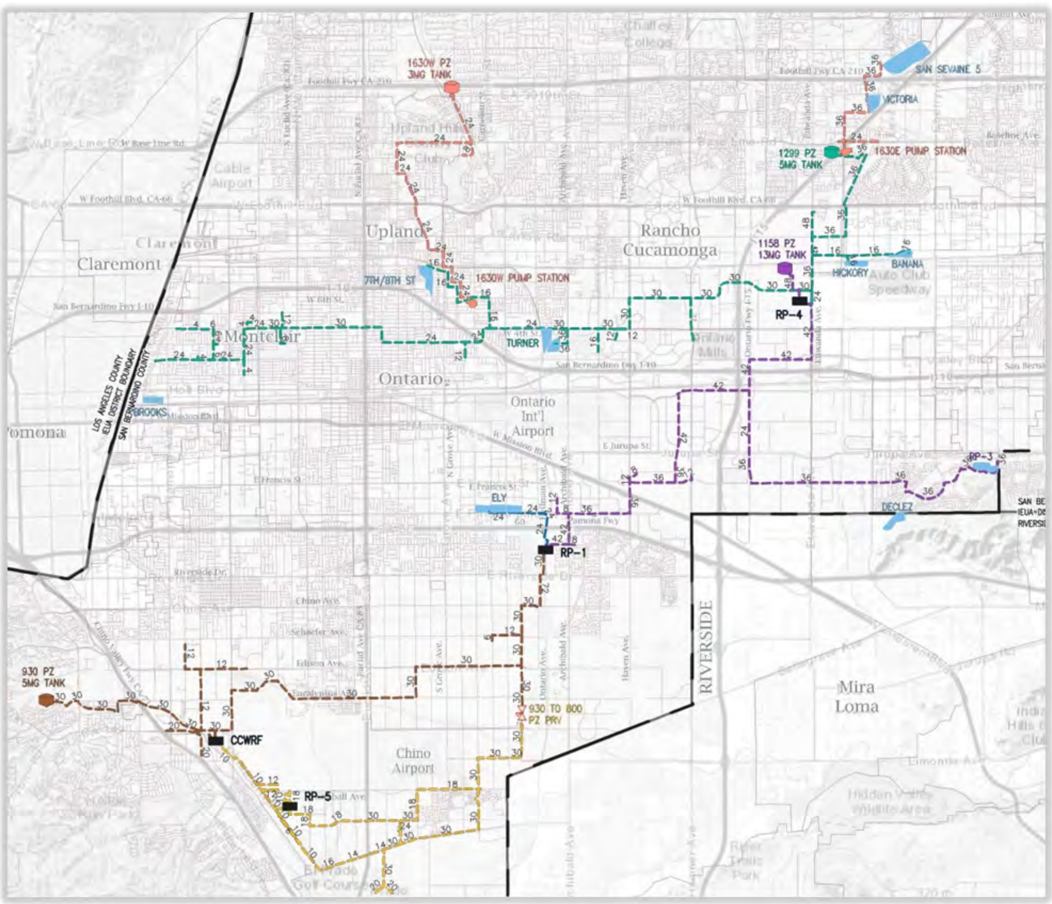
Inland Empire Utilities Agency
A MUNICIPAL WATER DISTRICT

RECYCLED WATER PROGRAM STRATEGY



Inland Empire Utilities Agency

October 2015

Stantec

Recycled Water Program Strategy

Facility Master Planning Study

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"*Recycled Water System Hydraulic Analysis for the Enhanced GWR Program*", December 2013

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.

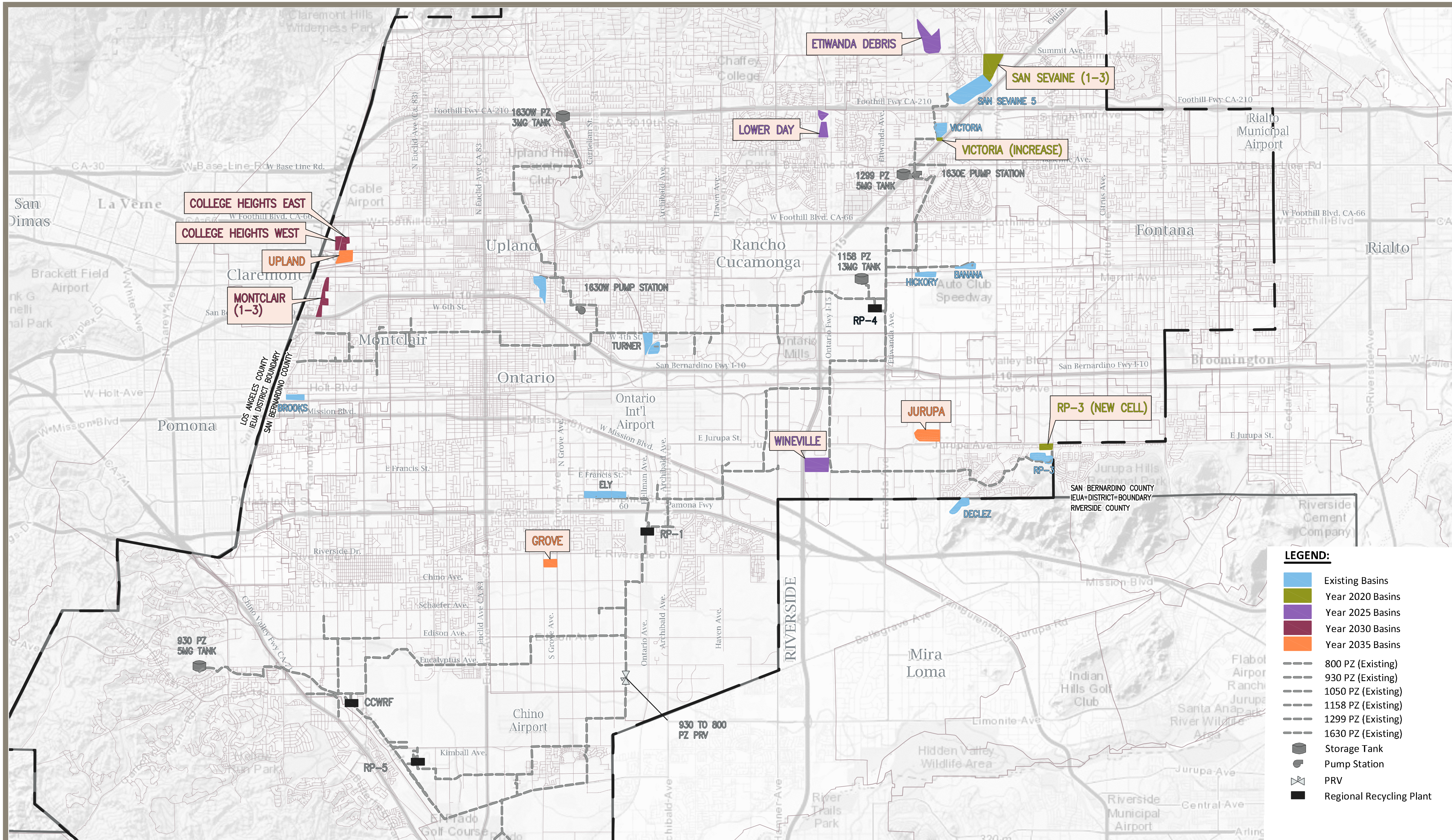
[3] Range of potential annual deliveries to the existing and 2013 RMPU GWR basins only, based on operating time of GWR program and basin capacity estimated at 9-months per year. Values assume all basins operating at average annual infiltration without reuse supply limitations for duration specified. 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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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.

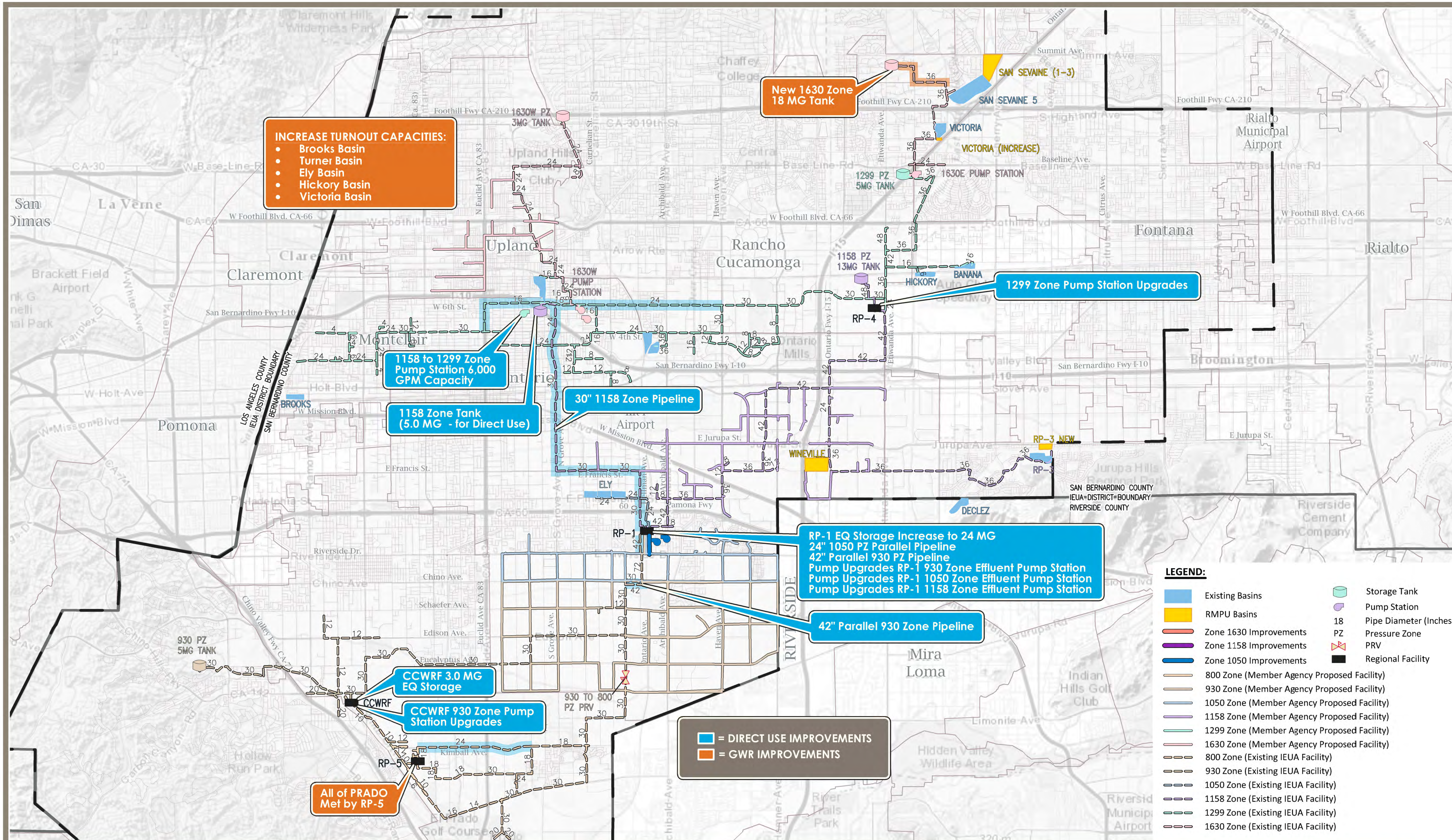
Table ES.6 identifies the comprehensive list of projects and corresponding project costs for each planning year. Since the improvements recommended are to either meet direct use demands or maximize GWR to the basins, a description of the demand condition that triggers the need for the project as well 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.

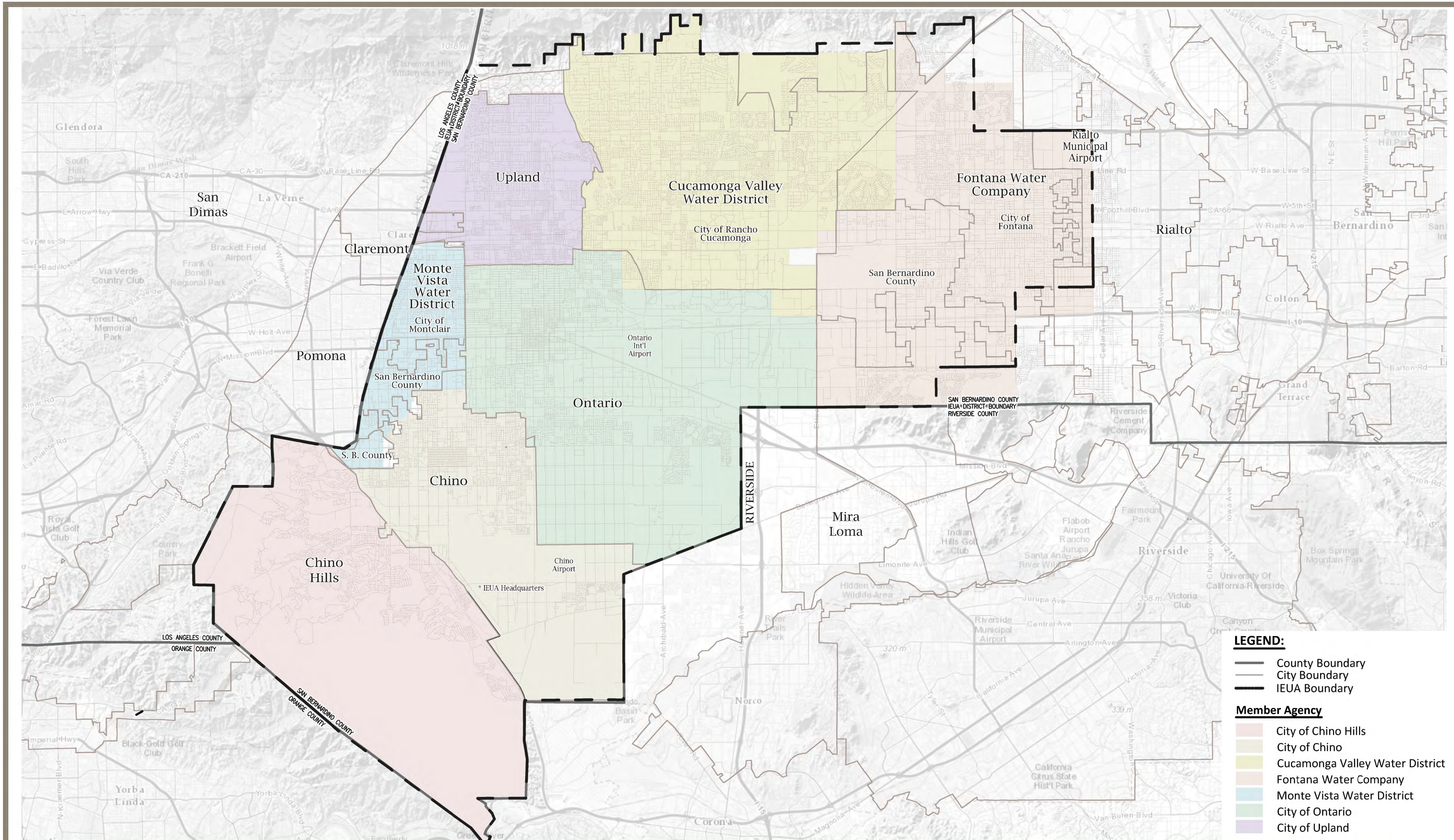
Although this RWPS does not change the priority of reuse supply (SARBF Obligation is first, direct use demands are second, and GWR is third), it does define a delivery strategy in order to maximize all of the reuse supply available to the GWR basins. Reuse supply to the GWR basins is defined to be a 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

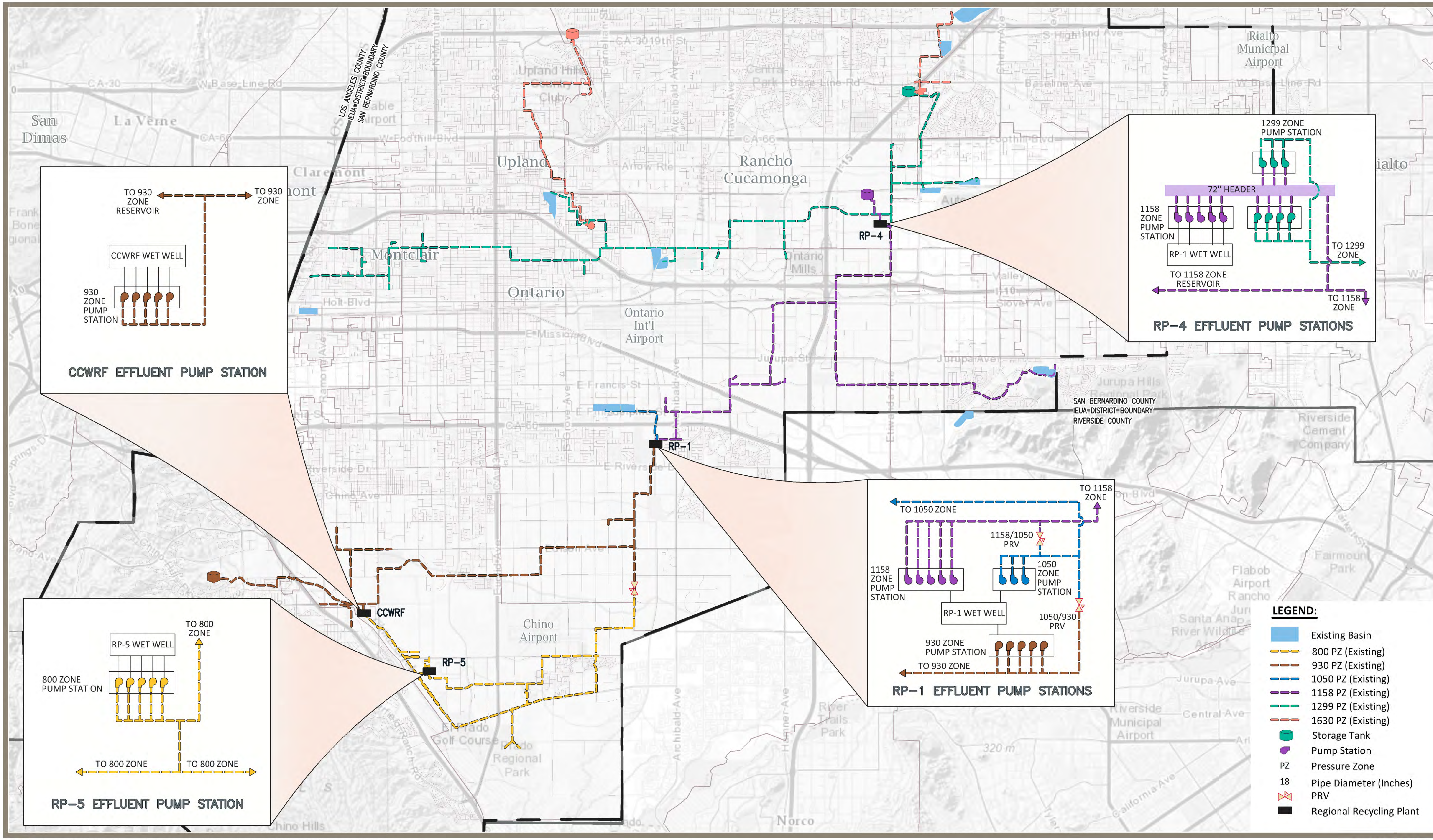
Regional Water Recycling Plant No. 1 (RP-1) is located in the City of Ontario near the intersection of State Highway 60 and Archibald Avenue. This facility was originally commissioned in1948 and has undergone several expansions to increase the design wastewater treatment capacity to the current 44.0 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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GRAPHIC SCALE
0 4250' 8500' 17000'
(IN FEET) 1 inch = 8500 FT

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

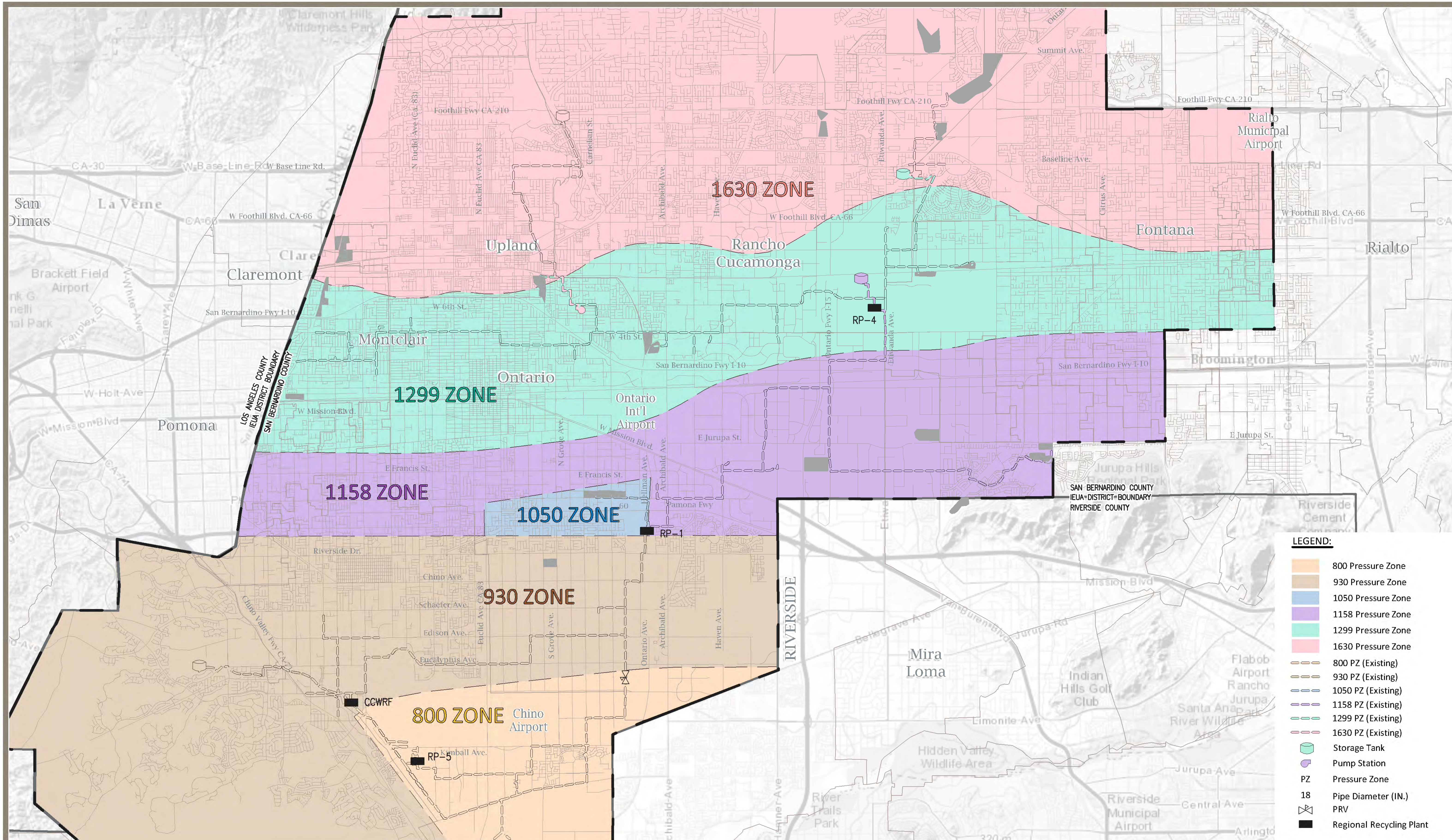
Six (6) pressure zones are utilized to deliver the reuse supply to the Agency's customers with the appropriate service pressures as shown below. These pressure zones are listed in Table 3.6 and illustrated in Figure 3-2. The pressure zones are established based on the following set of design criteria:

- 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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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

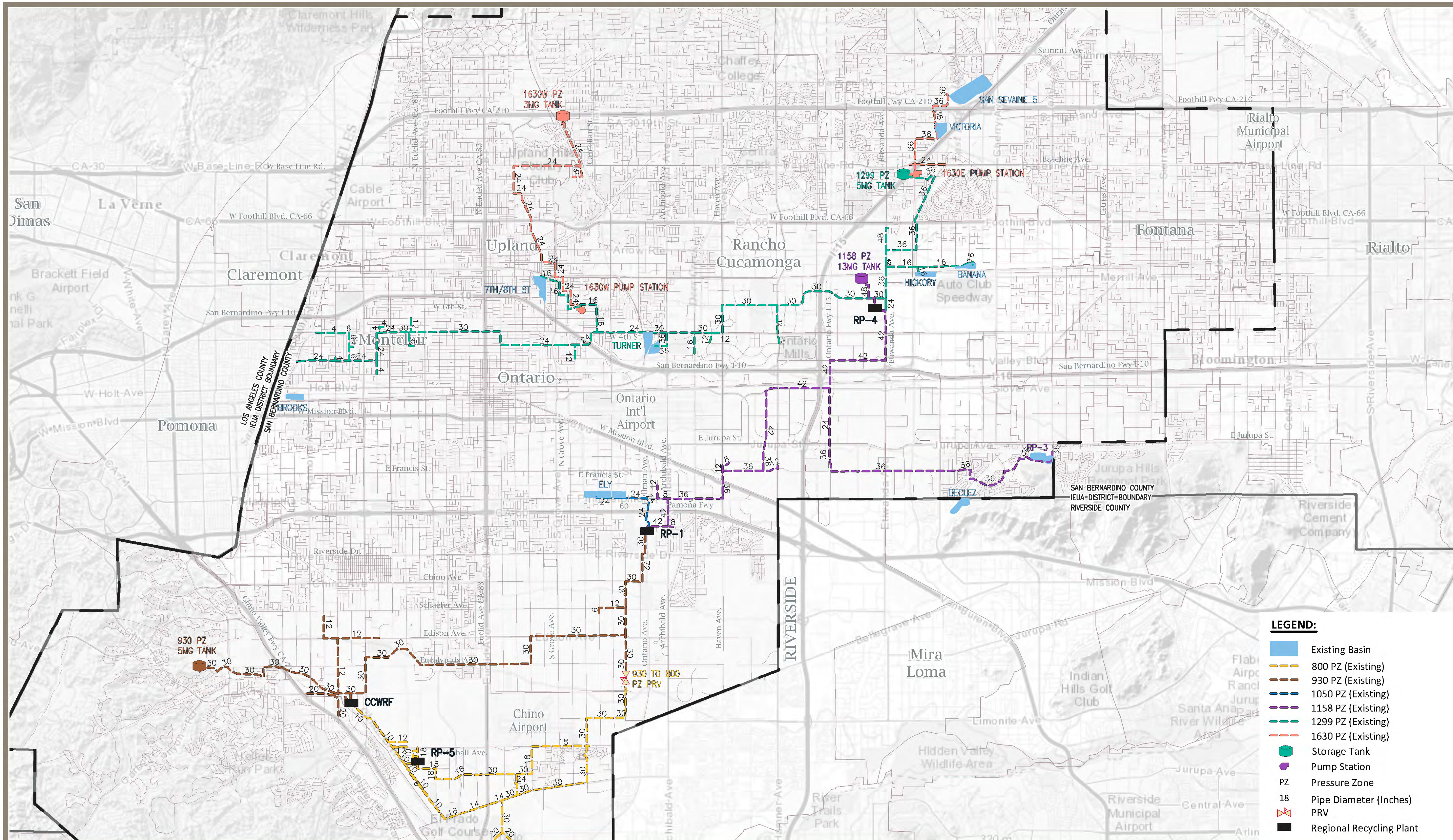
There are three (3) pressure reducing stations that allow RW to flow from a higher pressure zone down to a lower pressure zone. These pressure reducing stations are equipped with a PRV designed to open and supplement the lower pressure zone with RW when the downstream system pressure drops below a defined 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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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.

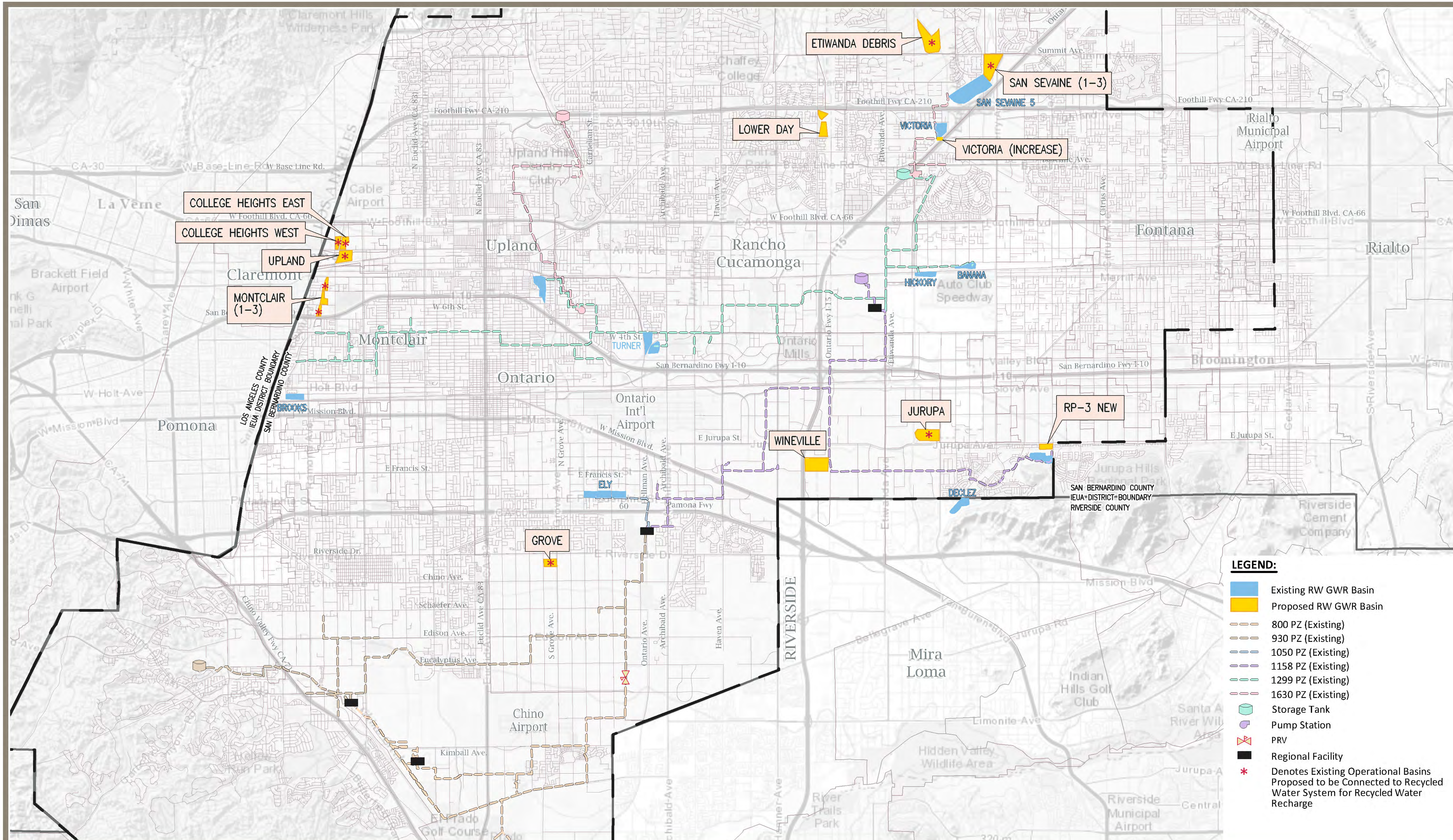
Table 4.1 Proposed GWR Basins to Receive Recycled Water

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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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.

<u>Costs Related Criteria</u>

- *Pressure Zone Demand Distribution* – consideration is given to how the basins will be implemented over the next 20 years based on the geographic location within each pressure zone, and how many basins are supplied by the same pressure zone. This criterion groups the basins for each 5-year increment to evenly spread out the basin demands within each pressure zone and spread the demands over multiple basins, if possible, in order to limit the amount of new infrastructure required during the same planning year. Based on the hydraulic evaluations, the pressure zones in the eastern portion of the system have more 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	1 pt
Yes	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	10 pts
Existing Wells	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.

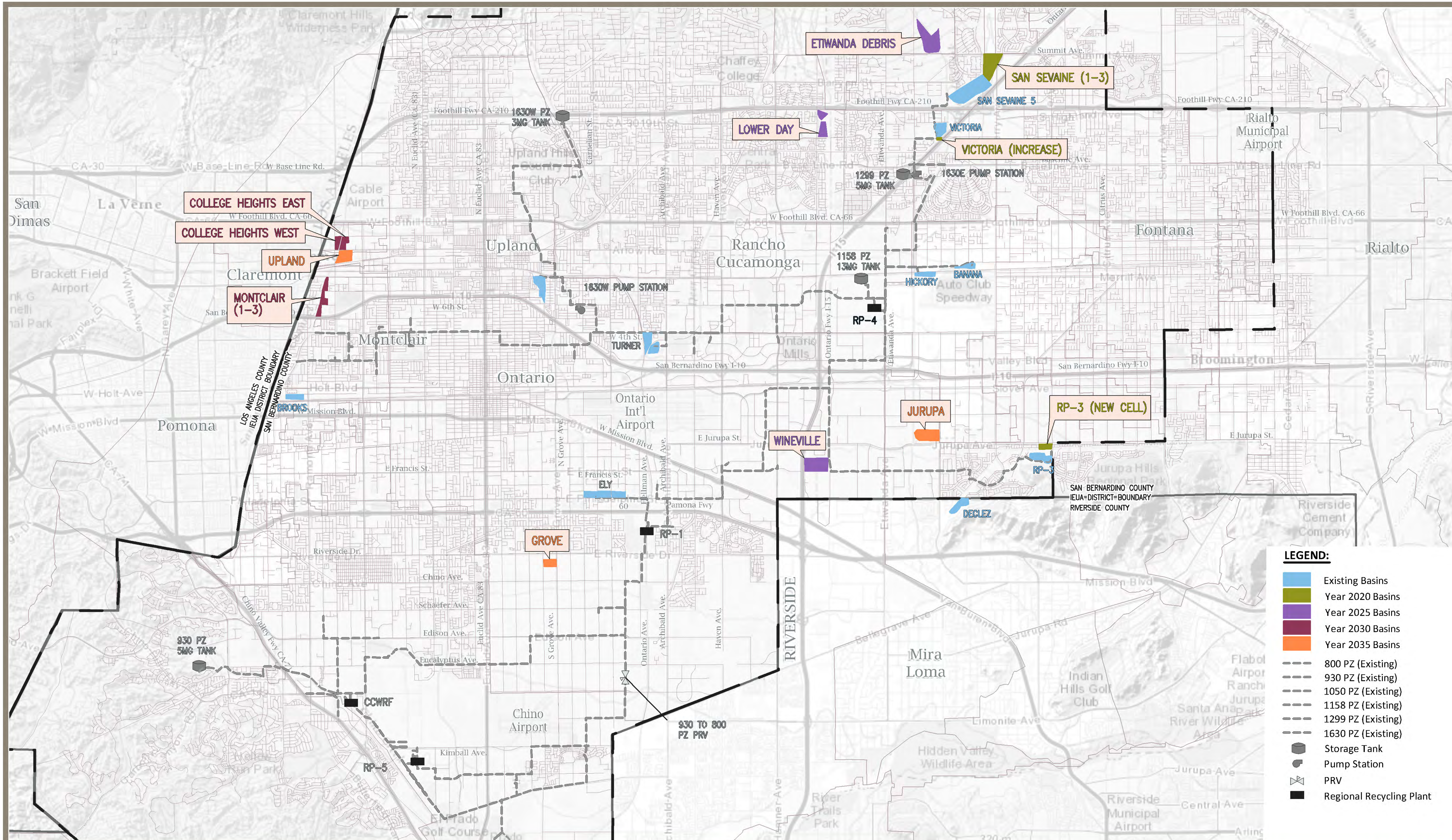
It should be noted that the priority order in which the basins were grouped and implemented also included consideration for total GWR demand. The implementation order of the GWR basins was modified as necessary to balance the GWR demand as evenly as possibly throughout the entire 20 year RWPS planning 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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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.

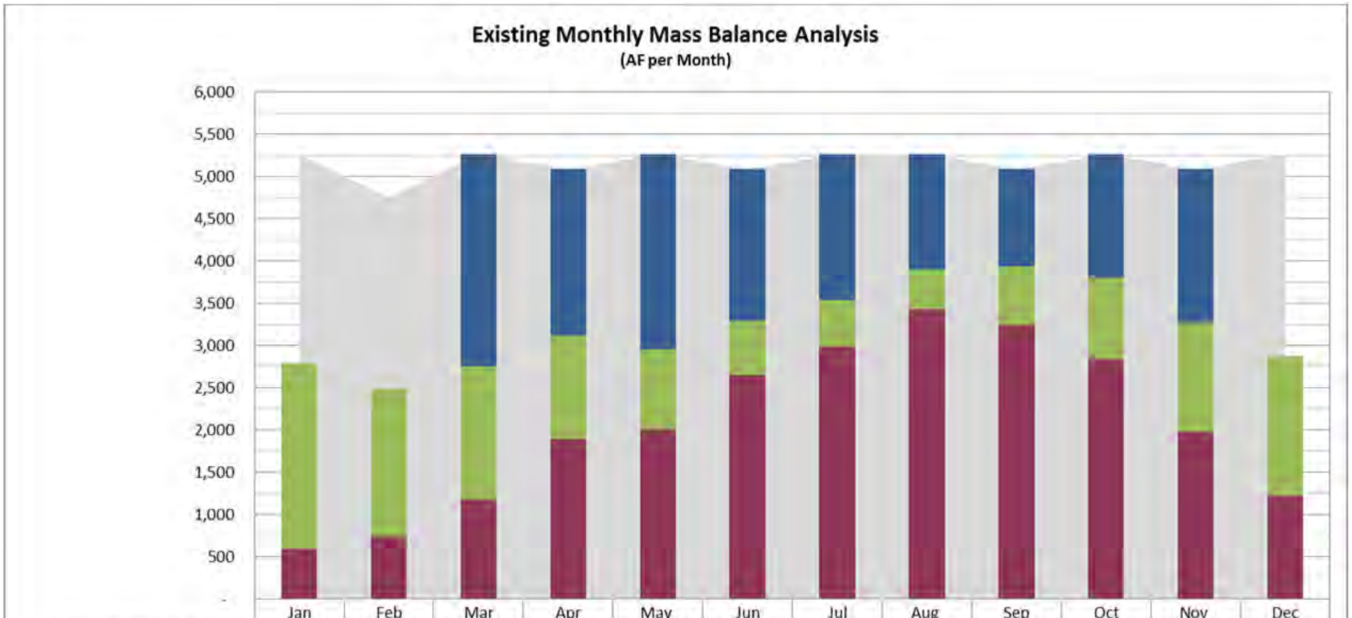
[3] The Un-Used Winter Months RW Surplus could be utilized in dry years for GWR if no storm water or local runoff water needs are to be captured.

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

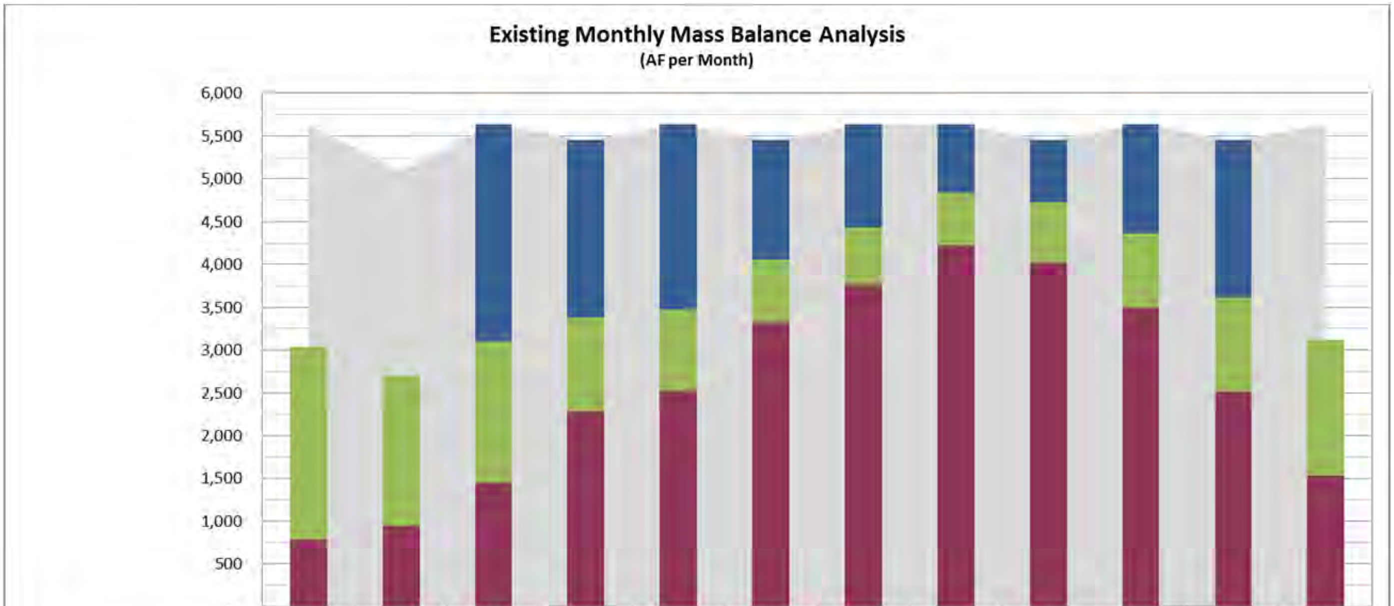


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,261	4,752	5,261	5,091	5,261	5,091	5,261	5,261	5,091	5,261	5,091	5,261
Groundwater Recharge	-	-	2,506	1,979	2,309	1,797	1,720	1,355	1,157	1,457	1,817	-
SARB at Prado Obligation	2,201	1,746	1,581	1,224	951	644	555	485	690	970	1,298	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

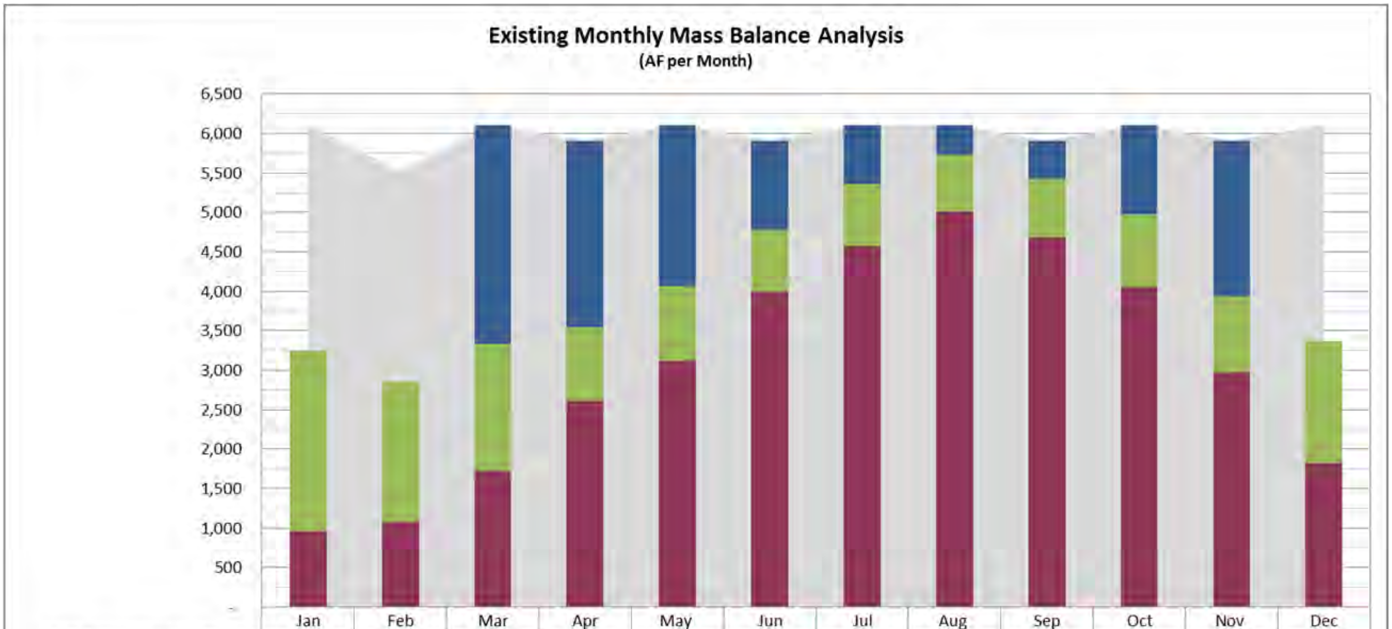


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	5,632	5,087	5,632	5,450	5,632	5,450	5,632	5,632	5,450	5,632	5,450	5,632
Groundwater Recharge	-	-	2,529	2,073	2,165	1,389	1,196	797	726	1,267	1,835	-
SARB at Prado Obligation	2,255	1,753	1,649	1,100	942	737	666	618	709	875	1,105	1,591
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

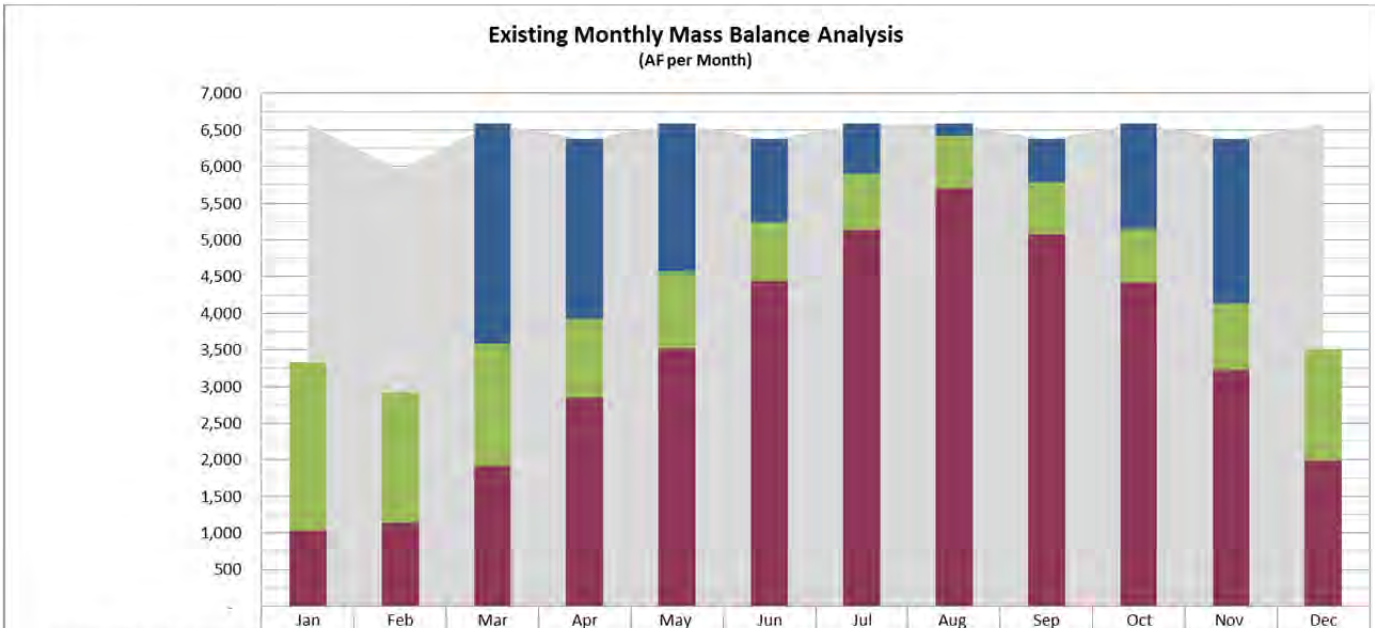


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,108	5,517	6,108	5,911	6,108	5,911	6,108	6,108	5,911	6,108	5,911	6,108
Groundwater Recharge	-	-	2,777	2,373	2,042	1,131	742	374	485	1,132	1,970	-
SARB at Prado Obligation	2,289	1,767	1,605	924	946	783	790	723	743	923	967	1,542
Direct 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

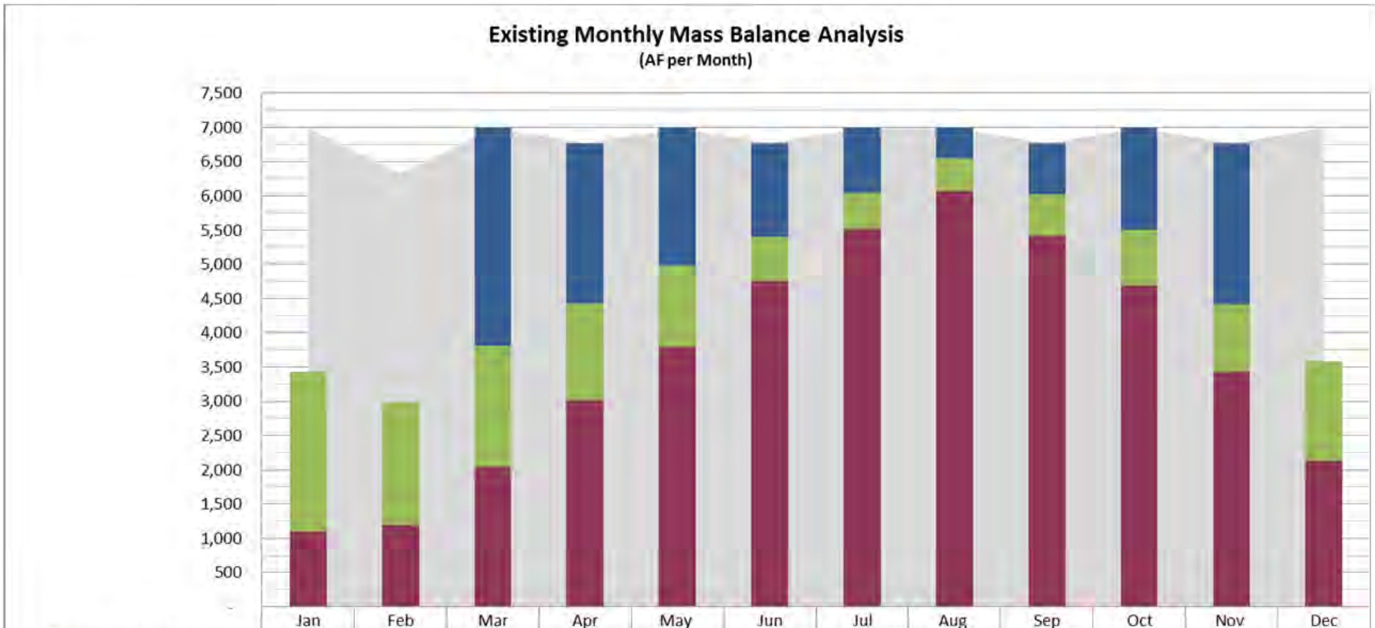


	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Recycled Water Supply	6,583	5,946	6,583	6,371	6,583	6,371	6,583	6,583	6,371	6,583	6,371	6,583
Groundwater Recharge	-	-	2,999	2,452	2,011	1,128	686	166	589	1,433	2,243	-
SARB at Prado Obligation	2,297	1,782	1,667	1,073	1,053	799	761	714	700	733	904	1,517
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.

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

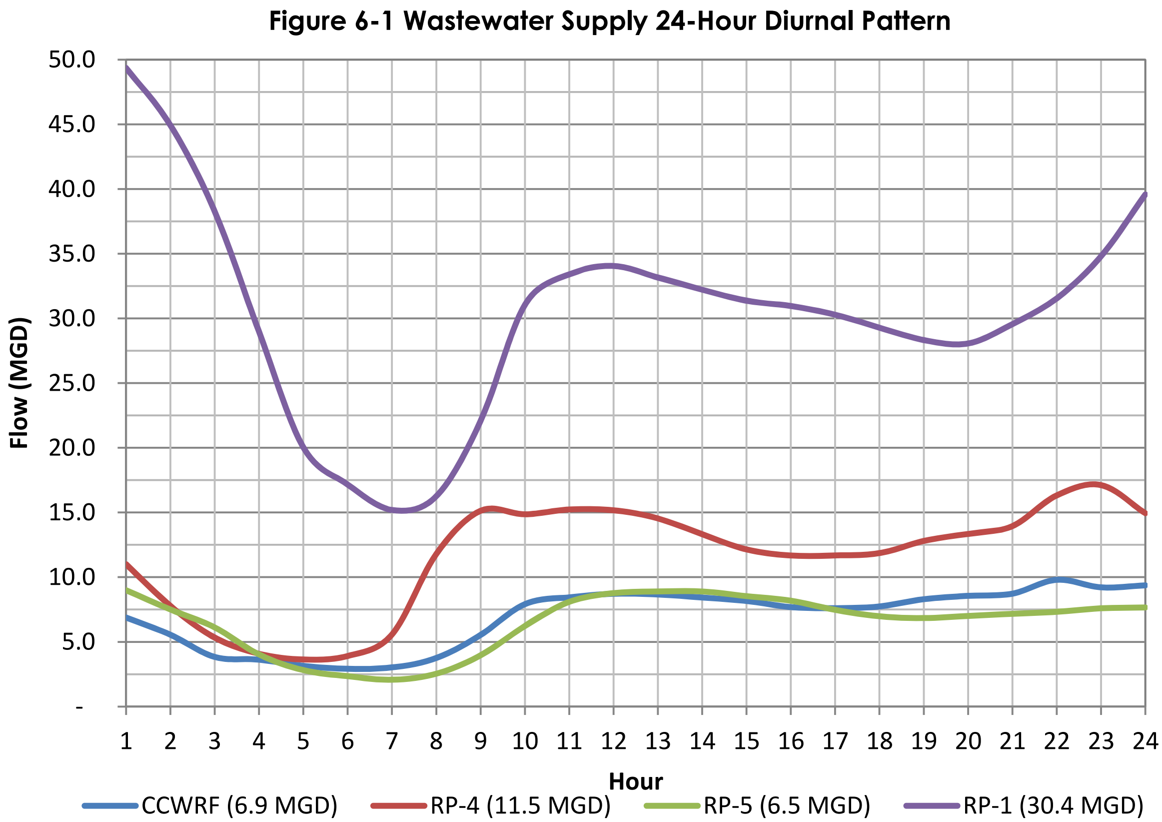
[1] The Direct Use Demands for the "AD" condition are the average demands for the spring/fall months of March, April, May, and November. The "MD" condition demands are the maximum month's demands between June and October.
[2] The SARBF at Prado Obligation demands are the average demands for the appropriate 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.



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

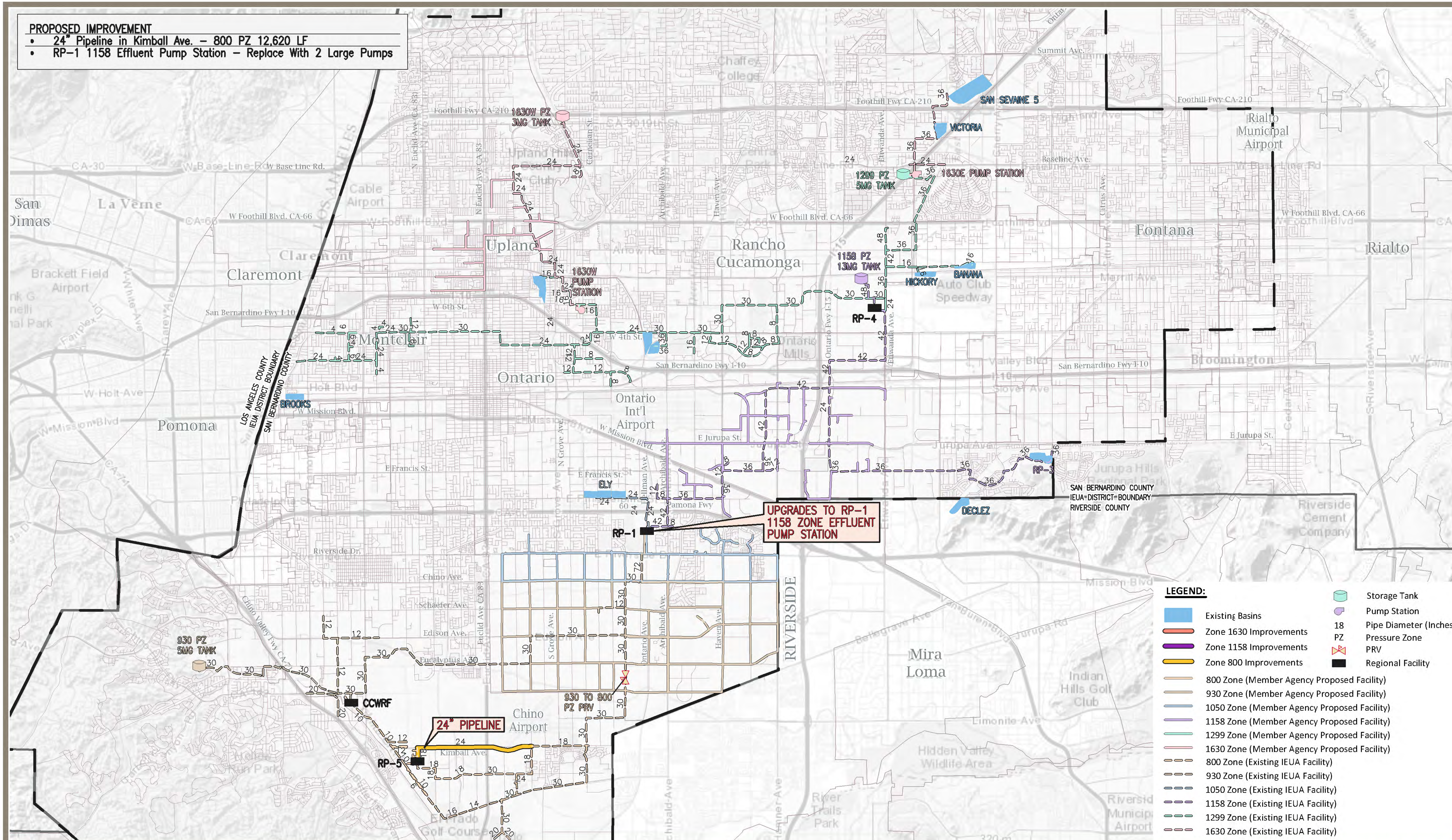
The Year 2035 analysis and recommendations are primarily due to the growth associated with development in the 930 Zone and 1050 Zone service areas.

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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Proposed Recycled Water System Improvements
YEAR 2020 - Direct Use Demands Only
FIGURE 6-3

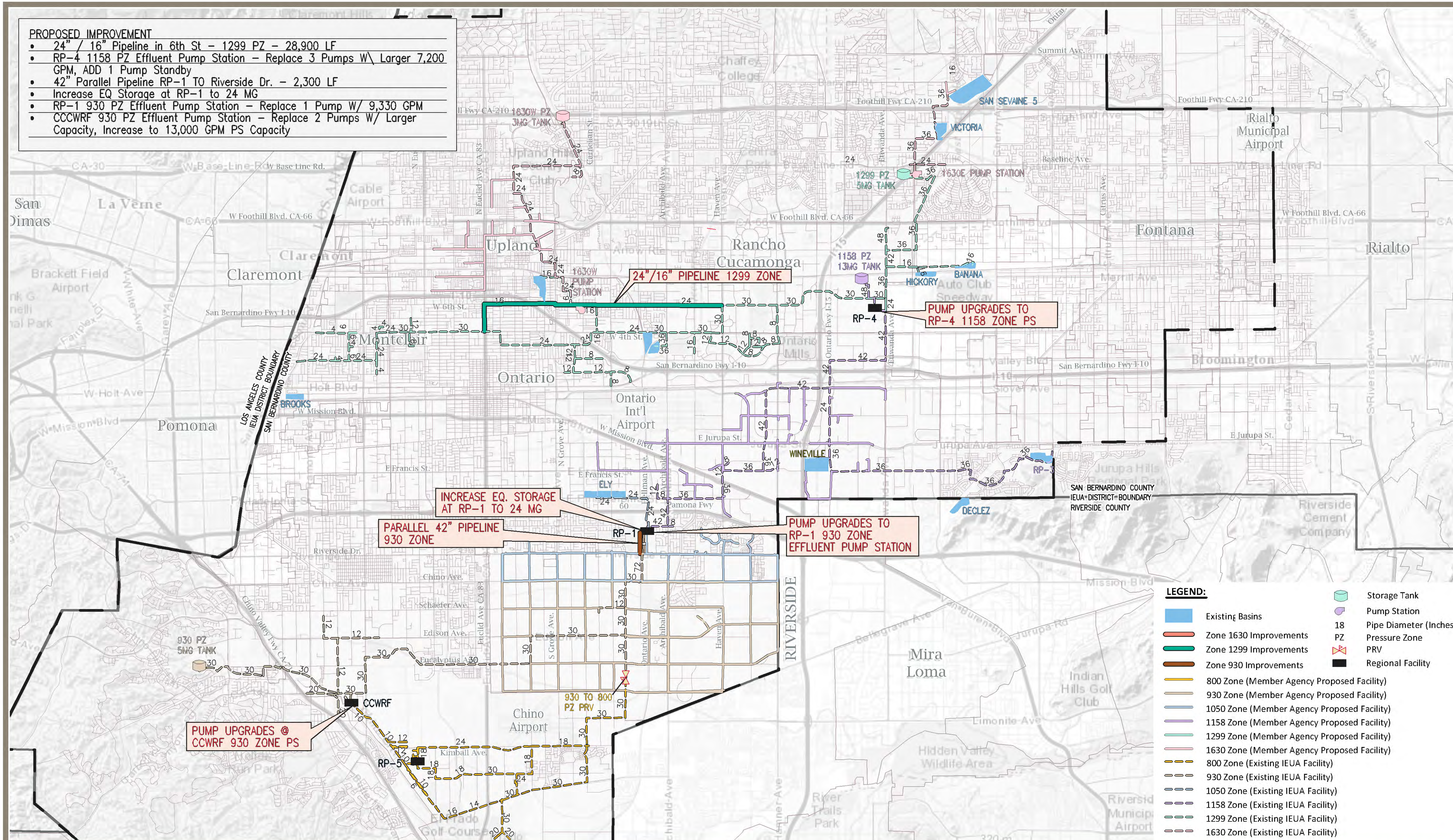

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FIGURE 6-4

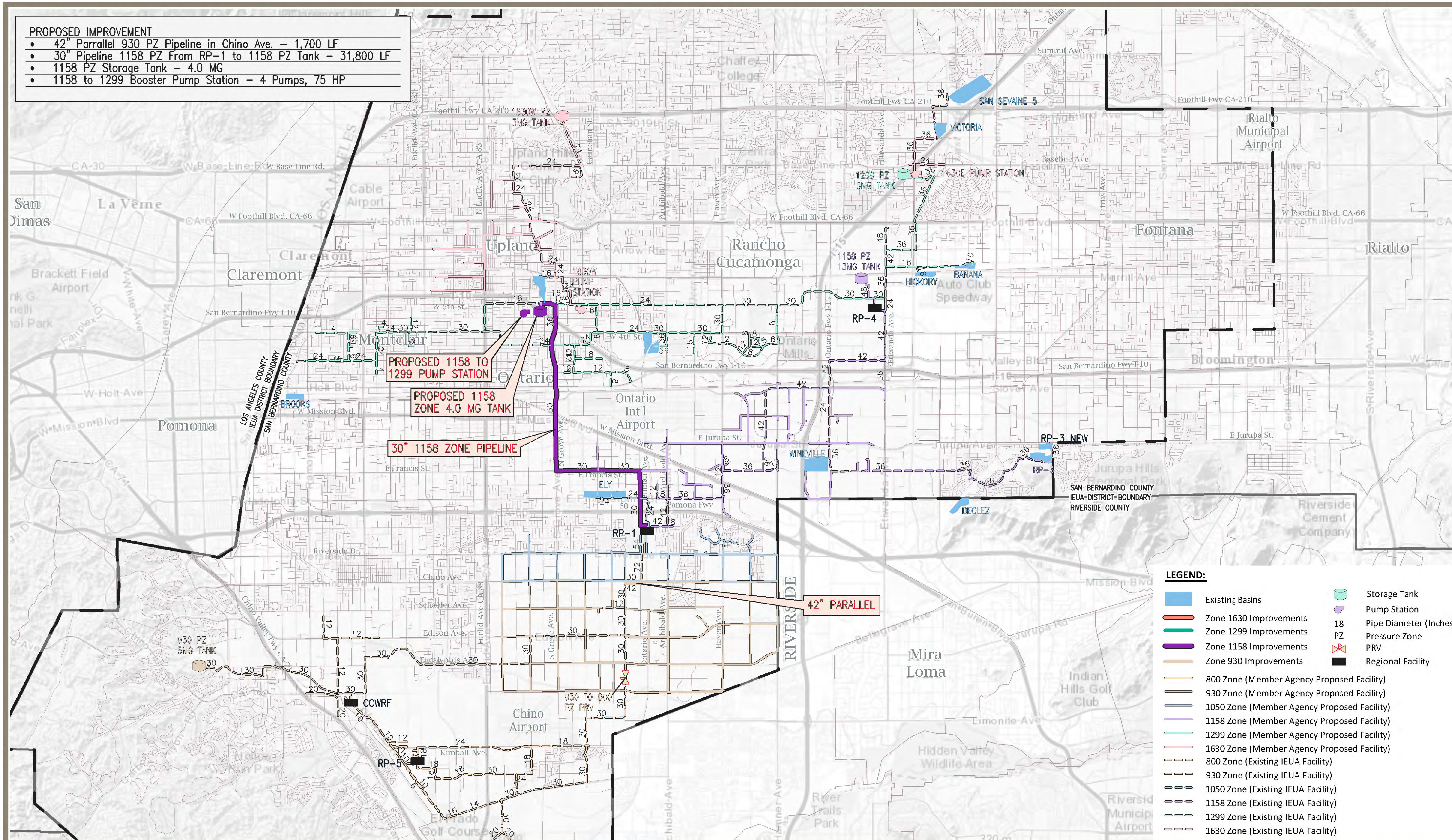

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FIGURE 6-5

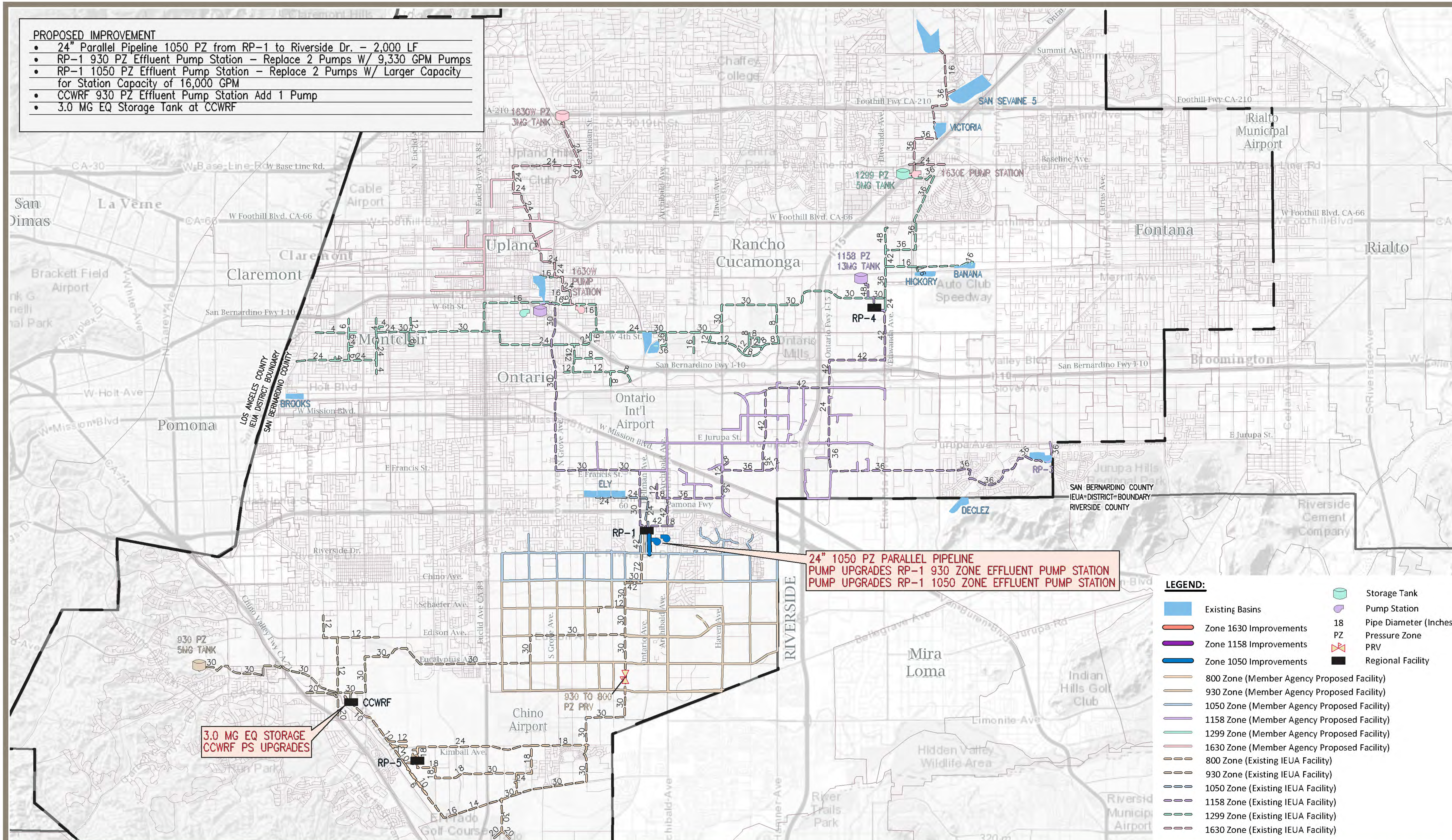

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FIGURE 6-6

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.

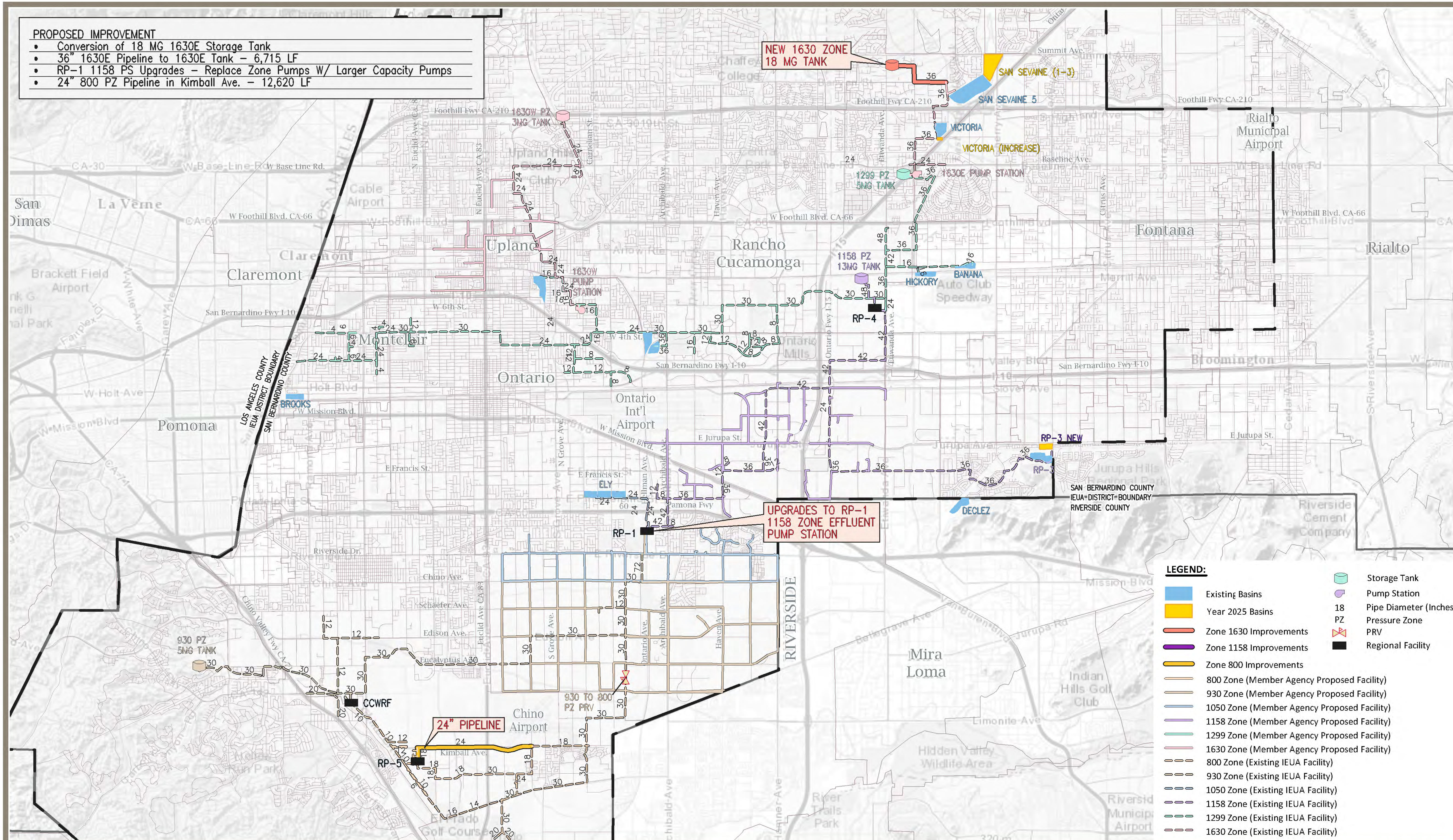
6.3.2.2 Year 2020 GWR plus Maximum Direct Use Demand Conditions (Summer)

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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YEAR 2020 - Base GWR Implementation
FIGURE 6-7

6.3.3 Year 2025 GWR Implementation Analysis and Improvements

6.3.3.1 Year 2025 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The Year 2025 model analysis scenario analyzed the system for a GWR Basin demand of 19.2 MGD, including the addition of the following basins: 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.

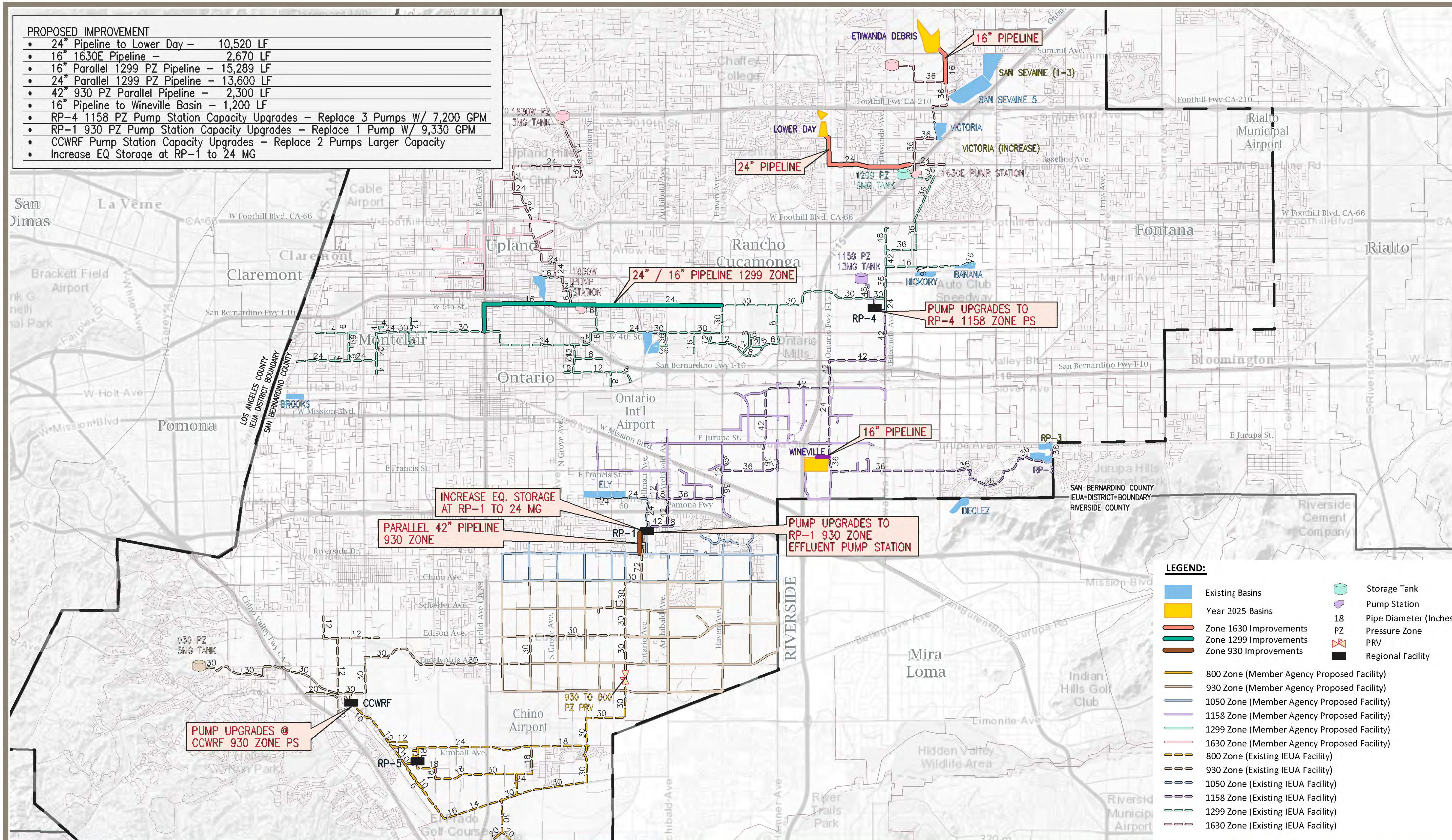
The demand increase in the Northern Service Area requires additional capacity to the RP-4 1158 Zone Effluent Pump Station. It is recommended that two pumps be replaced with larger capacity pumps at this station.

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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YEAR 2025 - Base GWR Implementation
FIGURE 6-8

6.3.4 Year 2030 GWR Implementation Analysis and Improvements

6.3.4.1 Year 2030 GWR plus Average Direct Use Demand Conditions (Spring/Fall)

The Year 2030 model analysis scenario analyzed the system for a GWR Basin demand of 20.7 MGD, including the addition of the following basins: Montclair (1-3), College Heights East, and College Heights West basins, which are scheduled to come on line for this planning year.

The additional College Heights East and West basins are located in the 1630W PZ and there are currently no pipelines to convey 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)

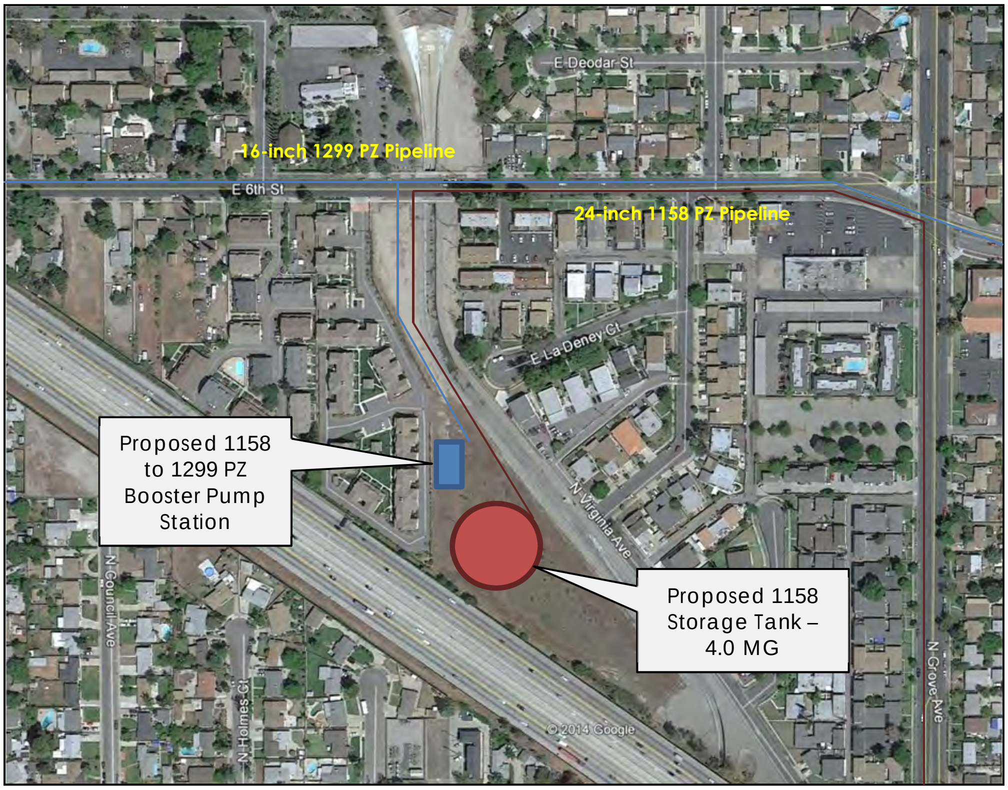
The same GWR Basins were analyzed as was for the Year 2030 Average Demand Conditions; however, due to the maximum direct use demands and limited wastewater supply, the GWR flows were reduced accordingly to not exceed the wastewater supply available. The total basin demand was reduced to 1.7 MGD from 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.

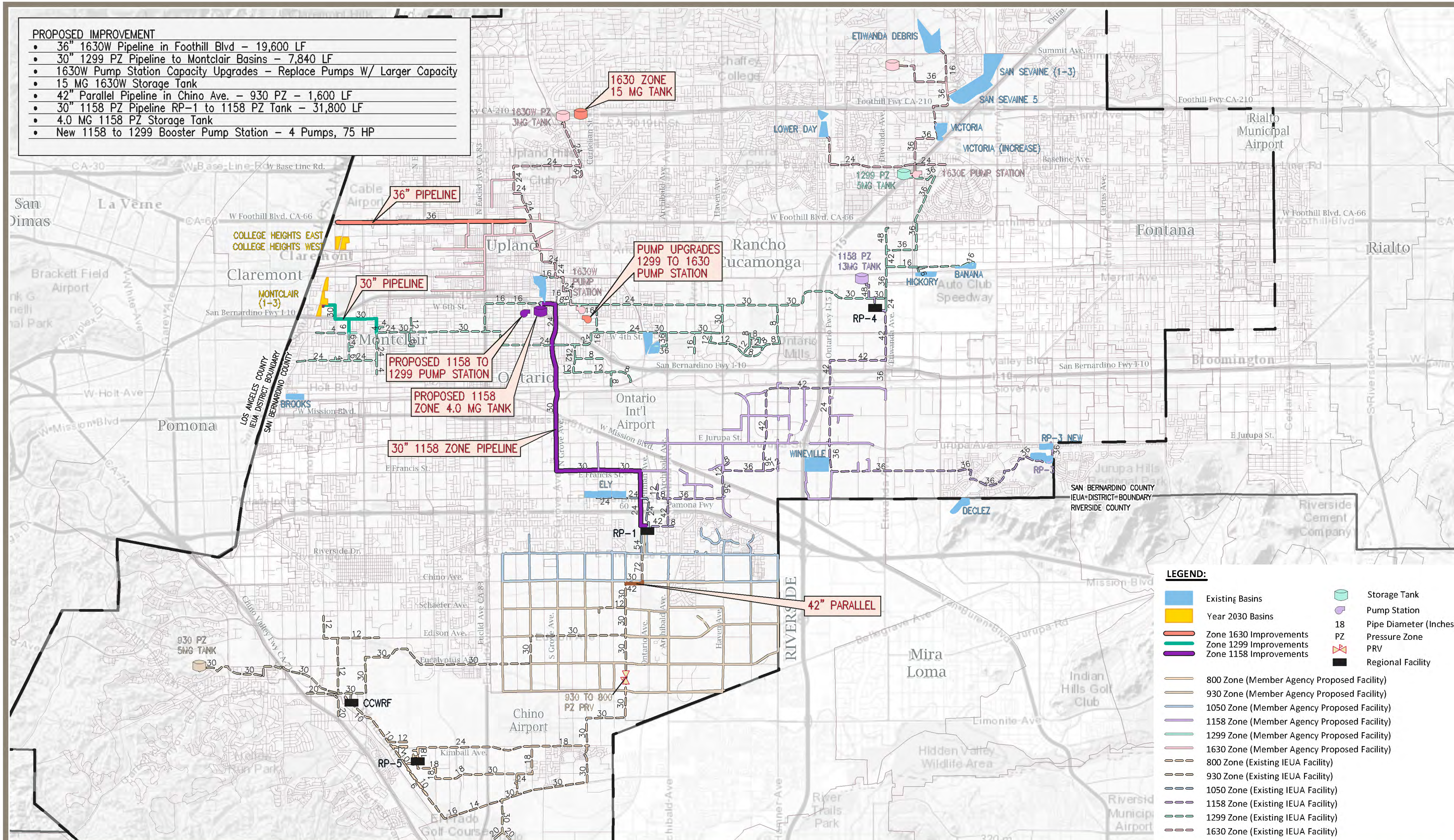


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FIGURE 6-10

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.

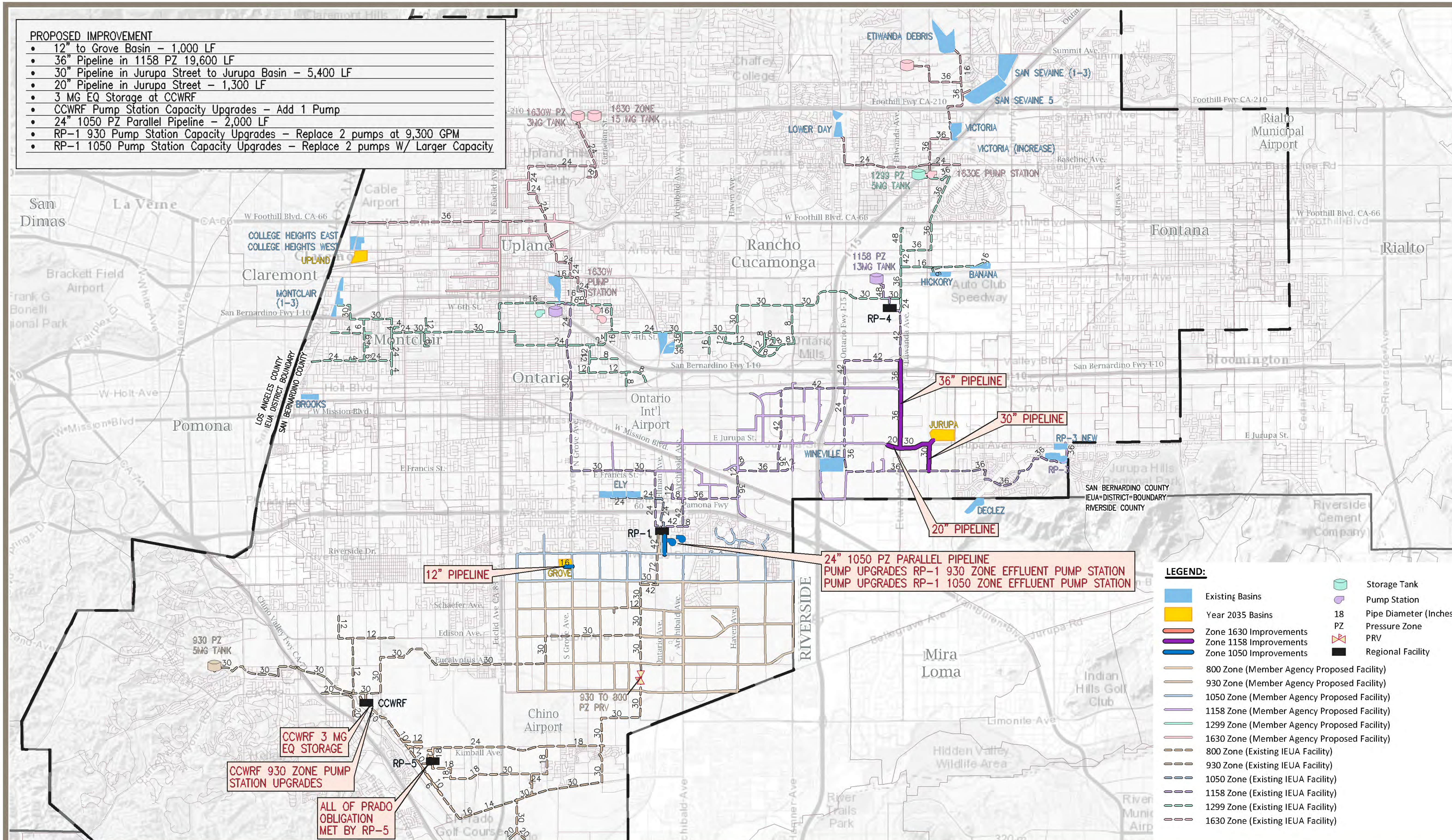

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FIGURE 6-11

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.

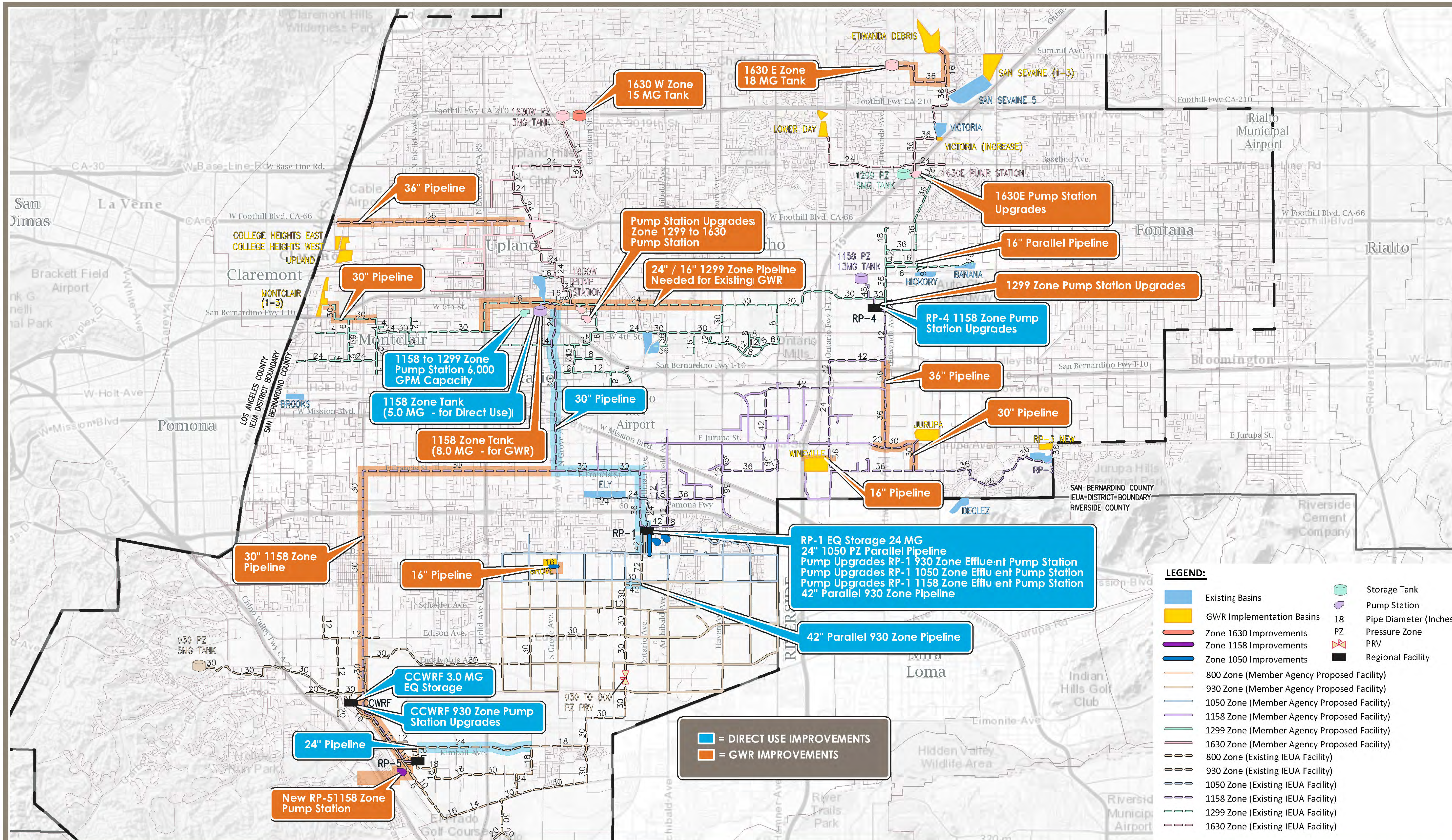
See Figure 7-3 for an illustration of the proposed facilities related to Scenario C for Year 2020 through Year 2035.

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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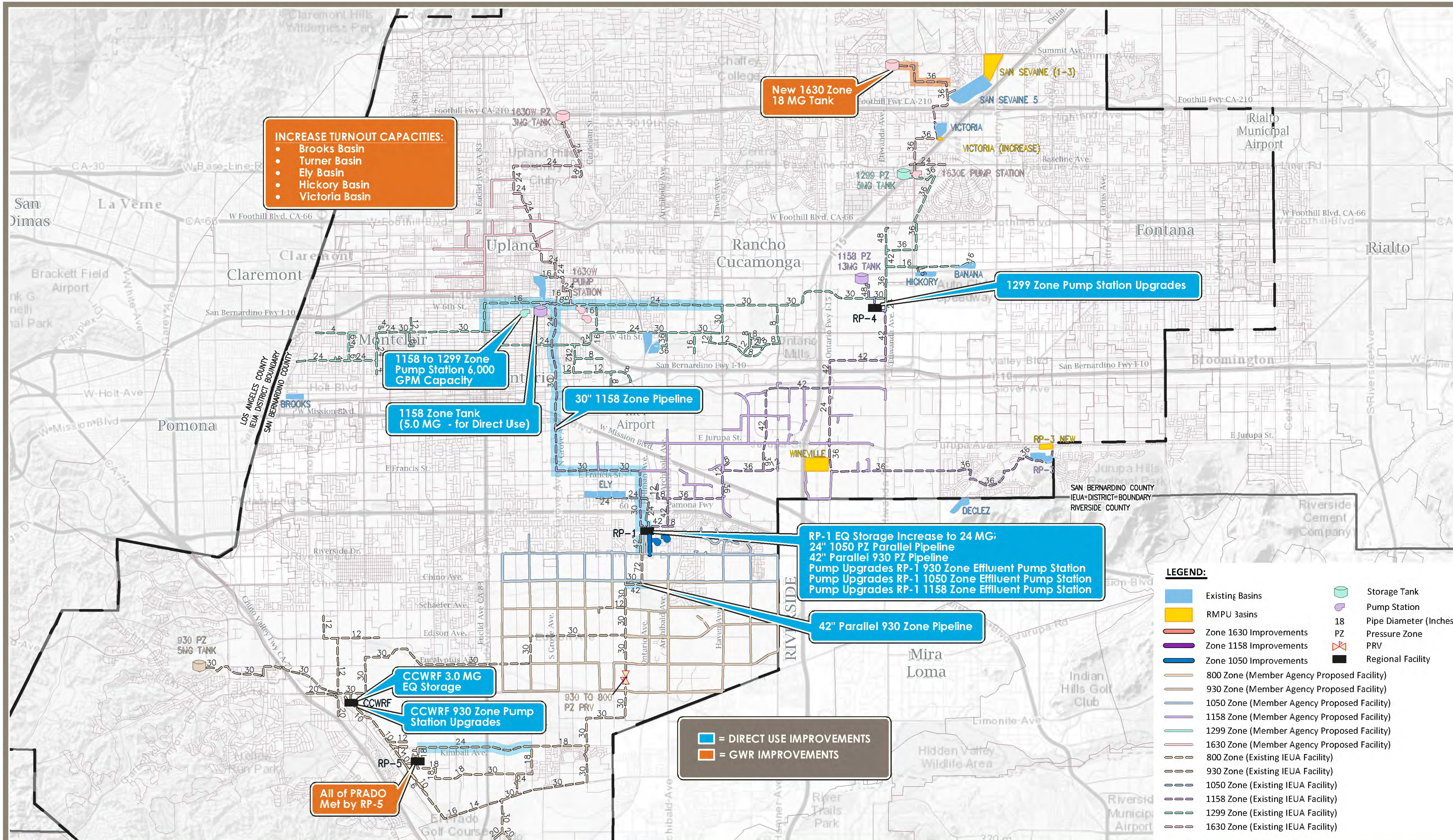
Recycled Water System Improvements
Sensitivity Analysis - Scenario A
FIGURE 7-1

Table 7.7 Scenario B Sensitivity Analysis Facility Improvements

Year	Demand Condition Trigger	Deficiency	Proposed Improvement	Quantity	
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	Conversion of 18 MG 1630E Storage Tank	1	LS
2020	GWR to basins in 1630E PZ	System optimization for GWR flows, system expansion to serve GWR	36-inch 1630E Pipeline to 1630E Tank	6715	lf
2020	GWR to basins in 1630E PZ	Insufficient supply capacity to 1630E PZ for GWR flows, system expansion to serve GWR	RP-1 1158 PS Upgrades	1	LS
2020	Average Direct Use	Existing 18-inch pipeline undersized in Bickmore, increase flow from RP-5	24-inch 800 PZ Pipeline in Kimball Ave	12620	lf
2025	Summer DU & GWR	Insufficient supply capacity from RP-1	24 MG EQ Storage at RP-1	1	LS
2025	Summer DU & GWR	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	16-inch Parallel 1299 PZ Pipeline	15289	lf
2025	Summer DU & GWR	Deficient 1299 PZ transmission mains, serve east & 7th/8th Street Basins	24-inch Parallel 1299 PZ Pipeline	13600	lf
2025	Summer DU & GWR	Existing 30-inch pipeline undersized from RP-1 to Riverside Dr.	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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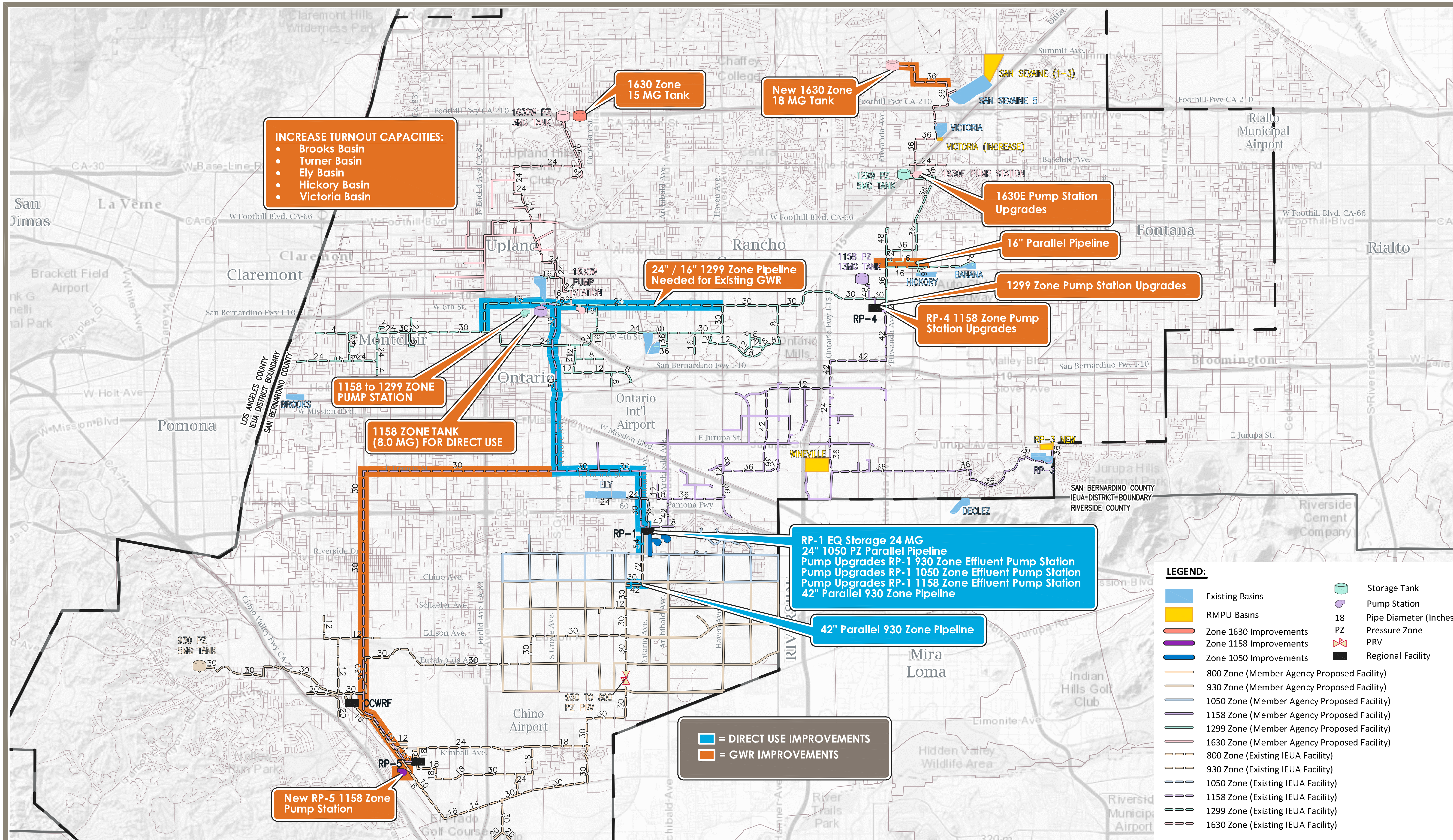
Recycled Water System Improvements
Sensitivity Analysis - Scenario B
FIGURE 7-2

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

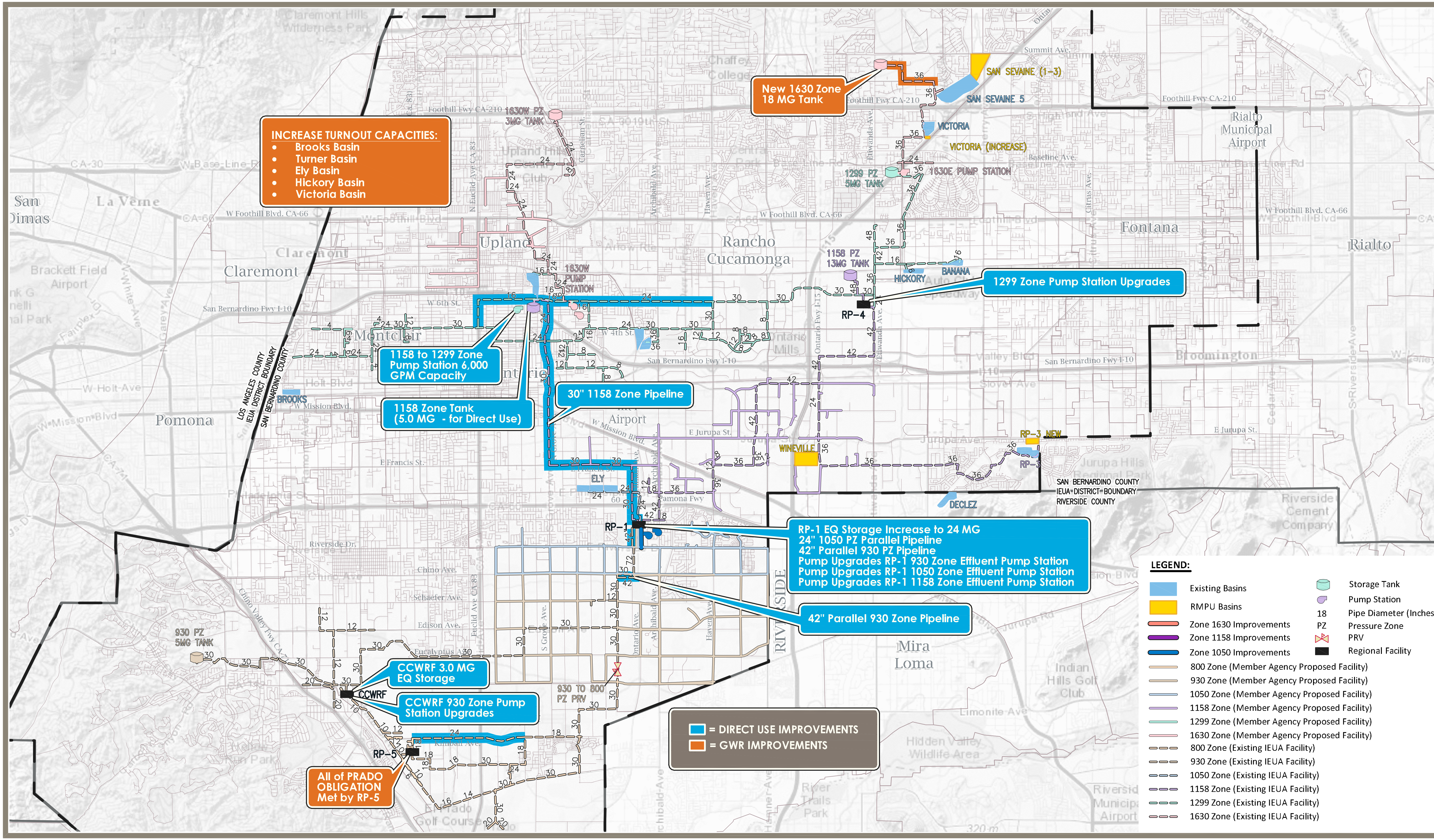
Table 8.1 provides a comprehensive list of projects and project costs identified for each planning year. Since the proposed improvements recommended are required to either meet direct use demands or GWR purposes, the table includes a description of the demand condition that triggers the need for the 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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Recommended Recycled Water System Improvements

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.

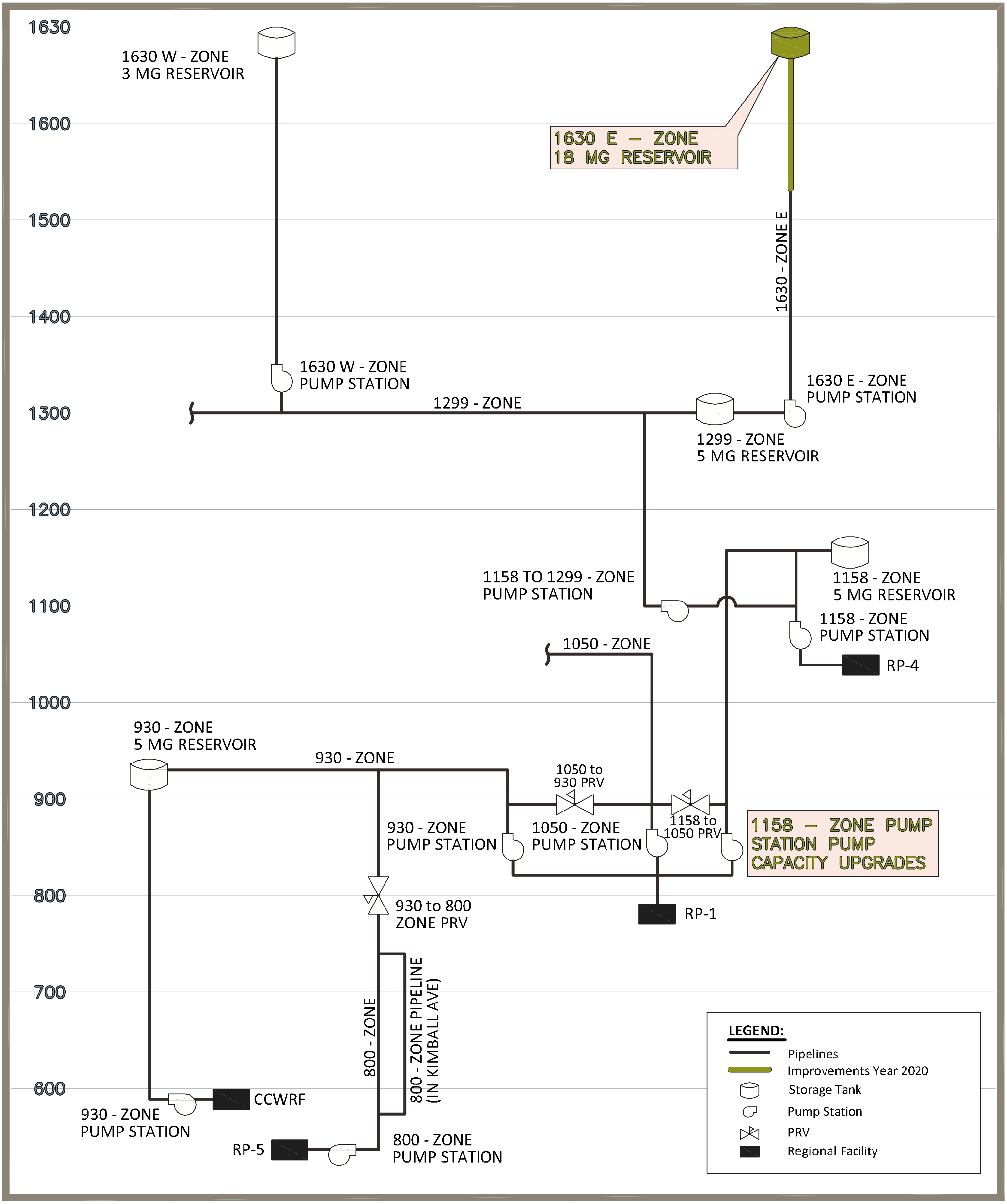
For each of the planning years, the direct use demands will be met first. For purposes of this study, approximately 25% of the total annual SARBF at Prado Obligation demand should be met during the summer months.

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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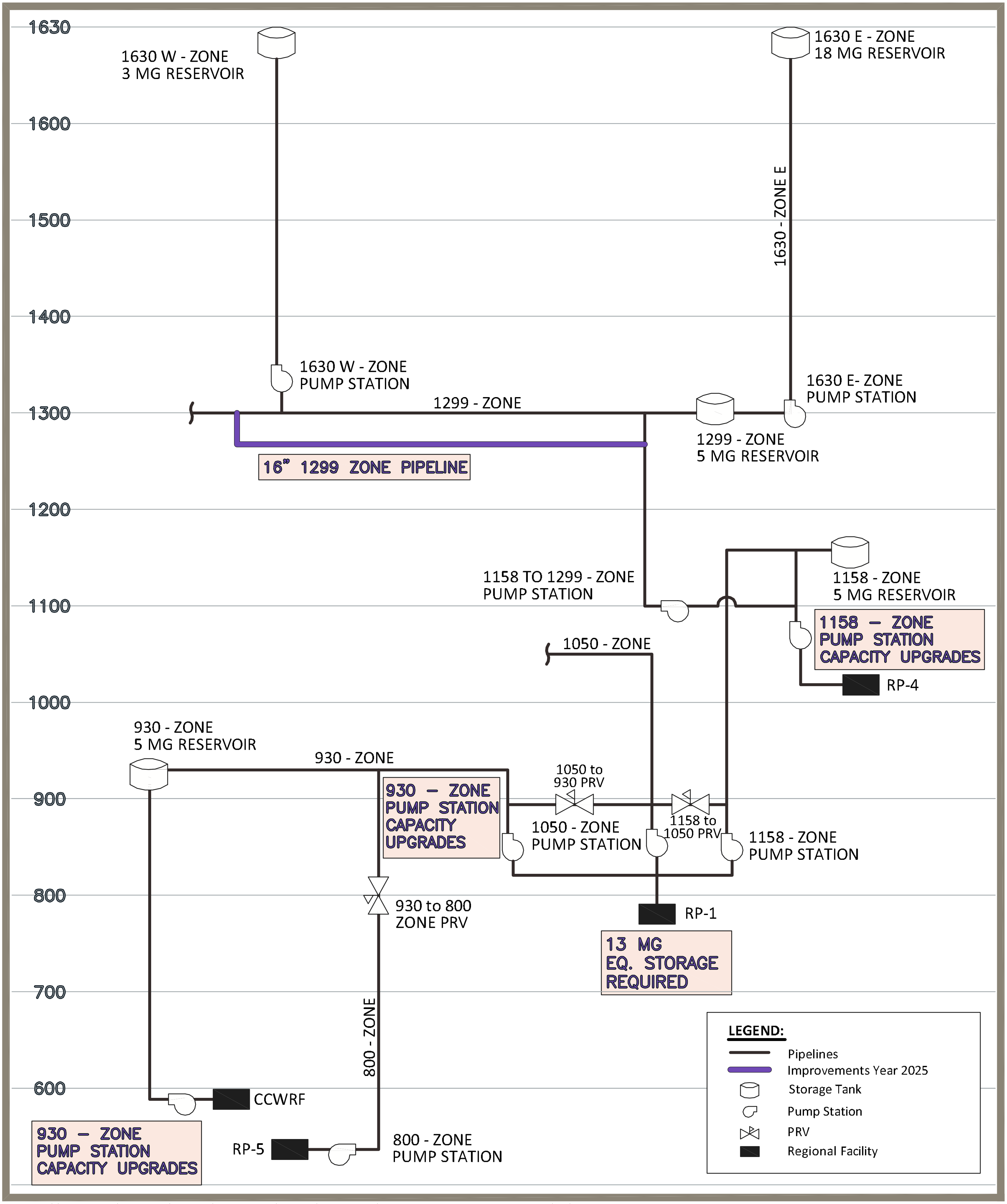
Year 2020 System Profile

FIGURE 9-1



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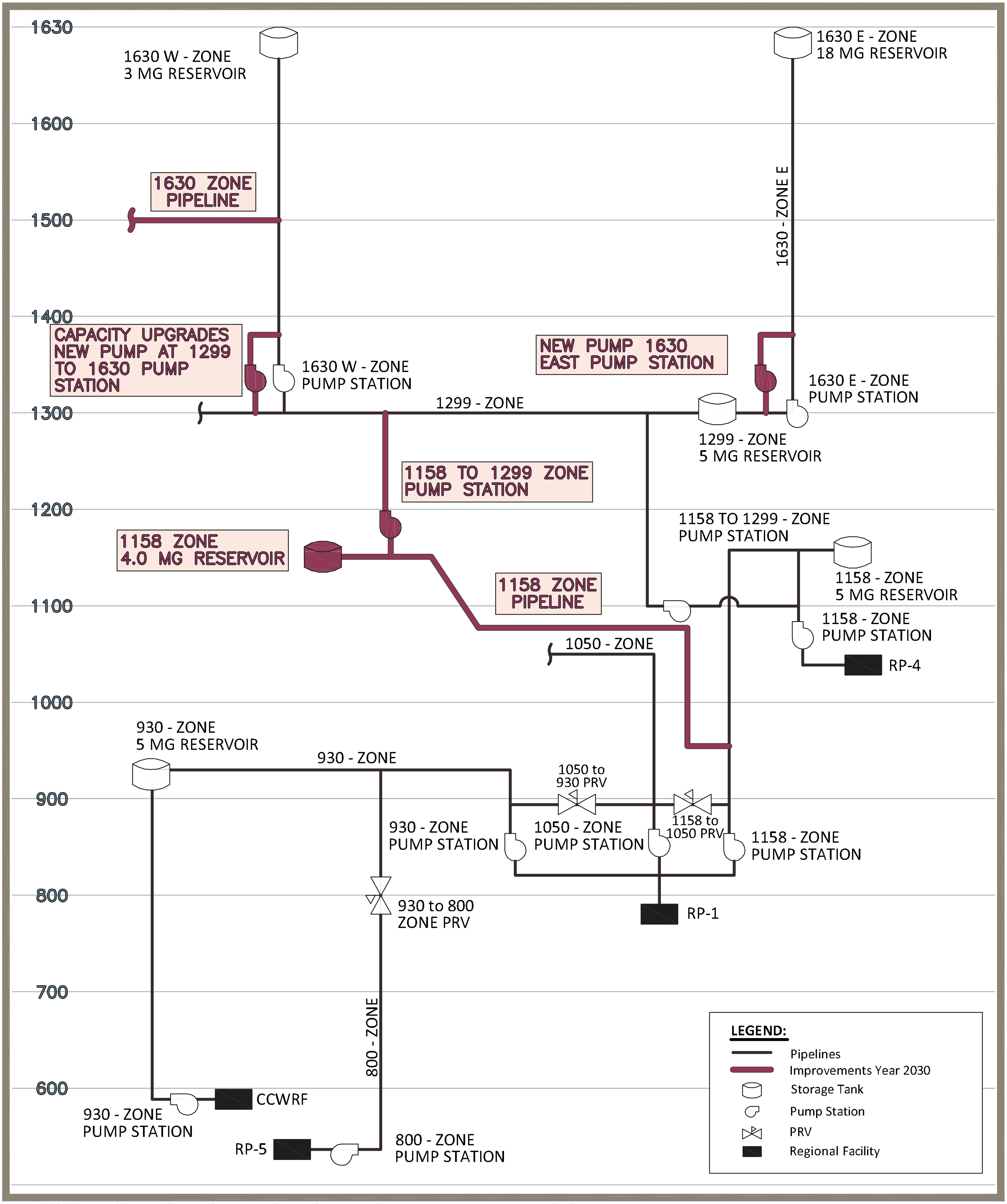
Year 2025 System Profile

FIGURE 9-2



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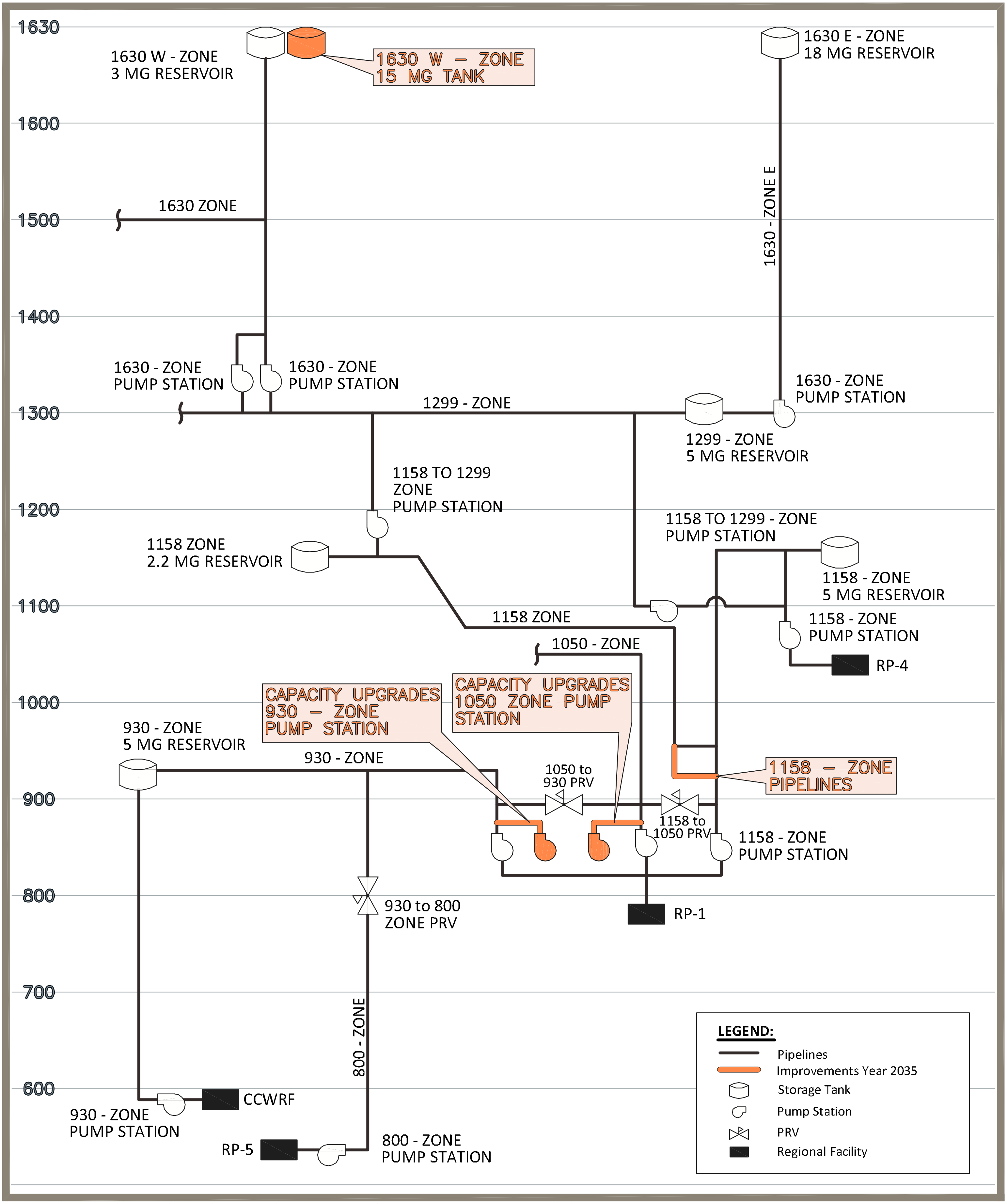
Year 2030 System Profile

FIGURE 9-3



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IEUA RWPS
Year 2035 System Profile

FIGURE 9-4

Appendix A

"*Recycled Water System Hydraulic Analysis for the Enhanced GWR Program*", December 2013