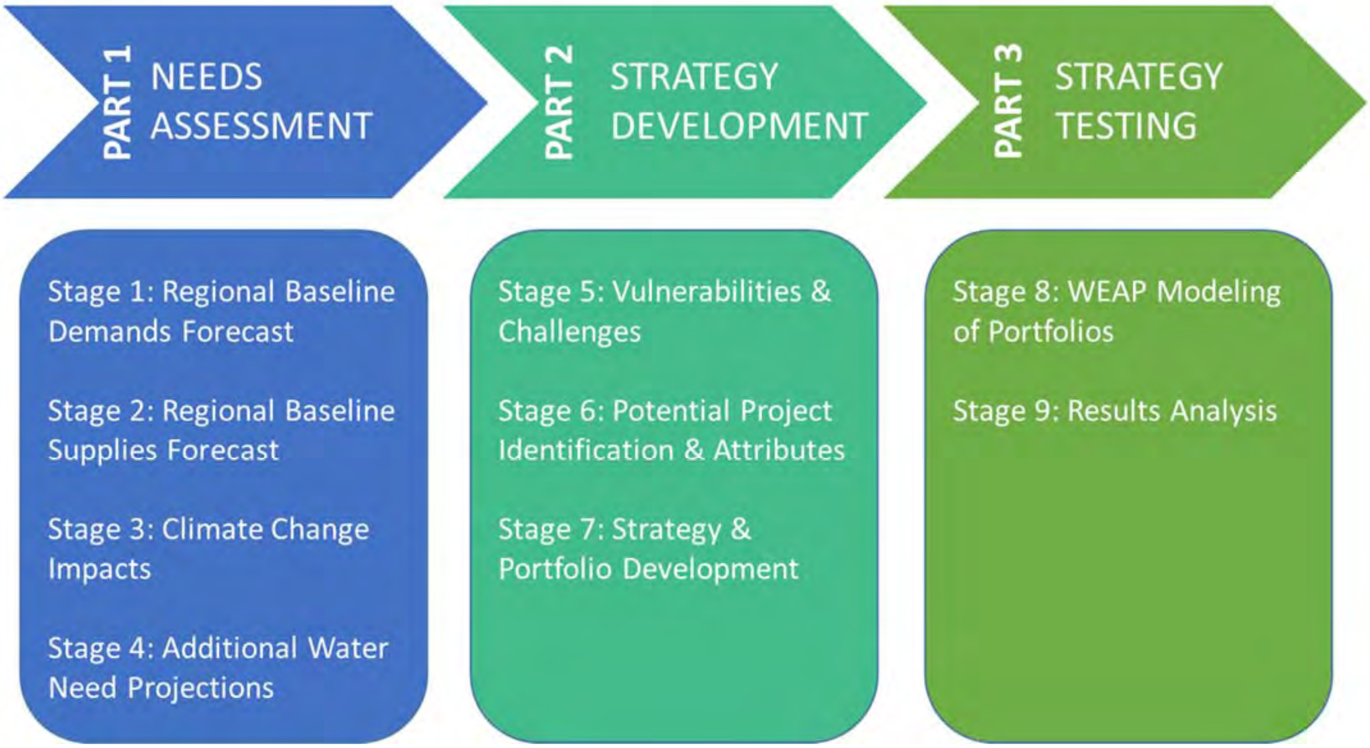
Part 1: Needs Assessment

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; and 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; and energy intensity of additional treatment levels for direct potable.

- *Imported Water*— potential for catastrophic interruption; dependence on the MWD Rialto feeder pipeline; and 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; and 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 (TYCIP), 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 described 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 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

Introduction to Water Demands

Water Demand Setting

Methodology

Urban M&I Demand Projection Variables

Urban M&I Demand Forecast

Additional Water Needs Forecast

Total Regional 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 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 TDS), 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 FACTORS

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

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

to be exacerbated in the near future.

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.

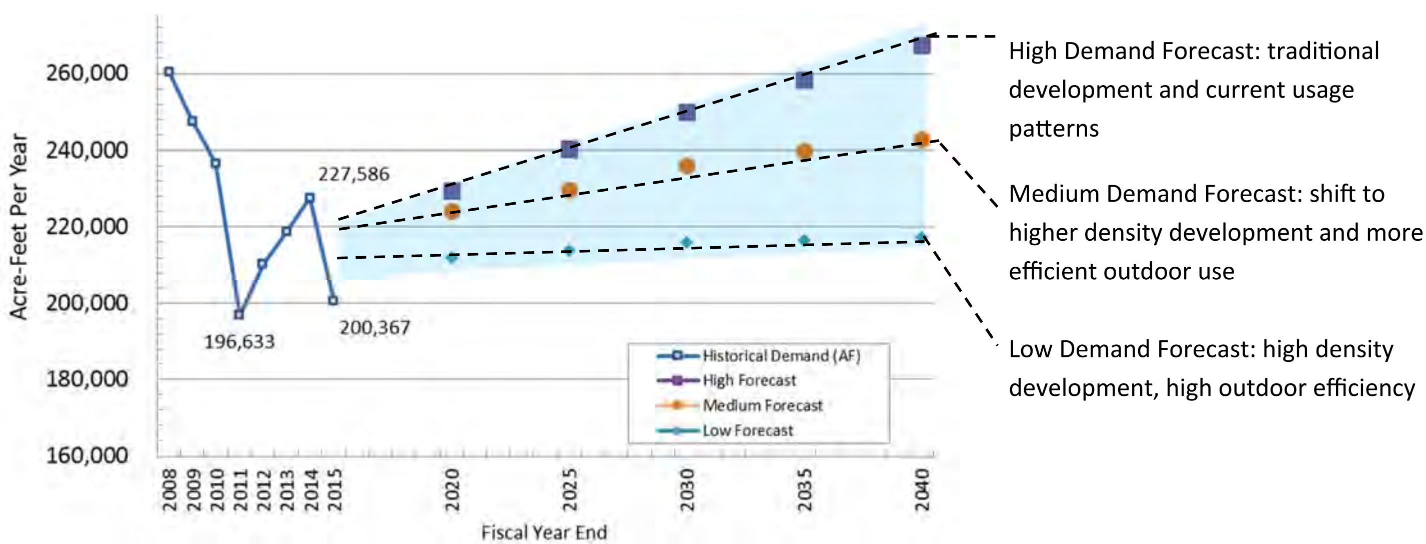
Weather-induced change in demands was accounted for in two ways. First, an adjustment was made for long term climate change based on the National Oceanic and Atmospheric Administration (NOAA) Technical Report, the National Environmental Satellite, Data, and Information Service (NESDIS) 142-5: Regional 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 estimates 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 estimates the long-term effect of warming on outdoor

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



demand. It was 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.

Table 2-3 summarizes the climate and weather 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 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 2015 IRP demand model (which was 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.

Table 2-5: Additional Continuing Operational 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 Supplemental 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

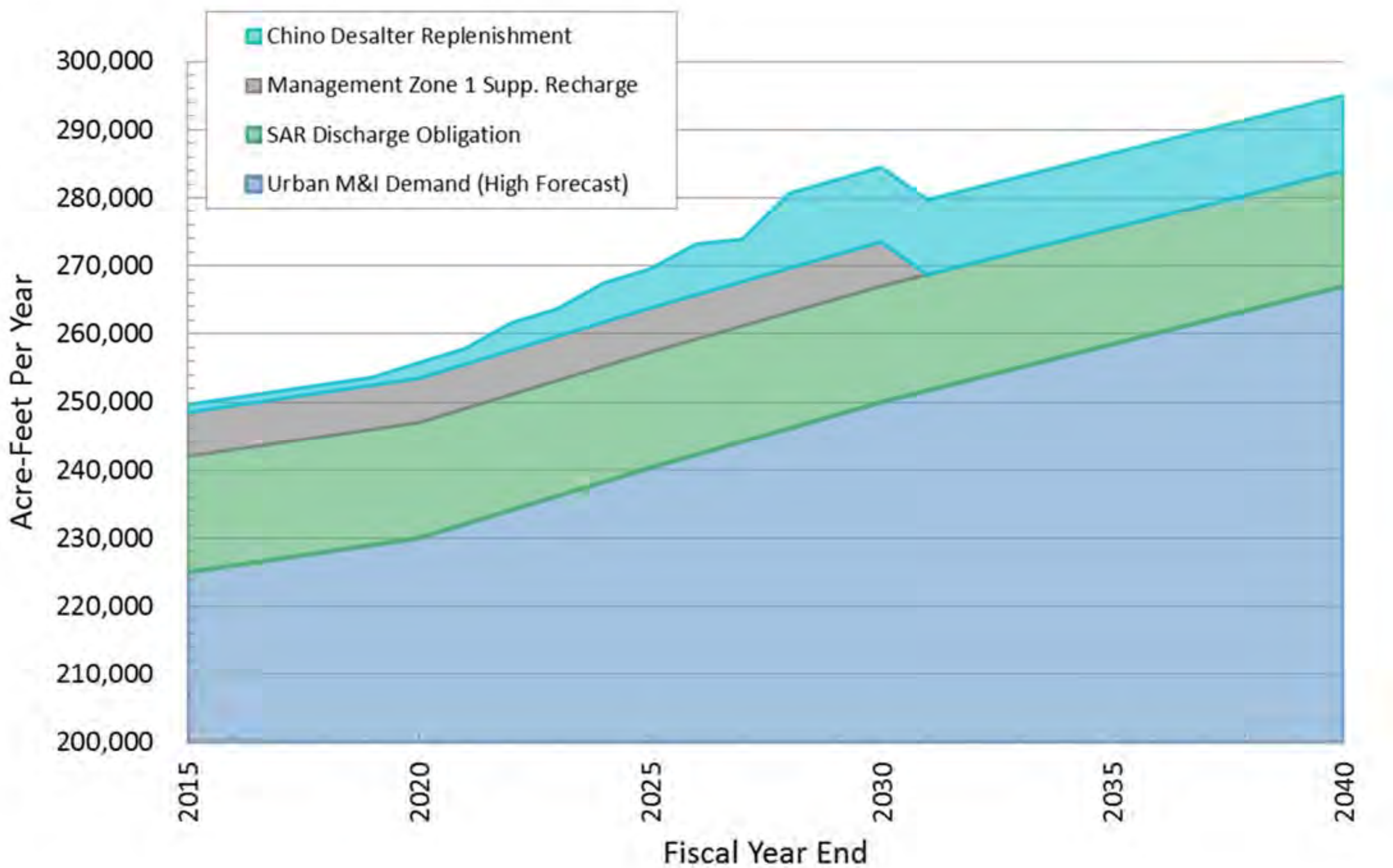


Table 2-6: Total Regional Demand Forecast

Total Regional Demand Forecast	2015	2020	2040
Urban M&I Demand (High Forecast)	225,000	230,000	267,000
Additional Continuing Operational Water Needs	24,645	25,790	28,035
Total Regional Demand	**249,645**	**255,790**	**295,035**

ADDITIONAL CONTINUING OPERATIONAL WATER NEEDS FORECAST

Current and future water demands include regional environmental and/or contractual stream flow obligations. These continuing operational water needs are not subject to the same variables as the urban M&I demands and instead 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 obligation that requires annual water discharges to the Santa Ana River above Prado dam. For the purposes of the IRP, 17,000 AFY is used as the Agency's requirement to fulfill the obligation through 2040. This is half of the 34,000 AFY minimum obligation shared with Western Municipal Water District. 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 continuing operational 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 legally obligated stream flows.

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

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 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 RAND 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 opportunities and build 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 (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 water rights. CBWM is responsible for management of the Chino Basin in accordance with the 1989 Judgement, 2000 Peace Agreement, 2007 Peace II Agreement, and the Chino Basin Optimum Basin Management Program (OBMP).

Water rights in the Chino Basin are held by representatives to three stakeholder groups, called Pools. The three Pools are:

- **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 nitrate and total dissolved solids (TDS). There are also some areas that exceed standards for perchlorate and volatile organic chemicals (VOCs). This lower quality 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 Chino Basin is subdivided into five groundwater zones, referred to as management zones. Each management zone has unique groundwater management issues. Management zones 1, 2, and 3 comprise the Chino North Management Zone. Management Zones 4 and 5 are outside of the IEUA service area. Throughout these management zones, there are 19 active spreading basins that are operated to capture stormwater, recycled water, and/or imported water for recharge 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 of the appropriative pool parties within the IEUA service area. This amount of groundwater pumping includes recharge from natural rainfall, stormwater capture, and recharge. It does not include recharge from recycled water.

Baseline 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 recharged recycled water.

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 by development patterns (increased hardscaping) and

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

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 allow 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 implications for the 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 some of the runoff and helps replenish the groundwater basin. However, developed areas with a significant amount of hardscape tend to concentrate and accumulate stormwater runoff in large quantities in a relatively short amount of time. Stormwater also runs off roofs, through streets, and into stormdrains, where these flows are largely diverted into the region's flood control channels.

The Chino Basin has 6 main 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 West Cucamonga Creek
- San Antonio Creek

Located on and adjacent to the channels are detention basins that are operated 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 channels also carry 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 storm flows, large amounts of water can discharge to the ocean during large 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 resource sub-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. As a result, the baseline stormwater supply assumed to be available between 2020 and 2040 is 6,400 AFY as 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 with 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, the 6,410 AFY baseline stormwater supply could vary from 2015 and 2020 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.	6,400

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 utilized the list of potential stormwater projects shown in Table 3-2. 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, and through on-site MS4 low impact development improvements.

Implications

Stormwater is an extremely valuable resource to the region because it is considered a "free" once the necessary facilities to capture and use this water have been constructed and maintained. It is also a high quality water source that can 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 implications for 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 impacted 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 OBMP, 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 limits, and monitoring requirements.

The recycled water program makes up approximately 15% of the regional water portfolio and 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 are permitted 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 (RWPS), regional direct use demand forecasts were developed. Direct use for recycled water is defined in the RWPS as the amount of water needed for landscaping, agricultural, and industrial processes. The forecasts indicate that by 2025 direct use demands will increase by 5,000 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) = 28,960 AFY by 2025
- Long Term (2030 to 2040) = 28,960 AFY by 2025

Recycled water deliveries for groundwater recharge were also updated as part of the 2015 RWPS. Similar to

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

direct use deliveries, projects required to contribute 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) = 18,700 AFY by 2025
- Long Term (2030 to 2040) = 18,700 AFY by 2025

Table 3-4 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.

Implications for 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 southern Chino Basin. A Joint

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 saline groundwater extracted from the southern portion of the Chino Basin. Saline 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 2001 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, OBMP, 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. CDA accounts for approximately 5% of the regional water supply portfolio.

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

The effect of climate 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 saline water and brine disposal

The location of Desalter production wells near existing contamination 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 of potential projects that are listed in Table 3-7. 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 southern 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 implications for the Chino Desalter water supplies:

- Are not impacted by climate.
- 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.
- 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 in 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, and currently accounts for approximately 5% of the regional water supply portfolio.

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 bypassed downstream where it may be available for groundwater recharge.

Baseline Supply

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 5-year average of production during the period of FY2009-10 through

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

FY2013-14. This period of time includes 3 consecutive years of below average precipitation and 2 years of normal or above normal 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.

Historical variability in local surface supplies is highly correlated with precipitation but also temperature. Annual surface water supplies are highly dependent on the weather and susceptible to changes in climate and were 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.

Records indicate that local surface flows have declined and projections indicate that flows will decline in the near future from at least 2021 to 2040 (Seager 2012).

Supply Challenges
Supply challenges facing local surface water supplies include the need to address:

- High variability due to their dependence on rainfall and snow melt .

Supply Opportunities
The IRP process identified potential projects listed in Table 3-8. 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 considered relatively "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 implications for 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. These basins currently provide approximately 10% of the regional water supply portfolio.

There are four agencies within the IEUA 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 slight 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 implications for 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.
- Reduce the water resource needs in 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

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

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 salinity management 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 the region's water 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

Imported water currently accounts for approximately 25% of the regional water supply portfolio. 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.

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,

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

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 during future droughts, or catastrophic events (see Figure 3-11). 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 MWD and the SWP include the need to address:

- Catastrophic interruption—for example, an earthquake affecting the Delta or Tehachapis, or a break along the Delta levee, MWD feeder, or pump station.
- 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.
- Cost of MWD 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 TDS, 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 implications for 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 passive “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 codes and appliance standards and from customer response to higher water costs and rates that encourage water efficiency.

Over the past 24 years, since signing the 1991 California Urban Water Conservation Council’s (CUWCC) memorandum of understanding (MOU) regarding Urban Water Conservation, 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

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 24 25 26	2,500 AF 2,500 AF 5,000 AF 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 28 29 30	2,450 AF 2,450 AF 2,450 AF 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

Table 3-10: Imported Water Baseline & Projects *(continued)*

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 90 91	7,850 AF 7,850 AF 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 93 94	5,000 AF 5,000 AF 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 96 97	10,000 AF 10,000 AF 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

Garden in Every School Program, National Theatre for Children, monthly water conservation tips, landscape audits, and turf-grass removal programs.

Water conservation, also called water use efficiency 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 appear to impact 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 potential projects that are listed in Table 3-11. Efficiency 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 projected water 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.

Key implications for water conservation programs:

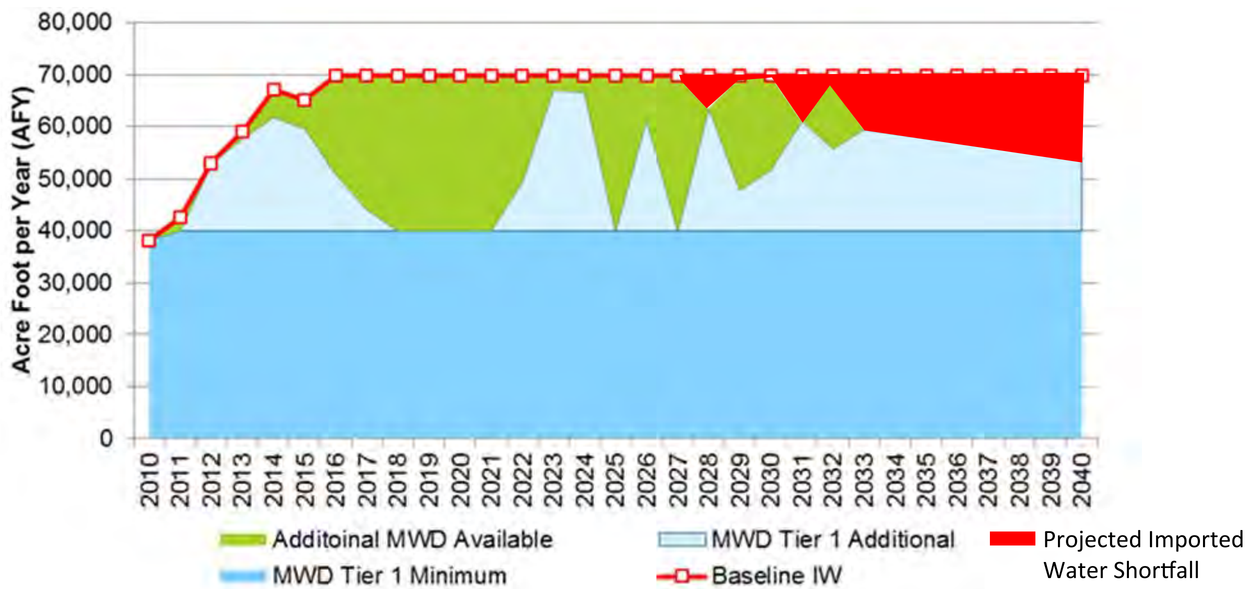
- Are cost effective relative to imported water supplies.
- Extend other water supplies and delay the need for additional system expansion because it is a demand offset.
- Are instrumental for the region to reduce dependence on climate variable supplies such as imported water.
- Are not impacted by climate change or water quality concerns.

Table 3-11: 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

Figure 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 5 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. 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 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 60,000 AFY . Note that the amount of unmet demand is smaller in the near term (about 20,000 AFY by 2030) and increases to 60,000 AFY by 2040. It is also important to note that without additional water supply development the region would struggle to meet future

Figure 4-1: Baseline Unmet Demands

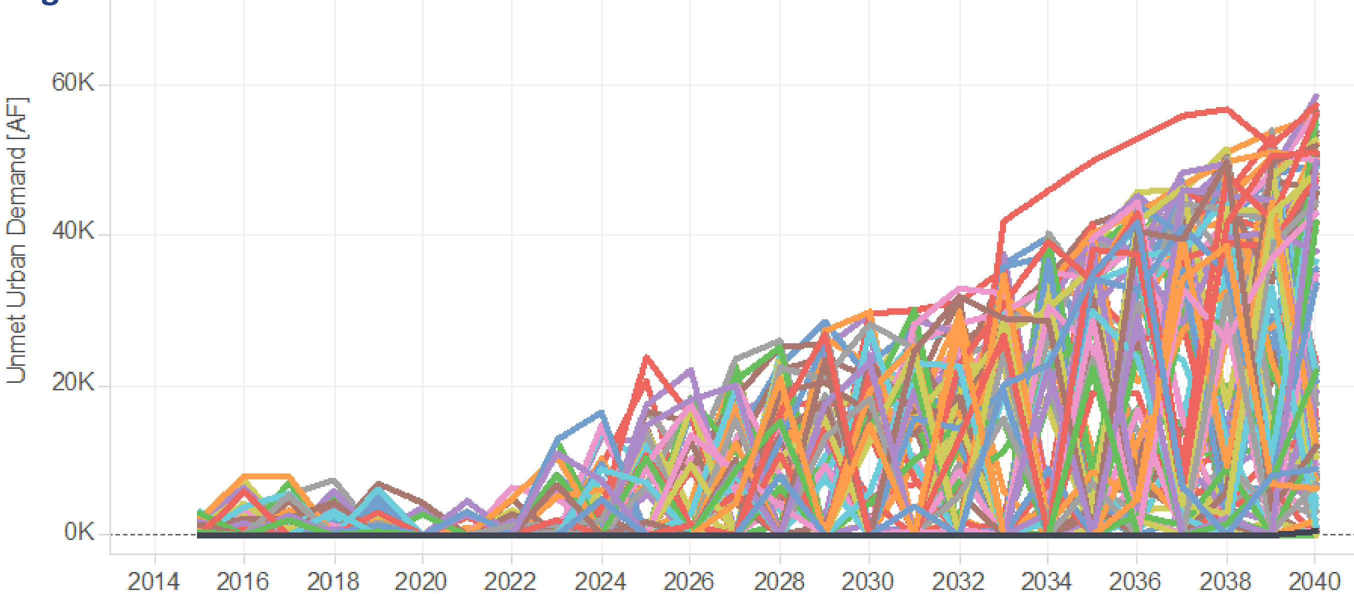
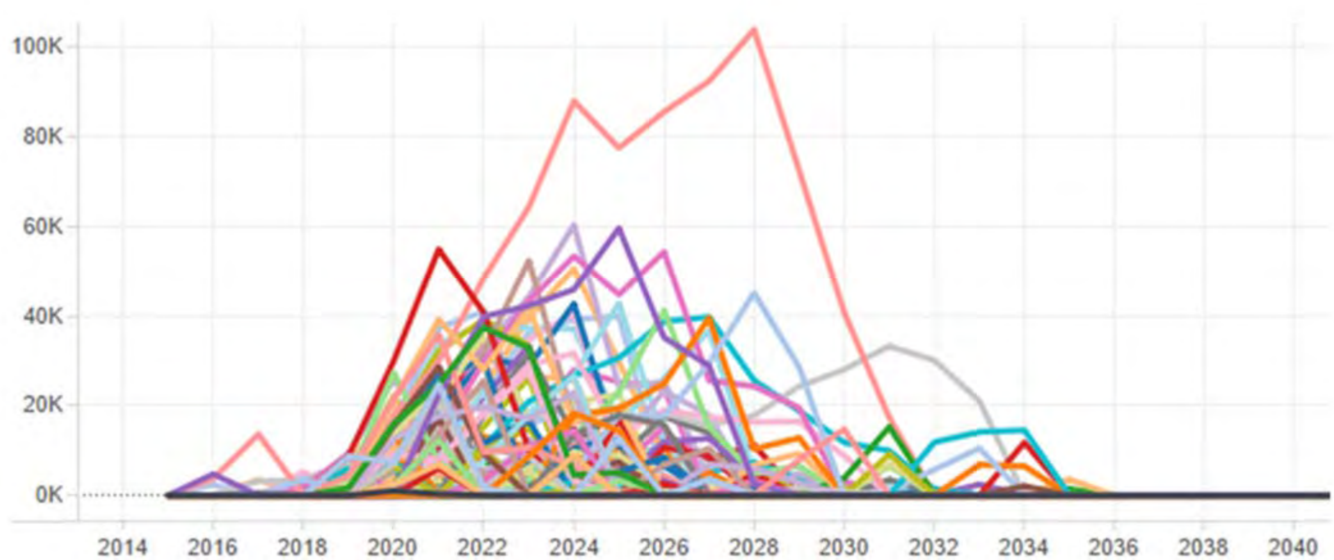


Figure 4-2: Baseline Stored Water Balance



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 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 approximately 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 AFY to approximately 130,000 AFY 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.

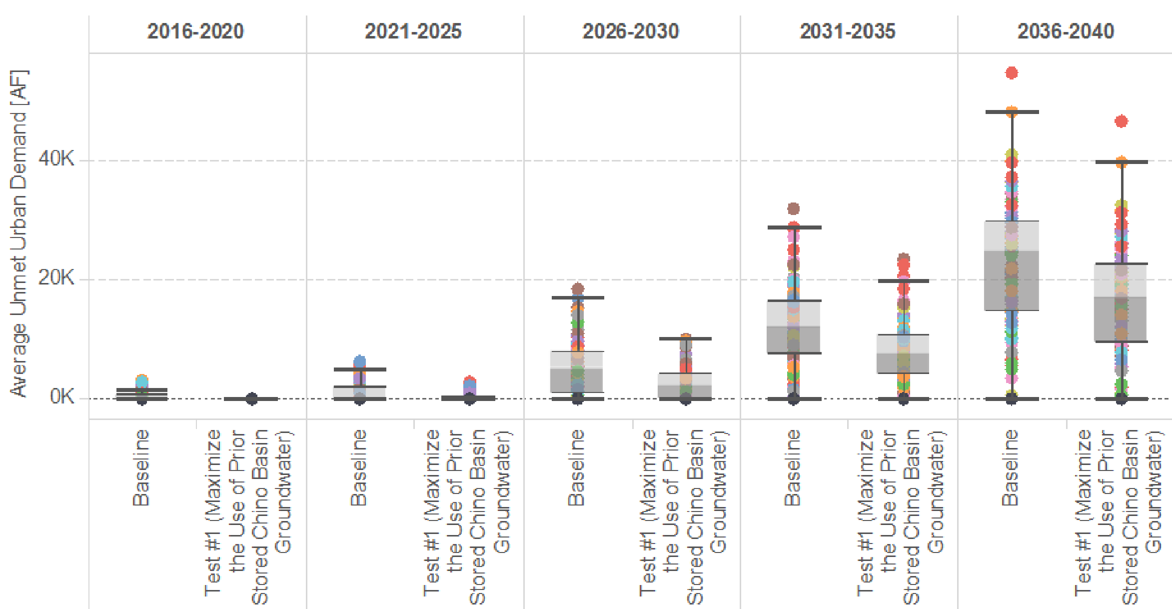
2 – Maximizing the Purchase of Metropolitan Water District (MWD) Imported Water

IEUA member agencies (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 storage via groundwater recharge or in-lieu of

Figure 4-3: Baseline vs Test 1 Unmet Demand Comparison



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:

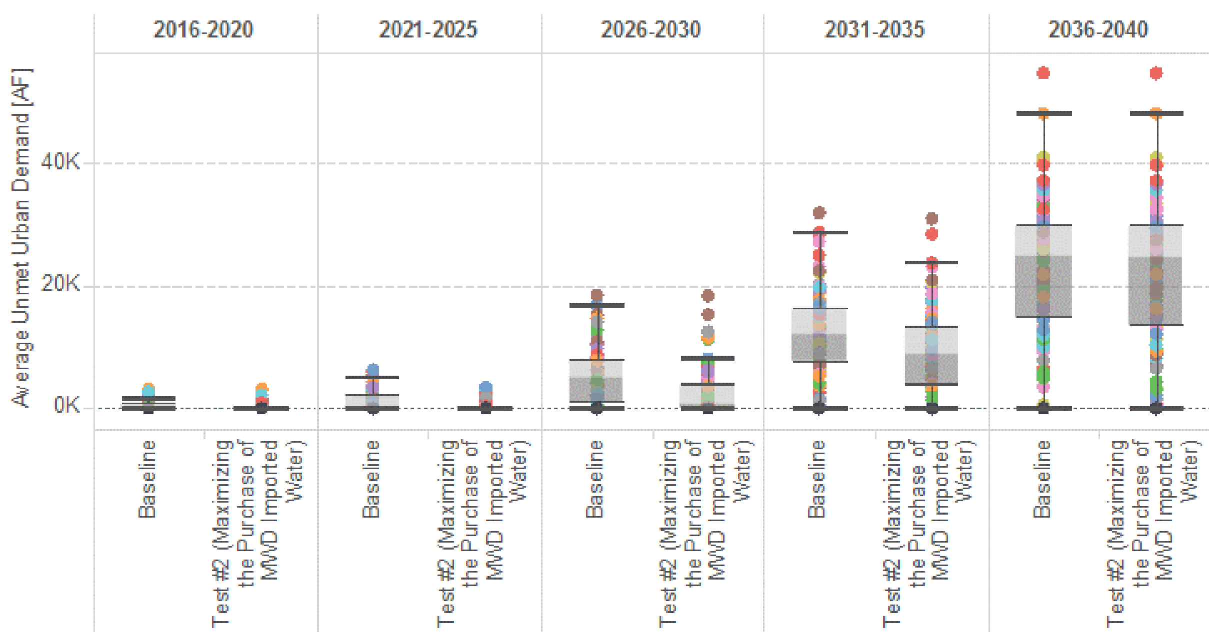
- 85% of regional demands are met by 2040.
- Water supply shortages, or unmet demands, will be slightly improved by 2040 over baseline conditions because imported water availability is adversely impacted by climate change.
- Unmet demand would be reduced to 22,000 AFY by 2030 and 55,000 AFY by 2040.
- 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 approach 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 indirect use (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.

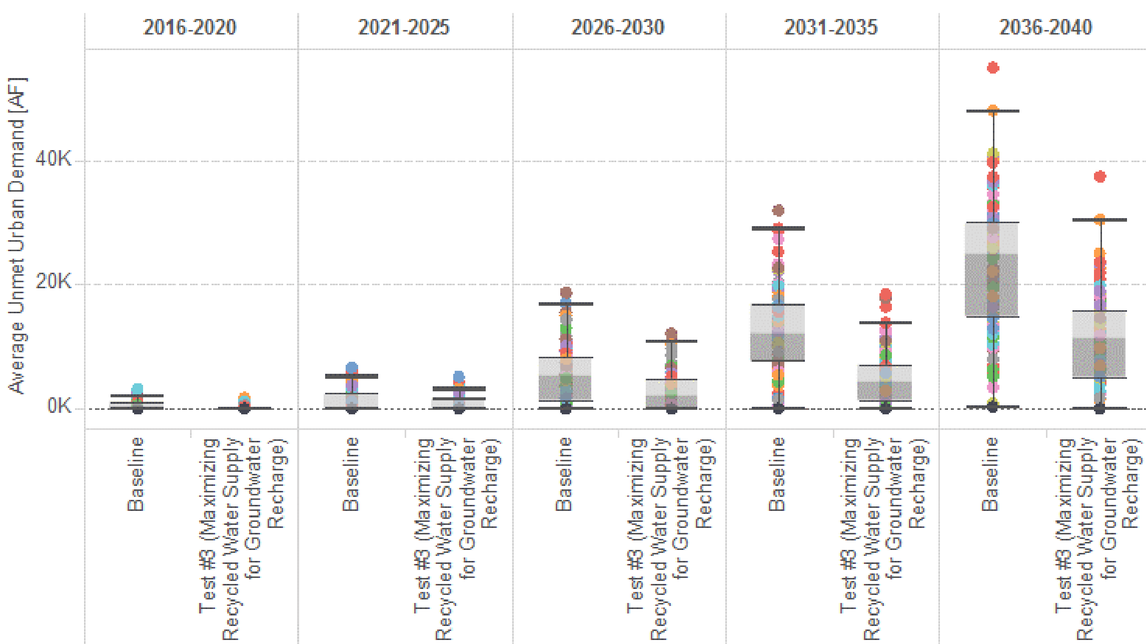
Results of this test are illustrated in Figure 4-5. If the region relies only upon maximizing recycled water supply for groundwater recharge for future water needs:

- 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.

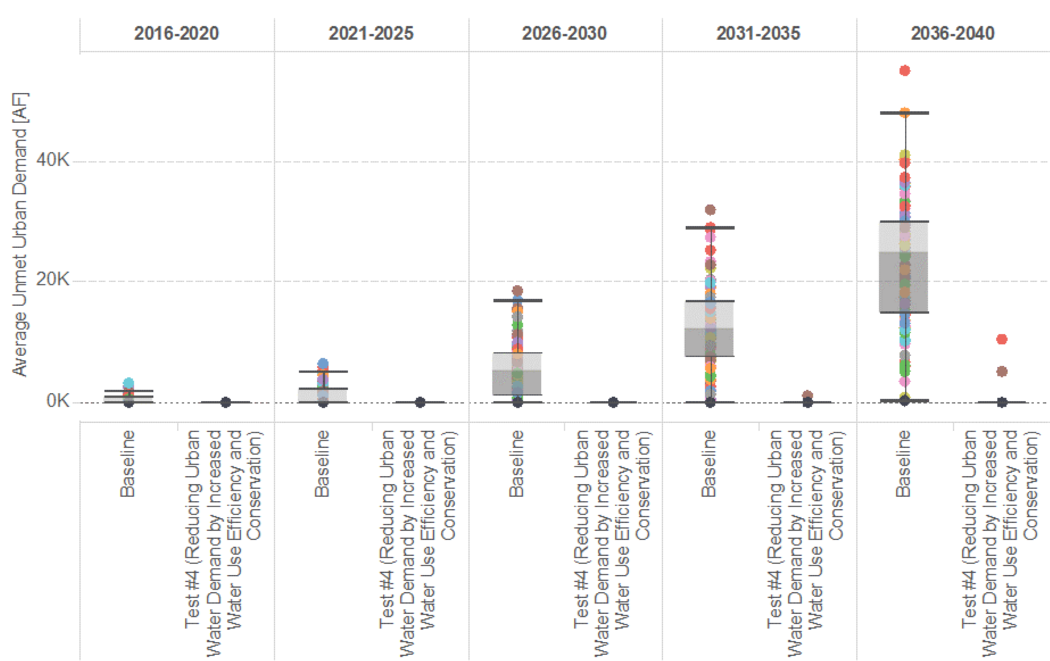
Results of this test are illustrated in Figure 4-6. If the region relies upon only reducing urban water demand by Increased Outdoor Water Use Efficiency and Conservation to meet future water needs:

- 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 AFY 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

Figure 4-6: Baseline vs Test 4 Unmet Demand Comparison



used as the basis for developing the next step in the IRP, 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 2 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 AFY 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.

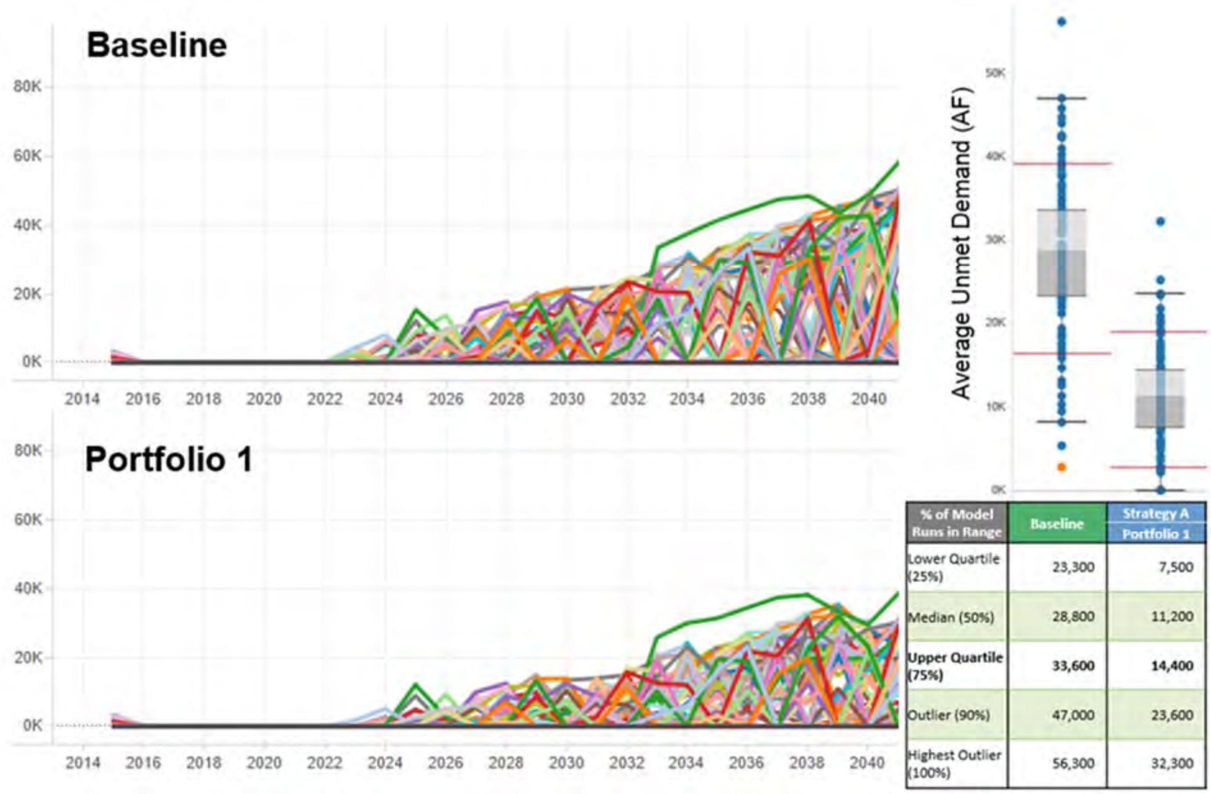
In summary, Portfolio 1

- 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 AFY 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 AFY 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

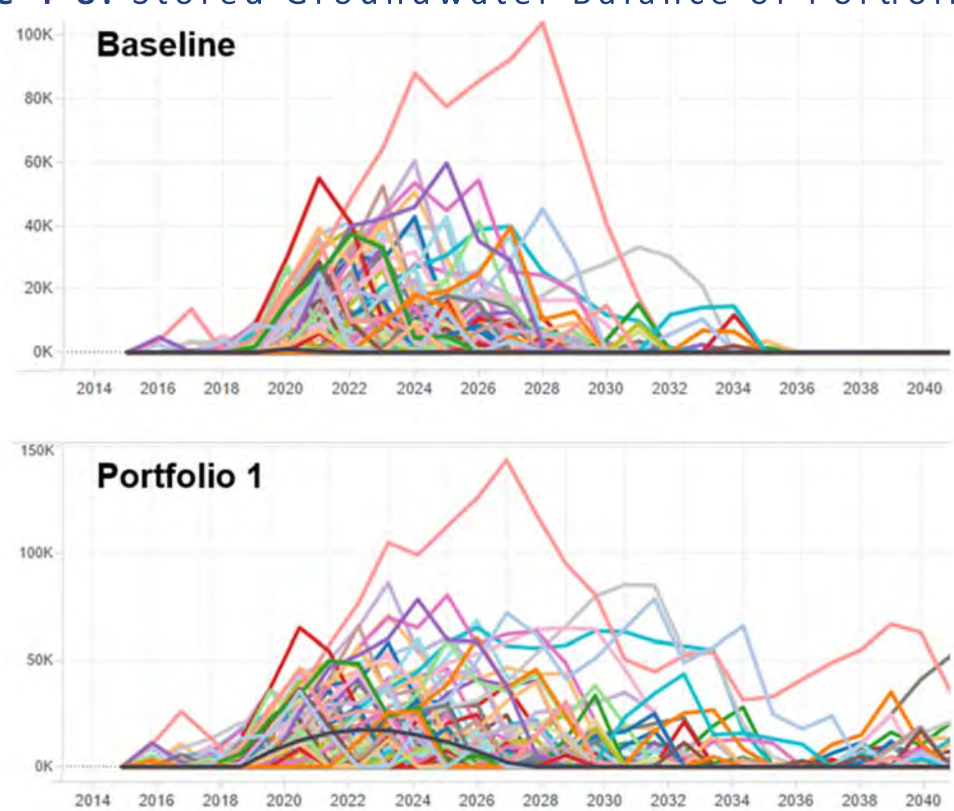


Table 4-2: Supply Totals for Portfolio 2 & 3

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 AFY 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 Portfolio 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 to 27,900 AFY to 9,000 AF.

Stored groundwater 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 AFY or less of stored water. By 2040 the quantity of stored water is depleted in approximately 90% of the climate runs.

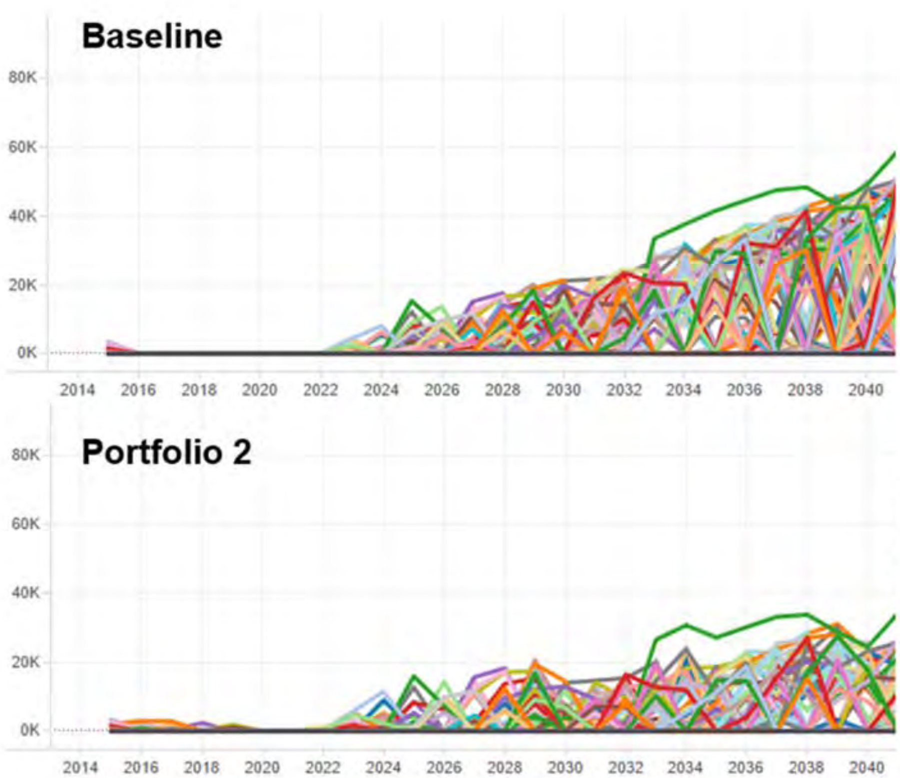
Unmet demands for Portfolio 3 in comparison to the baseline model run are shown in Figure 4-11. Potential shortfalls for Portfolio 3 begin to appear after 2035, 13 years after the baseline condition. In the majority of model runs, Portfolio 3 reduces unmet demands in 2040 from 27,900 AFY to 9,000 AF.

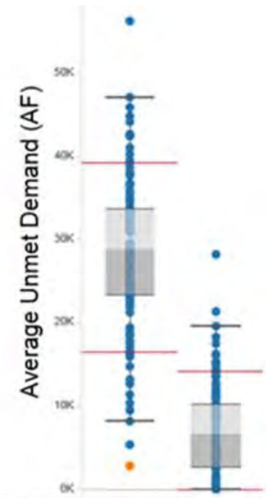
Stored water balances for Portfolio 3 are illustrated in Figure 4-12. Portfolio 3 behaves in a similar fashion to Portfolio 2, however there is a much greater probability of accumulating stored water. Approximately 70% of the runs in Portfolio 3 have water in storage by 2040. The range of stored water falls between 0 AFY 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

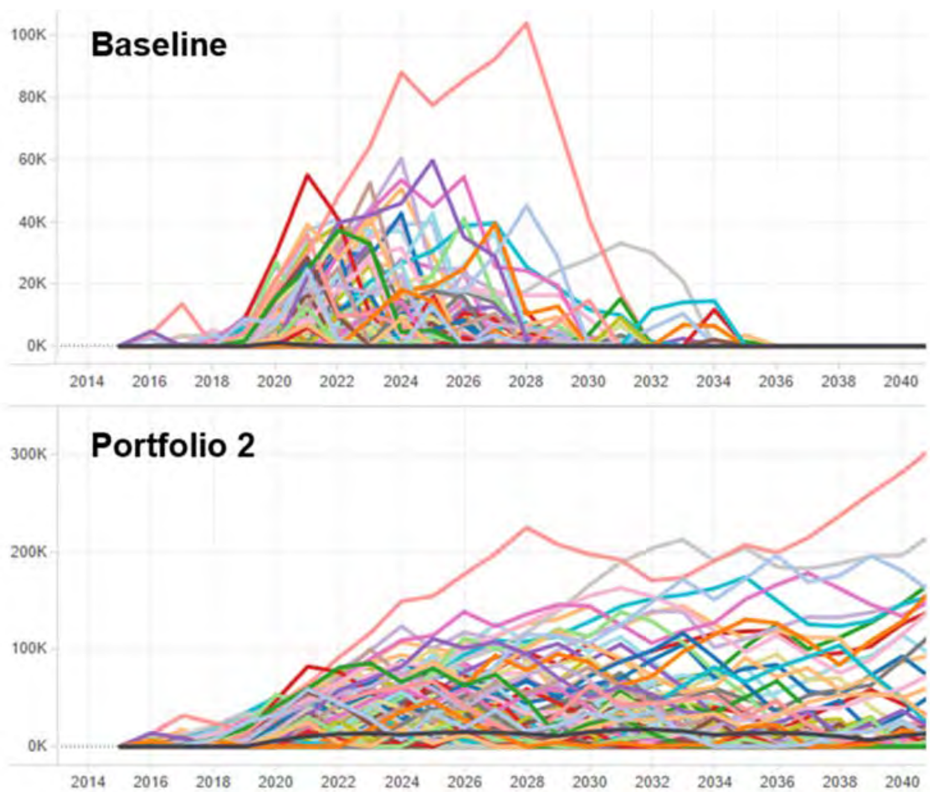
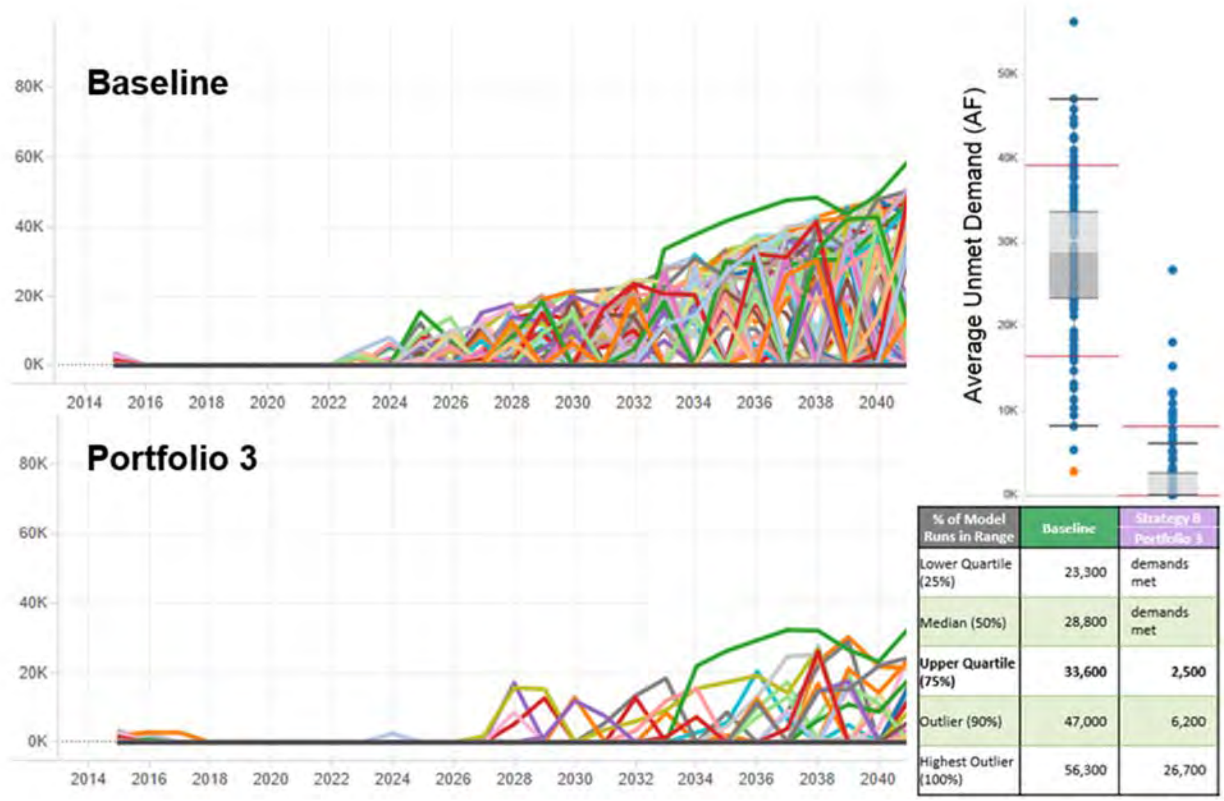
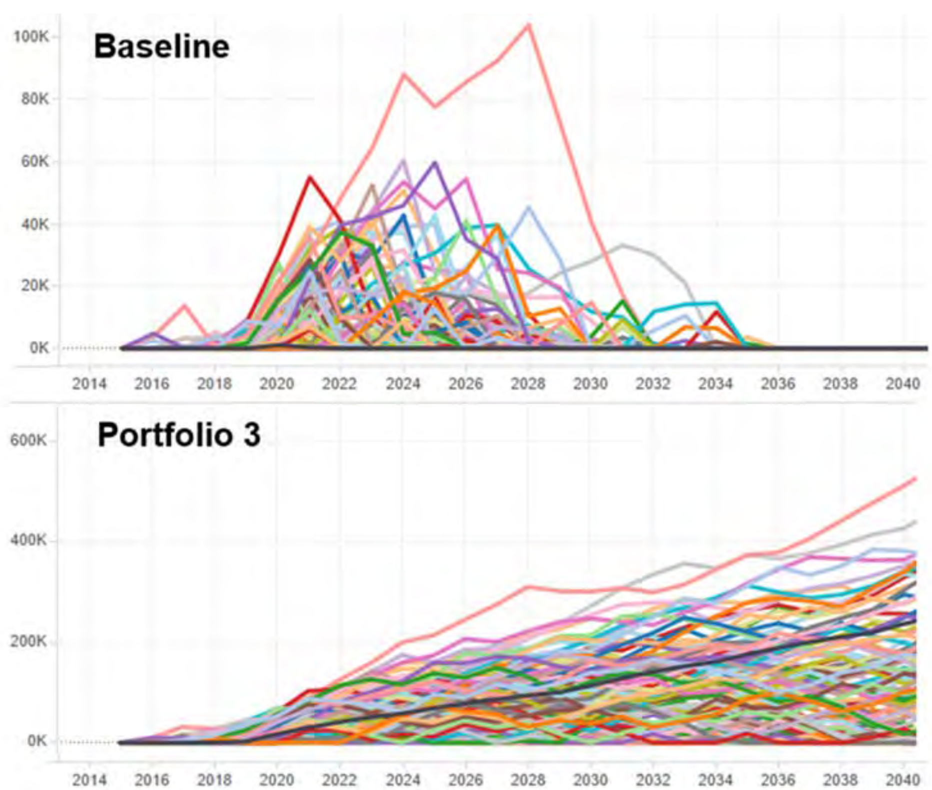


Figure 4-11: Unmet Demands of Portfolio 3 Compared to Baseline



% 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 AFY of locally generated recycled water, securing 10,500 AFY 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 the portfolios 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 AFY 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.

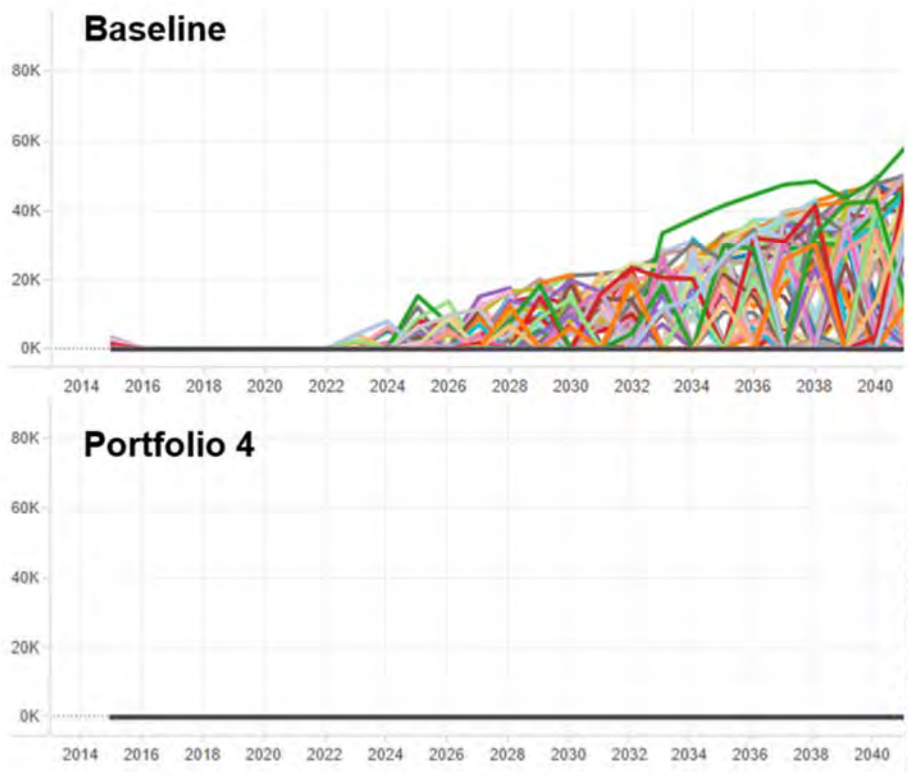
(2) Baseline WUE of 1,000 AFY already included in the Urdan Demand forecast. Therefore, not included in Supply Table to avoid double counting. Only new WUE in addition to Baseline to be counted in Total Supply.

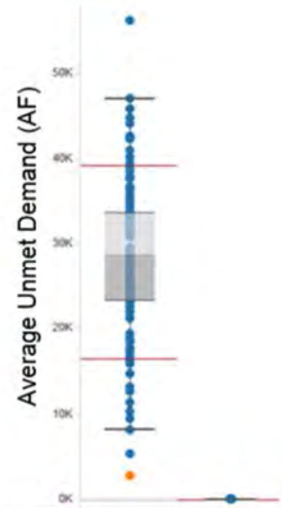
Stored water balances for Portfolio 5 are illustrated in Figure 4-16. As illustrated, groundwater balances begin to accumulate in Portfolio 3B by 2020 with majority of model runs continuing to build stored water through 2040. By 2040, 105 of the 106 model runs accumulated a minimum of 500,000 AFY of 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 AFY by 2040
- Portfolio 5 has the potential for stored groundwater to build to over 500,000 AFY 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

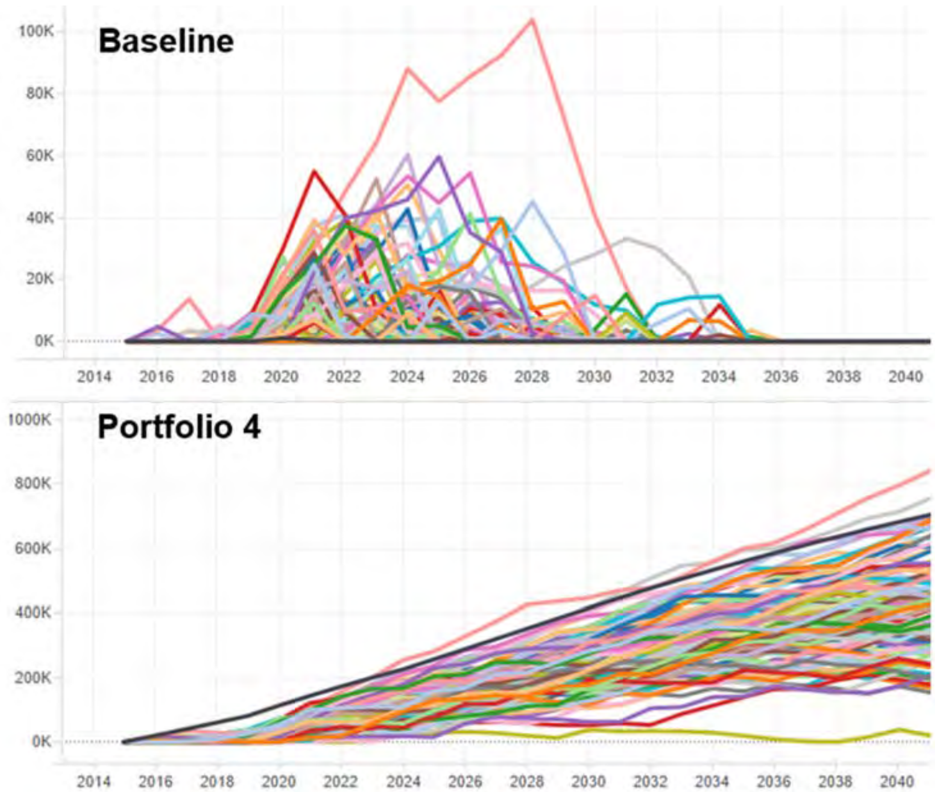
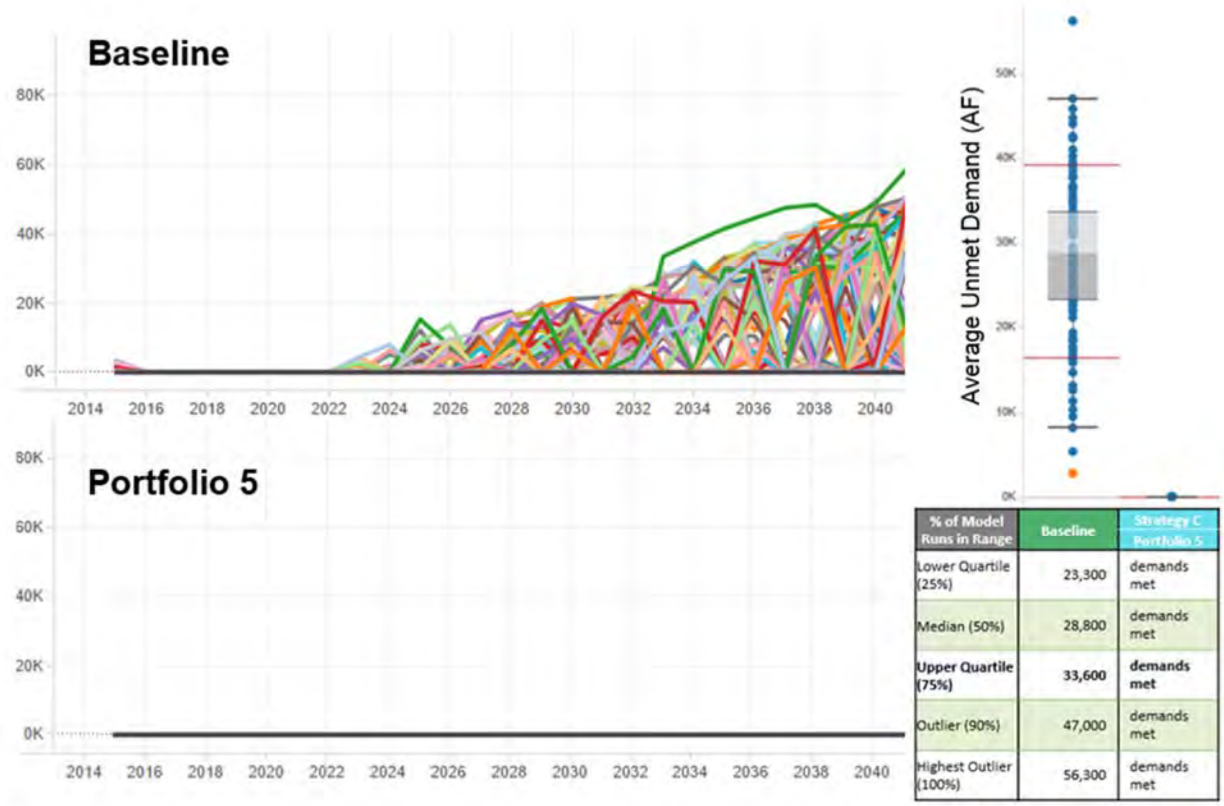


Figure 4-15: Unmet Demands of Portfolio 5 Compared to Baseline



% 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

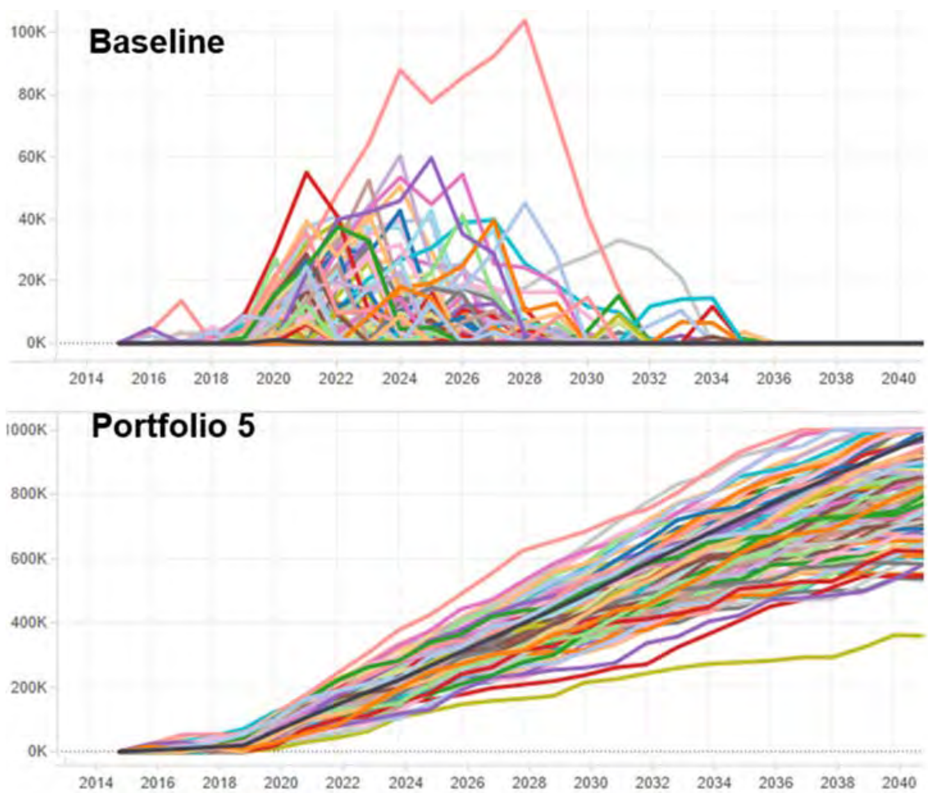


Table 4-4: Supply Totals for Portfolio 6

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 6 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

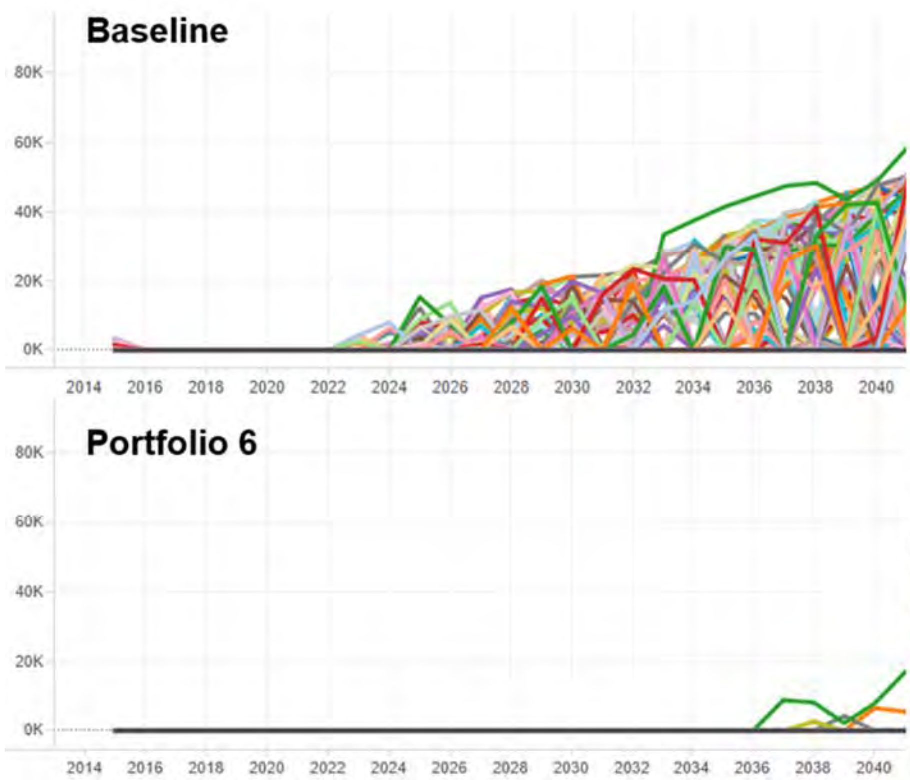
Under Strategy E, the IRP Technical Work Group evaluated how maximizing the purchase of imported water could alleviate pressure on and extend the availability of local water resources. This strategy allows for the purchase of up to 93,300 AFY of imported water to meet urban demand or to be used for groundwater 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.

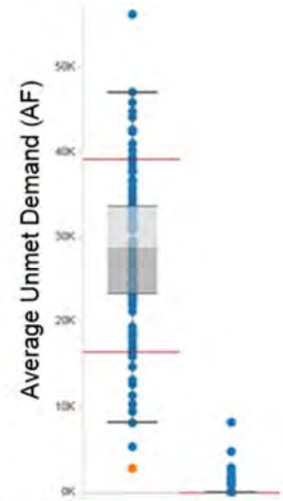
Two water supply portfolios were developed for Strategy E. The first, Portfolio 7, models the additional water supplies as described above. The second, Portfolio 8, includes all of the supplies of Portfolio 7 plus the addition of maximizing all locally produced recycled water as shown in Table 4-5. A 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

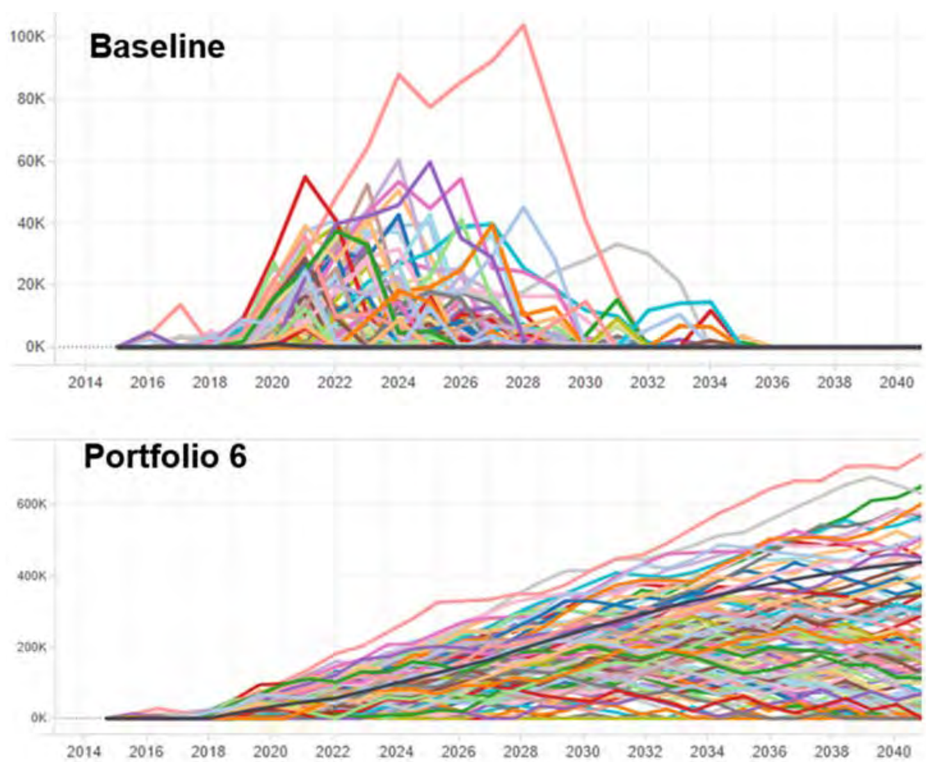
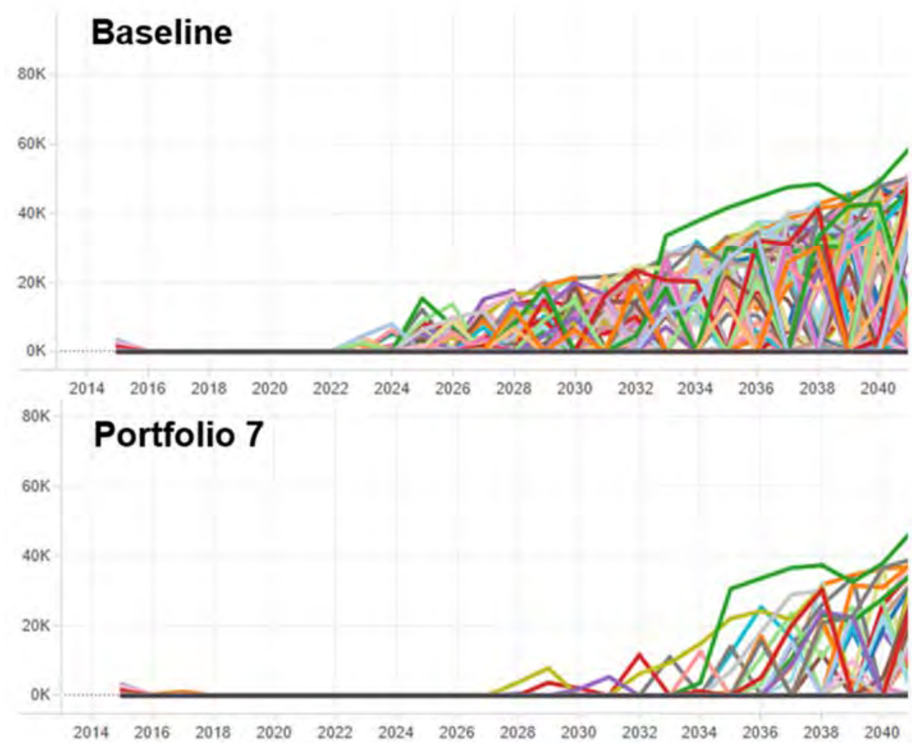
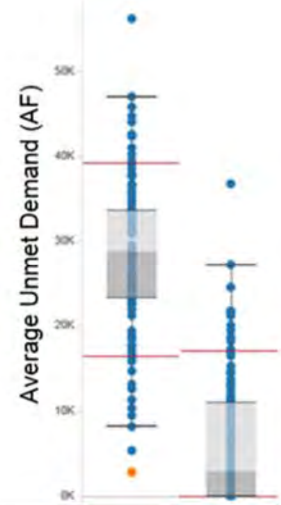


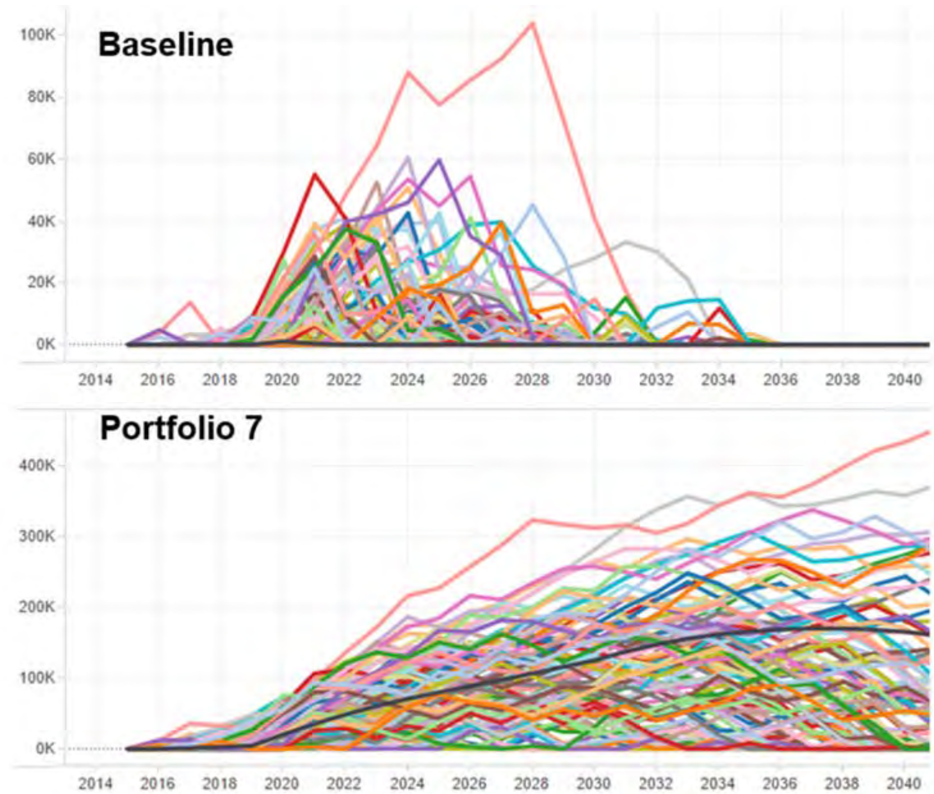
Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline





% 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 AFY 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

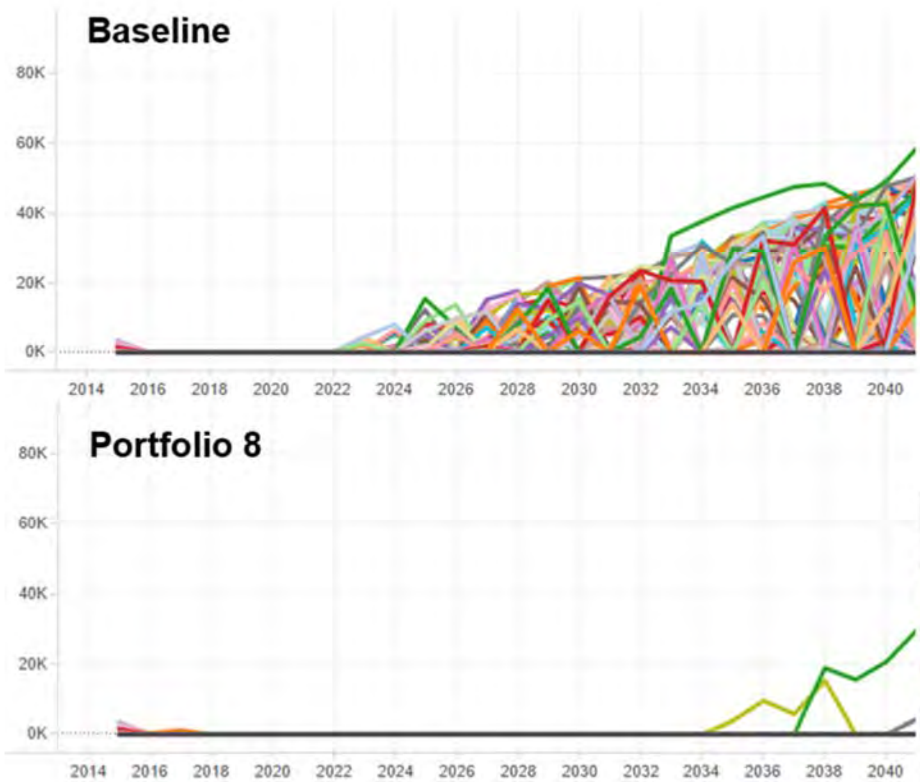
Supply Type	Baseline	Portfolio 7	Portfolio 8
Chino Groundwater	91,300	-	-
Stormwater	6,400	-	-
Recycled Water		-	-
Locally Developed[1]	64,700	-	20,800
External Supplies		-	7,000
Chino Desalter	17,700	-	-
Local Surface	22,100	-	-
Non-Chino Groundwater	11,600	-	-
Imported Water		-	-
MWD	69,750	23,550	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**

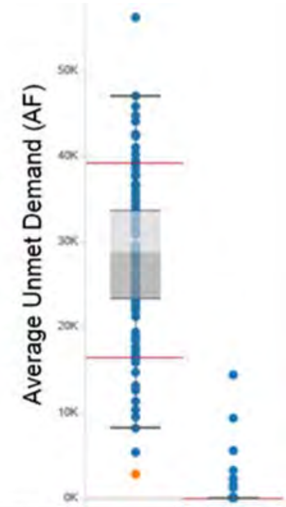
Notes:

(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.

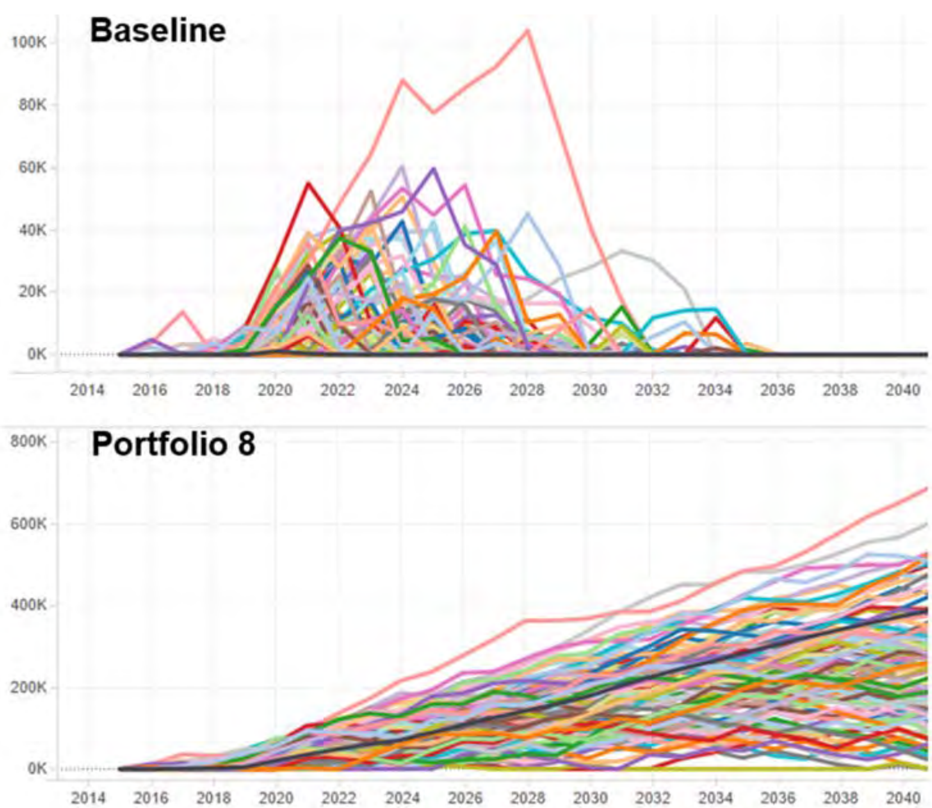
Figure 4-19: Unmet Demands of Portfolio 7 Compared to Baseline





% 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



Low water-use California native plants in a garden setting


OPEN

5. Conclusions & Next Steps

Core Findings of the 2015 IRP

Lessons Learned from the Climate Simulations

Final IRP Recommendations and Next Steps

Strawberry fields near a new development in Ontario.

Conclusions & Next Steps

With the adoption of the Chino Basin OBMP in 2000, the region embarked on a new era of water management. Over the past 15 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 drought of the last 4 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 .

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.

RECOMMENDATIONS & NEXT STEPS

Plans to protect air and water, wilderness and wildlife are in fact plans to protect man.

-Stewart Udall

The region adopted the following core recommendations for the 2015 IRP:

- **Continue investment in recycled water** projects to maximize the beneficial reuse.
- **Acquire low TDS 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

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

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.

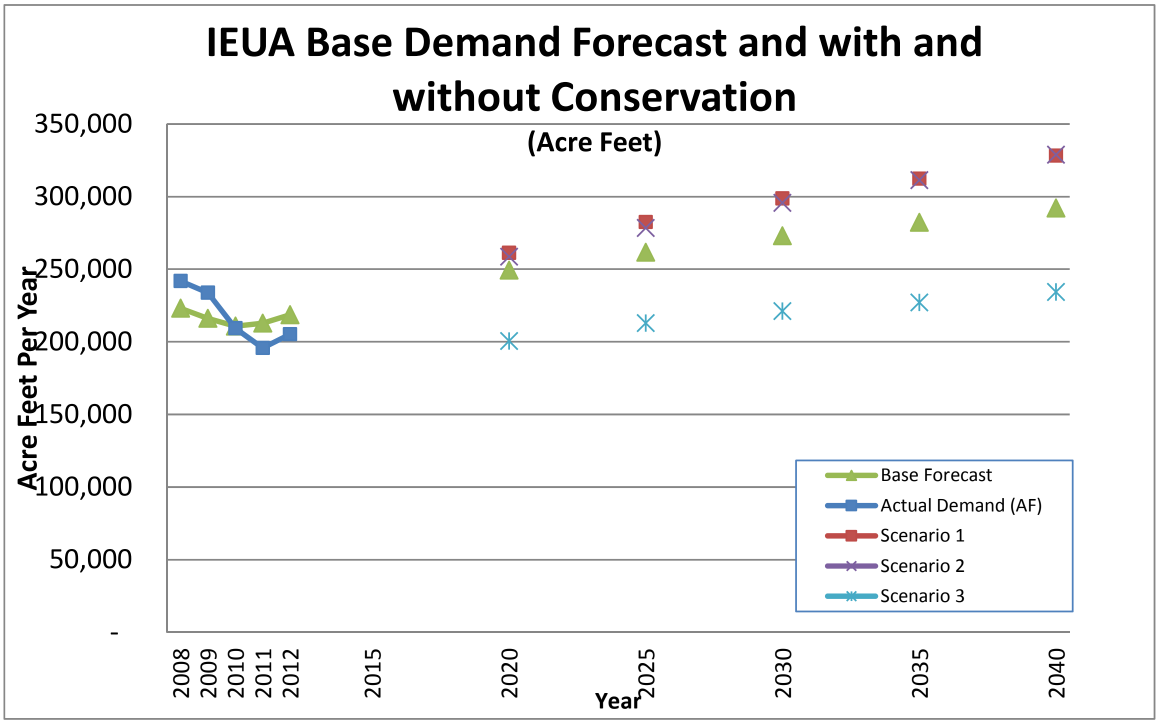
The Control Panel Worksheet contains drop down boxes to select values of demand drivers. A Collection of assumptions on demand drivers constitutes a demand forecasting scenario. Three scenarios are allowed. By allowing the user to define and control sources of forecast uncertainty in this control panel, 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.

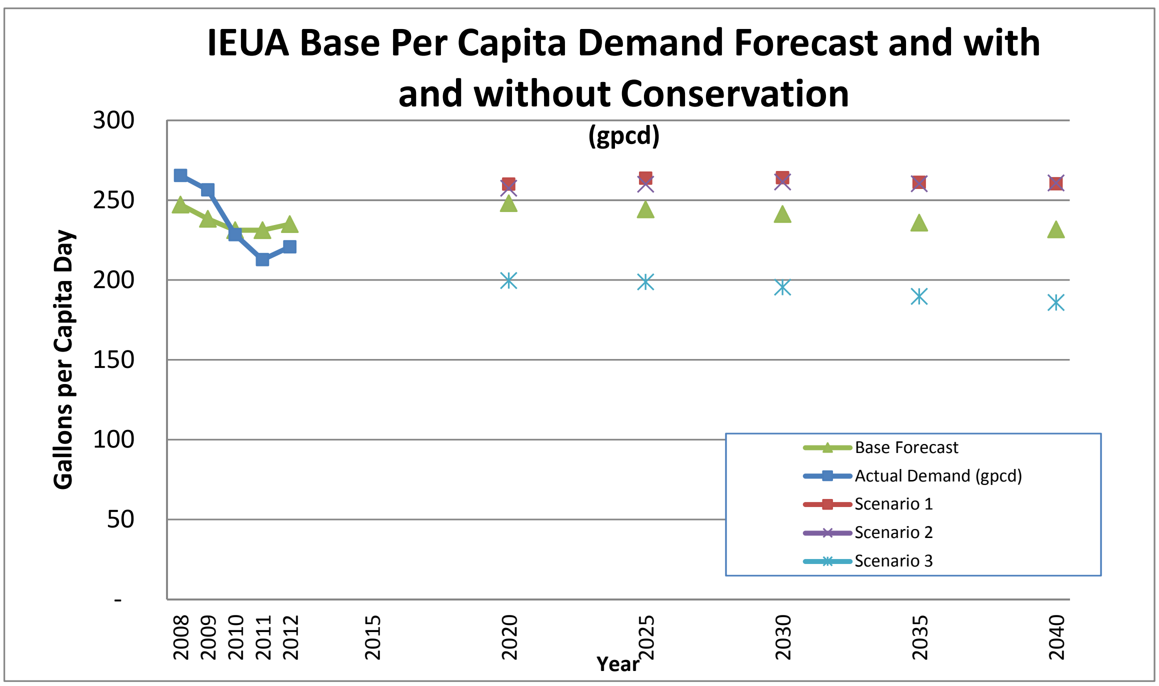
Each green box contains drop down boxes to choose values for each demand driver.

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.

$$Socioeconomic_{i,t} = \ln(real\_marginal\_price_{i,t}) + \ln(\frac{Units_{i,1990}}{Acres_{i,1990}}) + \ln(\frac{Persons_{i,1990}}{Units_{i,1990}}) + \ln(\frac{\overline{Income_{i,1990}}}{Unit_{i,1990}})$$

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.

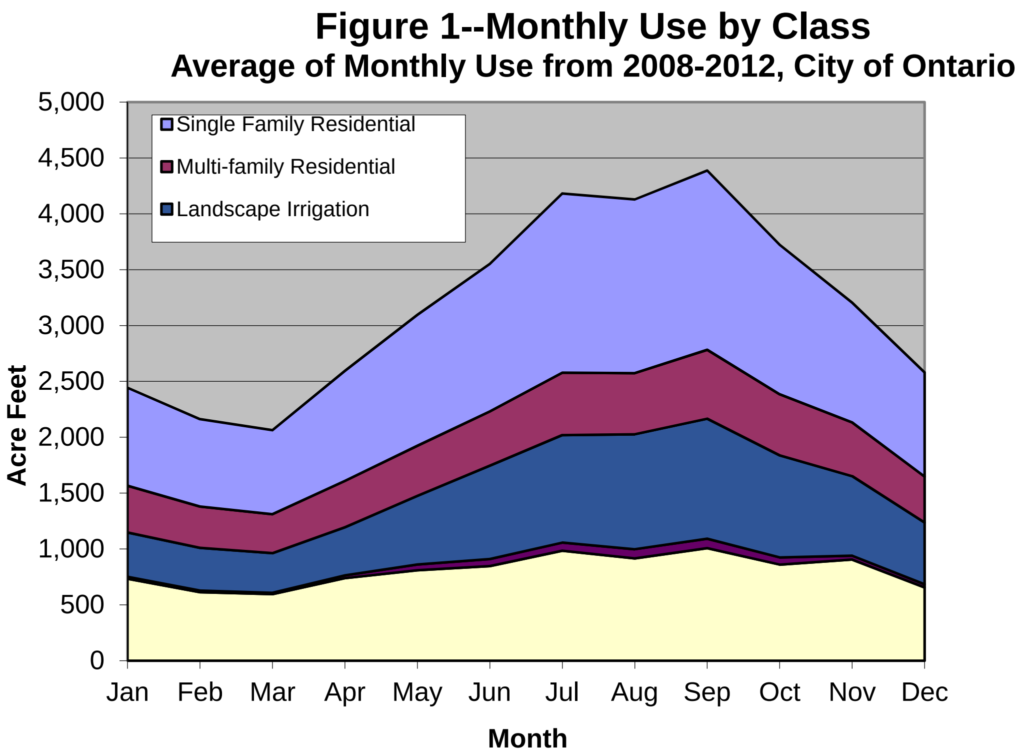
Data

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).

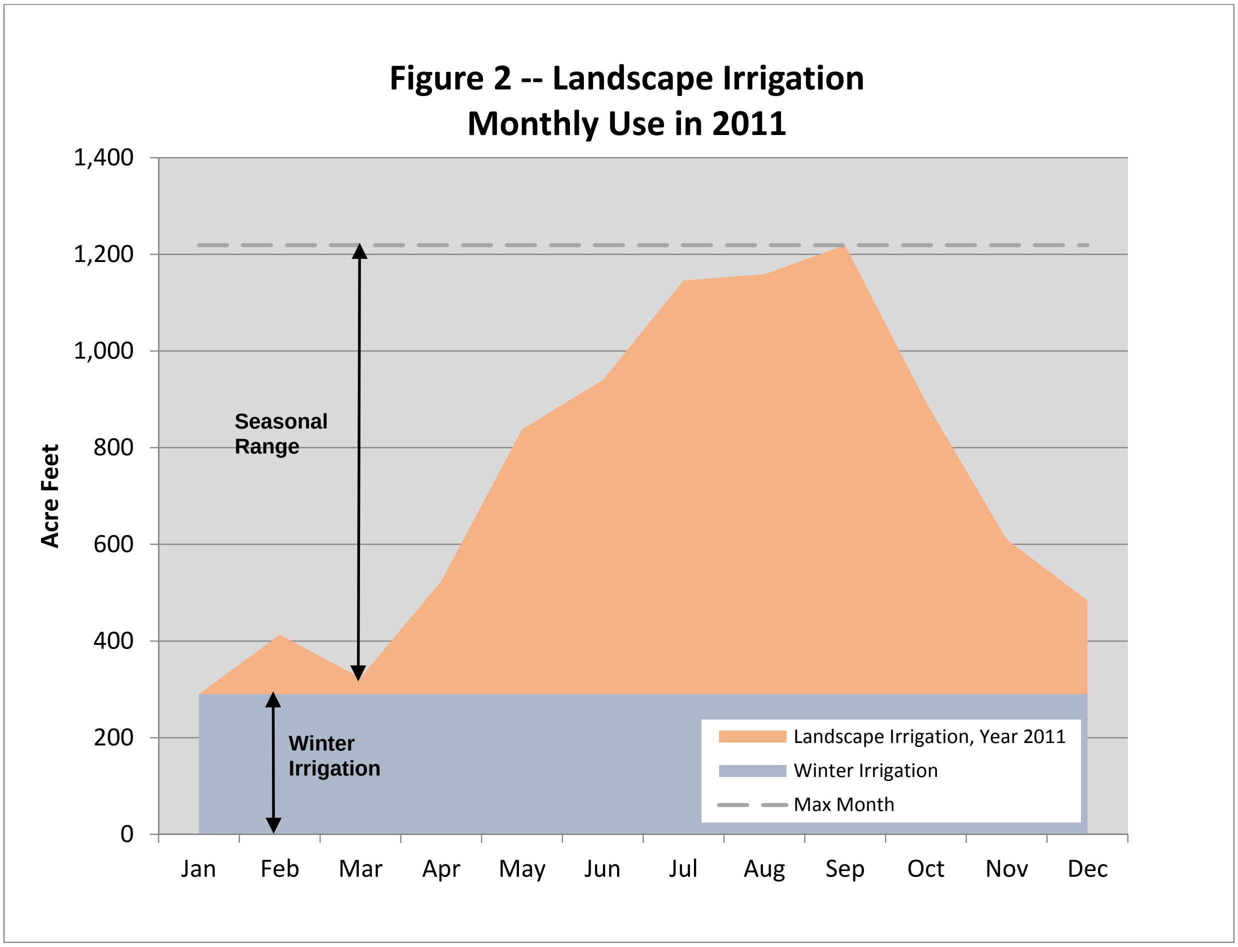
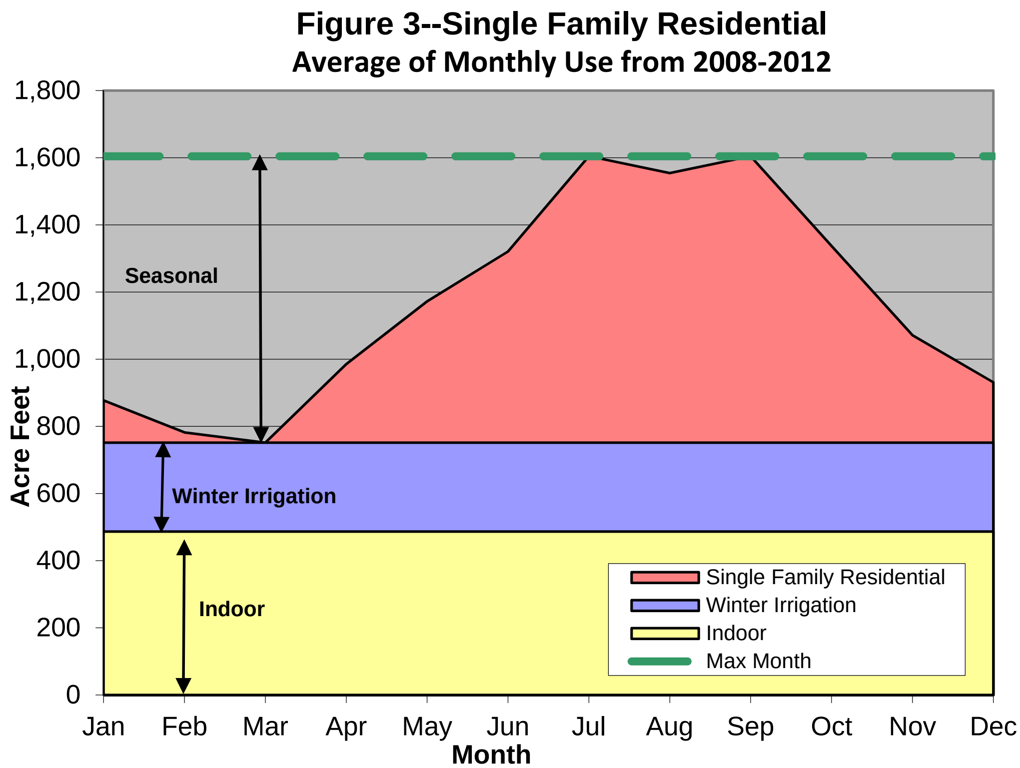


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors 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, as	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

[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 pure 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 $\boldsymbol{\varepsilon}$, then the error component is added to Equation **(1)**:

Equation 8

$$\ln \frac{Use}{Pop} = \mathbf{f}(\mathbf{S}_t, \mathbf{C}_t, \mathbf{T}_t) + \varepsilon$$

In an Ordinary Least Squares (OLS) Regression, the error term is assumed to be distributed normally with a constant variance.

$$\varepsilon \sim N(\mu_\varepsilon, \sigma_\varepsilon)$$

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.

[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.

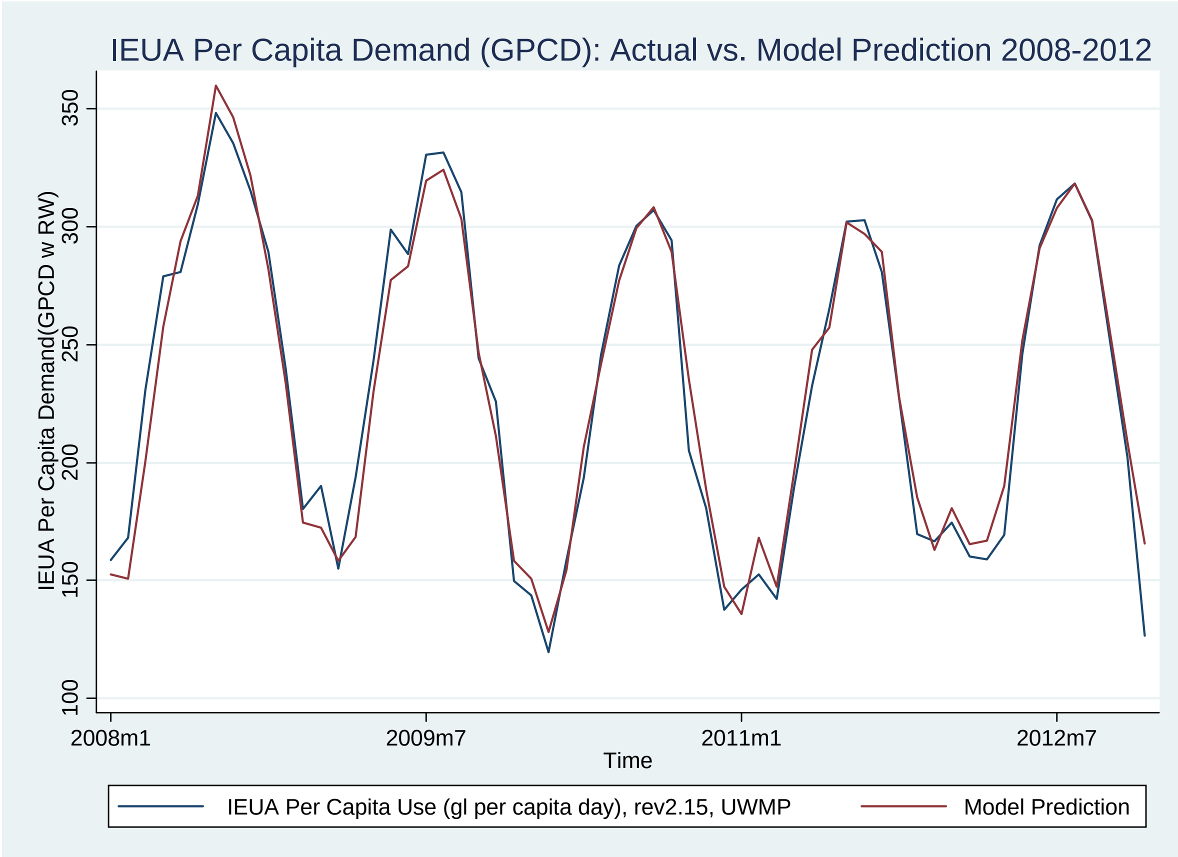


Figure 1-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2008-2012

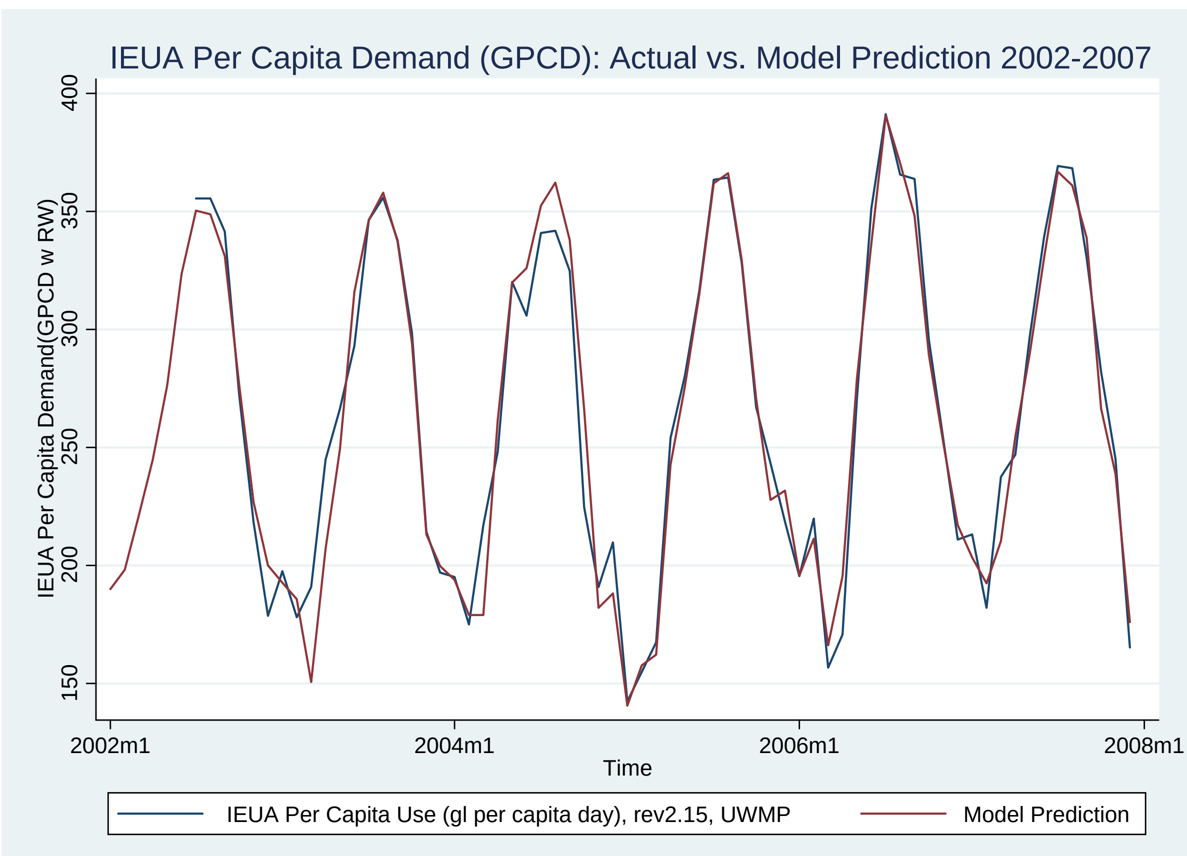


Figure 2-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction , FY 2002-2007

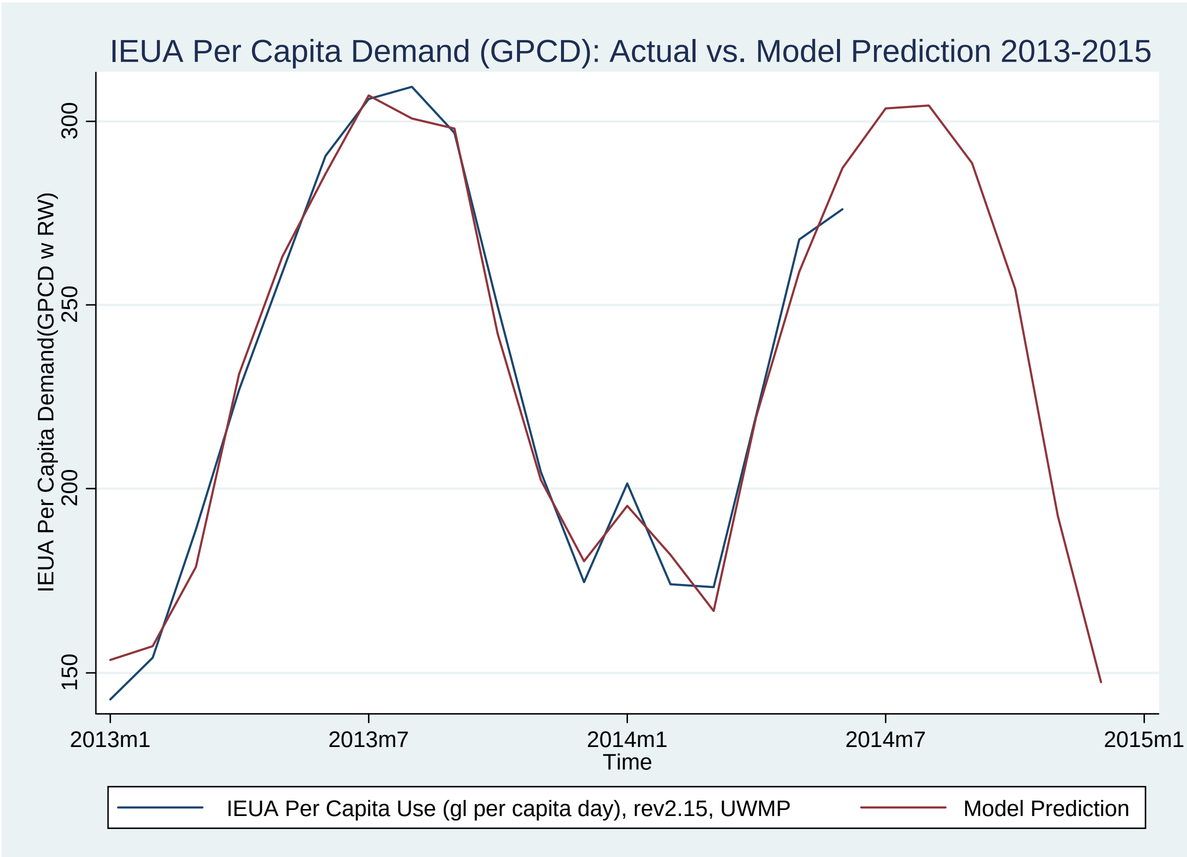


Figure 3-- IEUA Per Capita Demand (GPCD): Actual vs. Model Prediction, 2013-2014

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.

[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.

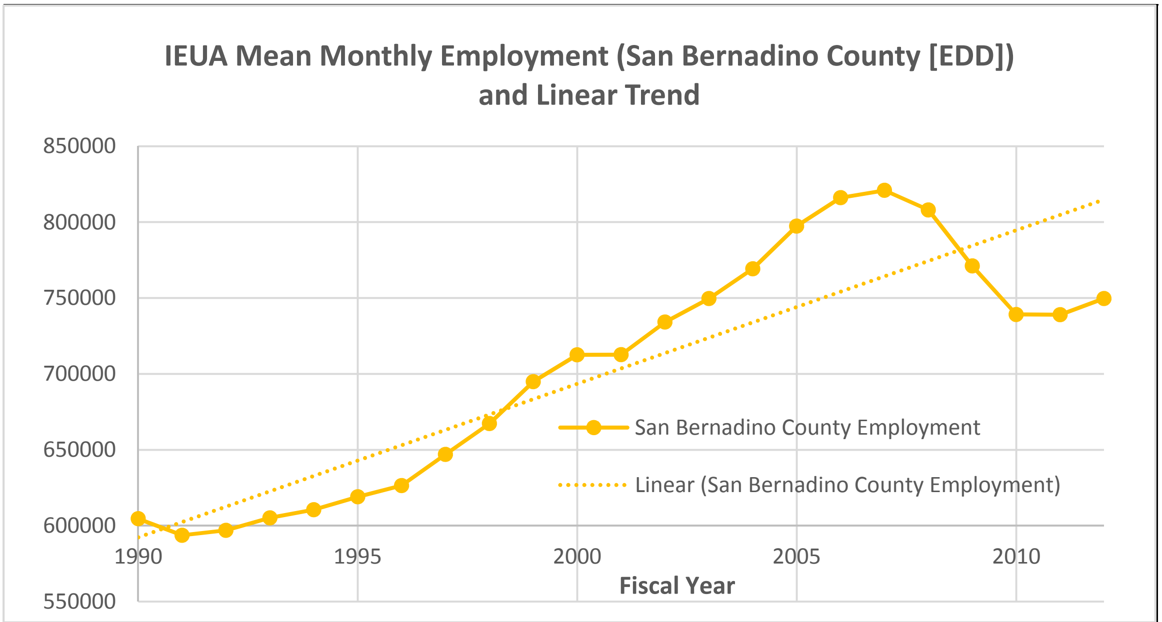


Figure 4-- IEUA Mean Monthly Employment (San Bernardino County [EDD]) and Linear Trend

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.

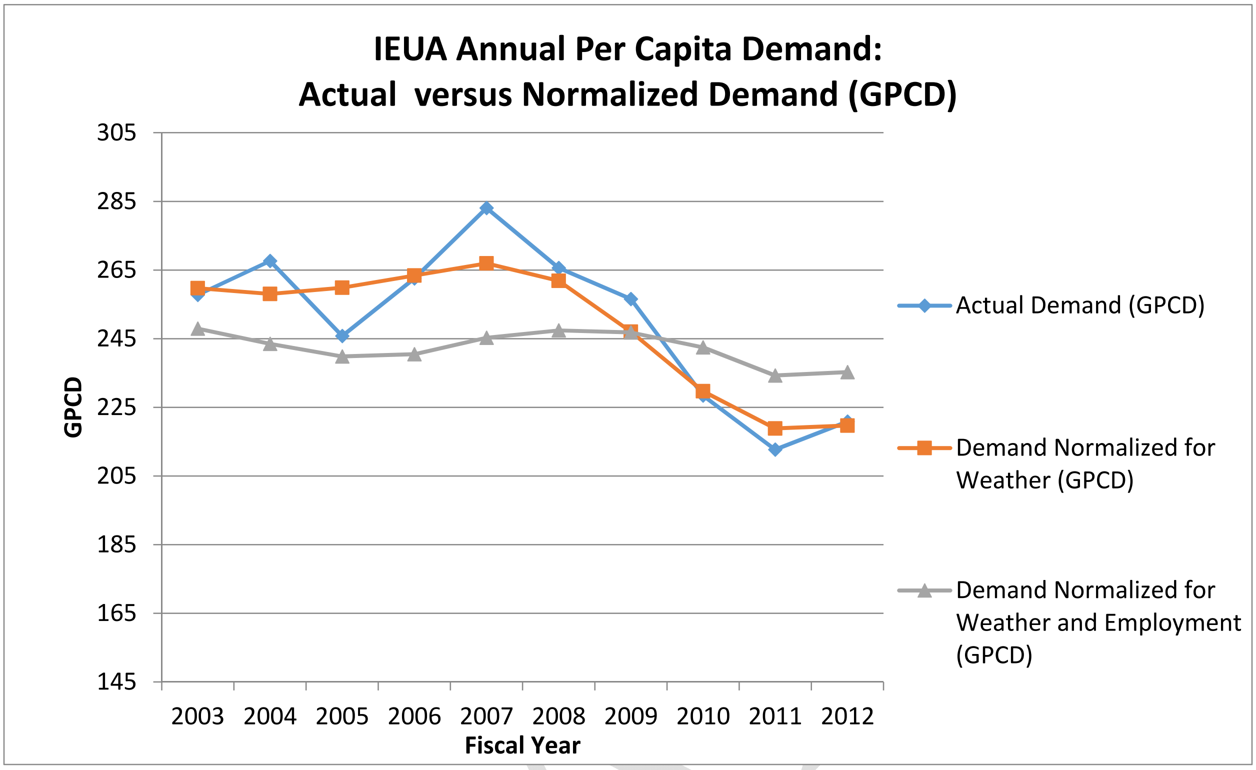


Figure 5-- IEUA Annual Per Capita Demand: Actual versus Normalized Demand (GPCD)

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"

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)

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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).

Table of Contents

Figures

Tables

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.

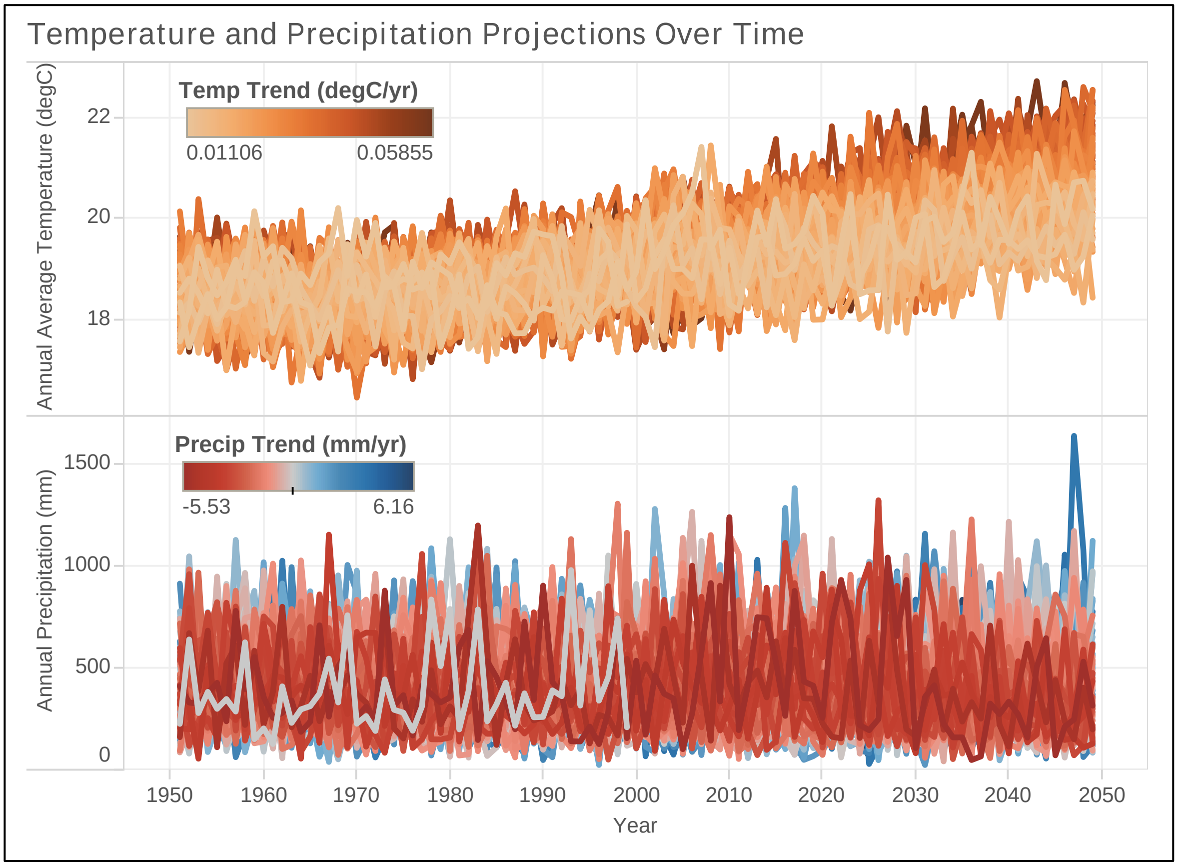
The Inland Empire Utilities Agency (IEUA), a water management agency in Southern California, recently partnered with the RAND Corporation, a multi-disciplinary, non-partisan research organization and educational institution headquartered in Santa Monica, California, to evaluate how adaptive, integrative 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

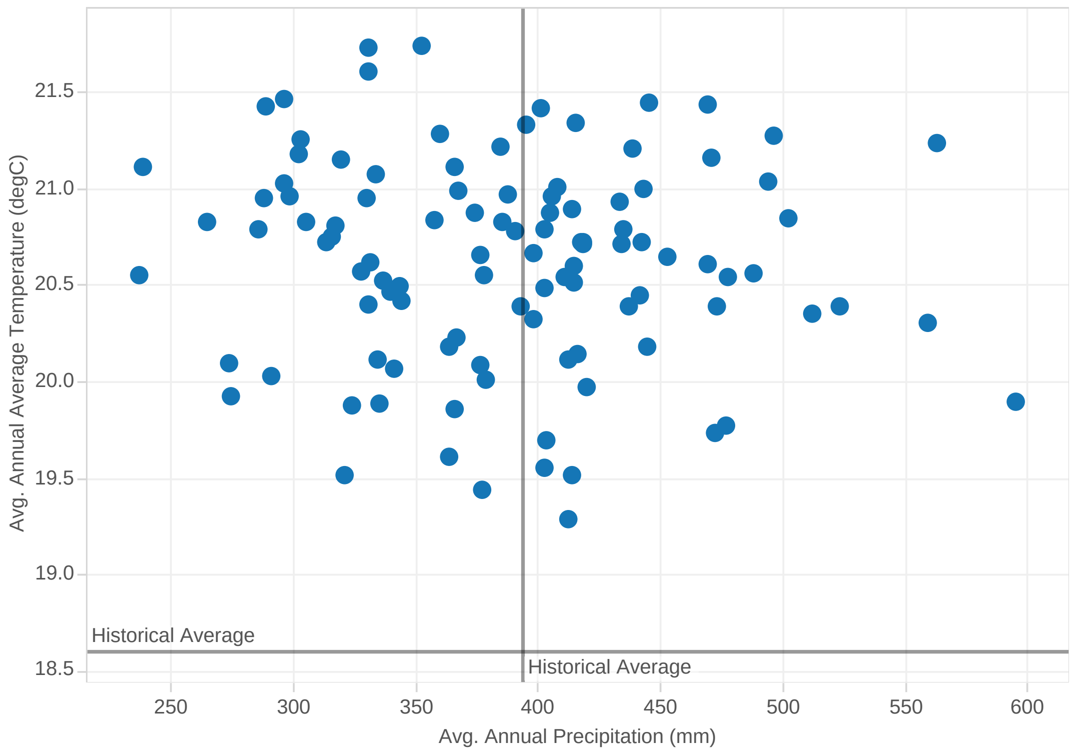
Portfolio Name	Portfolio Description
Portfolio #1	Maximize the Use of Prior Stored Groundwater
Portfolio #2A	Maximize Recycled Water (Including External Supplies) and Local Supply Projects and Implement Minimal Water Efficiency
Portfolio #2B	Portfolio 2A Plus Secure Supplemental Imported Water from MWD 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)

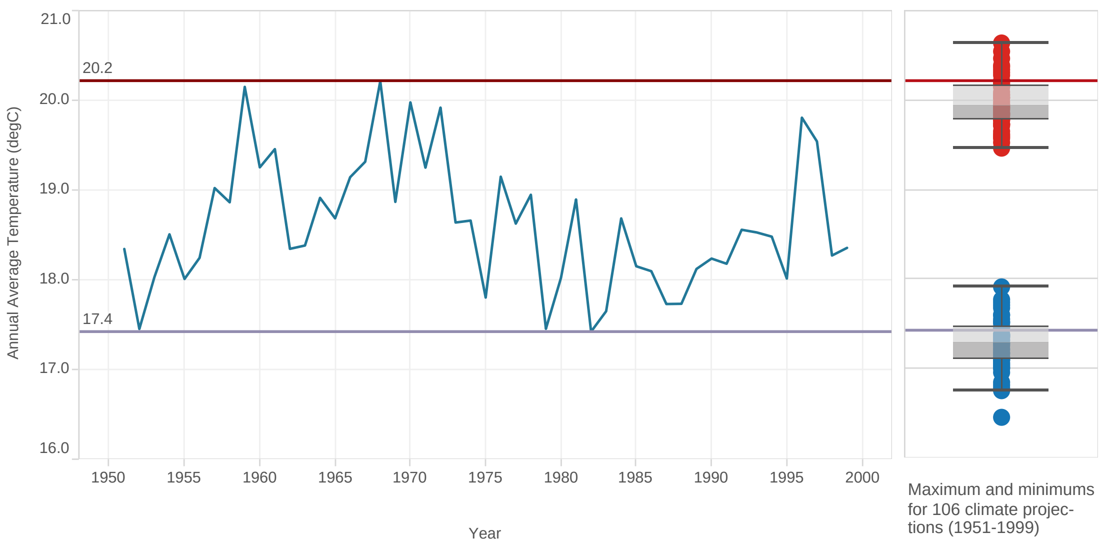
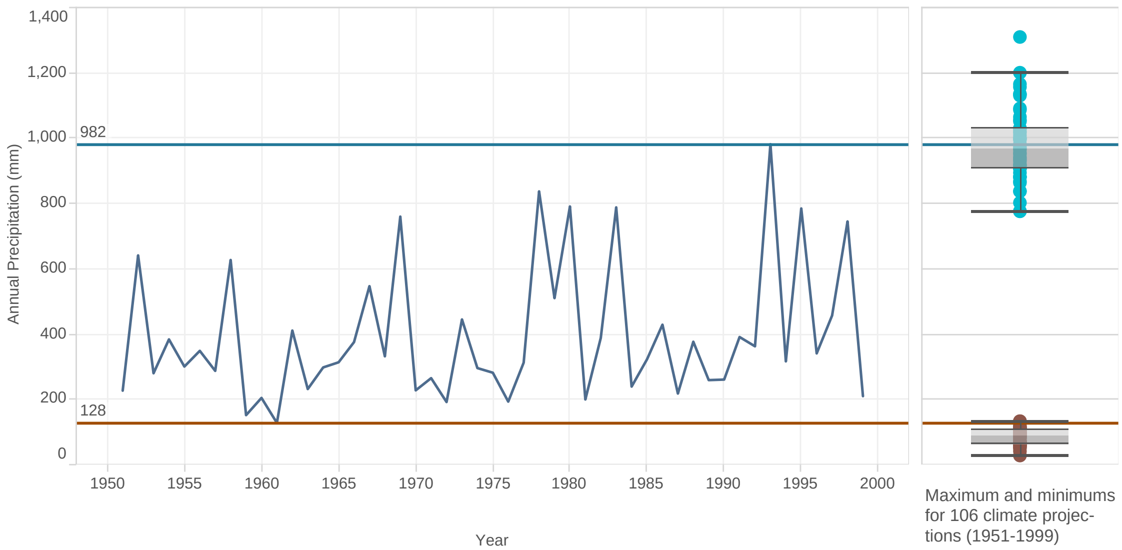
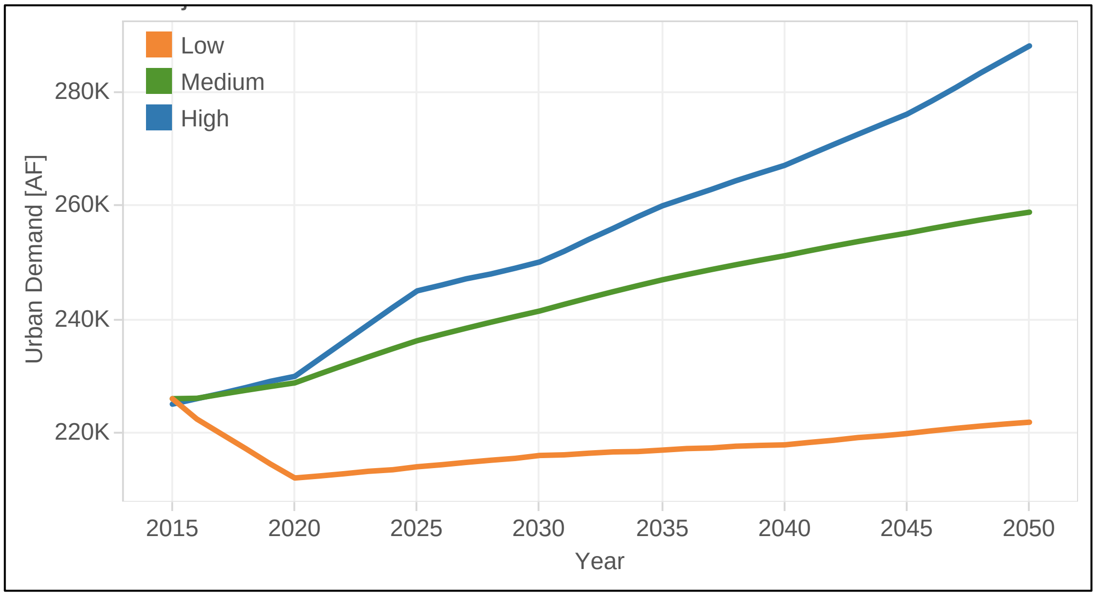


Figure 4: Observed historical annual total precipitation record for the IEUA service area from 1951 – 1999 (left) compared to the distribution of predicted maximum and minimum precipitation across the 106 climate scenarios for the same historical time period (right)



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

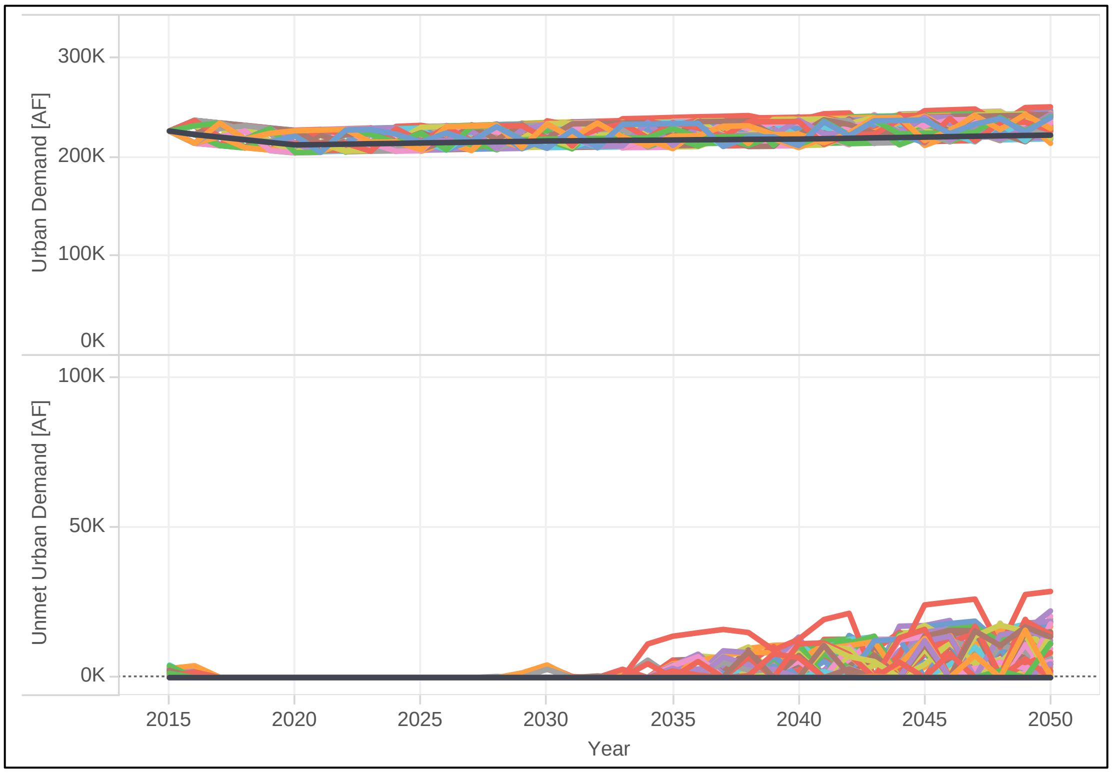
The study team used the WEAP IEUA model to stress test the IEUA's baseline supplies and proposed supply augmentation portfolios, and evaluated urban demand, supplies, and unmet demand from 2015 to 2050 for each of the 106 climate change projections as well as a projection that repeated historical climate 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.

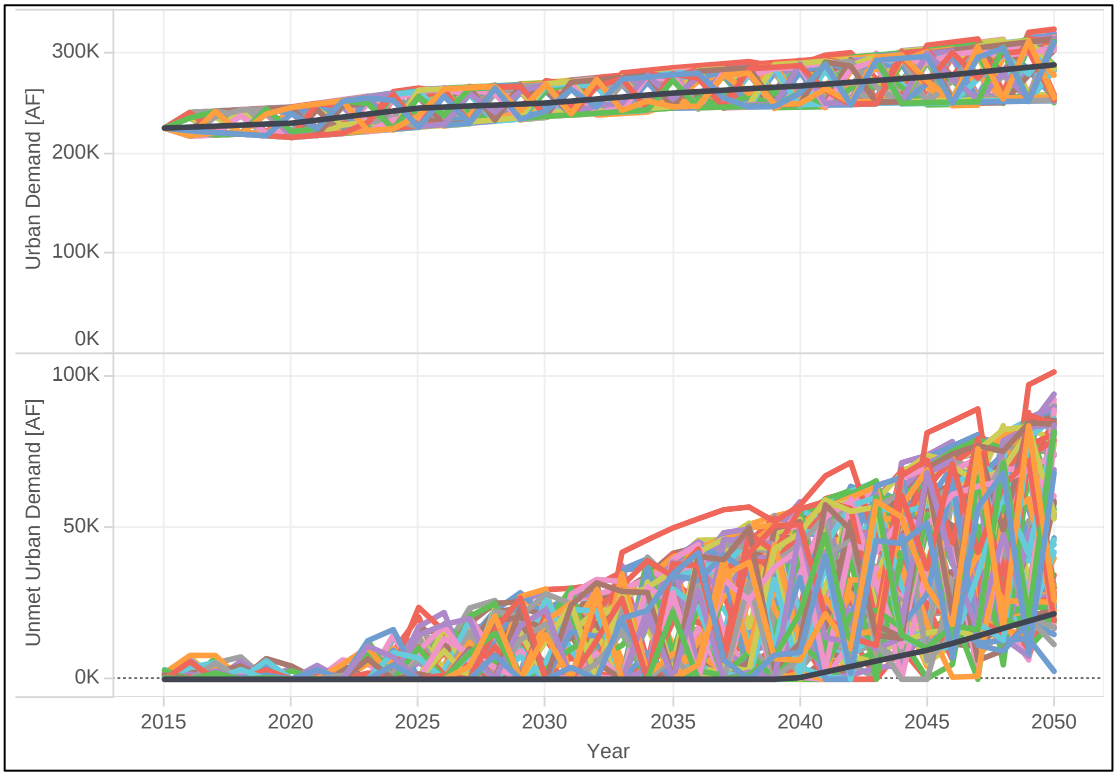
Figure 6: Unmet demand for IEUA service area by climate change scenario over time (low demand scenario)



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).

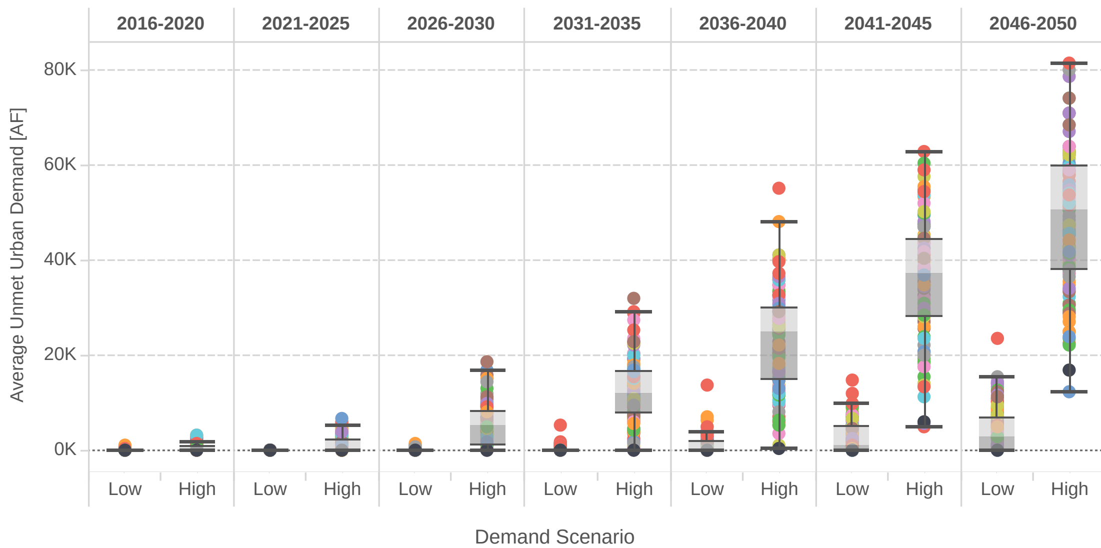
Figure 7: Unmet demand for IEUA service area by climate change scenario over time (high demand scenario)



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

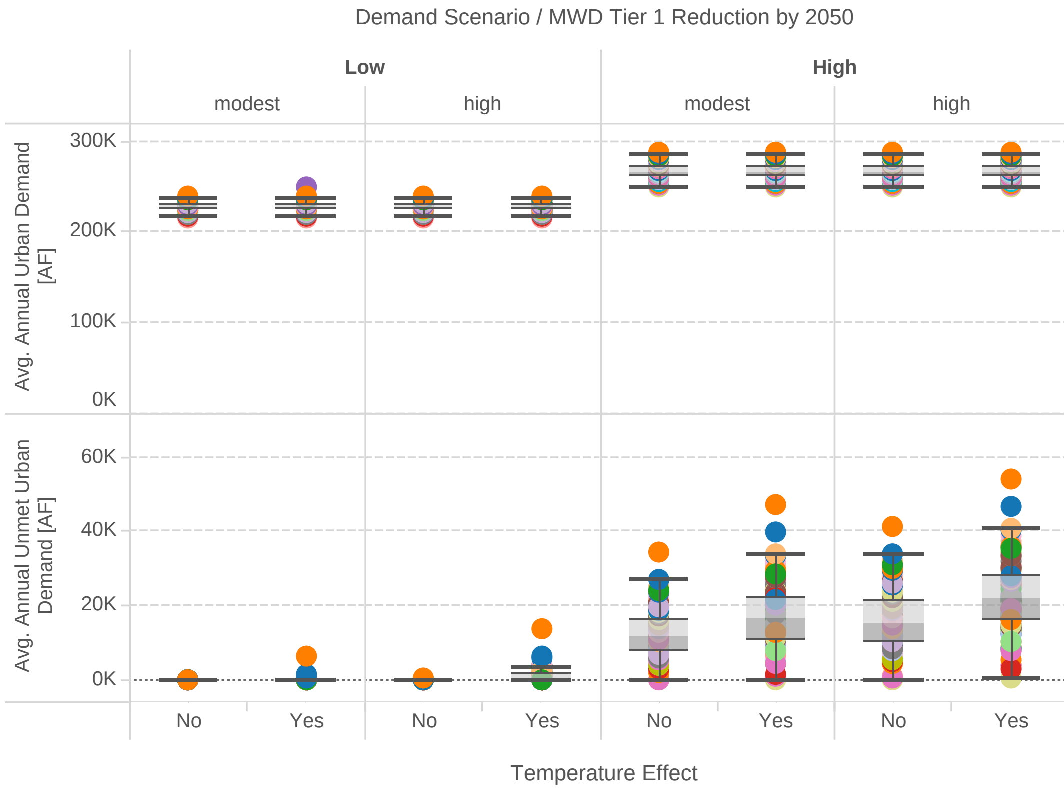


Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

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)



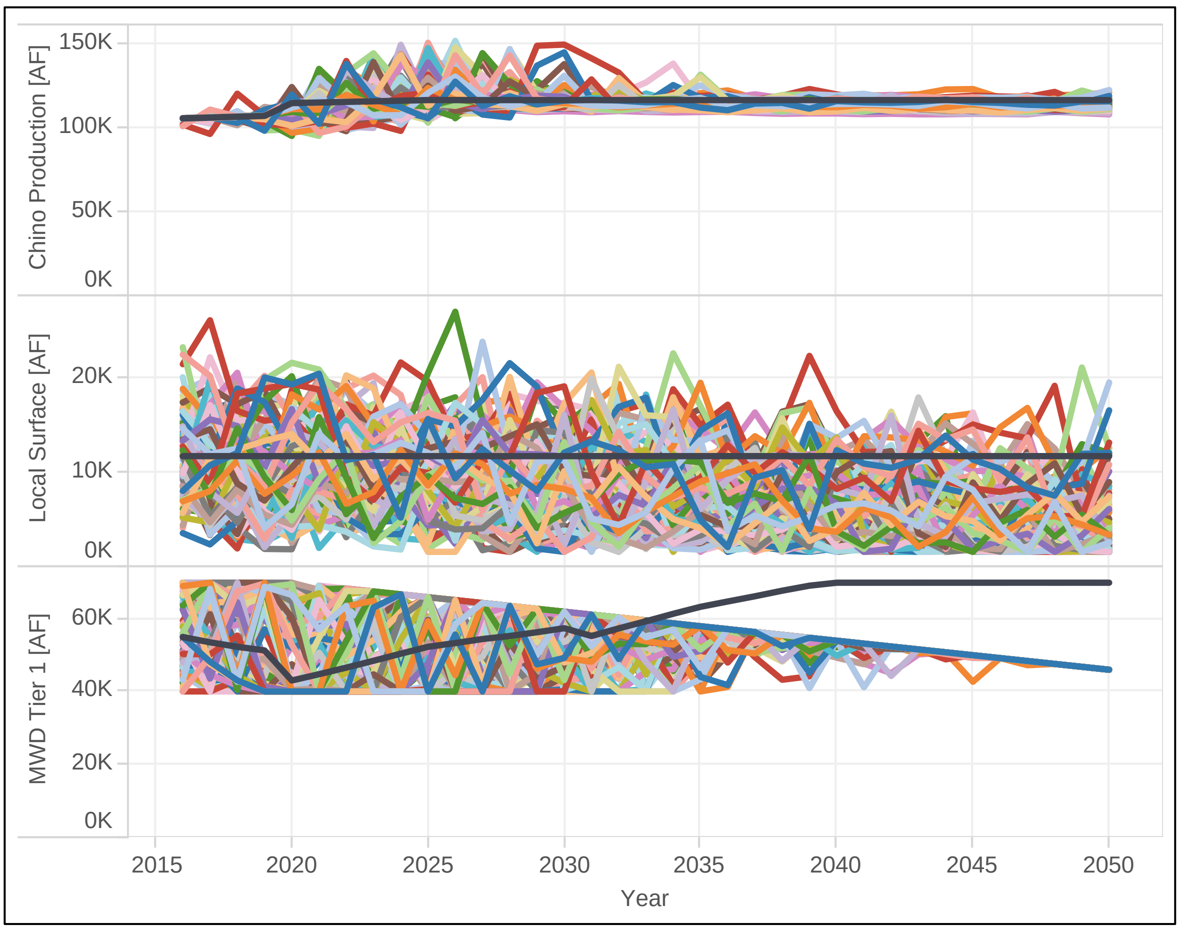
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range.

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.

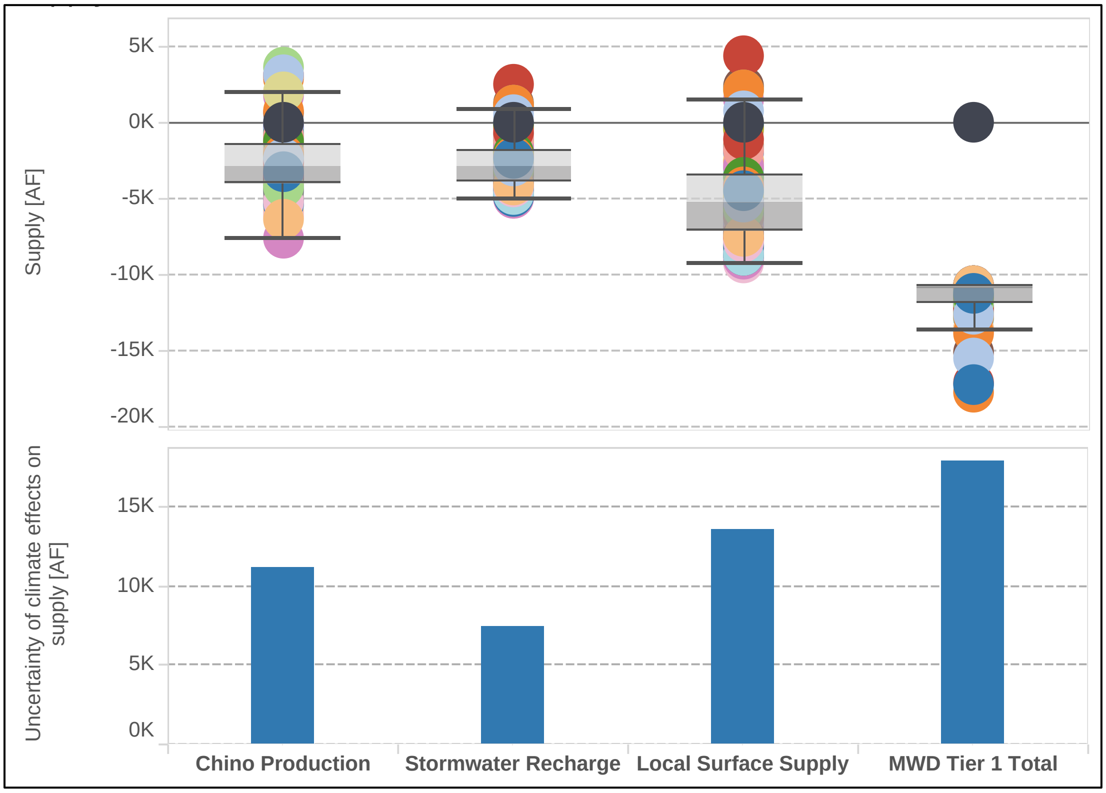
Figure 10: Baseline supply ability to meet IEUA service area in the high demand scenario by climate projection



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)



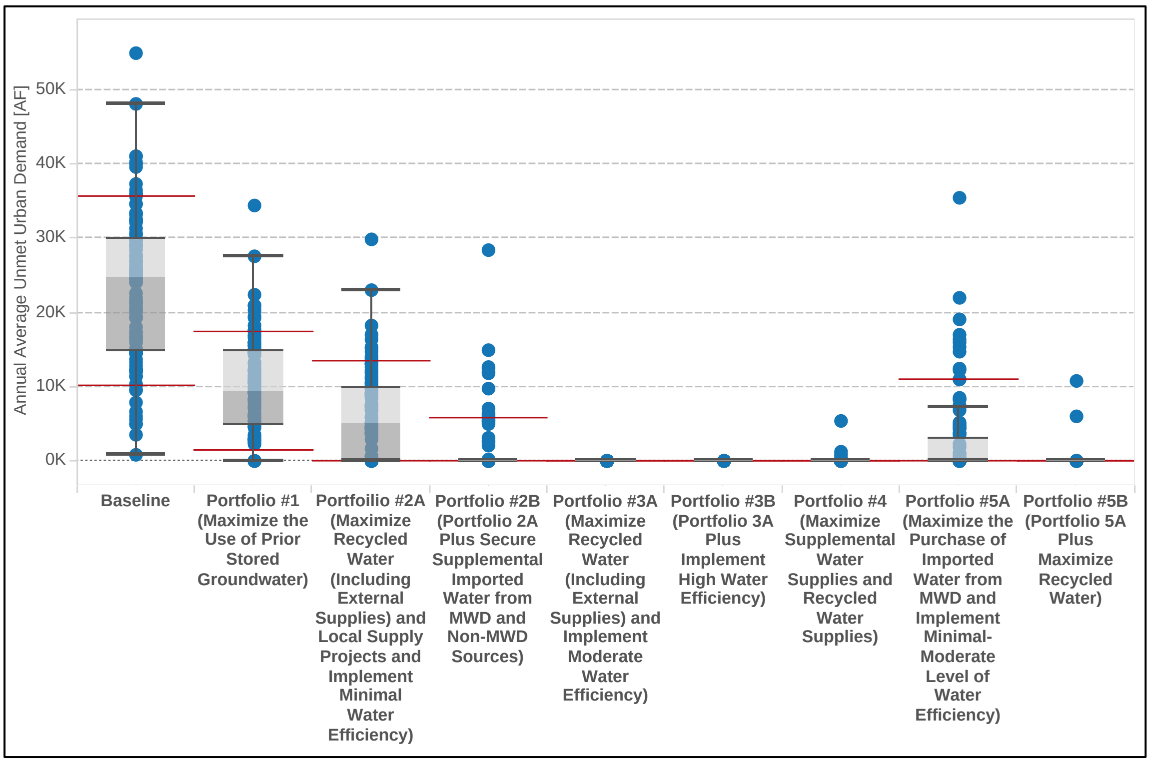
Note: Colored dots correspond to the individual 106 climate scenarios. The black dots correspond to the historical climate scenario. The boxes show the 25th, median, and 75th quartile results, with the vertical stems indicates 1.5 times the 25th-75th quartile range. The blue bars indicate the range of 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

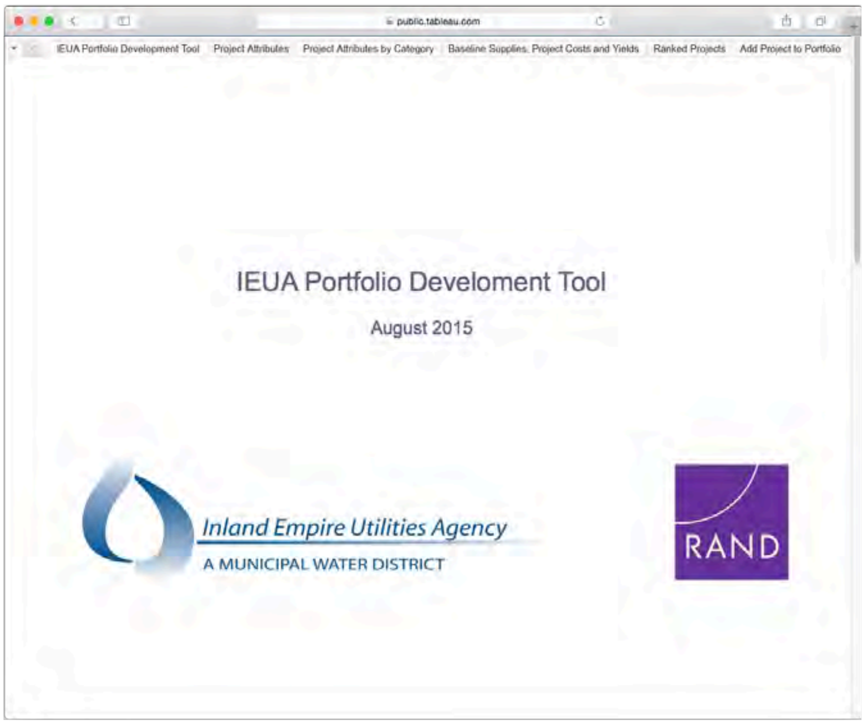
This is one of a growing number of water planning examples that highlights the benefits of examining the impacts of different climate change futures on meeting consumer demand. Here, assumptions about demand growth and climate future both had substantial impacts on ability to meet demand, and level of 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

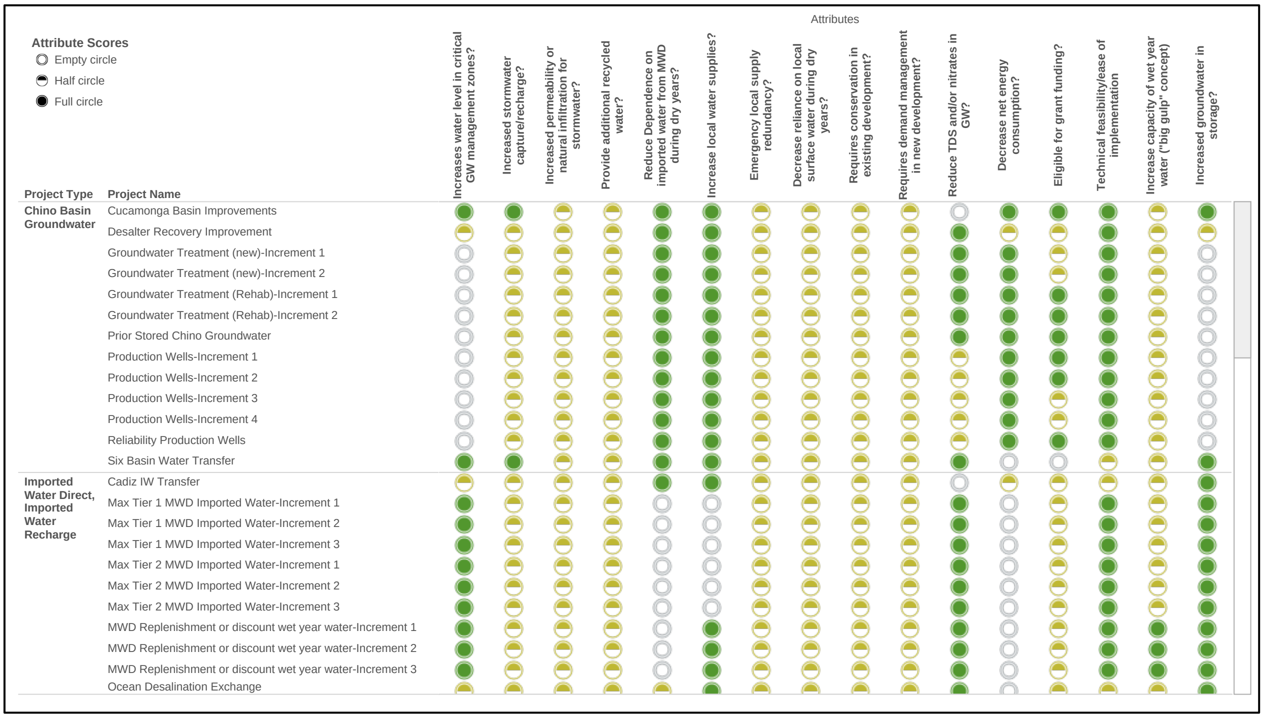
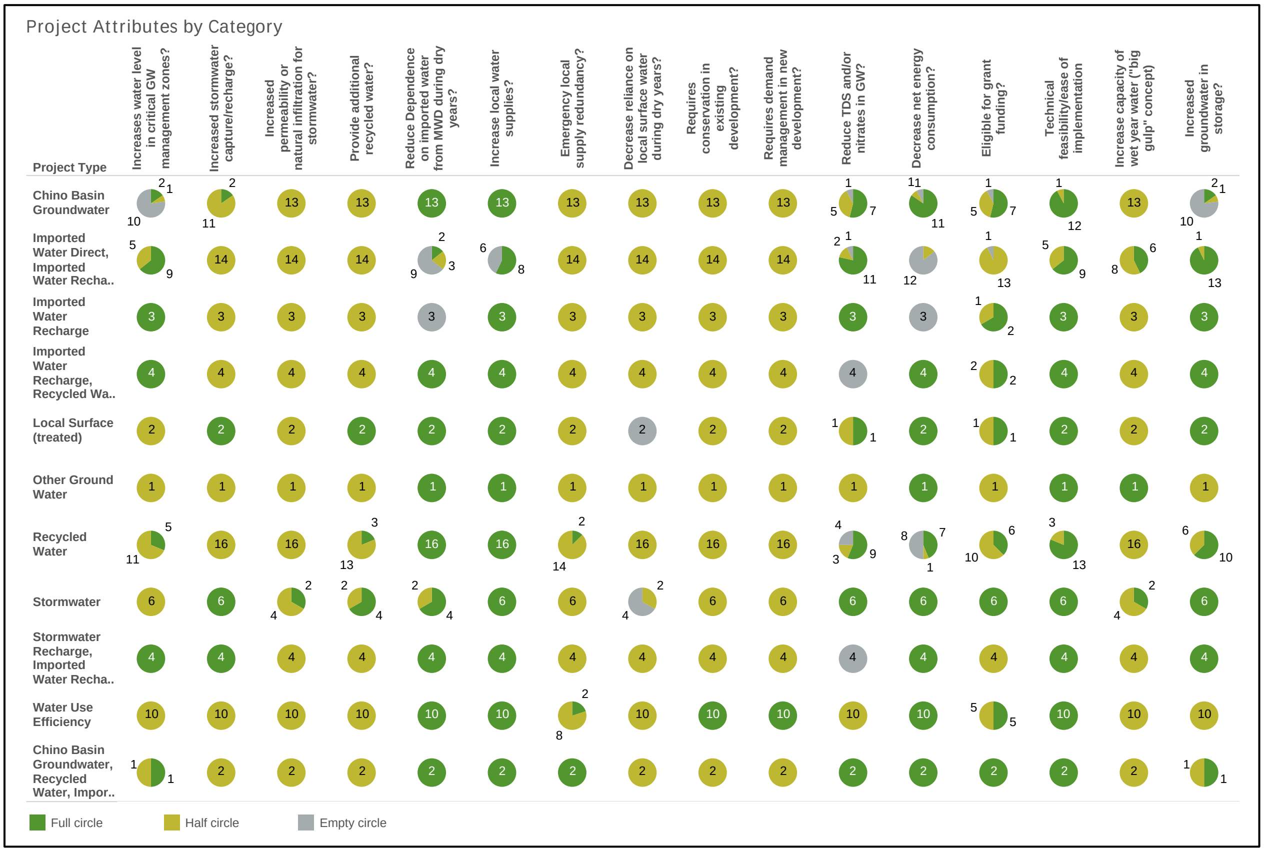


Figure 15 displays the same IEUA qualitative goals as in the previous screenshot (above), but summarizes their values within the different project categories. This shows, for example, how many projects within the more general category of "Chino Basin Groundwater" add to, detract from, or have neutral 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

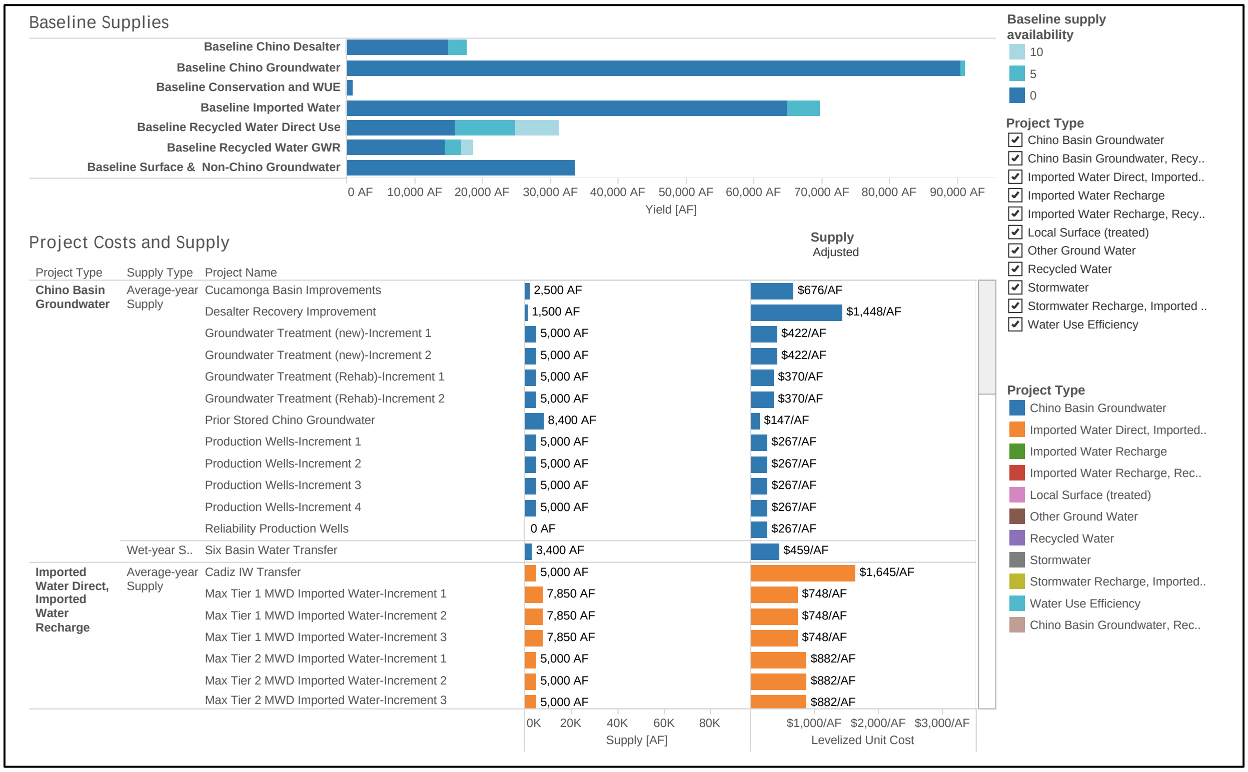
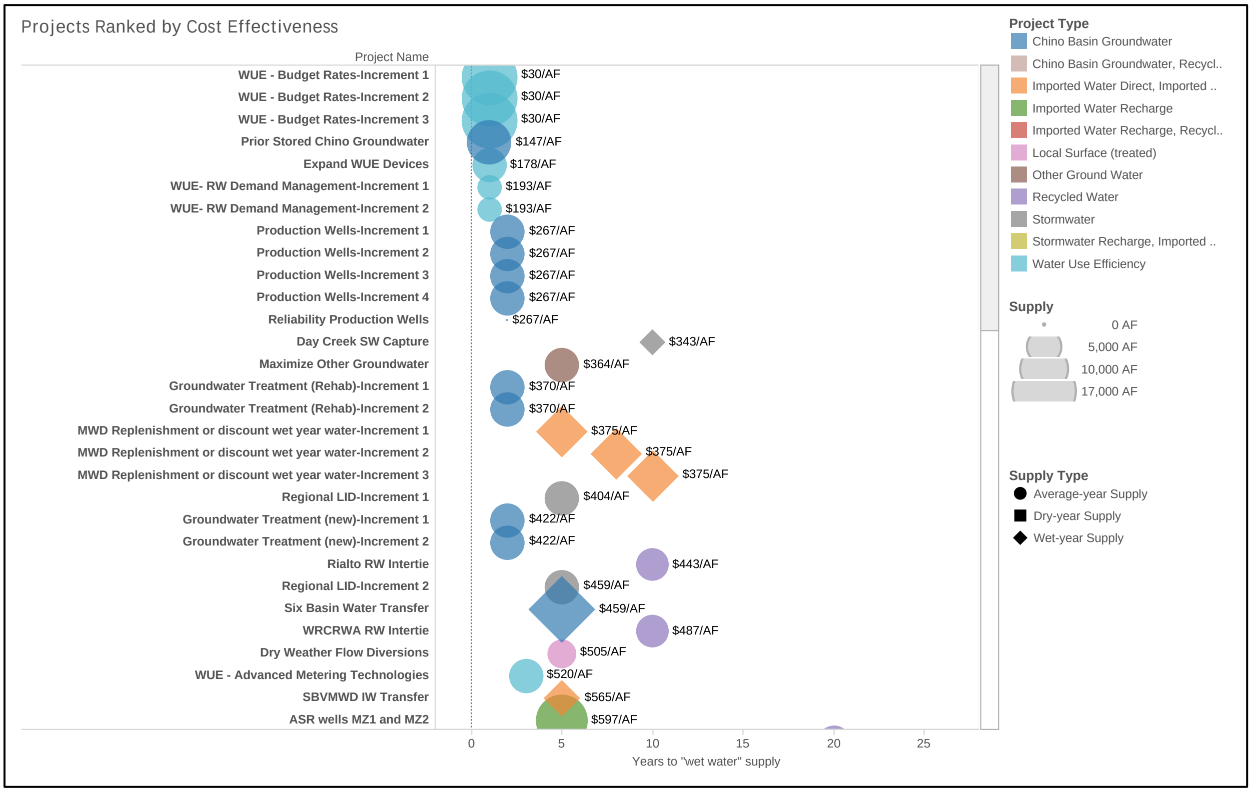


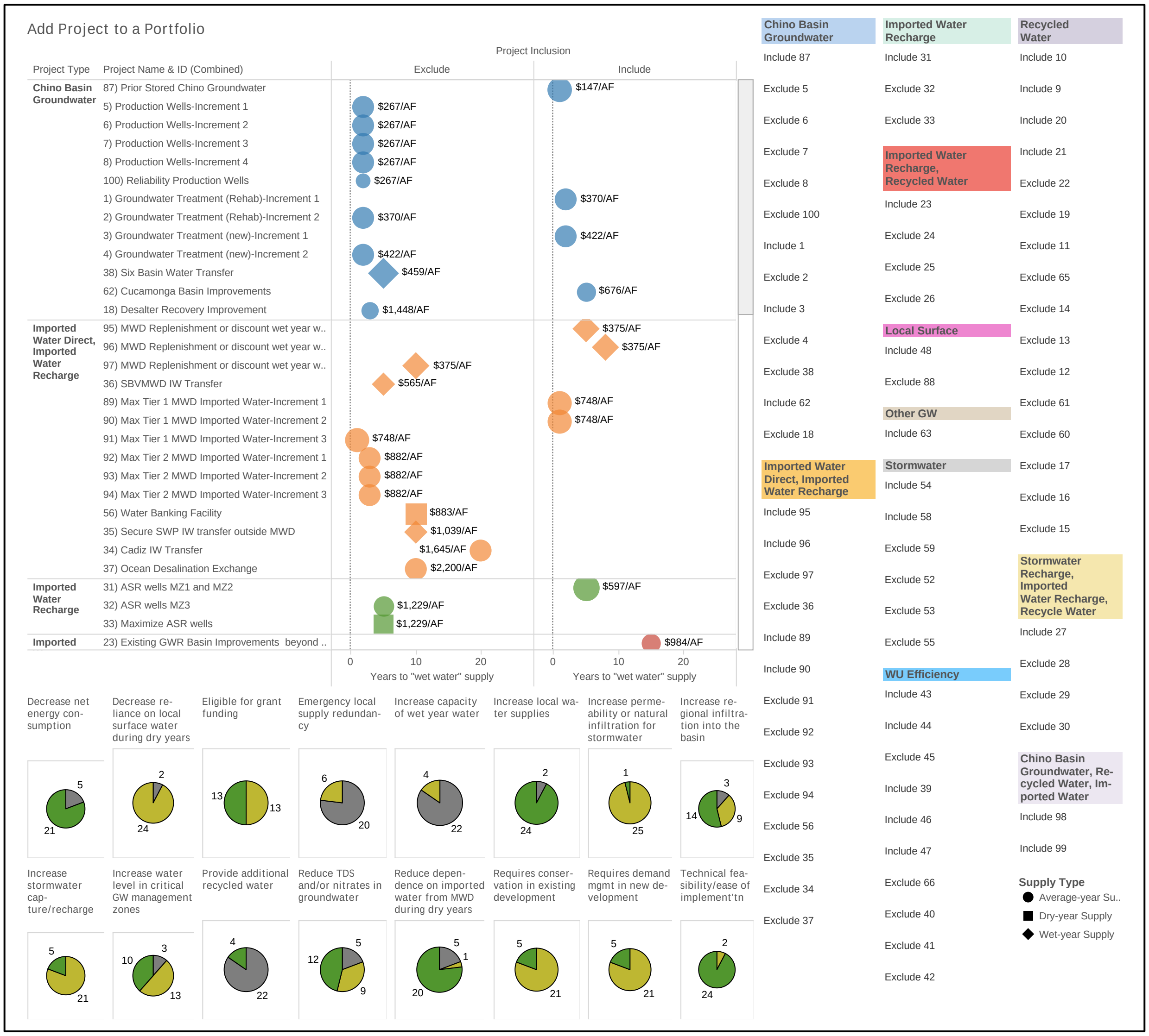
Figure 17 displays all the projects, sorted by preliminary estimates of per unit water cost (these have yet to be finalized). Symbol coloring indicates its category, size indicates its estimated volume; horizontal position indicates the number of years until which the project produces enough water to 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



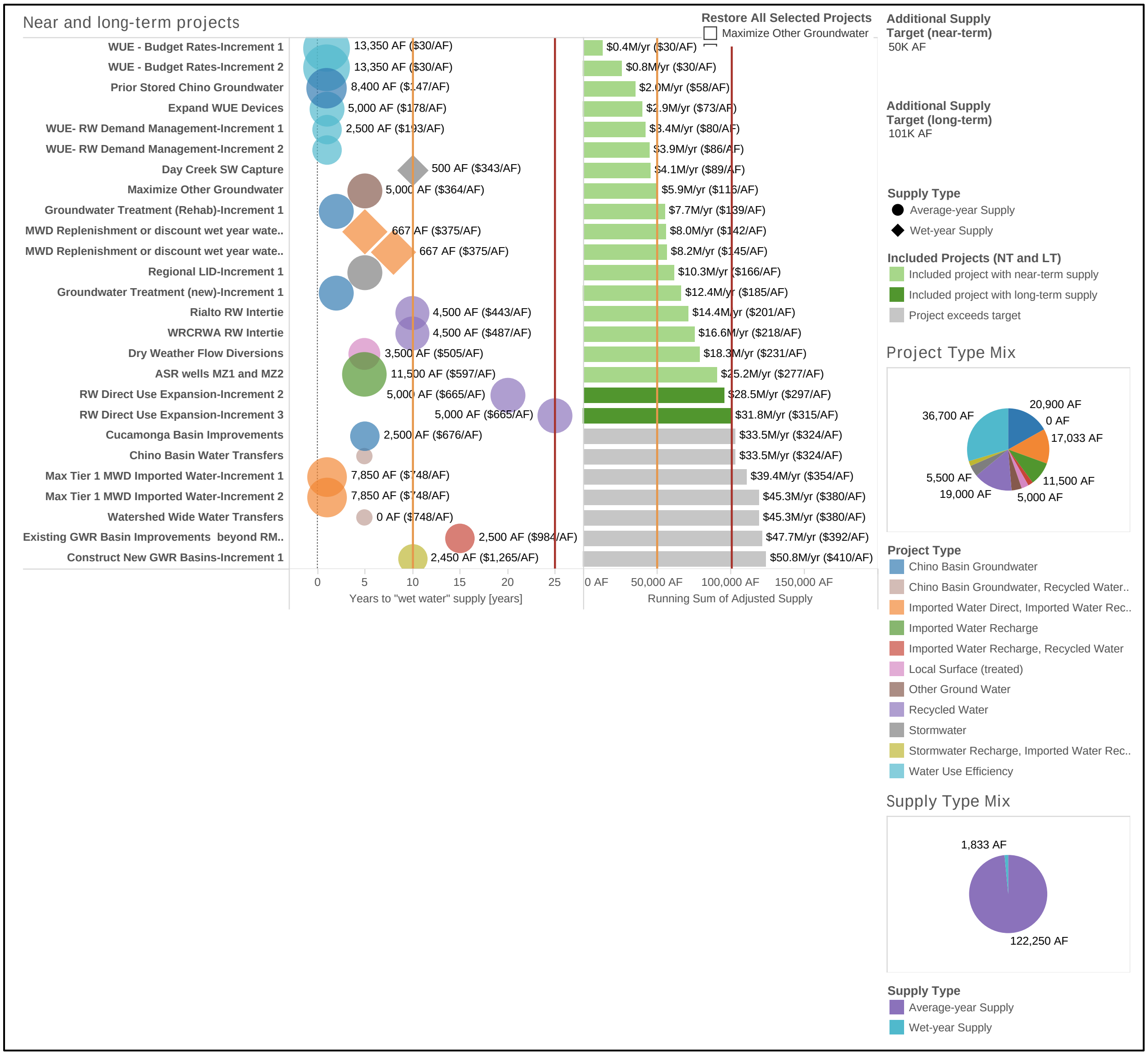
The next figures show how IEUA and member agencies were able to use the tool to create different potential portfolios of water management options. Figure 18 shows a tab in which the user is able to select individual projects to be considered in a portfolio. The user can exclude or include a project with 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



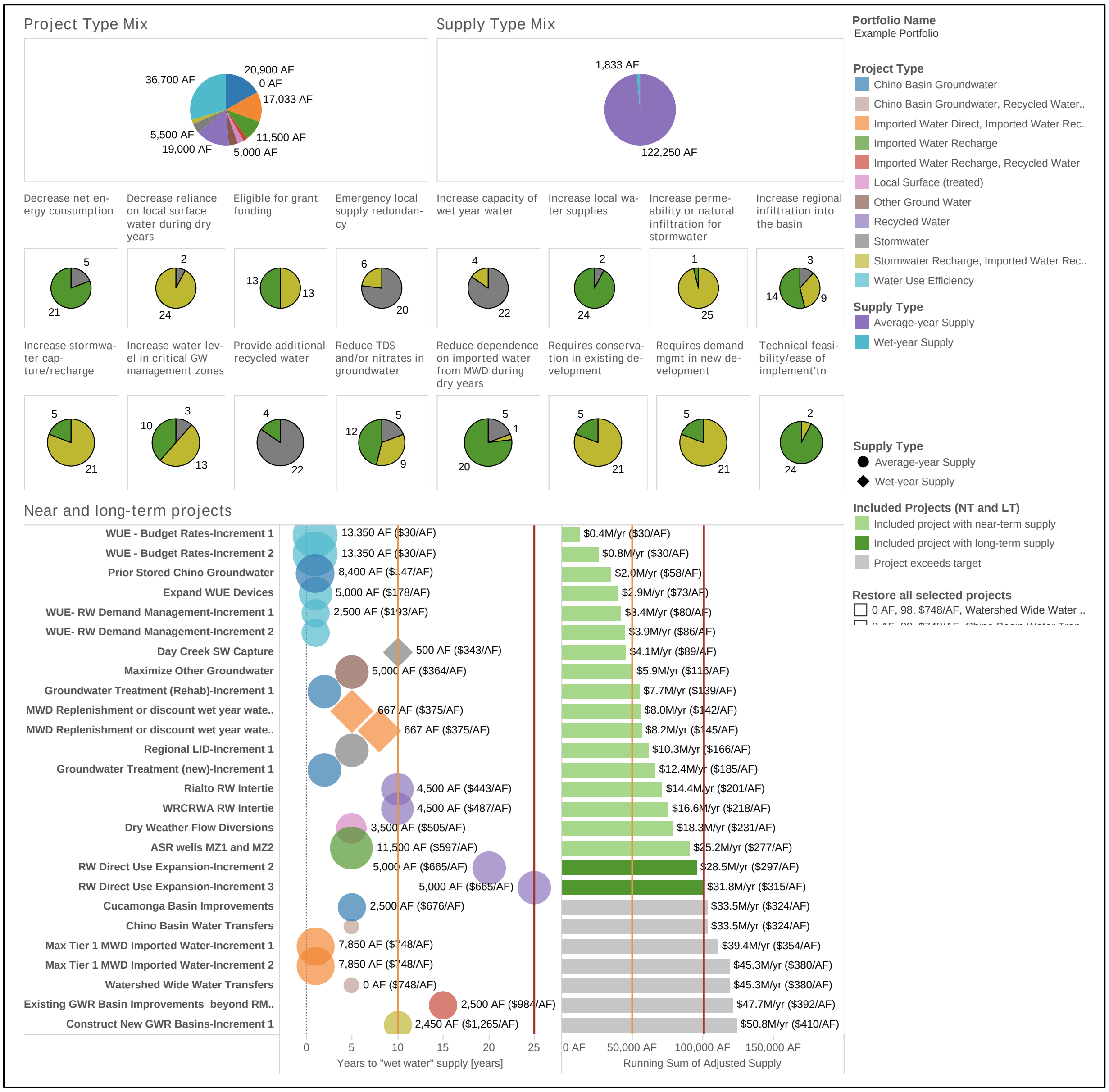
The next visualization (Figure 19) takes the options included in the previous screens and sorts them by cost effectiveness and availability to meet user-specified near-term (year 10) and long-term (year 25) targets. In this example, the near-term target is set to 50 TAF, whereas the long-term target 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

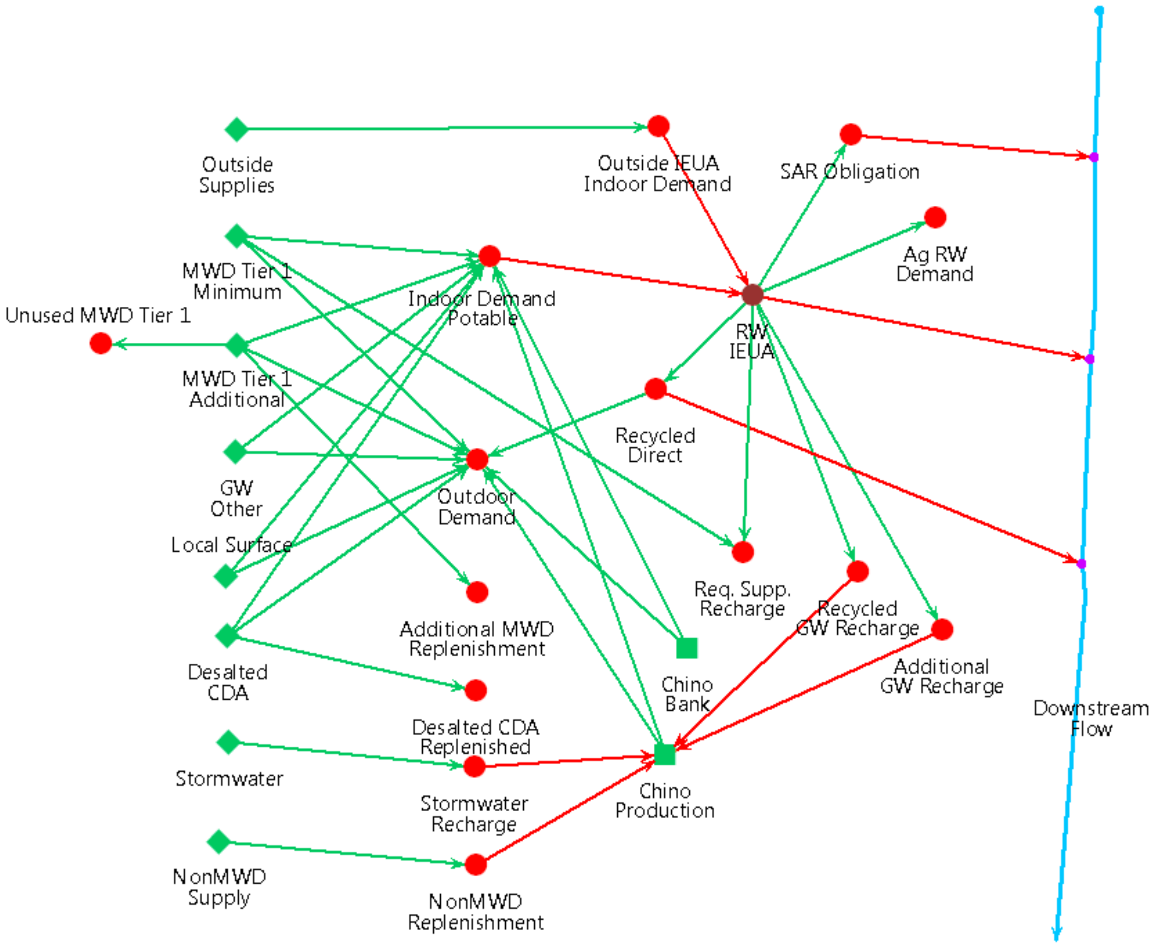
Model Overview

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

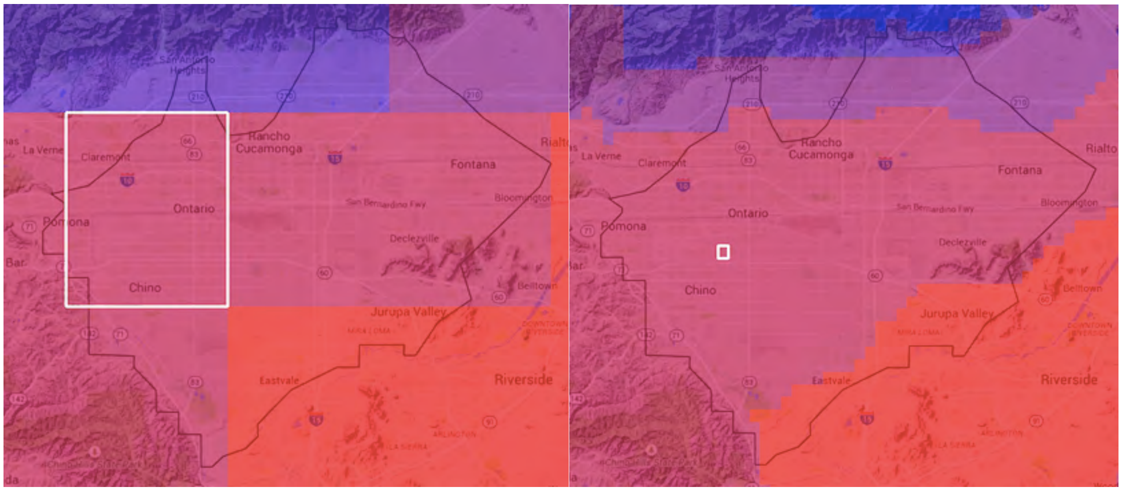
SAR Obligation	Santa Ana River flow obligation; met by recycled water
Ag RW Demand	Agricultural water demand in IEUA service area met with recycled water
Supplies	
MWD Tier 1 Minimum	Specified annual minimum Tier 1 MWD imports (about 40 TAF)
MWD Tier 1 Additional	Additional annual Tier 1 MWD imports, 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

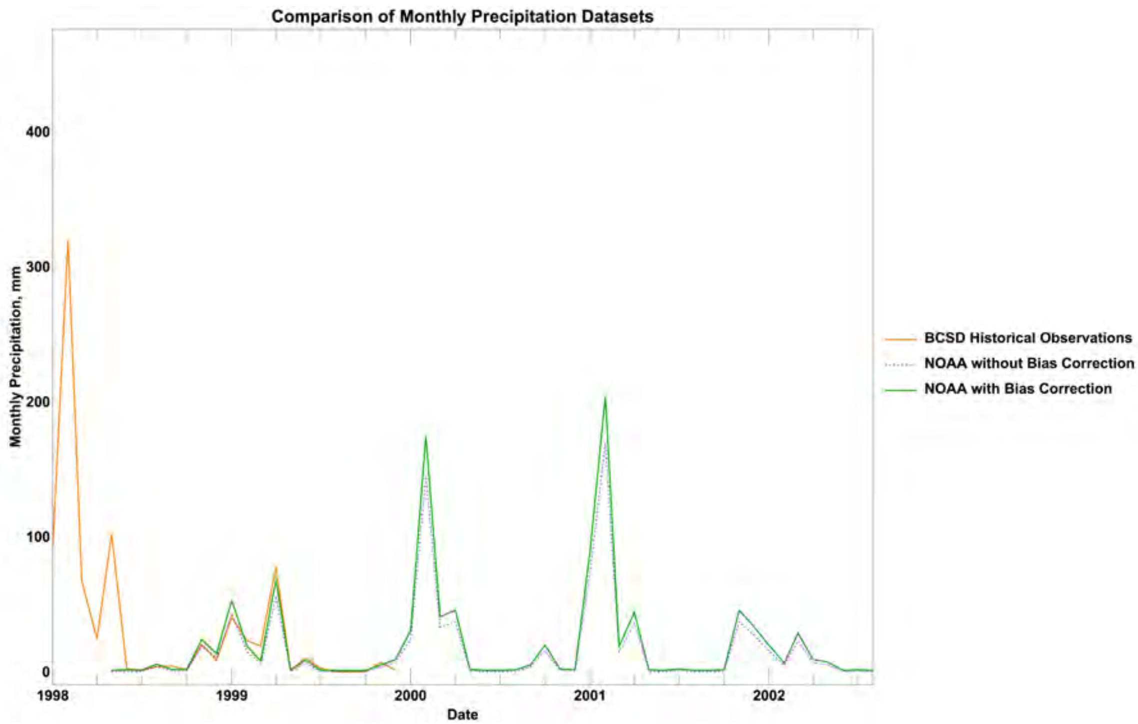
Total monthly local surface supplies within the IEUA management boundary for water years (July through June) 2010 through 2015 were provided by IEUA member agencies and represent the amount of water that is diverted, not total stream flow. To estimate these total local surface water supplies under different 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

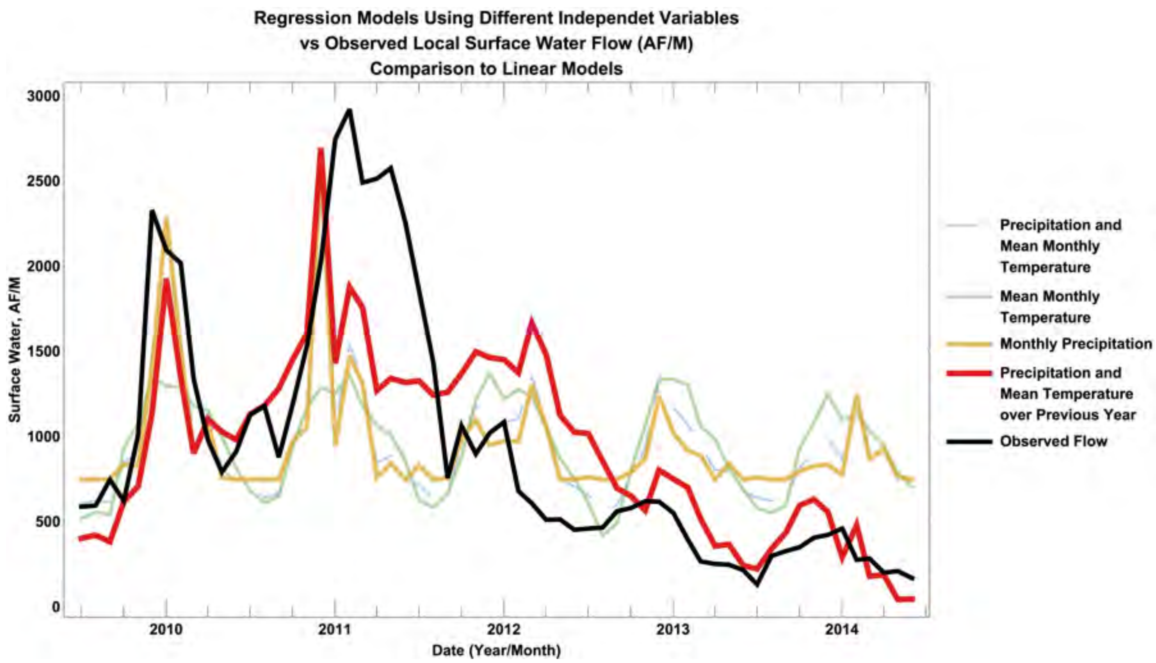
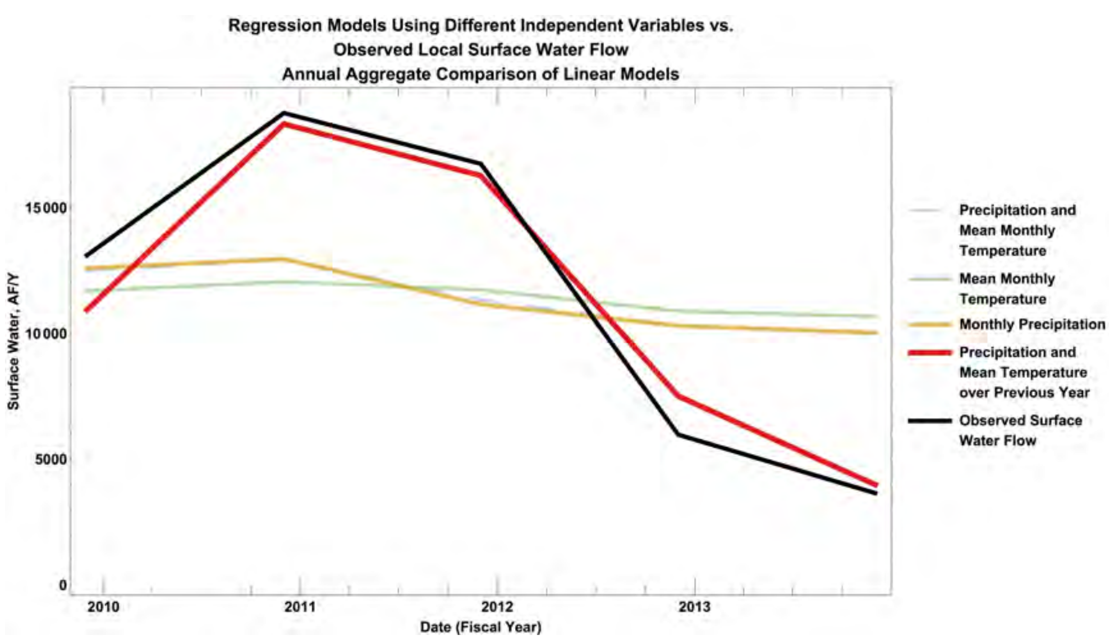


Figure 25: Four regression models averaged annually



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

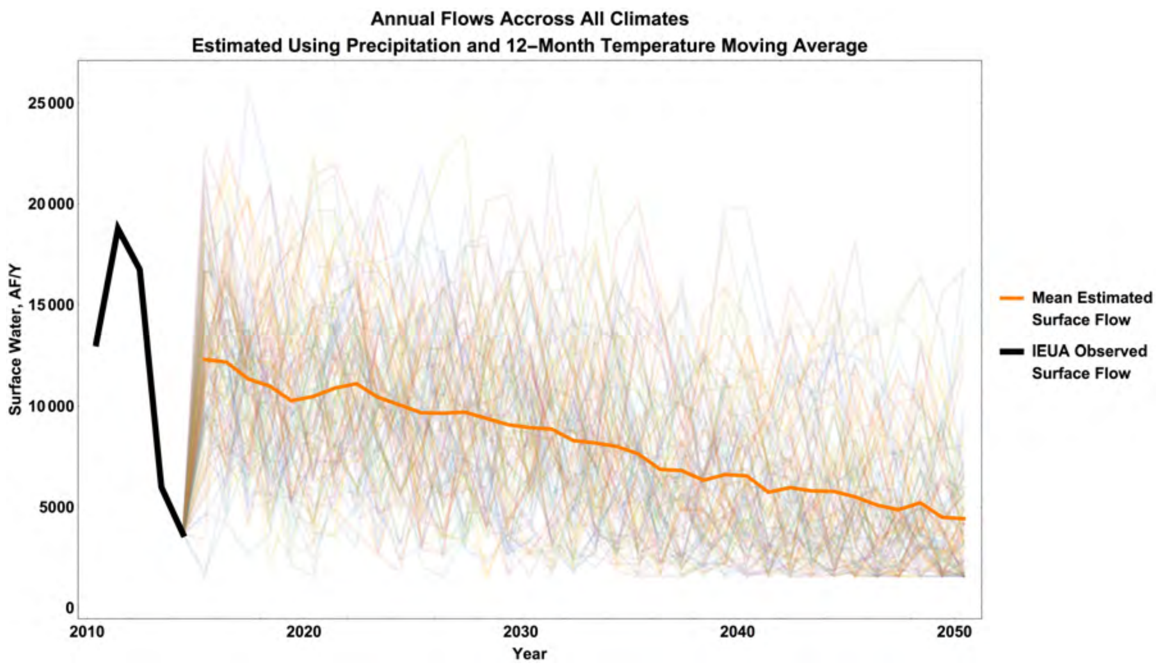
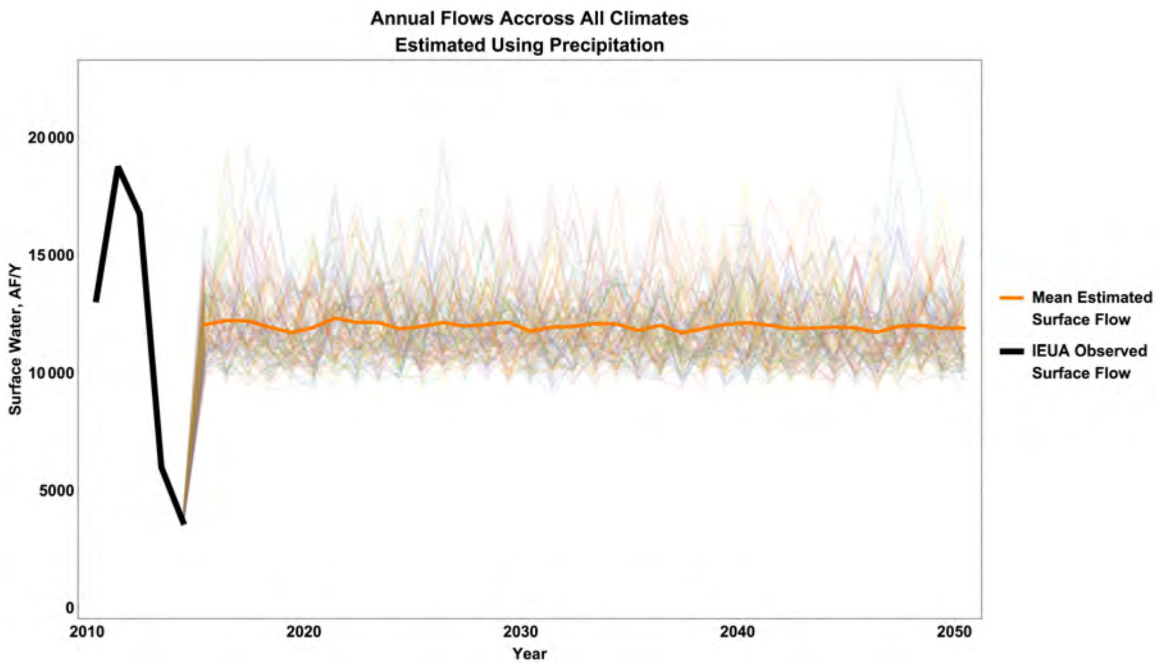


Figure 27: Annual projected IEUA surface supplies using the Precipitation regression model



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

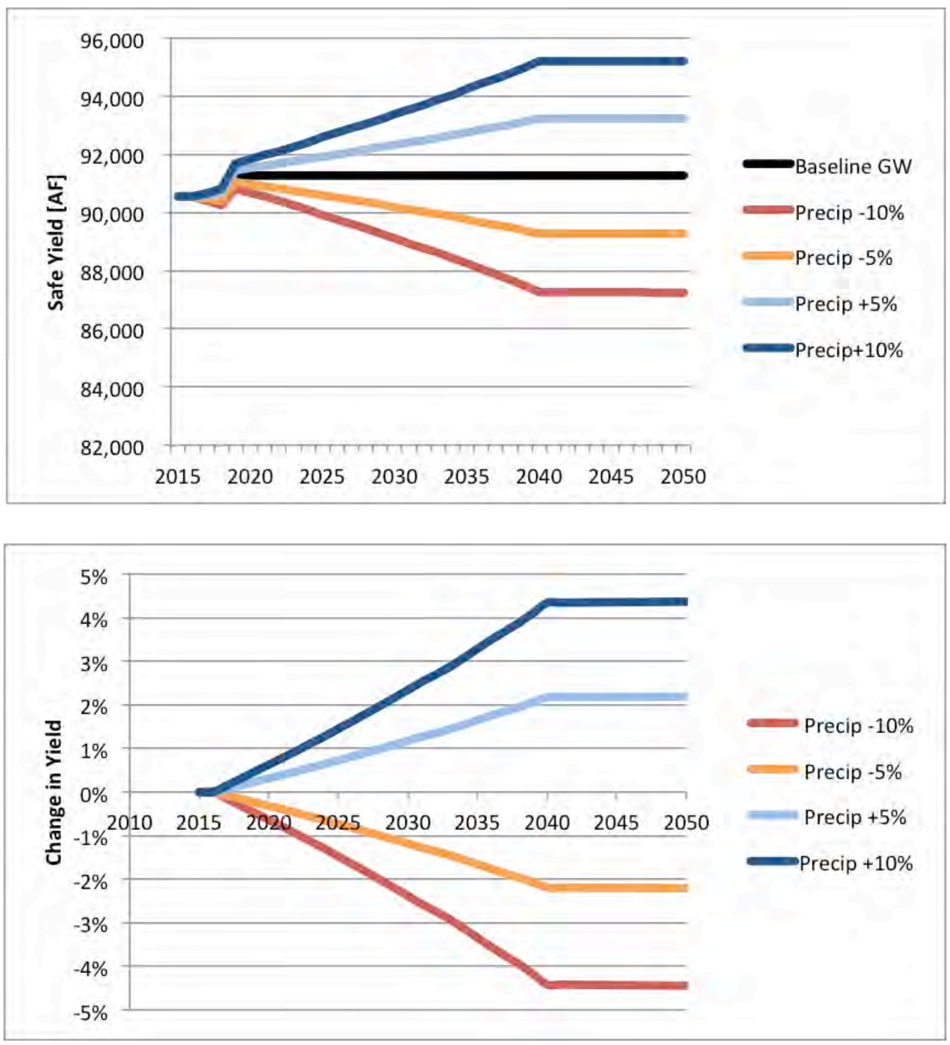
IEUA purchases water from MWD. Tier 1 water is generally used to meet urban indoor and outdoor demands. Per contract with MWD, IEUA must purchase at least 39,835 AF/year. Additional Tier 1 water, up to a total of 93,283 AF/year, is also typically made available to IEUA and is purchased when needed for 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

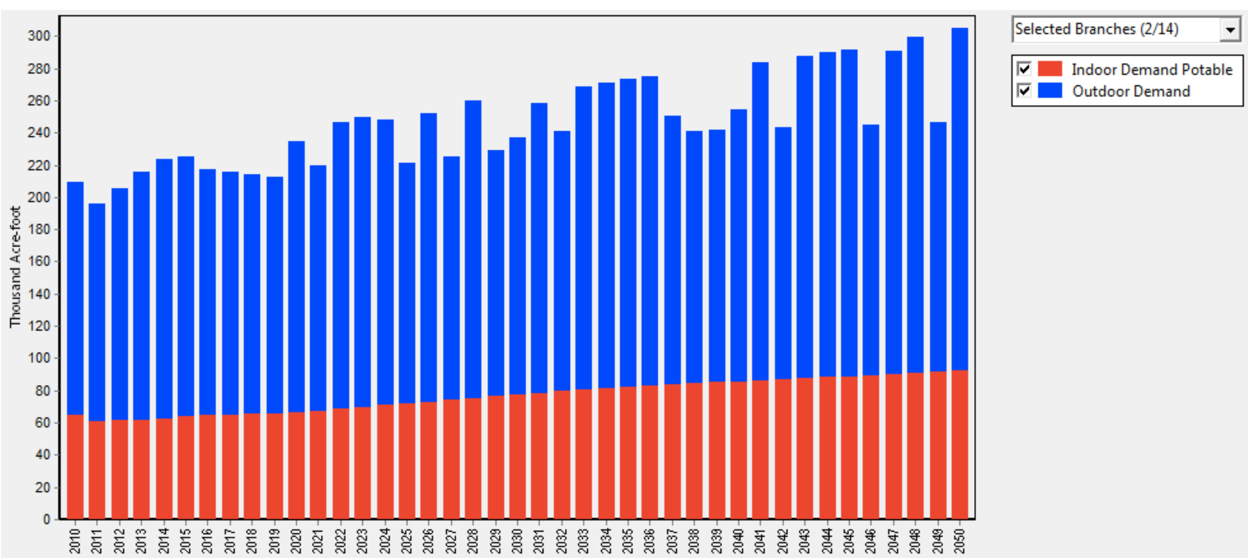


Figure 30 shows the mixture of supplies used to meet the demands in Figure 29. The largest source is Chino groundwater supplies. MWD Tier 1 supplies (minimum and additional) provide significant water. Lastly, recycled water provides about 20 percent of the supply.

Figure 30: Supplies used to meet demand for high demand scenario and historical climate

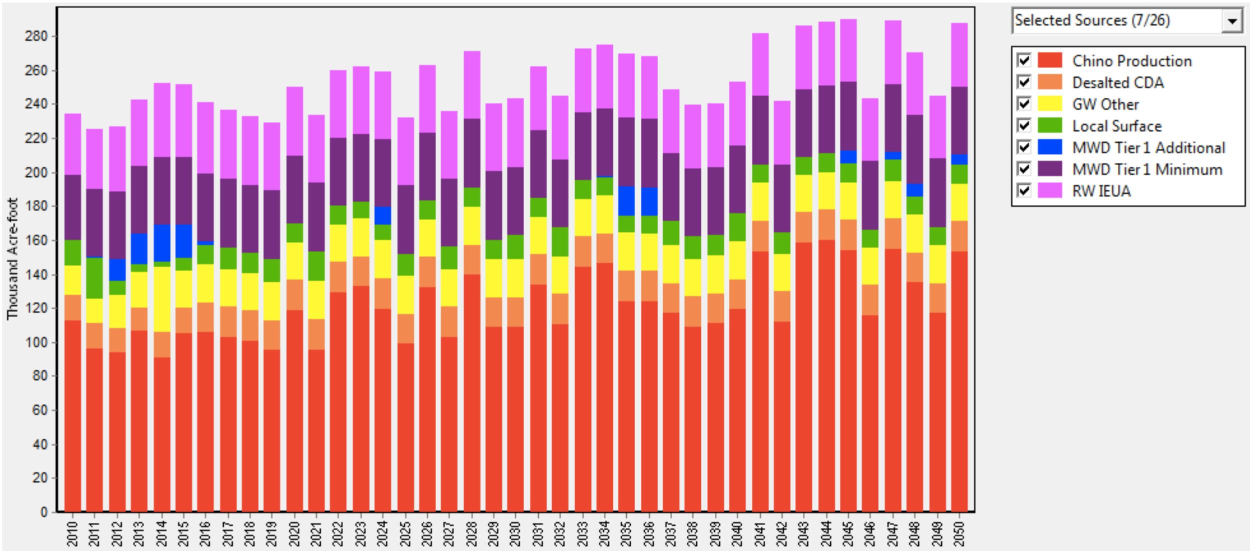


Figure 31 focuses on the recycled water portion of the IEUA system. The top bars show the inflows—return flow from IEUA indoor demand and some small amount of wastewater from outside the IEUA service area. The bottom bars show the destinations for the recycled water supply including: outdoor urban use (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

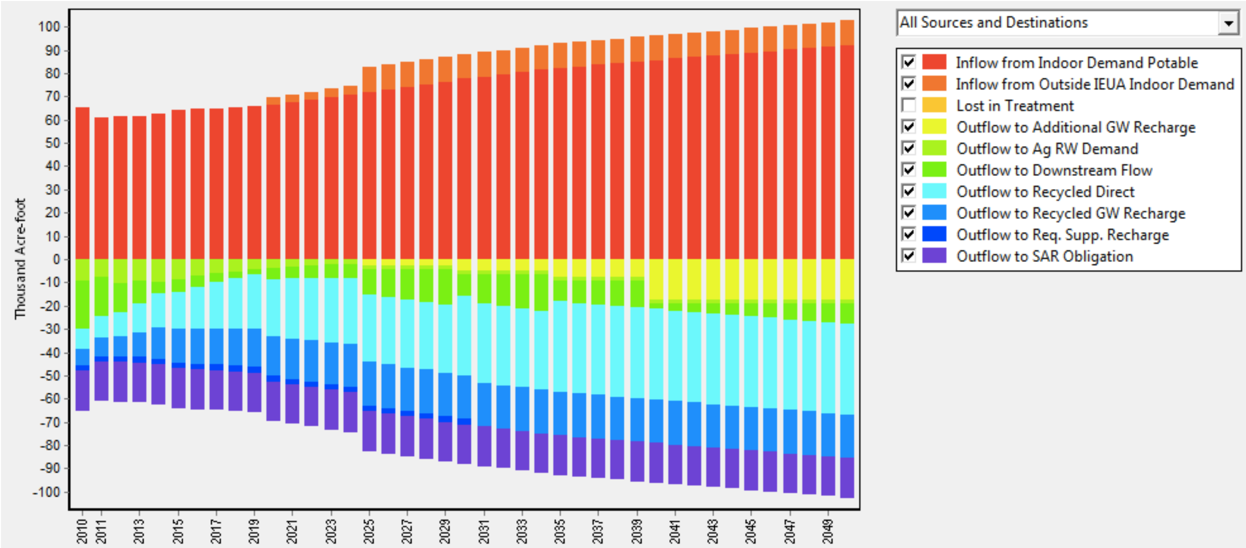
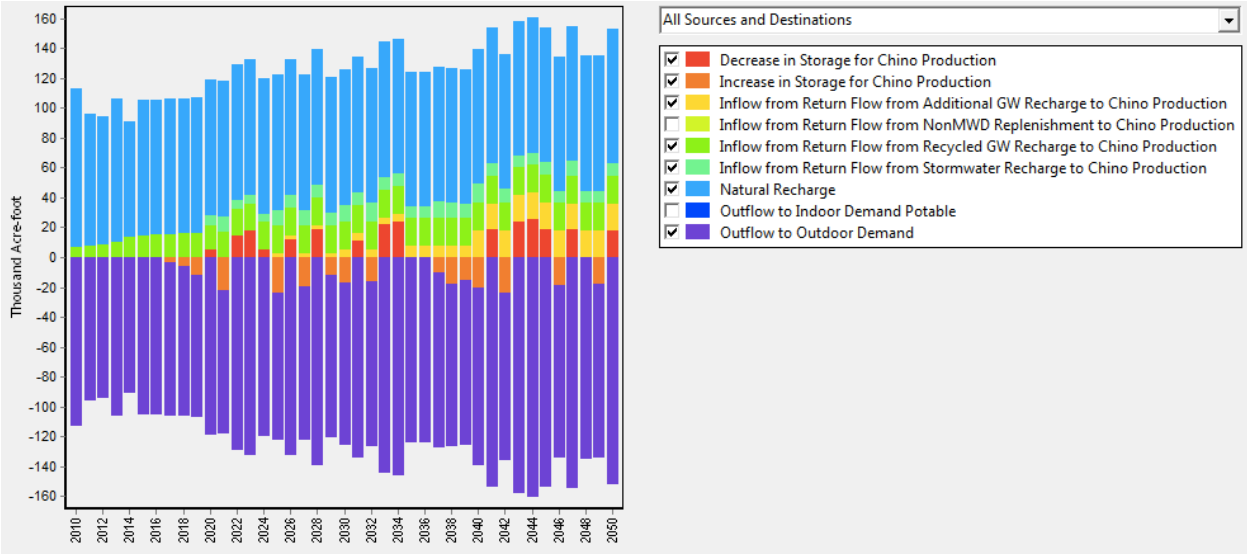


Figure 32 shows the inflows and outflows to the Chino Groundwater Basin. Natural Recharge is the largest source, but one can see how the different replenishment sources increase the inflows over time. The primary use of groundwater is to meet outdoor demands.[4] There is some modest increase and decrease 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.

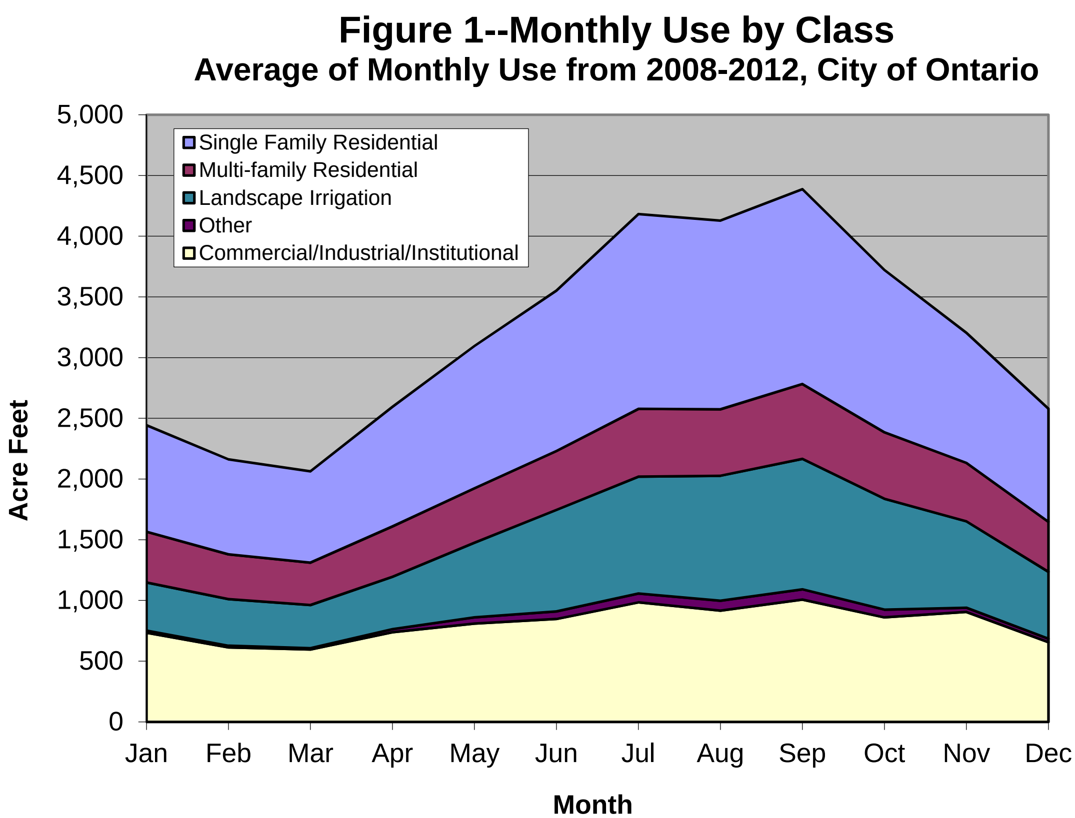
Data

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).

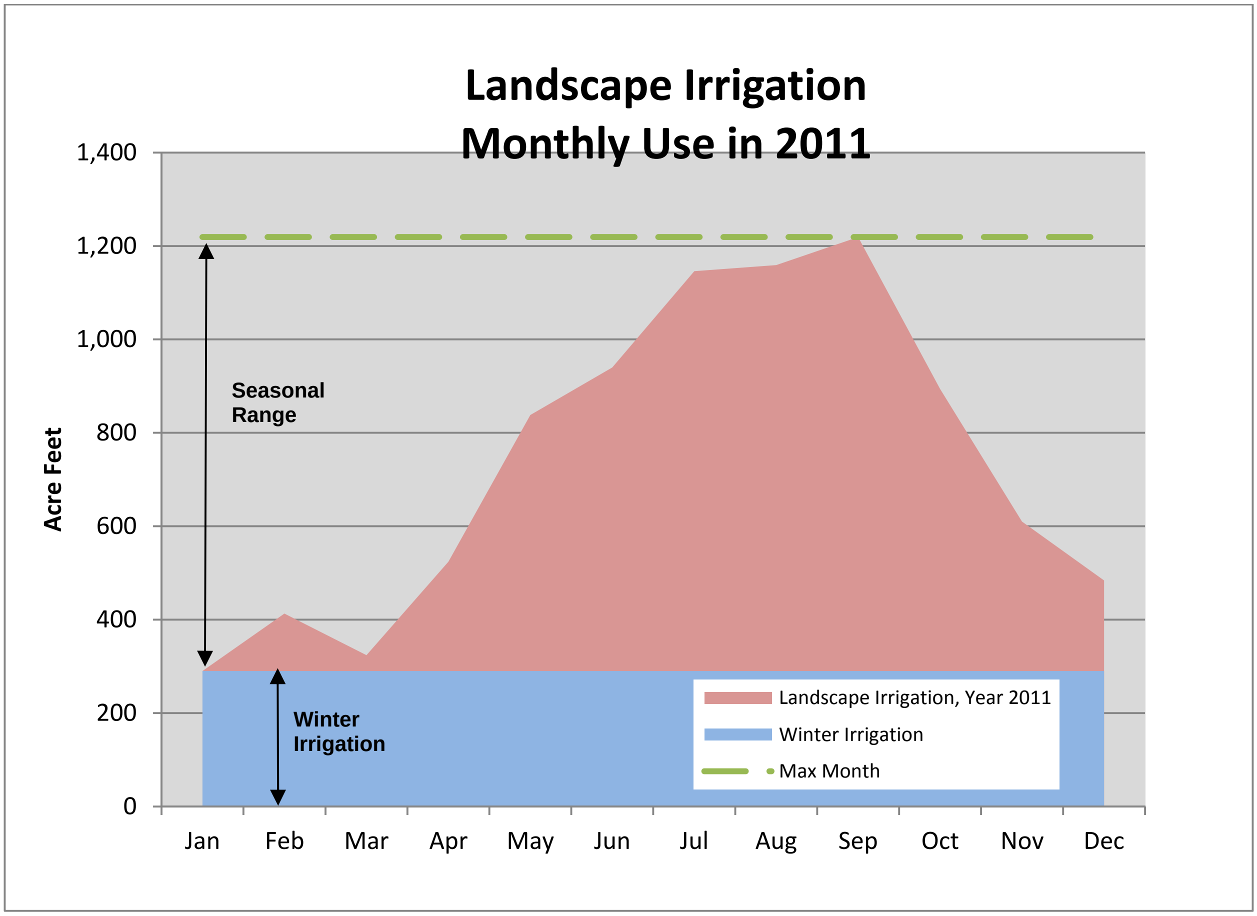
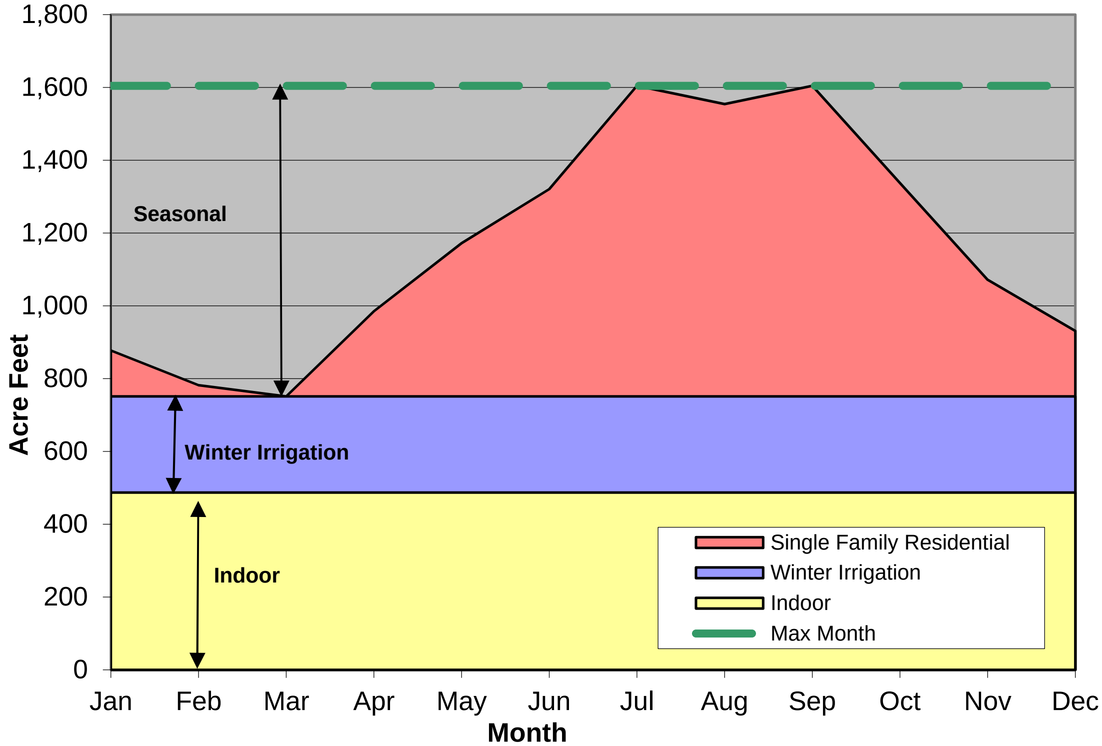


Figure 2 shows winter irrigation is 31% of seasonal range between summer and winter for dedicated irrigation accounts for the year 2011. We repeated this calculation for each year for which were able to collect data (1993 to 2012) and averaged the values to get the result we apply to customer sectors 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.

Figure 3--Single Family Residential
Average of Monthly Use from 2008-2012



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.

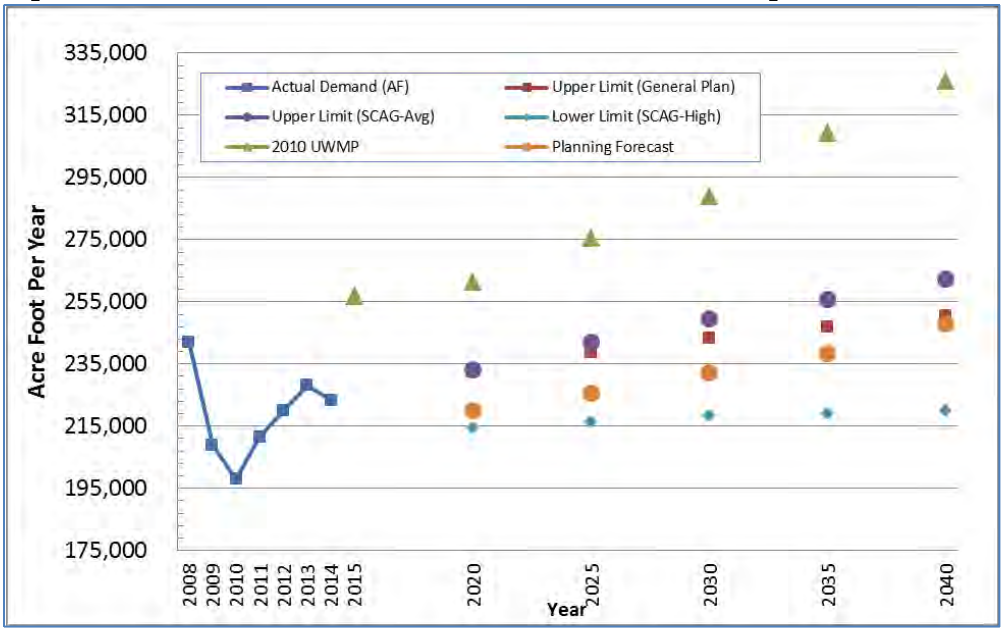
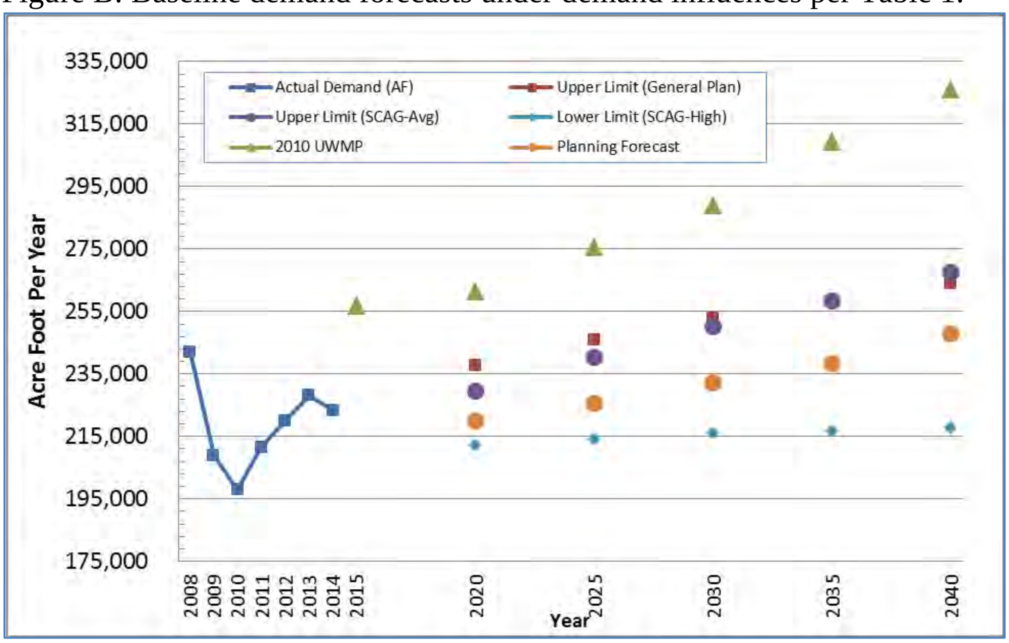


Figure B: Baseline demand forecasts under demand influences per Table 1.



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	**251,837.3**	**234,837.3**		**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**		**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**	**266,556.6**		**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**	
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**	**266,556.6**		**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**	
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**	**266,556.6**		**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**	-
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**	**266,556.6**		**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**	-

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	289.60	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	78,763.92	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 1982.
[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 (778.840 AF OSY), Feldspar Gardens in 1986 (47.540 AF 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 1988 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] SCWC permanently transferred 823.300 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.

Inland Empire Utilities Agency
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Chino, CA 91708
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Appendix K

Fiscal Year 2016/17 Ten-Year Capital Improvement Plan

ESA

Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

DRAFT

April 2016

Fiscal Year 2016/17 Ten-Year Capital Improvement Plan

Inland Empire Utilities Agency Fiscal Year 2016/17 Ten-Year Capital Improvement Plan

Inland Empire Utilities Agency
6075 Kimball Avenue
Chino, CA 91708

Table of Contents

TABLE OF CONTENTS

Abbreviations

4R	Repair, Relocation, Reconstruction, and Rehabilitation
AFY	Acre-Feet of Water per Year
AMP	Asset Management Plan
ARRA	American Recovery Rehabilitation Act
BIP	Base Interruptible Program
BCU	Baseline Capacity Units
BMPTF	Basin Monitoring Program Task Force
CASA	California Association of Sanitation Districts
CBFIP	Chino Basin Facilities Improvement Project
CBWCD	Chino Basin Water Conservation District
CBWM	Chino Basin Watermaster
CCRA	Capital Capacity Reimbursement Account
CCTV	Closed Circuit Television
CCWRF	Carbon Canyon Wastewater Recycling Facility
CDA	Chino Desalter Authority
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH4	Methane
CO2	Carbon Dioxide

CO2-eq	CO2 Equivalent
CPUC	California Public Utilities Commission
CSI	California Solar Incentive
CSDLAC	County Sanitation Districts of Los Angeles County
CUWCC	California Urban Water Conservation Council
CVWD	Cucamonga Valley Water District
DA	Direct Access
DCS	Distribution Control System
DR	Demand Response
DWR	Department of Water Resources
DYY	Dry Year Yield
EDU	Equivalent Dwelling Unit
ESP	Electricity Service Provider
FMP	Facilities Master Plan
FSL	Firm Service Level
FY	Fiscal Year
GG	Administrative Services Program
GPD	Gallons per Day
GPS	Global Positioning System
GWP	Global Warming Potential
H2S	Hydrogen Sulide`
HFC	Hydroluorocarbon`

HVAC	Heating/Ventilation/Air Conditioning
ICE	Internal Combustion Engine
IE	Inland Empire
IERCF	Inland Empire Regional Composting Facility
IEUA	Inland Empire Utilities Agency
IRP	Integrated Resource Plan
KPI	Key Performance Indicators
KW	Kilowatt
LOC	Lewis Operating Company
LOS	Level of Service
MACR	Modified Accelerated Cost-Recovery
mg/L	Milligrams per liter
MGD	Million Gallons per Day
MW	Megawatts
MG	Million Gallons
MWH	Megawatt Hours
MOU	Memorandum of Understanding
MVWD	Monte Vista Water District
MWD	Metropolitan Water District of Southern California
N2O	Nitrous Oxide
NC	Non-Reclaimable Wastewater Program Capital Fund
NEM	Net Energy Metering

NPDES	National Pollutant Discharge Elimination System
NRW	Non-Reclaimable Wastewater
NRWS	Non-Reclaimable Wastewater System
O&M	Operations & Maintenance
OBMP	Optimum Basin Management Plan
OBMP	Optimum Basin Management Plan
OCSD	Orange County Sanitation District
OWOW	One Water One Watershed
PPA	Power Purchase Agreement
PFC	Perluorocarbon`
PEIR	Program Environmental Impact Report
RC	Regional Capital Improvement (Wastewater) Fund
RCA	Regional Composting Authority
RDA	Redevelopment Agency
REC	Renewable Energy Credit
RO	Regional Operations and Maintenance (Wastewater) Fund
RP-1	Regional Plant No.1 in the City of Ontario
RP-2	Regional Plant No.2 in the City of Chino
RP-4	Regional Plant No.4 in the City of Rancho Cucamonga
RP-5	Regional Plant No.5 in the City of Chino
R&R	Repair and Replacement
RW	Groundwater Recharge Fund

RWC	Recycled Water Contribution
RWRP	Regional Water Recycling Plants
RWQCB	Regional Water Quality Control Board
SAWA	Santa Ana Watershed Association
SAWPA	Santa Ana Watershed Project Authority
SBCFCD	San Bernardino County Flood Control District
SCADA	Supervisory Control and Data Acquisition
SCAP	Southern California Alliance of Publicly-Owned Treatment Works
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SF6	Sulfur Hexaluoride`
SGIP	Self-Generation Incentive Program
SHF	RP-5 Solids Handling Facility
SRF	State Revolving Fund
SWRCB	State Water Resources Control Board
TA&TI	Technical Assistance and Technology Incentives
TDS	Total Dissolved Solids
TIN	Total Inorganic Nitrogen
TOU-BIP	Time-of-Use Base Interruptible Program
TYCIP	Ten-Year Capital Improvement Plan
UPC	Unit Production Cost
USBR	United States Bureau of Reclamation

UWMP Urban Water Management Plan

VFD Variable Frequency Drives

WC Recycled Water Program Fund

WFMP Wastewater Facilities Master Plan

WSAP Water Supply Allocation Plan

WUE Water Use Efficiency

Introduction

PURPOSE OF TEN-YEAR CAPITAL IMPROVEMENT PLAN

The purpose of a capital improvement plan is to catalog and schedule capital improvement projects over a multiyear period. Each year, pursuant to the terms of the Regional Sewage Service Contract, the Inland Empire Utilities Agency (Agency/IEUA) submits a ten-year forecast of capacity demands and capital projects called the Ten-Year Capital Improvement Plan (TYCIP) to the Regional Technical and Policy Committees. This TYCIP identifies projects for the Fiscal Years (FY) 16/17 through FY 25/26 that are needed for the rehabilitation, replacement, or expansion of the facilities owned or operated by the Agency.

The TYCIP is a document which links the vision of the Agency with a list of physical projects to fulill` that purpose. Projects identiied` in the TYCIP are necessary to accomplish the Agency's goals based on physical conditions of assets and forecasted regional projections of water and wastewater needs. Based on these projections, the TYCIP proposes a schedule for the implementation of projects based on necessity. The timing of the projects identiied` in the TYCIP are further reined` during the Capital Budget based on the availability of financial resources.

DEFINITION OF A CAPITAL PROJECT

The TYCIP is composed of a list of Capital Projects. Capital Projects are projects which involve the purchase, improvement or construction of major ixed` assets and equipment, which are typically large in size, expensive, and permanent. Examples of capital projects include the expansion of treatment plants and the construction of pipeline and pump stations.

REGIONAL SEWAGE SERVICE CONTRACT REQUIREMENTS AND TYCIP ADOPTION

The Regional Sewage Service Contract is the guiding document that deines` the terms of the services and facilities in the Agency's regional sewage system. The contract was originally signed in January 1973, amended in April 1984, and is due for renewal in January 2023, 50 years after it was originally executed.

Per the Regional Sewage Service Contract, the TYCIP includes wastewater .low forecasts and a description of planned capital projects, including any necessary facility expansions, major asset repair and rehabilitation, and major capital equipment purchases. Projected annual expenditures and inanci ng will be developed in the Agency's annual Operating and Capital Program Budget. After comments and recommendations from the Regional Technical and Policy Committees have been considered and incorporated, the TYCIP is presented to the Agency's Board of Directors for adoption.

CONNECTION OF TYCIP TO OTHER AGENCY PLANNING INITIATIVES

The TYCIP is one of several critical planning documents involved in the formation of capital improvements. These include:

- IEUA Business Goals
- IEUA Strategic Plan
- Urban Water Management Plan
- Facilities Master Plan Program Environmental Impact Report
- Asset Management Plan
- Ten Year Capital Improvement Plan
- Operating and Capital Program Budget
- Long-Range Plan of Finance
- Integrated Water Resources Plan
- Recycled Water Program Strategy
- Groundwater Recharge Master Plan Update

The IEUA Business Goals (2013) guide the development of the capital improvement program, operational budget, and organizational goals and objectives. The objectives and commitments outlined in the document establish the framework for the direction of the Agency and subsequent planning efforts. The Goals relect the Agency's commitment to deliver high-quality, reliable services to customers in a regional, cost-effective manner through prudent inanc ial planning and strategic resource management. Goals were categorized into six main areas: Fiscal Responsibility, Workplace Environment, Business Practices, Water Reliability, Wastewater Management and Environmental Stewardship. To meet these commitments the Agency is also conducting studies to establish baseline conditions at the regional water recycling plants (RWPS), such as an Odor Assessment Panel Study.

The IEUA Strategic Plan serves as a transitional document between the IEUA Business Goals and the annual Operating and Capital Program Budget (Budget). Every two years a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis based on the current business environment is completed by executive management to update strategies within the IEUA Strategic Plan. These strategies introduce actions and timeframes to the high level IEUA Business Goals. In turn, those strategies become speciic work plans containing department goals and objectives referenced in the budget book. The Strategic Plan, with a rolling five-year timeframe, outlines the fundamental decisions that shape what the Agency plans to accomplish and sets a rational course of action.

The 2010 Urban Water Management Plan (UWMP) and 2002 Facilities Master Plan Program Environmental Impact Report (FMP PEIR) are long-range planning documents that provide a vision of the desired future water resources and wastewater facilities programs for the Agency. The FMP PEIR links together three major fundamental master planning documents: the Chino Basin Organics Management Strategy (May 2001), the Recycled Water System Feasibility Study (2002), and the Wastewater Facilities Master Plan (2002). Within these documents, projects are identified to accommodate changes within the service area, such as increasing and shifting population growth, wastewater flows, water and recycled water supply demands, and salinity management. The Agency is currently updating these documents and developing an Integrated Resources Plan (IRP), which will be the foundation for the Agency's major programs. The IRP is targeted to be published in August 2015. Once the updated planning documents have been completed, identiied projects will be used to generate a new Programmatic Environmental Impact Report (PEIR) that will be used to guide the Agency's future planning initiatives.

The Agency's first Asset Management Plan (AMP) was completed in 2014. The AMP provides an up-to-date inventory and status assessment of the physical assets owned by the Agency to determine the future funding requirements needed to maintain, repair, and manage these assets. A key component of developing the AMP is assembling a comprehensive list of the Agency's assets at each of the regional water recycling plants, recycled water distribution system, Inland Empire Regional Composting Facility, regional sewer system, and non-reclaimable wastewater system. Projects identiied in the AMP will be instrumental in prioritizing and planning for the repair and replacement of equipment and facilities. AMP updates will be done on an annual basis and align with the TYCIP and budget processes.

The TYCIP identiies and prioritizes the capital assets required to successfully carry out the Agency's dual mission of providing wastewater treatment services and wholesale potable water supplies to the service area in an environmentally responsible manner over the next ten years. The TYCIP contains projects identiied by the maintenance, operations, engineering, and planning departments and will be used to determine revenue requirements and long-term rates and inancial impacts to fund the proposed projects and anticipated operating costs. The TYCIP has historically been updated annually, but will move to a biannual cycle effective FY 16/17.

The annual Budget is an implementation document that prioritizes the identiied physical improvements in the TYCIP and links them with available in ancial resources for the upcoming year. The FY 16/17 Budget will be published in June, 2015.

The Long-Range Plan of Finance is a document analyzing the long-term implications of inancial decisions. Short-term actions can have far reaching implications and impact the Agency's future financial standing and available options. As a result, the Finance Department is in the process of completing the Long-Range Plan of Finance which is projecting in ancial trends over a 50-year period. This way the Agency can better anticipate and prepare for necessary adjustments and reduce sudden budgetary impacts to stakeholders and operations. The Agency is also doing a rate study in conjunction with the Long-Range Plan of Finance to evaluate connection fees and rates.

The Integrated Water Resources Plan (IRP) is the region's blueprint for ensuring reliable, cost-effective and environmentally responsible water supplies through 2040. The IRP evaluated current and future water supplies, and accounted for possible luctuations in demand forecasts due to climate change impacts. IRP Phase 1, which tested eight regional supply strategies was completed in March 2016. IRP Phase 2, which will begin in July 2016, will focus on detailed modeling of identii ed local and regional projects.

The Recycled Water Program Strategy (RWPS) provided an updated forecast of regional direct use and recycled water available for groundwater recharge. Priority projects were identiied through 2040 and were incorporated into both the IRP Phase 1 baseline supply assessments and the TYCIP project lists.

The 2013 Groundwater Recharge Master Plan Update identiied and prioritized recharge improvement projects, locations for new recharge basins, and locations for existing basin expansion projects. RMPU projects that the region have committed to are incorporated into both the IRP the IRP Phase 1 baseline supply assessments and the TYCIP project lists.

IEUA Overview

INTRODUCTION

The Agency is a regional wastewater treatment agency and wholesale distributor of imported water. The Agency is responsible for serving approximately 844,000 people[1] over 242 square miles in western San Bernardino County. The Agency is focused on providing three key services: (1) treating wastewater, developing recycled water, local water resources, and conservation programs to reduce the region's dependence on imported water supplies and provide local supply resiliency to the service area; (2) converting biosolids and waste products into a high-quality compost made from recycled materials; and (3) generating electrical energy from renewable sources. This Ten-Year Capital Improvement Plan, beyond being a requirement of the Regional Sewage Service Contract between the Agency and its Contracting Agencies, is also a means of communicating the future projects and capital spending needed for future demands in the service area.

FORMATION & PURPOSE

The Agency was originally formed as the Chino Basin Municipal Water District on June 6, 1950 as a municipal corporation with the mission to supply supplemental imported water purchased from the Metropolitan Water District of Southern California (MWD) to municipalities in the Chino Basin. Since then, the Agency has expanded its mission from a supplemental water supplier to include regional wastewater treatment with both domestic and industrial disposal systems, and energy production facilities. In addition, the Agency has become a major provider of recycled water, a supplier of biosolids/compost materials, and continues its leading role in water quality management and environmental protection in the Inland Empire.

GOVERNANCE

The Agency is a special district which is governed by five publicly elected Board of Directors. Each director is assigned to one of the five divisions: Division 1- Upland/

[1] *Source: California Department of Finance*

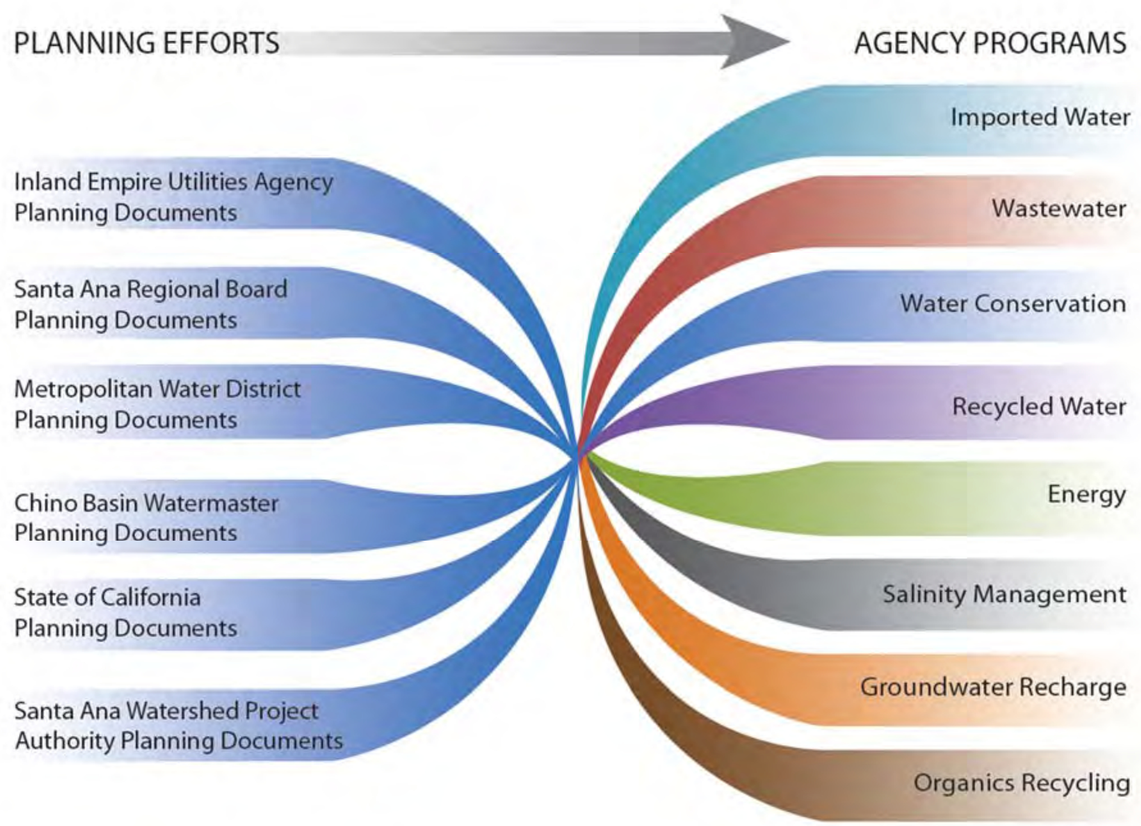
Montclair; Division 2- Ontario/Agricultural Preserve; Division 3- Chino/ Chino Hills; Division 4- Fontana; and Division 5- Rancho Cucamonga. Monthly meetings are also held with the Regional Technical and Policy Committees comprised of representatives from each of the Agency's Regional Sewer Service Contracting Agencies. These Committees discuss and provide information on technical and policy issues affecting the Agency.

INTER-AGENCY COORDINATION IN THE CHINO BASIN

The Agency joined the Santa Ana Watershed Project Authority (SAWPA) in 1972 to participate in regional watershed-scale planning. The Agency also sits on the Board of Directors for MWD, SAWPA, and Chino Basin Watermaster (CBWM).

The Agency collaborates with SAWPA, MWD, CBWM, and the Regional Water Quality Control Board (RWQCB) to develop regional planning documents. The Agency also works with state agencies, such as the Department of Water Resources and CalEPA in the development of State of California planning documents. Figure 2 below illustrates how the various regional and state planning documents are tied to the Agency's capital and operational programs.

FIGURE 2: COORDINATED REGIONAL PLANNING

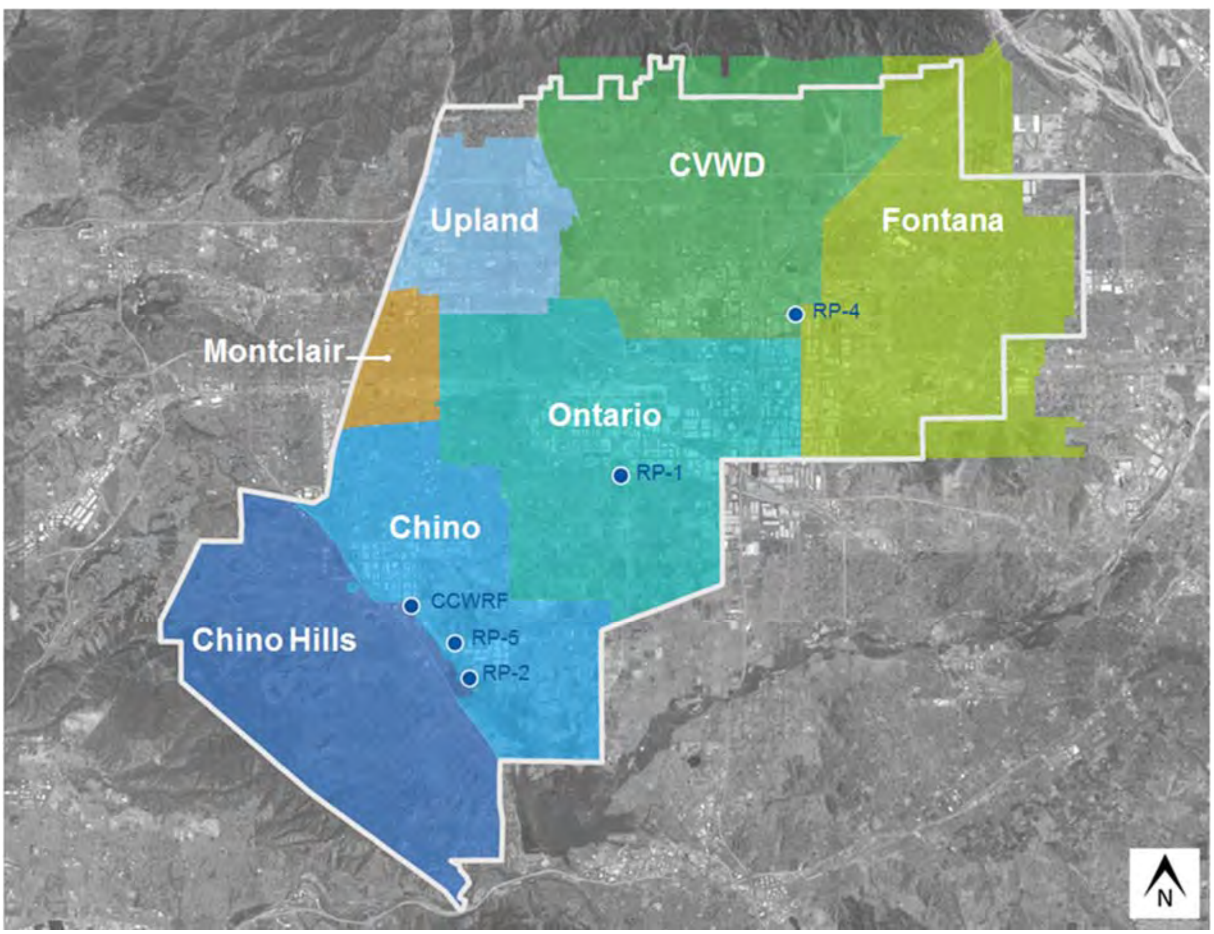


CONTRACTING AND RETAIL AGENCIES

As a regional wastewater treatment agency, the Agency provides sewage utility services to seven contracting agencies under the Chino Basin Regional Sewage Service Contract: the cities of Chino, Chino Hills, Fontana, Montclair, Ontario, Upland, and Cucamonga Valley Water District (CVWD) in the city of Rancho Cucamonga. Figure 3 depicts each Contracting Agency's sphere of inluence within the Agency's service area.

In addition to the contracting agencies, the Agency provides wholesale imported water from MWD to seven retail agencies: the cities of Chino, Chino Hills, Ontario, Upland, CVWD in Rancho Cucamonga, Fontana Water Company in Fontana, and the Monte Vista Water District (MVWD) in the city of Montclair.

FIGURE 3: IEUA CONTRACTING AGENCIES



REGIONAL PROGRAMS & FACILITIES OVERVIEW

Industrial and municipal wastewater collections are provided through regional wastewater interceptors and two non-reclaimable wastewater pipeline systems. Recycled water is produced at four RWRPs. In addition, the Agency has three facilities where the biosolids from the water recycling plants are handled: RP-1 Solids Handling Facility, RP-2 Solids Handling Facility, and the Inland Empire Regional Composting Facility. The Agency also has a solids handling facility at RP-5 which is leased to a private enterprise that intends to produce biogas and energy from food and dairy waste.

Although the Agency is a wholesale water provider, the Agency has very little infrastructure or assets related to potable water treatment, conveyance, or use. Water resources-related assets are connected to the recycled water, drought-proofing, and demand management programs. In addition to recycled water and wastewater services, the Agency operates a network of groundwater recharge facilities in partnership with Chino Basin Watermaster (CBWM), San Bernardino County Flood Control District (SBCFCD), and Chino Basin Water Conservation District (CBWCD). The Chino Desalter I facility is operated by the Agency in coordination with the Chino Desalter Authority to manage the salinity of the Chino Basin.

Regional Wastewater Facilities

The Agency has four RWRPs which produce recycled water that meet Title 22 standards for indirect reuse and groundwater recharge. All of the RWRPs have primary, secondary, and tertiary treatment and recycled water pumping facilities that are interconnected in a regional network. Agency staff uses influent bypass and diversion facilities, such as the San Bernardino Lift Station, Montclair Diversion Structure, Etiwanda Trunk Line, and Carbon Canyon bypass, to optimize the Agency's flows and capacity utilization. In general, flows are routed between regional plants in order to maximize recycled water deliveries while minimizing overall pumping and treatment costs. Figure 5 illustrates the service area boundaries for the Agency's four RWRPs

The four Regional facilities are: Regional Water Recycling Plant No. 1 (RP-1), Regional Water Recycling Plant No. 4 (RP-4), Regional Water Recycling Plant No. 5 (RP-5), and Carbon Canyon Wastewater Recycling Facility (CCWRF). The biosolids produced at RP-4 and RP-1 are thickened, digested, and dewatered at solids handling facilities located at RP-1. Similarly, the CCWRF and RP-5 biosolids are treated at Regional Water Recycling Plant No. 2 (RP-2). The stabilized and dewatered solids are then transported to the Inland Empire Regional Composting Facility for processing into soil amendment.

RP-5 began treating and discharging wastewater in March 2004. At that time, the RP-2 wastewater influent was diverted to RP-5 for treatment. Since portions of RP-2 are located in the 100-year flood plain, liquid wastewater processing at RP-2 was discontinued and the plant is currently used only for processing solids from RP-5 and CCWRF. Biosolids will continue to be processed at RP-2 until solids handling facilities are constructed at RP-5 around 2022.

The Agency has a network of regional interceptor sewers that can be used to bypass flow from one water recycling plant to another to balance and optimize the use of treatment capacity. Currently, the regional interceptors can bypass flow from RP-4 to RP-1 and from CCWRF to RP-5. In addition, primary effluent can be bypassed from the RP-1 equalization basins to RP-5.

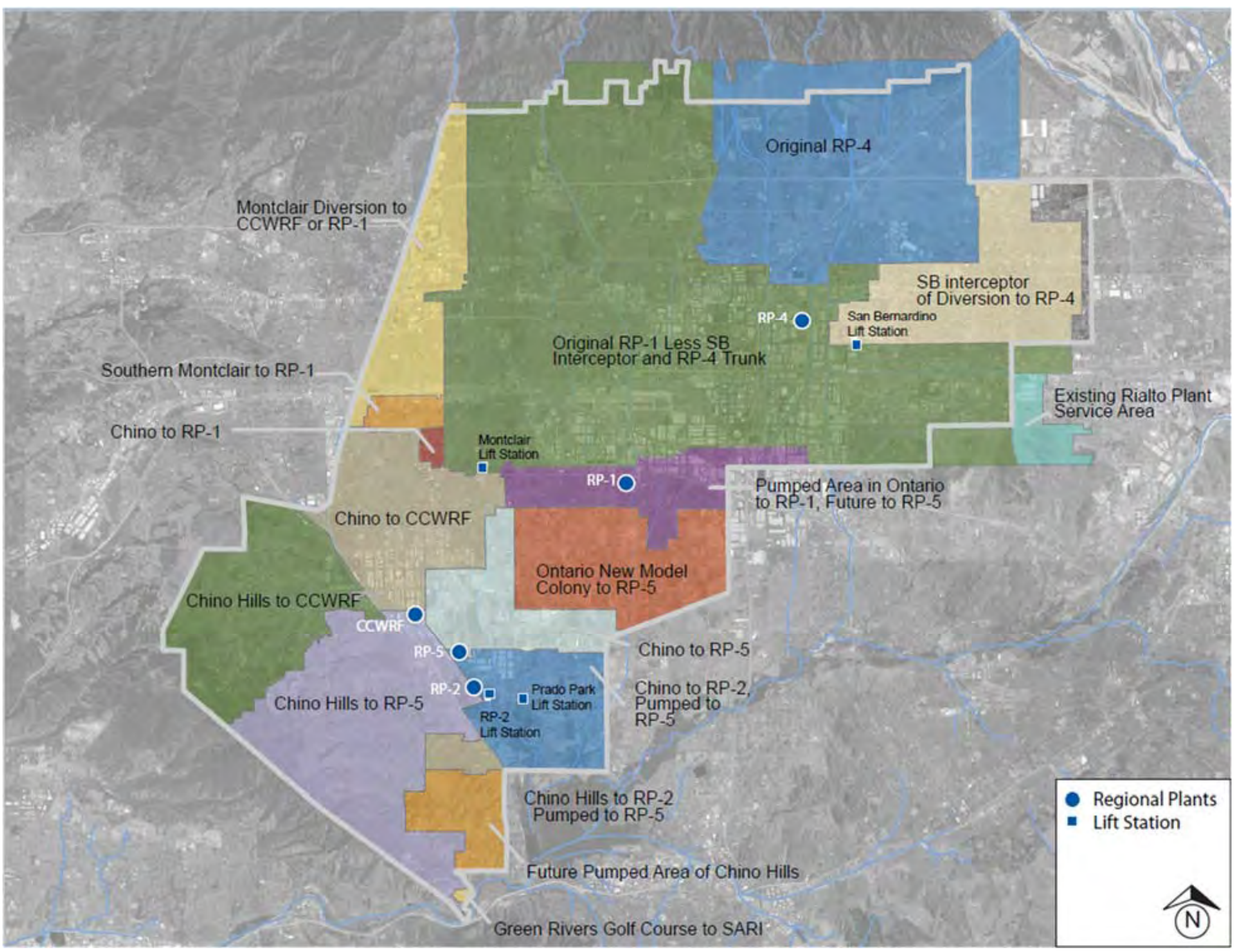
The main routes for bypassing/diverting flow are:

- Up to approximately 6 million gallons per day (MGD) can be bypassed from RP-4 to RP-1 through the Etiwanda Interceptor.
- 1 to 2 MGD is typically bypassed from CCWRF to RP-5 through the Chino Interceptor.
- A portion of the flow from the Cities of Upland and Montclair (approximately 4 MGD) can be diverted either to CCWRF, through the Westside Interceptor, or to RP-1, via the Montclair Lift Station and Montclair Interceptor. To optimize groundwater recharge in the northern service area, all flow from Upland to Montclair are diverted to RP-1 for treatment and distribution as discussed in the WFMP.
- Primary effluent and sludge can be diverted from the RP-1 equalization basins into the Eastern Trunk Sewer where it then flows by gravity to RP-5. The RP-1 to RP-5 Bypass is typically not used under normal operation in order to keep water north for GWR. In special circumstances (shutdowns, projects, upsets) the bypass is used and at these times average flows would be 1-2 MGD.

The Agency also has four wastewater lift stations, which are shown on Figure 6. These are used to shift flows that would naturally flow from one portion of the service area to a different treatment plant to balance flows and keep water in the northern portion of the service area to maximize potential recycled water use. The lift stations are:

- Montclair Lift Station– pumps wastewater from portions of Montclair, Upland, and Chino to RP-1 and CCWRF.
- Prado Park Lift Station– pumps wastewater from the Prado Regional Park in the City of Chino to the RP-2 Lift Station
- RP-2 Lift Station– pumps wastewater from the southeastern portions of the cities of Chino and Chino Hills and the solids treatment side streams from RP-2 to RP-5.
- San Bernardino Avenue Pump Station– pumps a portion of the low from the City of Fontana to RP-4.

FIGURE 5: REGIONAL PLANT SERVICE AREA BOUNDARIES



Recycled Water Distribution System

The Agency has served recycled water to its member agencies since formation of the Regional Sewage Service Contract in 1972. The Agency currently receives over 50 million gallons per day (MGD) of wastewater from its member agencies. The wastewater is treated to Title 22 regulations set forth by the California Department of Health Services and supplied to the recycled water distribution system.

Recycled water was originally delivered to Whispering Lakes Golf Course and Westwind Park in the city of Ontario, as well as to Prado Regional Park and El Prado Golf Course in San Bernardino County. In the early 1990's, the Agency built the first phase of the Carbon Canyon Recycled Water Project, which now serves customers in Chino and Chino Hills. In 2000 the region identified recycled water as a critical component in providing water supply resiliency for the region, including providing relief from drought and maintaining economic growth. With imported water rates increasing and long-term imported supply reliability in decline, the Agency committed to develop local water supplies to offset these impacts. This set the path for the development of a regional recycled water program. By 2014 over $250 million has been invested into the regional recycled water program. The region has been successful at obtaining grant funding and reduced interest loans to help subsidize capital costs for the Agency and its member agencies.

Since the early 2000's, recycled water and groundwater recharge sales increased to approximately 30,000 acre-feet per year (AFY). During the fiscal year 2014-15, the Agency delivered over 33,000 acre-feet of this reliable local water supply to the region. On average, the program has been able to utilize approximately 90% of the regions recycled water supply. Major benefits of the regional recycled water program include:

- New Water Supply – delivery of over 30,000 AFY of a local water supply
- Enhances Water Quality – improves the quality of the Chino Basin aquifer
- Reliable supply – is not directly impacted by drought or climate change and helps mitigate the impacts of regional and statewide water supply limitations
- Reduces dependence on imported supplies – increases local water supply reliability and decreases water imports from the Sacramento Bay Delta
- Reduces greenhouse gas emissions – requires significantly less energy to deliver to customers than imported water

The regional recycled water program is committed to maximizing the beneficial use of recycled water. The Agency will continue to develop, expand, and provide flexibility to the program to allow the region to utilize of all available recycled water supplies. Expansion of the program relies upon the treatment capacities at the four regional treatment facilities and wastewater flow projections. These constraints must be considered and coordinated with future expansion needs for the regional recycled water program. The next phase of capital improvements and priorities will be developed as part of the 2015 Recycled Water Program Strategy and the Integrated Water Resources Plan.

Groundwater Recharge Basins

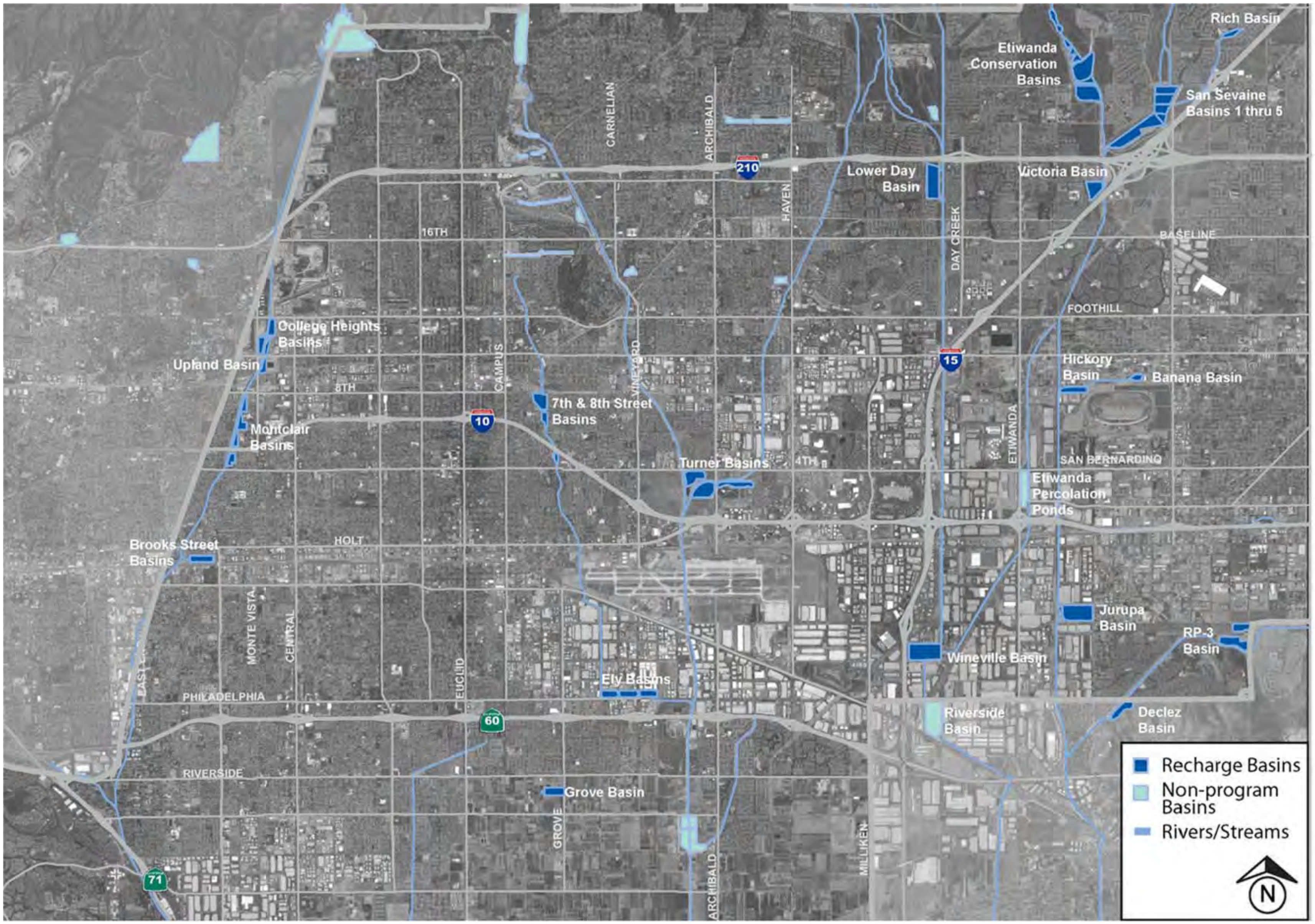
In conjunction with the CBWM, CBWCD, and SBCFCD, the Agency conducts the groundwater recharge program within Chino Basin to increase groundwater recharge using stormwater, recycled water, and imported water. By enhancing the recharge capacity in the Chino Basin, additional high-quality stormwater can be captured and stored. The stored water can subsequently be withdrawn from the groundwater basin as needed, during droughts, and during imported water shortages. Figure 6 is a map of the 18 recharge sites that are an active part of the recharge program. Annual recharge varies due to weather patterns and the availability of supplemental water supplies (imported water and recycled water). Estimated monthly recharge capacities for the recharge sites are listed in Table 1.

The Agency, CBWM, CBWCD, and their respective member agencies completed the 2013 Recharge Master Plan Update (Update) to the 2010 Recharge Master Plan. The Update evaluated 27 yield enhancing capital projects for the Chino Basin. The Agency has agreed to finance three of these projects and has included them in the TYCIP project lists. The remaining 24 projects require additional investigation to evaluate their feasibility and cost-effectiveness for incorporation into the recharge program. The Agency is working with CBWM and CBWCD toward this end.

Salinity Management

Maintaining a low salinity (total dissolved solids, TDS) level in recycled water is critical to ensure that recycled water can be used for groundwater recharge and other uses. To reduce the salinity, the Agency operates a Non-Reclaimable Wastewater System (NRWS) comprised of pipelines and pump stations which export high-salinity industrial wastewater generated within the Agency's service area to the Pacific Ocean (see Figure 7). This system also ensures that the Regional Water Recycling Plants do not exceed the TDS discharge limits established by the Regional

FIGURE 6: CHINO BASIN RECHARGE PROGRAM SITES



Water Quality Control Board. In addition, the Agency is implementing other salt management activities including the implementation of a water softener ordinance and by offering a water softener rebate to remove salt-based water softeners in order to reduce salt from being introduced into the wastewater treatment process.

The NRWS is comprised of a north and a south system. The north system conveys the non-reclaimable wastewater to County Sanitation Districts of Los Angeles County (CSDLAC) for treatment and disposal. The south system conveys wastewater through the Brine Line (owned by Santa Ana Watershed Project Authority, SAWPA), to the Orange County Sanitation District (OCSD).

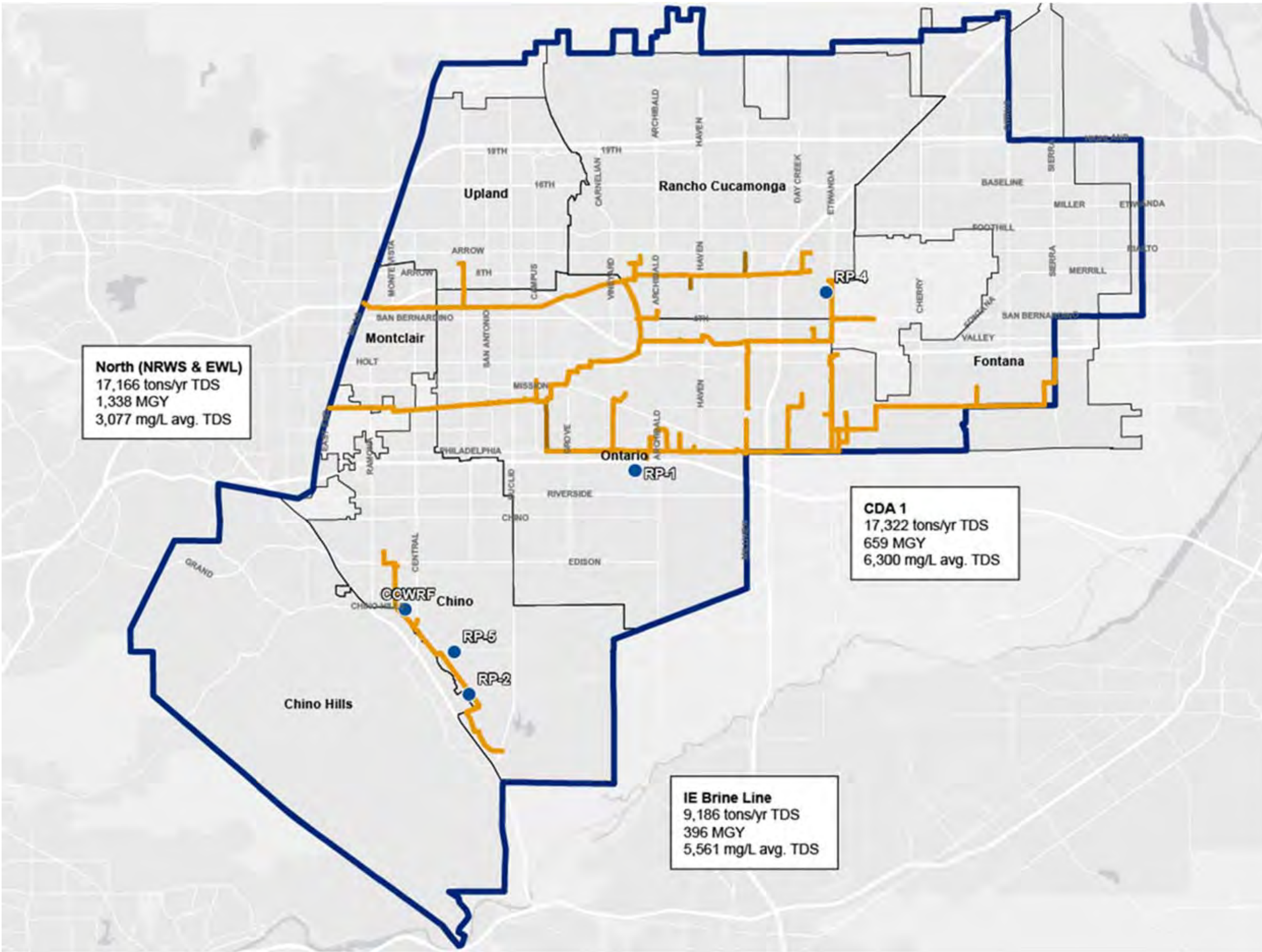
Wastewater discharged to the NRWS consists mainly of industrial and groundwater treatment brines. The Agency also discharges centrate resulting from the dewatering of the biosolids generated within the Agency's water recycling treatment facilities and some domestic wastewater from non-sewered areas. The NRWS is physically

TABLE 1: ESTIMATED MONTHLY RECHARGE CAPACITY

Recharge Site	Recycled Water Recharge Capacity (Acre-Feet per Month)
7th and 8th St. Basins	170
Banana Basin	117
Brooks Basin	188
College Heights Basins*	457
Declez Basin	151
Ely Basins	193
Etiwanda Debris Basin*	263
Grove Basin*	38
Hickory Basin	136
Lower Day Basin	340
Montclair Basins*	559
RP3 Basin	760
San Sevaine Basins	108
Turner Basins	161
Upland Basin*	187
Victoria Basin	160
Wineville Basin*	409
Total	4,397

* Basin not permitted for recycled water recharge

FIGURE 7: SALT EXPORT THROUGH THE CHINO BASIN'S 60 MILE NON-RECLAIMABLE WASTEWATER SYSTEM (NRWS)



The NRWS removes a total of 43,674 tons of TDS each year from the Agency's service area.

separated from the Regional Wastewater System and provides a means for segregating non-reclaimable wastewater for export out of the Agency's service area. By maximizing the use of the NRWS, the quality of recycled water is improved for local use and helps ensure that the Agency can comply with the final effluent TDS and total nitrogen limits listed in the National Pollutant Discharge Elimination System (NPDES) permit.

The CSDLAC and the Agency entered into agreements dating back to 1966 under which the CSDLAC agreed to accept a portion of the Agency's industrial wastewater flows from the NRWS. In 2013, the Agency and CSDLAC executed a new NRWS Agreement, effective July 1, 2014. The new Agreement includes a 30-year term with up to four additional 5-year extensions and provides 15,000 initial Baseline Capacity Units (BCU) for allocation amongst the existing NRWS customers. Additional Capacity Units may be purchased or leased, and payment of remaining capital charges funded by SRF loans, will be paid in full over a 6-year term.

Inland Empire Regional Composting Facility

The IERCF was constructed in 2007 under a Joint Powers Authority agreement between the Agency and the CSDLAC. The IERCF, located in Rancho Cucamonga, is completely enclosed to control odors to meet stringent air quality regulations and is the nation's largest indoor biosolids composting facility.

The IERCF uses the Aerated Static Pile composting process to recycle approximately 150,000 wet tons/year of dewatered and stabilized biosolids from the Agency and CSDLAC's wastewater treatment processes as well as wood waste from local communities. It produces over 230,000 cubic yards of high quality compost each year for local landscaping and horticultural use. The composted product, marketed as SoilPro® Premium Compost, is sold as a soil conditioner which helps improve water retention, resulting in better plant growth and water savings.

The facility is currently operating at its design capacity, receiving nearly 600 tons per day of biosolids and recycled waste products. The potential of freeing up 50 wet tons per day of additional capacity at the IERCF can be achieved by the RP-1 Dewatering Facility capital improvement project. This project includes will use centrifuges to dry solids to a higher percentage.

Renewable Energy

The Agency has made significant strides in decreasing energy costs, enhancing the Agency's ability to help achieve the State's goals of improving the reliability of the energy grid, and reducing greenhouse gasses by investing in renewable energy. In an effort to diversify and maximize renewable energy generation, the Agency installed 3.5 megawatts (MW) of solar power in 2008, a 1 MW wind turbine in 2011 and a 2.8 MW biogas fuel cell in 2012. Combined, these projects have provided more than 50% of peak energy demand Agency wide, and net energy export at RP-2.

The Agency is continually evaluating new technologies that can increase sustainability. Full utilization of renewable digester gas to support sustainability and minimize gas flaring is a primary goal. Third party audits were conducted in 2015 to assess equipment performance and identify opportunities for increased efficiency. The Agency has implemented projects to improve efficiency as recommended in these audits. Agency personnel will assess operational processes and strive for optimization to reduce energy wherever possible.

To continue toward the goal of increasing the Agency's use of renewable energy by 2020, the Agency developed an Energy Management Plan (EMP) in 2015. The EMP focuses on energy conservation and sustainable operations of the regional facilities. To do this, past performance, new technologies, and anticipated regional needs were evaluated to construct a blueprint for continued reliability and enhanced efficiency for the Agency.

Wastewater Flow Projections

Wastewater flow forecasts are conducted annually and are based on three components: (1) historical wastewater l ow trends; (2) per dwelling unit wastewater generation factors; and (3) expected future growth numbers provided by Contracting Agencies. Projections are used to determine future demands on the Agency's facilities in order to anticipate the need for modiic ations to Regional Water Recycling Plants (RWRP) and Solids Handling facilities.

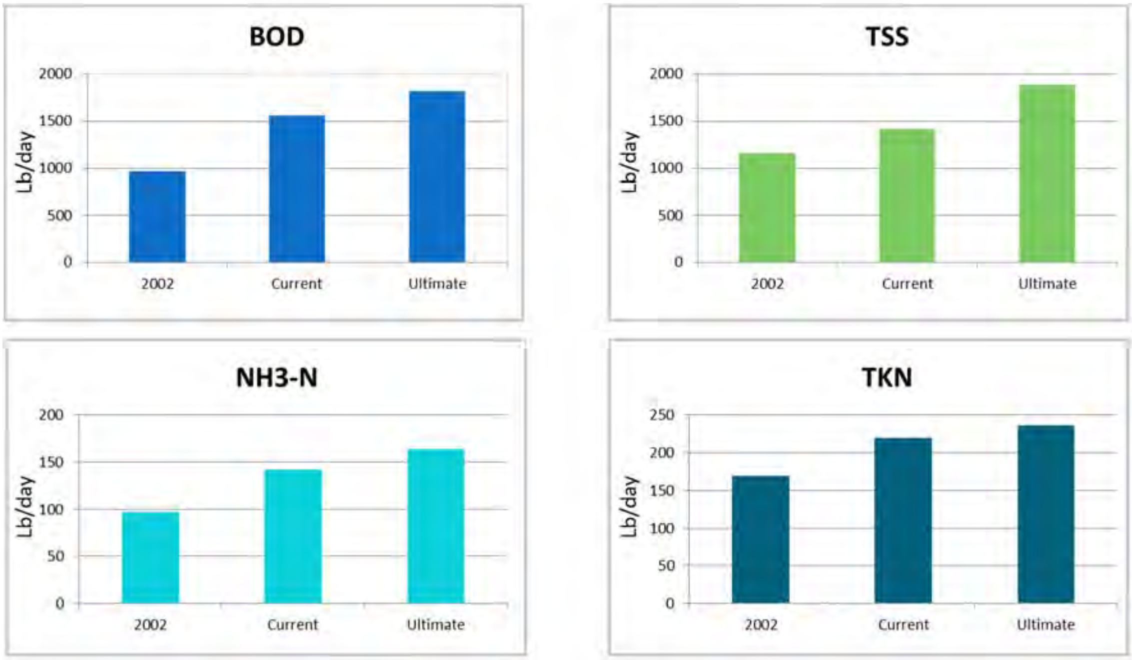
Based on analyses of the components, 10-year flow projections have been made for each of the Agency's RWRPs, and for the Agency's service area. The projected l ows are then compared to current and future planned plant capacities. For these forecasts, the "tributary area low" is defined as raw sewage flow from the service area that is naturally tributary to a particular RWRP without pumping, diversion or bypassing. In contrast, the treated influent low is the actual low that is received and treated at the RWRP. The treated influent flow is different than the tributary area flow because the RWRPs are interconnected, allowing some of the tributary flow to be re-routed between plants. In addition, treated influent low includes the recycle streams generated during solids processing that are sent back to the plant headworks for additional treatment.

Member Agency's ten-year flow forecast for FY16/17 indicated that the total system capacity would exceed 75% of regional capacity. This initiated the in-development Wastewater Facilities Master Plan Update (WWFMPU) to conduct treatment plant low monitoring, strength loading, evaluate treatment plant capacities and identify expansion needs, through ultimate build-out based on city master plans and SCAG data.

WASTEWATER FLOW TRENDS

Since FY06/07, the Agency's wastewater flows have declined by approximately 10%, but strength has increased. This is believed to relect the effects of water conservation, the recession, and drought conditions. As part of the WWFMPU, wastewater low monitoring of influent lows show that loading has signiicantly

FIGURE 8: INFLUENT WASTEWATER LOADING INCREASES



Source: draft 2015 Wastewater Facilities Master Plan

increased from the 2002 Wastewater Facilities Master Plan, and are projected to increase due to a continued reduction of flows per EDU (see Figure 8).

Although wastewater l ows have decreased, the Agency has been able to increase the amount of recycled water supplied to users by using the San Bernardino Avenue Lift Station and the Montclair Lift Station to route additional raw wastewater to the recycling plants in the northern service area where the system has been expanded and where groundwater recharge basins are located.

Figure 9 illustrates the wastewater flow pattern within the Agency in FY13/14 and the current lows being treated at each of the Agency's RWRPs. For FY13/14, the average raw wastewater low treated was 52.2 MGD and the treated inluent flow was 54.4 MGD. The difference was due to 2.2 MGD of solids processing recycle low sent from RP-2 to the RP-5 headworks for additional treatment. Figure 10 shows the projected lows to the treatment plants in 2035 and 2060 (ultimate) based on the WWFMPU. The WWFMPU estimates that there will be a regional flow of 73.5 MGD by 2035 and an ultimate/build-out low of 87.9 MGD by 2060. Although these periods are beyond the 10-year window of the current TYCIP, this implies that there will be a number of facilities expansions over the next 20 years. A rough timeline based on the WWFMPU findings for plant expansions is shown in Table 2.

Expansions at RP-5, the relocation of RP-2 solids handling to RP-5, and RP-1 Liquid Treatment Expansion are included in the 10-year window.

WASTEWATER FLOW GENERATION FACTORS

The regional collection system and RWRPs were planned and designed using the raw wastewater generation factor of 270 gallons per day per equivalent dwelling unit (GPD/EDU), as speciied in the Regional Sewerage Service Contract, Exhibit J. Although the Agency still plans its regional system around Exhibit J, new developments are using less water due to water-conserving devices and new water use efficiency laws. Even as the economy improves the Agency expects average lows throughout the service area to remain well below the 270 GPD/EDU due to the rising water costs, reduced imported water supply availability, and increased water conservation measures.

Recent low monitoring conducted by the Agency as part of the WWFMPU suggests that the current average inluen t l ow rate is 200 GPD/EDU, although long-term the low may decrease to 195 GPD/EDU. As a result, the future flow projections for the RWRPs illustrated on the following pages were calculated using both 200 and 270 GPD/EDU. However, when combined with the expected increased wastewater loading strength of BOD, TSS, NH3-N, and TKN relative total low, increased treatment capacity will be needed or require investments in new treatment processes.

ANTICIPATED SERVICE AREA GROWTH

The results of the 10-year capacity demand forecast based on the August 2013 Member Agency survey are summarized in Table 3. For FY16/17, the forecasted activity was 5,277 EDUs. Over the next ten years, activity was projected to total 34,090 EDUs. Approximately 60% of this activity was projected to occur in the cities of Ontario and Fontana as the result of new development. Over the next ten years,

TABLE 2: PRELIMINARY TREATMENT PLANT EXPANSION SCHEDULE

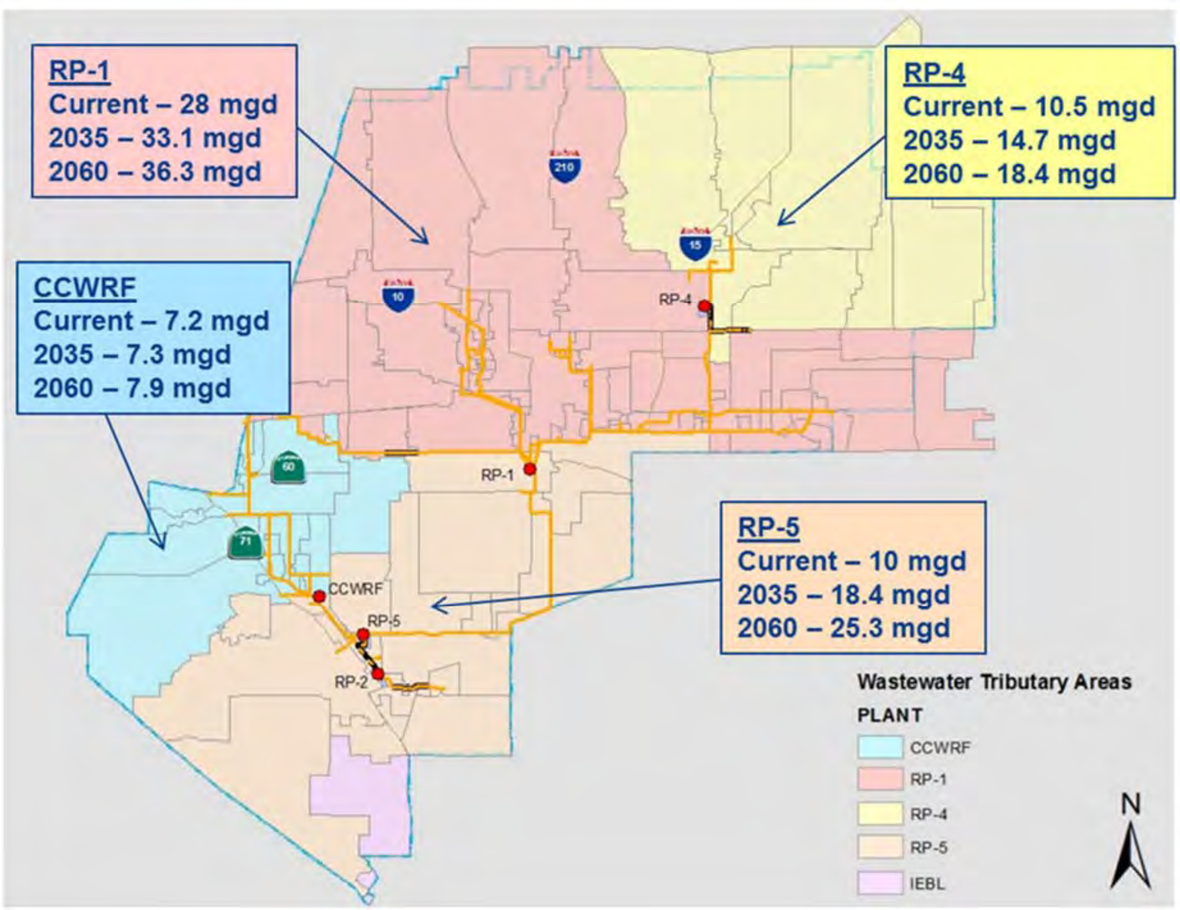
Description	15/20	20/25	25/30	30/35	Total Cost
RP-1 Liquid Treatment Expansion					$83.0M
RP-1 Solids Treatment Expansion					$25.0M
RP-2 Decommissioning					$30.0M
RP-4 Tertiary Expansion					$25.0M
RP-5 Liquid Treatment Expansion					$125.0M
RP-5 Solids Treatment Facility					$136.0M

building activity is projected to be approximately 76% residential and 24% commercial/industrial (see Table 4).

Individual baseline forecast exhibits for each treatment plant at 270 and 200 GPD/EDU are located at the end of this section. These tables represent typical operational low scenarios, based on current operating procedures. This includes the following assumptions:

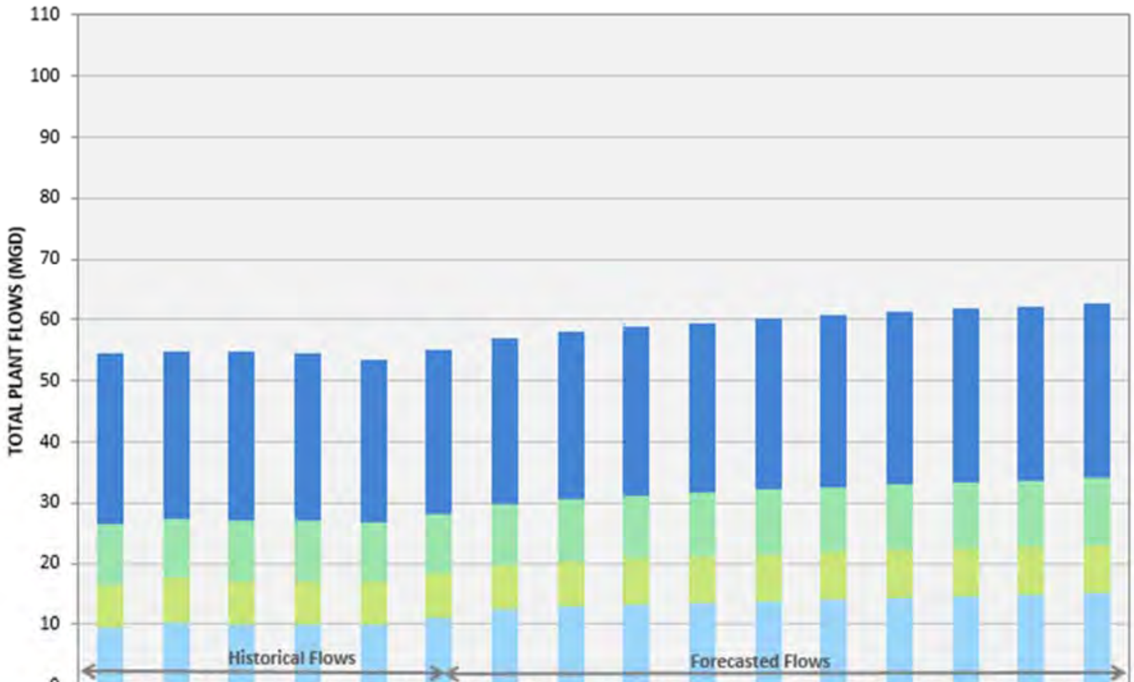
- Flow is approximately 200 GPD/EDU
- Uses the contracting agencies projected EDU growth as a basis
- Former Ontario Lift Station low (2.5 MGD) is considered part of RP-5 raw service area low
- San Bernardino Lift Station routes 4.5 MGD which would otherwise naturally flow to RP-1 to RP-4
- 2.2 MGD of Montclair Interceptor lows are ro uted to RP-1
- 2.3 MGD is bypassed from CCWRF to RP-5

FIGURE 10: PROJECTED TRIBUTARY SEWER FLOWS



Areas developed by IRP Wastewater Flows Projections TM (RMC 2013)

FIGURE 11: HISTORICAL TOTAL PLANT FLOWS (200 GPD/EDU)



	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
RP-1	28.00	27.30	27.90	27.31	26.60	26.84	27.10	27.37	27.60	27.79	27.97	28.12	28.27	28.40	28.53	28.65
RP-4	10.10	9.70	10.04	10.09	9.80	9.94	10.10	10.25	10.39	10.52	10.64	10.74	10.85	10.95	11.05	11.08
CCWRF	7.10	7.40	7.05	7.16	7.10	7.19	7.28	7.40	7.49	7.55	7.60	7.64	7.66	7.67	7.69	7.70
RP-5	9.40	10.30	9.93	9.85	9.90	11.13	12.44	12.93	13.28	13.60	13.90	14.18	14.45	14.73	14.99	15.25

- SARI lows from (0.7 MGD) will be diverted to RP-5 starting in FY 14/15

Table 5 indicates the projected EDUs by treatment plant over the next 10 years. Total regional system capacity utilization projections are illustrated in Figure 12 and 13.

FIFTY YEAR FLOW PROJECTION

As part of the WWFMPU, low projections were made for each plant to ultimate conditions which are expected to be reached by 2060. As indicated in Table 6 wastewater lows are estimated to reach approximately 87.9 MGD by the year 2060.

TABLE 3: 10-YEAR CAPACITY DEMAND FORECAST BY AGENCY

Fiscal Year	Chino EDUs	Chino Hills EDUs	CVWD EDUs	Fontana EDUs	Montclair EDUs	Ontario EDUs	Upland EDUs	Total EDUs
2016/17	610	1236	364	695	85	2050	237	5277
2017/18	725	702	364	678	142	2350	226	5187
2018/19	424	442	364	623	29	1950	231	4063
2019/20	344	272	364	485	29	1800	176	3470
2020/21	344	182	364	462	29	1700	144	3225
2021/22	344	133	364	370	29	1600	71	2911
2022/23	344	96	364	372	29	1500	18	2723
2023/24	344	64	322	375	29	1500	0	2634
2024/25	344	6	250	382	29	1500	0	2511
2025/26	344	1	215	0	29	1500	0	2089
TOTALS	**4167**	**3134**	**3335**	**4442**	**459**	**17450**	**1103**	**34090**

TABLE 4: 10-YEAR DEMAND FORECAST BY CUSTOMER TYPE

Fiscal Year	Residential (EDUs)	Commercial/ Industrial	Total (EDUs)
2016/17	4392	885	5277
2017/18	4090	1097	5187
2018/19	3214	849	4063
2019/20	2677	793	3470
2020/21	2485	740	3225
2021/22	2185	726	2911
2022/23	1996	727	2723
2023/24	1910	724	2634
2024/25	1806	705	2511
2025/26	1494	595	2089
TOTALS	**26249**	**7841**	**34090**

TABLE 5: 10-YEAR DEMAND FORECAST BY REGIONAL PLANT

Fiscal Year	RP-1 EDUs	RP-4 EDUs	CCWRF EDUs	RP-5 EDUs	TOTAL EDUs
2016/17	1291	782	451	2753	**5529**
2017/18	1354	768	603	2462	**5187**
2018/19	1140	721	428	1774	**4063**
2019/20	960	619	303	1588	**3470**
2020/21	890	602	264	1469	**3225**
2021/22	784	524	184	1419	**2911**
2022/23	715	527	109	1372	**2723**
2023/24	673	530	72	1359	**2634**
2024/25	645	493	58	1315	**2511**
2025/26	591	130	53	1315	**2089**
TOTALS	**9043**	**5696**	**2525**	**16826**	**34342**

TABLE 6: WWFMPU PROJECTED AVERAGE INFLUENT WASTEWATER FLOW

Year	RP-1 (MGD)	RP-4 (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	31.1	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	36.3	18.4	7.9	25.3	**87.9**

Source: TM No.4, WWFMPU (CH2M Hill 2014)

FIGURE 11: REGIONAL SYSTEM TREATED INFLUENT FLOW FORECAST

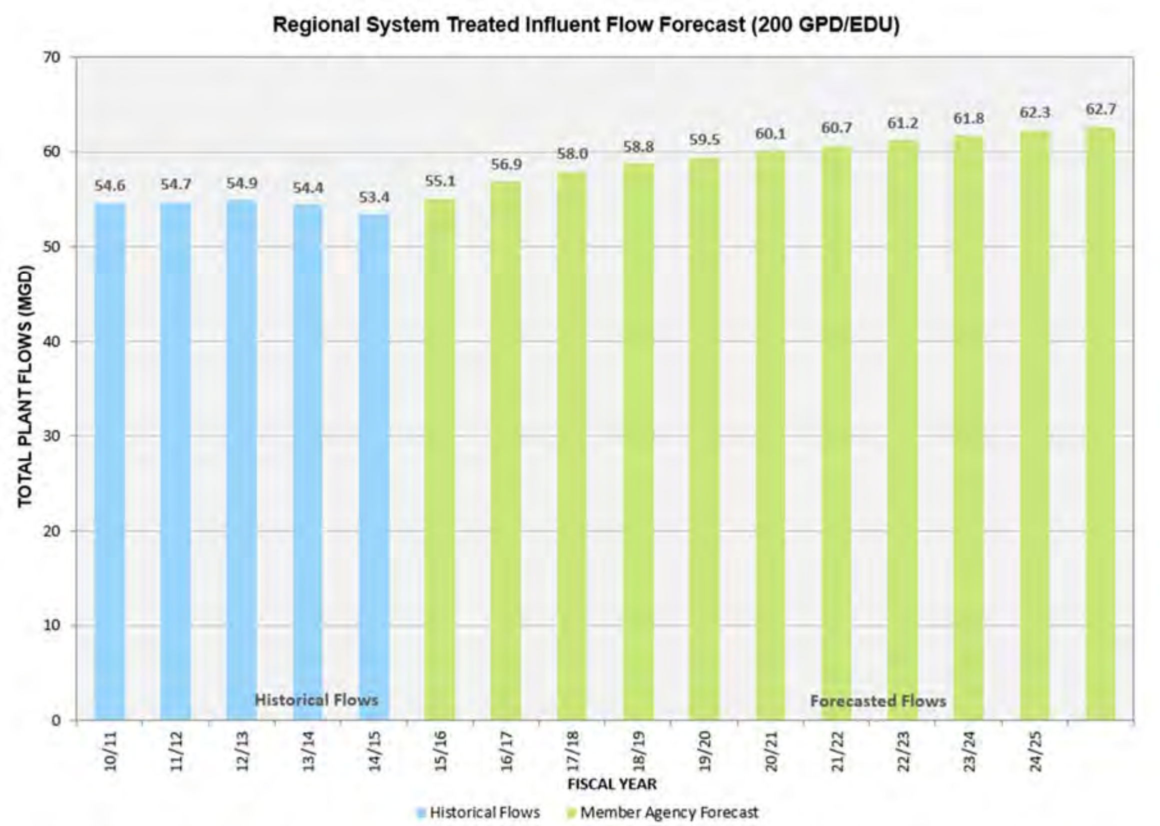


FIGURE 12: REGIONAL SYSTEM TREATED INFLUENT FLOW FORECAST

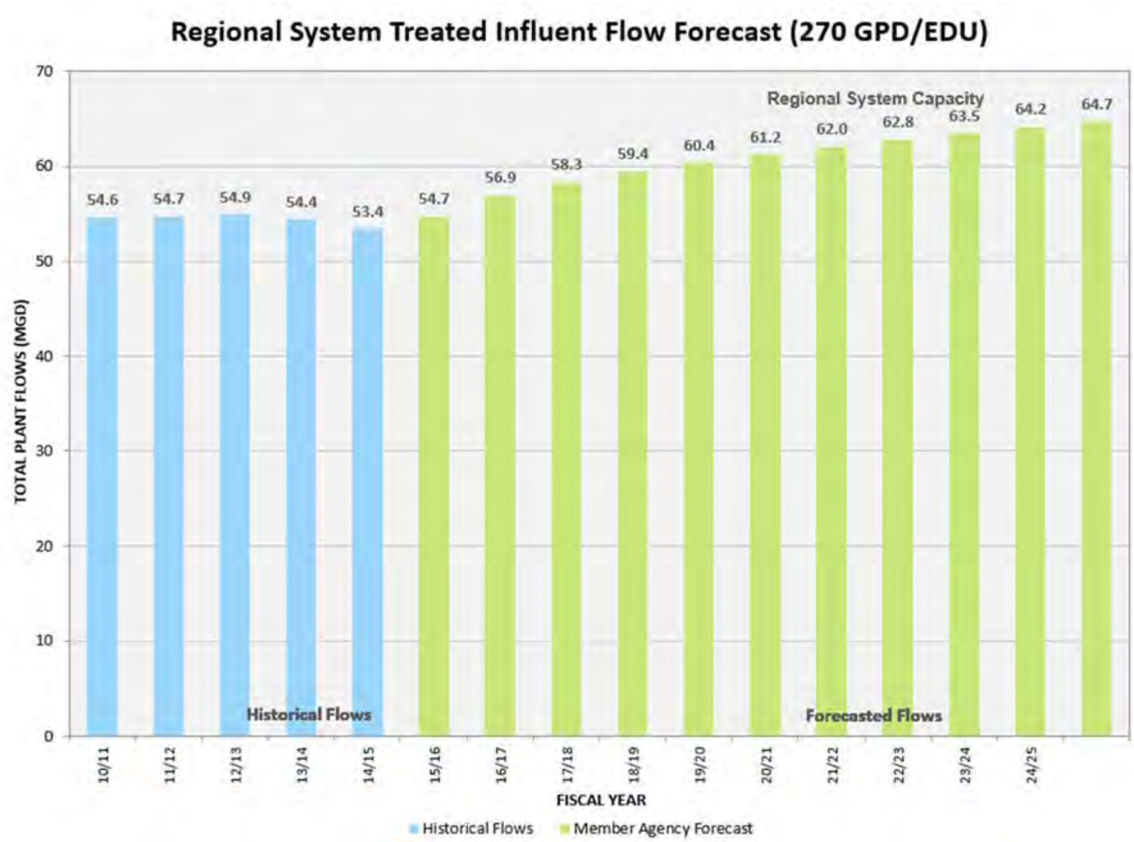
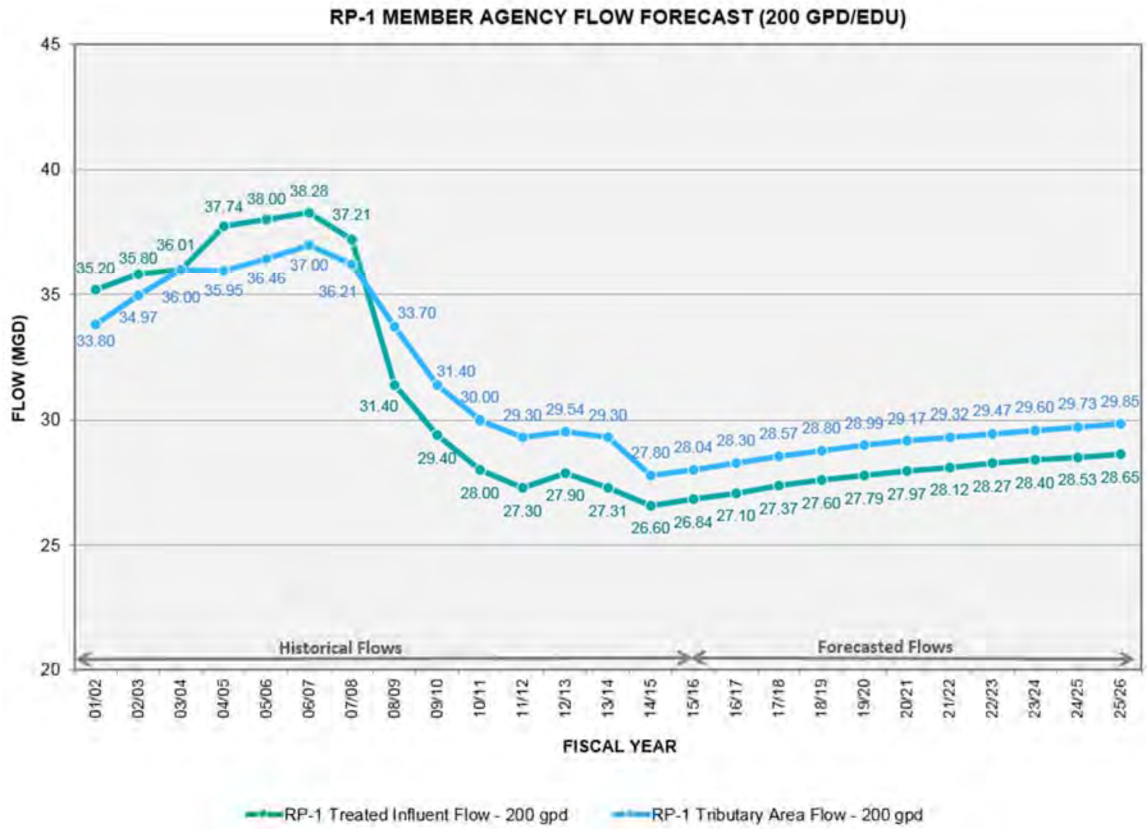


EXHIBIT A: RP-1



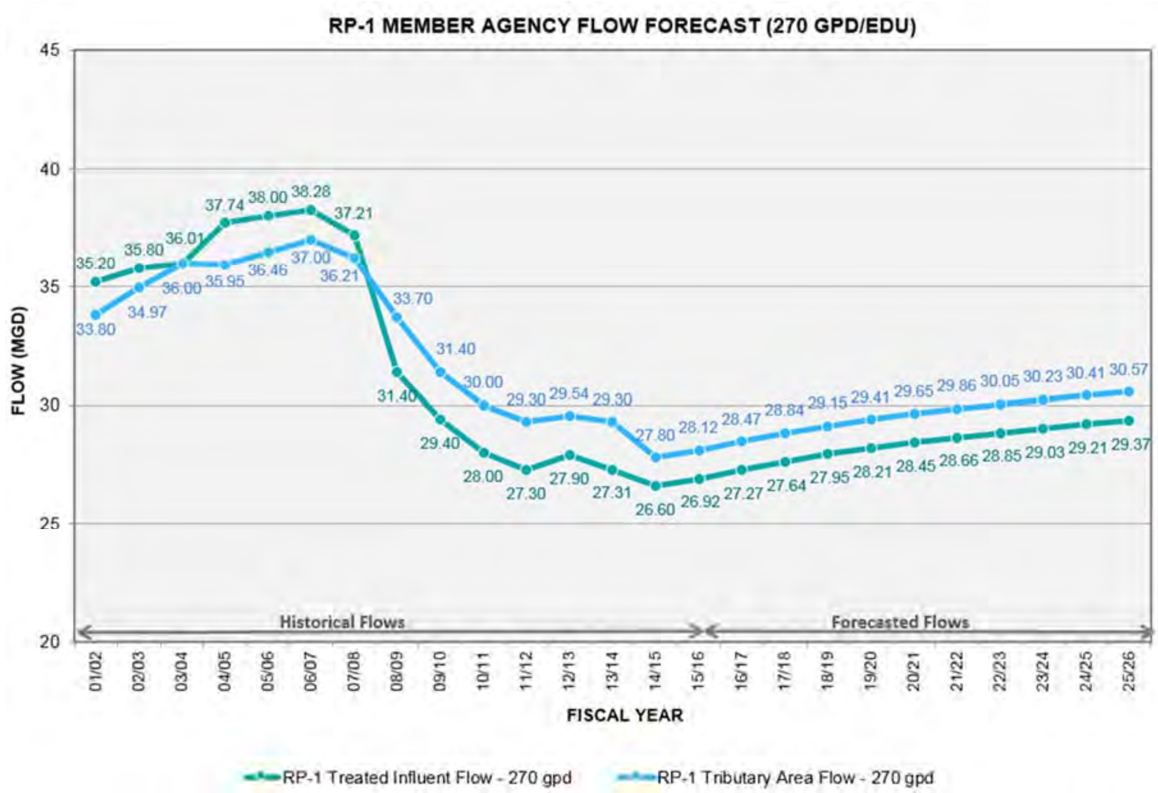
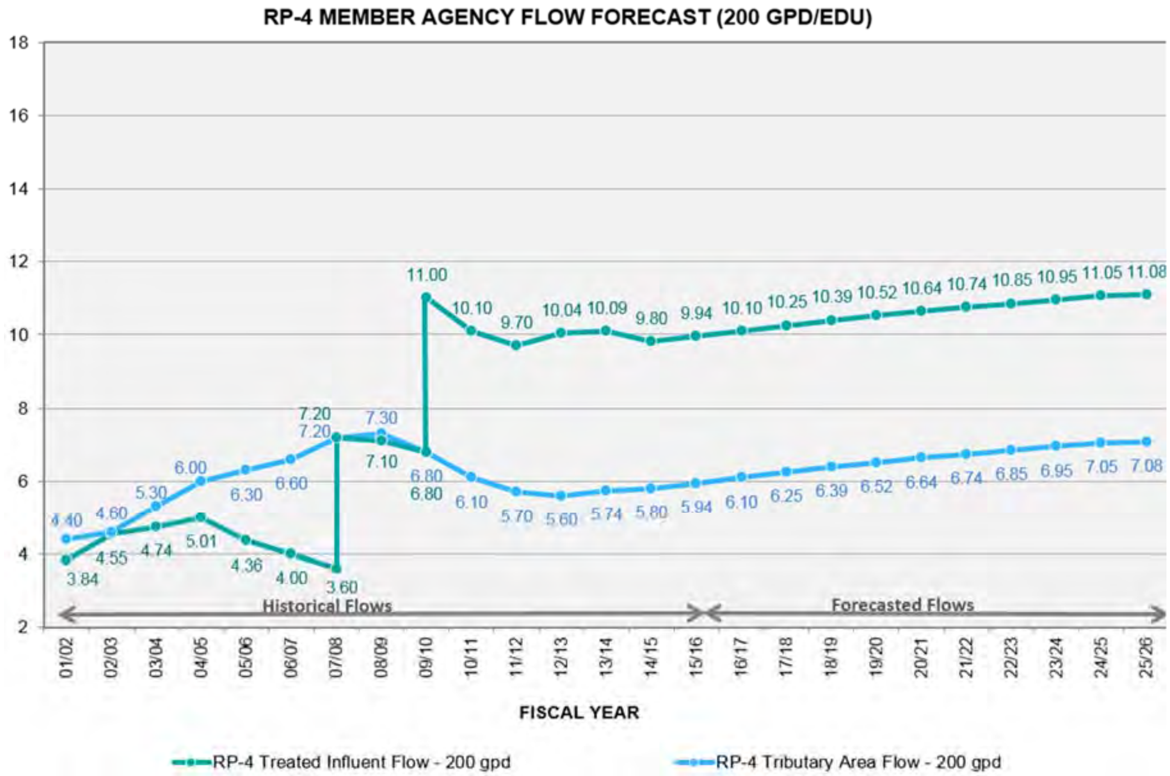


EXHIBIT B: RP-4



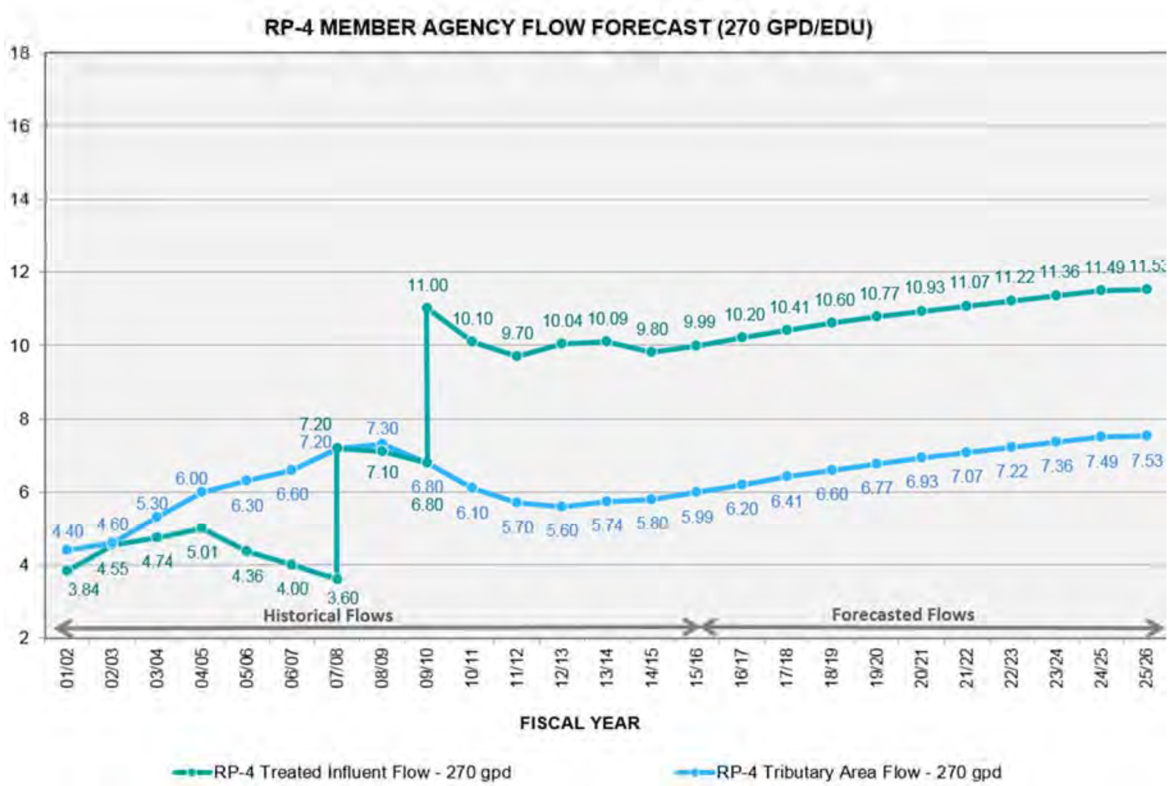
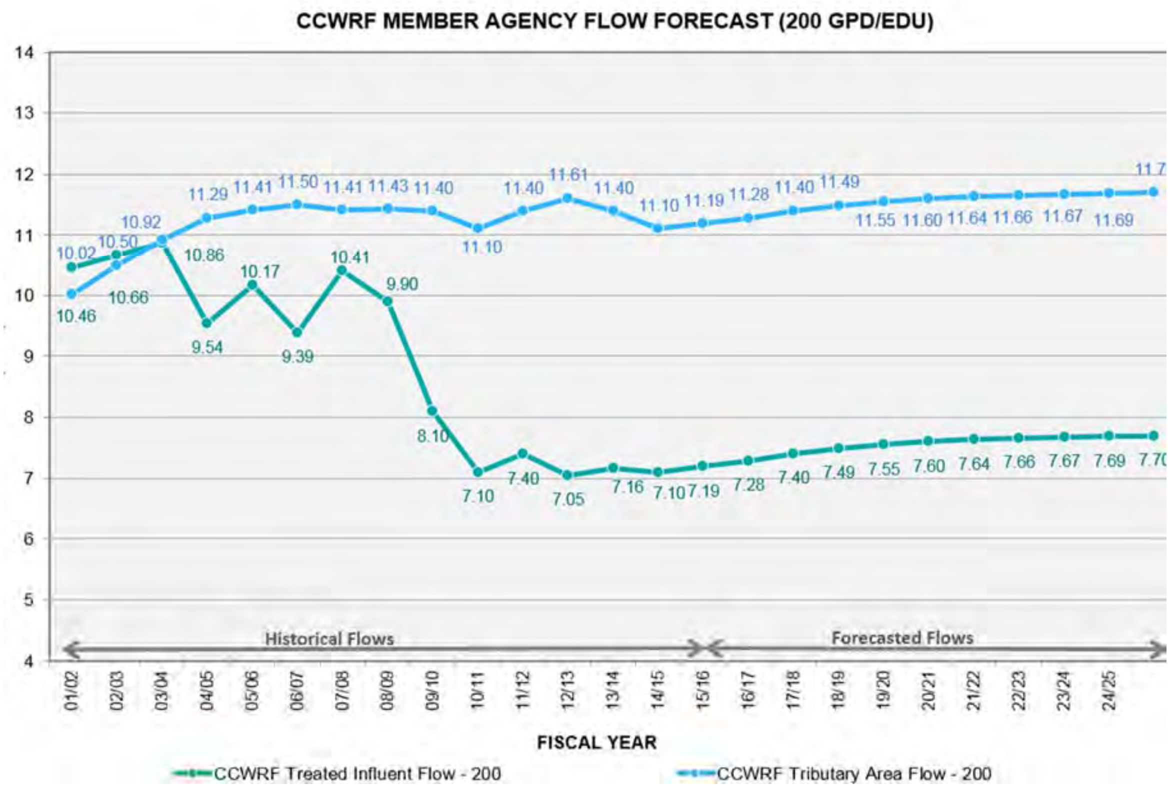


EXHIBIT C: CCWRF



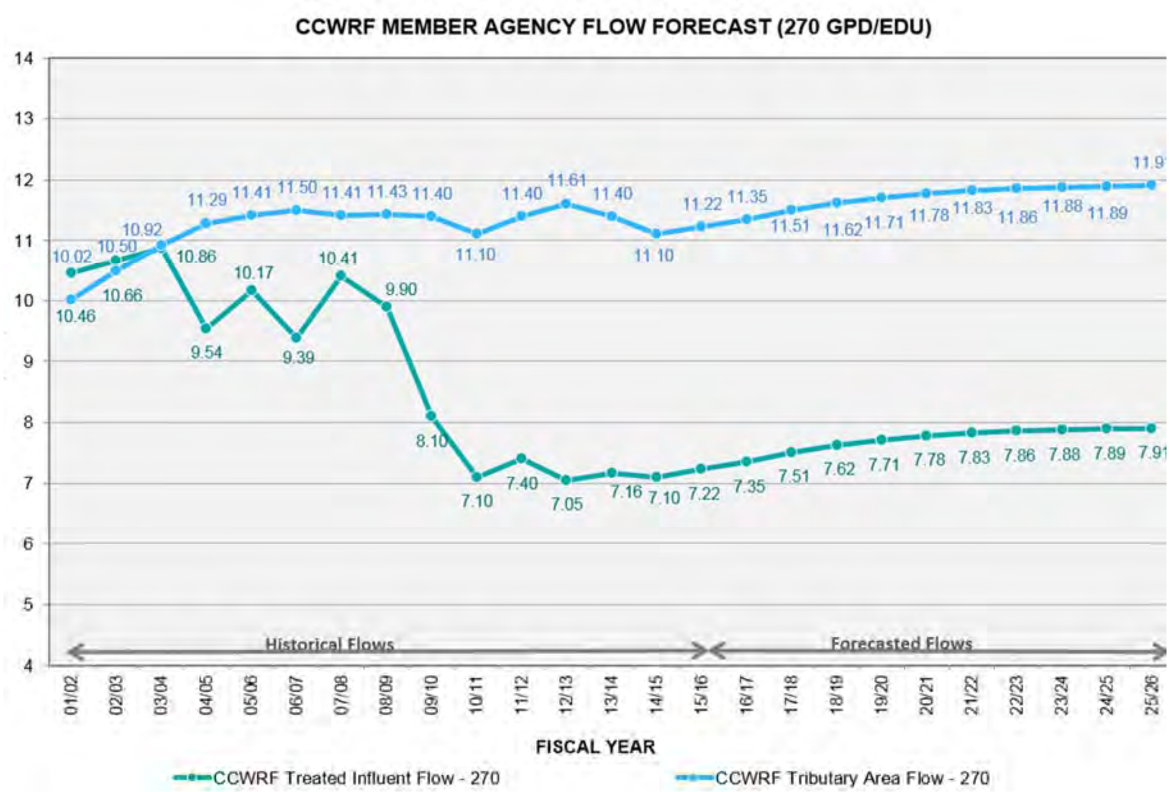
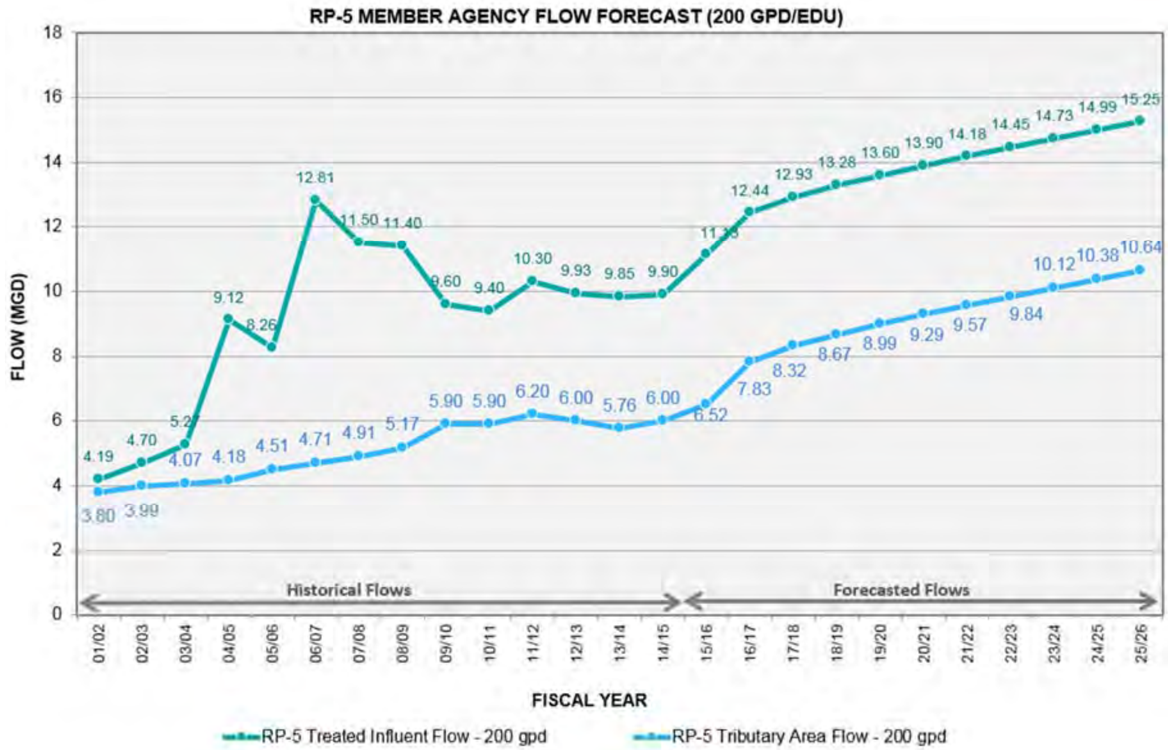
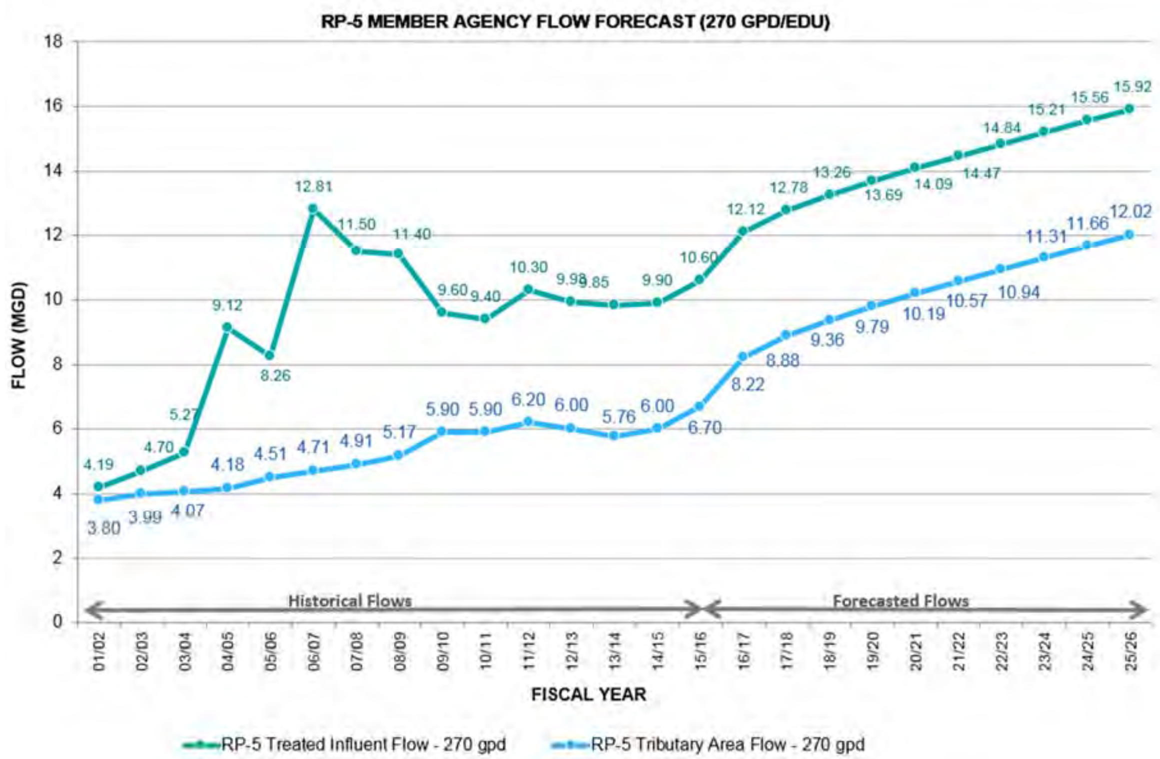


EXHIBIT D: RP-5





Capital Improvement Projects

PROJECT IDENTIFICATION PROCESS

The TYCIP contains projects which were identiied by the Maintenance, Operations, Engineering, and Planning departments. The two main project types are 1) repair and rehabilitation project for existing facilities; and 2) expansion projects to provide additional capacity.

PROJECT PRIORITIZATION CRITERIA

Projects listed in the TYCIP are prioritized by timing and criticality. Drivers used to determine the timeframe and criticality during which a project would be undertaken

TABLE 7: 10-YEAR CAPITAL PROJECT BUDGET ESTIMATE, BY FUND

Fund	Description	FY 16/17	FY17/18	FY19-25	TYCIP Total
GG	Administrative Services	$1.5M	$0.2M	$1.4M	$3.1M
NC	Non-Reclaimable Wastewater	$0.7M	$0.2M	-	$0.9M
RC	Regional Capital Improvement	$15.5M	$19.1M	$325.4M	$360.0M
RO	Regional Operations & Maintenance	$13.7M	$22.5M	$18.9M	$55.1M
RW	Recharge Water	$4.6M	$12.7M	$35.8M	$53.1M
WC	Recycled Water	$11.2M	$26.7M	$33.7M	$71.6M
WW	Water Resources	-	-	-	$0M
RM/ RCA	Organics Management/ IERCA	$4.5M	$0.2M	$1.7M	$6.4M
	TOTAL	$51.7M	$81.6M	$416.9M	$550.2M

include the regulatory and permitting requirements, wastewater low projections, asset age, performance, eficiency, grant or funding availability.

The 10-year project list in Appendix A represents the Agency's best assessment of what capital projects will occur based on existing planning documents. The list will be rein ed regularly as planning documents are updated. An estimated ten-year budget for capital project by fund is summarized in Table 7. Full project lists, including operations and maintenance, rehabilitation and repair, and equipment purchases that are not capitalized are listed in Appendix B.

WASTEWATER FACILITIES

The following section describes capital projects for each of the programs. Capital Projects are listed in Appendix A.

Regional Program

The Agency's Regional Program encompasses the activities associated with repair and replacement (R&R) of the Agency's wastewater, energy generation, and solids handling facilities. The Regional Sewerage System connects several regional water recycling plants. Waste biogas produced by the RWRPs is used to produce energy and the tertiary treated water is used as recycled water. The biosolids waste from the RWRPs is further treated to produce grade A compost, which is used as a fertilizer soil amendment.

The Regional Sewerage System includes 90 miles of regional sewage interceptors. The sewage lateral pipelines are owned and maintained by the individual contracting agencies. Key projects include lift stations, regional sewerage system, and general improvements to regional assets/facilities not associated with a particular location. The major upcoming projects for the Regional Sewerage System are related to R&R (for example, manhole rehabilitation and the Montclair Diversion Structure rehabilitation). Individual projects associated with a specific treatment plant are listed in the subsequent sections. See Appendix A for the capital project list.

RP-1 (Northern Service Area)

Regional Water Recycling Plant No. 1 (RP-1) is located in the City of Ontario near the intersection of Highway 60 and Archibald Avenue. This facility was originally commissioned in 1948 and has undergone several expansions to increase the design wastewater treatment capacity to approximately 44 MGD, based on the wastewater characteristics at the time of the expansions. Although the projected influent wastewater flows do not show a significant increase from current to build-out, they do reflect higher loading characteristics that require specific treatment process expansions to meet effluent discharge regulations. RP-1 serves areas of Ontario, Upland, Fontana, Chino, Montclair and Cucamonga Valley Water District, treating approximately 27.9 MGD.

RP-1 also has biosolids treatment, designed at a capacity of approximately 60 MGD. Treatment consists of gravity thickening and dissolved air flotation thickening, anaerobic digestion, and dewatering by centrifuges. The stabilized, dewatered solids are trucked to the IERCF in the City of Rancho Cucamonga for further treatment to produce grade A compost. RP-1 handles solids from both RP-1 and RP-4. Based on wastewater flow projection surveys by member agencies, plant flows are expected to reach between 28.8 and 29.4MGD by FY 24/25 (see Exhibit A).

Some major projects in the next ten years are the installation of mixed liquor return pumps, rehabilitation of the east primary effluent piping, migration of the control system, and flare system improvements. Beyond ten years, major projects include rehabilitation of the headworks, upgrades to sludge thickening, and expansion of the liquid and solids treatment capacity. See Appendix A for the capital project list.

RP-4 (Northern Service Area)

The Regional Water Recycling Plant No. 4 (RP-4) is located in Rancho Cucamonga and has been in operation treating wastewater and producing recycled water since 1997. The RP-4 facility capacity expanded from 7 MGD to 14 MGD in 2009.

Waste sludge generated at RP-4 is discharged back to the sewer and flows by gravity to RP-1. RP-4 serves areas of Fontana and Cucamonga Valley Water District, treating approximately 10.0 MGD. Based on wastewater flow projection surveys by member agencies, plant flows are expected to reach between 13.0 and 14.0 MGD by FY 24/25 (see Exhibit B).

Some major projects in the next ten years include improvements to the chlorination system, various process improvements, and R&R projects. There are no major expansion projects planned for RP-4 in the next 30 years. See Appendix A for the capital project list.

CCWRF (Southern Service Area)

The Carbon Canyon Water Reclamation Facility (CCWRF) is located in the City of Chino and has been in operation since May 1992. The CCWRF works in tandem with RP-2 and RP-5 to serve the areas of Chino, Chino Hills, Montclair, and Upland.

Wastewater is treated at CCWRF while the biosolids removed from the wastewater flow are pumped to RP-2 for processing. The CCWRF is designed to treat an annual average flow of 11.4 MGD and treats approximately 7.1 MGD. Based on wastewater flow projection surveys by member agencies, plant flows are expected to reach between 7.8 and 8.1 MGD by FY 24/25 (see Exhibit C).

Some major projects in the next ten years include replacement of the odor control systems, rehabilitation of the headworks, and replacement of the aeration blowers. There are no major expansion projects planned for CCWRF in the next 30 years. See Appendix A for the capital project list.

RP-2 (Southern Service Area)

The Regional Plant No. 2 (RP-2) in the City of Chino has been in operation since 1960. RP-2 was both a liquids and solids treatment facility until 2004, when RP-5 was constructed to handle the liquids portion. Since then, RP-2 treats only the solids from CCWRF and RP-5. Biogas is a byproduct of the treatment process and utilized as a fuel source to operate an engine generator that produces electricity. The electricity is used to operate equipment, thereby reducing the Agency's need to purchase power. RP-2 treatment processes include: gravity thickening and DAF thickening, anaerobic digestion for stabilization, and dewatering by either belt press or centrifuge.

Once the solids are dewatered, they are transported to the IERCF. RP-2 is located on land leased from the US Army Corps of Engineers and the lease is due to expire in 2035. RP-2 is also located within the flood zone behind Prado Dam. Orange County Flood Control District and the Army Corps have plans to raise the maximum operational water level behind the dam to allow greater water storage and conservation. Since RP-2 does not have physical flood protection, IEUA is planning to relocate the solids handling from RP-2 to RP-5. The relocation of RP-2 to RP-5 will be complete around 2022.

There are no projects planned for RP-2 in the next ten years. Beyond ten years, there will be a major project to decommission RP-2.

RP-5 (Southern Service Area)

The Regional Water Recycling Plant No. 5 (RP-5) is located immediately east of the Agency's Administrative Headquarters campus in the City of Chino and began operation in March 2004. It has a capacity rating of 16.3 MGD, which includes capacity for approximately 15 MGD of raw wastewater and 1.3 MGD of solids processing return or recycled flows from RP-2. Waste sludge produced at RP-5 is pumped to the RP-2 solids handling facility, which will be relocated to RP-5 around

2022. RP-5 serves areas of Chino, Chino Hills, and Ontario, treating approximately 9.9 MGD. Based on wastewater flow projection surveys by member agencies, plant flows are expected to reach between 15.4 and 16.1 MGD by FY 24/25 (see Exhibit D).

The RP-5 Solids Handling Facility (RP-5 SHF) was operated by IEUA from 2001 to 2009 as a regional facility accepting dairy manure for recycling and generating biogas. In 2010, IEUA entered into a lease agreement with Environ Strategies, and in 2012, they began utilizing the facility for digestion of primarily food wastes with minor amounts of dairy manure. RP-5 SHF can process 705 wet tons/day of food and dairy waste through an anaerobic digestion process and can generate electricity from the biogas produced. Due to the regional benefits of such a waste handling facility, the Agency plans to keep RP-5 SHF available for the processing of food and dairy waste.

Major projects in the next ten years include improvements to flow equalization and flow monitoring, various process improvements, expansion of the liquid treatment capacity, and construction of solids handling facilities. Beyond ten years, there are no major expansion projects planned for RP-5. See Appendix A for the capital project list.

Salinity Management Program

The salinity management program consists primarily of the NRWS system. The NRWS collection system includes 75 miles of pipeline and is comprised of a north and a south system. The north system, which serves approximately 42 industries, conveys wastewater to sewer lines owned and operated by the CSDLAC. From there, it is conveyed to CSDLAC's treatment facility in Carson, where it is treated and discharged to the ocean.

The south system, which serves approximately 12 industries (including five wastewater haulers) , conveys wastewater to the Inland Empire Brine Line owned by SAWPA, and from there it is carried to the OCSD facility in Fountain Valley for treatment and ocean discharge. The combined northern and southern NRWS system removed 46,097 tons of salt in FY 2014/15 from the service area, reducing the region's salinity and enhancing the opportunities for beneficial use of recycled water.

In addition to the NRWS system, the salinity management program includes a residential Self-Regenerating Water Softener Removal Rebate Program. This program incentivizes the removal of self-regenerating salt-based devices which increase the salinity of plant influent and thus also increases salinity of recycled water supplies. As of December 2015, the program has removed 746 devices, removing approximately 170 tons per year of salt from the Regional system, saving approximately 14.06 acre-feet of water each year. . Although the Agency operates the Chino Desalter I facility, it is managed by the Chino Basin Desalter Authority and thus there are no IEUA capital projects associated with the Desalter. See Appendix A for the capital project list.

WATER SUPPLY

The Agency has established an aggressive goal to increase regional resiliency against droughts, reduce dependence on imported water and develop programs for long-term water efficiency. Recommendations from the completion of the Phase 1 IRP which tested regional water supply resiliency against 106 potential climate impacts include:

- Continuing investments in recycled water
- Acquiring supplemental water to enhance groundwater quality
- Implementing water use efficiency measures to reduce current demand by 10%
- Maximize the purchase of supplemental water for recharge or in-lieu, when available
- Evaluate and include the use of external supplies (e.g. exchanges, storage, and water transfers)
- Continue to maximize stormwater recharge projects, including rainwater capture and infiltration.

Recycled Water

The Recycled Water Distribution Facilities consists of a network of pipelines, pump stations and reservoirs that allow the Agency to deliver recycled water throughout the service area. The facilities allow recycled water to be distributed into six pressure zones (see Figure 14), for direct use and groundwater recharge.

Recycled water projects fall into distribution improvements, groundwater recharge expansion (see the following section on groundwater recharge for a more detailed discussion), operational flexibility, rehabilitation and replacement, and program administration. Project prioritization is based on the ability of projects to increase recycled water deliveries and decrease unit costs. Projects that are listed were identified in the Recycled Water Implementation Plan, Recycled Water Program Strategy, Chino Basin Recharge Master Plan Update, the Agency's Asset Management Plan, and use projections from Member Agencies. These projects will enable the region to beneficially maximize the reuse of the region's projected recycled water supply, increasing recycled water deliveries from 30,000 to approximately 50,000 by 2025.

Once the regional recycled water distribution pipeline in the central-east service area has been completed, projects are focused on capacity improvements and operational upgrades. Capacity improvements include the RP-1 outfall parallel pipeline, the 800 Pressure Zone upgrades near RP-5, and projects to maximize operational flexibility to meet seasonal variation in direct use and groundwater recharge demands. The Agency also included projects to evaluate the potential of an intertie for bring external recycled water supplies into the Chino Basin. See Appendix A for the capital project list.

Groundwater Recharge

The capital projects for the groundwater recharge program mainly involve diversion, capacity improvements, and refurbishment at selected basins to increase the reliability and the recharge capabilities of the basins. Three such enhancement projects were identified by the 2013 Recharge Master Plan Update. Other potential projects identified in the Update require additional investigation and may be added to future TYCIPs.

Recycled water recharge is a key component of the region's water supply portfolio. The more recycled water that is recharged into the Chino Groundwater Basin, the more self-reliant the region becomes is it will be less dependent on imported water supplies. To maximize past investments, several of the projects are primarily focused on environmental and permitting issues that will allow continued basin maintenance to sustain optimal infiltration rates. Other RMPU projects would improve the program asset management and recharge site communications. These other projects are comparably lower-cost projects than new basin construction, and will be explored and funded in the future. The CIP groundwater recharge projects are a means to diversify the water supply for the region and maximize the beneficial reuse of recycled water. See Appendix A for the capital project list.

Water Resources Projects

The Agency currently does not have any capital projects associated with water resources, and conservation programs which are funded by the OM fund are listed in Appendix B. However during Phase 2 of the IRP process, which is scheduled to begin in July 2016, detailed analysis of specific projects, corresponding water supply benefits, and ownership of regionally beneficial projects will be discussed and determined through discussions and modeling work with retail member agencies. The Agency 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.

ADDITIONAL AGENCY FACILITIES

Headquarters & Chino Creek Wetlands and Educational Park

The Agency headquarters, located in the City of Chino, opened in the summer of 2003. It was constructed to meet the Platinum rating from the United States Green Building Council's Leadership in Energy and Environmental Design (LEED) 2004. The headquarter facilities demonstrate how using recycled building materials and state-of-the-art energy efic ient technologies can be used to incorporate environmental sensibilities in an urban setting while creating a better environment, saving water, improving staff productivity, and contributing to the restoration of native landscapes. The headquarters' complex is one of the largest public landscapes in Southern California to use native plants and to have integrated stormwater management, including the restoration of natural drainage and the creation of wetlands and riparian habitat known as the Chino Creek Wetlands and Educational Park.

The Chino Creek Wetlands and Educational Park (Park) is located adjacent to the IEUA headquarters. The 22-acre Park opened in 2004 and was partially funded by a grant from the State Water Resources Control Board. It was designed to restore native habitat and natural drainage, and to showcase the environmental values of the Prado Basin, the largest freshwater habitat remaining in Southern California. The Prado Basin, within which the park resides, provides a critical link for biological and trail networks between the extensive riparian open space of the Prado Flood Control Basin and the Chino Hills State Park to the west. Prado Basin is home to endangered species, including the Least Bell's Vireo and Southwestern Willow Flycatcher.

The Park facilities include an outdoor classroom, 1.7 miles of trails, and educational stations with signage. Local and regional school programs are held at the park, including the Water Discovery educational program funded by the State Parks and Recreation. The Park is open to the public seven days a week throughout the year, with special programs about water quality, conservation, and local ecosystems provided by the Agency.

Projects associated with the Headquarters and Park are primarily O&M and are listed in Appendix B.

Laboratory

The Laboratory consists of two buildings on the RP-1 campus, the original facility built in 1979, and the expansion building built in 1997. At present, the Laboratory facilities are insufficient. Current facilities are crowded, the ventilation system needs improvement, the sample receiving area is small and not easily accessible, the heating and cooling system present challenges for the temperature controls required in a modern lab, and the overall layout of the laboratory is inefficient.

In addition, laboratory testing technologies continue to advance and regulations continue to change, requiring laboratories to detect constituents at lower levels and test for additional chemicals of emerging concern. The current laboratory facilities will be unable to accommodate these changes, and more testing will need to be sent to contract laboratories at additional cost to the Agency. If the Laboratory facility cannot be updated to current and future lab standards, it is essential that the Agency construct a new laboratory.

In 2010 the Agency hired the Austin Company to design the Water Quality Laboratory, but it was put on hold in late 2010 after 50% of the design had been completed. In 2015 the Austin Company was brought back to complete the design, in February 2016 the design reached 100%. The contract for construction is expected to be awarded in May 2016, and construction completed by May of 2019. Budget for laboratory improvements or a new facility is currently included in the TYCIP.

See Appendix A for the capital project list.

Inland Empire Regional Composting Authority

The IERCA is a joint powers authority between IEUA and LACSD. Together, these agencies have shared the costs and resources to develop a state-of-the-art biosolids compost manufacturing facility in Rancho Cucamonga called the Inland Empire Regional Composting Facility (IERCF). The facility is completely enclosed to control odors and to meet stringent air quality regulations.

The IERCF is designed to process and recycle the dewatered and stabilized biosolids from the Agency and SDLAC's wastewater treatment processes as well as wood waste from local communities. It produces over 230,000 cubic yards of high-quality compost each year for local landscaping and horticultural use. The composted product, which is marketed as SoilPro® Premium Compost, is sold as a soil conditioner which helps improve water retention resulting in better plant growth and water savings. The facility is currently operating at its design capacity, receiving nearly 600 tons per day of biosolids and recycled green waste products.

Capital projects for the IERCA include replacement and upgrade projects. Ongoing projects include emergency lighting, amendment hopper improvements, belt conveyor modiicat ions to match actual process low, door widening for improved truck access, belt conveyor catwalks improvement, and lighting and structure protection evaluations. The lighting and structural evaluations may result in future projects for improvements in both areas. Future demands and operational issues will determine what speciic future capital projects are needed. Any capital maintenance, enhancement, or replacement projects will be jointly analyzed and determined with the CSDLAC. See Appendix A for the capital project list.

Business Network and Process Automation Control Network

The capital purchases in the Business Network and Process Automation Control Network are primarily for computers and software. There are no capital projects for this program. Non-capital projects identiied for this program include system upgrades, computer equipment replacement, network infrastructure replacement, software purchases. These projects are shown in Appendix A, which lists all of the IEUA identiied proj ects.

Appendix A

Proposed Capital Project List

ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
70	NC	EN22002	NRW East End Flowmeter Replacement	175,000	200,000	-	**375,000**
138	WC	WR15021	Napa Lateral	500,000	3,300,000	2,000,000	**5,800,000**
162	RO	EN15008	Water Quality Laboratory	7,000,000	10,000,000	8,000,000	**25,000,000**
235	RC	EN18006	RP-1 Flare Improvements	600,000	2,600,000	800,000	**4,000,000**
294	WC	EN15043	SBCFCD Recycled Water Easement	570,000	-	-	**570,000**
295	RC	EN15042	SBCFCD Sewer Easement	275,000	-	-	**275,000**
378	RC	EN16071	San Bernardino Avenue Gravity Sewer	1,300,000	-	-	**1,300,000**
379	WC	TBD	Baseline RWPL Extension	300,000	2,500,000	2,200,000	**5,000,000**
380	GG	EN16013	RP-4 Lighting Improve-ments - Phase 1	100,000	-	-	**100,000**
4	GG	CP16006	Headquarters Chair Re-placement	150,000	-	-	**150,000**
11	RO	EN21002	Chino Creek Wetlands and Educational Park Up-	-	-	-	**1858000***
22	GG	EP17003	RP-1 Training Room	200,000	-	-	**200,000**
23	GG	EP17004	Agency-Wide Vehicle Re-placement	600,000	150,000	1,200,000	**1,950,000**
44	RW	EN18007	RMPU Construction Costs	-	8,300,000	35,749,500	**44,049,500**
46	RW	RW15002	Upper Santa Ana River Habitat Conserv	280,000	-	-	**280,000**
47	RW	RW15003	Recharge Master Plan Update (Softcost)	3,100,000	3,520,500	-	**6,620,500**
49	RW	RW15004	Lower Day Basin RMPU Improvements	1,155,000	910,000	-	**2,065,000**
92	WC	EN12016	North CIM Lateral*	450000*	-	-	**450000***
93	WC	EN13001	San Sevaine Basin Im-provements	3,250,000	2,493,195	-	**5,743,195**
94	WC	EN13041	RP-5 RW PS Process Con-trol Sys Migration	-	-	280,000	**280,000**
95	WC	EN13045	Wineville RW Extension Segment B	15,000	-	-	**15,000**
96	WC	EN13048	RP-1 Power System Up-grades	200,000	600,000	415,000	**1,215,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
97	WC	EN14042	RP-1 1158 RWPS Upgrades	475,000	1,610,000	1,900,000	**3,985,000**
98	WC	EN14043	RP-5 RW Pipeline Bottle-neck	600,000	1,925,000	175,000	**2,700,000**
99	WC	EN15002	1158 Reservoir Site Clean-up	650,000	650,000	-	**1,300,000**
100	WC	EN15055	1630 W. Recycled Water Pump Station - Surge Tank	1,340,000	-	-	**1,340,000**
101	WC	EN16034	RW Pressure Sustaining Valve Installation	341,300	500,000	-	**841,300**
106	WC	EN16065	RW Connections to JCSD	1,000,000	7,000,000	7,000,000	**15,000,000**
107	WC	EN17007	930 To 800 West CCWRF PRV	100,000	250,000	265,000	**615,000**
114	WC	EN19003	RP-1 Outfall Parallel Line FY13/14	200,000	400,000	2,765,000	**3,365,000**
127	WC	EN24003	Wineville Basin Pipeline	-	-	1,000,000	**1,000,000**
136	WC	WR15019	RP-3 Basin Improvements	-	650,000	2,650,000	**3,300,000**
137	WC	WR15020	Victoria Basin Improve-ments	-	65,000	65,000	**130,000**
161	RO	EN13016	SCADA Enterprise System	1,200,000	3,800,000	6,220,000	**11,220,000**
163	RO	EN15012	RP-1 East Primary Effluent Pipe Rehab	500,000	700,000	620,000	**1,820,000**
170	RO	EN17110	RP-4 Process Improve-ments (change to Rehabili-	180,000	1,400,000	3,600,000	**5,180,000**
218	RC	EN14018	RP-4 Disinfection Facility Improvements	1,000,000	1,200,000	15,000	**2,215,000**
219	RC	EN14019	RP-1 Headworks Primary and Secondary Upg	1,500,000	3,425,000	-	**4,925,000**
222	RC	EN16011	Whispering Lakes Pump Station Rehab	-	150,000	5,000,000	**5,150,000**
224	RC	EN16025	RP-1 Expansion PDR	350,000	-	-	**350,000**
225	RC	EN16028	RP-5 Expansion PDR	1,850,000	-	-	**1,850,000**
227	RC	EN17003	Aeration System Improve-ments	-	-	6,250,000	**6,250,000**
228	RC	EN17006	CCWRF Headworks & Odor Control Replaceme	610,000	2,800,000	5,865,000	**9,275,000**
234	RC	EN18004	RP-1 IPS System Improve-ments	-	250,000	750,000	**1,000,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
234	RC	EN18004	RP-1 IPS System Improvements	-	250,000	750,000	**1,000,000**
238	RC	EN19001	RP-5 Expansion to 30 mgd	1,250,000	1,875,000	121,875,000	**125,000,000**
239	RC	EN19005	Haven LS Improvements	-	-	1,500,000	**1,500,000**
240	RC	EN19006	RP-5 SHF - RO	3,125,000	4,375,000	128,500,000	**136,000,000**
244	RC	EN20006	RP-1 Digester Mixing Upgrade	-	-	750,000	**750,000**
245	RC	EN20007	RP-5 Process Improvements	-	-	6,300,000	**6,300,000**
254	RC	EN24001	RP-1 Liquid Treatment Expansion	-	-	31,050,000	**31,050,000**
255	RC	EN24002	RP-1 Solids Treatment Expansion	-	-	7,685,000	**7,685,000**
262	RC	PL16010	CEQA Document Impl. of WWFMP,IRP RWPS	250,000	-	-	**250,000**
267	RM	RA17006	IERCF Eletrical Room HVAC Upgrades	400,000	-	-	**400,000**
269	RM	RA19002	IERCF Trommel Screen Improvements	-	-	900,000	**900,000**
276	RM	RA17001	IERCF Transition Air Duct Improvements	75,000	75,000	750,000	**900,000**
291	RC	EN13018	Montclair Diversion Structure Improvemen	80,000	-	-	**80,000**
292	WC	EN12014	East Avenue 1630 E. RWP Relocation	165,000	-	-	**165,000**
293	NC	EN15044	SBCFCD NRW Easement	515,000	-	-	**515,000**
296	GG	EN16068	Main Office Permit Office	293,000	-	-	**293,000**
297	RO	EN14012	RP-2 Drying Beds Rehabilitation	350,000	-	-	**350,000**
298	RO	EN15013	RP-1 TWAS and Primary Effluent Piping Re	120,000	395,000	-	**515,000**
299	WC	EN16051	RP-1 Utility Water Flow Meter & Control	260,000	-	-	**260,000**
300	RC	EN11031	RP-5 Flow Equalization and Effluent Moni	1,465,000	1,500,000	10,000	**2,975,000**
301	RO	EN16055	Headquarters Back Up Generator	400,000	-	-	**400,000**
302	GG	EN16012	Capital Project's Document Management Program	175,000	-	-	**175,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
303	WC	EN16037	RW Asset Managemetn (Cathodic Protection	250,000	250,000	2,000,000	**2,500,000**
304	RO	TBD	RP-1Filter Valve Replacement	-	150,000	500,000	**650,000**
305	RO	TBD	RP-1 Power Reliability Building Controls Upgrades	350,000	1,150,000	-	**1,500,000**
306	RO	TBD	RP4 Primary Clarifier Rehab	400,000	1,500,000	-	**1,900,000**
307	RO	TBD	Digester 6 and 7 Roof Repairs	400,000	3,400,000	-	**3,800,000**
308	WC	Potential GWR	8th St. Basin RW Turnout Discharge Retrofit	25,000	250,000	-	**275,000**
314	RC	TBD	Septic Conversion PDR	200,000	800,000	-	**1,000,000**
318	RC	TBD	Purchase Existing Solar Installations	-	-	7,500,000	**7,500,000**
319	RM	TBD	IERCF Solar Photovoltaic Power Plant Phase II	4,000,000	150,000	-	**4,150,000**
320	RC	TBD	Headquarters Solar Photovoltaic Power Plants Phase II	1,300,000	100,000	-	**1,400,000**
321	GG	TBD	Primavera Enhancements	-	-	200,000	**200,000**
325	RC	TBD	Regional Conveyance AMP	-	-	500,000	**500,000**
328	RC	EN14020	RP-1 Sludge Thickening Upgrades	-	-	500,000	**500,000**
331	RC	TBD	RP-4 Tertiary Expansion	-	-	500,000	**500,000**
332	WC	TBD	1299 Pressure Zone Pipeline Capacity Upgrades	-	-	500,000	**500,000**
334	WC	EN09007	1630 East Reservoir & Segment B Pipeline	-	-	1,000,000	**1,000,000**
338	WC	TBD	2025-2030 Recycled Water Projects	-	-	1,000,000	**1,000,000**
343	WC	EN16060	RW Connection Pomona	500,000	3,500,000	3,500,000	**7,500,000**
345	RC	EN17030	RP-4 South Side Sight-Proof Safety Wall	380,000	-	-	**380,000**
346	WC	EN17032	RP-4 Outfall Repair from Mission Blvd. to RP-1	50,000	300,000	4,950,000	**5,300,000**
347	RO	EN17034	Agency-wide Lighting Improvements, Phase 2	1,385,000	15,000	-	**1,400,000**
352	RW	RW17001	Truck Purchase	40,000	-	-	**40,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
352	RW	RW17001	Truck Purchase	40,000	-	-	**40,000**
370	RO	TBD	RP-1 Dewatering Vertical Conveyor Repair	375,000	-	-	**375,000**
371	RO	TBD	RP-1 Dewatering Silo/ Conveyor Safety Repairs	231,000	-	-	**231,000**
372	WC	EN14047	GWR and RW SCADA Control Upgrades	455,263	455,263	-	**910,526**
375	RO	TBD	RP-1 and RP-4 Safety Improvements	760,000	-	-	**760,000**

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Appendix B

Proposed Non-Capital Project List

ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
1	GG	CP16003	Headquarters Roofing Replacement	450,000	-	-	**450,000**
2	GG	CP16004	Headquarters LEED OM Certification	40,000	25,000	-	**65,000**
5	GG	EN16047	HQ Parking Lot FY15/16	415,000	-	-	**415,000**
6	GG	EN16048	As-Built Database Up-grades	150,000	-	-	**150,000**
7	GG	EN16049	Conference Rooms Audio Visual Upgrades	400,000	640,000	10,000	**1,050,000**
8	GG	EN16132	Magnolia Channel Spillway	384,000	-	-	**384,000**
9	GG	EN17012	Capital Project's Document Management Program	-	50,000	-	**50,000**
10	GG	EN17023	HQ Drainage Investigations	50,000	-	-	**50,000**
14	GG	EN20008	HQ Parking Lot FY19/20	-	-	250,000	**250,000**
19	GG	EN24004	HQ Parking Lot FY23/24	-	-	250,000	**250,000**
24	GG	IS14001	IEUA Website Consultant	4,200	4,200	33,600	**42,000**
25	GG	IS14025	Finance Process/SAP Func-tional Analysis	40,000	-	-	**40,000**
26	GG	IS15001	HCM Phase 2-Self Service/ HR Process Automation	50,000	100,000	-	**150,000**
27	GG	IS15003	Document/Records Man-agement System	414,000	-	-	**414,000**
28	GG	IS16001	HCM Phase 2 - Position Budgeting & Control	-	206,000	-	**206,000**
29	GG	IS16003	SAP Archiving	-	50,000	-	**50,000**
30	GG	IS16020	SAP User Interface Im-provement	102,535	-	-	**102,535**
31	GG	IS16021	SAP Roadmap & Strategy (change name to "SAP	150,000	150,000	2,150,000	**2,450,000**
32	GG	IS17004	Business Network Equip-ment Replacement and Improvements	93,792	155,000	1,210,000	**1,458,792**
34	GG	IS17007	GIS Master Plan	50,000	-	-	**50,000**
37	GG	IS17013	Exchange (Email) Software Updgrade	54,500	-	-	**54,500**
38	GG	IS17018	HyperV Host Server	23,500	-	-	**23,500**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
39	GG	IS17021	Keyboard/ Video/ Monitor Console Replacement	6,485	-	-	**6,485**
42	GG	PA15002	Agency Wide Coatings and Paving	200,000	100,000	800,000	**1,100,000**
43	GG	PA15008	Major Asset Repair/ Replace	50,000	50,000	400,000	**500,000**
45	RW	IS17009	Replace VM Host Server - GWR	44,800	-	-	**44,800**
48	WC	WR16001	Water Softener Removal Rebate Program	60,000	60,000	480,000	**600,000**
50	NC	CW17101	NRW OE Projects FY16/17	10,000	-	-	**10,000**
51	NC	CW18101	NRW OE Projects FY 17/18	-	10,000	-	**10,000**
52	NC	CW19101	NRW OE Projects FY 18/19	-	-	10,000	**10,000**
53	NC	CW20101	NRW OE Projects FY 19/20	-	-	10,000	**10,000**
54	NC	CW21101	NRW OE Projects FY 20/21	-	-	10,000	**10,000**
55	NC	CW22101	NRW OE Projects FY 21/22	-	-	10,000	**10,000**
56	NC	CW23101	NRW OE Projects FY 22/23	-	-	10,000	**10,000**
57	NC	CW24101	NRW OE Projects FY 23/24	-	-	10,000	**10,000**
58	NC	CW25101	NRW OE Projects FY 24/25	-	-	10,000	**10,000**
59	NC	CW26101	NRW OE Projects FY 25/26	-	-	10,000	**10,000**
60	NC	EN17014	NRWS Manhole Upgrades - 16/17	350,000	-	-	**350,000**
61	NC	EN17016	NRWS Emergency O&M Projects FY 16/17	200,000	-	-	**200,000**
62	NC	EN18014	NRWS Manhole Upgrades - 17/18	-	200,000	-	**200,000**
63	NC	EN18016	NRWS Emergency O&M Projects FY 17/18	-	200,000	-	**200,000**
64	NC	EN19014	NRWS Manhole Upgrades - 18/19	-	-	200,000	**200,000**
65	NC	EN19016	NRWS Emergency O&M Projects FY 18/19	-	-	200,000	**200,000**
66	NC	EN20014	NRWS Manhole Upgrades - 19/20	-	-	200,000	**200,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
67	NC	EN20016	NRWS Emergency O&M Projects FY 19/20	-	-	200,000	**200,000**
68	NC	EN21014	NRWS Manhole Upgrades - 20/21	-	-	200,000	**200,000**
69	NC	EN21016	NRWS Emergency O&M Projects FY 20/21	-	-	200,000	**200,000**
71	NC	EN22014	NRWS Manhole Upgrades - 21/22	-	-	200,000	**200,000**
72	NC	EN22016	NRWS Emergency O&M Projects FY 21/22	-	-	200,000	**200,000**
73	NC	EN23002	Philadelphia Lift Station Force Main Imp	-	-	6,000,000	**6,000,000**
74	NC	EN23014	NRWS Manhole Upgrades - 22/23	-	-	200,000	**200,000**
75	NC	EN23016	NRWS Emergency O&M Projects FY 22/23	-	-	200,000	**200,000**
76	NC	EN24014	NRWS Manhole Upgrades - 23/24	-	-	200,000	**200,000**
77	NC	EN24016	NRWS Emergency O&M Projects FY 23/24	-	-	200,000	**200,000**
78	NC	EN25014	NRWS Manhole Upgrades - 24/25	-	-	200,000	**200,000**
79	NC	EN25016	NRWS Emergency O&M Projects FY 24/25	-	-	200,000	**200,000**
80	NC	EN26016	NRWS Emergency O&M Projects FY 25/26	-	-	200,000	**200,000**
81	WC	CW17002	WC OE Projects FY 16/17	50,000	-	-	**50,000**
82	WC	CW18002	WC OE Projects FY 17/18	-	50,000	-	**50,000**
83	WC	CW19002	WC OE Projects FY 18/19	-	-	50,000	**50,000**
84	WC	CW20002	WC OE Projects FY 19/20	-	-	50,000	**50,000**
85	WC	CW21002	WC OE Projects FY 20/21	-	-	50,000	**50,000**
86	WC	CW22002	WC OE Projects FY 21/22	-	-	50,000	**50,000**
87	WC	CW23002	WC OE Projects FY 22/23	-	-	50,000	**50,000**
88	WC	CW24002	WC OE Projects FY 23/24	-	-	50,000	**50,000**
89	WC	CW25002	WC OE Projects FY 24/25	-	-	50,000	**50,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
90	WC	CW26002	WC OE Projects FY 25/26	-	-	50,000	**50,000**
102	WC	EN16035	WC Planning Documents	500,000	-	2,000,000	**2,500,000**
104	WC	EN16038	Recycled Water Injection Pilot Study	250,000	750,000	-	**1,000,000**
105	WC	EN16039	WRCWRA Intertie	879,000	-	-	**879,000**
108	WC	EN17011	RW Hydraulic Modeling FY 16/17	100,000	-	-	**100,000**
109	WC	EN17017	WC Emergency O&M Projects FY 16/17	500,000	-	-	**500,000**
110	WC	EN17020	WC On-Call Operations & Maintenance Support	250,000	-	-	**250,000**
111	WC	EN17025	WC Safety Projects Operations & Maintenance Support	250,000	-	-	**250,000**
112	WC	EN18011	RW Hydraulic Modeling FY 17/18	-	100,000	-	**100,000**
113	WC	EN18017	WC Emergency O&M Projects FY 17/18	-	500,000	-	**500,000**
115	WC	EN19011	RW Hydraulic Modeling FY 18/19	-	-	100,000	**100,000**
116	WC	EN19017	WC Emergency O&M Projects FY 18/19	-	-	500,000	**500,000**
117	WC	EN20011	RW Hydraulic Modeling FY 19/20	-	-	100,000	**100,000**
118	WC	EN20017	WC Emergency O&M Projects FY 19/20	-	-	500,000	**500,000**
119	WC	EN20031	Recycled Water Program Strategy 2020	-	-	250,000	**250,000**
120	WC	EN21011	RW Hydraulic Modeling FY 20/21	-	-	100,000	**100,000**
121	WC	EN21017	WC Emergency O&M Projects FY 20/21	-	-	500,000	**500,000**
123	WC	EN22011	RW Hydraulic Modeling FY 21/22	-	-	100,000	**100,000**
124	WC	EN22017	WC Emergency O&M Projects FY 21/22	-	-	500,000	**500,000**
125	WC	EN23011	RW Hydraulic Modeling FY 22/23	-	-	100,000	**100,000**
126	WC	EN23017	WC Emergency O&M Projects FY 22/23	-	-	500,000	**500,000**
128	WC	EN24011	RW Hydraulic Modeling FY 23/24	-	-	100,000	**100,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
129	WC	EN24017	WC Emergency O&M Projects FY 23/24	-	-	500,000	**500,000**
130	WC	EN25011	RW Hydraulic Modeling FY 24/25	-	-	100,000	**100,000**
131	WC	EN25017	WC Emergency O&M Projects FY 24/25	-	-	500,000	**500,000**
132	WC	EN26017	WC Emergency O&M Projects FY 25/26	-	-	500,000	**500,000**
133	WC	EN25031	Recycled Water Program Strategy 2025	-	-	250,000	**250,000**
134	WC	IS17017	1630 East Licensed Radio Upgrade	30,500	-	-	**30,500**
135	WC	IS17022	VersaView Replacement Project	47,000	-	-	**47,000**
139	WW	WR16022	Water reliability and sustanability Projects (IRP	-	100,000	8,020,000	**8,120,000**
140	WW	WR16024	SARCCUP Projects	1,500,000	3,000,000	15,000,000	**19,500,000**
141	WW	WR16025	WW Planning Documents	500,000	200,000	2,000,000	**2,700,000**
142	WW	WR17002	CBWCD Landscape Audit & Monitoring Proga	40,000	-	-	**40,000**
143	WW	WR17004	Garden in Every School	45,000	-	-	**45,000**
144	WW	WR17006	Residential Landscape Device Retrofit - Lg Land-	200,000	-	-	**200,000**
145	WW	WR17007	Residential Rebate Incentives	100,000	-	-	**100,000**
146	WW	WR17008	CII Rebate Incentives	100,000	-	-	**100,000**
147	WW	WR17009	National Theater for Children	60,000	-	-	**60,000**
148	WW	WR17010	Reg Educational Outreach Activities (Oth	16,000	-	-	**16,000**
149	WW	WR17011	Freesprinklernozzles.com Program	243,750	-	-	**243,750**
150	WW	WR17013	Sponsorships & Public Outreach	80,000	-	-	**80,000**
151	WW	WR17015	Residential Landscape Training Classes	15,000	-	-	**15,000**
152	WW	WR17017	Residential Pressure Regulation Program	400,000	-	-	**400,000**
153	WW	WR17018	IEUA WUE Model Update & Workshops	4,500	-	-	**4,500**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
154	WW	TBD	Member Agency Locally Implemented Programs	100,000	-	-	**100,000**
155	WW	WR17027	Residential Education, Surveys and Controller Upgrade Program	300,000	-	-	**300,000**
156	WW	WR16019	Technology Based Soft-ware	150,000	-	-	**150,000**
157	WW	WR16020	Budget Based Water Rates	450,000	-	-	**450,000**
159	RO	CP16001	Regional Plant Facilities Aesthetics	80,000	40,000	-	**120,000**
160	RO	EN13012	Magnolia Channel Moni-toring & Maintenanc	10,000	10,000	-	**20,000**
164	RO	EN16021	Chino Basin Groundwater Supply Wells and	3,000,000	7,940,000	-	**10,940,000**
167	RO	EN17019	RO Emergency O&M Pro-jects FY 16/17	600,000	-	-	**600,000**
168	RO	EN17022	RO On-Call Operations & Maintenance Support	250,000	-	-	**250,000**
169	RO	EN17026	RO Safety Operations & Maintenance Support	250,000	-	-	**250,000**
172	RO	EN18019	RO Emergency O&M Pro-jects FY 17/18	-	600,000	-	**600,000**
176	RO	EN19019	RO Emergency O&M Pro-jects FY 18/19	-	-	600,000	**600,000**
178	RO	EN20019	RO Emergency O&M Pro-jects FY 19/20	-	-	600,000	**600,000**
180	RO	EN21019	RO Emergency O&M Pro-jects FY 20/21	-	-	600,000	**600,000**
181	RO	EN21103	Regional Wastewater AMP	-	-	36,000,000	**36,000,000**
183	RO	EN22019	RO Emergency O&M Pro-jects FY 21/22	-	-	600,000	**600,000**
185	RO	EN23019	RO Emergency O&M Pro-jects FY 22/23	-	-	600,000	**600,000**
187	RO	EN24019	RO Emergency O&M Pro-jects FY 23/24	-	-	600,000	**600,000**
189	RO	EN25019	RO Emergency O&M Pro-jects FY 24/25	-	-	600,000	**600,000**
190	RO	EN26019	RO Emergency O&M Pro-jects FY 24/26	-	-	600,000	**600,000**
191	RO	EP16001	RP1/RP2 Digester Cleaning Project	500,000	500,000	4,000,000	**5,000,000**
192	RO	EP16002	Major Facilities Repair/ Replacements	400,000	600,000	4,800,000	**5,800,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
193	RO	IS15020	Process Automation Controls IT Improvmnt	500,000	300,000	2,400,000	**3,200,000**
194	RO	IS16019	RP-1Filter PLC Upgrade Project	52,500	-	-	**52,500**
195	RO	IS17002	RACO Alarm System Replacement Proj	61,100	-	-	**61,100**
196	RO	IS17012	RP-1 Centrifuge Plant Ethernet Upgrade	59,000	-	-	**59,000**
197	RO	IS17014	Philadelphia Lift Station Licensed Radio Upgrade	51,500	-	-	**51,500**
198	RO	IS17015	Replace VM Host Server - RP-4	44,800	-	-	**44,800**
199	RO	IS17019	Replace VM Host Server - RP-1	22,400	-	-	**22,400**
200	RO	IS17020	VantagePoint Connectors	15,000	-	-	**15,000**
201	RO	IS17023	RP-4 Replace OITS	58,720	-	-	**58,720**
202	RO	IS17024	Invensys/ Foxboro RP-5 and RP-2 Upgrades	254,500	-	-	**254,500**
203	RO	IS17106	Virtualization Host Server Replacement	100,000	-	-	**100,000**
204	RO	PA17006	Agency-Wide Aeration Panel Replacement	2,400,000	2,500,000	4,700,000	**9,600,000**
205	RO	PK11001	Water Discovery Field Trip & Bus Grant	50,000	40,000	42,000	**132,000**
206	RC	CW17003	RC OE Projects FY 16/17	50,000	-	-	**50,000**
207	RC	CW18003	RC OE Projects FY 17/18	-	50,000	-	**50,000**
208	RC	CW19003	RC OE Projects FY 18/19	-	-	50,000	**50,000**
209	RC	CW20003	RC OE Projects FY 19/20	-	-	50,000	**50,000**
210	RC	CW21003	RC OE Projects FY 20/21	-	-	50,000	**50,000**
211	RC	CW22003	RC OE Projects FY 21/22	-	-	50,000	**50,000**
212	RC	CW23003	RC OE Projects FY 22/23	-	-	50,000	**50,000**
213	RC	CW24003	RC OE Projects FY 23/24	-	-	50,000	**50,000**
214	RC	CW25003	RC OE Projects FY 24/25	-	-	50,000	**50,000**

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ID #	Fund	Project Number	Project Name	FY 16/17 Amended Budget	FY 17/18 Forecast	FY19-26 Forecast	FY 16/17-FY 19/26 Total
215	RC	CW26003	RC OE Projects FY 25/26	-	-	50,000	**50,000**
216	RC	EN11039	TP-1 Disinfection Pump Improvements	225,000	969,000	-	**1,194,000**
217	RC	EN13028	Preserve Lift Station	100,000	300,000	2,400,000	**2,800,000**
223	RC	EN16024	RP-1 Mixed Liquor Return Pumps	2,850,000	2,835,000	15,000	**5,700,000**
226	RC	EN16036	RC Planning Documents	1,000,000	-	2,000,000	**3,000,000**
229	RC	EN17015	Collection System Up-grades 16/17	500,000	-	-	**500,000**
230	RC	EN17018	RC Emergency O&M Pro-jects FY 16/17	600,000	-	-	**600,000**
231	RC	EN17021	RC On-Call Operations & Maintenance Support	250,000	-	-	**250,000**
233	RC	EN17027	RC Safety Operations & Maintenance Support	250,000	-	-	**250,000**
236	RC	EN18015	Collection System Up-grades 17/18	-	500,000	-	**500,000**
237	RC	EN18018	RC Emergency O&M Pro-jects FY 17/18	-	600,000	-	**600,000**
242	RC	EN19015	Collection System Up-grades 18/19	-	-	500,000	**500,000**
243	RC	EN19018	RC Emergency O&M Pro-jects FY 18/19	-	-	600,000	**600,000**
246	RC	EN20015	Collection System Up-grades 19/20	-	-	500,000	**500,000**
247	RC	EN20018	RC Emergency O&M Pro-jects FY 19/20	-	-	600,000	**600,000**
248	RC	EN21015	Collection System Up-grades 20/21	-	-	500,000	**500,000**
249	RC	EN21018	RC Emergency O&M Pro-jects FY 20/21	-	-	600,000	**600,000**
250	RC	EN22015	Collection System Up-grades 21/22	-	-	500,000	**500,000**
251	RC	EN22018	RC Emergency O&M Pro-jects FY 21/22	-	-	600,000	**600,000**
252	RC	EN23015	Collection System Up-grades 22/23	-	-	500,000	**500,000**
253	RC	EN23018	RC Emergency O&M Pro-jects FY 22/23	-	-	600,000	**600,000**
256	RC	EN24015	Collection System Up-grades 23/24	-	-	500,000	**500,000**

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257	RC	EN24018	RC Emergency O&M Projects FY 23/24	-	-	600,000	**600,000**
258	RC	EN25015	Collection System Upgrades 24/25	-	-	500,000	**500,000**
259	RC	EN25018	RC Emergency O&M Projects FY 24/25	-	-	600,000	**600,000**
260	RC	EN26018	RC Emergency O&M Projects FY 25/26	-	-	600,000	**600,000**
261	RC	IS17016	Host Servers for Test Environment	44,400	-	-	**44,400**
263	RM	RA17002	IERCF Replace Printers	4,700	-	-	**4,700**
264	RM	RA17003	IERCF Replace VM Host Servers	44,800	-	-	**44,800**
265	RM	RA17004	IERCF Replace Network Switches	25,000	-	-	**25,000**
266	RM	RA17005	IERCF UPS Replacement	14,000	-	-	**14,000**
268	RM	RA19001	IERCF Pugmill Improvements	-	-	100,000	**100,000**
272	RM	RA20003	IERCF Belt Conveyor Improvements	-	-	600,000	**600,000**
273	RM	RA20004	IERCF Misc Fan Improvements	-	-	900,000	**900,000**
275	RM	RA16001	IERCF Fire Sprinkler Improvements	200,000	-	-	**200,000**
278	RM	RA11001	IERCF Capital Replacement	500,000	500,000	4,000,000	**5,000,000**
279	RM	RA15001	IERCF Baghouse Improvements	350,000	-	-	**350,000**
280	RM	TBD	IERCF Building Improvements	100,000	100,000	-	**200,000**
281	RM	TBD	IERCF Inner Roof Lining Repair	-	-	300,000	**300,000**
282	RM	TBD	IERCF Front End Loader Replacement	-	-	600,000	**600,000**
284	RC	PL16016	Sewer Use Fee Evaluation	350,000	-	-	**350,000**
285	DM		CDA Printer Replacement (1)	2,176	-	-	**2,176**
286	DM		CDA RO/CW/IEX PLC Replacement	46,080	-	-	**46,080**
287	DM		Purchase Web Based HMI for Desalter/Wonderware	30,000	-	-	**30,000**

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288	GG		ICP instrument	-	-	200,000	**200,000**
289	GG		TOC instrument	-	-	35,000	**35,000**
309	WC	Potential RW	1630 East Pump Station Upgrades	100,000	200,000	-	**300,000**
310	WC	EN17038	GWR Level Transmitter Upgrades	200,000	-	-	**200,000**
311	WC	Potential GWR	Orchard Recycled Water Turnout Improvements	25,000	100,000	-	**125,000**
312	GG		Dionex Integrion HPIC	41,000	-	-	**41,000**
313	GG	LB17001	TKN Block Digester	11,000	-	-	**11,000**
315	RO		RO Planning Documents	250,000	-	1,000,000	**1,250,000**
316	RC	PL16015	Septic to Sewer Feasibility Study	350,000	-	-	**350,000**
322	NC	TBD	Lift Station AMP Projects	-	-	200,000	**200,000**
324	RM	TBD	IERCF Projects AMP	-	-	500,000	**500,000**
327	RC	TBD-20	RP-1 Headworks Rehab	-	-	500,000	**500,000**
329	RO	TBD-04	RP-2 Preliminary Design Report for Decomissioning	-	-	600,000	**600,000**
341	RO	TBD	Agency-Wide Condition Assessments	250,000	250,000	2,000,000	**2,500,000**
344	RO	EN16070	Agency-wide Pump Effi-ciencies Improvements	1,260,000	15,000	-	**1,275,000**
348	WC	EN26011	RW Hydraulic Modeling	-	-	100,000	**100,000**
350	GG	LB17002	Integrion HPIC	41,000	-	-	**41,000**
351	WW	WR18001	Ag Conservation	100,000	-	-	**100,000**
353	RW	RW17002	West Valley (Midge	120,000	-	-	**120,000**
355	WW	WR16002	CBWCD Landscape Audit & Monitoring Proga	40,000	-	-	**40,000**
356	WW	WR16004	Garden in Every School	78,128	-	-	**78,128**
357	WW	WR16006	Residential Landscape Device Retrofit - Lg Land-	200,000	-	-	**200,000**

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358	WW	WR16007	Residential Rebate Incentives	114,185	-	-	**114,185**
359	WW	WR16008	CII Rebate Incentives	200,000	-	-	**200,000**
360	WW	WR16009	National Theater for Children	60,000	-	-	**60,000**
361	WW	WR16010	Reg Educational Outreach Activities (Oth	16,000	-	-	**16,000**
362	WW	WR16011	Freesprinklernozzles.com Program	243,750	-	-	**243,750**
363	WW	WR16013	Sponsorships & Public Outreach	80,000	-	-	**80,000**
364	WW	WR16015	Residential Landscape Training Classes	15,000	-	-	**15,000**
365	WW	WR16017	Residential Pressure Regulation Program	400,000	-	-	**400,000**
366	WW	WR16018	IEUA WUE Model Update & Workshops	4,500	-	-	**4,500**
367	WW	WR16027	Residential Education, Surveys and Controller	300,000	-	-	**300,000**
368	WW	WR18XXX	Conservation Programs	-	1,250,000	10,000,000	**11,250,000**
369	WW	WR18XXX	Conservation Programs-grant share*	-	1250000*	-	**11,250,000***
373	WC	TBD	CCWRF Valve Replacement	250,000	-	-	**250,000**
374	WW	WR15022	Water Use Assessments	188,382	-	-	**188,382**
381	GG	TBD	New PC Workstation	9,000	-	-	**9,000**

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