APPENDIX 9.10

UTILITIES AND SERVICE SYSTEMS TECHNICAL REPORTS

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

******* NOTE TO APPLICANT: To fill out this form, please ensure that you are utilizing the latest design guidelines, noted below: *******

- EMWD's "Water System Planning & Design" guidelines, Updated Feb 2006, and revised Sep 14, 2006 (Contact Development Services Dept. (DSD) Engineer to obtain the latest Master Plan supplement)
- EMWD's "Sanitary Sewer System Planning & Design" guidelines, Updated Feb 1993, and revised Sep 1, 2006 (Contact Development Services Dept. (DSD) Engineer to obtain the latest Master Plan supplement)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

I. PROJECT INFORMATION

City View Reference No.:	WS 2013-371
DDC - Work Order:	15273
Plan Check - Work Order:	TBD
Grid Partition:	18C
ID (W/S):	U-36 / U-35

Is LAFCO Fringe Annexation Required?	☐ Yes ☑ No
Was LAFCO Fringe Annexation Approved?	☐ Yes ☑ No
Project to be transferred to AFS, upon DDC approval?	☐ Yes ☑ No

Project Name: [a] Murrieta Hills TR 35853 Master Design Conditions

Cross Streets: South-West of Keller Road and I-215 freeway

(a) Include TTM, TR, PM, SP, APN or other applicable number or name

Existing land use	Proposed Land Use	Acres	# of Units, or Hotel Bedrooms	Building Area (SF)	# of Students	# of Hospital Beds, or Dialysis Seats	Average Flow (GPD)
	Residential, Rural						
	Residential, Low Density (SFR)	50.3	60				
	Residential, Medium Density (SFR)	198.1	497				
	Residential, Condominiums						
	Residential, Apartments	12.7	193				
	Residential, Age Restricted						
	Residential, Mobile Home Park						
	School						
	Educational: College						
	Church						
	Motel/Hotel						
	Hospital						
	Medical Office Building (offices)						
	Medical Office Building (long term care)						
	Medical Office Building (Dialysis)						
	Mixed Use Policy Area						
	Commercial, Retail	18.1					
	Commercial, Office						
	Industrial, Light						
	Industrial, Light (Warehouse)						
	Industrial, Heavy						
	Open Space, Rural						
	Open Space, Agricultural						
	Open Space, Conservation	614.5					
	Open Space, Recreation	37.3					
	Other	46.4					
	Totals:	**977.5**	**750**	**0**	**0**	**0**	**0**

II. COMMUNITY FACILITIES DISTRICT (CFD)

Is this Project in a Facilities CFD ?	☐ Yes ☑ No
Is This Project in a Fees Only CFD ?	☐ Yes ☑ No

If yes, what is the lead agency: EMWD ☐ Yes ☑ No

Other:

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

III. WATER DEMAND AND SEWER FLOW ASSESSMENT

AREA DESCRIPTION	LAND USE	AREA SIZE AC	AREA SIZE DU	POTABLE WATER DEMAND PROJECTIONS (GAL/AC)	(GAL/EDU)	ADD	PEAK FACTOR MDD	PKHR	SEWER FLOW PROJECTIONS (GAL/AC)	(GAL/EDU)	ADWF
PA 1	MDR	13.59	47		440	20,680	3.0			235	11,045
PA 2	MDR	34.18	116		440	51,040	3.0			235	27,260
PA 3	MDR	52.49	101		440	44,440	3.0			235	23,735
PA 4	MDR	32.51	74		440	32,560	3.0			235	17,390
PA 5	MDR	33.26	79		440	34,760	3.0			235	18,565
PA 6	MDR	32.09	80		440	35,200	3.0			235	18,800
PA 7	LDR	50.32	60		570	34,200	3.0			310	18,600
PA-8	HDR	12.67	193		310	59,830	2.0			165	31,845
PA-9	Commercial	18.14		2,000		36,280	2.0		1,700		30,838
								2.0		ADWF TOTAL (GPD)	198,078
					TOTAL (GPD)	348,990	950,860	1,901,720		ADWF TOTAL (GPM)	138
					TOTAL (GPM)	242	660	1321		PEAK FACTOR [a]	2.63
										PDWF - PEAK FLOW (GPD)	520,945
										PDWF - PEAK FLOW (GPM)	362

IRRIGATION [b] AREA DESCRIPTION	LAND USE	AREA SIZE AC	AREA SIZE DU	POTABLE WATER DEMAND ASSMT. (GAL/AC)	(GAL/EDU)	ADD	PEAK FACTOR MDD	PKHR
OS	Parks / HOA Parks	16.31		4,017		65,523	2	
						0		
Note: Parks & golf courses converted from demand of 4.5 AF/AC/YR (~4,017 gpd/ac)					TOTAL (GPD)	65,523	131,046	
					TOTAL (GPM)	46	91	

(a) Sewer Peak Factor:
1- Use PF of 3.0 for Temecula Wine Country, Old Town Temecula, or similar hospitality type of use.
2- All other cases, PF is based on the following equation, PF = 2.13 $Q^{-0.13}$, where Q is ADWF in MGD,
3- Use max PF of 2.87, and Min PF of 1.5

IV. WATER SUPPLY

Is Water Supply Analysis Required? ☑ Yes ☐ No

Water Supply Analysis Issued? ☑ Yes ☐ No Date Issued: 10/17/2018 & 12/18/13

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

V. WATER PRESSURE

Pressure Zone: 1853 & 2055 HWL **Pressure Conditions (in the main pipeline):** ☐ High ☐ Normal ☐ Low ☑ Not Applicavble (Commercial)

Notes: Only for Residential lots, Plan checker shall utilize the attached service-pressure table(s) to determine pressure conditions for each lot, and cause the recordation of High or Low pressure conditions if applicable: Low Pressure Agreement is required for pressures<40 psi; High Pressure Agreement is required for pressures>80 psi; and Lots with pressures <50 psi shall receive a minimum of 1.5" laterals. **(To be determined during phasing, no pressure tables provided)**

VI. Fire Flow Demand

Has applicant received a fire flow letter or fire flow test by EMWD:	☑ Yes ☐ Waiting for result ☐ Need to request		
Did it meet the fire flow demand:	☑ Yes ☐ No		
Fire flow demand (GPM):	3,000	1,500	**(GPM)**
Fire flow duration (HRS):	3	2	**(HRS)**
Have we received a copy of Fire Flow Conditions or onsite private calcs:	☑ Yes ☐ No	Comment:	Project building storage to accommodate FF requirements

Note: -Estimated for planning purposes (at a 20 psi residual pressure). Actual fire flow and duration will be established by the governing Fire Marshall.

VII. WATER TRANSMISSION

Nearest Pipeline Facility w/Capacity: North of project area along Zeiders. Existing 12-inch line (1853 PZ) & 30" CML&C (1698K PZ)

☐ Not requesting Water Service

VIII. WATER FACILITY REQUIREMENTS [e]

	Onsite/Offsite	Dia (in)	Length (lf) [f]	Location		Limits		Size needed by Project (in)
Pipeline:	Offsite	18	*~8,400	Antelope Rd (1698K PZ)		from Keller Rd to Lee Ln (per District WFMP - PVSPW-202)		0
Pipeline:	Offsite	18	2,456	1853PZ		From the intersection of Zeiders & Keller Road to proposed booster pump		18
Pipeline:	Onsite	18	2,219	1853PZ		Per Specific Plan		18
Pipeline:	Onsite	8	10,784	1853PZ				8
Pipeline:	Onsite	8	19,018	2055PZ				8
Pipeline:	Onsite	12	7,246	1853PZ				12
Pipeline:	Onsite	12	4,892	2055PZ				12
	Onsite/Offsite	**Size**	**Unit**	Easement	Grant Deed	Abandonment Deposit Am't	**Location**	
Booster Plant:	Onsite	~423	gpm				1698 to 1853 PZ	423
Booster Plant:	Onsite	~ 329	gpm				1853 to 2055 PZ	329
Storage Tank:	Onsite	~726,000	gal				1853 PZ Reservoir	726,000
Storage Tank:	Onsite	~726,000	gal				1853 PZ Reservoir	726,000
Storage Tank:	Onsite	~ 784,000	gal				2055 PZ Reservoir	784,000
Temporary Pipeline Alignment:				☐ Yes	☐ Yes			
Implementing facility:								

Notes:
1- The Planning & Design Criteria used for this DDC are: "Water System Planning & Design" guidelines, Updated Feb 2006, and revised Sep 14, 2006, supplemented by the 2015 Water Facilities Master Plan criteria (Chapter 5).
2- The booster plants and storage tanks sizing and/or oversizing will be determined at the final design level. Please refer to Water Exhibit attached for a preliminary size.
* District may request construction of 18" CIP project for redundant supply to south from 1698K PZ during construction of Antelope Rd from Keller Rd to Lee Ln

(e) Include attachments (such as hydraulic calculations, maps, etc.) when necessary
(f) Approximate lengths for planning purposes only

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

IX. SEWER TREATMENT

Location: Perris Valley Regional Water Reclamation Facility

Remaining Available Capacity?:	☑ Yes	☐ No
Is the project within 1/4 mile from the Treatment Plant?	☐ Yes	☑ No

If yes, a notification letter shall be recorded against each of the lots.

X. SEWER COLLECTION

Nearest Pipeline Facility w/Capacity: North of project along Zeiders Road. Existing 15-inch line (D-42142)

☐ Not requesting Sewer Service

XI. SEWER FACILITY REQUIREMENTS [g]

	Onsite/Offsite	Dia (in)	Length (lf) [h]	Location	Limits	Size needed by Project
Pipeline:	Offsite	8	~ 2,551	Keller Rd	From Gloria Rd to ~ 568 feet east of the intersection with Zeiders Rd	8
Pipeline:	Offsite	15	~ 2,632	North of Project	Starting at the intersection of Zeider/Keller and ending ~2,632 feet north	12
Pipeline:	Onsite	8	~ 36,052	Per Specific Plan	Per Specific Plan	8
Pipeline:	Onsite	10	842			10
Pipeline:	Onsite	12	645			12

	Onsite/Offsite	Size (gpm)	Interim/Perm	Easement	Grant Deed	Abandonment Deposit Am't	Location	
Lift Station [i][j][k]:				☐ Yes	☐ Yes			
Implementing facility:								

Notes:
1- The Planning & Design Criteria used for this DDC are: "Sanitary Sewer System Planning & Design" guidelines, Updated Feb 1993, and revised Sep 1, 2006, supplemented by the 2015 Waste Water Facilities Master Plan criteria (Appendix 3A).
2- Oversizing of offsite 15" in Zeiders Rd to be determined phased design conditions prior to preliminary design

(g) Include attachments (such as special studies, maps, etc.) when applicable
(h) Approximate lengths for planning purposes only
(i) If interim, describe method and timing of abandonment, and include Demolition and Abandonment plans during Plan Check. Customer is responsible for Abandonment cost.
(j) If applicant is proposing a Lift Station (either temporary or permanent): Submit a study justifying this use, identifying all other options and why they are not viable.
The study shall include a grading analysis of quantities and cost.
For a proposed temporary Lift Station, the study shall identify an abandonment plan, including plans and calculations, to demonstrate the feasibility of the abandonment.
(k) Proposed Lift Stations shall be presented for consideration by the Waste Water Enterprise Team prior to considering the DDC approval.

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

XII. RECYCLED WATER TRANSMISSION

Nearest Pipeline Facility w/Capacity: N/A - Not a recycled water candidate

XIII. RECYCLED WATER FACILITY REQUIREMENTS [j] (RWUE and/or RWUP)

	Onsite/Offsite	Dia (in)	Length (lf)[k]	Location		Limits		Size needed by Project
Pipeline:	N/A							
Pipeline:								
Pipeline:								
	Onsite/Offsite	**Size**	**Unit**	Easement	Grant Deed	Abandonment Deposit Am't	**Location**	
Temporary Inter-Tie				☐ Yes	☐ Yes			
Booster Plant:								
Storage Tank:								
Implementing facility:								
Notes[l]:								

(j) Include attachments (such as hydraulic calculations, maps, etc.) when necessary
(k) Approximate lengths for planning purposes only
(l) RWUP: has it been completed ? ☐ Yes ☐ No ☑ N/A
RWUE: has it been completed ? ☐ Yes ☐ No ☑ N/A

Comments: Outside of candidacy boundary

XIV. FRONTAGE [m]

Water/Sewer/Rcld	Description/General Location	Existing Frontage Memo #	Type [n,o]	Length (lf)	$ Amt/lf	Total
Sewer	Keller Rd from Gloria Rd to ~568 feet east of Zeiders Rd		Potentially Reimbursable	2,551	TBD	#VALUE!
Sewer	Zeiders Rd from Keller Rd to existing sewer to north		Potentially Reimbursable	2,632	TBD	#VALUE!
Water	Keller Rd from Tank site to Zeiders Rd		Potentially Reimbursable	~2,200	TBD	#VALUE!
						$0

(n) "Potentially Reimbursable" means: Potentially Reimbursable to project sponsor, in accordance with EMWD Admin Code as amended.
(o) "Non-Reimbursable" means: Payment by this applicant to reimburse original sponsor of facilities

Estimated for budgetary purposes only
(m) *Special Funding Agreement Area:* ☐ Yes ☑ No
(If Yes) Name of Area:

Signature (EMWD-FRONTAGE) **Date**

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

XV. FINANCIAL PARTICIPATION CHARGES [m]

S.O. by DSD Representative? ☑ Yes ☐ No *If 'Yes', please coordinate with a Development Services Representative for preparation of an Application For Service*

XVI. ESTIMATE CONNECT FEES FOR APPLICANT BENEFIT

All connection fees can be estimated via our EMWD website.
Visit http://www.emwd.org/new_biz/construction_fee-schedule.html for our complete fee schedule.

XVII. DDC APPROVAL TIME LIMITATION

This Development Design Conditions approval is valid for 24 months. From the time the DDC is approved and until preparation of the Standard Facilities Agreement, this DDC shall be subject to further evaluation if any of the following conditions exist:
a- The project's scope of work has changed substantially from the approved DDC, causing the need to re-evaluate the proposed facilities
b- New regulatory requirements are in effect
c- EMWD has significant updates to its Facilities Master Plans/CIP program, and Design Criteria

Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

emwd

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

XVIII. SPECIAL CONDITIONS: For Conditions 1 and 2, please select one of the choices from the Drop-Down List - For all others, do NOT delete the ones that do not apply, instead, cross them out.

1-	Use The Drop Down List	At the time this DDC was processed, final Conditions Of Approval (COAs) were not available. Therefore, the COAs shall be provided prior to submittal of Plan Check.
2-	Use The Drop Down List	To qualify for oversizing reimbursement, the sponsor shall provide EMWD with three prevailing-wage bid comparisons following Plan Approval, subject to review by staff, recommendation to, and approval by, the Board of Directors. Only after such review and approval can the sponsor proceed to the Standard Agreement phase. Oversizing of EMWD facilities shall be performed with prevailing-wage contracting (see attachment for EMWD's Prevailing-wage requirements and authorization process description)
3-		It is the applicant's responsibility to provide any updates or revisions to the Project COA during the development, or after the approval, of the DDC. The DDC shall be revised and updated as needed: Failure to provide timely COA updates or revisions may result in potential additional facility requirements and/or delays in processing the project during subsequent phases (such as Plan Check or Agreement phases).
4-		(Only for Residential lots) Plan checker shall utilize the attached service-pressure table(s) to determine pressure conditions for each lot, and cause the recordation of High or Low pressure conditions if applicable: Low **Pressure Agreement** is required for lot pressures <40 psi; **High Pressure Agreement** is required for lot pressures >80 psi; and Lots with pressures <50 psi shall receive a **minimum of 1.5" service laterals. (To be determined during phased submittals with lot pressure tables)**
5-		~~The project lies within the _____ Special Benefit Area, and is subject to additional connection fees.~~
6-		(For residential landscaping fed from a potable water source) At FIRST Plan Check, a "Residential Landscaping Water Budget" form shall be completed and submitted (by a Licensed Civil Engineer or a Licensed Landscape Architect). This form will be reviewed by the Conservation Dept. during the Plan Check phase. A final approval of this form is required by EMWD's Conservation Dept., prior to EMWD's facilities "Release" by the Inspection Department.
7-		To submit for Plan Check of final design, the applicant shall refer to the Plan Check Submittal Checklist (attached). The Plan Check submittal shall include the appropriate Plan Check deposit in order for it to be considered complete.
8-		~~If this project requires Implementing Facilities, then such Implementing Facilities shall be concurrently in Plan Check with this project's Plan Check.~~
9-		For design of all pumping facilities: Provide design capacity, and preliminary site plan and pipeline alignments for DDC approval. Final design shall be reviewed during Plan Check. If a an interim Lift Station is proposed, customer shall include Demolition and Abandonment plans during Plan Check.
10-		Design and install a potable-water sampling station per standard detail B-935, to be located within the project and as designated during the Plan Check review.
11-		~~The project is located within 1/4 mile from an existing EMWD waste water treatment plant, and therefore a notification letter shall be recorded against each of the lots, prior to occupancy.~~
12-		
13-		

XIX. LIST OF APPLICABLE ATTACHMENTS & REFERENCES: (do NOT delete Attachments & References that do not apply, instead, cross them out)

1- Project Vicinity Map
2- Exhibit(s) of DDC Facilities: existing and proposed facilities
3- Exhibit(s) of DDC Facilities subject to relocation and/or easements
~~5- Available Min/Max Pressure table(s) (Residential only)~~
~~6- Fire Dept. Requirements~~
~~7- Project Conditions Of Approval (Draft or Final)~~
~~8- EMWD Fire Flow Test Results~~
~~9- Hydraulic Boundary Conditions~~
~~10- Accepted Recycled Water Use Exhibit or Plan~~
11- Reports or special studies
~~12- CFD Letter, signed by the Owner (Residential tracts only)~~
13- Plan Check Deposit Schedule
~~14- Signed "Residential Landscaping Water Budget" (spreadsheet)~~
15- Manifold detail, for commercial projects
16- DCDA vs RPDA: EMWD Requirements Memo
~~17- DCDA vs RPDA: Customer memo declaring intent of on-site use (Commercial & industrial use only)~~
~~18- Oversizing memo and authorization~~
19- Prevailing-wage requirements and process description
~~20- Customer/developer e-mail, waiving oversizing reimbursement from EMWD~~
~~21- Signed At-Risk Plan Check Letter request, from Developer~~
22- Document Required For Plan Check (Form NBD-063)
~~23- Application For Service Requirements~~

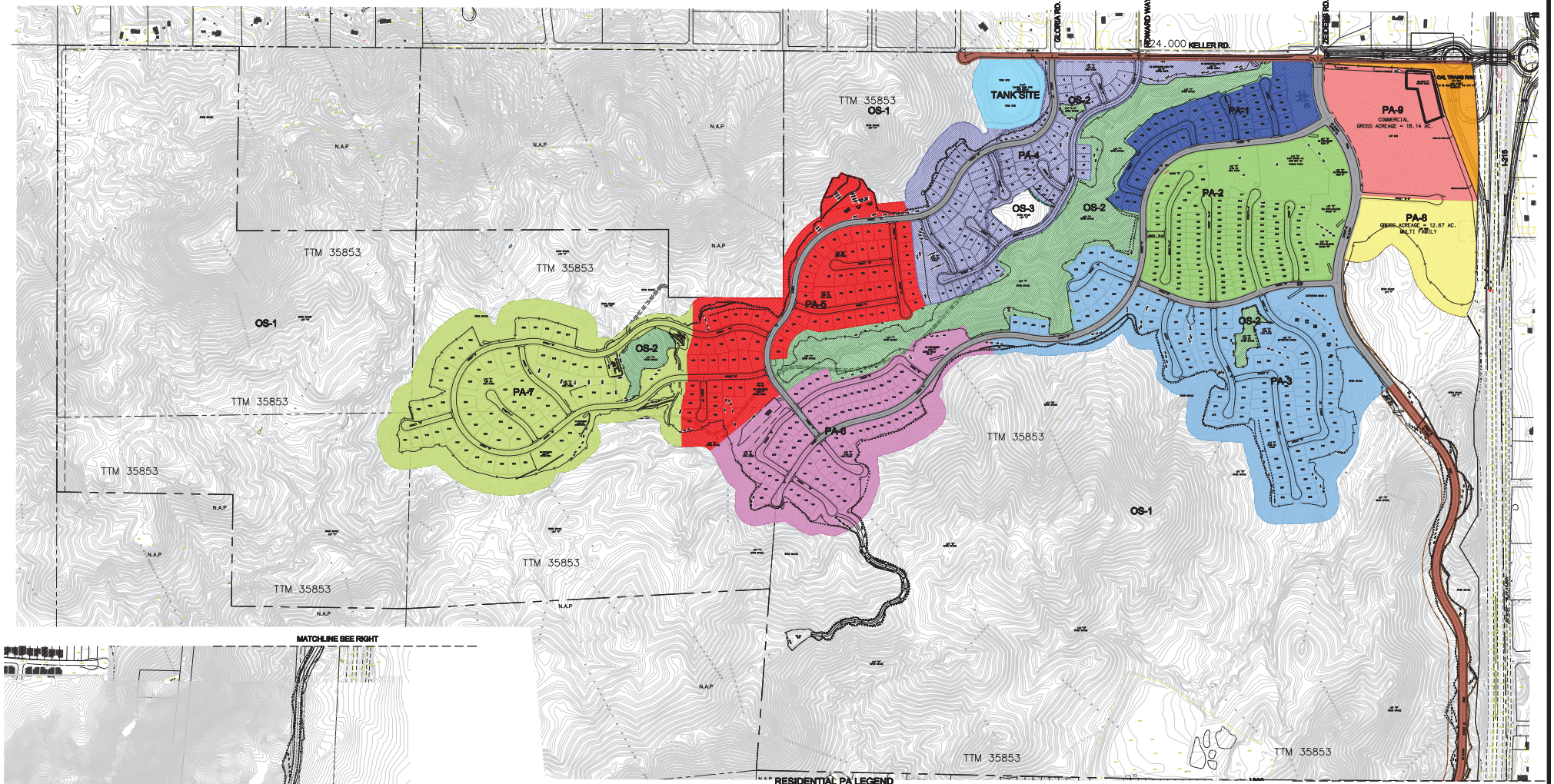
		Date
Prepared By:	Michael Boeck	10/11/2018
Reviewed By:	Brian Raines BAR DSD Engineer & Initials	12/21/2018
Supervisor's Name:	Maroun El-Hage MH Senior Engineer & Initials	12/21/2018

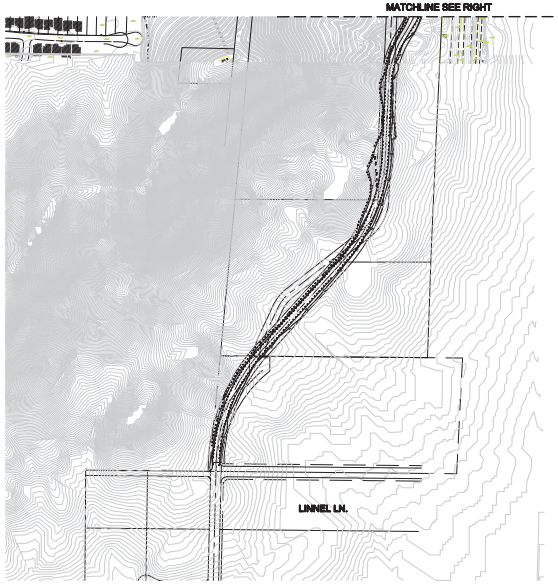
Work Order Closure processed ? ☐ Yes ☑ No

EMWD's Disposition:

APPROVED

Initials: BAR Date: 12/21/18





RESIDENTIAL PA LEGEND

	GROSS ACREAGE	NUMBER OF UNITS	DENSITY
PA-1 (SINGLE FAMILY)	13.59 AC.	47	3.5 UNITS PER AC.
PA-2 (SINGLE FAMILY)	34.18 AC.	116	3.4 UNITS PER AC.
PA-3 (SINGLE FAMILY)	52.49 AC.	101	1.9 UNITS PER AC.
PA-4 (SINGLE FAMILY)	32.51 AC.	74	2.3 UNITS PER AC.
PA-5 (SINGLE FAMILY)	33.26 AC.	79	2.4 UNITS PER AC.
PA-6 (SINGLE FAMILY)	32.09 AC.	80	2.5 UNITS PER AC.
PA-7 (SINGLE FAMILY)	50.32 AC.	60	1.2 UNITS PER AC.
TOTAL	248.44 AC.	557	

COMMERCIAL / MULTI FAMILY PA LEGEND

	GROSS ACREAGE	NUMBER OF UNITS	DENSITY
PA-8 (MULTI-FAMILY)	12.67 AC.	193	15.2 DU PER AC.
PA-9 (COMMERCIAL)	18.14 AC.		

TOTAL PROJECT = 557 RESIDENTIAL UNITS + 193 M.F UNITS = 750 DU

OPEN SPACE LEGEND

	GROSS ACREAGE
OS-1 MSHCP	612.72 AC.
OS-2 LINEAR NATURE PARK	37.33 AC.
OS-3 ENVIRONMENTAL SENSITIVE AREA	1.75 AC.
TOTAL	651.80 AC

CAL TRANS R/W ACQUISITION

	GROSS ACREAGE
CAL TRANS R/W	4.61 AC.

WATER TANK ACCESS ROAD

	GROSS ACREAGE
ACCESS ROAD	1.97 AC.

STREET R/W DEDICATION

	GROSS ACREAGE
RIGHT OF WAY DEDICATION	3.34 AC.
ROAD SLOPES OUTSIDE R/W	4.05 AC.

CIRCULATION

	GROSS ACREAGE
BACKBONE STREETS	19.64 AC.

TOTAL TTM AREA	972.15 AC.	750	.77 DU PER AC.
TANK SITE (NOT A PART)	4.54 AC.	5.44 AC.	
TOTAL	977.50 AC.	750	.77 DU PER AC.

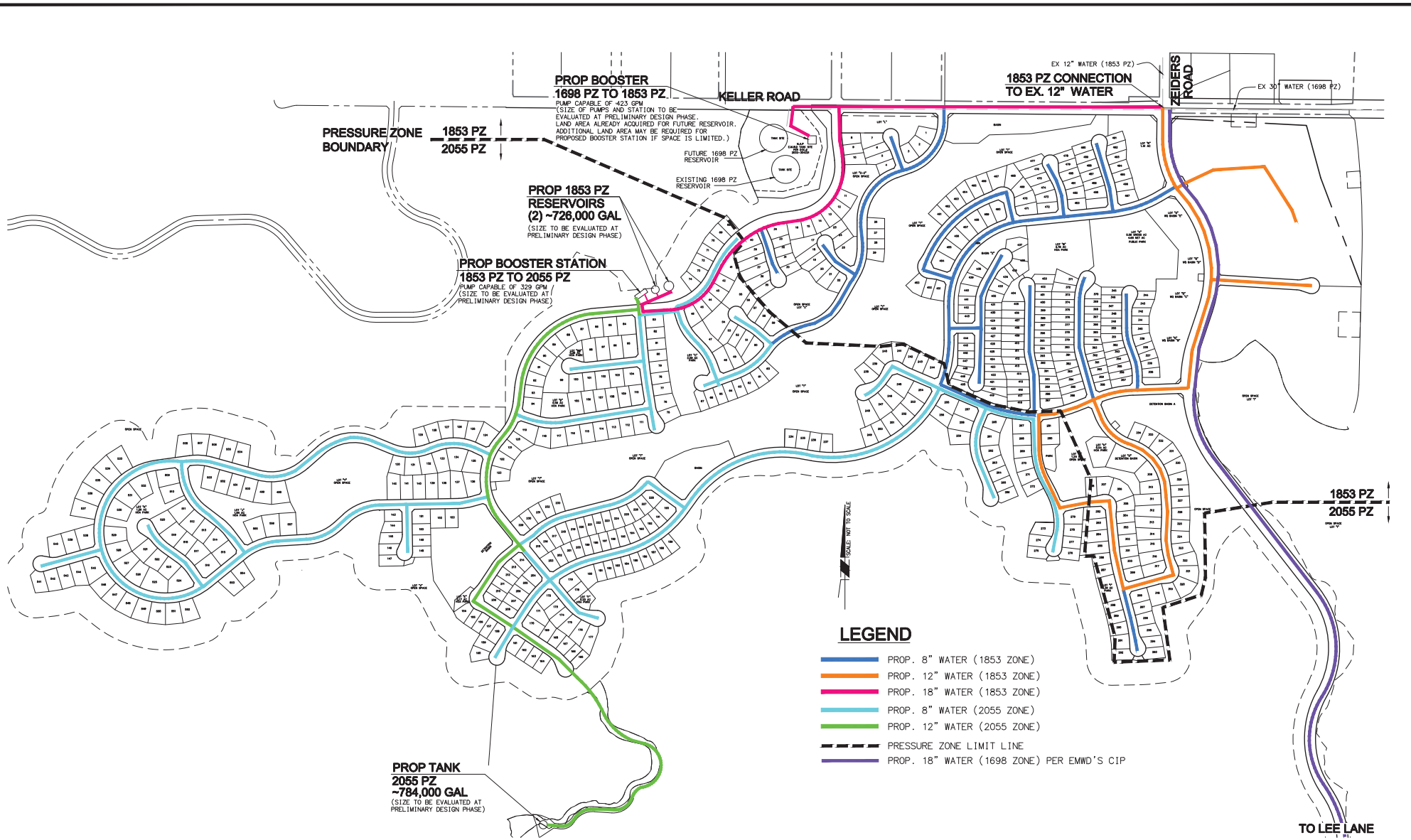
SCALE: 1"=250'

250 125 0 250 500 750

SCALE: 1"=250'

Murrieta Hills
INTERNATIONAL
40810 COUNTY CENTER DR.
SUITE 200
TEMECULA, CA 92591
PHONE: (951) 676-8042
MBAKERINTL.COM

MURRIETA HILLS SITE PLAN



Michael Baker
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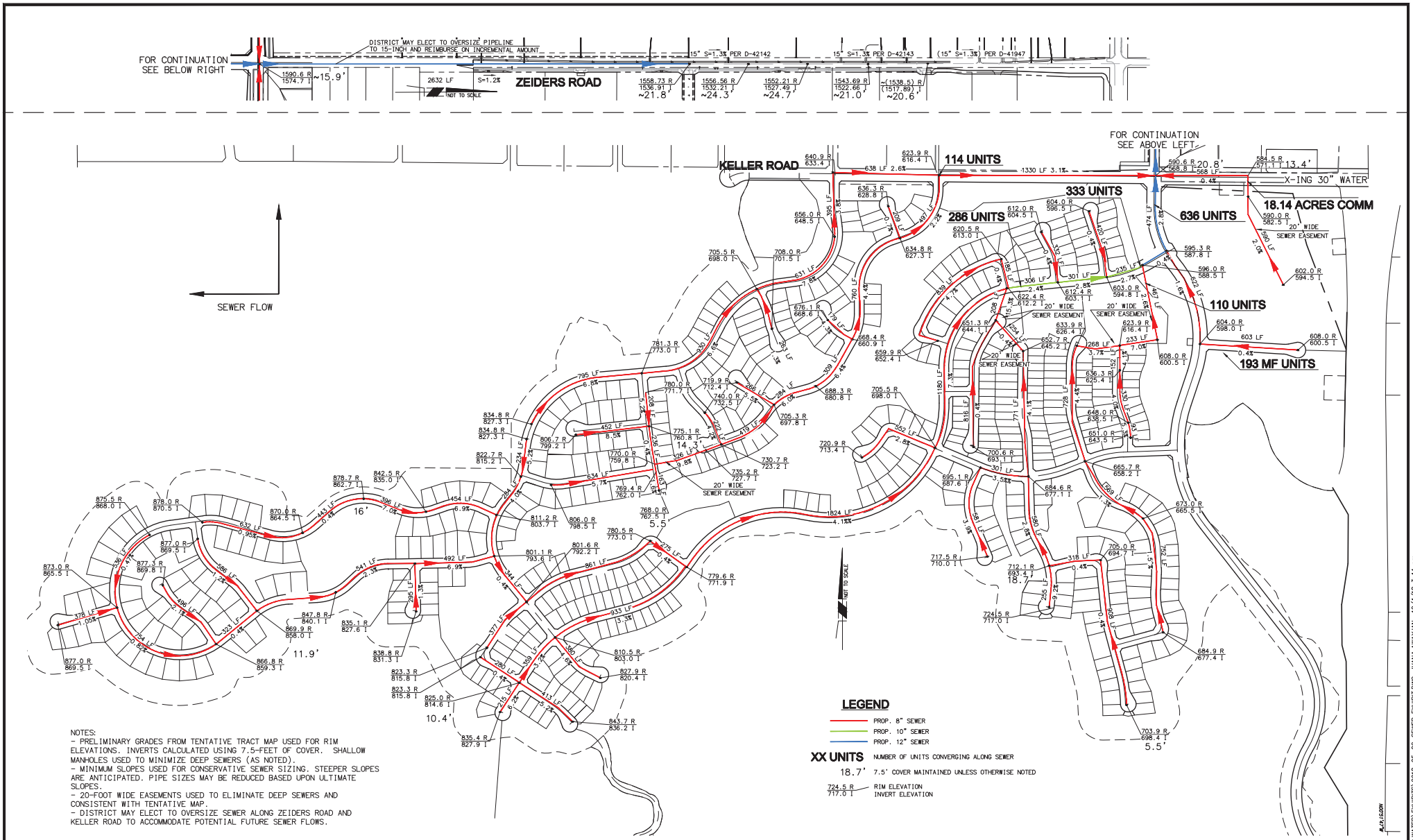
40810 COUNTY CENTER DRIVE, SUITE 200
TEMECULA, CA 92591
PHONE: (951) 676-8042 · MBAKERINTL.COM

MURRIETA HILLS

PROPOSED WATER SYSTEM

H:\PDATA\166347\CADD\WATER\EXHIBITS\2018-05-01_WATER EXHIBIT.DWG MBOECK 1/9/19 3:15 pm



NOTES:
- PRELIMINARY GRADES FROM TENTATIVE TRACT MAP USED FOR RIM ELEVATIONS. INVERTS CALCULATED USING 7.5-FEET OF COVER. SHALLOW MANHOLES USED TO MINIMIZE DEEP SEWERS (AS NOTED).
- MINIMUM SLOPES USED FOR CONSERVATIVE SEWER SIZING. STEEPER SLOPES ARE ANTICIPATED. PIPE SIZES MAY BE REDUCED BASED UPON ULTIMATE SLOPES.
- 20-FOOT WIDE EASEMENTS USED TO ELIMINATE DEEP SEWERS AND CONSISTENT WITH TENTATIVE MAP.
- DISTRICT MAY ELECT TO OVERSIZE SEWER ALONG ZEIDERS ROAD AND KELLER ROAD TO ACCOMMODATE POTENTIAL FUTURE SEWER FLOWS.

Michael Baker INTERNATIONAL
40810 COUNTY CENTER DRIVE, SUITE 280
TEMECULA, CA 92591
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MURRIETA HILLS

PROPOSED SEWER SYSTEM
DECEMBER 23, 2014

H:\PDATA\166347\CADD\WATER\EXHIBITS\2018-05-02_SEWER EXHIBIT.DWG IVANA.AWAY\AN 10/4/18 3:44 pm

EMWD's 2009 Master Plan Requirements For Storage

1853 A (Phase 1 Tank) - excludes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	210 Units	193 Units	18.1 Acres	- Acres	8.3 Acres	- Acres	3,000 gpm	372 gpm	372 gpm	- gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	372	372	372	
- gpd ADD	92,400 gpd ADD	59,830 gpd ADD	36,200 gpd ADD	- gpd ADD	38 AF/YR ADD	- AF/YR		93 gpm	93 gpm	- gpm	-	-	0.50	
- gpm ADD	64.2 gpm ADD	41.5 gpm ADD	25.1 gpm ADD	- gpm ADD	23.3 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	186	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		5,586 gph	5,586 gph	- gph	60	60	60	
- **GPM MDD**	193 **GPM MDD**	83 **GPM MDD**	50 **GPM MDD**	- **GPM MDD**	47 **GPM MDD**	- **GPM MDD**		24	24	24	-	-	11,172	
- **GPD MDD**	277,200 **GPD MDD**	119,660 **GPD MDD**	72,400 **GPD MDD**	- **GPD MDD**	67,009 **GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 372 **GPM MDD**								
						Total = 536,269 **GPD MDD**	540,000 gal	**134,067** gal	**134,067** gal	- gal	-		**268,135**	**1,076,269** gal
							50.2%	12.5%	12.5%	0.0%	0.0%	0.0%	24.9%	100.0%

EMWD's 2009 Master Plan Requirements For Storage

1853 B (Phase 2 Tank) - Includes Pump through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	45 Units	Units	Acres	- Acres	1.6 Acres	- Acres	1,500 gpm	50 gpm	50 gpm	426 gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	50	50	50	
- gpd ADD	19,800 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	7 AF/YR ADD	- AF/YR		13 gpm	13 gpm	43 gpm	-	-	0.50	
- gpm ADD	13.8 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	4.4 gpm ADD	- gpm ADD	less two-hr FF	60 min	60 min	60 min	-	-	25	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		752 gph	752 gph	2,556 gph	60	60	60	
- **GPM MDD**	41 **GPM MDD**	- **GPM MDD**	- **GPM MDD**	- **GPM MDD**	9 **GPM MDD**	- **GPM MDD**		24	24	24	-	-	1,504	
- **GPD MDD**	59,400 **GPD MDD**	- **GPD MDD**	- **GPD MDD**	- **GPD MDD**	12,775 **GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 50 **GPM MDD**								
						Total = 72,175 **GPD MDD**	- gal	**18,044** gal	**18,044** gal	**61,344** gal	-		**36,088**	**133,519** gal
							0.0%	13.5%	13.5%	45.9%	0.0%	0.0%	27.0%	100.0%
														gal

EMWD's 2009 Master Plan Requirements For Storage

1853 (Combined ultimate Tank) - Includes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	255 Units	193 Units	18.1 Acres	- Acres	9.9 Acres	- Acres	3,000 gpm	423 gpm	423 gpm	426 gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	423	423	423	
- gpd ADD	112,200 gpd ADD	59,830 gpd ADD	36,280 gpd ADD	- gpd ADD	45 AF/YR ADD	- AF/YR		106 gpm	106 gpm	43 gpm	-	-	0.50	
- gpm ADD	77.9 gpm ADD	41.5 gpm ADD	25.2 gpm ADD	- gpm ADD	27.7 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	211	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		6,340 gph	6,340 gph	2,556 gph	60	60	60	
- **GPM MDD**	234 **GPM MDD**	83 **GPM MDD**	50 **GPM MDD**	- **GPM MDD**	55 **GPM MDD**	- **GPM MDD**		24	24	24	-	-	12,679	
- **GPD MDD**	336,600 **GPD MDD**	119,660 **GPD MDD**	72,560 **GPD MDD**	- **GPD MDD**	79,784 **GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 423 **GPM MDD**								
						Total = 608,604 **GPD MDD**	540,000 gal	**152,151** gal	**152,151** gal	**61,344** gal	-		**304,302**	**1,209,948** gal
							44.6%	12.6%	12.6%	5.1%	0.0%	0.0%	25.2%	100.0%
Check	0	234	83	50	0	55	0		152,111	152,111	61,344	-	-	304,222	

X **1.2** Multiplier for 40-ft tank, to define total Operational storage =

MDD Of 2055 PZ (Upper Zone), for Pump Through Calculations: **426 GPM**

indicates cells with data entry

123,456 indicates cells with auto-computation

Note 1: Time Of Use storage requirement is subject to review and discussion with Brian Powell, to decide on Inclusion or Exclusion, in the Planning Criteria

If Building One Tank, Total Operational Tank Volume: **1,451,938 GAL**

If Building Two Tanks, in two phases, each tank volume is: **725,969 GAL**

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

EMWD's Master Plan Requirements For Storage

2055 PZ

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
60 Units	242 Units	- Units	- Acres	- Acres	6.4 Acres	- Acres	1,500 gpm	329 gpm	329 gpm	- gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	329	329	329	
34,200 gpd ADD	106,480 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	29 AF/YR ADD	- AF/YR		82 gpm	82 gpm	- gpm	-	-	0.50	
23.8 gpm ADD	73.9 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	17.8 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	164	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		4,930 gph	4,930 gph	- gph	60	60	60	
71 **GPM MDD**	222 **GPM MDD**	- **GPM MDD**	- **GPM MDD**	- **GPM MDD**	36 **GPM MDD**	- **GPM MDD**		24	24	24	-	-	9,860	
102,600 **GPD MDD**	319,440 **GPD MDD**	- **GPD MDD**	- **GPD MDD**	- **GPD MDD**	51,261 **GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 329 **GPM MDD**								
						Total = 473,301 **GPD MDD**	**180,000** gal	**118,325** gal	**118,325** gal	- gal	-		**236,651**	**653,301** gal
							27.6%	18.1%	18.1%	0.0%	0.0%	0.0%	36.2%	100.0%

X 1.2

Multiplier for 40-ft tank, to define total Operational storage =

Total Operational Tank Volume: 783,962 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

From:	Arroyo, Armando
To:	Raines, Brian
Cc:	Sambito, Maria; El-Hage, Maroun; Azimie, Fred; Chew, Edmund; Lay, Sambo; Marcial, Leland; Mendoza, Abe; Dumas, Brenda; Tibayan, Rebecca
Subject:	Senate Bill 854
Date:	Wednesday, March 04, 2015 8:26:27 AM
Attachments:	00057_C22_Contractor Registration Extract.doc 00028_C05D_Subcontractors_DEV.doc EN-025_NBD.doc

Brian,

Starting March 1, 2015 all projects that have an oversizing component will be required to follow the process shown below:

1. POS Engineer to provide Developer with form C-22 (Contractor Registration Extract) and form C-5D (Designation of Subcontractors). The Developer is made aware through this form that all bidders and their subs will need to be registered with the state in order to perform public work projects.
2. If Developer wants additional information about the SB 854, please provide them with the following link to the State's fact sheet: http://www.dir.ca.gov/DLSE/PublicWorks/SB854FactSheet_6.30.14.pdf
3. All Bidders shall submit form C-5D with their bid. Failure to submit a completely filled form by the bidders will result in a non-responsive bid.
4. Once bids have been received, POS Engineer will review form C-5D and verify that prime and subcontractors are registered with the state at the following website: *https://efiling.dir.ca.gov/PWCR/Search.action*
5. Unregistered prime and subcontractors will result in a non-responsive bid.
6. Once the lowest responsible bid has been determined, the Developer's contractor shall submit a completely filled out form EN-25 NBD in conjunction with its insurance. Failure to provide a completely filled out form EN-25 NBD and insurance will result in the delay of the pre-construction meeting.
7. Once a completely filled out form EN-25 NBD has been received, Brenda Dumas will create a project in the State's database (State form PWC100) within five (5) days from the CO# issue date.
8. Once project has been created in the State's database, project can move forward with construction.

Regards,

Armando G. Arroyo
Senior Civil Engineer
Eastern Municipal Water District
(951) 928-3777 ext. 4480
arroyoa@emwd.org

P.S. CFD projects will follow a similar process. Field Engineering may provide assistance with

those particular projects.

TECHNICAL MEMORANDUM

Murrieta Hills
(Specific Plan 320 / TTM 35853)
Master Water and Wastewater
Plan of Service

Applicant
Benchmark Pacific
Richard Robotta Vice President

Owner
Pulte Group
Sohail Bokhari Project Manager

Engineer
RBF Consulting
Michael Boeck, PE Project Manager

Rev. Date	Summary
7/29/2014	Draft
12/18/2014	Final Draft
4/13/2015	Final
7/07/2015	Final

RBF JN 136919
EMWD WO# 15273

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APPENDICES

Appendix A: Domestic Water Model Results
Appendix B: Wastewater Model Results
Appendix C: Supporting Documents
Appendix D: Murrieta Hills Offsite Sewer Report (12/14/06)

I. Introduction

RBF Consulting was contracted by Benchmark Pacific/Pulte Group (Developer) to prepare a master water and wastewater analysis for the proposed project known as Murrieta Hills (Project). The project site consists of twenty-five assessor parcel numbers to be annexed in the City of Murrieta. The Project is concurrently moving forward with the planning approval process with the City. It should be noted that a previous Plan of Service study was initially prepared for the site in January 2009. At that time, the Project included 1,375 residential dwelling units. The proposed land use consists of single and multi-family residential, commercial, and parks and open spaces. The area is bounded by Keller Road to the north and Interstate 215 (I-215) to the east, as shown in Exhibit 1.

The water and sewer purveyor for this development is Eastern Municipal Water District (EMWD). A Water Supply Assessment dated December 18, 2013 was initially prepared by EMWD and provided to the Board for approval. The District will more than likely need to revise or update the Water Supply Assessment for this updated site plan and the change of water demands. This analysis used EMWD's planning and design criteria for water and sewer systems. The criteria guidelines are included within Appendix C. The intent of this study is to provide the Applicant/Owner with an overall assessment of the proposed backbone water and wastewater facilities necessary for the Project. Further preliminary design analysis may be required for specific water facilities or specific planning areas such as the commercial area.

II. Project Background

The proposed land use for the Project consists of a total of 750 residential units and 27-acres of proposed commercial over 973.7-acres of undeveloped land. The closest existing water and sewer infrastructure is located to the north of the Project. Please refer to Exhibit 2 for the District's existing water systems adjacent to the study area. The water system that will supply water to the project is part of EMWD's 1698 Pressure Zone (Zone). One storage tank (6.2 MG total) is located along Keller Road near Gloria Road. A booster station from this reservoir site will be required to boost water flows to an on-site piping distribution network. A hydro-pneumatic station is not anticipated at this time.

The closest existing sewer system occurs along Zeiders Road approximately 4,100 linear feet from Keller Road. Approximately 1,400 linear feet of 15-inch sewer line is currently being construction along Zeiders Road for the Commerce Pointe project. A stub at this proposed sewer will be provided at the southerly property boundary of the Commerce Pointe development.

The following documents, exhibits, and correspondences (meetings/emails) were used as resources for determining demands and developing hydraulic models:

- EMWD's "Water and Sewer Systems Planning and Design Criteria" standards dated July 2, 2007.
- Existing Sewer Design Plans (D-41947, D-42140 thru D-42143)
- Existing Water Design plans (D-3704 & D-3705, D-24411 – D-24417).
- Water Supply Assessment Report for Murrieta Hills Specific Plan dated December 18, 2013.
- Due Diligence Meeting (August 27, 2013) and follow-up review meeting (November 17, 2014) and email correspondences with EMWD staff.

- EMWD Facilities Planning Report (October 6, 2008); Hydraulic Boundary Conditions at Points of Connection; Menifee West Water Study (April 2008, by IEC).

III. Land Use

The proposed land use for the Project consists of 750 residential dwelling units, where 532 are single-family and 218 are multi-family type units. The commercial portion incorporates a gross area of 27-acres with a Floor Area Ratio (FAR) of 0.5. The land use designations are shown on the attached site plan in Exhibit 3. A summary of the proposed development parameters are shown in Table 1.

Exhibit 1 Vicinity Map

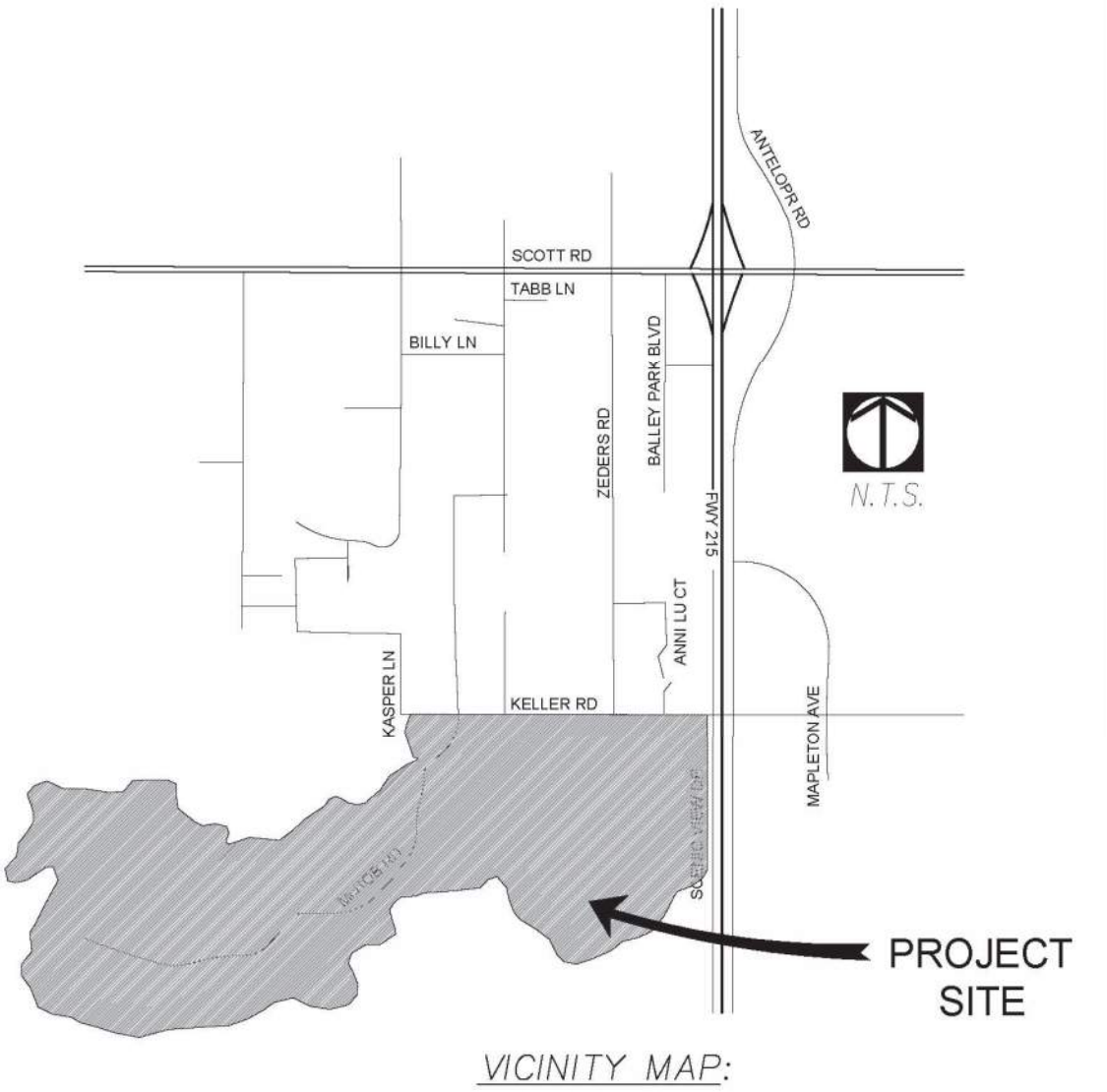


Exhibit 2 EMWD's Existing Domestic Water System

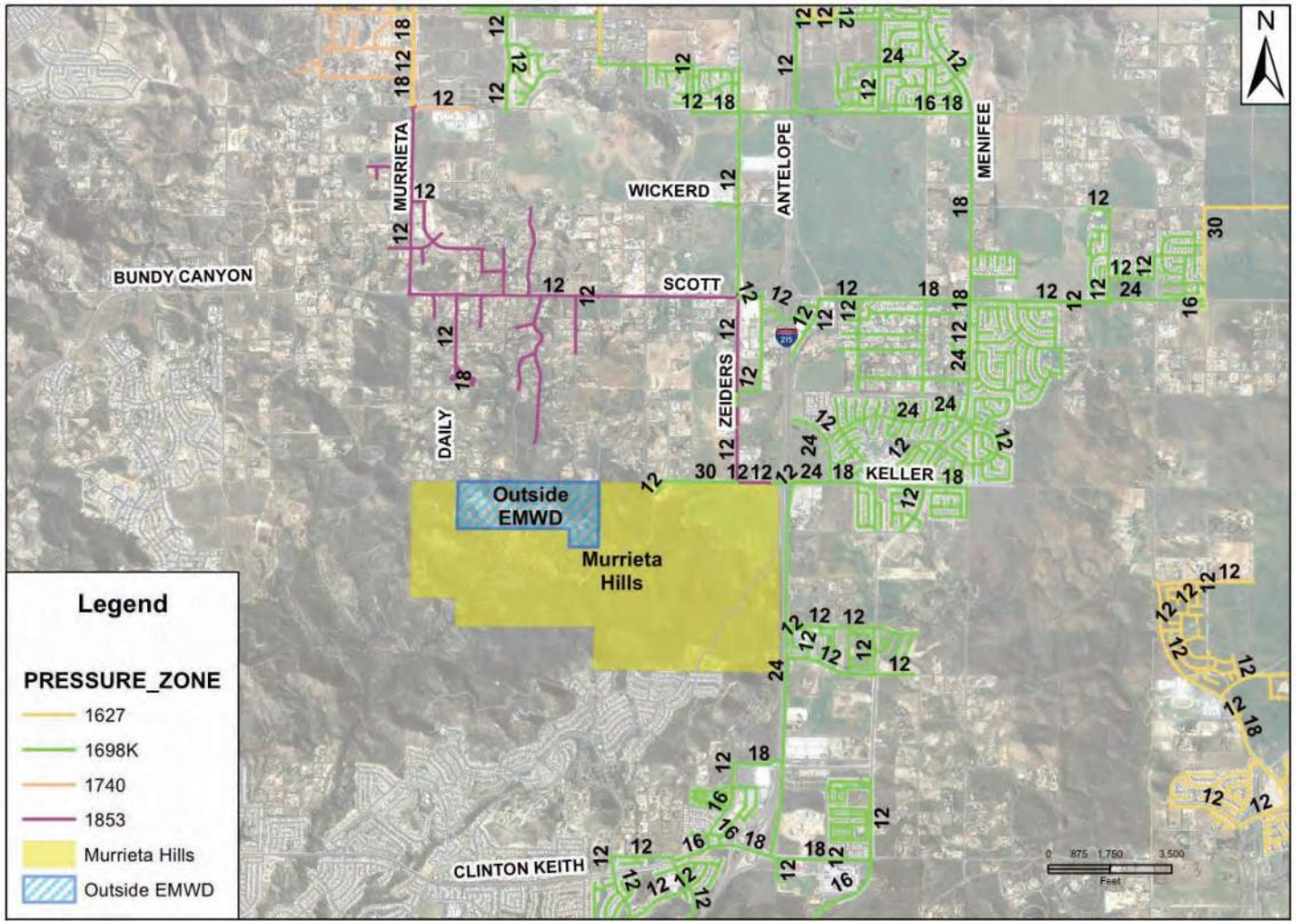


Exhibit 3 Land Use Designations

LAND USE SUMMARY

		LAND USE		GROSS ACRES	UNITS	DENSITY DU/AC*
RESIDENTIAL						
	PA 1	Single Family	5,000 s.f. min. lot size	13.8	47	3.4
	PA 2	Single Family	4,800 s.f. min. lot size	39.3	127	3.2
	PA 3	Single Family	6,000 s.f. min. lot size	55.1	103	1.9
	PA 4	Single Family	5,000 s.f. min. lot size	34.1	82	2.4
	PA 5	Single Family	6,000 s.f. min. lot size	31.9	78	2.5
	PA 6	Single Family	5,000 s.f. min. lot size	32.7	80	2.4
	PA 7	Executive Single Family	10,000 s.f. min. lot size	52.9	60	1.1
	PA 8	Multi Family		15.0	172	11.5
		RESIDENTIAL SUB-TOTAL		***274.8***	***750***	***2.7***
PARKS (within Residential Gross Acreage)**						
		Public Park (located within PA2)		5.7		
		HOA Parks		10.3		
COMMERCIAL						
	PA 9	Community Commercial		26.5	-	-
		COMMERCIAL SUB-TOTAL		***26.5***		
OPEN SPACE						
	OS 1	MSHCP (Includes portion of McElwain Road)		610.8	-	-
	OS 2	Linear Nature Park		39.4	-	-
		OPEN SPACE SUB-TOTAL		***649.2***		
CIRCULATION						
		Backbone Streets (Loop road and McElwain)		23.2	-	-
		CIRCULATION SUB-TOTAL		***23.2***		
TOTAL				**973.7**	**750**	**0.7**

*Densities are based on gross acre within the MSHCP boundary line.

**Park gross acreages are included within the Residential Gross Acreage section. Excluded from total.

This illustrative demonstrates a conceptual design incorporating all required Specific Plan elements, including land use, circulation, infrastructure, open space, and recreation. Other designs may be acceptable provided they are consistent with this Specific Plan.

Table 1 Land Use and Water Demand Summary

Planning Area Land Use	Acreage	Dwelling Unit[1]	Average Day (gpm)[2]	Max Day (gpm)[3]	Peak Hour (gpm)[4]
PA1 – PA 6 (Single Family) Residential)	274.8	518	194.3	582.8	1,359.8
PA7 (Executive Single Family Residential)		60	28.3	85.0	198.1
PA8 (Multi-Family Residential)		172	35.8	71.6	89.6
PA9 (Commercial)	26.5	--	36.8	73.6	73.6
Public/HOA Parks[5]	16.0	--	37.4	74.8	--
Linear Nature Park (OS2)	33.4	--	--	--	--
Streets/Non-Irrigated Park (OS1)	639	--	--	--	--
Total	**973.7**	**750**			

[1] Lot count from Land Use Plan August 15, 2013.

[2] Average demand uses of 680 gpd/unit, 540 gpd/unit, 300 gpd/unit, and 2,000 gpd/acre were used for Executive Single Family, Single Family, Multi-Family, and Commercial uses, respectively. The gross acreage of the commercial area was used for the calculation including the FAR value of 1.0. A demand factor of 3.8 AF/year/acre was used for landscape demands for Parks. Open Space areas will not have irrigation demands or use drought tolerant plants that will not require irrigation.

[3] A peaking factor of 3.0 was multiplied to the Average Day Demand to determine the Max Day Demand for Single Family and Executive Single Family Residential uses. A peaking factor of 2 was multiplied to the Average Day Demand to determine the Max Day Demand for the Multi-Family and Commercial areas.

[4] A peaking factor of 7.0 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Single Family and Executive Single Family Residential areas. A peaking factor of 2.5 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Multi-Family Residential. A peaking factor of 2.0 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Commercial Area.

[5] Typical irrigation for parks and greenbelts will be served from the potable water system. Irrigation could occur at any time during a 24-hour period and is not constricted to a 9-hour window like typical non-potable systems require. A peaking factor of 2 was multiplied to the Average Day Demand to determine the Max Day Demand. Park gross acreages are included within the Residential Gross Acreage section.

The natural topography of the development flows from southwest to northeast. Proposed grading for the site was balanced such that no additional fill or export is anticipated. Table 2 outlines the elevations for service from two pressure zones, and the respective static pressures.

Table 2 Static Pressure Summary

Static Pressure Summary		
Reservoir Pad Elevation (ft) [HWL]	**Range of Elevations Served within Development (ft)**	**Static Pressure Range (psi)***
1818 [1853 Zone]	1590.0 – 1706.7	48 – 114
2020 [2055 Zone]	1727.2 - 1880.0	60 – 142

* Pressure regulating stations are anticipated for high pressure areas where the pressure of 100 psi is exceeded.

IV. Domestic Water Demands

Both the residential and commercial areas of the Project are anticipated to use a public water distribution system with EMWD as the purveyor. Therefore, all water demands were determined using EMWD's Planning and Design Criteria dated July 2007 and the 2009 Master Plan Requirements for Storage. Dwelling unit (du) count was used as a basis for residential portions of the development. Gross area was used as a basis for the mixed use/commercial site and irrigation areas (parks and open space). Several demand factors were used. The site plan defines the land uses by the following:

- The commercial component for the Project has a Floor Area Ratio (FAR) of 0.5. A conservative approach was used (FAR factor of 1) in determining the demands for the commercial area. EMWD's Commercial density factor of 2,000 gpd/acre was used.
- EMWD's High Density Residential demand factor of 300 gpd/du was used for the multi-family areas.
- EMWD's Medium Density Residential demand factor of 540 gpd/du was used for the remaining single-family home sites.
- EMWD's Low Density Residential demand factor of 680 gpd/du was used for the single-family home sites in PA7 as shown as the Executive Single Family Residential.
- Open Space areas utilized an irrigation demand factor of 3.8 AFY.

V. Domestic Water System Facilities

The proposed water system was evaluated using EMWD's design criteria. This design criteria is summarized in Table 3 below.

Table 3 Water System Design Criteria

Maximum Customer Service Pressure (per Uniform Plumbing Code)	80 psi (per Uniform Plumbing Code) Pressures greater than 80 psi will require individual regulators provided by the customer.
Minimum Distribution System Pressure ❑ Daily Demands (Peak Hour) ❑ Maximum Day Demand Plus Fire Flow	 50 psi 20 psi
Minimum Pipeline Diameter	8 inch (City and EMWD)
Hazen-Williams Coefficient "C" Factor	120 (to account for minor losses – bends, valves, meters, etc.)
Maximum Pipeline Velocities ❑ Average Day Demands ❑ Maximum Day and Peak Hour Demands ❑ Fire Flow Demands	 Not to exceed 5 fps Not to exceed 10 fps May exceed 10 fps[1]

Per EMWD's Planning and Design Criteria. [1] Distribution pipeline flows should not exceed 10 fps, except during fire flow conditions.

Fire Flow

The Project proposes residential home sites, and commercial type buildings. Table 4 shows the fire flow requirements for these structures based on EMWD design criteria.

Table 4 Fire Flow Requirements

Structure	Flow (gpm)	Duration (hours)
Single Family (Residential)	1,500	2
Light Commercial	3,000	3

Verification with the City of Murrieta's Fire Marshal will be necessary when further developing the site plan as to the actual fire flow required (typically found within the Conditions of Approval). Fire flows are determined based on building size and type of construction used. The latest fire regulations require all buildings to be equipped with fire sprinklers, including residential home sites. Therefore, the fire flow requirements shown in Table 4 may increase due to this new regulation. A fire flow of 3,000 gpm was used for the commercial areas for modeling purposes. Please refer to the attached Appendix A for the model results.

Pipelines

Pipelines are sized to ensure minimum pressures are met throughout the system while providing the required fire flows and adhering to EMWD's system criteria. New pipelines for the study area include 8, 12, and 18-inch mains for on-site distribution between booster stations and reservoirs as shown in Exhibit 4.

Pipe sizes and alignments found in Exhibit 4 are for preliminary planning and estimating. Once a site plan is developed, a more refined analysis can be performed to confirm the various elements: elevation grades, pipe corridors and sizes, connections to off-site and on-site distribution piping, and phasing. The analysis presented in this study assumes a complete project buildout using a public system delivery.

Reservoirs

Two pressure zones are proposed for the Project as described in Table 2: 1853 Zone and 2055 Zone. Reservoir sizing is based upon the following storage needs including: operational flow (Maximum Day Demands), and emergency flow (fire events). In the case of the 1853 Zone reservoirs, an additional flow factor was included to account for pumping to the higher 2055 Zone system. This factor is 10% of the Maximum demand. Refer to the calculations for reservoir sizing in Appendix A.

1853 Zone

The 1853 Zone will have a High Water Level (HWL) at the 1853-foot elevation. The pad elevation for the zone will be at 1818-feet. These elevations were made consistent with the Daily II storage tank so that connection into the existing 1853 Zone could be made for system redundancy and reliability. This zone will be dedicated for phasing of approximately 240 single-family lots. The zone will also accommodate the commercial and multi-family portion of the Project, which is not expected to be on-line at the initial stages of the Project. Due to this phasing need, two reservoirs are proposed:

- Reservoir 1853A will be sized to accommodate the initial 210 single-family lots and associated fire flow.
- Reservoir 1853B will be sized to accommodate the remaining single family lots (30 units), multi-family (172 units), and commercial area. The net difference in fire storage will also be added to the second reservoir to make up the fire flow needs associated with the commercial portion.
- The District has stated that they would prefer to see two equally sized reservoirs for maintenance and operational uses. The actual size of the reservoirs will be determined in the preliminary design phase, which will take into account freeboard requirements. An approximate reservoir size has been included for planning purposes for reservoirs 1853A and 1853B. The ultimate diameter for two equally sized reservoirs would have an approximate height of 35-feet and diameter of 57-feet. The size of Reservoir 1853A would be slightly increased to accommodate this request.

2055 Zone

The 2055 Zone will have a HWL at the 2055-foot elevation. The pad elevation for the zone will be at 2020-feet. This zone will be dedicated for the remaining single-family lots (278 units plus 60 Executive Single-Family units) and their associated fire flow needs.

A breakdown of preliminary reservoir sizes for the Project is shown in Table 5. Actual reservoir sizing along with site improvements will be determined as part of final design stages.

Table 5 Project Reservoirs

Reservoir	Construction Phasing (lot per zone)	Fire Flow (gal)	Max Day (gal)	Total Storage (gal)	Approx. Size (ft)[1]
1853A	210 single family	180,000 (1,500 gpm for 2 hours)	382,784	562,784 (excluding Pump Through Storage to 2055 Zone)	Height: 35 Diameter: 53
1853B	30 single family 172 multi-family	360,000 Difference of 540,000 (3,000 gpm for 3 hours) minus existing fire flow of 180,000	300,384	721,872 (including Pump Through Storage to 2055 Zone)	Height: 35 Diameter: 59
2055	278 single family 60 executive single family	180,000 (1,500 gpm for 2 hours)	615,344	954,413	Height: 35 Diameter: 68

[1] Size for water storage only and does not include freeboard requirements. Actual reservoir sizing and site improvements will be determined at the preliminary design stage.

Booster Stations

The system is planned to float off of the reservoirs during daily demands. Water is then boosted to the higher reservoir zone typically during off-peak power hours. Two booster stations are proposed to serve the Project for filling the proposed reservoirs. These booster stations are proposed at two locations: at the existing 1698 Keller Tank site along Keller Road and Gloria Road, and at the proposed pad site for Reservoirs 1853A and 1853B. Each pump station will be designed in accordance with EMWD criteria and have a capacity to meet maximum day demands and fire flow requirements. Actual booster pump locations and system curves will be determined at the preliminary design stage. Other areas on-site including the MSHCP open space area can be utilized to support water infrastructure including the booster station(s) should the reservoir location sites not be a feasible approach.[1]

VI. Domestic Water Analysis

The domestic water system hydraulic analysis was performed using Bentley's WaterCAD Hydraulic Modeling Software. The hydraulic model was created using the land use plan and pad elevations prepared by Pangaea. Standards from EMWD's Planning and Design Criteria were used to establish demands, minimum diameters, maximum velocities, and Hazen-Williams friction factors. Junctions were placed at intersections to join two or more pipelines and for applying normal demands and fire flows for various scenario simulations.

Water source for the development will be supplied by EMWD's 1698 Zone. A pumping station located at the 1698 Zone reservoirs will boost flows to the 1853 Zone Reservoir(s). Another pumping station will be located at the 1853 Zone Reservoir and boost flows to the 2055 Zone Reservoir. Each zone system will be "floated" and maintain pressure from these storage tanks. The two pressure systems were modeled using the proposed pad areas for the reservoirs as a

[1] Per meeting discussions with Richard Robotta, Brian Raines, Maroun El-Hage, and Michael Boeck on November 17, 2014.

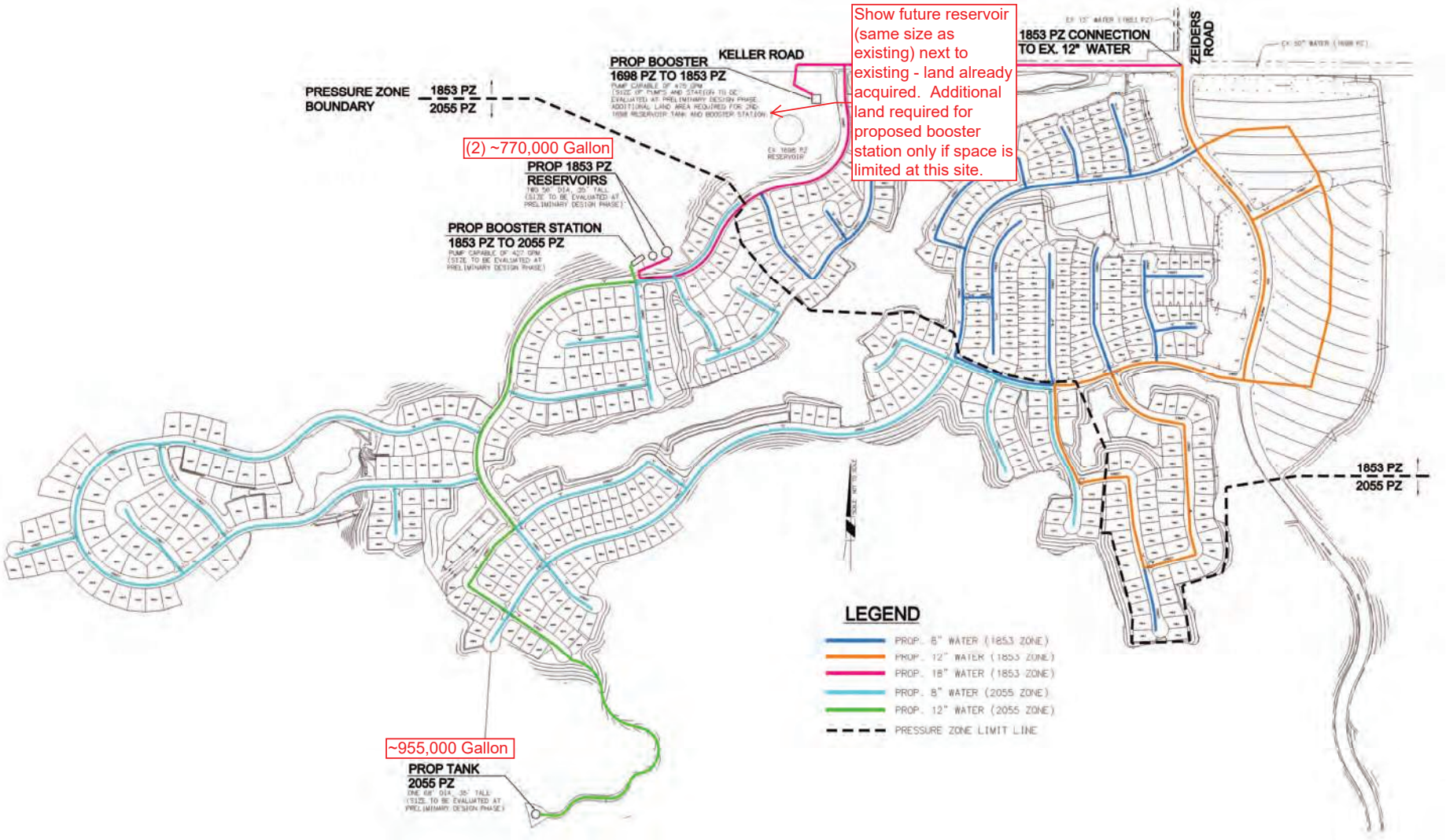
source of supply. Pipelines were placed in the model to ensure simulation of system head losses. Please refer to Appendix A for these test results and hydraulic calculations.

The computer model used a low water level (LWL) to simulate pressure calculations as a conservative approach. The HGL for the two systems were 1818 and 2020 (pad elevations). These HGL's were used for modeling the peak hour, and fire flow events.

Per discussions with EMWD staff[2], adequate storage at the 1698 Zone (6.2 MG reservoir) would be sufficient to support the project. Additional conveyance and/or pumping requirements from the 1698 PZ may be necessary upon review by Facilities Planning against the 5-year CIP.

[2] Per November 17, 2014 meeting with Brian Raines and Maroun El-Hage.

Exhibit 4 Proposed Domestic Water System



VI. Domestic Water Analysis (Continued)

The site plan shows areas for irrigation purposes for public and HOA parks. Open space areas will not be irrigated, or use drought tolerant type plants such that the irrigation demands for these areas were not considered. Recycled water is not available for the Project, therefore, irrigation demands were added to the domestic water model. It is our understanding that there are no time limitations for irrigating unlike a recycled water system where irrigation occurs during off-peak hours. Refer to the site plan shown in Exhibit 3 for the planning areas noted in Table 6.

Table 6 Irrigation Flows Included into Model

Area (acres)	Site Plan Location (Planning Area)	Max Day Demands (gpm)[1]	Modeled Junction Node
5.7	PA-2	26.2	J-19
2.6	PA-2	12.0	J-21
0.4	PA-3	1.8	J-46
0.6	PA-3	2.8	J-49
0.3	PA-3	1.4	J-43
2.1	PA-4	9.6	J-16
0.3	PA-4	1.4	J-72
0.6	PA-4	2.8	J-69
0.2	PA-6	1.0	J-60
0.2	PA-6	1.0	J-57
1.8	PA-7	8.8	J-77
1.2	PA-7	6.0	J-81

[1] Using demand usage of 3.8 acre-feet/year per acre and factor of 2.

Various critical operating scenarios were simulated and are summarized in Table 7. Conservative operating scenarios were chosen, such as fire flow demands at hydraulically remote locations to ensure minimum pressures are available for service. All scenarios used a Hazen Williams roughness coefficient (C) of 120 as a conservative value. The lower coefficient value assumes minor losses such as valves, fittings, and smaller size meters provided to various retail facilities, along with assuming an older or aged pipeline in operation for a long period of time. Additional losses should be accounted in further analysis should a private system or dedicated fire line be proposed for the multi-family or commercial site. These additional losses may cause pipe size increases to various pipe reaches on or off-site.

- Scenario 1 simulates the peak hour demands with reservoirs at an empty level (LWL).
- Scenarios 2 through 5 simulate the maximum-day demand plus fire flow at critical locations within the development with reservoirs at LWL.
    - Scenario 2: Fire demand at the residential area of PA-3. This scenario simulates a high pad elevation at a hydraulically remote area from the 1853 Reservoir (Fire demand of 1,500 added to the maximum day demand at Junction J-45).
    - Scenario 3: Fire demand at the multi-family location of PA-8. This scenario simulates a hydraulically remote area from the 1853 Reservoir with a high fire demand (Fire demand of 3,000 gpm added to the maximum day demand at Junction J-88).
    - Scenario 4: Fire demand at the commercial location of PA-9. This scenario simulates a hydraulically remote area from the 1853 Reservoir with a high fire demand (Fire demand of 3,000 gpm added to the maximum day demand at Junction J-87).

- Scenario 5: Fire demand at the residential area of PA-7. This scenario simulates a high pad elevation at a hydraulically remote area from the 2055 Reservoir (Fire demand of 1,500 added to the maximum day demand at Junction J-82).

The above scenarios were performed assuming the ultimate condition at the Project's build-out. Please refer to Exhibit 4 for this preliminary level water distribution system. A summary of the modeling results is located in Table 7. The program output files are in Appendix A.

Table 7 Computer Analysis Hydraulic Summary for Domestic Water Distribution

Scenario	Description	Minimum Pressure		Minimum Design Pressure[2]	Maximum Velocity[3]		Max. Vel.
		(psi)	Junction		(fps)	Pipe	
1	Empty Tanks (LWL) Peak Hour Demand	45.2	J-45	40	2.59	P-63	10
2	Max Day Demand plus Fire Flow @ J-45 (Residential – 1853 LWL)	36.4	J-45	20	5.4	P-21	--
3	Max Day Demand plus Fire Flow @ J-88 (Multi-Family)	26.5	J-45	20	9.7	P-21	--
4	Max Day Demand plus Fire Flow @ J-87 (Commercial)	31.6	J-45	20	9.9	P-21	--
5	Max Day Demand plus Fire Flow @ J-82 (Residential – 2055 LWL)	25.2	J-82	20	9.6	P-95	--

[1] The low water level (LWL) for the 1853 and 2055 PZ were used in the hydraulic model. These LWL elevations correspond to 1818 and 2020, respectively. The pressure zone labels were used to differentiate between the two modeled zones.
[2] Minimum pressure of 20 psi required during fire flow scenario only, otherwise, 50 psi minimum for peak hour conditions. Lots located at the upper pad areas of each zone will be less than 50 psi as shown in the above table.
[3] Distribution pipeline flows should not exceed 10 fps, except during fire flow conditions.

by developer's consultant

Prior to issuing an approved Plan of Service and final design of any subsequent phase, an Extended Period Simulation (EPS) will be conducted to verify the sizing of the required facilities. The EPS analysis will evaluate the system's capacity, to meet EMWD design criteria under various demands (such as Max Day Demand, Peak Hour Demand, and Fire Flow Demand).

VII. Wastewater Generation

The wastewater generation flows for the Project were determined using the unit flow factors provided in EMWD's Planning and Design Criteria. Unit flow factors from these design criteria were used to calculate the average day flows. Table 8 summarizes these factors and flow rates.

Table 8 Wastewater Flows

Planning Area Land Use[1]	Acreage	Dwelling Unit Count	Unit Flow Factor [2]	Average Flow (gpm)	Peak Flow (gpm) [3]
PA1 – PA6 (Single Family) Residential)	274.8	518	350	125.9	284.5
PA7 (Executive Single Family) Residential		60	420	17.5	39.6
PA8 (Multi-Family Residential)		172	200	23.9	59.7
PA9 (Commercial)	26.5	--	1,700 (gpd/ac)	31.3	78.2
Total		**750**		**198.6**	**462.0**

[1] Site Plan for Murrieta Hills.
[2] From EMWD's Planning and Design Criteria for Sewer Systems Table 1.
[3] Peak flow factor of 2.26 was used for the residential uses. A peaking factor of 2.5 was used for the multi-family and commercial areas.

VIII. Wastewater System Facilities

The proposed wastewater system was evaluated using the design criteria shown in Table 9.

Table 9 Wastewater System Design Criteria

Minimum Pipe Diameter	8 (in)
Manning's Roughness Coefficient (n)	0.015 (EMWD) - Used for this analysis
Velocities Minimum Recommended Maximum	 2 fps* 3 fps 10 fps
Maximum Velocities	10 fps
Maximum Flow Depth in All Pipes (D/d) (12-inch and smaller) (15-inch and larger)	 50 (%) 75 (%)
Minimum Pipe Slopes	8-inch: 0.4% 10-inch: 0.32% 12-inch: 0.24% 15-inch: 0.16%

* At minimum D/d.

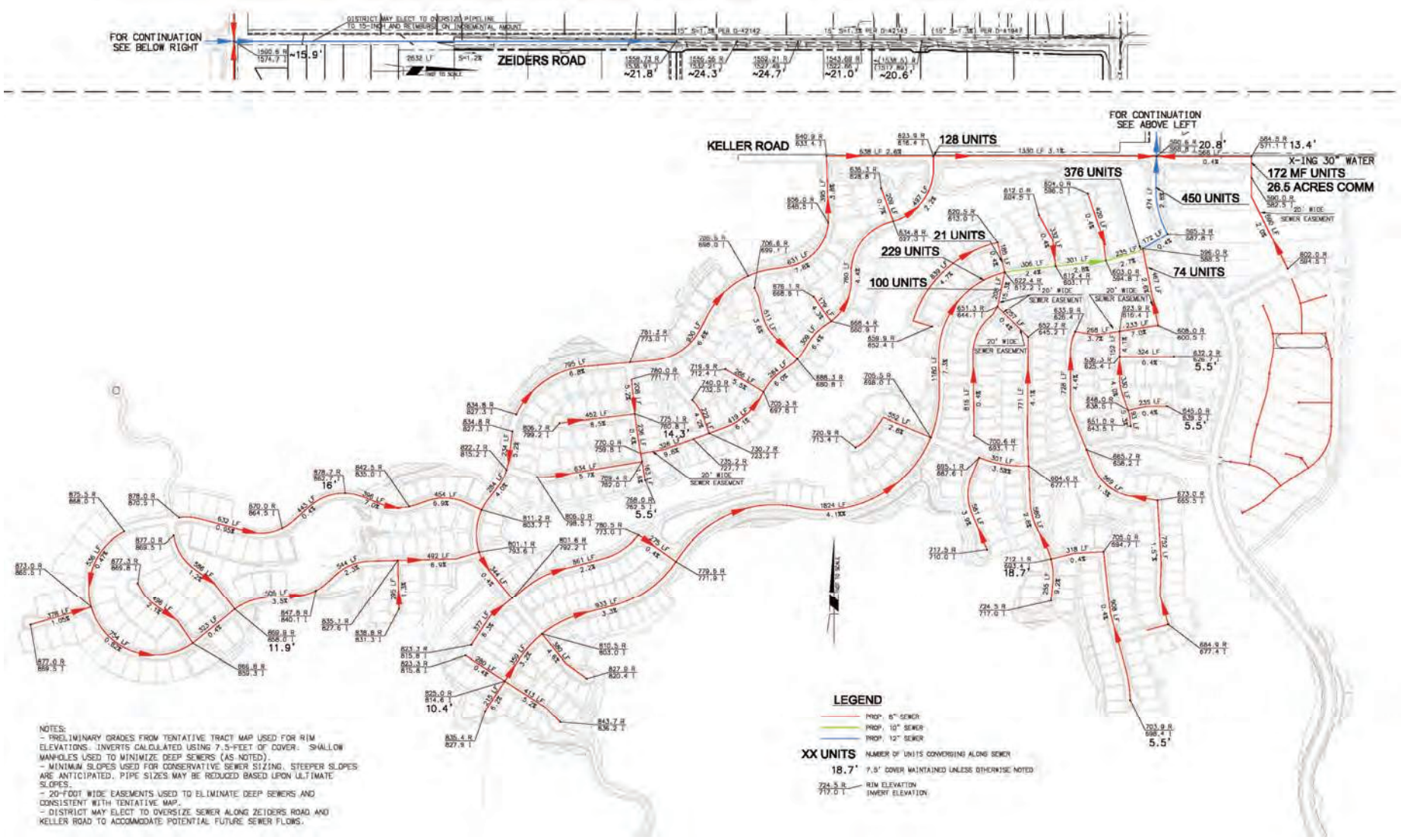
Off-Site Facilities/Tributary Analysis

The wastewater system for the Project will flow entirely by gravity from southwest to northeast. Flows from the Project will be collected to Keller Road. The majority of the on-site system can be served using 8-inch gravity sewer. Larger diameters are necessary where flows converge near the entrance off of Keller Road and Zeiders Road. Flow directions and pipe sizes for the entire system are shown in Exhibit 5. The pipeline diameters determined for the Project meet the design criteria stated in Table 9. The velocities as well as depth of flow in the major pipelines, at ultimate buildout can be found in Appendix B.

An offsite connection to the sewer within Zeiders Road near the Commerce Pointe Project, approximately 2,600 linear feet to the north of Keller Road would be the main point of connection. The approved Plan of Service for Commerce Pointe analyzed the proposed sewer along Zeiders Road for the Murrieta Hills Project. A sewer with a depth of 20-feet and slope 1.2-percent was approved by EMWD to satisfy the Project. A 12-inch main at this slope grade would be adequate to serve the Project.

The District has asked that the ultimate sewer along Zeiders Road by upsized to a 15-inch diameter. It was also requested that the 15-inch sewer continue east along Keller Road along the Project's commercial frontage for additional tributary areas to the east of the Interstate 215 freeway. The sewer would terminate at the frontage of the Project. The Murrieta Hills Project will not be responsible for continuing the sewer farther east across the freeway. No additional tributary areas were included as part of this study.

Exhibit 5 Proposed Sewer System



IX. Wastewater Analysis

The wastewater system analysis was performed using FlowMaster Hydraulic Modeling Software. The analysis consisted of totaling the maximum number of single family units, using minimum pipe diameters with the estimated peak flows. Street slopes are proposed for Project's site plan, however, it is not known how sewer and storm drain crossings will be designed. For this uncertainty, minimum slopes were used in determining the maximum depth of flow to pipe diameter ratio (D/d) for the on-site sewer system. The exception to using the minimum slope for analysis occurs along Zeiders Road where a slope of 1.2-percent was used per the direction of EMWD for the Commerce Pointe Project. The District's guidelines were utilized for both the onsite and offsite analysis.

For the majority of the Project, sewer depths with 7.5-feet of cover can be achieved. There are a few onsite areas within the Project that may require slopes that buck grade, therefore sewer depths will be greater than minimum cover depths at these locations. Conversely, there are areas throughout the Project that may require shallow manholes where the difference of the manhole rim to invert is less than 7-feet (minimum shallow sewer depth is ~5-feet from rim to invert). The use of shallow manholes will be resolved through the plan check process.

X. Conclusion and Recommendations

This analysis covers the master planned facilities for the entire Murrieta Hills Project. Addendums to this Plan of Service can be prepared as planning areas are more defined and specific areas are phased for construction.

Water

The domestic water system analysis for the Project is based on EMWD's criteria and ensuring adequate system performance under all operating scenarios. The Project shows a water tie-in connection to the District's 1853 Zone system at the intersection of Zeiders Road and Keller Road. This connection is for system redundancy and reliability for typical max day and peak hour flows. The proposed booster station located at the 1698 Zone reservoirs will be the primary source of water for the Project. Complete output results of the hydraulic analysis are found in Appendix A.

The recommended domestic on-site system includes 8 and 12-inch pipe with 18-inch transmission main from the 1698 Zone Reservoir/Booster Station to the proposed 1853 Zone Reservoirs. Please note that pipe sizes are dependent on the ultimate build-out condition of the Project. Dividing the Project into phases, or converting public pipelines to private mains may alter the pipe sizes and alignment of the water system. Redundancy and pressure may be reduced. Also of important note was the fire demand used during modeling purposes. A fire flow of 3,000 gpm for the Multi-Family and Commercial areas was used. It is conceivable that a larger building or different fire flow conditions may be requested from the City of Murrieta. The hydraulic model should be re-evaluated and corrected once a set of Conditions of Approval has been adopted for the Project.

Exhibit 4 shows the recommended domestic water distribution system at ultimate development. It should be noted that interior system operation may require additional facilities to ensure adequate operation prior to ultimate development such as meters, backflow preventers, fire detector checks, etc. to individual commercial buildings. These devices will change the available

pressure. A review of the domestic water hydraulic model is recommended when the Project's grading plans as well as site plans are finalized.

The project is conditioned to build a portion of McElwain Road based upon the Tentative Tract Map. Improvement of McElwain Road will depend on phasing. The City may not condition the project to develop full improvements within the road right-of-way. The District has asked that regional facilities (water pipeline) may be conditioned for the Project along McElwain Road. Further analysis of these facilities will be performed by the District as master plan studies. Additional hydraulic analysis will be necessary as grades increase in elevation farther south of the Project.

Sewer

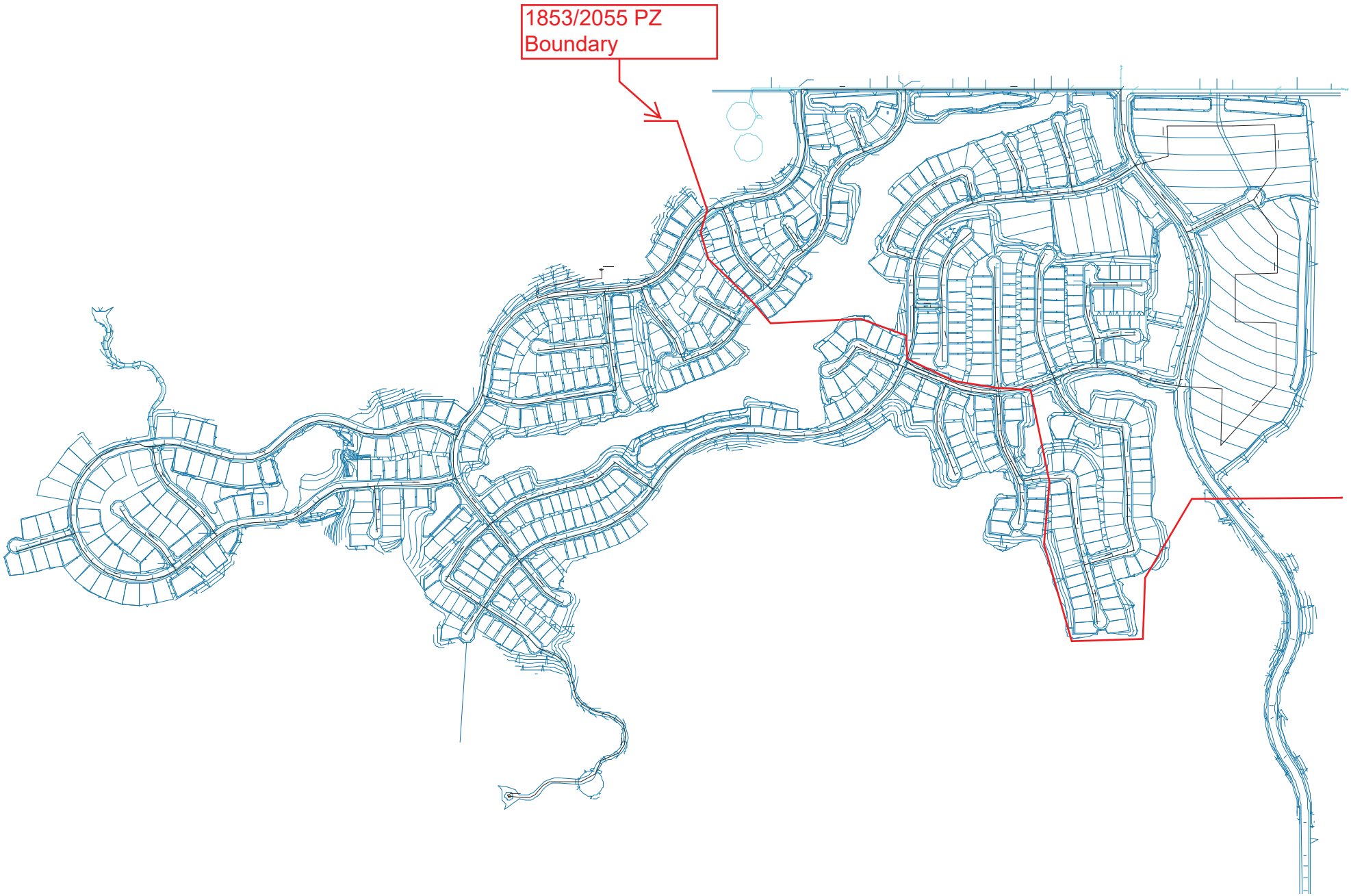
The sewer system analysis for the Project is based on EMWD's criteria and ensuring adequate system performance during peak conditions. Complete output results of the hydraulic analysis are found in Appendix B.

Recommended facilities for the wastewater collection system include 8, 10 and 12-inch sewer pipe mains as shown in Exhibit 5. The District may elect to oversize the sewer within Zeiders Road from 12 to 15-inch to accommodate potential future flows from the east or west at Keller Road. Cost for oversizing will be reimbursed by the District based upon reimbursement policies and agreements between the owner/developer and District.

It is understood that a grading site plan is not yet finalized. A review of the sewer system is recommended when the final grading plans as well as the site plans are finalized.

APPENDIX A – DOMESTIC WATER MODEL RESULTS

Scenario: Base



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Scenario: Base

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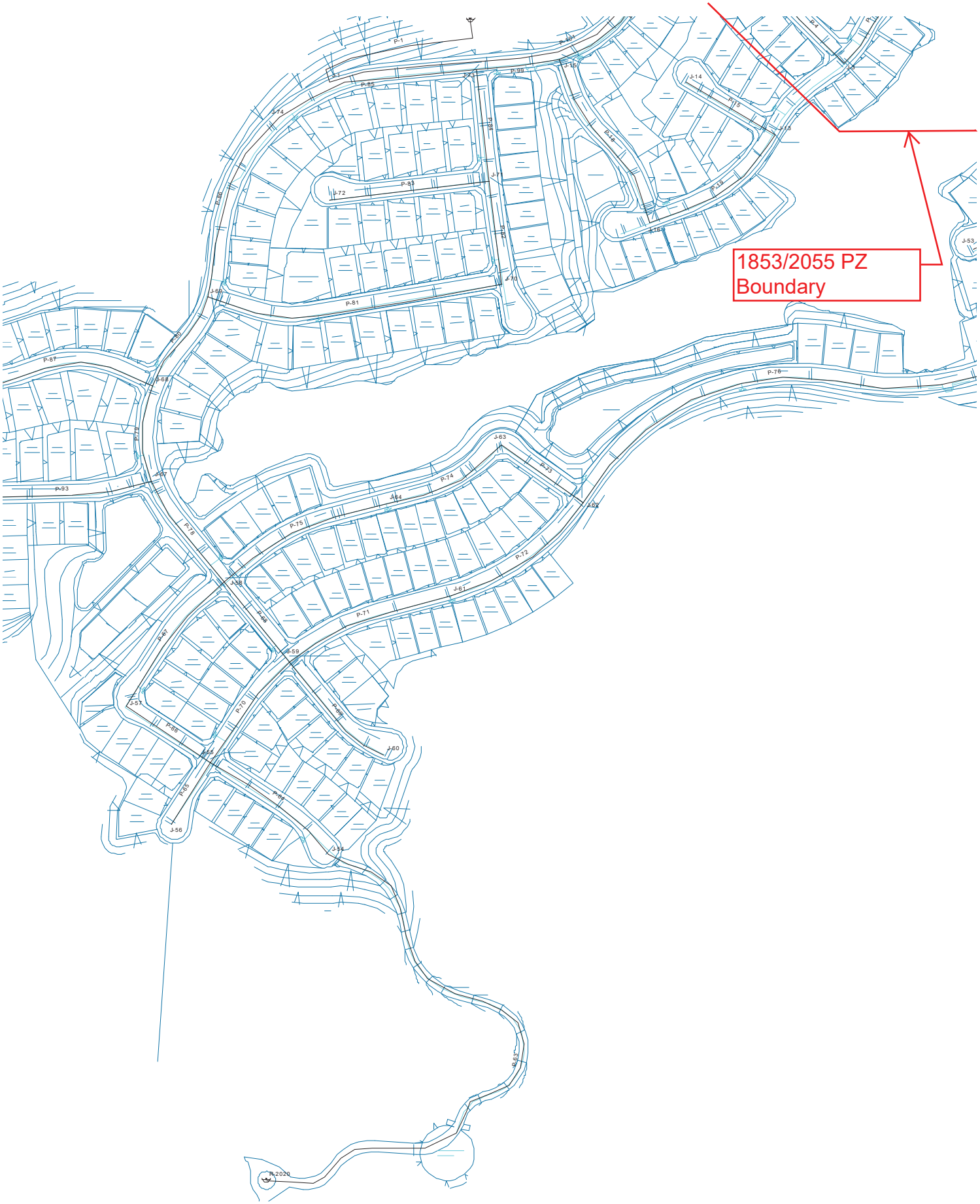
Scenario: Base



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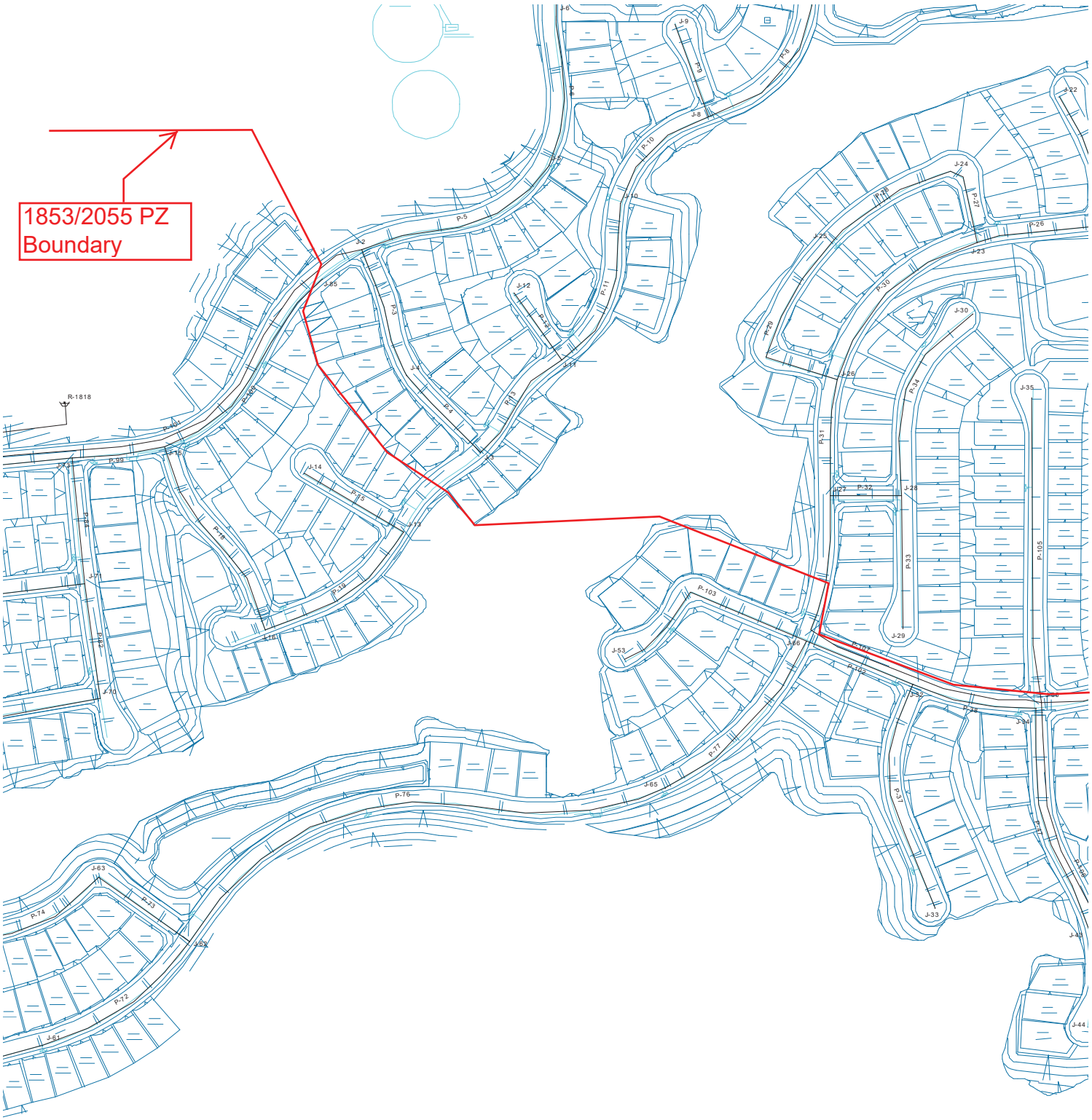

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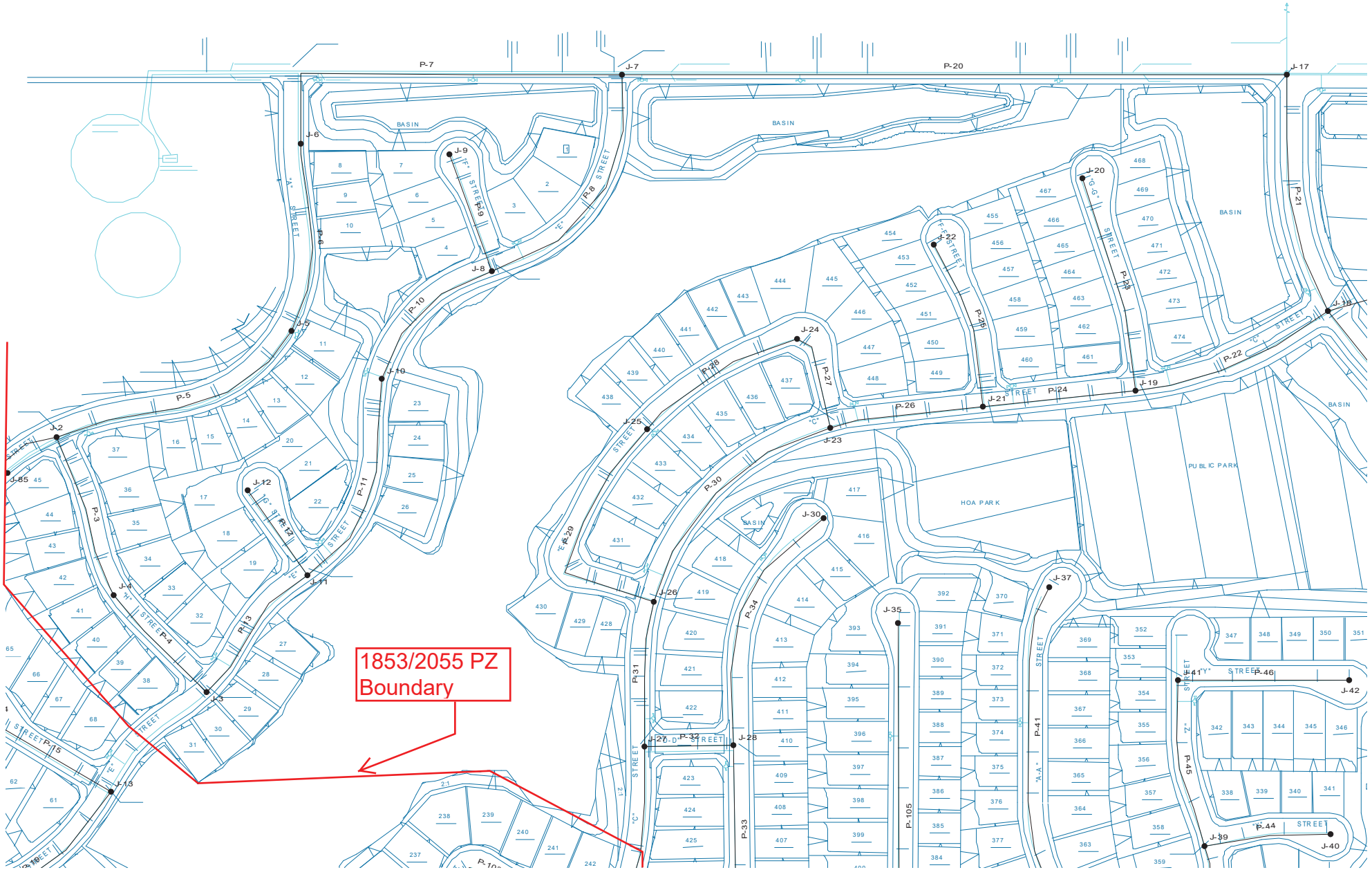

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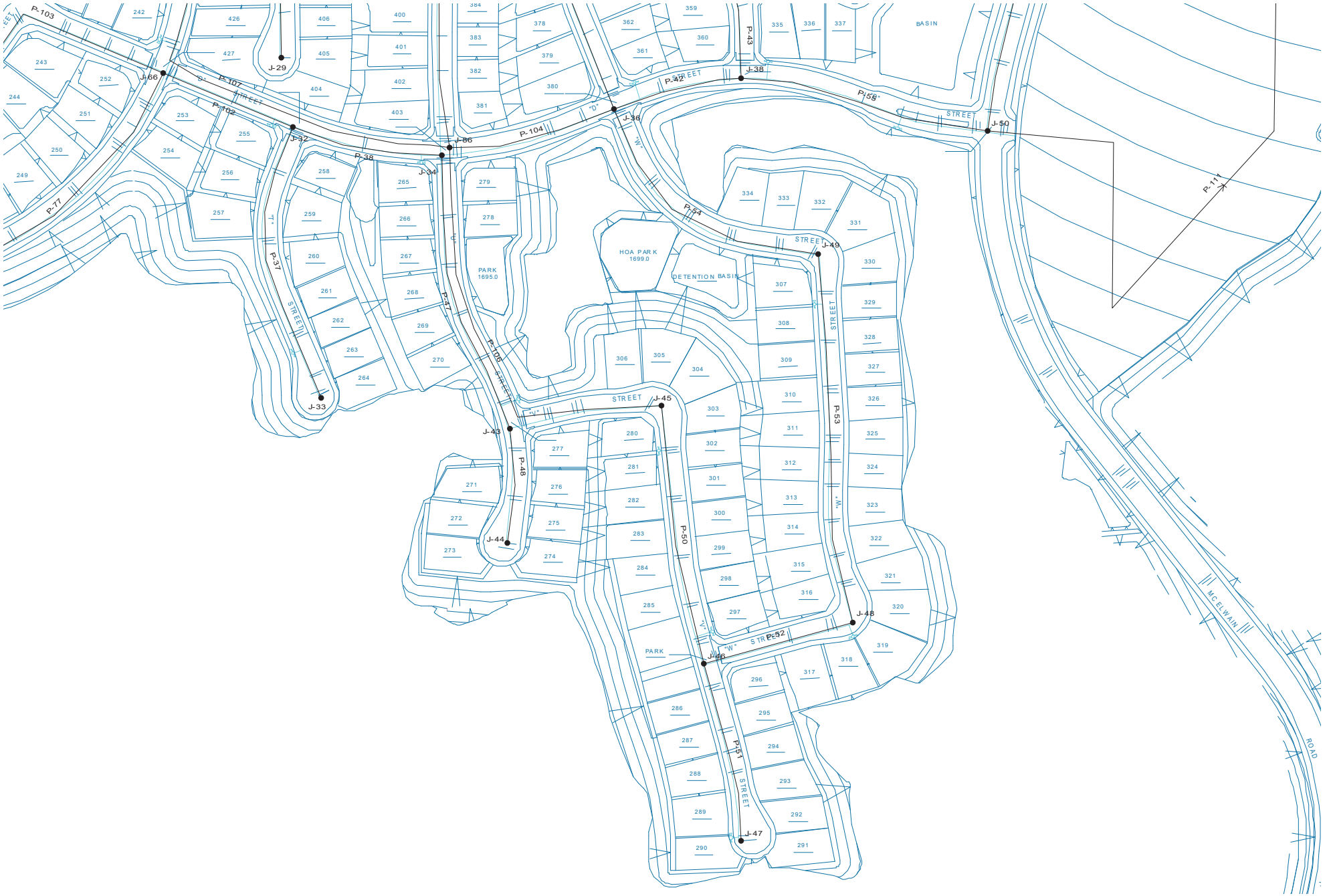
Scenario: Base



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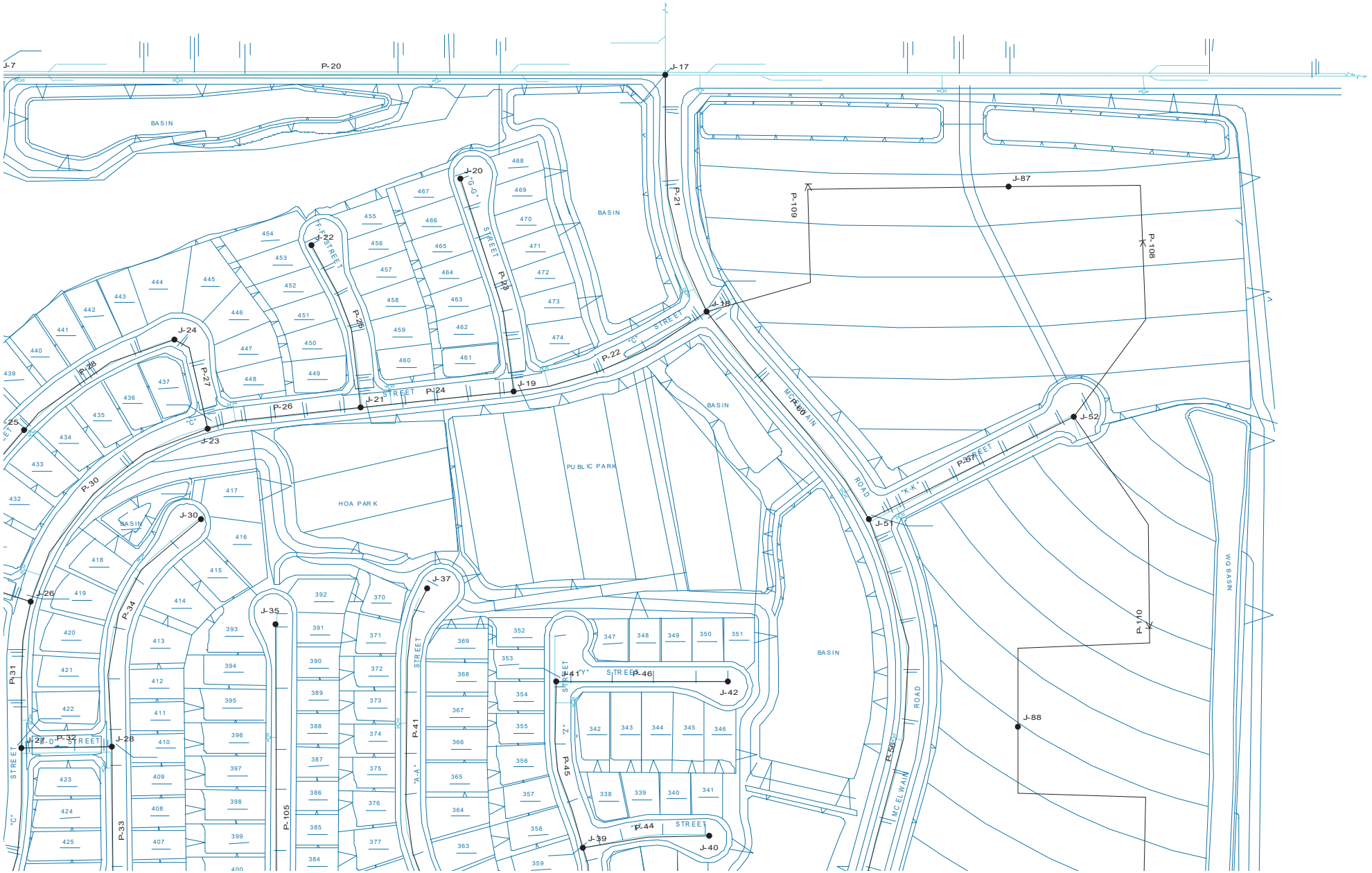
Scenario: Base



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WaterCAD Demands/Associated junctions
1853 Zone

Junction	irrigation	# lots	Avg Demand (gpm)	Max Demand (gpm)	Peak Demand (gpm)
J-1		0	0.0	0.0	0.0
J-2		6	2.6	7.9	18.4
J-3		5	2.2	6.6	15.3
J-4		8	3.5	10.5	24.5
J-5		6	2.6	7.9	18.4
J-6		0	0.0	0.0	0.0
J-7		0	0.0	0.0	0.0
J-8		3	1.3	3.9	9.2
J-9		4	1.8	5.3	12.3
J-10		4	1.8	5.3	12.3
J-11		0	0.0	0.0	0.0
J-12		6	2.6	7.9	18.4
J-17		0	0.0	0.0	0.0
J-18		0	0.0	0.0	0.0
J-19	26.2	0	0.0	26.2	26.2
J-20		14	6.1	18.4	42.9
J-21	12	0	0.0	12.0	12.0
J-22		12	5.3	15.8	36.8
J-23		0	0.0	0.0	0.0
J-24		7	3.1	9.2	21.4
J-25		11	4.8	14.4	33.7
J-26		3	1.3	3.9	9.2
J-27		0	0.0	0.0	0.0
J-28		7	3.1	9.2	21.4
J-29		7	3.1	9.2	21.4
J-30		10	4.4	13.1	30.6
J-35		23	10.1	30.2	70.4
J-36		0	0.0	0.0	0.0
J-37		20	8.8	26.3	61.3
J-38		0	0.0	0.0	0.0
J-39		6	2.6	7.9	18.4
J-40		5	2.2	6.6	15.3
J-41		7	3.1	9.2	21.4
J-42		8	3.5	10.5	24.5
J-45		11	4.8	14.4	33.7
J-46	1.8	10	4.4	14.9	32.4
J-47		11	4.8	14.4	33.7
J-48		16	7.0	21.0	49.0
J-49	2.8	15	6.6	22.5	48.7
J-50		0	0.0	0.0	0.0
J-51		0	0.0	0.0	0.0
J-52		0	0.0	0.0	0.0
J-86	0	0	0.0	0.0	0.0
J-87		26.5	36.8	55.2	73.6
J-88		172	35.8	53.8	89.6

WaterCAD Demands/Associated junctions
2055 Zone

J-13		0	0	0	0
J-14		8	3.5	10.5	24.5
J-15		12	5.25	15.75	36.75
J-16	9.6	11	4.8125	24.0375	43.2875
J-32		0	0	0	0
J-33		8	3.5	10.5	24.5
J-34		6	2.625	7.875	18.375
J-43	1.4	3	1.3125	3.9375	9.1875
J-44		4	1.75	5.25	12.25
J-53		9	3.9375	11.8125	27.5625
J-54		7	3.0625	9.1875	21.4375
J-55		4	1.75	5.25	12.25
J-56		2	0.875	2.625	6.125
J-57	1	5	2.1875	7.5625	16.3125
J-58		6	2.625	7.875	18.375
J-59		6	2.625	7.875	18.375
J-60	1	6	2.625	8.875	19.375
J-61		14	6.125	18.375	42.875
J-62		5	2.1875	6.5625	15.3125
J-63		4	1.75	5.25	12.25
J-64		8	3.5	10.5	24.5
J-65		6	2.625	7.875	18.375
J-66		6	2.625	7.875	18.375
J-67		3	1.3125	3.9375	9.1875
J-68		6	2.625	7.875	18.375
J-69	2.8	4	1.75	8.05	15.05
J-70		5	2.1875	6.5625	15.3125
J-71		6	2.625	7.875	18.375
J-72	1.4	8	3.5	11.9	25.9
J-73		4	1.75	5.25	12.25
J-74		7	3.0625	9.1875	21.4375
J-75		8	3.5	10.5	24.5
J-76		12	6.7	20.0	46.7
J-77	8.8	4	1.8	14.1	21.1
J-78		5	2.8	8.3	19.4
J-79		9	3.9	11.8	27.6
J-80		7	3.1	9.2	21.4
J-81	6	20	11.1	39.3	83.8
J-82		6	3.3	10.0	23.3
J-83		6	3.3	10.0	23.3
J-84		7	3.9	11.7	27.2
J-85		6	2.625	7.875	18.375

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.81	1.21
J-45	1,709.50	1853	Demand	33.70	Fixed	33.70	1,814.05	45.23
J-47	1,706.70	1853	Demand	33.70	Fixed	33.70	1,814.03	46.44
J-2	1,706.80	1853	Demand	18.40	Fixed	18.40	1,817.29	47.80
J-29	1,702.10	1853	Demand	21.40	Fixed	21.40	1,814.04	48.43
J-46	1,699.30	1853	Demand	32.40	Fixed	32.40	1,814.04	49.64
J-4	1,701.50	1853	Demand	24.50	Fixed	24.50	1,817.12	50.03
J-3	1,697.10	1853	Demand	15.30	Fixed	15.30	1,817.04	51.89
J-48	1,692.40	1853	Demand	49.00	Fixed	49.00	1,814.05	52.63
J-28	1,690.80	1853	Demand	21.40	Fixed	21.40	1,814.04	53.32
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,814.07	53.33
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,814.07	53.55
J-82	1,880.00	2055	Demand	23.30	Fixed	23.30	2,012.56	57.35
J-76	1,880.00	2055	Demand	46.70	Fixed	46.70	2,012.69	57.41
J-84	1,879.50	2055	Demand	27.20	Fixed	27.20	2,012.60	57.59
J-77	1,877.00	2055	Demand	21.10	Fixed	21.10	2,012.69	58.71
J-81	1,876.00	2055	Demand	83.90	Fixed	83.90	2,012.57	59.09
J-49	1,676.50	1853	Demand	48.70	Fixed	48.70	1,814.06	59.52
J-12	1,678.10	1853	Demand	18.40	Fixed	18.40	1,816.96	60.08
J-83	1,873.50	2055	Demand	23.30	Fixed	23.30	2,012.62	60.19
J-78	1,873.50	2055	Demand	19.40	Fixed	19.40	2,012.70	60.22
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,816.96	61.64
J-26	1,669.50	1853	Demand	9.20	Fixed	9.20	1,814.13	62.57
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,814.10	62.99
J-5	1,668.10	1853	Demand	18.40	Fixed	18.40	1,817.14	64.48
J-75	1,860.70	2055	Demand	24.50	Fixed	24.50	2,013.21	65.98
J-35	1,658.30	1853	Demand	70.40	Fixed	70.40	1,813.95	67.34
J-10	1,659.10	1853	Demand	12.30	Fixed	12.30	1,816.89	68.27
J-30	1,652.50	1853	Demand	30.60	Fixed	30.60	1,814.02	69.88
J-39	1,652.50	1853	Demand	18.40	Fixed	18.40	1,814.16	69.94
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,814.19	69.96
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,817.03	71.92
J-40	1,647.20	1853	Demand	15.30	Fixed	15.30	1,814.16	72.24
J-54	1,845.50	2055	Demand	21.40	Fixed	21.40	2,015.74	73.65
J-79	1,842.00	2055	Demand	27.60	Fixed	27.60	2,013.21	74.08
J-80	1,840.80	2055	Demand	21.40	Fixed	21.40	2,013.21	74.59
J-37	1,640.50	1853	Demand	61.30	Fixed	61.30	1,814.00	75.07
J-25	1,640.00	1853	Demand	33.70	Fixed	33.70	1,814.13	75.34
J-74	1,836.00	2055	Demand	21.40	Fixed	21.40	2,013.43	76.76
J-56	1,836.90	2055	Demand	6.10	Fixed	6.10	2,014.75	76.95
J-41	1,636.00	1853	Demand	21.40	Fixed	21.40	1,814.14	77.07
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,814.48	77.26
J-88	1,635.90	1853	Demand	89.60	Fixed	89.60	1,814.86	77.43
J-9	1,637.80	1853	Demand	12.30	Fixed	12.30	1,816.85	77.47
J-42	1,634.30	1853	Demand	24.50	Fixed	24.50	1,814.13	77.80
J-8	1,636.70	1853	Demand	9.20	Fixed	9.20	1,816.85	77.94
J-60	1,830.50	2055	Demand	19.40	Fixed	19.40	2,014.24	79.50
J-55	1,830.00	2055	Demand	12.30	Fixed	12.30	2,014.75	79.93
J-69	1,828.20	2055	Demand	15.10	Fixed	15.10	2,013.46	80.16
J-57	1,826.50	2055	Demand	16.30	Fixed	16.30	2,014.44	81.31
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,814.20	82.72
J-24	1,622.00	1853	Demand	21.40	Fixed	21.40	1,814.17	83.14
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,816.82	83.69
J-68	1,818.80	2055	Demand	18.40	Fixed	18.40	2,013.52	84.25

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-59	1,816.50	2055	Demand	18.40	Fixed	18.40	2,014.25	85.56
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,815.00	86.10
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,814.38	86.17
J-22	1,613.60	1853	Demand	36.80	Fixed	36.80	1,814.36	86.86
J-72	1,811.50	2055	Demand	25.90	Fixed	25.90	2,013.22	87.28
J-58	1,808.30	2055	Demand	18.40	Fixed	18.40	2,014.02	89.01
J-67	1,806.50	2055	Demand	9.20	Fixed	9.20	2,013.66	89.63
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,814.68	90.07
J-20	1,605.70	1853	Demand	42.90	Fixed	42.90	1,814.65	90.40
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,814.89	92.11
J-61	1,798.30	2055	Demand	42.90	Fixed	42.90	2,013.98	93.31
J-64	1,795.70	2055	Demand	24.50	Fixed	24.50	2,013.91	94.41
J-73	1,793.90	2055	Demand	12.30	Fixed	12.30	2,013.23	94.89
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,815.41	95.19
J-87	1,590.00	1853	Demand	89.60	Fixed	89.60	1,815.38	97.51
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,816.43	98.40
J-62	1,785.00	2055	Demand	15.30	Fixed	15.30	2,013.85	99.01
J-71	1,783.80	2055	Demand	18.40	Fixed	18.40	2,013.23	99.27
J-63	1,783.50	2055	Demand	12.30	Fixed	12.30	2,013.87	99.67
J-70	1,776.20	2055	Demand	15.30	Fixed	15.30	2,013.28	102.57
J-15	1,761.50	1853	Demand	36.75	Fixed	36.75	2,013.13	108.87
J-65	1,741.50	2055	Demand	18.40	Fixed	18.40	2,013.23	117.56
J-16	1,739.10	1853	Demand	43.30	Fixed	43.30	2,013.05	118.53
J-44	1,727.40	2055	Demand	12.30	Fixed	12.30	2,012.98	123.56
J-53	1,723.90	1853	Demand	27.60	Fixed	27.60	2,013.03	125.09
J-14	1,722.60	1853	Demand	24.50	Fixed	24.50	2,013.04	125.66
J-43	1,722.30	2055	Demand	9.20	Fixed	9.20	2,012.98	125.76
J-85	1,721.50	2055	Demand	18.40	Fixed	18.40	2,013.12	126.17
J-33	1,719.40	2055	Demand	24.50	Fixed	24.50	2,013.00	127.02
J-66	1,713.10	2055	Demand	18.40	Fixed	18.40	2,013.05	129.77
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,013.04	130.03
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,013.01	134.52
J-34	1,690.30	2055	Demand	18.40	Fixed	18.40	2,012.99	139.61

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	913.45	2,020.00	2,015.74	4.26	2.49	2.59
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	892.05	2,015.74	2,014.75	0.99	2.38	2.53
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	843.60	1,816.43	1,815.41	1.03	2.15	2.39
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-670.76	2,014.25	2,014.75	0.50	1.40	1.90
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	260.79	1,815.41	1,814.68	0.73	1.76	1.66
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	577.35	2,014.02	2,013.66	0.37	1.06	1.64
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	493.21	1,815.41	1,815.00	0.41	0.79	1.40
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-493.15	2,014.02	2,014.25	0.23	0.79	1.40
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	202.89	2,014.75	2,014.44	0.31	1.10	1.30
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	972.40	1,818.00	1,817.81	0.19	0.39	1.23
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	972.40	1,817.81	1,817.29	0.52	0.39	1.23
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	191.69	1,814.68	1,814.38	0.30	0.99	1.22
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	186.59	2,014.44	2,014.02	0.42	0.95	1.19
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-180.88	2,013.21	2,013.66	0.44	0.89	1.15
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-403.61	1,814.48	1,815.00	0.52	0.55	1.14
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-403.61	1,814.19	1,814.48	0.28	0.55	1.14
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	387.27	2,013.66	2,013.52	0.14	0.51	1.10
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	843.60	1,816.82	1,816.43	0.39	0.30	1.06
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	823.24	1,817.29	1,817.14	0.15	0.28	1.04
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	804.84	1,817.14	1,817.03	0.10	0.27	1.01
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	804.84	1,817.03	1,816.82	0.21	0.27	1.01
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-324.01	1,814.10	1,814.19	0.10	0.36	0.92
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	142.89	1,814.38	1,814.20	0.18	0.58	0.91
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	139.80	2,014.25	2,013.98	0.27	0.55	0.89
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	137.52	2,013.52	2,013.21	0.31	0.54	0.88
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-131.88	2,012.70	2,013.21	0.52	0.50	0.84
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	130.76	1,817.29	1,817.12	0.16	0.49	0.83
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	128.80	2,013.85	2,013.23	0.62	0.48	0.82
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	122.95	2,013.23	2,013.13	0.10	0.44	0.78
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	113.02	2,013.21	2,012.69	0.52	0.37	0.72
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	110.40	2,013.23	2,013.05	0.18	0.36	0.70
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-109.18	2,013.23	2,013.43	0.20	0.35	0.70
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	106.26	1,817.12	1,817.04	0.09	0.33	0.68
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	231.35	2,013.52	2,013.46	0.06	0.20	0.66
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	96.90	2,013.98	2,013.85	0.13	0.28	0.62
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-91.56	2,012.62	2,012.70	0.08	0.25	0.58
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-90.96	1,816.96	1,817.04	0.08	0.25	0.58
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	89.60	1,815.00	1,814.89	0.11	0.24	0.57
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	85.67	2,013.46	2,013.28	0.18	0.22	0.55
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-84.00	2,013.91	2,014.02	0.11	0.22	0.54
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	79.60	1,814.19	1,814.16	0.03	0.20	0.51
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	78.59	1,814.13	1,814.07	0.05	0.19	0.50
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	74.82	1,814.20	1,814.17	0.03	0.17	0.48
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	73.40	1,814.07	1,814.04	0.03	0.17	0.47
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-72.56	1,816.89	1,816.96	0.07	0.16	0.46
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	70.40	1,814.07	1,813.95	0.12	0.16	0.45
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	70.37	2,013.28	2,013.23	0.04	0.16	0.45
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-68.07	1,814.13	1,814.20	0.07	0.15	0.43
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	67.80	2,013.13	2,013.05	0.08	0.15	0.43
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	66.14	2,012.69	2,012.57	0.12	0.14	0.42
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-64.40	2,013.01	2,013.05	0.04	0.13	0.41
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	140.19	1,814.10	1,814.07	0.03	0.08	0.40
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	61.30	1,814.10	1,814.00	0.09	0.12	0.39

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-60.26	1,816.85	1,816.89	0.04	0.12	0.38
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-59.50	2,013.87	2,013.91	0.04	0.11	0.38
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-130.58	2,013.43	2,013.46	0.04	0.07	0.37
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-122.52	1,814.06	1,814.10	0.03	0.06	0.35
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	53.42	1,814.17	1,814.13	0.03	0.09	0.34
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-47.20	2,013.85	2,013.87	0.02	0.07	0.30
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	45.90	1,814.16	1,814.14	0.02	0.07	0.29
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	42.90	1,814.68	1,814.65	0.03	0.06	0.27
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-41.06	2,012.57	2,012.62	0.04	0.06	0.26
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	39.90	2,013.01	2,012.99	0.02	0.05	0.25
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	89.60	1,815.41	1,815.38	0.03	0.03	0.25
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	89.60	1,814.89	1,814.86	0.03	0.03	0.25
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-38.76	1,816.82	1,816.85	0.03	0.05	0.25
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	36.80	1,814.38	1,814.36	0.02	0.05	0.23
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	33.70	1,814.04	1,814.03	0.01	0.04	0.22
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	74.98	1,814.07	1,814.05	0.02	0.02	0.21
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-73.82	1,814.05	1,814.06	0.02	0.02	0.21
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	30.60	1,814.04	1,814.02	0.02	0.03	0.20
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	27.60	2,013.05	2,013.03	0.02	0.03	0.18
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	27.20	2,012.62	2,012.60	0.01	0.03	0.17
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-26.07	2,013.23	2,013.23	0.01	0.02	0.17
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	25.90	2,013.23	2,013.22	0.01	0.02	0.17
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.05	2,013.04	0.01	0.02	0.16
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.04	2,013.04	0.01	0.02	0.16
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.01	2,013.00	0.01	0.02	0.16
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	24.50	1,814.14	1,814.13	0.01	0.02	0.16
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	23.30	2,012.57	2,012.56	0.01	0.02	0.15
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	21.50	2,012.99	2,012.98	0.01	0.02	0.14
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	21.40	1,814.04	1,814.04	0.01	0.02	0.14
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	21.40	2,013.21	2,013.21	0.00	0.02	0.14
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-20.92	2,012.69	2,012.70	0.01	0.02	0.13
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	19.72	1,814.13	1,814.13	0.01	0.01	0.13
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	19.40	2,014.25	2,014.24	0.01	0.01	0.12
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	18.40	2,013.13	2,013.12	0.01	0.01	0.12
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,816.96	1,816.96	0.00	0.01	0.12
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	41.28	1,814.05	1,814.04	0.00	0.01	0.12
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	15.30	1,814.16	1,814.16	0.00	0.01	0.10
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	12.30	1,816.85	1,816.85	0.00	0.01	0.08
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	12.30	2,012.98	2,012.98	0.00	0.01	0.08
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-24.82	1,814.04	1,814.05	0.00	0.00	0.07
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	6.10	2,014.75	2,014.75	0.00	0.00	0.04
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	5.19	1,814.07	1,814.07	0.00	0.00	0.03
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	0.18	2,012.69	2,012.69	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,814.89	1,815.38	0.00	0.00	0.00
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,814.48	1,814.86	0.00	0.00	0.00

Scenario: Max + Fire @ J-45
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.28	0.99
J-45	1,709.50	1853	Demand	1,514.40	Fixed	1,514.40	1,793.54	36.36
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,794.11	37.82
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,794.12	41.02
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,799.20	42.01
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,794.48	44.17
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,795.79	45.64
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,799.20	46.90
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,799.21	46.90
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,815.35	46.96
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,814.99	49.10
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,814.72	50.89
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,795.43	51.45
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,796.16	55.23
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,800.42	56.64
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,814.43	58.98
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,795.77	59.48
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,814.43	60.54
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,797.37	62.68
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,797.37	62.68
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,814.74	63.44
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,799.20	63.47
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,797.37	64.97
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,814.05	67.04
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,796.14	67.34
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,800.80	69.57
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,797.36	69.81
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,797.36	70.55
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,814.30	70.74
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,799.80	70.91
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,804.24	72.83
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,813.79	76.14
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,813.79	76.62
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,801.29	77.14
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,801.10	77.49
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,802.74	81.14
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,804.29	81.47
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,802.73	81.83
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,813.42	82.21

Scenario: Max + Fire @ J-45
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,804.33	85.59
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,804.32	85.93
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,804.25	87.50
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,806.93	91.52
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,806.92	93.85
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,811.63	96.32
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-45
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	1,918.30	1,811.63	1,806.93	4.71	9.82	5.44
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	1,345.93	1,806.93	1,804.29	2.63	5.10	3.82
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	1,292.13	1,799.80	1,804.29	4.49	4.73	3.67
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	1,292.13	1,797.37	1,799.80	2.42	4.73	3.67
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	1,257.93	1,796.16	1,797.37	1.21	4.50	3.57
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	517.17	1,806.93	1,804.33	2.60	6.25	3.30
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	472.57	1,804.33	1,802.74	1.59	5.29	3.02
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	444.77	1,802.74	1,801.29	1.45	4.72	2.84
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	417.27	1,800.42	1,799.21	1.21	4.20	2.66
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	935.00	1,795.79	1,793.54	2.25	2.60	2.65
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	1,973.60	1,818.00	1,817.28	0.72	1.44	2.49
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	1,973.60	1,817.28	1,815.35	1.93	1.44	2.49
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	385.77	1,799.21	1,795.79	3.42	3.63	2.46
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	1,918.30	1,813.42	1,811.63	1.78	1.36	2.42
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	1,762.73	1,815.35	1,814.74	0.61	1.17	2.22
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	1,754.83	1,814.30	1,813.42	0.89	1.16	2.21
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	1,754.83	1,814.74	1,814.30	0.43	1.16	2.21
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-652.20	1,795.43	1,796.16	0.73	1.33	1.85
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-629.70	1,794.48	1,795.43	0.94	1.25	1.79
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-608.70	1,794.12	1,794.48	0.37	1.17	1.73
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	579.43	1,796.16	1,795.79	0.37	1.07	1.64
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	-579.40	1,793.54	1,794.12	0.57	1.07	1.64
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-257.34	1,800.42	1,801.29	0.87	1.71	1.64
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	202.97	1,815.35	1,814.99	0.36	1.10	1.30
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	192.47	1,814.99	1,814.72	0.27	1.00	1.23
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	187.43	1,801.29	1,801.10	0.19	0.95	1.20
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-185.87	1,814.43	1,814.72	0.29	0.94	1.19
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	178.23	1,801.10	1,800.80	0.30	0.87	1.14
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-177.97	1,814.05	1,814.43	0.38	0.87	1.14
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-172.67	1,813.79	1,814.05	0.26	0.82	1.10
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	163.83	1,800.80	1,800.42	0.38	0.74	1.05
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-163.47	1,813.42	1,813.79	0.38	0.74	1.04
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	53.80	1,804.29	1,804.25	0.04	0.09	0.34
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26

Scenario: Max + Fire @ J-45
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,797.37	1,797.37	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,799.21	1,799.20	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,795.79	1,795.77	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,796.16	1,796.14	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,806.93	1,806.92	0.01	0.01	0.16
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,804.25	1,804.24	0.01	0.01	0.15
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,797.37	1,797.36	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,804.33	1,804.32	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,802.74	1,802.73	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,794.12	1,794.11	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,799.20	1,799.20	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,797.36	1,797.36	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,799.20	1,799.20	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,814.43	1,814.43	0.00	0.00	0.05
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,797.37	1,797.37	0.00	0.00	0.04
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,813.79	1,813.79	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,799.80	1,804.24	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,804.25	1,806.92	0.00	0.00	0.00

Scenario: Max + Fire @ J-88
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,815.95	0.41
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,770.72	26.49
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,770.69	27.69
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,770.69	30.89
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,775.61	31.80
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,770.68	33.87
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,770.78	34.82
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,775.61	36.69
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,775.62	36.70
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,770.67	40.74
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,770.67	44.20
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,810.45	44.84
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,777.28	46.63
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,809.49	46.72
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,808.76	48.31
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,770.76	48.65
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,770.56	51.08
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,770.57	51.08
J-88	1,635.90	1853	Demand	3,053.80	Fixed	3,053.80	1,755.47	51.73
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,775.61	53.26
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,770.56	53.37
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,807.94	56.17
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,770.65	56.31
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,807.94	57.73
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,770.42	58.20
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,770.56	58.22
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,770.56	58.95
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,777.82	59.63
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,808.68	60.82
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,806.83	63.92
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,778.48	67.27
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,778.23	67.59
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,807.43	67.77
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,759.90	68.31
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,775.94	69.20
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,780.44	71.49
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,780.43	72.18
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,806.05	72.79
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,806.05	73.27
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,782.56	76.17
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,782.55	76.52
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,804.86	78.51
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70

Scenario: Max + Fire @ J-88
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,785.94	82.44
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,785.93	84.77
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,799.66	91.14
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-88
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	3,418.30	1,799.66	1,785.94	13.72	28.64	9.70
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	1,322.85	1,775.94	1,759.90	16.04	35.57	8.44
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	2,766.53	1,785.94	1,775.94	10.01	19.35	7.85
P-111	841.00	12.0	PVC	120.0	true	0.00	Open	1,730.95	1,770.42	1,755.47	14.95	8.12	4.91
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	3,473.60	1,815.95	1,810.45	5.50	4.09	4.38
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	3,473.60	1,818.00	1,815.95	2.05	4.09	4.38
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	3,418.30	1,804.86	1,799.66	5.20	3.97	4.31
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	1,443.68	1,770.42	1,775.94	5.52	5.80	4.10
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	3,122.58	1,810.45	1,808.68	1.76	3.36	3.94
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	3,114.68	1,808.68	1,807.43	1.25	3.34	3.93
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	3,114.68	1,807.43	1,804.86	2.57	3.34	3.93
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	596.57	1,785.94	1,782.56	3.39	8.14	3.81
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	1,322.85	1,759.90	1,755.47	4.43	4.94	3.75
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	551.97	1,782.56	1,780.44	2.12	7.05	3.52
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	524.17	1,780.44	1,778.48	1.96	6.40	3.35
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	496.67	1,777.28	1,775.62	1.67	5.80	3.17
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	465.17	1,775.62	1,770.78	4.84	5.13	2.97
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	343.12	1,810.45	1,809.49	0.96	2.92	2.19
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	332.62	1,809.49	1,808.76	0.73	2.76	2.12
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-326.02	1,807.94	1,808.76	0.82	2.66	2.08
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-318.12	1,806.83	1,807.94	1.10	2.54	2.03
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-312.82	1,806.05	1,806.83	0.78	2.46	2.00
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-304.78	1,777.28	1,778.48	1.19	2.35	1.95
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-303.62	1,804.86	1,806.05	1.19	2.33	1.94
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	219.39	1,778.48	1,778.23	0.25	1.28	1.40
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	210.19	1,778.23	1,777.82	0.41	1.18	1.34
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	195.79	1,777.82	1,777.28	0.53	1.03	1.25
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	321.47	1,770.67	1,770.57	0.10	0.36	0.91
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	-306.20	1,770.67	1,770.78	0.11	0.33	0.87
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	287.27	1,770.57	1,770.42	0.15	0.29	0.81
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	128.77	1,770.78	1,770.72	0.06	0.07	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	114.37	1,770.72	1,770.69	0.03	0.05	0.32
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25

Scenario: Max + Fire @ J-88
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	85.07	1,770.69	1,770.68	0.01	0.03	0.24
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,770.57	1,770.56	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,775.62	1,775.61	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,770.78	1,770.76	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	64.07	1,770.68	1,770.67	0.01	0.02	0.18
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,770.67	1,770.65	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,785.94	1,785.93	0.01	0.01	0.16
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,770.56	1,770.56	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	41.57	1,770.67	1,770.67	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,782.56	1,782.55	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,780.44	1,780.43	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,770.69	1,770.69	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,775.61	1,775.61	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,770.56	1,770.56	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,775.61	1,775.61	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,807.94	1,807.94	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,770.56	1,770.56	0.00	0.00	0.04
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,806.05	1,806.05	0.00	0.00	0.03
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,759.90	1,785.93	0.00	0.00	0.00

Scenario: Max + Fire @ J-87
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,815.83	0.36
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,782.57	31.62
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,782.57	32.83
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,782.85	34.94
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,782.57	36.03
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,782.57	39.01
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,782.85	39.83
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,782.86	39.83
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,782.58	39.93
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,810.04	44.67
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,782.57	45.89
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,809.03	46.52
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,808.26	48.09
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,783.00	49.11
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,782.58	49.36
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,782.56	53.76
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,807.40	55.94
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,782.58	56.28
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,782.58	56.28
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,782.85	56.40
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,807.40	57.50
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,782.57	58.57
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,808.18	60.61
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,782.56	61.46
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,783.04	61.89
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,782.57	63.41
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,782.57	63.46
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,782.60	63.47
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,806.23	63.66
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,782.57	64.15
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,806.86	67.52
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,783.11	69.27
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,783.08	69.69
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,782.66	72.11
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,805.41	72.51
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,783.33	72.74
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,805.41	72.99
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,783.32	73.43
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,775.25	74.96
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,783.61	76.63
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,783.61	76.97
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,804.15	78.20
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70

Scenario: Max + Fire @ J-87
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-87	1,590.00	1853	Demand	3,155.20	Fixed	3,155.20	1,773.52	79.40
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,784.19	81.68
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,798.66	90.71
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-87
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	3,518.30	1,798.66	1,784.19	14.47	30.21	9.98
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	2,283.41	1,784.19	1,773.52	10.67	13.56	6.48
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	871.79	1,782.66	1,775.25	7.41	16.43	5.56
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	3,573.60	1,818.00	1,815.83	2.17	4.31	4.51
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	3,573.60	1,815.83	1,810.04	5.79	4.31	4.51
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	3,518.30	1,804.15	1,798.66	5.49	4.19	4.44
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	3,213.24	1,810.04	1,808.18	1.86	3.54	4.05
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	3,205.34	1,808.18	1,806.86	1.32	3.53	4.04
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	3,205.34	1,806.86	1,804.15	2.71	3.53	4.04
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	1,004.20	1,784.19	1,782.66	1.53	2.96	2.85
P-108	760.00	12.0	PVC	120.0	true	0.00	Open	871.79	1,775.25	1,773.52	1.73	2.28	2.47
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	352.46	1,810.04	1,809.03	1.01	3.07	2.25
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	341.96	1,809.03	1,808.26	0.77	2.90	2.18
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-335.36	1,807.40	1,808.26	0.86	2.80	2.14
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-327.46	1,806.23	1,807.40	1.17	2.68	2.09
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-322.16	1,805.41	1,806.23	0.83	2.60	2.06
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-312.96	1,804.15	1,805.41	1.26	2.46	2.00
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	230.68	1,784.19	1,783.61	0.58	1.40	1.47
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	186.08	1,783.61	1,783.33	0.28	0.94	1.19
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	158.28	1,783.33	1,783.11	0.21	0.70	1.01
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	130.78	1,783.00	1,782.86	0.14	0.49	0.83
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	99.28	1,782.86	1,782.58	0.28	0.29	0.63
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-86.35	1,783.00	1,783.11	0.12	0.23	0.55
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	71.93	1,783.11	1,783.08	0.03	0.16	0.46
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	62.73	1,783.08	1,783.04	0.04	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-132.42	1,782.60	1,782.66	0.07	0.07	0.38
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	48.33	1,783.04	1,783.00	0.04	0.08	0.31
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-78.62	1,782.58	1,782.60	0.01	0.03	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,782.58	1,782.58	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21

Scenario: Max + Fire @ J-87
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,782.86	1,782.85	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,782.58	1,782.56	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,782.58	1,782.56	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-111	841.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,782.60	1,782.57	0.02	0.01	0.15
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-45.97	1,782.57	1,782.58	0.01	0.01	0.13
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-44.42	1,782.58	1,782.58	0.00	0.01	0.13
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,782.58	1,782.57	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,783.61	1,783.61	0.01	0.01	0.12
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	41.23	1,782.58	1,782.57	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,783.33	1,783.32	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,782.57	1,782.57	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,782.85	1,782.85	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	-27.85	1,782.58	1,782.58	0.00	0.00	0.08
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	26.83	1,782.57	1,782.57	0.00	0.00	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,782.57	1,782.57	0.00	0.00	0.07
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-23.47	1,782.57	1,782.57	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,782.85	1,782.85	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,807.40	1,807.40	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,782.58	1,782.57	0.00	0.00	0.04
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,805.41	1,805.41	0.00	0.00	0.03
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-2.47	1,782.57	1,782.57	0.00	0.00	0.01
P-110	897.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,775.25	1,782.57	0.00	0.00	0.00

Scenario: Max + Fire @ J-82
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.95	1.28
J-82	1,880.00	2055	Demand	1,510.00	Fixed	1,510.00	1,938.17	25.17
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	1,955.12	34.23
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	1,963.98	36.55
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	1,967.79	37.98
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	1,963.99	39.15
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	1,967.89	39.32
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	1,967.99	40.88
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,816.98	46.50
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,816.98	47.71
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,817.81	48.03
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,816.98	49.70
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,817.77	50.31
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,816.98	50.92
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,817.75	52.20
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	1,984.98	53.77
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,816.98	53.90
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,816.98	54.59
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,816.99	54.59
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,816.99	54.81
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,817.73	60.41
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,816.99	60.78
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	1,984.69	61.73
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,817.73	61.97
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	1,984.69	62.25
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,817.00	63.81
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,816.99	64.25
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,817.77	64.76
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	1,992.43	67.68
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,003.30	68.27
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,817.71	68.62
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,816.96	68.65
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	1,999.28	70.26
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	1,992.44	71.06
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,816.98	71.16
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,817.01	71.18
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,817.02	71.18
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	1,997.21	72.13
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,817.74	72.23
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	1,999.28	73.24
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,817.01	73.47
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	1,997.97	74.19
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	1,992.45	75.13
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,816.97	76.35
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,817.00	76.58
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,817.70	77.83
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	1,997.21	78.19
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	1,992.38	78.26
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,817.70	78.31
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,817.00	78.31
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,817.08	78.39
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,817.14	78.42
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,817.00	79.05
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	1,993.07	80.72

Scenario: Max + Fire @ J-82
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	1,995.97	81.19
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,817.01	83.94
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,817.69	84.06
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,817.00	84.37
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	1,996.72	85.85
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	1,992.38	85.87
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	1,996.11	86.71
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,817.20	87.05
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,817.04	87.33
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,817.04	88.02
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	1,992.39	90.25
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,817.10	91.12
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	1,996.34	91.44
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,817.10	91.46
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	1,996.23	92.04
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,817.15	93.09
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	1,992.40	93.54
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,817.30	96.01
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,817.29	98.34
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,817.58	98.90
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	1,992.36	99.88
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	1,992.34	109.56
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	1,996.21	110.20
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	1,996.16	116.28
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	1,992.33	116.70
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	1,992.36	117.19
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	1,996.17	117.80
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	1,996.16	118.48
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	1,996.16	119.74
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	1,992.34	121.07
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	1,996.17	122.47
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	1,996.16	127.23
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	1,996.16	132.33

Scenario: Max + Fire @ J-82
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	1,510.00	1,955.12	1,938.17	16.95	45.45	9.64
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-883.38	1,984.69	1,993.07	8.39	16.84	5.64
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-862.38	1,967.99	1,984.69	16.70	16.10	5.50
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	1,909.33	2,020.00	2,003.30	16.70	9.74	5.42
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	1,900.13	2,003.30	1,999.28	4.02	9.65	5.39
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	821.06	1,967.79	1,955.12	12.68	14.70	5.24
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	1,763.89	1,995.97	1,993.07	2.89	8.41	5.00
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	761.52	1,992.45	1,984.98	7.47	12.79	4.86
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	751.02	1,984.98	1,967.79	17.19	12.47	4.79
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-749.94	1,963.99	1,967.99	4.00	12.43	4.79
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-728.24	1,955.12	1,963.99	8.87	11.77	4.65
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-1,448.52	1,997.21	1,999.28	2.07	5.84	4.11
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-1,238.15	1,995.97	1,997.21	1.24	4.37	3.51
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	443.71	1,999.28	1,997.97	1.32	4.70	2.83
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	436.11	1,997.97	1,995.97	2.00	4.56	2.78
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	876.61	1,993.07	1,992.45	0.62	2.30	2.49
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	193.57	1,997.21	1,996.72	0.49	1.01	1.24
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	418.30	1,817.58	1,817.30	0.28	0.59	1.19
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	175.17	1,996.72	1,996.34	0.38	0.84	1.12
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	128.50	1,817.30	1,817.10	0.20	0.47	0.82
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	113.33	1,996.34	1,996.23	0.10	0.38	0.72
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	108.03	1,996.23	1,996.11	0.13	0.34	0.69
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	234.60	1,817.30	1,817.20	0.10	0.20	0.67
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-104.15	1,967.89	1,967.99	0.10	0.32	0.66
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	97.53	1,996.11	1,995.97	0.14	0.28	0.62
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	473.60	1,817.95	1,817.81	0.14	0.10	0.60
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	473.60	1,818.00	1,817.95	0.05	0.10	0.60
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	-90.05	1,967.79	1,967.89	0.09	0.25	0.57
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	83.90	1,817.10	1,817.04	0.06	0.21	0.54
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	418.30	1,817.69	1,817.58	0.11	0.08	0.53
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-180.80	1,817.08	1,817.20	0.12	0.12	0.51
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-180.80	1,817.02	1,817.08	0.06	0.12	0.51
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	404.05	1,817.81	1,817.77	0.04	0.08	0.51
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	396.15	1,817.77	1,817.74	0.03	0.07	0.50
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	396.15	1,817.74	1,817.69	0.06	0.07	0.50
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-146.60	1,816.99	1,817.02	0.02	0.08	0.42
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	61.65	1,817.81	1,817.77	0.04	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	1,992.38	1,992.36	0.03	0.11	0.37
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	56.10	1,817.04	1,817.01	0.03	0.10	0.36
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	1,996.34	1,996.21	0.13	0.10	0.35
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	53.80	1,817.20	1,817.15	0.04	0.09	0.34
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	51.15	1,817.77	1,817.75	0.02	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	1,992.38	1,992.43	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	1,992.45	1,992.44	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	1,996.21	1,996.17	0.04	0.07	0.30
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-44.55	1,817.73	1,817.75	0.02	0.07	0.28
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	1,992.44	1,992.40	0.04	0.05	0.25
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-36.65	1,817.71	1,817.73	0.02	0.05	0.23
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	1,992.36	1,992.34	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,817.02	1,817.01	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	1,992.40	1,992.39	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,816.99	1,816.98	0.01	0.03	0.20
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-31.35	1,817.70	1,817.71	0.01	0.03	0.20

Scenario: Max + Fire @ J-82
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,816.99	1,816.96	0.02	0.03	0.19
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	29.85	1,817.01	1,817.00	0.01	0.03	0.19
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	65.19	1,816.99	1,816.99	0.01	0.02	0.18
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	28.60	1,817.00	1,816.99	0.01	0.03	0.18
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	1,996.16	1,996.17	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	1,992.43	1,992.44	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,816.99	1,816.97	0.02	0.03	0.17
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-26.26	1,817.00	1,817.01	0.01	0.02	0.17
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,817.30	1,817.29	0.01	0.01	0.16
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-55.11	1,816.99	1,816.99	0.01	0.01	0.16
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,817.15	1,817.14	0.01	0.01	0.15
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-22.15	1,817.69	1,817.70	0.01	0.02	0.14
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	20.65	1,817.00	1,817.00	0.01	0.02	0.13
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,817.01	1,817.00	0.00	0.01	0.13
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,817.10	1,817.10	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	1,996.16	1,996.16	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,817.04	1,817.04	0.00	0.01	0.10
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-32.61	1,816.98	1,816.99	0.00	0.01	0.09
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,816.98	1,816.98	0.00	0.01	0.09
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	32.09	1,816.99	1,816.98	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,816.98	1,816.98	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	1,992.38	1,992.39	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	1,992.39	1,992.38	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	1,996.17	1,996.17	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	1,963.99	1,963.98	0.00	0.01	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,992.34	1,992.34	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,996.16	1,996.16	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,817.00	1,817.00	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,992.34	1,992.33	0.00	0.00	0.07
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	1,996.16	1,996.16	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,816.98	1,816.98	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,984.69	1,984.69	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	1,997.21	1,997.21	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,992.36	1,992.36	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,817.73	1,817.73	0.00	0.00	0.05
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	17.69	1,816.98	1,816.98	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,817.01	1,817.01	0.00	0.00	0.04
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	6.25	1,817.00	1,817.00	0.00	0.00	0.04
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,996.16	1,996.16	0.00	0.00	0.03
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,817.70	1,817.70	0.00	0.00	0.03
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-11.61	1,816.98	1,816.98	0.00	0.00	0.03
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	-2.90	1,816.99	1,816.99	0.00	0.00	0.02
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	1,999.28	1,999.28	0.00	0.00	0.02
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,817.08	1,817.14	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,817.15	1,817.29	0.00	0.00	0.00

Murrieta Hills: 1853 PZ Proposed Storage Tank

EMWD's 2009 Master Plan Requirements For Storage

1853 A (Phase 1 Tank) - excludes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	210 Units	- Units	- Acres	- Acres	5.3 Acres	- Acres	1,500 gpm	266 gpm	266 gpm	- gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	266	266	266	
- gpd ADD	113,400 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	24 AF/YR ADD	- AF/YR		66 gpm	66 gpm	- gpm	-	-	0.50	
- gpm ADD	78.8 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	14.8 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	133	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		3,987 gph	3,987 gph	- gph	60	60	60	
- **GPM MDD**	**236 GPM MDD**	- **GPM MDD**	- **GPM MDD**	- **GPM MDD**	**30 GPM MDD**	- **GPM MDD**		24	24	24	-	-	7,975	
- **GPD MDD**	**340,200 GPD MDD**	- **GPD MDD**	- **GPD MDD**	- **GPD MDD**	**42,584 GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 266 GPM MDD								
						Total = 382,784 GPD MDD	180,000 gal	95,696 gal	95,696 gal	- gal	-		191,392	562,784 gal
							32.0%	17.0%	17.0%	0.0%	0.0%	0.0%	34.0%	100.0%

EMWD's 2009 Master Plan Requirements For Storage

1853 B (Phase 2 Tank) - Includes Pump through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	30 Units	172 Units	26.5 Acres	- Acres	5.3 Acres	- Acres	3,000 gpm	209 gpm	209 gpm	427 gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	209	209	209	
- gpd ADD	16,200 gpd ADD	51,600 gpd ADD	53,000 gpd ADD	- gpd ADD	24 AF/YR ADD	- AF/YR		52 gpm	52 gpm	43 gpm	-	-	0.50	
- gpm ADD	11.3 gpm ADD	35.8 gpm ADD	36.8 gpm ADD	- gpm ADD	14.8 gpm ADD	- gpm ADD	less two-hr FF	60 min	60 min	60 min	-	-	104	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		3,129 gph	3,129 gph	2,562 gph	60	60	60	
- **GPM MDD**	**34 GPM MDD**	**72 GPM MDD**	**74 GPM MDD**	- **GPM MDD**	**30 GPM MDD**	- **GPM MDD**		24	24	24	-	-	6,258	
- **GPD MDD**	**48,600 GPD MDD**	**103,200 GPD MDD**	**106,000 GPD MDD**	- **GPD MDD**	**42,584 GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 209 GPM MDD								
						Total = 300,384 GPD MDD	360,000 gal	75,096 gal	75,096 gal	61,488 gal	-		150,192	721,872 gal
							49.9%	10.4%	10.4%	8.5%	0.0%	0.0%	20.8%	100.0%
														gal

EMWD's 2009 Master Plan Requirements For Storage

1853 (Combined ultimate Tank) - Includes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	240 Units	172 Units	26.5 Acres	- Acres	10.6 Acres	- Acres	3,000 gpm	474 gpm	474 gpm	427 gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	474	474	474	
- gpd ADD	129,600 gpd ADD	51,600 gpd ADD	53,000 gpd ADD	- gpd ADD	48 AF/YR ADD	- AF/YR		119 gpm	119 gpm	43 gpm	-	-	0.50	
- gpm ADD	90.0 gpm ADD	35.8 gpm ADD	36.8 gpm ADD	- gpm ADD	29.6 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	237	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		7,116 gph	7,116 gph	2,562 gph	60	60	60	
- **GPM MDD**	**270 GPM MDD**	**72 GPM MDD**	**74 GPM MDD**	- **GPM MDD**	**59 GPM MDD**	- **GPM MDD**		24	24	24	-	-	14,233	
- **GPD MDD**	**388,800 GPD MDD**	**103,200 GPD MDD**	**106,000 GPD MDD**	- **GPD MDD**	**85,168 GPD MDD**	- **GPD MDD**					24	24	24	
						Total = 474 GPM MDD								
						Total = 683,168 GPD MDD	540,000 gal	170,792 gal	170,792 gal	61,488 gal	-		341,584	1,284,656 gal
							42.0%	13.3%	13.3%	4.8%	0.0%	0.0%	26.6%	100.0%
Check 0	270	72	74	0	59	0		170,792	170,792	61,488	-	-	341,584	

X **1.2** Multiplier for 40-ft tank, to define total Operational storage =

MDD Of 2055 PZ (Upper Zone), for Pump Through Calculations: 427 GPM

indicates cells with data entry

123,456 indicates cells with auto-computation

Note 1: Time Of Use storage requirement is subject to review and discussion with Brian Powell, to decide on Inclusion or Exclusion, in the Planning Criteria

If Building One Tank, Total Operational Tank Volume: 1,541,587 GAL

If Building Two Tanks, in two phases, each tank volume is: 770,793 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

EMWD's Master Plan Requirements For Storage

2055 PZ

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
60 Units	278 Units	- Units	- Acres	- Acres	5 Acres	- Acres	1,500 gpm	427 gpm	427 gpm	- gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	427	427	427	
40,800 gpd ADD	150,120 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	24 AF/YR ADD	- AF/YR		107 gpm	107 gpm	- gpm	-	-	0.50	
28.3 gpm ADD	104.3 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	14.8 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	214	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		6,410 gph	6,410 gph	- gph	60	60	60	
85 GPM MDD	**313 GPM MDD**	**- GPM MDD**	**- GPM MDD**	**- GPM MDD**	**30 GPM MDD**	**- GPM MDD**		24	24	24	-	-	12,820	
122,400 GPD MDD	**450,360 GPD MDD**	**- GPD MDD**	**- GPD MDD**	**- GPD MDD**	**42,584 GPD MDD**	**- GPD MDD**					24	24	24	
					Total =	**427 GPM MDD**								
					Total =	**615,344 GPD MDD**	**180,000** gal	**153,836** gal	**153,836** gal	- gal	-		**307,672**	**795,344** gal
							22.6%	19.3%	19.3%	0.0%	0.0%	0.0%	38.7%	100.0%

X 1.2 Multiplier for 40-ft tank, to define total Operational storage =

Total Operational Tank Volume: 954,413 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

APPENDIX B – WASTEWATER MODEL RESULTS

Commercial/Multi Family Combined Flows

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	137.90	gal/min

Results

Normal Depth	3.53	in
Flow Area	0.15	ft²
Wetted Perimeter	0.97	ft
Hydraulic Radius	1.84	in
Top Width	0.66	ft
Critical Depth	0.26	ft
Percent Full	44.1	%
Critical Slope	0.00655	ft/ft
Velocity	2.07	ft/s
Velocity Head	0.07	ft
Specific Energy	0.36	ft
Froude Number	0.77	
Maximum Discharge	0.82	ft³/s
Discharge Full	0.76	ft³/s
Slope Full	0.00065	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.08	%
Downstream Velocity	Infinity	ft/s

Commercial/Multi Family Combined Flows

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.53	in
Critical Depth	0.26	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00655	ft/ft

Max flow for 8" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	150.00	gal/min

Results

Normal Depth	4.02	in
Flow Area	0.18	ft²
Wetted Perimeter	1.05	ft
Hydraulic Radius	2.01	in
Top Width	0.67	ft
Critical Depth	0.27	ft
Percent Full	50.3	%
Critical Slope	0.00878	ft/ft
Velocity	1.90	ft/s
Velocity Head	0.06	ft
Specific Energy	0.39	ft
Froude Number	0.65	
Maximum Discharge	0.71	ft³/s
Discharge Full	0.66	ft³/s
Slope Full	0.00102	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.26	%
Downstream Velocity	Infinity	ft/s

Max flow for 8" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.02	in
Critical Depth	0.27	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00878	ft/ft

Max flow for 10" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00320	ft/ft
Diameter	10.00	in
Discharge	241.00	gal/min

Results

Normal Depth	5.00	in
Flow Area	0.27	ft²
Wetted Perimeter	1.31	ft
Hydraulic Radius	2.50	in
Top Width	0.83	ft
Critical Depth	0.32	ft
Percent Full	50.0	%
Critical Slope	0.00809	ft/ft
Velocity	1.97	ft/s
Velocity Head	0.06	ft
Specific Energy	0.48	ft
Froude Number	0.61	
Maximum Discharge	1.16	ft³/s
Discharge Full	1.07	ft³/s
Slope Full	0.00080	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	49.98	%
Downstream Velocity	Infinity	ft/s

Max flow for 10" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.00	in
Critical Depth	0.32	ft
Channel Slope	0.00320	ft/ft
Critical Slope	0.00809	ft/ft

Max flow for 12" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00240	ft/ft
Diameter	12.00	in
Discharge	340.00	gal/min

Results

Normal Depth	6.00	in
Flow Area	0.39	ft²
Wetted Perimeter	1.57	ft
Hydraulic Radius	3.00	in
Top Width	1.00	ft
Critical Depth	0.36	ft
Percent Full	50.0	%
Critical Slope	0.00757	ft/ft
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.56	ft
Froude Number	0.54	
Maximum Discharge	1.63	ft³/s
Discharge Full	1.51	ft³/s
Slope Full	0.00060	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.03	%
Downstream Velocity	Infinity	ft/s

Max flow for 12" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	6.00	in
Critical Depth	0.36	ft
Channel Slope	0.00240	ft/ft
Critical Slope	0.00757	ft/ft

Total Flow 12' @ 1.2%

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01200	ft/ft
Diameter	12.00	in
Discharge	462.00	gal/min

Results

Normal Depth	4.54	in
Flow Area	0.27	ft²
Wetted Perimeter	1.33	ft
Hydraulic Radius	2.47	in
Top Width	0.97	ft
Critical Depth	0.43	ft
Percent Full	37.8	%
Critical Slope	0.00776	ft/ft
Velocity	3.78	ft/s
Velocity Head	0.22	ft
Specific Energy	0.60	ft
Froude Number	1.26	
Maximum Discharge	3.64	ft³/s
Discharge Full	3.38	ft³/s
Slope Full	0.00111	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	37.84	%
Downstream Velocity	Infinity	ft/s

Total Flow 12' @ 1.2%

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.54	in
Critical Depth	0.43	ft
Channel Slope	0.01200	ft/ft
Critical Slope	0.00776	ft/ft

APPENDIX C – SUPPORTING DOCUMENTS

NBD-001
Rev. 03/2013

FIRE FLOW REQUEST FORM

Date 10/18/2013

☐	Residential Fire Sprinkler System	$ 155	Fee
☐	Fire Hydrant Letter	$ 155	Fee
☒	2 Hour Fire Flow Test	$ 155	Fee
☐	3-4 Hour Fire Flow Test	$ 1,200	Deposit – Based on Actual

Only 1 fee applies when requesting both a Residential Fire Sprinkler System test and either a Fire Hydrant Letter or a 2 hour Fire Flow Test on the same application.

PLEASE NOTE The average processing time for this request runs between 2 to 4 weeks from the date received by EMWD. AN INCOMPLETE APPLICATION WILL NOT BE ACCEPTED OR HELD.

Customer Name: PacTen Partners/RBF Consulting

Contact Name: (if applicable) Michael Boeck/Kaveh Haghighi

Mailing Address: 40810 County Center Drive, Suite 100

City, State ZIP: Temecula, CA 92591

Phone: 951-676-8042 Fax: 951-676-7240 E-Mail: mboeck@rbf.com

Cell: Mailing and Contact information is for ☐ Customer ☒ Contact

Assessors Parcel Number (APN): 384-150-008, 009, 010

Tract or Parcel Map Number: CP1: PP21452; CP2: PP22280

Project Name: Commerce Pointe I & II

Project Address: Zieders Road

City, State ZIP: Menifee, CA

Hydrant(s), Gallons per Minute (GPM): 2990

Duration (Hours): 2

Number of Hydrants: 1

Project Average Day Demand (GPM): 71

Residential Fire Sprinkler System (GPM):

Project Type: ☐ Residential Single Lot ☐ Tract ☐ School ☒ Commercial ☒ Industrial

TO CONFIRM AGENCY REQUIREMENTS, PLEASE ATTACH THE PROJECT'S "CONDITIONS OF APPROVAL," OR FIRE FLOW VERIFICATION FORM, RECEIVED FROM THE FIRE DEPARTMENT OR THE CITY. This reference lists the number of gallons per minute (GPM) and the duration (number of hours) required for the fire flow test. Without this form, this request is considered incomplete, and will not be accepted. EMWD'S Fire Flow test results are valid for six (6) months from the date of testing.

By signing this form, the undersigned affirms she or he has been advised of both the cost of the service requested, and the time required to complete his or her request.

Michael Boeck
Customer Signature

10/18/13
Date

OFFICE USE ONLY

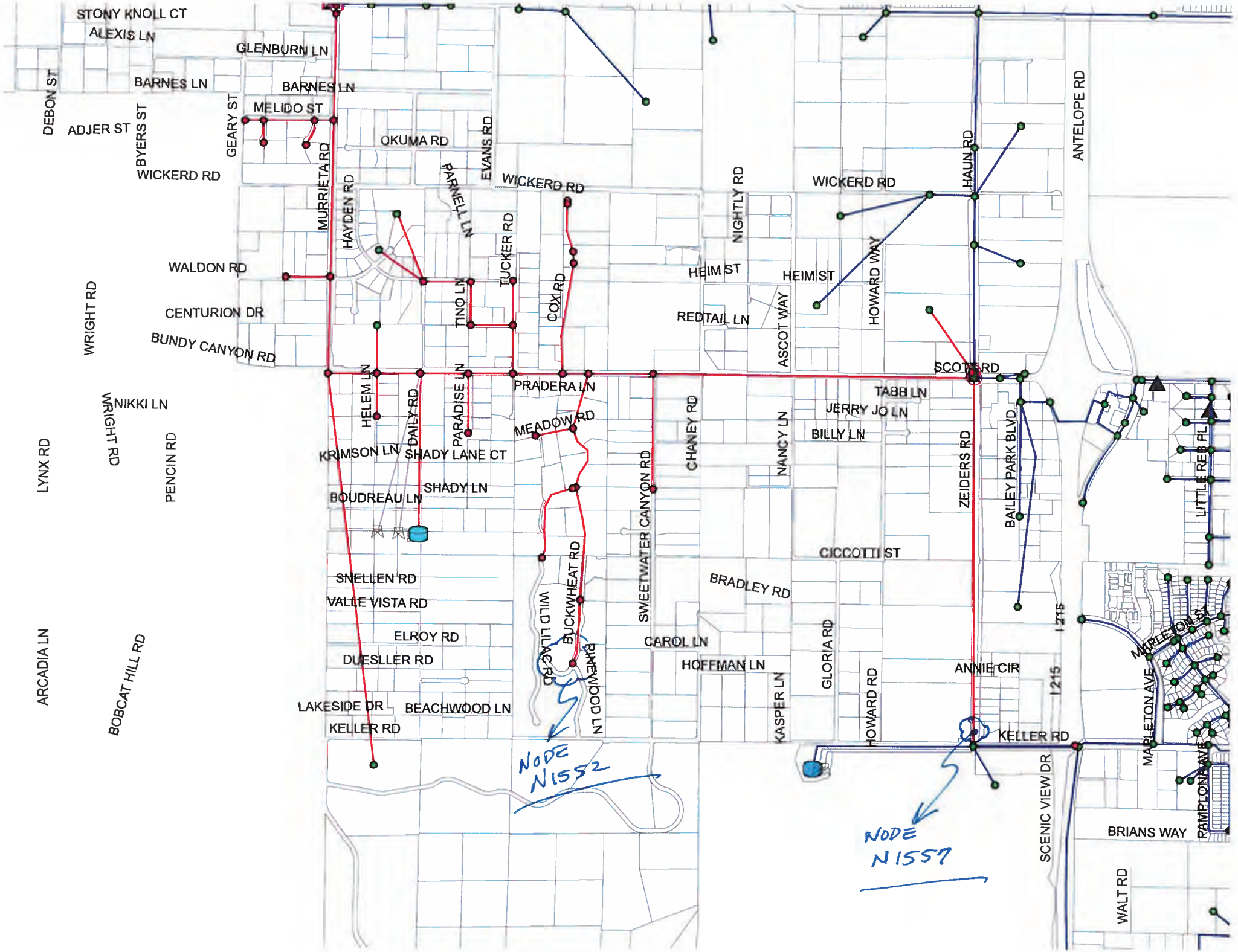
Date Form Received: _____ *Form must be complete to accept & acknowledge as "received"

☐ Payment Received Date: _____ Receipt: _____ ☐ Logged

Date to Engineer: _____ Received from Engineer: _____

Customer Notification Date _____ AdminAsst Signature _____
First Name, Last Initial

Comments: PP1 2013-493


STONY KNOLL CT
ALEXIS LN
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BARNES LN
BARNES LN
DEBON ST
ADJER ST
BYERS ST
GEARY ST
MELIDO ST
WICKERD RD
OKUMA RD
EVANS RD
MURRIETA RD
HAYDEN RD
PARNELL LN
WICKERD RD
NIGHTLY RD
WICKERD RD
HAUN RD
ANTELOPE RD
WALDON RD
TUCKER RD
COX RD
HEIM ST
HEIM ST
HOWARD WAY
WRIGHT RD
CENTURION DR
TINO LN
REDTAIL LN
ASCOT WAY
BUNDY CANYON RD
SCOTT RD
NIKKI LN
HELEM LN
DAILY RD
PARADISE LN
PRADERA LN
TABB LN
JERRY JO LN
MEADOW RD
CHANEY RD
NANCY LN
BILLY LN
ZEIDERS RD
BAILEY PARK BLVD
LITTLE REB PL
WRIGHT RD
LYNX RD
PENCIN RD
KRIMSON LN
SHADY LANE CT
SHADY LN
BOUDREAU LN
SWEETWATER CANYON RD
CICCOTTI ST
BRADLEY RD
SNELLEN RD
VALLE VISTA RD
WILD LILAC RD
BUCKWHEAT RD
BLUEWOOD LN
I 215
ELROY RD
CAROL LN
GLORIA RD
DUESLLER RD
HOFFMAN LN
ANNIE CIR
ARCADIA LN
BOBCAT HILL RD
KASPER LN
HOWARD RD
LAKESIDE DR
BEACHWOOD LN
KELLER RD
KELLER RD
MARLETON AVE
NODE N1552
NODE N1557
SCENIC VIEW DR
PAMPLONA AVE
BRIANS WAY
WALT RD

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	3,029.54	1,590.90	1,412.16	-77.45
2	N7620	37.68	1,585.40	1,659.73	32.20
3	N7616	35.13	1,677.33	1,734.64	24.83
4	N1553	30.09	1,699.22	1,683.97	-6.61
5	N7619	28.68	1,628.09	1,659.68	13.69
6	N1548	21.15	1,594.43	1,684.34	38.96
7	N7615	18.78	1,647.60	1,734.98	37.86
8	N1549	17.58	1,520.24	1,543.76	10.19
9	N1546	12.12	1,610.84	1,696.36	37.06

THIS RUN HAS YOUR 2990 GPM ADDED TO N1557

YOU ALSO NEED TO CALCULATE THE HEAD LOST FROM N1557 TO YOUR PROJECT SITE

THANKS

FRED.

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	39.54	1,590.90	1,834.31	105.47

WITHOUT ANY ADDED DEMAND (EXISTING)

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	1,039.54	1,590.90	1,767.92	76.70
2	N7620	37.68	1,585.40	1,802.67	94.14
3	N7616	35.13	1,677.33	1,814.93	59.62
4	N1553	30.09	1,699.22	1,806.07	46.30
5	N7619	28.68	1,628.09	1,802.62	75.62
6	N1548	21.15	1,594.43	1,806.44	91.86
7	N7615	18.78	1,647.60	1,815.27	72.65
8	N1549	17.58	1,520.24	1,786.11	115.20

THIS RUN IS WITH ADDED 1000 GPM at N 1557

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	1,539.54	1,590.90	1,704.97	49.43
2	N7620	37.68	1,585.40	1,776.27	82.70
3	N7616	35.13	1,677.33	1,799.68	53.01
4	N1553	30.09	1,699.22	1,783.32	36.44
5	N7619	28.68	1,628.09	1,776.22	64.19
6	N1548	21.15	1,594.43	1,783.69	82.01
7	N7615	18.78	1,647.60	1,800.02	66.05
8	N1549	17.58	1,520.24	1,742.58	96.34

THIS ROW IS WITH ADDED 1500 GPM at N 1557

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	2,039.54	1,590.90	1,623.85	14.28
2	N7620	37.68	1,585.40	1,743.35	68.44
3	N7616	35.13	1,677.33	1,781.06	44.95
4	N1553	30.09	1,699.22	1,755.14	24.23
5	N7619	28.68	1,628.09	1,743.30	49.92
6	N1548	21.15	1,594.43	1,755.50	69.79
7	N7615	18.78	1,647.60	1,781.40	57.98
8	N1549	17.58	1,520.24	1,687.12	72.31

THIS RUN IS WITH ADDED 2,000 GPM at N 1557

EXISTING LOW PRESSURE IN 1853 ZONE

Test Report Print Title

	ID	Pressure (psi)
1	N1552	13.27
2	N14772	55.41
3	N1553	58.47
4	N1538	60.21
5	N7617	61.85
6	N7614	64.66
7	N7616	68.19
8	N1540	75.18
9	N7615	81.22
10	N7618	84.07
11	N14977	84.62
12	N1551	87.66
13	N1541	87.72
14	N7619	89.40
15	WAL-MUR	90.42
16	N1550	91.83
17	WAL-END	92.19
18	ORT-TIN	93.70
19	WAL-END2	96.34
20	N1546	96.97
21	TIN-WAL	100.92
22	TUC-WAL	101.09
23	TUC-ORT	102.67
24	N1548	104.04
25	N1557	105.47
26	N7620	107.92
27	N7623	108.24
28	N7624	110.69
29	MEL-END	111.20
30	N7613	114.31
31	N7388	115.83
32	N1539	116.23
33	COX2	116.42
34	COX1	116.48
35	N7612	116.66
36	N1547	122.30
37	N14978	122.69
38	DISCH	128.73
39	N1526	130.62
40	N5180	130.62
41	N4572	130.62
42	N1536	135.27

WHEN I ADD 1000 GPM THE ZONE PRESSURE DROPS.

Test Report Print Title

	ID	Pressure (psi)
1	N1552	1.10
2	N14772	43.24
3	N1553	46.30
4	N1538	53.18
5	N7617	54.82
6	N7614	57.64
7	N7816	59.62
8	N1540	68.15
9	N7618	71.90
10	N14977	72.45
11	N7615	72.65
12	N1551	75.49
13	N7619	75.62
14	N1557	76.70
15	N1541	77.82
16	N1550	79.66
17	WAL-MUR	83.80
18	ORT-TIN	83.80
19	WAL-END	85.17
20	N1546	85.64
21	WAL-END2	86.43
22	N7388	87.06
23	TIN-WAL	91.02
24	TUC-WAL	91.18
25	N1548	91.86
26	TUC-ORT	92.77
27	N7620	94.14
28	N7623	101.21
29	N7624	103.67
30	MEL-END	104.18
31	COX2	105.09
32	COX1	105.15
33	N7613	107.28
34	N1539	109.20
35	N7612	109.63
36	N1547	110.97
37	N14978	111.36
38	N1536	114.32
39	N1549	115.20
40	REG1M8	115.90
41	N5104	116.40
42	DISCH	121.71

WHEN I ADD 1500 GPM THE ZONE GETS ITS FIRST NEGATIVE PRESSURE

Test Report Print Title

	ID	Pressure (psi)
1	N1552	-8.76
2	N14772	33.38
3	N1553	36.44
4	N1538	47.90
5	N1557	49.43
6	N7617	49.54
7	N7614	52.36
8	N7616	53.01
9	N7388	59.79
10	N7618	62.04
11	N14977	62.59
12	N1540	62.87
13	N7619	64.19
14	N1551	65.63
15	N7615	66.05
16	N1550	69.80
17	N1541	70.03
18	ORT-TIN	76.01
19	N1546	76.55
20	WAL-MUR	78.12
21	WAL-END2	78.65
22	WAL-END	79.83
23	N1548	82.01
24	N7620	82.70
25	TIN-WAL	83.23
26	TUC-WAL	83.40
27	TUC-ORT	84.98
28	N1536	95.42
29	N7623	95.93
30	COX2	96.00
31	COX1	96.06
32	N1549	96.34
33	REG1M8	97.04
34	N5104	97.54
35	N7624	98.38
36	MEL-END	98.90
37	N1547	101.88
38	N7613	102.00
39	N14978	102.27
40	N1539	103.92
41	N7612	104.35
42	DISCH	116.42

WHEN I ADD 2000 GPM

THE ZONE SHOWS

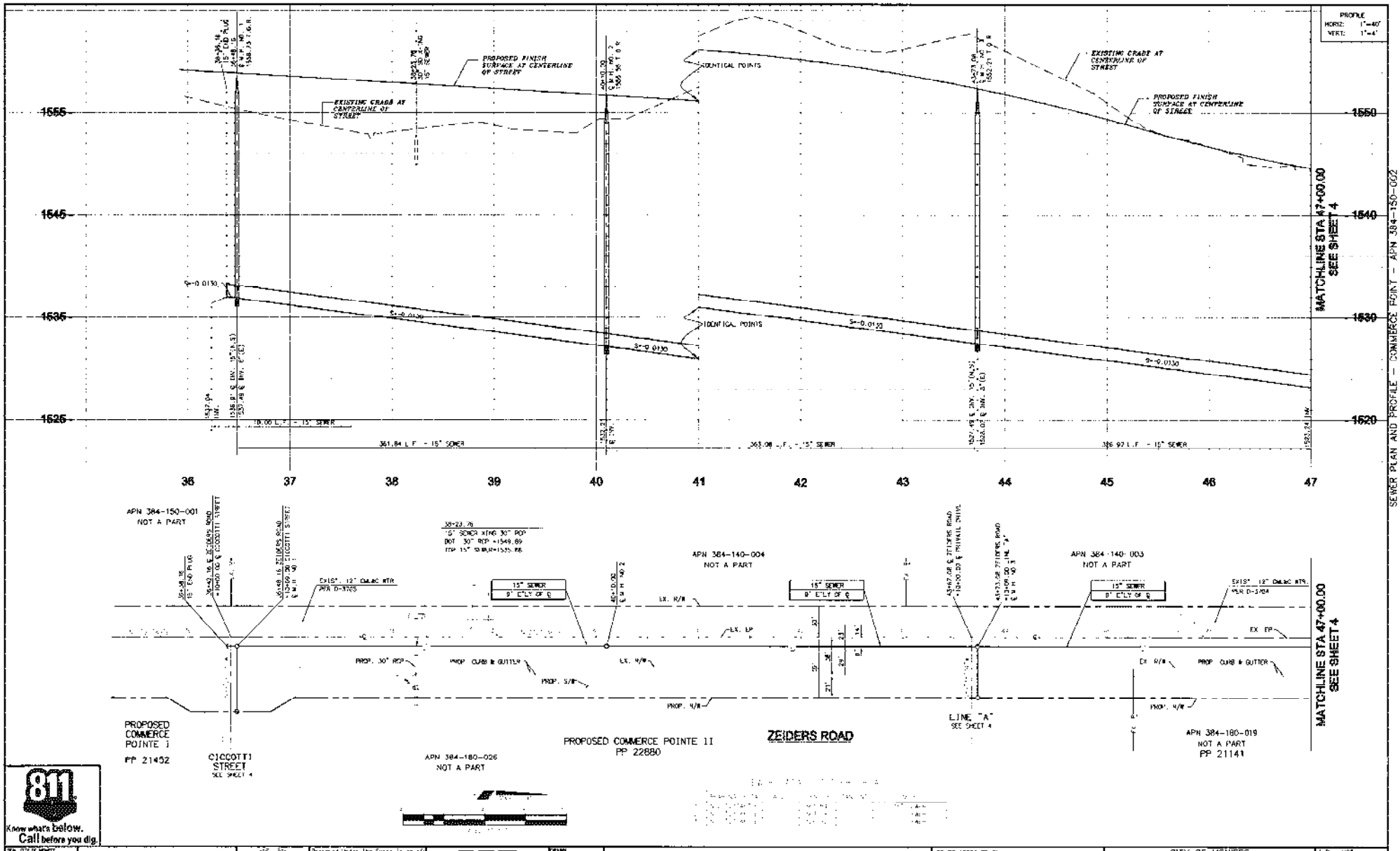
Test Report Print Title

	ID	Pressure (psi)
1	N1552	-20.98
2	N1557	14.28
3	N14772	21.16
4	N1553	24.23
5	N7388	24.63
6	N1538	41.50
7	N7617	43.15
8	N7616	44.95
9	N7614	45.96
10	N7618	49.83
11	N7619	49.92
12	N14977	50.37
13	N1551	53.42
14	N1540	56.47
15	N1550	57.59
16	N7615	57.98
17	N1541	60.47
18	N1546	65.33
19	ORT-TIN	66.44
20	N7620	68.44
21	WAL-END2	69.08
22	N1548	69.79
23	N1536	71.34
24	WAL-MUR	71.72
25	N1549	72.31
26	REG1M8	73.02
27	WAL-END	73.83
28	N5104	73.82
29	TIN-WAL	73.66
30	TUC-WAL	73.83
31	TUC-ORT	75.41
32	COX2	84.78
33	COX1	84.84
34	N7623	89.54
35	N1547	90.66
36	N14978	91.04
37	N7624	91.99
38	MEL-END	92.50
39	N7613	95.60
40	N1539	97.53
41	N7612	97.95
42	DISCH	110.03

Test Report Print Title

	ID	Pressure (psi)
1	N1557	-77.45
2	N7388	-67.09
3	N1552	-51.81
4	N14772	-9.67
5	N1553	-6.61
6	N1536	9.07
7	N1549	10.19
8	REG1M8	10.90
9	N5104	11.40
10	N7619	13.69
11	N7618	18.99
12	N14977	19.54
13	N1551	22.58
14	N7616	24.83
15	N1538	25.67
16	N1550	26.75
17	N7617	27.31
18	N7614	30.12
19	N7620	32.20
20	N1541	36.49
21	N1546	37.06
22	N7615	37.86
23	N1548	38.96
24	N1540	40.64
25	ORT-TIN	42.47
26	WAL-END2	45.10
27	TIN-WAL	49.68
28	TUC-WAL	49.85
29	TUC-ORT	51.43
30	WAL-MUR	55.89
31	COX2	56.51
32	COX1	56.57
33	WAL-END	57.65
34	N1547	62.39
35	N14978	62.78
36	N7623	73.70
37	N7624	76.15
38	MEL-END	76.66
39	N7613	79.77
40	N1539	81.69
41	N7612	82.12
42	DISCH	94.19

this is with ADD ⇒ 2990 GPM



CITY OF MENIFEE ENGINEERING DEPARTMENT

RECOMMENDED 8/4/10 DATE

Prepared Under the Supervision of:
MICHAEL J. BOECK
R.C.E. 66417
EXP. 6/30/12
DATE 10/29/2010

RBF CONSULTING
PLANNING • DESIGN • CONSTRUCTION
3000 COUNTY CENTER DRIVE, SUITE 100
TEMECULA, CALIFORNIA 92591-4022
951.676.8042 • FAX 951.676.7240 • www.rbf.com

DRAWN JDC/TMM
DESIGNED TMM
CHECKED MJB/KH
SCALE AS SHOWN
JOB NUMBER 15-101823

MARK INIT. DESCRIPTION APPR DATE
L.O.K. REVISION C.R.E.D.

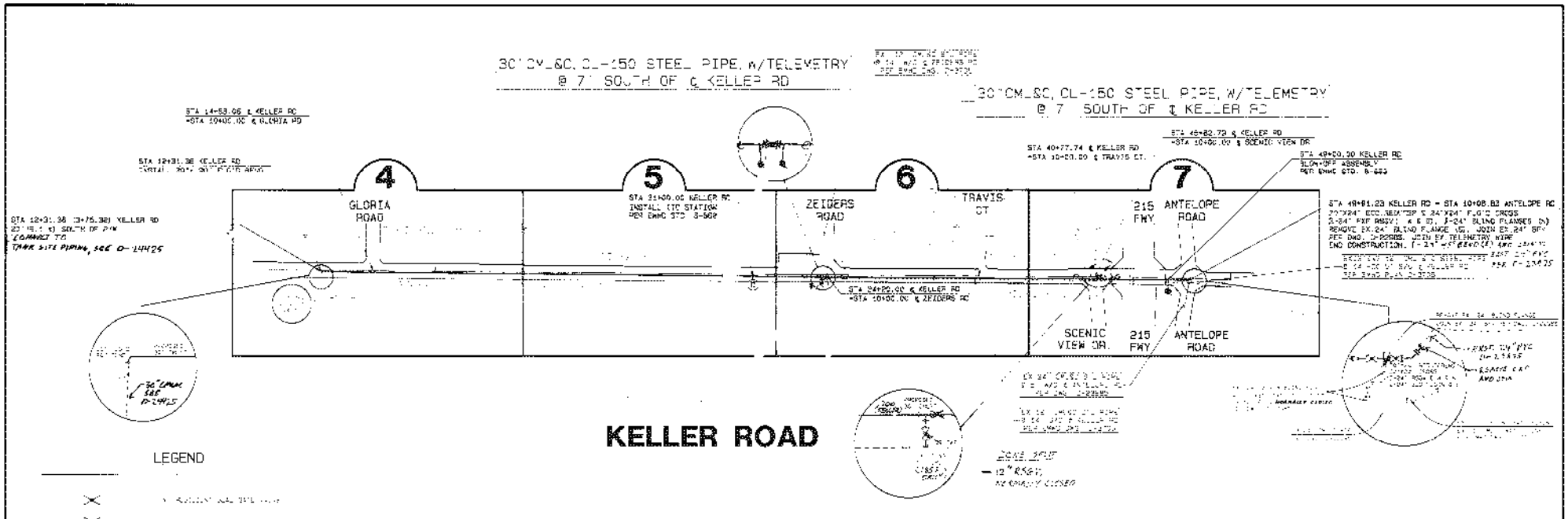
SEWER APPROVED BY:
EASTERN MUNICIPAL WATER DISTRICT
CIVIL ENGINEER OF SUBDIVISIONS 10/22/10 DATE

APPROVALS L.A.M. 10/20/10

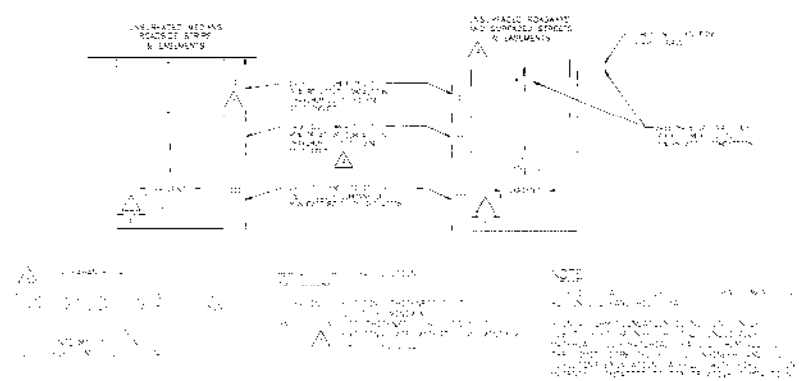
CITY OF MENIFEE
COMMERCE POINTE APN 384-150-002
OFFSITE SEWER IMPROVEMENT PLANS
ZEIDERS ROAD

STA. 36+38.16 47+00.00

I.D. 035
S.A. 33
W.O. 12-852
E.O.
COORD. 18A-24
SHT 3 OF 4
D- 42142



LEGEND

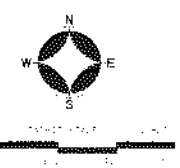


TRENCH BACKFILL DETAILS

QUANTITY ESTIMATES

NOTE: CONTRACTOR SHALL CONFIRM ALL QUANTITIES AND MATERIALS NEEDED

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	STD. DWG.
1	30" CM L&C STEEL PIPE W/ TELEMETRY WIRE & TELEMETRY WIRE	[illegible]	[illegible]	—
2	30"X24"X24" FLANGED TEE	[illegible]	[illegible]	—
3	30"X24" FLANGED REDUCER	[illegible]	[illegible]	—
4	24"X24"X24"X24" FLANGED CROSS	1	[illegible]	—
5	24" BLIND FLANGE W/24" OUTLET	[illegible]	[illegible]	—
6	24" FAB RESILIENT SEAT GATE VALVE	2	[illegible]	[illegible]
7	24" BLIND FLANGE	[illegible]	[illegible]	—
8	24" FAB RESILIENT SEAT GATE VALVE	[illegible]	[illegible]	[illegible]
9	30" 22" FLANGED BEND	[illegible]	[illegible]	—
10	BLOW-OFF ASSEMBLY	5	[illegible]	S-653
11	30" FAB BUTTERFLY VALVE	0	[illegible]	[illegible]
12	EMWD BLOW-OFF	0	[illegible]	[illegible]
13	24" ACCESS MANWAY	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]
15	30" FAB RESILIENT SEAT GATE VALVE	2	[illegible]	—



EMWD INSPECTOR: ANTHONY VALENZUELA - SPEC 840W

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE
1-800
227-2600

WEBB

1	2/19/04	SKS	AS CONST. PER C.O. 64710 OR 11/20/03

REFERENCES

EASTERN MUNICIPAL WATER DISTRICT

APPROVALS

EASTERN MUNICIPAL WATER DISTRICT

ASSESSMENT DISTRICT NO. 20
KELLER ROAD 30" TRANSMISSION PIPELINE
INDEX MAP, LEGEND & MISCELLANEOUS

PROJECT REVIEW COMMENTS

Project: Murrieta Hills (SP 320 / TTM 35853)
W.O.: 415273
Phase: Plan of Service

COMMENTS Provided: *9/10/2014* from NBD POS to RBF
12/18/2014 from RBF to NBD POS
2/19/2015 from NBD POS to RBF
6/22/2015 from NBD POS to RBF

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	Sect / Page #	Title / Heading	Comment	Design Impacts/Proposed Resolution	By	Date	Code*	Response	By	Date	Response	By	Date
1	Cover	TECHNICAL MEMORANDUM	Sign & Seal by Engineer of Record	see comment	MEH	9/3/14	C	Will be included in the next submittal.	RBF		Completed	BAR	2/6/2015
1A	Cover	TM	Add "Specific Plan 320 / TTM 35853" to cover page	see comment	MEH/ BAR	2/6/15	?				Completed	BAR	4/27/2015
2	I / 1	Introduction	Project states it is in the City of Murrieta	Please confirm this has been annexed into City or note status if still just within county.	MEH	9/3/14	C	Proposing annexation.	RBF		Completed, noted proposing annexation in description.	BAR	2/6/2015
3	I / 1	Introduction	"At this time, the Project…"	"At that time, the Project…"	MEH	9/3/14	C	Changed as noted.	RBF		Completed	BAR	2/6/2015
4	I / 1	Introduction	"The current land use…"	"The proposed land use…"	MEH	9/3/14	C	Changed as noted.	RBF		Completed	BAR	2/6/2015
5	II / 1	Project Background	"Two storage tanks…"	"One storage tank…" Note that project may need additional storage tank per master plan.	BAR	9/3/14	C	Changed as noted.	RBF		Completed	BAR	2/6/2015
6	II / 1	Project Background	"A booster station from this…"	proposing a hydro-pneumatic booster station system? Please clarify.	MEH	9/3/14	C	Per meeting discussions, a booster station is proposed, not a hydro-pneumatic booster station.	RBF		Completed	BAR	2/6/2015
7	II / 1	Project Background	"In summary, the facilities are as follows:"	Nothing is listed after this statement, please provide.	MEH	9/3/14	C	Line to be deleted.	RBF		Completed	BAR	2/6/2015
8	II / 1	Project Background	"…and correspondences were used…"	What correspondences were used? None provided, please provide.	MEH	9/3/14	C	Due diligence Meeting on 8/27/13 and subsequent emails that followed	RBF		OK, noted and some included.	BAR	2/6/2015
9	II / 1	Project Background	Meetings with EMWD staff	please provide record(s) of these meetings as referenced.	MEH	9/3/14	C	Due diligence Meeting on 8/27/13 and subsequent emails that followed	RBF		OK, noted and some included.	BAR	2/6/2015
10	II / 1	Project Background	EMWD Facilites Planning Report (Oct 6, 2008); Hydraulic Boundary Conditions at Points of Connection (Done / Dated?); Menifee West Water Study (April 2008 by IEC)	Add / request / note references per comment	MEH / BAR	9/3/14	C	Added to references	RBF		Completed	BAR	2/6/2015
11	III / 2	Land Use	"shwon"	replace with "shown"	BAR	9/3/14	C	Corrected.	RBF		Completed	BAR	2/6/2015
12	III / 3	Exhibit 2	Need to show Legend, PZ's and Pipeline sizes. Also, too small, need to make 11 x 17 / legible.	see comment	MEH / BAR	9/3/14	R	This exhibit was provided as a pdf from EMWD's atlas maps. Data can not be extracted from this file. It will be extended to 11 x17.	RBF		Completed w/ assistance from Ron in GIS.	BAR	4/27/2015
13	III / 4	Exhibit 3	Park acreage doesn't match Table 1 on pg. 5; Residential Units do not match Table 5 on pg. 7	please revise exhibits / tables to match acreage / unit count.	BAR	9/3/14	C	Total parks/HOA area is 16.0. The Table will be revised from 16.2 to 16.0. Total residential units is 750. The multi-family total is 172.	RBF		Completed, Areas & Quantities seem to match now.	BAR	2/6/2015
14	III / 5	Table 1	see comment #13 above; looks like you are double counting OS2 in OS1 acreage (s/b 639 acres); PA1 - PA7 needs to inclued 60 low density residential; peaking factors for notes [3] & [4] are based on use - need to separate by tenant type (commercial vs. residential peaking factors); Use Peaking Factor of 2.0 x MDD for PH (see attached design criteria revisions) - numbers come out equivalent to as published guidelines.	see comment	MEH / BAR	9/8/14	C	The 639 acres accounts for streets (23.2 acres) and OS1 (615.8 acres) to reach the 639 acre total. Will separate units and peaking factors.	RBF		Completed	BAR	2/6/2015
15	III / 5	Table 2	Reversed Range of Elevations served for 2055 PZ	see comment	BAR	9/8/14	C	Elevations were revised to go from low to high.	RBF		Completed	BAR	2/6/2015
16	IV / 5	Domestic Water Demands	"EMWD's Low Density Residential…of 630 gpd/du…"	"EMWD's Med Density Residential… of 630 gpd/du…"	BAR	9/8/14	C	Corrected.	RBF		Completed	BAR	2/6/2015
17	V / 7	Reservoirs	District performed EPS model run to evaluate storage requirements based on 2008 WFMP criteria, results have been provided for reference in updating your POS. Consider equal reservoir sizes for 1853A/1853B.	see comment	MEH	9/8/14	R	Revised storage calcs for 1853 and 2055 based on District's spreadsheets. Estimated reservoir sizes are shown for planning purposes. Actual size will be determined during the preliminary design phase.	RBF		Update per storage calculations provided 6/18/15 and submit as Final document with cover letter for signature.	BAR	6/22/2015

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	Sect / Page #	Title / Heading	Comment	Design Impacts/Proposed Resolution	By	Date	Code*	Response	By	Date	Response	By	Date
18	V / 7	Table 5	Add column for phasing; where does [1] factor of 1.3 come from?; see proposed storage spreadsheet noted in comment #17	see comment	MEH / BAR	9/8/14	R	Factor of 1.3 is the safety factor used for peaking needs (as stated in the previous paragraph). This factor includes "pump through" flows. This can be removed as a factor of 10% is used as the District's criteria. District's spreadsheet was revised and included within the report.	RBF		Update per storage calculations provided 6/18/15 and submit as Final document with cover letter for signature.	BAR	6/22/2015
~~19~~	~~V / 7-8~~	~~Booster Stations~~	~~Proposed booster stations will have to be relocated to proper suction of 50 psi.~~	~~see comment~~	~~BAR~~	~~9/8/14~~	~~C~~	~~Based upon 11/17/14 meeting, it is acceptable to have lower suction pressure of 50 psi. Actual location of the booster station will be determined during the preliminary design stage. A note was added stating that locations can be determined at the preliminary design stage and that the MSHCP open space is a viable location for infrastructure.~~	~~RBF~~		Completed	BAR	2/12/2015
~~20~~	~~VI / 8~~	~~Domestic Water Analysis~~	~~Is storage available in 1698 PZ (~150k Gal per 2008 WFMP criteria)? This will need to be reviewed against 5-yr CIP requirements.~~	~~see comment~~	~~MEH~~	~~9/8/14~~	~~D~~	~~Per 11/17/14 meeting, it appeared that adequate storage at the 6.2 MG reservoir at the 1698 PZ would be sufficient to support the project.~~	~~RBF~~		Completed	BAR	4/27/2015
~~21~~	~~VI / 8~~	~~" " "~~	~~"The development will be initially supplied by EMWD's 1698 Zone..."~~	~~Please elaborate, how is this shown on the exhibit? What is meant by "initially" vs. ultimate supply? Is it a proposed hydropneumatic system?~~	~~MEH~~	~~9/8/14~~	~~C~~	~~"Initially" meaning that water supply will originate from the 1698 PZ. Water will be further pumped from 1853 PZ to 2055 PZ. Water pumped from the 1698 PZ is the ultimate condition.~~	~~RBF~~		Completed	BAR	2/17/2015
~~22~~	~~VI / 8~~	~~" " "~~	~~Do you have the boundary conditions at proposed Points of Connection?~~	~~District to provide boundary conditions if not used to evaluate on site hydraulics. Please advise.~~	~~MEH~~	~~9/8/14~~	~~D~~	~~The boundary condition would be connection at the reservoir. Further analysis would be performed at the preliminary design stage.~~	~~RBF~~		Completed but noted it will be reviewed during Preliminary Design and with Facilities Planning during then current 5-yr CIP.	BAR	6/22/2015
~~23~~	~~VI / 9~~	~~Exhibit 4~~	~~Please clearly show 1853 / 2055 PZ split, move proposed 1853 to 2055 BPS to lower elevation to ensure proper suction pressures under all conditions, relocate proposed 1698 to 1853 BPS to Zeiders Rd(?) per 2008 Menifee West Water Study & Where is initial 1698 PZ service area? Hydropneumatic zone area?~~	~~see comment~~	~~MEH / BAR~~	~~9/9/14~~	~~R~~	~~Exhibit will be revised to show Pressure Zone split. As stated in the 11/17/14 meeting, the actual location of the booster stations will be determined at the preliminary design stage. We are currrently showing the booster stations near the reservoirs. A lot may be dedicated for booster pumping.~~	~~RBF~~		Completed as noted.	BAR	6/22/2015
~~24~~	~~VII / 10~~	~~(none provided)~~	~~No title provided as section would indicate, please provide.~~	~~see comment~~	~~BAR~~	~~9/9/14~~	~~R~~	~~There is no title change - we are still talking about the water analysis.~~	~~RBF~~		Completed	BAR	6/22/2015
~~25~~	~~App A~~	~~Scenario: base~~	~~Show boundaries for PZ's splits on maps as appropriate for reference~~	~~see comment~~	~~MEH / BAR~~	~~9/10/14~~	~~R~~	~~Changed as noted.~~	~~RBF~~		Completed	BAR	6/22/2015
~~26~~	~~App A~~	~~Scenario: all~~	~~Junction Reports: Shows 2 zones (1853 & 2020), no 2053?~~	~~Please revise to reflect appropriate zone HWL's.~~	~~MEH / BAR~~	~~9/10/14~~	~~R~~	~~2020 is the pad elevation for the 2055 zone. 1818 is the pad elevation for the 1853 zone.~~	~~RBF~~		Completed	BAR	6/22/2015
~~27~~	~~General~~	~~n/a~~	~~Project is required to install street section and right-of-way for McElwain Rd from Tentative Tract Map south to Linnel Lane for access / fire protection services.~~	~~District / project may need to install facilities to better serve project / regional development. This needs to be studied further through the POS process.~~	~~MEH / BAR~~	~~9/15/14~~	~~C~~	~~Topic of McElwain infrastructure will be added for the District's discussion purposes. As discussed in the 11/17/14 meeting, road improvements along McElwain Road may not be conditioned for the project. Additional analysis by the District will be necessary as the McElwain alignment increases in grade/elevation and may not be suitable hydraulically for piping connections.~~	~~RBF~~		Completed, addressed as noted.	BAR	2/19/2015
~~28~~	~~Sewer Comments~~		~~Please correct table 8 on pg. 11 to reflect the correct Peaking Factors of 2.26 for SFR and 2.5 as correctly noted in note [3] for the MFR and Commercial. This will affect the Peak Flow shown for SFR. The commercial flow calculations for Average and Peak flow are too high based on our calculations of the acreage and correct unit flow factor provided. Your total peak flow should be lower as well.~~		~~BAR~~	~~email dated 11/14/14~~	~~C~~	~~Corrected.~~	~~RBF~~		Completed	BAR	2/19/2015
~~29~~	~~Sewer Comments~~		~~Exhibit 5 pg. 13 - District may oversize the conveyance in Zeiders Rd from 12" to 15" at District cost to accommodate potential future flows from the east or west at Keller Rd.~~		~~BAR~~	~~email dated 11/14/14~~	~~R~~	~~Note added to text and exhibit.~~	~~RBF~~		Completed	BAR	6/22/2015

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	Sect / Page #	Title / Heading	Comment	Design Impacts/Proposed Resolution	By	Date	Code*	Response	By	Date	Response	By	Date
~~30~~	~~Sewer Comments~~		~~Section X. Wastewater Analysis pg. 14 - shallow sewer manholes will be resolved through the plan check process.~~		~~BAR~~	~~email dated 11/14/14~~	~~C~~	~~Statement added to report.~~	~~RBF~~		Completed	BAR	2/19/2015
~~31~~	~~VI / pg. 12~~	~~Table 7~~	~~Description of 1853 & 2055 PZ's.~~	~~S/B 1853 HWL & 2055 HWL (not LWL)~~	~~BAR~~	~~2/19/15~~	~~C~~	~~footnoted Table 7 to reflect HWL & LWL, accordingly~~	~~RBF~~		Completed	BAR	6/22/2015

*** CODES: C = Concur R = Revise D = Discussion NA = Not Applicable W = Withdrawn**

Compiled by B. Raines
J:\NEWBUSI_POS_Doc_Library\WO\WO_11470_15273 TR 35853 Murrieta Hills\03_POS_2014-15\2015-06-22_Final Review Comments_NBD POS

Interoffice Memo

TO: Developer

FROM: Development Services Engineer

DATE: December 20, 2018

SUBJECT: DCDA vs. RPDA – Hazardous Contaminant Identification

EASTERN MUNICIPAL WATER DISTRICT

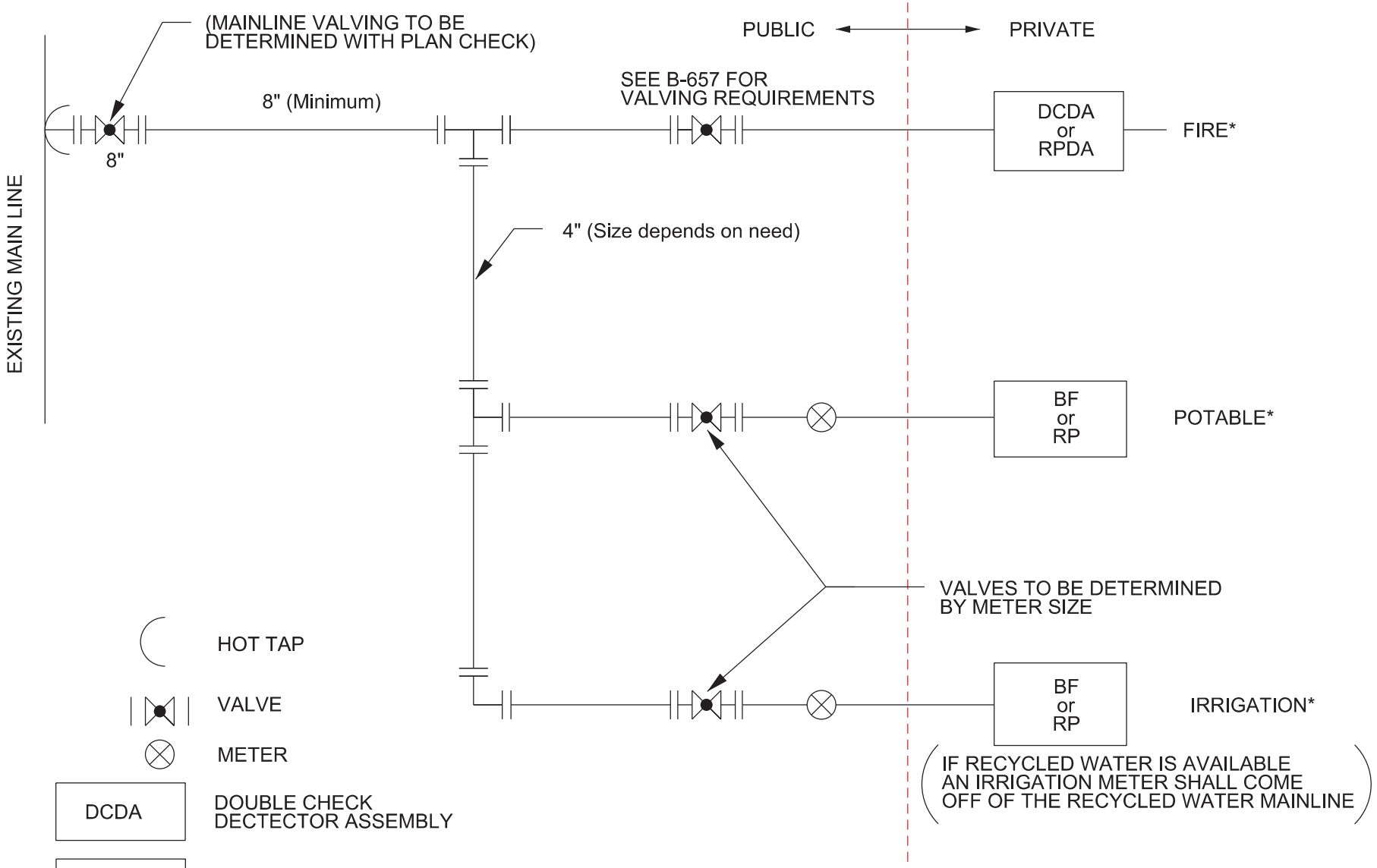
As part of your Plan of Service and in order to assist you through the Plan Check process, the New Business Department through the Admin Code has identified the need to know all the potential hazards which could contaminate EMWD's water system through the proposed private and dedicated Fire Service. While a double check detector fire protection backflow prevention assembly (DCDA) protects against low health hazard pollutants, a reduced pressure detector fire protection backflow prevention assembly (RPDA) protects against high health hazard pollutants and contaminants. All dedicated and private fire protection services must utilize, at a minimum, a DCDA at each point of connection to EMWD's public water system. In addition, an RPDA device must be used in the event of a potential onsite contaminant. Examples of potential contaminants we require you to identify (but not limited to) are:

- Use of chemicals, such as an industrial use
- Chemical-additive injection (for fire-fighting)
- On-site water storage
- On-site well
- Un-approved auxiliary water supply (i.e. on-site wells not properly abandoned or destroyed)
- Sites with marine facilities (such as lakes and water parks)

Please provide a list of process and potential hazards (pollutants or contaminants) for your proposed project as soon as possible during the plan of service process. This will ensure the appropriate backflow prevention device is utilized for onsite hydraulic design and plan check to review.

If a customer has concerns with EMWD's condition to use an RPDA (i.e. Fire Marshall, low pressure concerns), then a site survey shall be conducted to demonstrate that the use of a DCDA would provide adequate protection to EMWD's source water system. If you have any further questions or concerns regarding this notification, please feel free to contact the New Business Department staff for further information.

EMWD STANDARD FOR PRIVATE CONNECTIONS FOR EXISTING WATERLINES

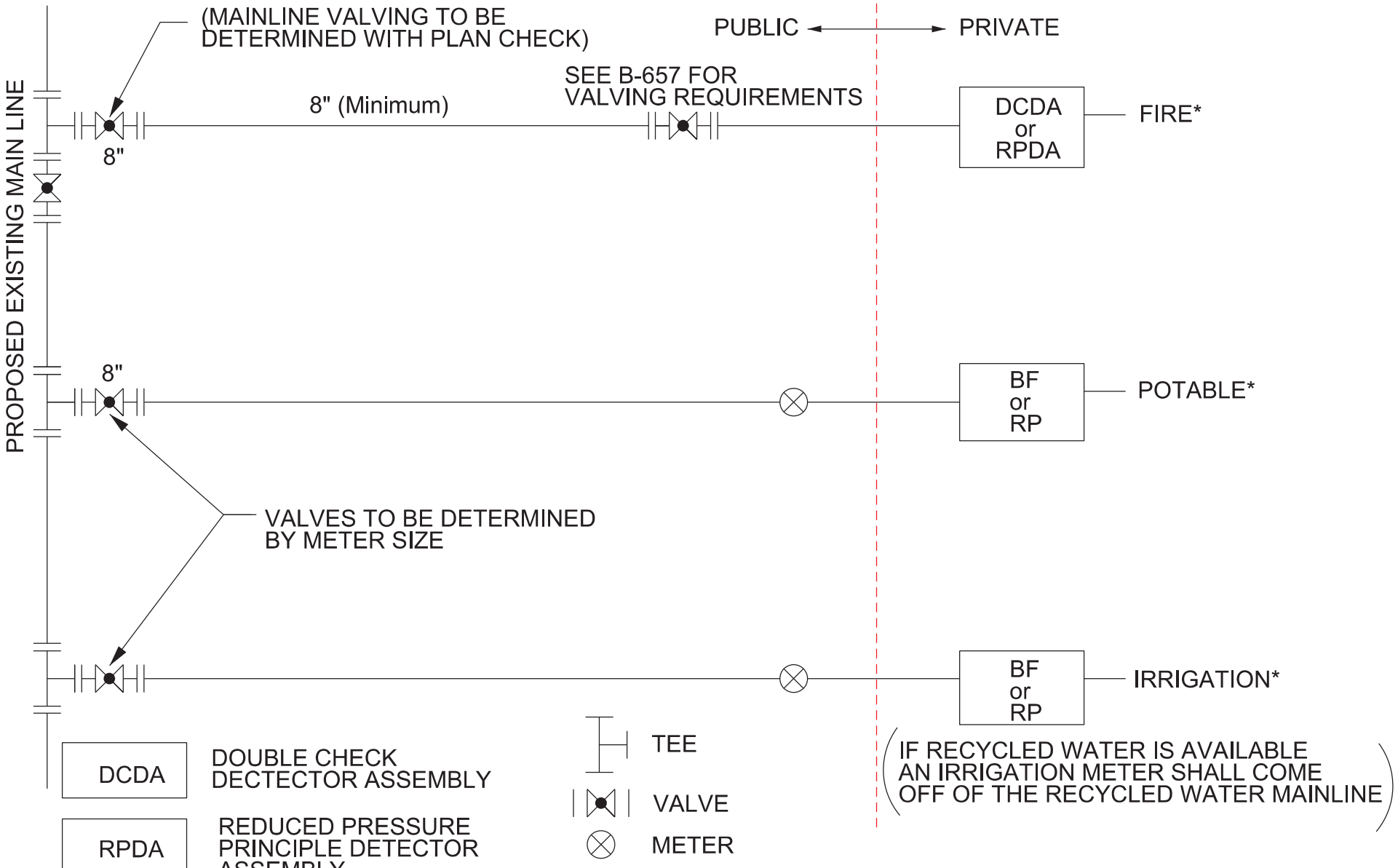


* Please note that EMWD does not inspect onsite private potable water and/or private fire systems, however, EMWD does require that there is no cross-connections onsite. Each service connection must maintain their separate systems onsite. (Example: domestic potable, fire services must remain a dual system onsite).

DATE 1-23-2015

\KAUAI\engineering\esparza\DGNv8

EMWD STANDARD FOR PRIVATE CONNECTIONS FOR PROPOSED WATERLINES



✳ Please note that EMWD does not inspect onsite private potable water and/or private fire systems, however, EMWD does require that there is no cross-connections onsite. Each service connection must maintain their separate systems onsite. (Example: domestic potable, fire services must remain a dual system onsite).

DATE 1-23-2015
\KAUAI\engineering\esparza\DGNv8

Community Facilities District (CFD) Letter

Re: **SPECIAL FUNDING DISTRICTS**

Project Name _____

Tract Number _____

Work Order Number _____

Special Funding Districts have a special set of requirements for construction. In some cases, EMWD is not aware of the need to process projects differently using CFD requirements. In order to make sure your project is processed correctly, please have the project owner/developer complete the questions below:

1. Will the project be funded using Assessment District or Community Facilities District funds? ☐ Yes ☐ No

   If YES, please answer questions 2 through 5:

2. Who will be the lead agency? (Supply CFD number and name of project, if known)

   _____

3. Will the CFD fund the water and/or sewer financial participation fees? ☐ Yes ☐ No
4. Will the CFD fund the water facilities? ☐ Yes ☐ No
5. Will the CFD fund the sewer facilities? ☐ Yes ☐ No

If you answered **YES** to Question 1, please contact Heidi Schoeppe, Senior Finance Manager, Albert A. Webb & Associates at (951) 200-8604, for CFD formation requirements.

I AM THE OWNER OR DEVELOPER OF TRACT_____. THE INFORMATION ABOVE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE. FURTHERMORE, I UNDERSTAND THAT DEVELOPER AGREEMENTS FOR PROJECTS, INCLUDING FACILITIES TO BE FUNDED BY A CFD, MUST BE IN PLACE PRIOR TO SCHEDULING A BID OPENING FOR THE PROJECT.

Signature	Company Name
Print Name	Address
Title	City, State ZIP
Contact Number	Contact Number
Date	

RETURN THIS FORM WITH THE NEXT PLAN OF SERVICE / PLAN CHECK SUBMITTAL

EASTERN MUNICIPAL WATER DISTRICT
New Business Department

Work Order Deposit[1] Work Sheet (for POS & PC)

Project:
Meeting Date:
Plan of Service Engineer: Brian Raines
File Name: NBD-053 DD Deposit Worksheet

Form: NBD-053
Version Date: 8/11/2015

Phase I: Due Diligence Phase

			Deposit[1] Amount Required For This Project
1	**Water, Sewer & Recycled water**	(No Charge for initial research and Due Diligence meeting)	**$0**

Phase II: Plan Of Service Phase

		Project Size: EDUs:	Small 1-100	Medium 101-200	Large Over 200	
1	**Water POS**		$ 2,000	$ 2,500	$ 3,000	
2	**3 or 4-Hour Fire Flow Tests**		$ 1,200	$ 1,200	$ 1,200	
3	**Sewer POS**		$ 2,000	$ 2,500	$ 3,000	
4	**Recycled Water Use Exhibit**	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
5	**Recycled Water Public Facilities (Plan Of Service)**		$ 2,000	$ 2,500	$ 3,000	
6	**Sewer Flow Monitoring By Applicant**		$ -	$ -	$ -	
7	**Sewer Flow Monitoring By District Staff**	Amount Varies (min. $2,000 per manhole)				
8	**Plan Check Support (if needed)**		$ 1,500	$ 1,500	$ 1,500	
9	**Project Complexity, such as: PZ Realignment, Storage, Booster/Lift Station**		$ -	$ -	$ -	
		Phase II (Plan Of Service) Total:				**$ -**

Phase III: Plan Check Phase

	On-site Recycled Water Irrigation Plan Check:					
1	Single source park, Streetscape, Tract	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
2	Commercial, Dual source[2] park, School	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
	Recycled Water Construction Inspection:					
3	Single source park	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
4	Commercial, Dual source[2] park, School, Tract	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
5	School, Streetscape	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
	Water & Sewer[3]					
	Number Of Sheets		**Deposit**	**With Easement, Add**	**CFD Specs, Add**	
6	1-2 sheets	One or more systems	$ 2,000	$ 1,000	$ 3,000	
7	3-8 sheets	one system	$ 4,000	$ 1,500	$ 3,000	
8		two or more systems	$ 6,000	$ 1,500	$ 3,000	
9	9-13 sheets	one system	$ 7,000	$ 1,500	$ 3,000	
10		two or more systems	$ 9,000	$ 1,500	$ 3,000	
11	14-20 sheets	one system	$ 10,000	$ 2,000	$ 3,000	
12		two or more systems	$ 13,000	$ 2,000	$ 3,000	
13	21-25 sheets	one system	$ 15,000	$ 2,000	$ 3,000	
14		two or more systems	$ 18,000	$ 2,000	$ 3,000	
15	26-35 sheets	one system	$ 20,000	$ 2,000	$ 3,000	
16		two or more systems	$ 23,000	$ 2,000	$ 3,000	
17	**Hydro-Pneumatic Booster Station**		$ 35,000			
18	**Booster Pump Station**		$ 35,000			
19	**Water Storage Reservoir**		$ 27,000			
20	**Small Sewer Lift Station**		$ 27,000			
	(Deposit amount varies for Medium & Large LS)	**Phase III (Plan Check) Total:**				**$ -**

(1) Deposit amount is based on the average District cost to review and process a typical project.
(1) During the POS and the Plan Check phases, the District reserves the right to review charges to a project and request additional funds if necessary.
(1) Initial deposits may be increased based on project complexity, as determined by District staff.
(1) All Plan Check charges must be paid prior to approval of the plans.
(2) Dual Source Site: Project site that has both potable and recycled water served onsite. Dual source sites are required per CDPH and EMWD to have cross connection test performed prior to acceptance and release of the project site.
(3) Recheck of approved plans: Apply 2/3 of the above Plan Check deposit (Additional fees to be determined based on the amount of design changes)

Date: _____

Project: _____

NBD-063
Rev. 04/29/15

DOCUMENTS REQUIRED FOR PLAN CHECK

NEW BUSINESS DEVELOPMENT DEPARTMENT

Note: EMWD will perform a completeness check of the documents identified below within the first week of submittal. If the package is found to be incomplete, your submittal will not be accepted. A submittal will **NOT** be placed in the queue for the next available plan checker until it is found to be complete.

We are providing the following:

Yes	N/A	
☐	☐	An Approved Plan of Service (POS) Summary Spreadsheet
☐	☐	2 Sets of Water & Sewer Improvement Plans (Per EMWD Standards and Guidelines)
☐	☐	1 Set of Street Improvement Plans
☐	☐	1 set of Storm Drain Plans (if not included with Street Improvement Plans)
☐	☐	1 Set of Grading Plans
☐	☐	1 Set of the Recorded Map
☐	☐	A Legible Site Plan Reduced to 11" x 17" size It can contain 2 or more sheets, if necessary to cover the project
☐	☐	1 Set of the Conditions of Approval, including Fire Flow Requirements If the Conditions of Approval are not available, provide one set of Fire Flow Conditions from the governing Fire Prevention Agency.
☐	☐	A Plan Check Deposit: Attached Amount $_____ Refer to Work Order Deposit Work Sheet (Form: NBD-053) for plan check deposit amount.
☐	☐	A Community Facilities District (CFD) Letter

Current guidelines for preparation of sewer and water plans and standard drawings are available on our website at www.emwd.org.

_____
Signature of Registered Civil Engineer

_____
Print name:

_____
Phone:

_____
Company Name

_____
Address

_____
City, State, Zip Code

Professional Engineer Stamp

Water Supply Assessment Report

Murrieta Hills

September 10, 2018

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Water Supply Assessment Report for the Murrieta Hills

Section I – Introduction

1.1 Purpose

Water Code 10910 (a) (b) (c)

The purpose of this Water Supply Assessment (WSA) Report is to satisfy the requirements under Senate Bill 610 (SB610), Water Code Section 10910 et seq., Senate Bill 221 (SB221), and Government Code Section 66473 that adequate water supplies are or will be available to meet the water demand associated with a proposed project. SB610 focuses on the content of a water supply agency's Urban Water Management Plan (UWMP) and stipulates that when an Environmental Impact Report (EIR) is required in connection with a project, the appropriate water supply agency must provide an assessment on whether its total projected water supplies will meet the projected water demand associated with the proposed project. SB610 applies to a proposed residential development of more than 500 dwelling units, or large commercial, industrial or mixed use development. SB221 requires water supply verification when a tentative map, parcel map, or development agreement for a project is submitted to a land use agency for approval. SB221 applies to proposed residential development of more than 500 dwelling units with some exceptions. The need for an assessment or verification is determined by the lead agency for the project.

1.2 Project Description

The City of Murrieta is the lead agency for the preparation of an EIR pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000, and et seq. for the Murrieta Hills (Proposed Project). The Proposed Project is located on approximately 972 acres in the City of Murrieta and consists of a master-planned, low, medium, and high density residential community of up to 750 dwelling units, along with roughly 15 acres of open space for recreation, 18 acres of commercial retail, and 647 acres of open space for conservation. The Proposed Project is located within the unincorporated Riverside County area bounded by Keller Road to the north, Escondido Expressway to the east, City of Wildomar to the west, and City of Murrieta to the south. The estimated annual demand for the Proposed Project is 430 acre-feet (AF). The land use considered for the project area in the 2015 UWMP demand projection was primarily rural mountainous, with four percent of the land use considered estate density residential, low density residential, and public facilities. These land uses are not consistent with the Proposed Project and the demand for this project is anticipated to exceed the limits of the projected demand for this area accounted for in the 2015 UWMP, however the demand for this project and other planned developments are below the total amount of new demand evaluated in the 2015 Urban Water Management Plan. Eastern Municipal Water District (EMWD) is also constantly updating its water supply portfolio and developing local resources to meet future demand. In 2021 the Urban Water Management Plan will be updated and include this project in future demand projections and updates to the EMWD supply portfolio.

The projected demands are shown in Table 8 of this WSA. The developer for the Proposed Project is Pulte/BP Murrieta Hills, LLC and the location is shown in Figure 2.

1.3 Requirements

The City of Murrieta has requested that Eastern Municipal Water District (EMWD) prepare a WSA for the Proposed Project. EMWD has confirmed that the projected demand from the Proposed Project exceeds the limits of demand accounted for in EMWD's 2015 UWMP, which was adopted in June 2016. With respect to water supplies, the project will be required to fund conservation to offset demand not considered in the 2015 UWMP or offset by their own demand through conservation efforts. The land use considered for the 972-acre project area in the 2015 UWMP demand projection was rural mountainous with four percent of the land use considered estate density residential, low density residential, and public facilities, which would have an estimated annual demand of 181.35 AF. Since the estimated annual demand for the Proposed Project is 430 AF, the project will be required to fund conservation to offset the 248.65 AF demand not considered in the 2015 UWMP. As authorized by Water Code Section 10910 (c)(2), EMWD has elected to incorporate information from the 2015 UWMP (attached as Appendix A) in this WSA.

In accordance with Water Code Section 10910 (d)-(f), the WSA shall:

1. Identify any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the Proposed Project, and provide a description of the quantities of water received in prior years by the public water system under existing water supply entitlements, water rights, or water service contracts;

2. If no water has been received in prior years by the public water system, identify other public water systems of water service contract holders that receive a water supply or have existing water supply entitlements, water rights or water service contracts to the same source of water as the public water system; and

3. If groundwater is included in the proposed supply, identify the groundwater basin or basins from which the Proposed Project will be supplied and include any applicable documentation of adjudicated rights to pump. If the basin is not adjudicated, regardless of whether the basin has been identified as overdrafted, provide a detailed description and analysis of the amount and location of groundwater pumped by the public water system for the past five years from any groundwater basin from which the Proposed Project will be supplied; and provide a detailed description and analysis of the amount and location of groundwater from the basin or basins from which the Proposed Project will be supplied to meet the projected water demand associated with the Proposed Project.

If the Proposed Project includes a "subdivision" of more than 500 residential dwelling units as defined by Government Code Section 66473.7 (a)(1), the public water system shall also provide verification as to whether the public water system is able or unable to provide a sufficient water supply based upon an analysis of whether water supplies available during normal, single-dry, and multiple-dry years within a 20-year projection will meet the projected demand associated with the proposed subdivision which considers:

1. The historical record for at least 20 years;

2. The applicability of any urban water shortage contingency analysis;

3. The reduction in water supply for "specific water use sector" per an adopted resolution, ordinance or contract; and

4. The amount of water that can be reasonably relied upon from specified supply projects.

This assessment is a technical, informational, advisory opinion only. It is a supporting document for an EIR and is not a commitment by EMWD to supply water for the Proposed Project. The information included is based on information available at the time of the report and changing circumstances could affect EMWD's water supply evaluation presented in this document.

This assessment does not specifically address funding of new or existing supplies. The cost of water supplies will increase over time and the developer of this project will be required to fund the acquisition of new, supplemental supplies, treatment or recycled water facilities, and water efficiency measures for existing customers. The extent of additional funding will be determined by EMWD and may take the form of a new component of connection fees or a separate charge. New customers may also be required to pay a higher commodity rate for water used than existing customers to help offset the rising costs of new supplies.

Prior to project construction, the developer of the Proposed Project is required to meet with EMWD staff to establish development design conditions, which will detail water, wastewater, and recycled water requirements to serve the Proposed Project. If there is a change in the circumstances detailed in this assessment, EMWD will address the changes in the development design conditions for the Proposed Project. Modifications at the development design conditions stage could reduce the amount of water available to serve the Proposed Project.

1.4 Background

EMWD was formed in 1950 and annexed into the Metropolitan Water District of Southern California (MWD) in 1951 to deliver imported water. In 1971, EMWD assumed the additional role of a groundwater producer with the acquisitions of the Fruitvale Mutual Water Company. Presently, EMWD's supply portfolio includes desalinated groundwater, recycled water, potable groundwater and imported water.

EMWD provides both retail and wholesale water supplies to a service area encompassing over 500 square miles with an estimated population of over 780,000 people. Agencies through which EMWD provides water supplies indirectly via wholesale service include the following:

- City of Hemet Water Department
- City of Perris / North Perris Water System
- City of San Jacinto Water Department
- Lake Hemet Municipal Water District (LHMWD)
- Murrieta Division of Western Municipal Water District (WMWD)
- Nuevo Water Company
- Rancho California Water District (RCWD)

1.5 Urban Water Management Plan

Water Code 10910 (c) (1)

In June of 2016, the EMWD Board of Directors adopted the 2015 UWMP. This plan details EMWD's projected supplies and demands in five-year increments through the year 2040, and reports EMWD's progress on water use efficiency targets as defined in the Water Conservation Act of 2009. The 2015 UWMP shows that the majority of EMWD's existing and future planned demand is to be met through imported water delivered by MWD. Demand for EMWD shown in the 2015 UWMP is projected across the District as a whole and is not project specific. The 2015 UWMP relies heavily on information and assurances contained within MWD's 2015 Urban Water Management Plan (UWMP-MWD) when determining supply reliability. The 2015 UWMP-MWD is attached as Appendix B.

1.6 Population Projection

In 2015, EMWD updated the population projections from its 2010 UWMP using information from the District's Database of Proposed Projects and the 2015 Empire Economics Absorption Study. EMWD's prior UWMP used the Riverside County Center for Demographic Research (RCCDR) 2010 Projection, which considers land use and land agency information to develop future population projections, which was adopted by the Western Riverside Council of Governments.

Consistent with the significant percentage of undeveloped land within EMWD's service area, growth is anticipated to continue throughout the 2015 UWMP's 25-year planning horizon (as shown below in Table 1). Currently, approximately 40 percent of the District's service area is built out. As population and the associated water demands increase, EMWD will increase the amount of water imported via MWD. Alternatively, local supply projects may eventually offset some of the imported water increases.

Table 1: Projected Population (2020 - 2040)

	2020	2025	2030	2035	2040
EMWD – Retail Service Area	617,100	699,800	784,100	864,200	939,100
City of Hemet Water Department	26,900	27,900	28,900	29,800	30,800
City of Perris / North Perris Water System	13,100	13,800	14,500	15,100	15,800
City of San Jacinto Water Department	16,100	18,500	20,800	23,100	25,500
Lake Hemet Municipal Water District	47,200	51,400	55,500	59,400	63,700
Nuevo Water Company	2,600	3,000	3,400	3,900	4,300
Other (Murrieta Division, etc.)	5,000	6,200	7,600	8,700	10,100
Rancho California Water District	128,500	146,500	160,400	174,400	185,300
Total	**856,500**	**967,100**	**1,075,200**	**1,178,600**	**1,274,600**

(1) Data Sources: American Community Survey, Empire Economics, EMWD, RCCDR, United States Census.

Section 2 – Identification of Supply and Quantity

Water Code 10910 (d)(1)

2.1 Overview of Supplies

EMWD has four sources of water supply: imported water purchased from MWD, local potable groundwater, local desalinated groundwater, and recycled water. On average from 2010 through 2015, EMWD's water supply portfolio averaged approximately 57 percent imported water, 10 percent groundwater, 4 percent desalinated groundwater, and 29 percent recycled water. These figures include water that was indirectly served as wholesale water. Please note that the average proportion of imported water in EMWD's water supply portfolio was affected by sizeable reductions in 2015 (relative to prior years) due to the mandatory water use restrictions enacted by the State Water Resources Control Board in response to severe statewide drought conditions. An annual breakdown of EMWD's supplies is shown in Table 2, which supplements information from the 2015 UWMP. General locations of EMWD's water supplies are shown in Figure 1.

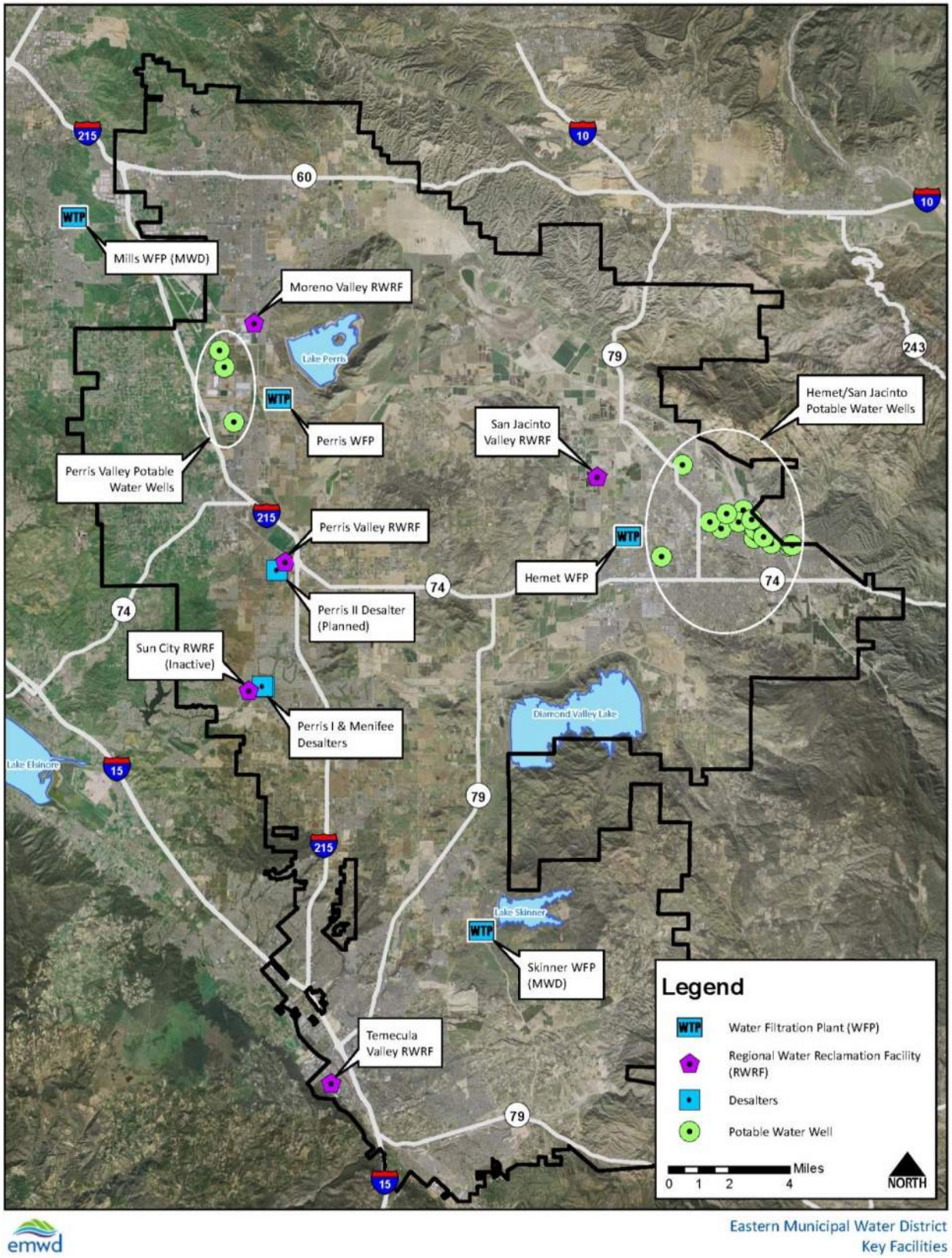
Table 2: Water Supply Portfolio (AF)

Type	Source	2012	2013	2014	2015	2016	2017
Imported – MWD Treated	Metropolitan Water District	62,000	62,200	66,900	39,200	47,700	58,000
Imported – EMWD Treated	Metropolitan Water District	18,300	18,200	21,600	18,600	15,500	12,900
Imported - Raw	Metropolitan Water District	13,300	16,000	15,300	11,900	13,300	7,600
Groundwater(1)	San Jacinto River Groundwater Basin	15,500	18,800	12,800	14,600	14,900	13,300
Desalination(2)	San Jacinto River Groundwater Basin	5,700	4,800	6,800	7,300	6,500	6,300
Recycled Water	Regional Water Reclamation Facilities	44,900	44,900	46,900	45,200	44,800	43,800
	Total	**159,700**	**164,900**	**170,300**	**136,800**	**142,700**	**141,900**

(1) Groundwater totals may include raw, brackish groundwater used to augment recycled water system (served to agricultural customers). Portions of the groundwater basin from which EMWD pumps potable groundwater are adjudicated under the Hemet-San Jacinto Watermaster and subject to adjusted base production rights.

(2) Refers to flow effluent from EMWD's desalination facilities (as opposed to total pumping from brackish wells, which are the influent flow).

Figure 1: Location of Supply Sources



As future development increases the water demands within EMWD's service area, it is anticipated that the majority of the new demands will be met through additional imported water from MWD. Imported supply sources will be supplemented by local supply projects increasing the desalination of brackish groundwater and use of recycled water. EMWD also plans to continue its efforts to enhance water use efficiency within its service area. Table 3 shows EMWD's projected water supplies for both retail and wholesale service throughout the planning horizon set within its UWMP under the assumption that new demands will primarily be met with increases in imported water. These estimates do not account for all potential new local supply projects under development by EMWD or by agencies to which EMWD provides wholesale service.

Table 3: Projected Water Supplies - Average Year Hydrology

Type	Source	2020	2025	2030	2035	2040
Imported Water[1]	Metropolitan Water District	131,697	143,197	158,197	172,797	186,897
Groundwater[2]	San Jacinto River Groundwater Basin	12,303	12,303	12,303	12,303	12,303
Desalination	San Jacinto River Groundwater Basin	7,000	10,100	10,100	10,100	10,100
Recycled Water	Regional Water Reclamation Facilities	46,901	53,100	55,200	57,400	58,900
	Total	**197,901**	**218,700**	**235,800**	**252,600**	**268,200**

(1) Includes 7,500 acre-feet annually to be delivered by MWD to meet the Soboba Settlement Agreement.
(2) Portions of the groundwater basin from which EMWD pumps potable groundwater are adjudicated under the Hemet-San Jacinto Watermaster and subject to adjusted base production rights.

EMWD's water supply reliability is primarily established through MWD, of which EMWD is a member agency. In the 2015 UWMP-MWD, the reliability of water delivery through the State Water Project (SWP) and the Colorado River Aqueduct (CRA) was assessed by MWD. MWD determined that its water sources will continue to provide a reliable supply to its member agencies during normal, single-dry, and multiple-dry years during the UWMP planning horizon. Unprecedented shortages are addressed in the Water Shortage Contingency Analysis and Catastrophic Supply Interruption Planning portions of the UWMP-MWD.

2.2 Wholesale Water Supplies

2.2.1 Written Contracts of Other Proof of Entitlement

Water Code Section 10910 (d)(2)(A)

EMWD is one of the 26 member agencies that make up MWD. The statutory relationship between MWD and its member agencies establishes the scope of EMWD's entitlements from MWD. Typically there are no set limits on supply quantities to member agencies and MWD has provided evidence in the 2015 UWMP – MWD that its supplies will meet member agency demands during normal, single-dry, and multiple-dry years within a 20-year projection.

During unprecedented shortage events, the MWD Water Supply Plan (WSAP) is implemented, requiring a reduction in demand by member agencies. The allocation plan takes into account member agency population growth and investments in local resources. Member agencies are allocated a portion of their anticipated demand with the assurance that a member agency will not see a retail shortage greater than the regional shortage. Water supply is not limited under the allocation plan but water use above a member agency's allocation is charged at a much higher rate. In 2015, after four years of dry conditions, MWD implemented Condition Three of its Water Supply Allocation Plan to preserve stored water. This action follows the principles in the Water Surplus and Drought Management Plan as described in the 2015 UWMP – MWD. During the allocation from MWD, EMWD implemented demand reduction strategies as outlined in its Water Shortage Contingency Plan and reduced imported demand below the allocation level. In 2016, MWD rescinded Condition 3 and declared a "Water Supply Alert" (Condition 2).

In 2014, the governor declared the State of California to be in a state of emergency due to drought. Beginning in June of 2015, urban water suppliers, including member agencies of MWD, have been subject to a mandatory conservation standard relative to 2013 demands under the emergency regulation enacted by the SWRCB. EMWD was initially subject to a mandatory conservation standard of 28 percent. In 2016, the SWRCB relaxed the mandatory conservation standards on an interim basis due to slight improvement in the statewide drought conditions; this was followed by an end to the declared drought emergency in April 2017. However, the SWRCB may implement either permanent conservation regulations or another temporary conservation order based on future hydrologic conditions in the state.

2.2.2 Metropolitan Water District of Southern California Supplies

EMWD relies on MWD to provide the majority of its potable water supply and a small percent of its non-potable water supply. The northern portion of EMWD's service area is supplied by MWD's Mills Water Filtration Plant (WFP), while the southeastern portion of EMWD's service area is supplied by MWD's Skinner WFP. Untreated water from MWD is treated at EMWD's Perris and Hemet WFPs, and is also delivered directly to a number of agricultural and wholesale customers.

The majority of new water demands caused by growth are to be met through additional imported water from MWD, although increases in local supplies such as brackish groundwater desalination and recycled water are expected to offset this to an extent. The 2015 UWMP-MWD concludes that MWD will have a reliable source of water to meet member agency needs through 2040 and includes reliability analysis for historic single-dry and multiple-dry years. Unprecedented shortages are addressed in the Water Shortage Contingency Analysis and Catastrophic Supply Interruption Planning portions of the UWMP-MWD.

2.2.3 Metropolitan Water District of Southern California – UWMP

The 2015 UWMP-MWD provides information about MWD's supply reliability and projected demands. MWD does not provide supply projections for each member agency; instead, MWD uses a regional approach to developing projections. Demand for the entire Southern California region is calculated, and then, based on available information about existing and proposed local projects, MWD determines the amount of imported water needed during future years. EMWD staff coordinated with MWD on the UWMP-MWD, exchanging information about demands, local supply projects, and population projections. Based on the information provided by EMWD and

other member agencies, MWD states that it is able to meet projected demands for all member agencies through 2040, even during dry periods. Under extreme conditions, water supplies could be allocated using the WSAP to preserve supplies in storage. The 2015 UWMP-MWD is included as Appendix B of this WSA.

2.3 Local Resources

Water Code 10910 (d)(1)

In an effort to reduce dependency of imported water from MWD and increase overall system reliability, EMWD has developed several programs to take advantage of local resources. High-quality groundwater is a source of water for local customers within the Hemet/San Jacinto area, as well as a limited area in Moreno and Perris Valley. EMWD also operates two desalination facilities (with a third in design) to take advantage of a region of brackish groundwater located within its service area. The product water from the desalination facilities is fed into the EMWD's potable distribution system.

2.4 Groundwater

Water Code Section 10910 (f)

Groundwater information is included in this assessment to assist the lead agency in determining the adequacy of EMWD's total supply. Groundwater is not being proposed to serve this project, as EMWD considers current groundwater production to be utilized completely by existing customers. New developments, including the Proposed Project, will be supplied with additional imported water from one of the following sources: (1) treated imported water from MWD; (2) untreated imported water from MWD, which is subsequently treated by EMWD; or (3) untreated imported water treated by EMWD and recharged into the San Jacinto River Groundwater Basin for later withdrawal.

2.4.1 Urban Water Management Plan Review

Water Code Section 10910 (f)(1)

The 2015 UWMP discusses projected groundwater use by EMWD and explains assumptions made about groundwater. In the following sections, portions of the 2015 UWMP are summarized or excerpted below for informational purposes only. The water supply for the Proposed Project will not include groundwater.

2.4.2 Basin Description – Groundwater Management Zones in EMWD's Service Area

Water Code Section 10910 (f)(2)

EMWD's service area overlies the San Jacinto Groundwater Basin, which is primarily comprised of alluvium-filled valleys carved into the elevated bedrock plateau of the Perris Block. The San Jacinto Groundwater Basin is generally considered a closed basin surrounded by impermeable bedrock mountains and hills. For groundwater management plan and reporting purposes, the San Jacinto Groundwater Basin is further separated into the Hemet/San Jacinto Basin, where the San Jacinto Fault Zone strongly influences the groundwater hydrology, and the West San Jacinto Basin.

Groundwater management zones within the San Jacinto Groundwater Basin as a whole are delineated based on groundwater flow, groundwater divides, and changes in groundwater quality. The Hemet/San Jacinto Basin is comprised of the Hemet South, Canyon, and San Jacinto Upper Pressure Management Zones, as well as the Hemet North portion of the Lakeview/Hemet North Management Zone. The West San Jacinto Basin covers the Perris North, Perris South, San Jacinto Lower Pressure, and Menifee Management Zones, and the Lakeview portion of the Lakeview/Hemet North Management Zone. EMWD produces water for potable use or blending in four of the management zones: Perris North, Hemet South, San Jacinto Upper Pressure and Canyon. Desalter production wells are located in the Perris South and Lakeview/Hemet North Management Zones.

Detailed descriptions of each Management Zone and other additional information may be found in Section 6 of the 2015 UWMP attached as Appendix A of this WSA.

2.4.3 Groundwater Management

Water Code 10910 (f)(2)

The San Jacinto Groundwater Basin is managed under two groundwater management plans. The Hemet/San Jacinto Groundwater Management Plan (HSJ Management Plan) covers the Hemet South, Canyon, San Jacinto Upper Pressure, and Hemet North portion of the Lakeview/Hemet North Groundwater Management Zones. The West San Jacinto Groundwater Basin Management Plan (WSJ Management Plan) covers the Perris North, Perris South, San Jacinto Lower Pressure, Menifee, and the Lakeview portion of the Lakeview/Hemet North Management Zones.

2.4.3.1 Hemet/San Jacinto Groundwater Management Plan

In 2001, the Cities of Hemet and San Jacinto, Lake Hemet Municipal Water District (LHMWD), EMWD, and representatives of the private groundwater producers, with the Department of Water Resources (DWR) acting as an impartial mediator, began working on a groundwater management plan for the Hemet/San Jacinto Basin. The group discussed and resolved several controversial issues, including San Jacinto Tunnel seepage water, the Fruitvale Judgment and Decree, export of groundwater from the basins, and how to maximize the use of recycled water. As a result of their efforts, a final HSJ Management Plan was completed in 2007 and a Stipulated Judgment was entered with the Superior Court of the State of California for the County of Riverside in April of 2013.

The HSJ Management Plan:

- Limits the amount of water being extracted from the basin free of the replenishment charge to a sustainable yield.
- Implements continued recharge of the basin using imported water through the Integrated Recharge and Recovery Program (IRRP).
- Ensures settlement claims by the Soboba Tribe are facilitated and accommodated.
- Expands the existing water production and water services system to meet future urban growth through the use of imported water recharged into the basin.
- Protects and/or enhances water quality in the Hemet/San Jacinto Basin.
- Supports cost-effective water supplies and treatment by the public agencies.

- Eliminates groundwater overdraft and enhances basin yield.
- Continues the monitoring program to promote and provide for best management and engineering principles to protect water resources.

Long-term groundwater management includes plans for artificial recharge using MWD replenishment water via permanent facilities through the IRRP Program. An agreement with the Soboba Tribe requires MWD to deliver, on average, 7,500 AFY of water for the next 30 years to EMWD, LHMWD, and the Cities of Hemet and San Jacinto as part of an effort to recharge groundwater in the Hemet/San Jacinto Basin, fulfilling the Soboba Tribe's water rights and addressing chronic groundwater overdraft.

EMWD's rights under the HSJ Management Plan will be a long-term base groundwater production right of 7,303 AFY. EMWD's base production right will be gradually adjusted to the long-term value. In 2018, EMWD's adjusted base production right was 7,469 AF, not including previously recharged water credited to it. Any pumping above that amount is subject to replenishment fees.

2.4.3.2 West San Jacinto Groundwater Basin Management Plan

In the West San Jacinto area, a cooperative groundwater management plan helps insure the reliability and quality of the water supply. In June 1995, EMWD adopted the WSJ Management Plan in accordance with the statutes in the California Water Code Sections 10750 through 10755 resulting from the passage of AB 3030. The plan was adopted after extensive public outreach and meetings with interested individuals and agencies.

Implementation of the WSJ Management Plan began directly after its adoption. Initial efforts to implement the WSJ Management Plan included establishing an advisory committee; prioritizing the management zones; evaluating groundwater resources including establishing groundwater quality, level, and extraction monitoring programs; and conducting hydro-geophysical investigations. The West San Jacinto Groundwater Basin Management Plan Annual Report, documenting the implementation of the plan and activities in the groundwater management zones, has been published annually since 1996.

2.4.4 Groundwater Recharge

EMWD has undertaken groundwater recharge operations with imported surplus MWD water within the Hemet/San Jacinto area since 1990, through the use of temporary facilities constructed under various pilot programs. Long term facilities for recharge were placed in operation under the IRRP, which plays an integral role in both the HSJ Management Plan and the Soboba Settlement. Facilities for the first phase of the IRRP include approximately 35 acres of basins/ponds for recharge, three extraction wells, three monitoring wells, modifications to two existing pump stations and pipelines within and adjacent to the San Jacinto River. Approximately 6,000 AF was recharged in 2012, 7,500 AF was recharged in 2013, and 3,500 AF was recharged in 2014. No recharge occurred in 2015 due to severe drought conditions statewide. Recharge resumed in 2016, and a total of 12,656 AF was recharged. Approximately 19,686 AF was recharged in 2017.

EMWD also contributes to the replenishment of the basin by providing recycled water to customers for use in lieu of private groundwater production. This program can deliver up to

8,540 AF annually to local agricultural users and the costs are borne jointly by EMWD, LHMWD, and the Cities of Hemet and San Jacinto. Agreements that set limits on groundwater production and support portions of operational and maintenance costs have been in place since 2008.

2.4.5 Groundwater Pumping Rights

Water Code 10910 (f)

The Hemet/San Jacinto area forms the bulk of the eastern portion of EMWD's service area and is adjudicated through the Hemet-San Jacinto Watermaster and managed under the HSJ Management Plan. The groundwater native to this region is generally of high quality and is a major source of municipal as well as private production. EMWD's adjusted base groundwater production right in this area for 2018 is 7,469 AF and will eventually step down to a long term value of 7,303 AF. Any pumping above this amount is subject to replenishment fees or must be offset by groundwater recharge.

EMWD also has a number of potable wells in the Moreno Valley/North Perris area and a number of brackish wells that feed EMWD's desalination facilities. These wells are located outside of the Hemet/San Jacinto area and are not subject to pumping restrictions.

2.4.6 Surface Diversion Rights

License Number 10667

EMWD holds a right to divert up to 5,760 AF of San Jacinto River flows for recharge and subsequent use. The diversion right applies annually from November 1 through June 30 each year. EMWD's diversion and recharge of San Jacinto River flows takes place within the Canyon Groundwater Management Zone at EMWD's Grant Avenue Ponds located in the Valle Vista area. Diversions are recharged into the groundwater basin and are not sold or used directly. Flows in the San Jacinto River are ephemeral and in any given year, flows may not be sufficient for any amount of diversion at all. In 2017, approximately 3,150 AF of San Jacinto River flows were diverted. Additional information about surface water diversions is available in the 2016 Annual Report of the HSJ Management Plan.

2.4.7 Past Groundwater Extraction

Water Code 10910 (f)(3)

Historic groundwater extractions by EMWD are documented in Table 2. The majority of EMWD's groundwater is extracted from the Hemet/San Jacinto area, with the remainder coming from the area covered by the WSJ Management Plan. The general location of wells and desalination facilities are shown in Figure 1.

2.4.8 Projected Groundwater Extraction

Water Code 10910 (f)(4)

EMWD's projected groundwater supplies are shown in Table 3. Groundwater produced from the Hemet/San Jacinto area is adjudicated by the Hemet-San Jacinto Watermaster. For 2018, EMWD has a base production right of 7,469 AF. This will step down annually to a long term base production right of 7,303 AF. Any pumping above the base production right will be subject to replenishment fees or offset by groundwater recharge. Groundwater production outside the

Hemet/San Jacinto area is not restricted and includes EMWD's wells located in Moreno Valley and North Perris, as well as the wells feeding EMWD's desalter system. The general locations of the facilities shown in Figure 1 are anticipated to remain consistent for the foreseeable future.

2.4.9 Analysis of the Sufficiency of Groundwater

Water Code 10910 (f)(5)

Protecting the groundwater supply available to EMWD is an important part of the District's planning efforts. EMWD is actively working with other agencies and groups to ensure that groundwater will continue to serve as a reliable water resource in the future. This effort includes the replacement of groundwater extracted beyond a given basin's safe yield.

EMWD extracts groundwater within its service area under the HSJ and WSJ Management Plans. Under the HSJ Management Plan, imported water will be recharged in the Hemet/San Jacinto area to support groundwater extractions, while pumping in the WSJ area will remain relatively constant.

The groundwater produced by EMWD is allocated towards meeting existing demands. Although the planned expansion of the District's desalination facilities will provide an additional supply of water, the amount will not be sufficient to accommodate the proposed growth within the District's service area. The majority of the increased water demand created by this project will be met by increasing the use of imported water from MWD, recognizing the conditions of approval outlined in this document.

2.5 Recycled Water

Water Code 10910 (d)(1)

Recycled water is used extensively in EMWD's service area in place of potable water. This offset to municipal demand comes from recycled water use to irrigate landscape and for industrial purposes. The majority of EMWD's agricultural customers also use recycled water, in some cases, in lieu of groundwater production.

EMWD's recycled water supply will expand as the population within EMWD's service area continues to grow. EMWD currently uses all of its recycled water and is limited only by the amount available to serve during peak demands and by system losses. EMWD stores recycled water during low demand periods and does not discharge recycled water. The District anticipates that this will continue even as the supply grows via programs to retrofit additional landscape customers currently using potable water and future indirect potable recharge.

2.6 Water Use Efficiency Measures

The Water Conservation Act of 2009 (SBx7-7) set a requirement for water agencies to reduce their per capita water use by the year 2020. The overall goal is to reach a statewide reduction of per capita urban water use of 20 percent by December 31, 2020, with an intermediate 10 percent reduction by December 31, 2015. Demand reduction can be achieved through both conservation and the use of recycled water as a potable demand offset.

EMWD's conservation effort primarily utilizes three methodologies:

1. Budget Based Tiered Rates – EMWD implemented a tiered rate billing structure for its residential and landscape customers in April of 2009. Customers are provided an allocation for reasonable water use and are required to pay a higher rate for water use over their allocated limit. A study by the University of California, Riverside, showed that budget based rates reduced demand from existing residential customers by 15 percent;

2. Water Use Efficiency Requirements for New Development – These requirements focus on the installation of lower water use landscape and interior fixtures. Water use efficiency is mandated statewide through existing ordinances, plumbing codes, and legislation. To enforce water use efficiency, EMWD has lowered the water budget allocations for new developments. Any residential or dedicated landscape account installed after January 1, 2011, has an outdoor budget allocation based on only 70 percent of evapotranspiration (ET) and non-functional turf is prohibited. Similar accounts installed after April 2015, have an outdoor budget allocation that is reduced to 50 percent of ET. As of January 2018, accounts with an outdoor budget allocation of 100 percent of ET have been reduced to 80 percent of ET; and

3. Active Conservation Program – EMWD implements a variety of water use efficiency programs that encourage the replacement of inefficient devices and includes monetary rebates, distribution, and direct installation programs.

In addition to these outlined conservation efforts, EMWD continues to expand its recycled water system to offset potable demand.

2.7 Local Resources Documentation

2.7.1 Written Contracts or Other Proof

Water Code 10910 (d)(2)(A)

The following is a list of documents related to EMWD's local water supply:

- **EMWD 2015 Urban Water Management Plan (June 2016)**: EMWD's 2015 Urban Water Management Plan is attached as Appendix A. This plan supplies additional information on EMWD, its service area, water management, and supply capabilities.
- **Hemet/San Jacinto Groundwater Management Area – 2016 Annual Report (June 2017)**: This annual report contains detailed information on the history and progress of groundwater management and the groundwater monitoring program in the Hemet/San Jacinto area. This report can be found on EMWD's website (www.emwd.org).
- **Hemet/San Jacinto Groundwater Management Area – Water Management Plan**: This plan was developed by stakeholders in the Hemet/San Jacinto area to provide a foundation to guide and support responsible water management into the future. The plan was finalized in 2007.
- **West San Jacinto Groundwater Management Area – 2016 Annual Report (June 2017)**: This annual report contains detailed information on the history and progress of groundwater management and the groundwater monitoring program in the West San

Jacinto area (including Perris and Moreno Valley). This report can be found on EMWD's website (www.emwd.org).

With respect to EMWD's ownership and use of reclaimed/recycled water, the California Water Code, Section 1210 states:

> *The owner of a wastewater treatment plant operated for the purpose of treating wastes from a sanitary sewer system shall hold the exclusive right to the treated wastewater as against anyone who has supplied the water discharged into the wastewater collection and treatment system, including a person using water under a water service contract, unless otherwise provided by agreement.*

With respect to the Water Use Efficiency Ordinance that will result in additional supplies through conservation:

- The County of Riverside Board of Supervisors approved an update to Ordinance No. 859 on October 20, 2009, requiring water efficient landscaping in any new development requiring a permit.

- EMWD's Administrative Code requires water efficient landscaping in new developments and water efficiency by all customers. The efficiency is enforced through allocation based tiered rates. EMWD's Administrative Code can be found on EMWD's website (www.emwd.org).

2.7.2 EMWD's Capital Improvement Plan

Water Code 10910 (d)(2)(B)

EMWD maintains and periodically updates a comprehensive Water Facilities Master Plan (WFMP). This working plan defines water supplies, transmission mains, and storage facilities required for the accommodation of projected growth within EMWD. On a yearly basis, a five-year Capital Improvement Plan (CIP) is prepared, which is based on a further refinement of the WFMP. The CIP outlines specific projects and their funding source. Each project is also submitted individually to the EMWD Board of Directors for authorization and approval. This allows EMWD to accurately match facility needs with development trends. Financing information for the desalter plant construction, expansion of the regional water reclamation facilities, and well replacement can also be found in the CIP.

2.7.3 Federal, State and Local Permits Needed for Construction

Water Code 10910 (d)(2)(c)

As part of EMWD's CIP, an Environment Review Committee (Committee) has been established. This Committee, made of representatives from the Engineering, Water Supply Planning, Groundwater Management and Facilities Planning, and Environmental and Regulatory Compliance Departments, discuss each project and the steps needed to comply with regulatory requirements. EMWD works with various government agencies, including the United States Department of Fish and Wildlife, the United States Army Corps of Engineers, the California Department of Public Health, the California Division of Drinking Water, the California State Water Resources Board, the California Air Quality Management District, and the California Department

of Fish and Game to obtain permits when necessary. The Engineering Department procures additional construction permits on a case-by-case basis. EMWD has already, or is in the process of, obtaining Environmental Impact Reports or other environmental documents necessary for desalter construction, expansion of regional water reclamation facilities, and well replacements. Any necessary permits secured by EMWD are kept on file at the District's headquarters facility.

2.7.4 Regulatory Approvals

Water Code 10910 (d)(2)(D)

The California Division of Drinking Water (DDW) has issued a system-wide permit for EMWD's water supply system. EMWD's Environmental and Regulatory Compliance Department conforms to specific regulations and obtains any additional necessary approvals. As new facilities are constructed by EMWD, they are subject to inspection and testing by regulatory agencies and the DPH permit is amended.

Section 3 – Demands

3.1 Demand Projections

Water Code 10910 (c)(2), 10631 (e)(1)

EMWD's primary retail customers for potable/raw water can be divided into residential, commercial, industrial, institutional, and landscape sectors. The residential sector is EMWD's largest customer segment; however, each sector plays a role in the growth and development of EMWD's service area. The historic and projected customer distribution and water use by the various potable/raw retail customer types are shown in Table 4 and Table 5.

Table 4: Retail Potable/Raw Customer Account Distribution

	Actual Accounts			Projected Accounts				
Use Type	2005	2010	2015	2020	2025	2030	2035	2040
Single Family	114,100	129,400	136,200	154,300	173,600	193,200	212,000	230,500
Multi-Family	1,000	4,300	4,300	4,900	5,500	6,100	6,800	7,300
Commercial	1,500	2,100	2,600	3,000	3,300	3,700	4,100	4,400
Industrial	100	100	200	200	200	200	200	300
Institutional	40	500	500	600	700	800	900	900
Landscape[1]	1,500	2,200	2,800	2,200	2,200	2,200	2,200	2,100
Agriculture	200	100	700	700	700	700	700	700
Total	**118,440**	**138,700**	**147,300**	**165,900**	**186,200**	**206,900**	**226,900**	**246,200**

(1) Landscape accounts are projected to remain constant or decrease over time due to anticipated conversion to recycled water.

Table 5: Retail Potable/Raw Water Deliveries by Customer Type (2005 - 2040)

	Actual Deliveries - AF			Projected Deliveries – AF [2]				
Use Type[1]	2005	2010	2015	2020	2025	2030	2035	2040
Single Family	62,300	54,000	45,700	64,800	72,900	81,100	89,000	96,800
Multi-Family	5,500	6,100	5,800	8,300	9,300	10,300	11,400	12,300
Commercial	3,900	4,200	4,600	6,500	7,300	8,100	8,900	9,700
Industrial	400	400	300	400	400	500	500	600
Institutional	2,900	2,300	2,000	3,000	3,300	3,700	4,100	4,400
Landscape[3]	7,500	8,900	7,700	7,500	7,500	7,500	7,500	7,300
Agriculture (Potable)	2,400	1,800	1,900	1,900	1,900	1,900	1,900	1,900
Agriculture (Raw)	100	500	900	1,000	1,000	1,000	1,000	1,000
Total	**85,000**	**78,200**	**68,900**	**93,400**	**103,600**	**114,100**	**124,300**	**134,000**

(1) Figures do not include system losses.
(2) Passive water savings due to restrictions outlined in the Administrative Code are included in the demand projections.
(3) Landscape demands remain constant or decrease over time as landscape accounts are offset by conversion to the recycled water system.

EMWD also provides wholesale water service to a number of sub-agencies, serves recycled water, and imports water for recharge purposes. These demands, along with system losses, are shown in Table 6 and Table 7. Total demands are shown in Table 8.

Table 6: Wholesale Deliveries to Other Agencies (2005 – 2040)

	Actual Sales - AF			Projected Sales - AF				
Agency	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
City of Hemet	100	0	0	0	0	0	0	0
City of Perris	1,900	1,700	1,500	1,800	1,900	2,000	2,100	2,200
City of San Jacinto	0	0	0	0	0	0	0	0
Lake Hemet Municipal Water District[1]	100	1,300	4,300	4,700	5,100	5,500	5,900	6,300
Nuevo Water Company	800	600	200	400	500	600	600	700
Murrieta Division (WMWD)	100	1,600	700	2,500	3,900	5,200	6,500	7,900
Rancho California Water District	26,300	21,900	15,000	33,600	35,200	36,900	38,600	40,200
Hemet-San Jacinto Watermaster[2]	0	0	0	7,500	7,500	7,500	7,500	7,500
Total	**29,300**	**27,100**	**21,700**	**50,500**	**54,100**	**57,700**	**61,200**	**64,800**

(1) Deliveries to Lake Hemet Municipal Water District may include non-potable supplies used to meet agricultural demand or may be in the form of recharge managed through the Hemet/San Jacinto Water Management Plan.

(2) Deliveries to the Hemet-San Jacinto Watermaster will support groundwater recharge activities under the Hemet/San Jacinto Water Management Plan.

Table 7: Other Water Uses (2005 - 2040)

	Actual Use - AF			Projected Use - AF				
Category	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Recycled Water[1][2]	32,600	28,200	46,100	46,900	53,100	55,200	57,400	58,900
Recharge Water[2]	7,000	0	0	0	0	0	0	0
Other/System Losses[3]	7,700	8,400	9,100	7,100	7,900	8,800	9,700	10,500
Total	**47,300**	**36,600**	**55,200**	**54,000**	**61,000**	**64,000**	**67,100**	**69,400**

(1) Recycled water projections include recycled water that is delivered to sub-agencies.

(2) Recycled water totals may include brackish groundwater used to supplement the recycled water system during high demand months.

(3) Total recharge water does not include water that is wholesaled to the Hemet-San Jacinto Watermaster for recharge purposes (totals are shown in Table 7).

(4) Includes real and apparent losses for retail and the wholesale system, unbilled, authorized consumption, etc.

Table 8: Summary of System Water Demands (2005 - 2040)

	Actual Demands - AF			Projected Demands - AF				
Category	2005	2010	2015	2020	2025	2030	2035	2040
Retail Demands	85,000	78,200	68,900	93,400	103,600	114,100	124,300	134,000
Wholesale Demands	29,300	27,100	21,700	50,500	54,100	57,700	61,200	64,800
Other Water Uses(1)	47,300	36,600	55,200	54,000	61,000	64,000	67,100	69,400
Total	**161,600**	**141,900**	**145,800**	**197,900**	**218,700**	**235,800**	**252,600**	**268,200**

(1) Includes retail and wholesale recycled water demands.

3.2 Project Demands

The City of Murrieta is the lead agency for the preparation of an EIR pursuant to the California Environmental Quality Act (CEQA), Public Resources Code Section 21000, and et seq. for the Murrieta Hills (Proposed Project). The Proposed Project is located on approximately 972 acres in the City of Murrieta and consists of a master-planned, low, medium, and high density residential community of up to 750 dwelling units, along with roughly 15 acres of open space for recreation, 18 acres of commercial retail, and 647 acres of open space for conservation. The Proposed Project is located within the unincorporated Riverside County area bounded by Keller Road to the north, Escondido Expressway to the east, City of Wildomar to the west, and City of Murrieta to the south. The estimated annual demand for the Proposed Project is 430 acre-feet (AF). The land use considered for the project area in the 2015 UWMP demand projection was primarily rural mountainous, with four percent of the land use considered estate density residential, low density residential, and public facilities. These land uses are not consistent with the Proposed Project and the demand for this project is anticipated to exceed the limits of the projected demand for this area accounted for in the 2015 UWMP, however the demand for this project and other planned developments are below the total amount of new demand evaluated in the 2015 Urban Water Management Plan. EMWD is also constantly updating its water supply portfolio and developing local resources to meet future demand. In 2021 the Urban Water Management Plan will be updated and include this project in future demand projections and updates to the EMWD supply portfolio. The projected demands are shown in Table 8 of this WSA. The developer for the Proposed Project is Pulte/BP Murrieta Hills, LLC and the location is shown in Figure 2.

The estimate of annual demand for this project is shown below in Table 9.

Table 9: Project Demand Estimate

Land Use Category	Base Unit	Project Size (units)	Flow Factor (gpd/unit)	Average Day Demand (gpd)	Annual Demand (MG)	Annual Demand (AF)
Low Density Residential	DU	47	570	26,790	10	30
Medium Density Residential	DU	510	440	224,400	82	252
High Density Residential	DU	193	310	59,830	22	67
Commercial Retail	acre	18	2,200	39,600	14	44
Open Space Recreation	acre	15	2,200	33,000	12	37
Open Space Conservation	acre	647	0	0	0	0
			Total	383,620	140	430

The demand for this project is estimated based on average annual demand from similar land use and is for supply planning only. Demand for facilities planning will be based on peak flows and is to be determined as part of the development design conditions for this project.

All new development is required to install water efficient devices and landscaping. The use of turf for non-functional purposes is prohibited. For reference, a document titled "Water Efficient Guidelines for New Development" is available on EMWD's website (www.emwd.org) to help increase water use efficiency for this project.

3.3 Database of Proposed Projects

Water Code 10910 (c)(3)

To develop the projections used in this WSA, EMWD uses a development tracking database that assesses future water demands for specific projects. EMWD uses this database to help plan for future water supply and infrastructure needs by monitoring new projects through various stages of development. Subject to the Board of Director's approval of this WSA, information associated with this project will be updated in the supply and demand projections EMWD uses for planning. Changes in density and land use are also tracked in this database for planning purposes. The developer is required to notify EMWD if any changes to project density or land use occur.

Section 4 – Evaluation of Supply and Demand

Water Code 10910 (c)(2)

4.1 Supply and Demand Evaluation under Historic Conditions

EMWD's 2015 UWMP includes estimates of EMWD's demand during average, single and multiple dry years. The estimates for EMWD's retail system are documented below in Table 10, Table 11, and Table 12 and are taken directly from the 2015 UWMP document. Similar estimates for EMWD's wholesale system are shown in Table 13, Table 14, and Table 15. More details on this analysis can be found in Section 7.6 (Supply and Demand Assessment) of the 2015 UWMP.

Table 10: Retail Normal Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply Totals	145,745	159,834	172,917	185,800	197,800
Demand Totals	145,745	159,834	172,917	185,800	197,800
Difference	**0**	**0**	**0**	**0**	**0**

Table 11: Retail Single-Dry Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply Totals	166,300	182,400	197,400	212,000	225,700
Demand Totals	166,300	182,400	197,400	212,000	225,700
Difference	**0**	**0**	**0**	**0**	**0**

Table 12: Retail Multiple-Dry Years Supply and Demand Comparison (AF)

		2020	2025	2030	2035	2040
First Year	Supply Totals	166,300	182,400	197,400	212,000	225,700
	Demand Totals	166,300	182,400	197,400	212,000	225,700
	Difference	**0**	**0**	**0**	**0**	**0**
Second Year	Supply Totals	142,500	155,400	167,400	179,000	190,100
	Demand Totals	142,500	155,400	167,400	179,000	190,100
	Difference	**0**	**0**	**0**	**0**	**0**
Third Year	Supply Totals	149,500	162,700	175,100	186,900	198,600
	Demand Totals	149,500	162,700	175,100	186,900	198,600
	Difference	**0**	**0**	**0**	**0**	**0**

Table 13: Wholesale Normal Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply Totals	52,156	58,866	62,883	66,800	70,400
Demand Totals	52,156	58,866	62,883	66,800	70,400
Difference	**0**	**0**	**0**	**0**	**0**

Table 14: Wholesale Single-Dry Year Supply and Demand Comparison (AF)

	2020	2025	2030	2035	2040
Supply Totals	58,500	66,200	70,700	75,200	79,300
Demand Totals	58,500	66,200	70,700	75,200	79,300
Difference	**0**	**0**	**0**	**0**	**0**

Table 15: Wholesale Multiple-Dry Years Supply and Demand Comparison (AF)

		2020	2025	2030	2035	2040
First Year	Supply Totals	58,500	66,200	70,700	75,200	79,300
	Demand Totals	58,500	66,200	70,700	75,200	79,300
	Difference	**0**	**0**	**0**	**0**	**0**
Second Year	Supply Totals	48,500	54,700	58,200	61,700	64,900
	Demand Totals	48,500	54,700	58,200	61,700	64,900
	Difference	**0**	**0**	**0**	**0**	**0**
Third Year	Supply Totals	52,000	57,400	61,100	64,600	68,000
	Demand Totals	52,000	57,400	61,100	64,600	68,000
	Difference	**0**	**0**	**0**	**0**	**0**

EMWD's 2015 UWMP discusses the supply reliability for EMWD during dry years. It is anticipated that the majority of water for future development will be supplied by imported water from MWD during single dry years. Typically, MWD does not place imported water limits on a member agency, but predicts the future water demand based on regional growth information. The 2015 UWMP – MWD shows that MWD would have the ability to meet all of its member agencies' project supplemental demand through 2040, even under a repeat of historic drought scenarios.

4.2 Contingency Planning

EMWD maintains a Water Shortage Contingency Plan (WSCP) that aims to reduce demand during water shortage using significant penalties for wasteful water use. EMWD's WSCP details demand reductions for several stages of shortage through a 50 percent or greater reduction. Additional information about contingency planning is included in Chapter 8 of EMWD's 2015 UWMP. The WSCP was last updated on January 20, 2016, and is located in Title 5, Article 10 of the EMWD Administrative Code, which is available on EMWD's website (www.emwd.org).

EMWD is currently in Stage 2 of the WSCP in response to improved statewide water supply conditions and the declared end of the drought emergency.

Section 5 – Water Supply Assessment

5.1 Potable Water

From a facilities perspective, the Proposed Project would be conditioned to construct off-site and on-site water facilities needed to distribute water throughout the project area. Prior to construction, the developer should contact EMWD staff to establish development design conditions and determine if any revisions are required to the master plan. Figure 3 shows existing water facilities in relation to the project.

With respect to water supplies, the project will be required to fund conservation to offset demand not considered in the 2015 UWMP. The remaining project demand will be served using imported water from MWD, supplemented with new local supply projects during multiple-dry years, if needed. Allocation from MWD may result in water supplies being made available at a significantly higher cost depending on circumstances.

5.2 Recycled Water

EMWD policy recognizes recycled water as the preferred source of supply for all non-potable water demands, including irrigation of recreation areas, greenbelts, open space common areas, commercial landscaping, and supply for aesthetic impoundment or other water features.

According to the District's policies, the project may be conditioned to construct a recycled water system separately from the potable water system. The system will need to be constructed to recycled water standards. The project may also be conditioned to construct off-site recycled water facilities. EMWD will make a final determination on requirements for recycled water use and facilities during the development design conditions phase of the project.

5.3 Duration of Approval

This assessment will be reviewed every three years until the project begins construction. The project applicant shall notify EMWD when construction has begun. The review will ensure that the information included in this assessment remains accurate and no significant changes to either the project or EMWD's water supply have occurred. Furthermore, if the EIR for the project is not certified within three years after the adoption of this WSA, the WSA may be updated at such time if there are changed circumstances warranting updated analysis. If the EIR is certified within three years of the adoption of the WSA, then the applicant shall provide updates to EMWD every three years on the status of the project until construction commences; however, in such an instance, the WSA shall not be amended or invalidated by EMWD. If neither the project applicant nor the lead agency contacts EMWD within three years of approval of this WSA, it is assumed that the Proposed Project no longer requires the estimated water demand calculated, and the demand for this project will not be considered in assessments for future projects. The assessment provided by this document will then become invalid.

5.4 Conclusion

EMWD relies on MWD to meet the needs of its growing population. MWD stated in the 2015 UWMP – MWD that with the addition of all water supplies, existing and planned, MWD has the ability to meet all of its member agencies' projected supplemental demand through 2040, even under a repeat of historic multiple-year drought scenarios.

Based on present information and the assurance that MWD is engaged in identifying solutions that, when combined with the rest of its supply portfolio, will ensure a reliable long-term water supply for its member agencies, EMWD has determined that it will be able to provide adequate water supplies to meet the potable water demand for this project as part of its existing and future demands.

In the event that the lead agency determines adequate water supply exists for the Proposed Project, the developer of this project is required to meet with EMWD Development Services Staff to establish development design conditions. The development design conditions will detail water, wastewater, and recycled water requirements to serve the Proposed Project. An agreement developed prior to construction will determine additional funding required to reduce existing customer demand on imported supplies through the expansion of local resources. The reduction of existing customer demand on imported water supplies will free up allocated imported water to be used to serve this project under multiple dry year conditions. The amount of funding will be determined by the EMWD and may take the form of a new component of connection fees or a separate charge. The estimated cost of desalinated water is between $1,400 and $1,700 per AF. These costs are expected to increase over time.

If there is a change in the circumstances detailed in this assessment, EMWD will address the changes in the development design conditions for the project. Modifications at the development design conditions stage could reduce the amount of water available to serve this project.

Section 6 – Conditions of Approval

This assessment is not a commitment to serve the project, but a review of EMWD supplies based on present information available. This assessment is conditioned on MWD's ability to continue to supply imported water to meet EMWD's requirements, including the requirements for this project. This project is subject to any special or additional requirements imposed by MWD or EMWD on such deliveries, including increased pricing or a different pricing structure.

All new development is required to install water efficient devices and landscaping. The use of turf for non-functional purposes is prohibited. A document titled "Water Efficient Guidelines for New Development" is available on EMWD's website to help increase water efficiency for this project.

The lead agency for the project is responsible to evaluate the adequacy of the water supply assessment and make the ultimate decision of the sufficiency of the water supply. The developer for the project is responsible for keeping EMWD informed about progress in the planning and development of the project. The project applicant will contact EMWD with project status information and updates every three years until the project begins construction. This will insure that the information included in this assessment remains accurate and no significant changes to either the project or EMWD's water supply have occurred. Furthermore, if the EIR for the project is not certified within three years after the adoption of this WSA, the WSA may be updated at such time if there are changed circumstances warranting updated analysis. If the EIR is certified within three years of the adoption of the WSA, then the applicant shall provide updates to EMWD every three years on the status of the project until construction commences; however, in such instance, the WSA shall not be amended or invalidated by EMWD. If neither the project applicant

nor the lead agency contacts EMWD within three years of approval of this WSA, it is assumed that the Proposed Project no longer requires the estimated water demand calculated, and the demand for this project will not be considered in assessments for future projects. The assessment provided by this document will then become invalid.

If the lead agency determines adequate water supply exists for this project, to the greatest extent possible, recycled water shall be used on the Proposed Project. Details about the feasibility of recycled water use shall be included in the development design conditions for the project.

Section 7 – Additional Figures

Figure 2: Project Location

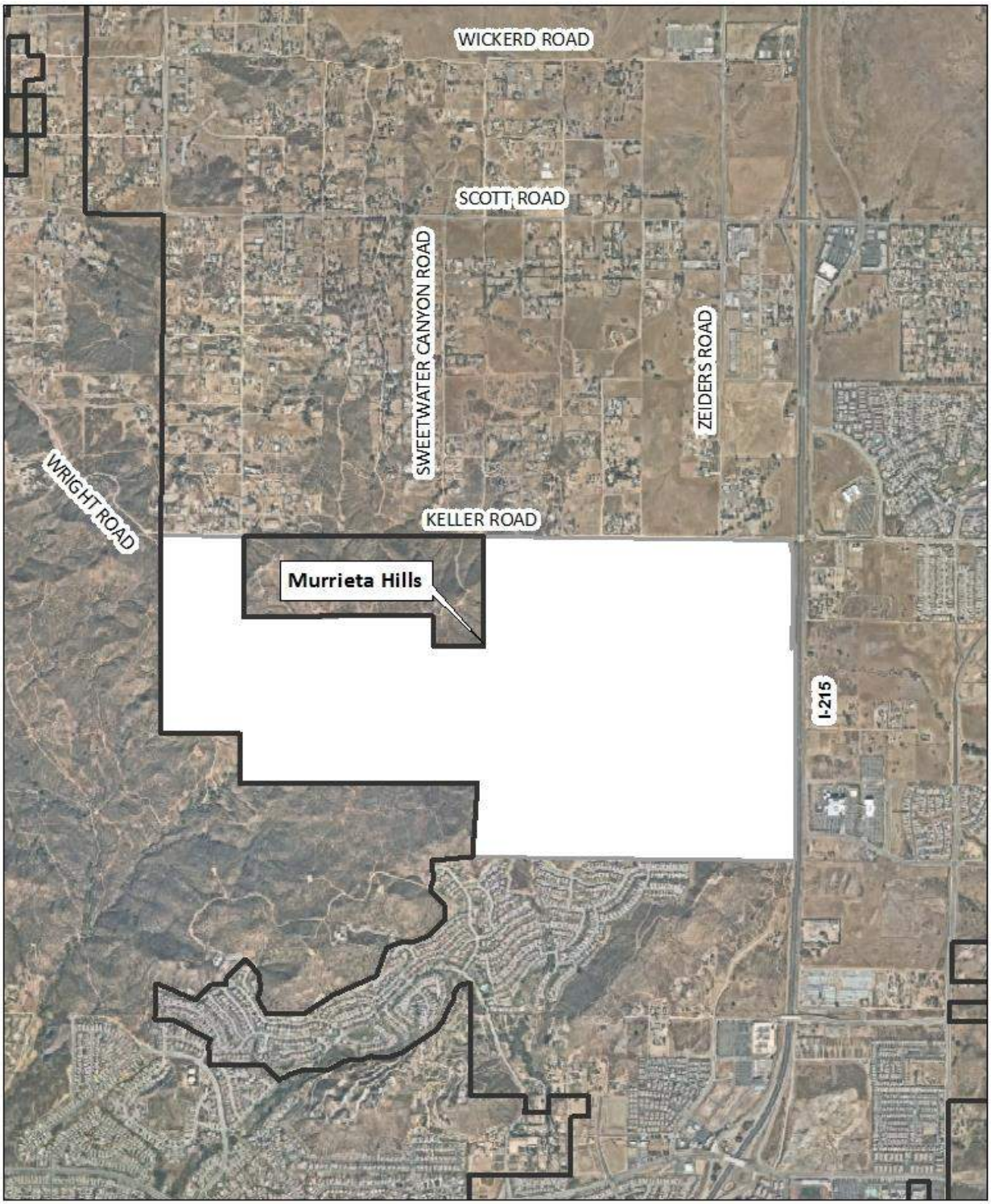
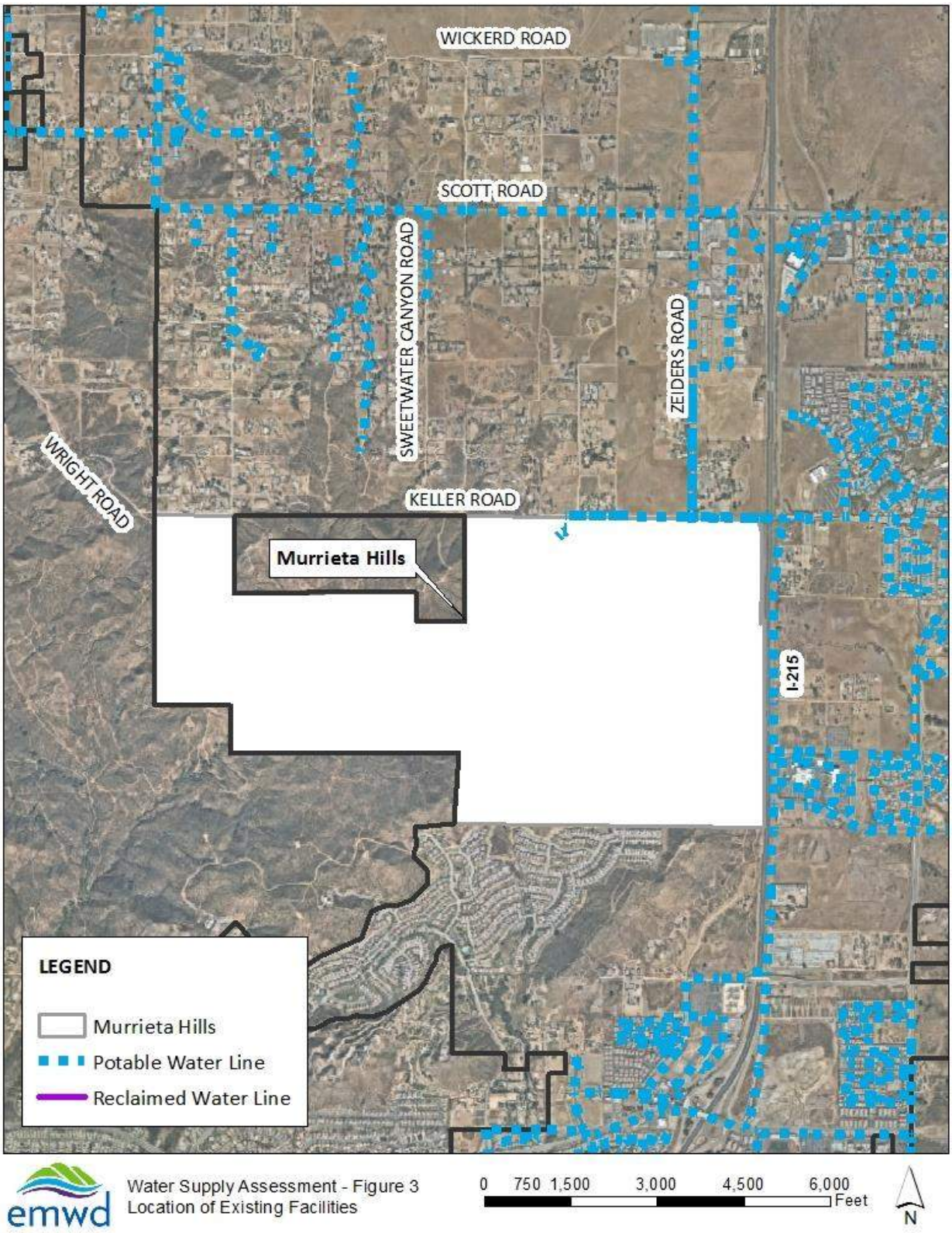


Figure 3: Project Location in Relation to Existing Waterlines



Water Supply Assessment Report

Supplemental Information

Appendix A

EMWD – 2015 Urban Water Management Plan

Available at: https://www.emwd.org/post/urban-water-management-plan

Appendix B

MWD – 2015 Urban Water Management Plan

Available at: http://www.mwdh2o.com/pdf_about_your_water/2.4.2_regional_urban_water_management_plan.pdf

Appendix C

EMWD CIP Budget

Available at: https://www.emwd.org/sites/main/files/file-attachments/budgetbookadopted060717.pdf

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Appendix B

Development Design Conditions for Water and Sewer by EMWD

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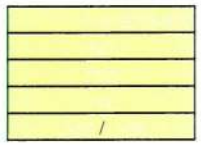

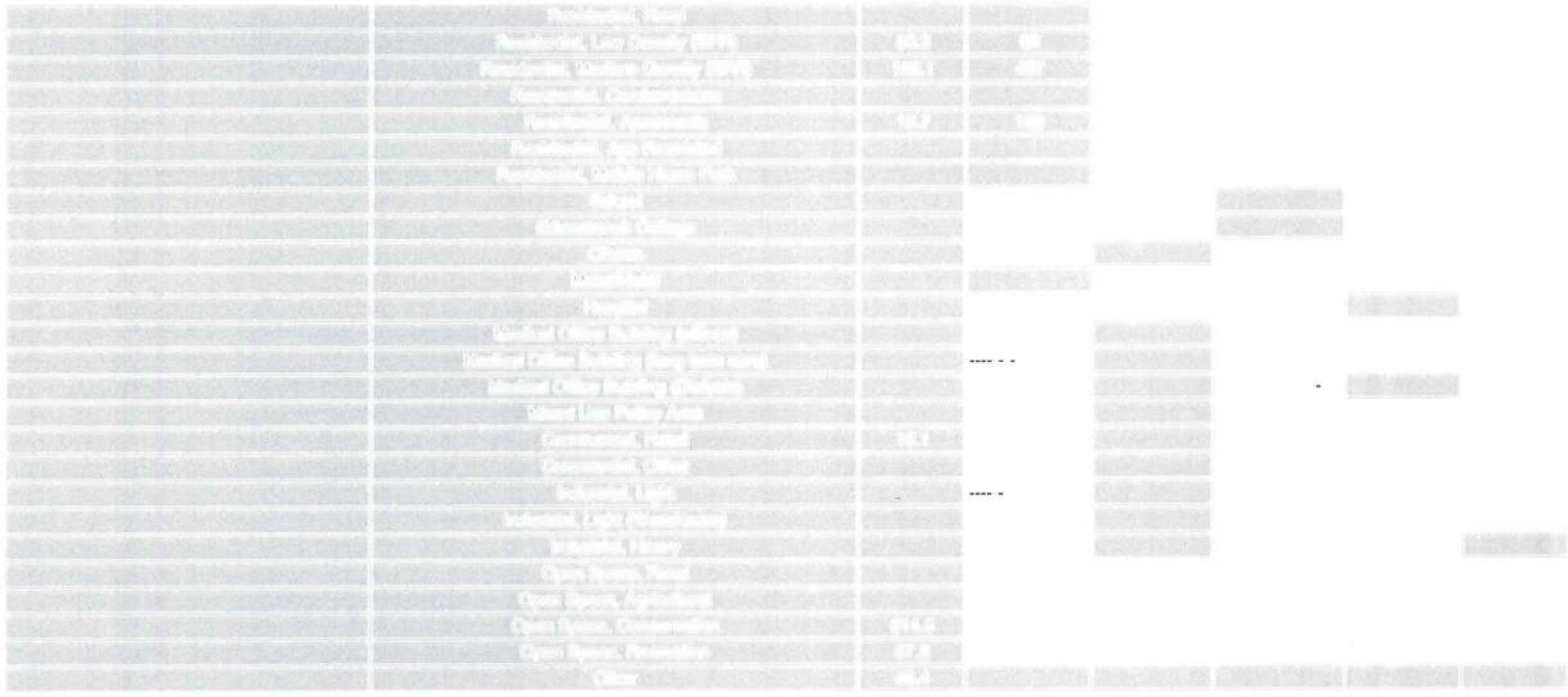

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Onsite	10	8,000	[illegible]				18
Onsite	8	10,000	[illegible]				8
Onsite	8	10,000	[illegible]				8
Onsite	12	7,000	[illegible]				12
Onsite	12	4,000	[illegible]				12
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1. The Planning & Design Criteria used for FIB 2000 and "Water Facilities Planning & Design" guidelines, Updated FIB 2000, and revised May 14, 2018, supplemented by the 2018 Water Facilities Master Plan, Volume 2, Chapter 2.
2. The booster plants and storage tanks using water encroaching will be determined at the final design level. Please refer to Water Facilities Master Plan Preliminary data.
3. Direct any request construction of 18" CIP project for redundant supply to tanks from 1 [illegible] PE during construction of Antelope Pit from Water Pit to Lee Ln.

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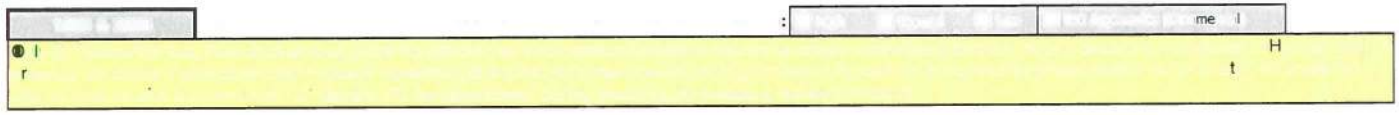

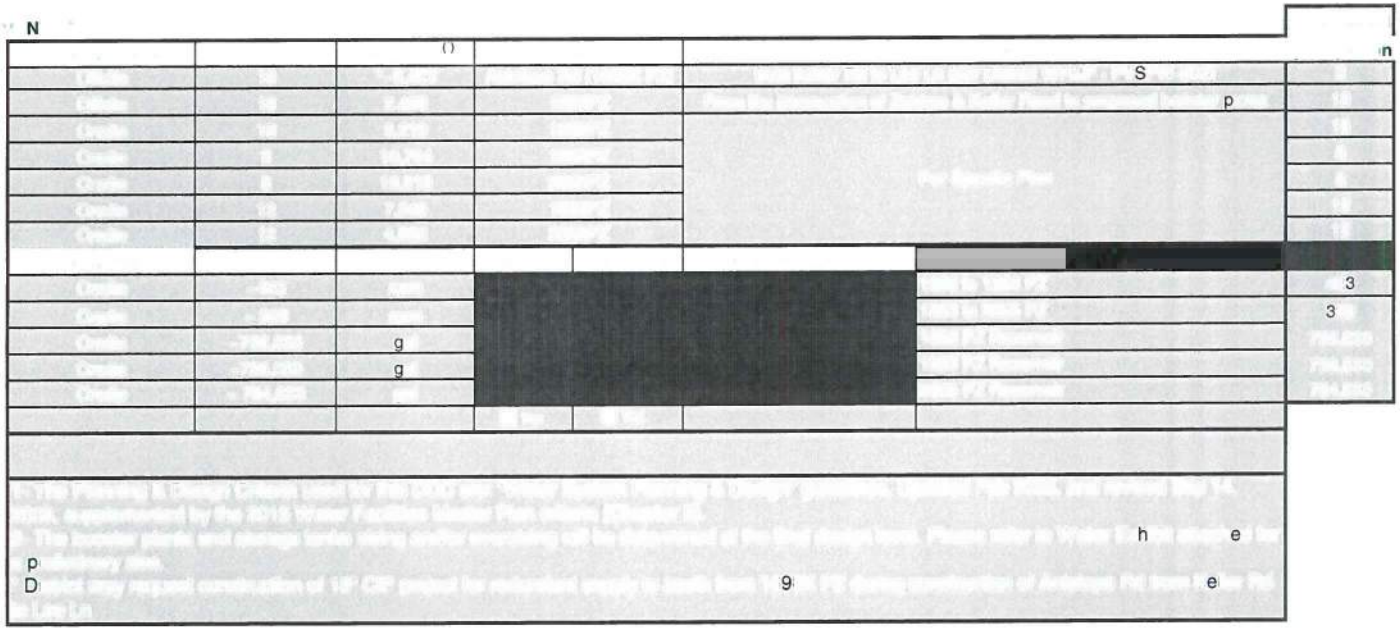

- Applicant to complete Grey sections -

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Criteria	8	[illegible]	Refer PM		Form Criteria PM to [illegible]		[illegible]
Criteria	15	[illegible]	Batch of Project		g [illegible]	ng 3	1
Criteria	8	[illegible]	Per Specific Plan		Per Specific Plan		[illegible]
Criteria	10	[illegible]					[illegible]
Criteria	12	[illegible]					[illegible]
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1. The Planning & Design Criteria used for this DOC was "Planning Water Systems Planning & Design" (Reference: Updated Feb 1996, and revised Sep 1, 2008, supplemented by the 2010 Waste Water Facilities Water Plan criteria (Appendix 8A).
2. Connecting of criteria 1/2 in Zeldom Rd to be determined present design conditions prior to preliminary design.

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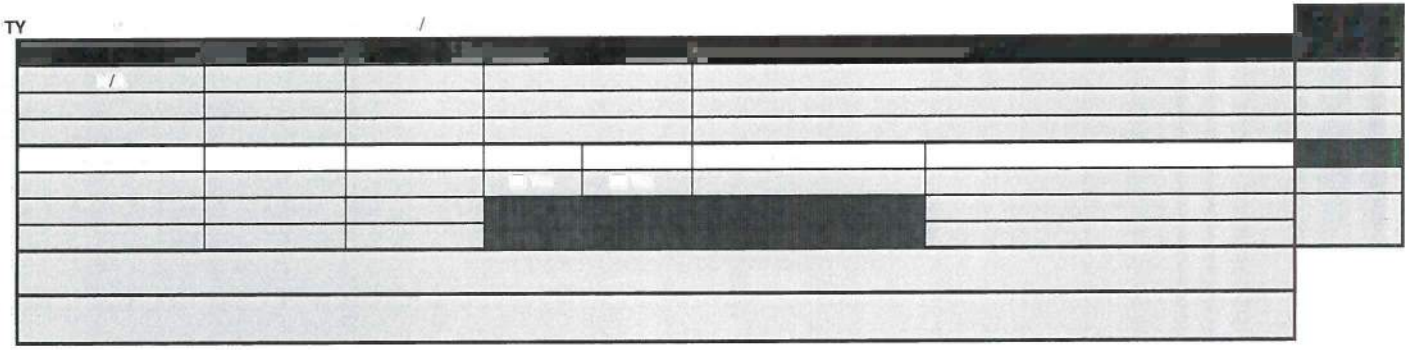

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Developoment Service Department (DSD)

DEVELOPMENT DESIGN CONDITIONS (DDC)

- Applicant to complete Gray sections - EMWD to complete Yellow/White sections -

Form No: *DSD-045*

XVIII. SPECIAL CONDITIONS: For Conditions 1 and 2, please select one of the choices from the Drop-Down List - For all others, do NOT delete the ones that do not apply, instead, cross them out.

1- (Use The Drop Down List)	At the time this DDC was processed, final Conditions Of Approval (COAs) were not available: Therefore, the COAs shall be provided prior to submittal of Plan Check.
2- (Use The Drop Down List)	To qualify for oversizing reimbursement, the sponsor shall provide EMWD with three prevailing-wage bid comparisons following Plan Approval, subject to review by staff, recommendation to, and approval by, the Board of Directors. Only after such review and approval can the sponsor proceed to the Standard Agreement phase. Oversizing of EMWD facilities shall be performed with prevailing-wage contracting (see attachment for EMWD's Prevailing-wage requirements and authorization process description)
3-	It is the applicant's responsibility to provide any updates or revisions to the Project COA during the development, or after the approval, of the DDC. The DDC shall be revised and updated as needed: Failure to provide timely COA updates or revisions may result in potential additional facility requirements and/or delays in processing the project during subsequent phases (such as Plan Check or Agreement phases).
4-	(Only for Residential lots) Plan checker shall utilize the attached service-pressure table(s) to determine pressure conditions for each lot, and cause the recordation of High or Low pressure conditions if applicable: **Low Pressure Agreement** is required for lot pressures <40 psi; **High Pressure Agreement** is required for lot pressures >80 psi; and Lots with pressures <50 psi shall receive a **minimum of 1.5" service laterals. (To be determined during phased submittals with lot pressure tables)**
5-	~~The project lies within the _____ Special Benefit Area, and is subject to additional connection fees.~~
6-	(For residential landscaping fed from a potable water source) At FIRST Plan Check, a "Residential Landscaping Water Budget" form shall be completed and submitted (by a Licensed Civil Engineer or a Licensed Landscape Architect). This form will be reviewed by the Conservation Dept. during the Plan Check phase. A final approval of this form is required by EMWD's Conservation Dept., prior to EMWD's facilities "Release" by the Inspection Department.
7-	To submit for Plan Check of final design, the applicant shall refer to the Plan Check Submittal Checklist (attached). The Plan Check submittal shall include the appropriate Plan Check deposit in order for it to be considered complete.
8-	~~If this project requires Implementing Facilities, then such Implementing Facilities shall be concurrently in Plan Check with this project's Plan Check.~~
9-	For design of all pumping facilities: Provide design capacity, and preliminary site plan and pipeline alignments for DDC approval. Final design shall be reviewed during Plan Check. If a an interim Lift Station is proposed, customer shall include Demolition and Abandonment plans during Plan Check.
10-	Design and install a potable-water sampling station per standard detail B-935, to be located within the project and as designated during the Plan Check review.
11-	~~The project is located within 1/4 mile from an existing EMWD waste water treatment plant, and therefore a notification letter shall be recorded against each of the lots, prior to occupancy.~~
12-	
13-	

XIX. LIST OF APPLICABLE ATTACHMENTS & REFERENCES: (do NOT delete Attachments & References that do not apply, instead, cross them out).

1- Project Vicinity Map
2- Exhibit(s) of DDC Facilities: existing and proposed facilities
3- Exhibit(s) of DDC Facilities subject to relocation and/or easements
~~5- Available Min/Max Pressure table(s) (Residential only)~~
~~6- Fire Dept. Requirements~~
~~7- Project Conditions Of Approval (Draft or Final)~~
~~8- EMWD Fire Flow Test Results~~
~~9- Hydraulic Boundary Conditions~~
~~10- Accepted Recycled Water Use Exhibit or Plan~~
11- Reports or special studies
~~12- CFD Letter, signed by the Owner (Residential tracts only)~~
13- Plan Check Deposit Schedule
~~14- Signed "Residential Landscaping Water Budget" (spreadsheet)~~
15- Manifold detail, for commercial projects
16- DCDA vs RPDA: EMWD Requirements Memo
~~17- DCDA vs RPDA: Customer memo declaring intent of on-site use (Commercial & industrial use only)~~
~~18- Oversizing memo and authorization~~
19- Prevailing-wage requirements and process description
~~20- Customer/developer e-mail, waiving oversizing reimbursement from EMWD~~
~~21- Signed At-Risk Plan Check Letter request, from Developer~~
22- Document Required For Plan Check (Form NBD-063)
~~23- Application For Service Requirements~~

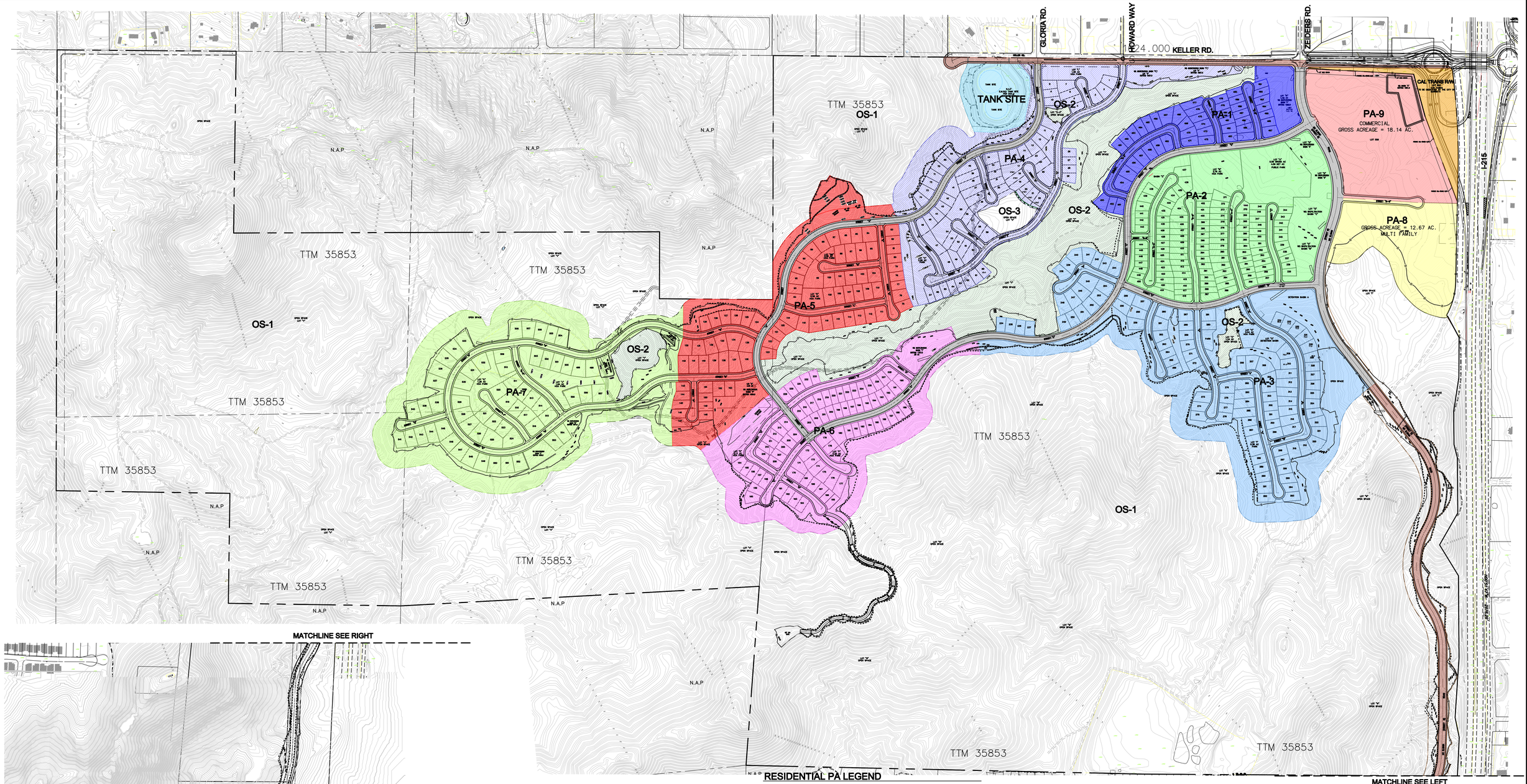
		Date
Prepared By:	Michael Boeck	10/11/2018
Reviewed By:	Brian Raines BAR DSD Engineer & Initials	12/21/2018
Supervisor's Name:	Maroun El-Hage Senior Engineer & Initials	12/21/2018

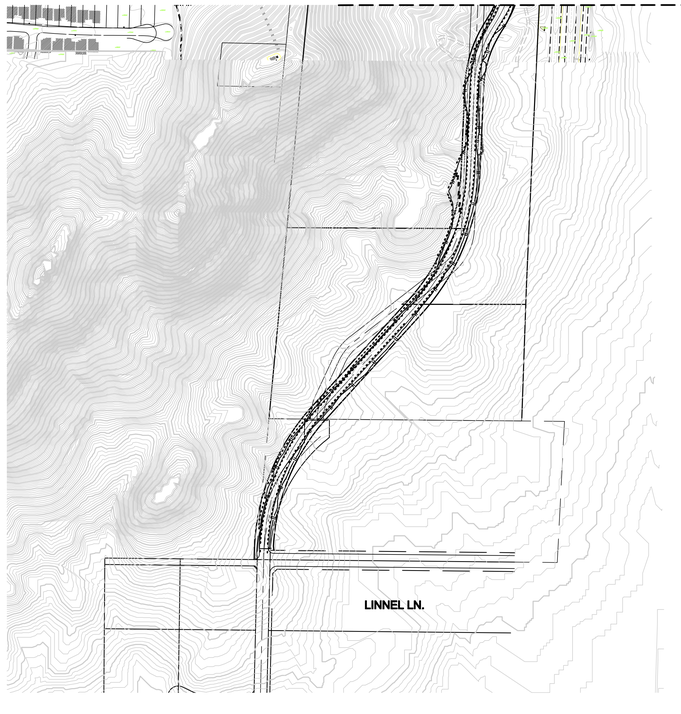
Work Order Closure processed ? ☐ Yes ☑ No

EMWD's Disposition:

APPROVED

Initials: BAR Date: 12/21/18





RESIDENTIAL PA LEGEND

	GROSS ACREAGE	NUMBER OF UNITS	DENSITY
PA-1 (SINGLE FAMILY)	13.59 AC.	47	3.5 UNITS PER AC.
PA-2 (SINGLE FAMILY)	34.18 AC.	116	3.4 UNITS PER AC.
PA-3 (SINGLE FAMILY)	52.49 AC.	101	1.9 UNITS PER AC.
PA-4 (SINGLE FAMILY)	32.51 AC.	74	2.3 UNITS PER AC.
PA-5 (SINGLE FAMILY)	33.26 AC.	79	2.4 UNITS PER AC.
PA-6 (SINGLE FAMILY)	32.09 AC.	80	2.5 UNITS PER AC.
PA-7 (SINGLE FAMILY)	50.32 AC.	60	1.2 UNITS PER AC.
TOTAL	248.44 AC.	557	

COMMERCIAL / MULTI FAMILY PA LEGEND

	GROSS ACREAGE	NUMBER OF UNITS	DENSITY
PA-8 (MULTI-FAMILY)	12.67 AC.	193	15.2 DU PER AC.
PA-9 (COMMERCIAL)	18.14 AC.		

TOTAL PROJECT = 557 RESIDENTIAL UNITS + 193 M.F UNITS = 750 DU

OPEN SPACE LEGEND

	GROSS ACREAGE
OS-1 MSHCP	612.72 AC.
OS-2 LINEAR NATURE PARK	37.33 AC.
OS-3 ENVIRONMENTAL SENSITIVE AREA	1.75 AC.
TOTAL	651.80 AC

CAL TRANS R/W ACQUISITION

	GROSS ACREAGE
CAL TRANS R/W	4.61 AC.

WATER TANK ACCESS ROAD

	GROSS ACREAGE
ACCESS ROAD	1.97 AC.

STREET R/W DEDICATION

	GROSS ACREAGE
RIGHT OF WAY DEDICATION	3.34 AC.
ROAD SLOPES OUTSIDE R/W	4.05 AC.

CIRCULATION

	GROSS ACREAGE
BACKBONE STREETS	19.64 AC.

TOTAL TTM AREA	972.15 AC.	750	.77 DU PER AC.
TANK SITE (NOT A PART)	4.54 AC.	5.44 AC.	
TOTAL	977.50 AC.	750	.77 DU PER AC.

SCALE 1"=250'

250 125 0 250 500 750

SCALE: 1"=250'

Michael Baker INTERNATIONAL
40810 COUNTY CENTER DR., SUITE 200
TEMECULA, CA 92591
PHONE: (951) 676-8042
MBAKERINTL.COM

MURRIETA HILLS SITE PLAN

1853 PZ Phase 1 vs. Phase 2?

PROP BOOSTER
1698 PZ TO 1853 PZ
PUMP CAPABLE OF 423 GPM
(SIZE OF PUMPS AND STATION TO BE EVALUATED AT PRELIMINARY DESIGN PHASE. LAND AREA ALREADY ACQUIRED FOR FUTURE RESERVOIR. ADDITIONAL LAND AREA MAY BE REQUIRED FOR PROPOSED BOOSTER STATION IF SPACE IS LIMITED.)

KELLER ROAD

EX 12" WATER (1853 PZ)

1853 PZ CONNECTION TO EX. 12" WATER

ZEIDERS ROAD

EX 30" WATER (1698 PZ)

or Lot "L" 1.59 AC park?

PRESSURE ZONE BOUNDARY 1853 PZ / 2055 PZ

FUTURE 1698 PZ RESERVOIR

EXISTING 1698 PZ RESERVOIR

PROP 1853 PZ RESERVOIRS (2) ~726,000 GAL
TWO 56' DIA. 35' TALL
(SIZE TO BE EVALUATED AT PRELIMINARY DESIGN PHASE)

PROP BOOSTER STATION 1853 PZ TO 2055 PZ
PUMP CAPABLE OF 329 GPM
(SIZE TO BE EVALUATED AT PRELIMINARY DESIGN PHASE)

PROP TANK 2055 PZ
~784,000 GAL
ONE 68' DIA, 35' TALL
(SIZE TO BE EVALUATED AT PRELIMINARY DESIGN PHASE)

1853 PZ / 2055 PZ

TO LEE LANE

SCALE: NOT TO SCALE

LEGEND

- PROP. 8" WATER (1853 ZONE)
- PROP. 12" WATER (1853 ZONE)
- PROP. 18" WATER (1853 ZONE)
- PROP. 8" WATER (2055 ZONE)
- PROP. 12" WATER (2055 ZONE)
- PRESSURE ZONE LIMIT LINE
- PROP. 18" WATER (1698K ZONE)

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MURRIETA HILLS

PROPOSED WATER SYSTEM

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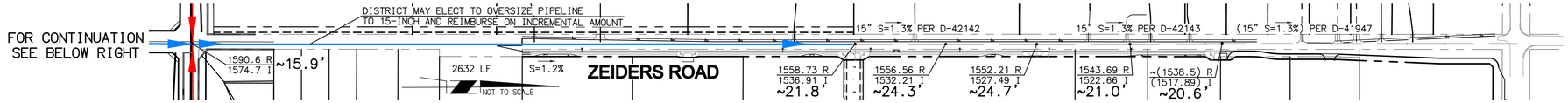

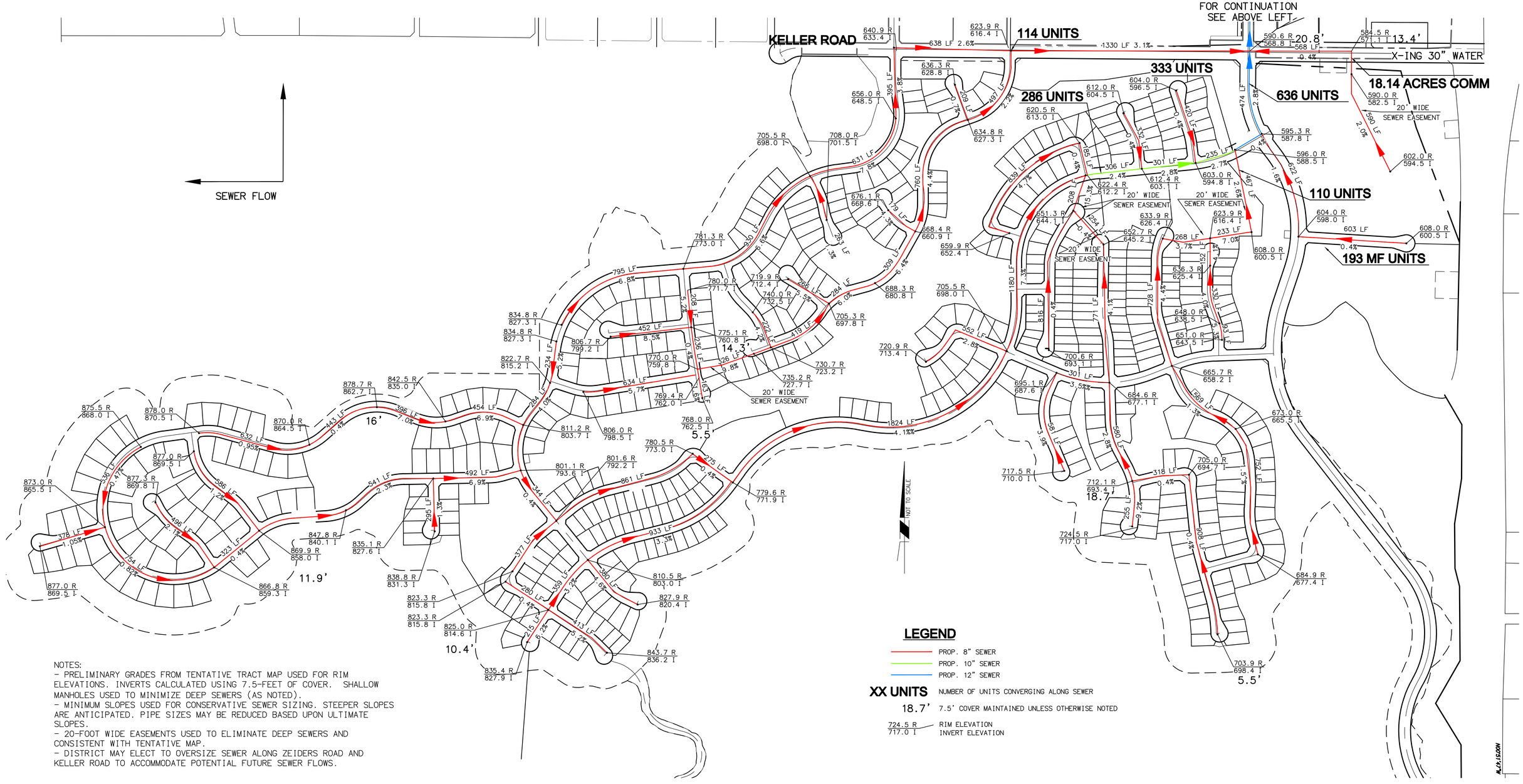

NOTES:
- PRELIMINARY GRADES FROM TENTATIVE TRACT MAP USED FOR RIM ELEVATIONS. INVERTS CALCULATED USING 7.5-FEET OF COVER. SHALLOW MANHOLES USED TO MINIMIZE DEEP SEWERS (AS NOTED).
- MINIMUM SLOPES USED FOR CONSERVATIVE SEWER SIZING. STEEPER SLOPES ARE ANTICIPATED. PIPE SIZES MAY BE REDUCED BASED UPON ULTIMATE SLOPES.
- 20-FOOT WIDE EASEMENTS USED TO ELIMINATE DEEP SEWERS AND CONSISTENT WITH TENTATIVE MAP.
- DISTRICT MAY ELECT TO OVERSIZE SEWER ALONG ZEIDERS ROAD AND KELLER ROAD TO ACCOMMODATE POTENTIAL FUTURE SEWER FLOWS.

LEGEND

- PROP. 8" SEWER
- PROP. 10" SEWER
- PROP. 12" SEWER

XX UNITS NUMBER OF UNITS CONVERGING ALONG SEWER

18.7' 7.5' COVER MAINTAINED UNLESS OTHERWISE NOTED

724.5 R / 717.0 I RIM ELEVATION / INVERT ELEVATION

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MURRIETA HILLS

PROPOSED SEWER SYSTEM
DECEMBER 23, 2014

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EMWD's 2009 Master Plan Requirements For Storage

1853 A (Phase 1 Tank) - excludes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	210 Units	193 Units	18.1 Acres	- Acres	8.3 Acres	- Acres	3,000 gpm	372 gpm	372 gpm	- gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	372	372	372	
- gpd ADD	92,400 gpd ADD	59,830 gpd ADD	36,200 gpd ADD	- gpd ADD	38 AF/YR ADD	- AF/YR		93 gpm	93 gpm	- gpm	-	-	0.50	
- gpm ADD	64.2 gpm ADD	41.5 gpm ADD	25.1 gpm ADD	- gpm ADD	23.3 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	186	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		5,586 gph	5,586 gph	- gph	60	60	60	
- GPM MDD	193 GPM MDD	83 GPM MDD	50 GPM MDD	- GPM MDD	47 GPM MDD	- GPM MDD		24	24	24	-	-	11,172	
- GPD MDD	277,200 GPD MDD	119,660 GPD MDD	72,400 GPD MDD	- GPD MDD	67,009 GPD MDD	- GPD MDD					24	24	24	
						Total = 372 GPM MDD								
						Total = 536,269 GPD MDD	540,000 gal	134,067 gal	134,067 gal	- gal	-		268,135	1,076,269 gal
							50.2%	12.5%	12.5%	0.0%	0.0%	0.0%	24.9%	100.0%

EMWD's 2009 Master Plan Requirements For Storage

1853 B (Phase 2 Tank) - Includes Pump through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	45 Units	Units	Acres	- Acres	1.6 Acres	- Acres	1,500 gpm	50 gpm	50 gpm	426 gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	50	50	50	
- gpd ADD	19,800 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	7 AF/YR ADD	- AF/YR		13 gpm	13 gpm	43 gpm	-	-	0.50	
- gpm ADD	13.8 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	4.4 gpm ADD	- gpm ADD	less two-hr FF	60 min	60 min	60 min	-	-	25	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		752 gph	752 gph	2,556 gph	60	60	60	
- GPM MDD	41 GPM MDD	- GPM MDD	- GPM MDD	- GPM MDD	9 GPM MDD	- GPM MDD		24	24	24	-	-	1,504	
- GPD MDD	59,400 GPD MDD	- GPD MDD	- GPD MDD	- GPD MDD	12,775 GPD MDD	- GPD MDD					24	24	24	
						Total = 50 GPM MDD								
						Total = 72,175 GPD MDD	- gal	18,044 gal	18,044 gal	61,344 gal	-		36,088	133,519 gal
							0.0%	13.5%	13.5%	45.9%	0.0%	0.0%	27.0%	100.0%
														gal

EMWD's 2009 Master Plan Requirements For Storage

1853 (Combined ultimate Tank) - Includes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	255 Units	193 Units	18.1 Acres	- Acres	9.9 Acres	- Acres	3,000 gpm	423 gpm	423 gpm	426 gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	423	423	423	
- gpd ADD	112,200 gpd ADD	59,830 gpd ADD	36,280 gpd ADD	- gpd ADD	45 AF/YR ADD	- AF/YR		106 gpm	106 gpm	43 gpm	-	-	0.50	
- gpm ADD	77.9 gpm ADD	41.5 gpm ADD	25.2 gpm ADD	- gpm ADD	27.7 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	211	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		6,340 gph	6,340 gph	2,556 gph	60	60	60	
- GPM MDD	234 GPM MDD	83 GPM MDD	50 GPM MDD	- GPM MDD	55 GPM MDD	- GPM MDD		24	24	24	-	-	12,679	
- GPD MDD	336,600 GPD MDD	119,660 GPD MDD	72,560 GPD MDD	- GPD MDD	79,784 GPD MDD	- GPD MDD					24	24	24	
						Total = 423 GPM MDD								
						Total = 608,604 GPD MDD	540,000 gal	152,151 gal	152,151 gal	61,344 gal	-		304,302	1,209,948 gal X 1.2
							44.6%	12.6%	12.6%	5.1%	0.0%	0.0%	25.2%	100.0%
Check	0	234	83	50	0	55	0	152,111	152,111	61,344	-	-	304,222	

Multiplier for 40-ft tank, to define total Operational storage =

MDD Of 2055 PZ (Upper Zone), for Pump Through Calculations:	**426 GPM**

	indicates cells with data entry
123,456	indicates cells with auto-computation

Note 1: Time Of Use storage requirement is subject to review and discussion with Brian Powell, to decide on Inclusion or Exclusion, in the Planning Criteria

If Building One Tank, Total Operational Tank Volume:	**1,451,938 GAL**
If Building Two Tanks, in two phases, each tank volume is:	**725,969 GAL**

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

EMWD's Master Plan Requirements For Storage

2055 PZ

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
60 Units	242 Units	- Units	- Acres	- Acres	6.4 Acres	- Acres	1,500 gpm	329 gpm	329 gpm	- gpm				
570 gpd/Unit	440 gpd/Unit	310 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	329	329	329	
34,200 gpd ADD	106,480 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	29 AF/YR ADD	- AF/YR		82 gpm	82 gpm	- gpm	-	-	0.50	
23.8 gpm ADD	73.9 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	17.8 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	164	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		4,930 gph	4,930 gph	- gph	60	60	60	
71 GPM MDD	**222 GPM MDD**	**- GPM MDD**	**- GPM MDD**	**- GPM MDD**	**36 GPM MDD**	**- GPM MDD**		24	24	24	-	-	9,860	
102,600 GPD MDD	**319,440 GPD MDD**	**- GPD MDD**	**- GPD MDD**	**- GPD MDD**	**51,261 GPD MDD**	**- GPD MDD**					24	24	24	
					Total =	**329 GPM MDD**								
					Total =	**473,301 GPD MDD**	**180,000** gal	**118,325** gal	**118,325** gal	**-** gal	**-**		**236,651**	**653,301** gal
							27.6%	18.1%	18.1%	0.0%	0.0%	0.0%	36.2%	100.0%

X 1.2

Multiplier for 40-ft tank, to define total Operational storage =

Total Operational Tank Volume: 783,962 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

From:	Arroyo, Armando
To:	Raines, Brian
Cc:	Sambito, Maria; El-Hage, Maroun; Azimie, Fred; Chew, Edmund; Lay, Sambo; Marcial, Leland; Mendoza, Abe; Dumas, Brenda; Tibayan, Rebecca
Subject:	Senate Bill 854
Date:	Wednesday, March 04, 2015 8:26:27 AM
Attachments:	00057_C22_Contractor Registration Extract.doc 00028_C05D_Subcontractors_DEV.doc EN-025_NBD.doc

Brian,

Starting March 1, 2015 all projects that have an oversizing component will be required to follow the process shown below:

1. POS Engineer to provide Developer with form C-22 (Contractor Registration Extract) and form C-5D (Designation of Subcontractors). The Developer is made aware through this form that all bidders and their subs will need to be registered with the state in order to perform public work projects.
2. If Developer wants additional information about the SB 854, please provide them with the following link to the State's fact sheet: http://www.dir.ca.gov/DLSE/PublicWorks/SB854FactSheet_6.30.14.pdf
3. All Bidders shall submit form C-5D with their bid. Failure to submit a completely filled form by the bidders will result in a non-responsive bid.
4. Once bids have been received, POS Engineer will review form C-5D and verify that prime and subcontractors are registered with the state at the following website: *https://efiling.dir.ca.gov/PWCR/Search.action*
5. Unregistered prime and subcontractors will result in a non-responsive bid.
6. Once the lowest responsible bid has been determined, the Developer's contractor shall submit a completely filled out form EN-25 NBD in conjunction with its insurance. Failure to provide a completely filled out form EN-25 NBD and insurance will result in the delay of the pre-construction meeting.
7. Once a completely filled out form EN-25 NBD has been received, Brenda Dumas will create a project in the State's database (State form PWC100) within five (5) days from the CO# issue date.
8. Once project has been created in the State's database, project can move forward with construction.

Regards,

Armando G. Arroyo
Senior Civil Engineer
Eastern Municipal Water District
(951) 928-3777 ext. 4480
arroyoa@emwd.org

P.S. CFD projects will follow a similar process. Field Engineering may provide assistance with

those particular projects.

TECHNICAL MEMORANDUM

Murrieta Hills
(Specific Plan 320 / TTM 35853)
Master Water and Wastewater
Plan of Service

Applicant
Benchmark Pacific
Richard Robotta Vice President

Owner
Pulte Group
Sohail Bokhari Project Manager

Engineer
RBF Consulting
Michael Boeck, PE Project Manager

Rev. Date	Summary
7/29/2014	Draft
12/18/2014	Final Draft
4/13/2015	Final
7/07/2015	Final

RBF JN 136919
EMWD WO# 15273

Michael Baker INTERNATIONAL
40810 County Center Drive, Suite 100
Temecula, CA 92591-6022
(951) 676-8042

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APPENDICES

Appendix A: Domestic Water Model Results
Appendix B: Wastewater Model Results
Appendix C: Supporting Documents
Appendix D: Murrieta Hills Offsite Sewer Report (12/14/06)

I. Introduction

RBF Consulting was contracted by Benchmark Pacific/Pulte Group (Developer) to prepare a master water and wastewater analysis for the proposed project known as Murrieta Hills (Project). The project site consists of twenty-five assessor parcel numbers to be annexed in the City of Murrieta. The Project is concurrently moving forward with the planning approval process with the City. It should be noted that a previous Plan of Service study was initially prepared for the site in January 2009. At that time, the Project included 1,375 residential dwelling units. The proposed land use consists of single and multi-family residential, commercial, and parks and open spaces. The area is bounded by Keller Road to the north and Interstate 215 (I-215) to the east, as shown in Exhibit 1.

The water and sewer purveyor for this development is Eastern Municipal Water District (EMWD). A Water Supply Assessment dated December 18, 2013 was initially prepared by EMWD and provided to the Board for approval. The District will more than likely need to revise or update the Water Supply Assessment for this updated site plan and the change of water demands. This analysis used EMWD's planning and design criteria for water and sewer systems. The criteria guidelines are included within Appendix C. The intent of this study is to provide the Applicant/Owner with an overall assessment of the proposed backbone water and wastewater facilities necessary for the Project. Further preliminary design analysis may be required for specific water facilities or specific planning areas such as the commercial area.

II. Project Background

The proposed land use for the Project consists of a total of 750 residential units and 27-acres of proposed commercial over 973.7-acres of undeveloped land. The closest existing water and sewer infrastructure is located to the north of the Project. Please refer to Exhibit 2 for the District's existing water systems adjacent to the study area. The water system that will supply water to the project is part of EMWD's 1698 Pressure Zone (Zone). One storage tank (6.2 MG total) is located along Keller Road near Gloria Road. A booster station from this reservoir site will be required to boost water flows to an on-site piping distribution network. A hydro-pneumatic station is not anticipated at this time.

The closest existing sewer system occurs along Zeiders Road approximately 4,100 linear feet from Keller Road. Approximately 1,400 linear feet of 15-inch sewer line is currently being construction along Zeiders Road for the Commerce Pointe project. A stub at this proposed sewer will be provided at the southerly property boundary of the Commerce Pointe development.

The following documents, exhibits, and correspondences (meetings/emails) were used as resources for determining demands and developing hydraulic models:

- EMWD's "Water and Sewer Systems Planning and Design Criteria" standards dated July 2, 2007.
- Existing Sewer Design Plans (D-41947, D-42140 thru D-42143)
- Existing Water Design plans (D-3704 & D-3705, D-24411 – D-24417).
- Water Supply Assessment Report for Murrieta Hills Specific Plan dated December 18, 2013.
- Due Diligence Meeting (August 27, 2013) and follow-up review meeting (November 17, 2014) and email correspondences with EMWD staff.

- EMWD Facilities Planning Report (October 6, 2008); Hydraulic Boundary Conditions at Points of Connection; Menifee West Water Study (April 2008, by IEC).

III. Land Use

The proposed land use for the Project consists of 750 residential dwelling units, where 532 are single-family and 218 are multi-family type units. The commercial portion incorporates a gross area of 27-acres with a Floor Area Ratio (FAR) of 0.5. The land use designations are shown on the attached site plan in Exhibit 3. A summary of the proposed development parameters are shown in Table 1.

Exhibit 1 Vicinity Map

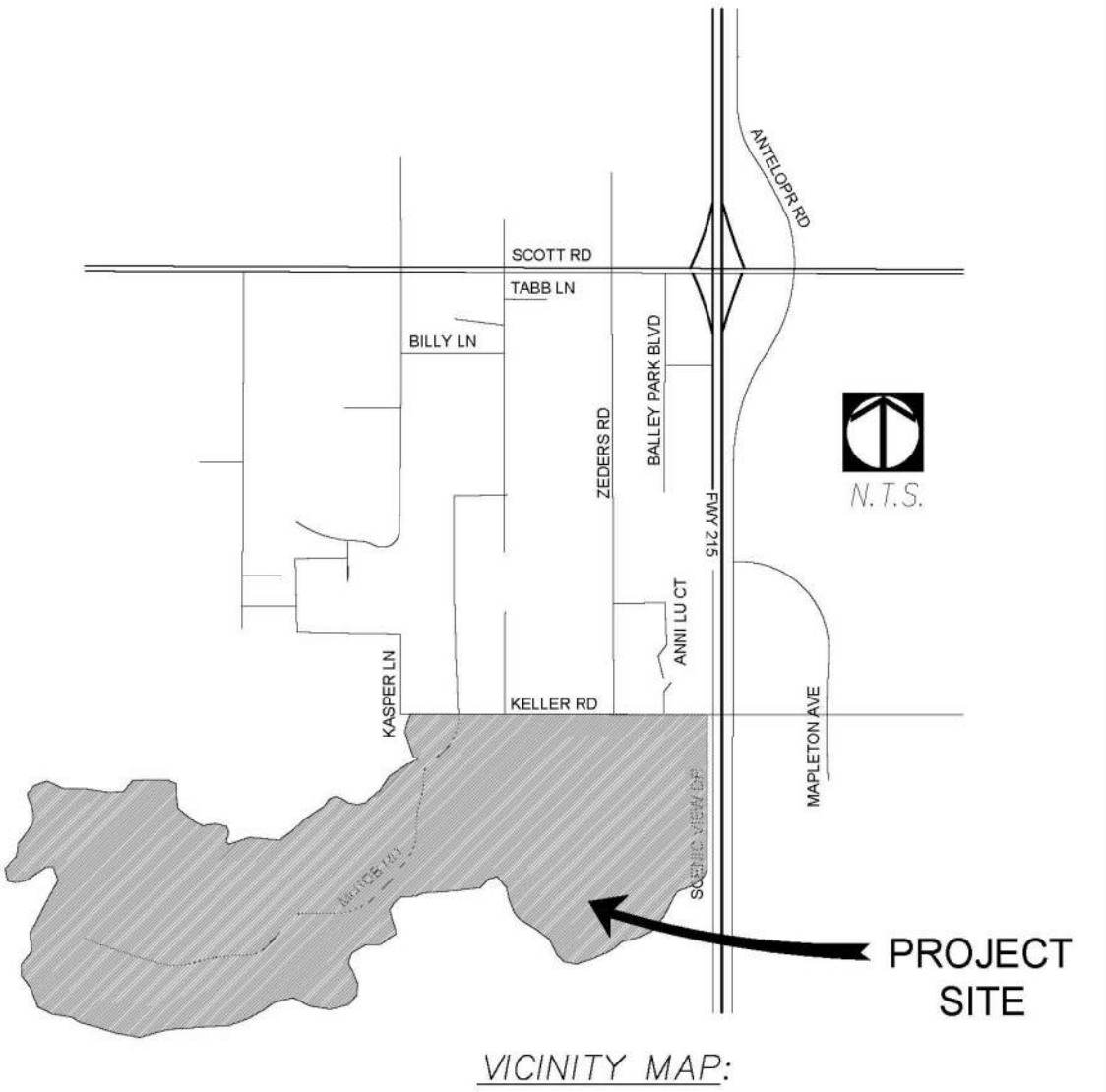


Exhibit 2 EMWD's Existing Domestic Water System

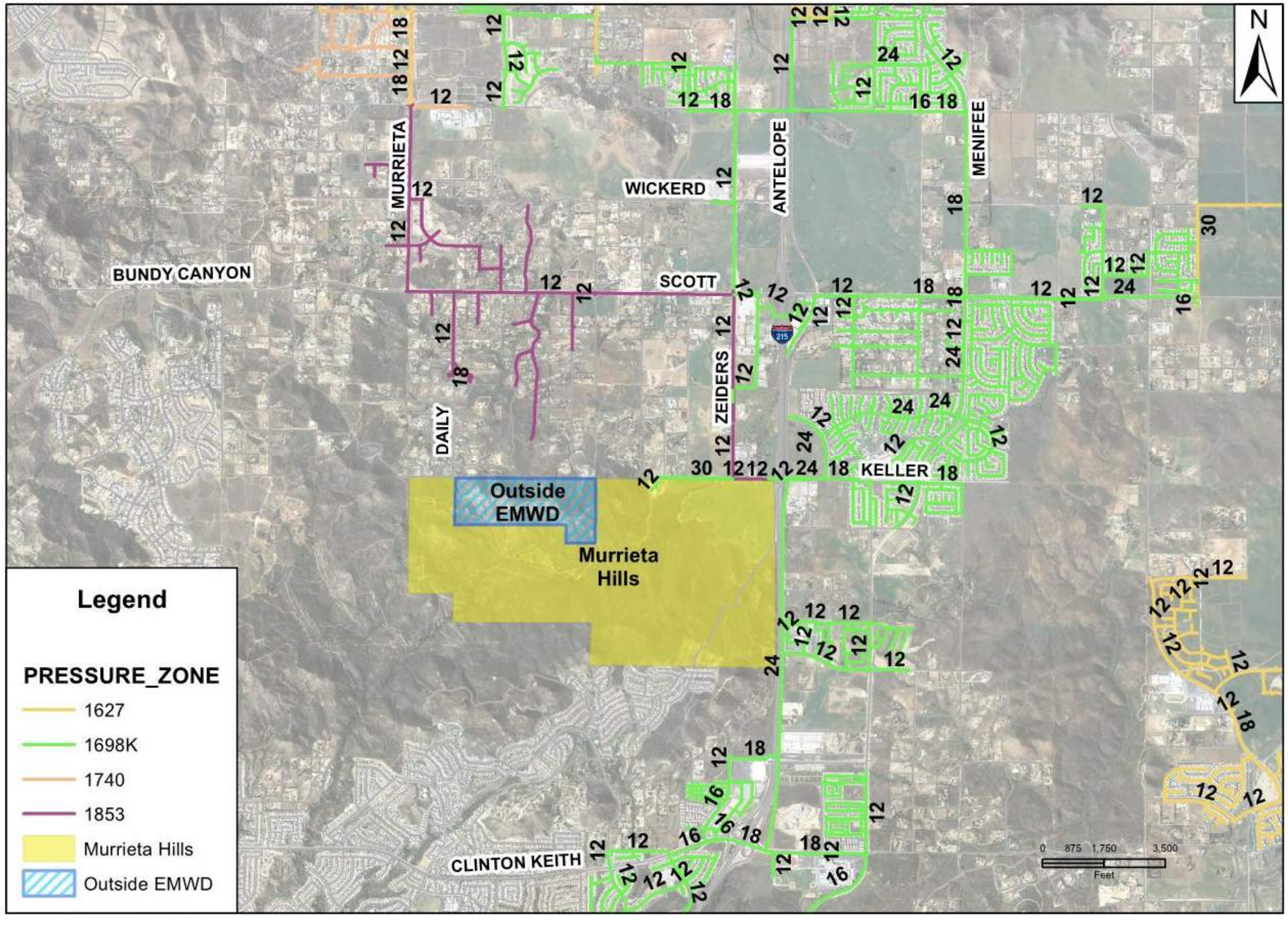
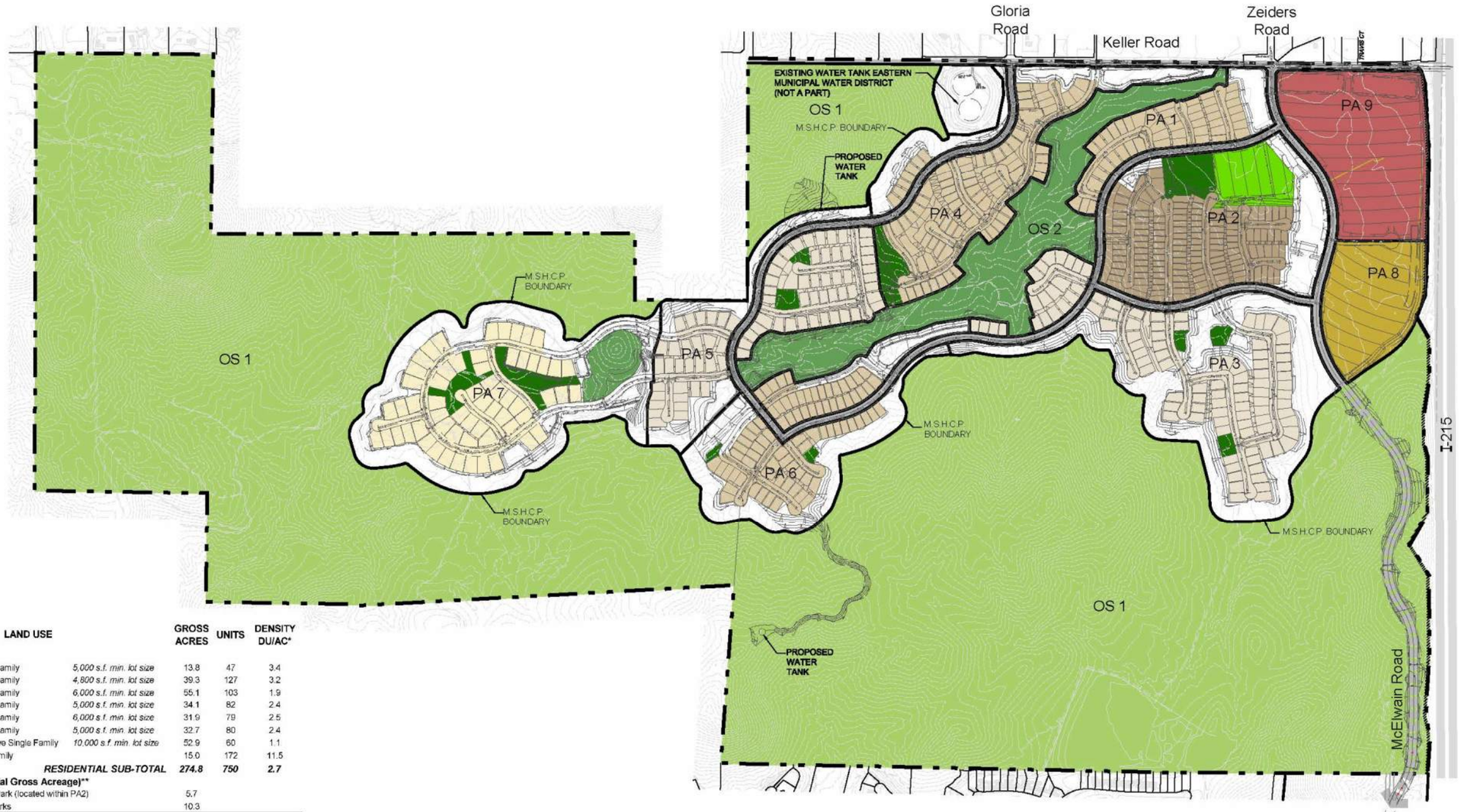


Exhibit 3 Land Use Designations



LAND USE SUMMARY

LAND USE			GROSS ACRES	UNITS	DENSITY DU/AC*
RESIDENTIAL					
PA 1	Single Family	*5,000 s.f. min. lot size*	13.8	47	3.4
PA 2	Single Family	*4,800 s.f. min. lot size*	39.3	127	3.2
PA 3	Single Family	*6,000 s.f. min. lot size*	55.1	103	1.9
PA 4	Single Family	*5,000 s.f. min. lot size*	34.1	82	2.4
PA 5	Single Family	*6,000 s.f. min. lot size*	31.9	79	2.5
PA 6	Single Family	*5,000 s.f. min. lot size*	32.7	80	2.4
PA 7	Executive Single Family	*10,000 s.f. min. lot size*	52.9	60	1.1
PA 8	Multi Family		15.0	172	11.5
		RESIDENTIAL SUB-TOTAL	***274.8***	***750***	***2.7***
PARKS (within Residential Gross Acreage)**					
	Public Park (located within PA2)		5.7		
	HOA Parks		10.3		
COMMERCIAL					
PA 9	Community Commercial		26.5	-	-
		COMMERCIAL SUB-TOTAL	***26.5***		
OPEN SPACE					
OS 1	MSHCP (Includes portion of McElwain Road)		615.8	-	-
OS 2	Linear Nature Park		33.4	-	-
		OPEN SPACE SUB-TOTAL	***649.2***		
CIRCULATION					
	Backbone Streets *(Loop road and McElwain)*		23.2	-	-
		CIRCULATION SUB-TOTAL	***23.2***		
TOTAL			**973.7**	**750**	**0.7**

*Densities are based on gross acre within the MSHCP boundary line.

**Park gross acreages are included within the Residential Gross Acreage section. Excluded from total.

This illustrative demonstrates a conceptual design incorporating all required Specific Plan elements, including land use, circulation, infrastructure, open space, and recreation. Other designs may be acceptable provided they are consistent with this Specific Plan.

400 800 1600

CONCEPTUAL SITE PLAN

Murrieta Hills

Table 1 Land Use and Water Demand Summary

Planning Area Land Use	Acreage	Dwelling Unit[1]	Average Day (gpm)[2]	Max Day (gpm)[3]	Peak Hour (gpm)[4]
PA1 – PA 6 (Single Family) Residential)	274.8	518	194.3	582.8	1,359.8
PA7 (Executive Single Family Residential)		60	28.3	85.0	198.1
PA8 (Multi-Family Residential)		172	35.8	71.6	89.6
PA9 (Commercial)	26.5	--	36.8	73.6	73.6
Public/HOA Parks[5]	16.0	--	37.4	74.8	--
Linear Nature Park (OS2)	33.4	--	--	--	--
Streets/Non-Irrigated Park (OS1)	639	--	--	--	--
Total	**973.7**	**750**			

[1] Lot count from Land Use Plan August 15, 2013.

[2] Average demand uses of 680 gpd/unit, 540 gpd/unit, 300 gpd/unit, and 2,000 gpd/acre were used for Executive Single Family, Single Family, Multi-Family, and Commercial uses, respectively. The gross acreage of the commercial area was used for the calculation including the FAR value of 1.0. A demand factor of 3.8 AF/year/acre was used for landscape demands for Parks. Open Space areas will not have irrigation demands or use drought tolerant plants that will not require irrigation.

[3] A peaking factor of 3.0 was multiplied to the Average Day Demand to determine the Max Day Demand for Single Family and Executive Single Family Residential uses. A peaking factor of 2 was multiplied to the Average Day Demand to determine the Max Day Demand for the Multi-Family and Commercial areas.

[4] A peaking factor of 7.0 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Single Family and Executive Single Family Residential areas. A peaking factor of 2.5 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Multi-Family Residential. A peaking factor of 2.0 was multiplied to the Average Day Demand to determine the Peak Hour Demand for the Commercial Area.

[5] Typical irrigation for parks and greenbelts will be served from the potable water system. Irrigation could occur at any time during a 24-hour period and is not constricted to a 9-hour window like typical non-potable systems require. A peaking factor of 2 was multiplied to the Average Day Demand to determine the Max Day Demand. Park gross acreages are included within the Residential Gross Acreage section.

The natural topography of the development flows from southwest to northeast. Proposed grading for the site was balanced such that no additional fill or export is anticipated. Table 2 outlines the elevations for service from two pressure zones, and the respective static pressures.

Table 2 Static Pressure Summary

Static Pressure Summary		
Reservoir Pad Elevation (ft) [HWL]	**Range of Elevations Served within Development (ft)**	**Static Pressure Range (psi)***
1818 [1853 Zone]	1590.0 – 1706.7	48 – 114
2020 [2055 Zone]	1727.2 - 1880.0	60 – 142

* Pressure regulating stations are anticipated for high pressure areas where the pressure of 100 psi is exceeded.

IV. Domestic Water Demands

Both the residential and commercial areas of the Project are anticipated to use a public water distribution system with EMWD as the purveyor. Therefore, all water demands were determined using EMWD's Planning and Design Criteria dated July 2007 and the 2009 Master Plan Requirements for Storage. Dwelling unit (du) count was used as a basis for residential portions of the development. Gross area was used as a basis for the mixed use/commercial site and irrigation areas (parks and open space). Several demand factors were used. The site plan defines the land uses by the following:

- The commercial component for the Project has a Floor Area Ratio (FAR) of 0.5. A conservative approach was used (FAR factor of 1) in determining the demands for the commercial area. EMWD's Commercial density factor of 2,000 gpd/acre was used.
- EMWD's High Density Residential demand factor of 300 gpd/du was used for the multi-family areas.
- EMWD's Medium Density Residential demand factor of 540 gpd/du was used for the remaining single-family home sites.
- EMWD's Low Density Residential demand factor of 680 gpd/du was used for the single-family home sites in PA7 as shown as the Executive Single Family Residential.
- Open Space areas utilized an irrigation demand factor of 3.8 AFY.

V. Domestic Water System Facilities

The proposed water system was evaluated using EMWD's design criteria. This design criteria is summarized in Table 3 below.

Table 3 Water System Design Criteria

Maximum Customer Service Pressure (per Uniform Plumbing Code)	80 psi (per Uniform Plumbing Code) Pressures greater than 80 psi will require individual regulators provided by the customer.
Minimum Distribution System Pressure ❑ Daily Demands (Peak Hour) ❑ Maximum Day Demand Plus Fire Flow	 50 psi 20 psi
Minimum Pipeline Diameter	8 inch (City and EMWD)
Hazen-Williams Coefficient "C" Factor	120 (to account for minor losses – bends, valves, meters, etc.)
Maximum Pipeline Velocities ❑ Average Day Demands ❑ Maximum Day and Peak Hour Demands ❑ Fire Flow Demands	 Not to exceed 5 fps Not to exceed 10 fps May exceed 10 fps[1]

Per EMWD's Planning and Design Criteria. [1] Distribution pipeline flows should not exceed 10 fps, except during fire flow conditions.

Fire Flow

The Project proposes residential home sites, and commercial type buildings. Table 4 shows the fire flow requirements for these structures based on EMWD design criteria.

Table 4 Fire Flow Requirements

Structure	Flow (gpm)	Duration (hours)
Single Family (Residential)	1,500	2
Light Commercial	3,000	3

Verification with the City of Murrieta's Fire Marshal will be necessary when further developing the site plan as to the actual fire flow required (typically found within the Conditions of Approval). Fire flows are determined based on building size and type of construction used. The latest fire regulations require all buildings to be equipped with fire sprinklers, including residential home sites. Therefore, the fire flow requirements shown in Table 4 may increase due to this new regulation. A fire flow of 3,000 gpm was used for the commercial areas for modeling purposes. Please refer to the attached Appendix A for the model results.

Pipelines

Pipelines are sized to ensure minimum pressures are met throughout the system while providing the required fire flows and adhering to EMWD's system criteria. New pipelines for the study area include 8, 12, and 18-inch mains for on-site distribution between booster stations and reservoirs as shown in Exhibit 4.

Pipe sizes and alignments found in Exhibit 4 are for preliminary planning and estimating. Once a site plan is developed, a more refined analysis can be performed to confirm the various elements: elevation grades, pipe corridors and sizes, connections to off-site and on-site distribution piping, and phasing. The analysis presented in this study assumes a complete project buildout using a public system delivery.

Reservoirs

Two pressure zones are proposed for the Project as described in Table 2: 1853 Zone and 2055 Zone. Reservoir sizing is based upon the following storage needs including: operational flow (Maximum Day Demands), and emergency flow (fire events). In the case of the 1853 Zone reservoirs, an additional flow factor was included to account for pumping to the higher 2055 Zone system. This factor is 10% of the Maximum demand. Refer to the calculations for reservoir sizing in Appendix A.

1853 Zone

The 1853 Zone will have a High Water Level (HWL) at the 1853-foot elevation. The pad elevation for the zone will be at 1818-feet. These elevations were made consistent with the Daily II storage tank so that connection into the existing 1853 Zone could be made for system redundancy and reliability. This zone will be dedicated for phasing of approximately 240 single-family lots. The zone will also accommodate the commercial and multi-family portion of the Project, which is not expected to be on-line at the initial stages of the Project. Due to this phasing need, two reservoirs are proposed:

- Reservoir 1853A will be sized to accommodate the initial 210 single-family lots and associated fire flow.
- Reservoir 1853B will be sized to accommodate the remaining single family lots (30 units), multi-family (172 units), and commercial area. The net difference in fire storage will also be added to the second reservoir to make up the fire flow needs associated with the commercial portion.
- The District has stated that they would prefer to see two equally sized reservoirs for maintenance and operational uses. The actual size of the reservoirs will be determined in the preliminary design phase, which will take into account freeboard requirements. An approximate reservoir size has been included for planning purposes for reservoirs 1853A and 1853B. The ultimate diameter for two equally sized reservoirs would have an approximate height of 35-feet and diameter of 57-feet. The size of Reservoir 1853A would be slightly increased to accommodate this request.

2055 Zone

The 2055 Zone will have a HWL at the 2055-foot elevation. The pad elevation for the zone will be at 2020-feet. This zone will be dedicated for the remaining single-family lots (278 units plus 60 Executive Single-Family units) and their associated fire flow needs.

A breakdown of preliminary reservoir sizes for the Project is shown in Table 5. Actual reservoir sizing along with site improvements will be determined as part of final design stages.

Table 5 Project Reservoirs

Reservoir	Construction Phasing (lot per zone)	Fire Flow (gal)	Max Day (gal)	Total Storage (gal)	Approx. Size (ft)[1]
1853A	210 single family	180,000 (1,500 gpm for 2 hours)	382,784	562,784 (excluding Pump Through Storage to 2055 Zone)	Height: 35 Diameter: 53
1853B	30 single family 172 multi-family	360,000 Difference of 540,000 (3,000 gpm for 3 hours) minus existing fire flow of 180,000	300,384	721,872 (including Pump Through Storage to 2055 Zone)	Height: 35 Diameter: 59
2055	278 single family 60 executive single family	180,000 (1,500 gpm for 2 hours)	615,344	954,413	Height: 35 Diameter: 68

[1] Size for water storage only and does not include freeboard requirements. Actual reservoir sizing and site improvements will be determined at the preliminary design stage.

Booster Stations

The system is planned to float off of the reservoirs during daily demands. Water is then boosted to the higher reservoir zone typically during off-peak power hours. Two booster stations are proposed to serve the Project for filling the proposed reservoirs. These booster stations are proposed at two locations: at the existing 1698 Keller Tank site along Keller Road and Gloria Road, and at the proposed pad site for Reservoirs 1853A and 1853B. Each pump station will be designed in accordance with EMWD criteria and have a capacity to meet maximum day demands and fire flow requirements. Actual booster pump locations and system curves will be determined at the preliminary design stage. Other areas on-site including the MSHCP open space area can be utilized to support water infrastructure including the booster station(s) should the reservoir location sites not be a feasible approach.[1]

VI. Domestic Water Analysis

The domestic water system hydraulic analysis was performed using Bentley's WaterCAD Hydraulic Modeling Software. The hydraulic model was created using the land use plan and pad elevations prepared by Pangaea. Standards from EMWD's Planning and Design Criteria were used to establish demands, minimum diameters, maximum velocities, and Hazen-Williams friction factors. Junctions were placed at intersections to join two or more pipelines and for applying normal demands and fire flows for various scenario simulations.

Water source for the development will be supplied by EMWD's 1698 Zone. A pumping station located at the 1698 Zone reservoirs will boost flows to the 1853 Zone Reservoir(s). Another pumping station will be located at the 1853 Zone Reservoir and boost flows to the 2055 Zone Reservoir. Each zone system will be "floated" and maintain pressure from these storage tanks. The two pressure systems were modeled using the proposed pad areas for the reservoirs as a

[1] Per meeting discussions with Richard Robotta, Brian Raines, Maroun El-Hage, and Michael Boeck on November 17, 2014.

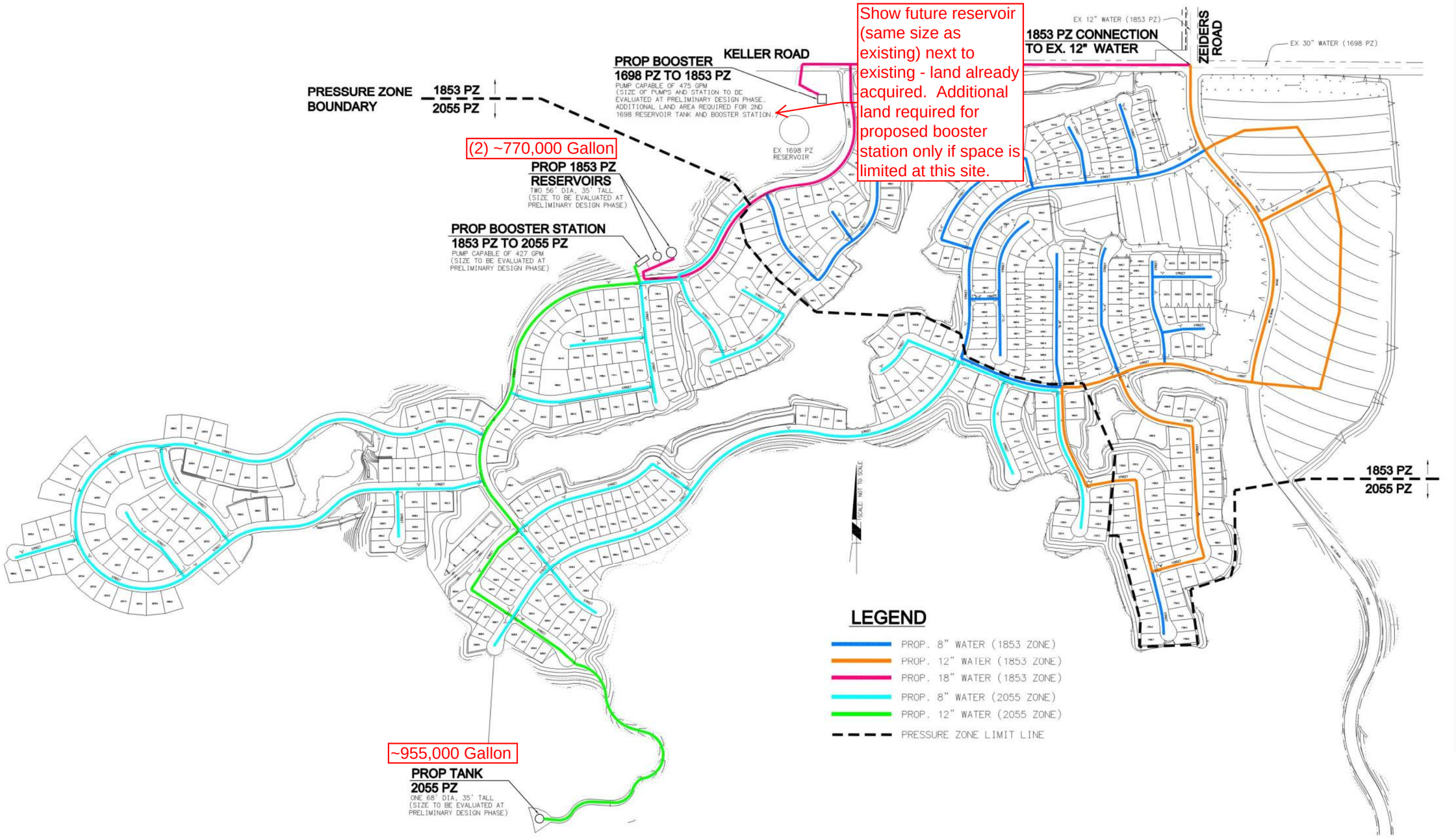
source of supply. Pipelines were placed in the model to ensure simulation of system head losses. Please refer to Appendix A for these test results and hydraulic calculations.

The computer model used a low water level (LWL) to simulate pressure calculations as a conservative approach. The HGL for the two systems were 1818 and 2020 (pad elevations). These HGL's were used for modeling the peak hour, and fire flow events.

Per discussions with EMWD staff[2], adequate storage at the 1698 Zone (6.2 MG reservoir) would be sufficient to support the project. Additional conveyance and/or pumping requirements from the 1698 PZ may be necessary upon review by Facilities Planning against the 5-year CIP.

[2] Per November 17, 2014 meeting with Brian Raines and Maroun El-Hage.

Exhibit 4 Proposed Domestic Water System



VI. Domestic Water Analysis (Continued)

The site plan shows areas for irrigation purposes for public and HOA parks. Open space areas will not be irrigated, or use drought tolerant type plants such that the irrigation demands for these areas were not considered. Recycled water is not available for the Project, therefore, irrigation demands were added to the domestic water model. It is our understanding that there are no time limitations for irrigating unlike a recycled water system where irrigation occurs during off-peak hours. Refer to the site plan shown in Exhibit 3 for the planning areas noted in Table 6.

Table 6 Irrigation Flows Included into Model

Area (acres)	Site Plan Location (Planning Area)	Max Day Demands (gpm)[1]	Modeled Junction Node
5.7	PA-2	26.2	J-19
2.6	PA-2	12.0	J-21
0.4	PA-3	1.8	J-46
0.6	PA-3	2.8	J-49
0.3	PA-3	1.4	J-43
2.1	PA-4	9.6	J-16
0.3	PA-4	1.4	J-72
0.6	PA-4	2.8	J-69
0.2	PA-6	1.0	J-60
0.2	PA-6	1.0	J-57
1.8	PA-7	8.8	J-77
1.2	PA-7	6.0	J-81

[1] Using demand usage of 3.8 acre-feet/year per acre and factor of 2.

Various critical operating scenarios were simulated and are summarized in Table 7. Conservative operating scenarios were chosen, such as fire flow demands at hydraulically remote locations to ensure minimum pressures are available for service. All scenarios used a Hazen Williams roughness coefficient (C) of 120 as a conservative value. The lower coefficient value assumes minor losses such as valves, fittings, and smaller size meters provided to various retail facilities, along with assuming an older or aged pipeline in operation for a long period of time. Additional losses should be accounted in further analysis should a private system or dedicated fire line be proposed for the multi-family or commercial site. These additional losses may cause pipe size increases to various pipe reaches on or off-site.

- Scenario 1 simulates the peak hour demands with reservoirs at an empty level (LWL).
- Scenarios 2 through 5 simulate the maximum-day demand plus fire flow at critical locations within the development with reservoirs at LWL.
    - Scenario 2: Fire demand at the residential area of PA-3. This scenario simulates a high pad elevation at a hydraulically remote area from the 1853 Reservoir (Fire demand of 1,500 added to the maximum day demand at Junction J-45).
    - Scenario 3: Fire demand at the multi-family location of PA-8. This scenario simulates a hydraulically remote area from the 1853 Reservoir with a high fire demand (Fire demand of 3,000 gpm added to the maximum day demand at Junction J-88).
    - Scenario 4: Fire demand at the commercial location of PA-9. This scenario simulates a hydraulically remote area from the 1853 Reservoir with a high fire demand (Fire demand of 3,000 gpm added to the maximum day demand at Junction J-87).

- Scenario 5: Fire demand at the residential area of PA-7. This scenario simulates a high pad elevation at a hydraulically remote area from the 2055 Reservoir (Fire demand of 1,500 added to the maximum day demand at Junction J-82).

The above scenarios were performed assuming the ultimate condition at the Project's build-out. Please refer to Exhibit 4 for this preliminary level water distribution system. A summary of the modeling results is located in Table 7. The program output files are in Appendix A.

Table 7 Computer Analysis Hydraulic Summary for Domestic Water Distribution

Scenario	Description	Minimum Pressure		Minimum Design Pressure[2]	Maximum Velocity[3]		Max. Vel.
		(psi)	Junction		(fps)	Pipe	
1	Empty Tanks (LWL) Peak Hour Demand	45.2	J-45	40	2.59	P-63	10
2	Max Day Demand plus Fire Flow @ J-45 (Residential – 1853 LWL)	36.4	J-45	20	5.4	P-21	--
3	Max Day Demand plus Fire Flow @ J-88 (Multi-Family)	26.5	J-45	20	9.7	P-21	--
4	Max Day Demand plus Fire Flow @ J-87 (Commercial)	31.6	J-45	20	9.9	P-21	--
5	Max Day Demand plus Fire Flow @ J-82 (Residential – 2055 LWL)	25.2	J-82	20	9.6	P-95	--

[1] The low water level (LWL) for the 1853 and 2055 PZ were used in the hydraulic model. These LWL elevations correspond to 1818 and 2020, respectively. The pressure zone labels were used to differentiate between the two modeled zones.
[2] Minimum pressure of 20 psi required during fire flow scenario only, otherwise, 50 psi minimum for peak hour conditions. Lots located at the upper pad areas of each zone will be less than 50 psi as shown in the above table.
[3] Distribution pipeline flows should not exceed 10 fps, except during fire flow conditions.

by developer's consultant

Prior to issuing an approved Plan of Service and final design of any subsequent phase, an Extended Period Simulation (EPS) will be conducted to verify the sizing of the required facilities. The EPS analysis will evaluate the system's capacity, to meet EMWD design criteria under various demands (such as Max Day Demand, Peak Hour Demand, and Fire Flow Demand).

VII. Wastewater Generation

The wastewater generation flows for the Project were determined using the unit flow factors provided in EMWD's Planning and Design Criteria. Unit flow factors from these design criteria were used to calculate the average day flows. Table 8 summarizes these factors and flow rates.

Table 8 Wastewater Flows

Planning Area Land Use[1]	Acreage	Dwelling Unit Count	Unit Flow Factor [2]	Average Flow (gpm)	Peak Flow (gpm) [3]
PA1 – PA6 (Single Family) Residential)	274.8	518	350	125.9	284.5
PA7 (Executive Single Family) Residential		60	420	17.5	39.6
PA8 (Multi-Family Residential)		172	200	23.9	59.7
PA9 (Commercial)	26.5	--	1,700 (gpd/ac)	31.3	78.2
Total		**750**		**198.6**	**462.0**

[1] Site Plan for Murrieta Hills.
[2] From EMWD's Planning and Design Criteria for Sewer Systems Table 1.
[3] Peak flow factor of 2.26 was used for the residential uses. A peaking factor of 2.5 was used for the multi-family and commercial areas.

VIII. Wastewater System Facilities

The proposed wastewater system was evaluated using the design criteria shown in Table 9.

Table 9 Wastewater System Design Criteria

Minimum Pipe Diameter	8 (in)
Manning's Roughness Coefficient (n)	0.015 (EMWD) - Used for this analysis
Velocities Minimum Recommended Maximum	 2 fps* 3 fps 10 fps
Maximum Velocities	10 fps
Maximum Flow Depth in All Pipes (D/d) (12-inch and smaller) (15-inch and larger)	 50 (%) 75 (%)
Minimum Pipe Slopes	8-inch: 0.4% 10-inch: 0.32% 12-inch: 0.24% 15-inch: 0.16%

* At minimum D/d.

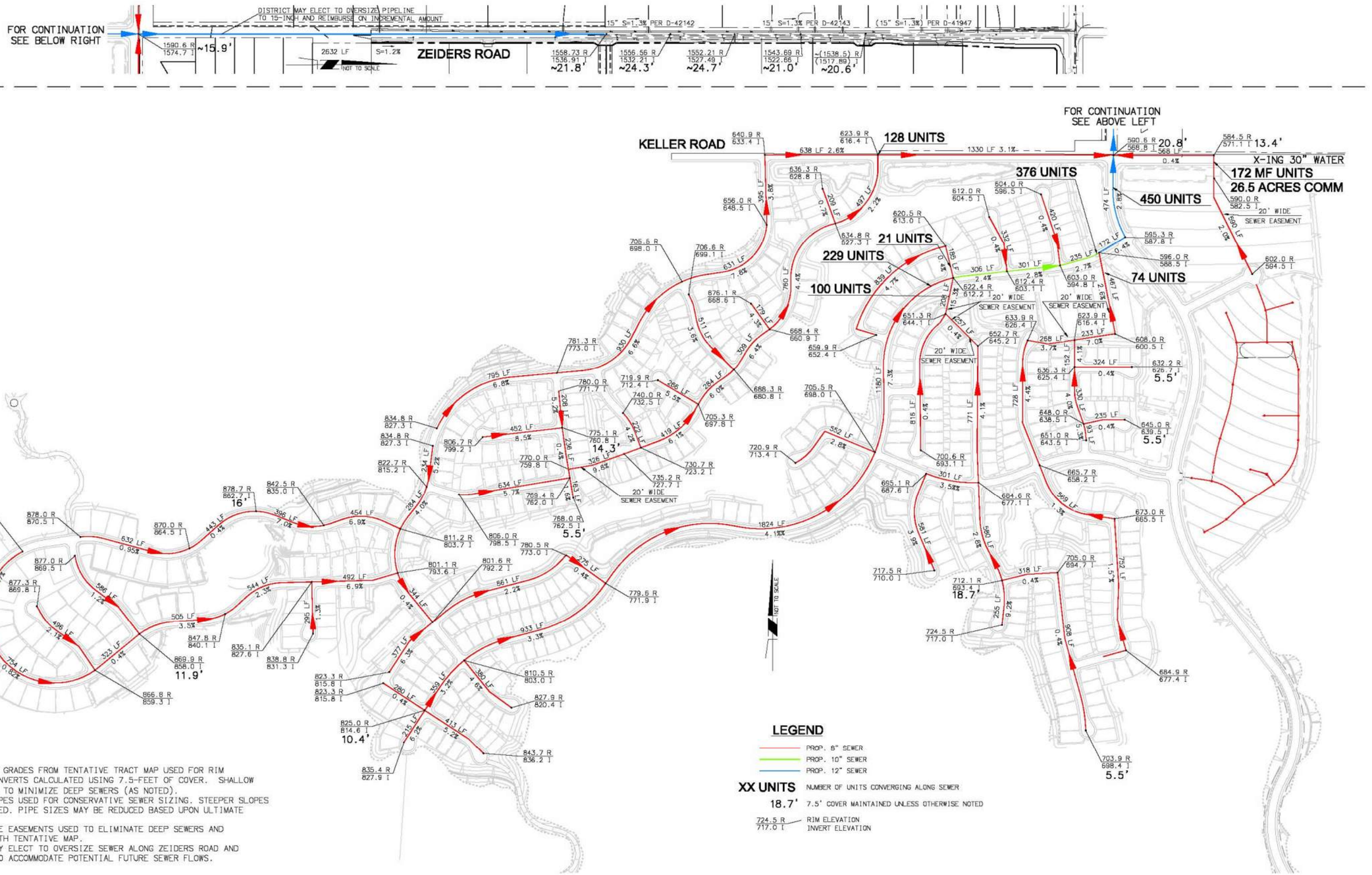
Off-Site Facilities/Tributary Analysis

The wastewater system for the Project will flow entirely by gravity from southwest to northeast. Flows from the Project will be collected to Keller Road. The majority of the on-site system can be served using 8-inch gravity sewer. Larger diameters are necessary where flows converge near the entrance off of Keller Road and Zeiders Road. Flow directions and pipe sizes for the entire system are shown in Exhibit 5. The pipeline diameters determined for the Project meet the design criteria stated in Table 9. The velocities as well as depth of flow in the major pipelines, at ultimate buildout can be found in Appendix B.

An offsite connection to the sewer within Zeiders Road near the Commerce Pointe Project, approximately 2,600 linear feet to the north of Keller Road would be the main point of connection. The approved Plan of Service for Commerce Pointe analyzed the proposed sewer along Zeiders Road for the Murrieta Hills Project. A sewer with a depth of 20-feet and slope 1.2-percent was approved by EMWD to satisfy the Project. A 12-inch main at this slope grade would be adequate to serve the Project.

The District has asked that the ultimate sewer along Zeiders Road by upsized to a 15-inch diameter. It was also requested that the 15-inch sewer continue east along Keller Road along the Project's commercial frontage for additional tributary areas to the east of the Interstate 215 freeway. The sewer would terminate at the frontage of the Project. The Murrieta Hills Project will not be responsible for continuing the sewer farther east across the freeway. No additional tributary areas were included as part of this study.

Exhibit 5 Proposed Sewer System



IX. Wastewater Analysis

The wastewater system analysis was performed using FlowMaster Hydraulic Modeling Software. The analysis consisted of totaling the maximum number of single family units, using minimum pipe diameters with the estimated peak flows. Street slopes are proposed for Project's site plan, however, it is not known how sewer and storm drain crossings will be designed. For this uncertainty, minimum slopes were used in determining the maximum depth of flow to pipe diameter ratio (D/d) for the on-site sewer system. The exception to using the minimum slope for analysis occurs along Zeiders Road where a slope of 1.2-percent was used per the direction of EMWD for the Commerce Pointe Project. The District's guidelines were utilized for both the onsite and offsite analysis.

For the majority of the Project, sewer depths with 7.5-feet of cover can be achieved. There are a few onsite areas within the Project that may require slopes that buck grade, therefore sewer depths will be greater than minimum cover depths at these locations. Conversely, there are areas throughout the Project that may require shallow manholes where the difference of the manhole rim to invert is less than 7-feet (minimum shallow sewer depth is ~5-feet from rim to invert). The use of shallow manholes will be resolved through the plan check process.

X. Conclusion and Recommendations

This analysis covers the master planned facilities for the entire Murrieta Hills Project. Addendums to this Plan of Service can be prepared as planning areas are more defined and specific areas are phased for construction.

Water

The domestic water system analysis for the Project is based on EMWD's criteria and ensuring adequate system performance under all operating scenarios. The Project shows a water tie-in connection to the District's 1853 Zone system at the intersection of Zeiders Road and Keller Road. This connection is for system redundancy and reliability for typical max day and peak hour flows. The proposed booster station located at the 1698 Zone reservoirs will be the primary source of water for the Project. Complete output results of the hydraulic analysis are found in Appendix A.

The recommended domestic on-site system includes 8 and 12-inch pipe with 18-inch transmission main from the 1698 Zone Reservoir/Booster Station to the proposed 1853 Zone Reservoirs. Please note that pipe sizes are dependent on the ultimate build-out condition of the Project. Dividing the Project into phases, or converting public pipelines to private mains may alter the pipe sizes and alignment of the water system. Redundancy and pressure may be reduced. Also of important note was the fire demand used during modeling purposes. A fire flow of 3,000 gpm for the Multi-Family and Commercial areas was used. It is conceivable that a larger building or different fire flow conditions may be requested from the City of Murrieta. The hydraulic model should be re-evaluated and corrected once a set of Conditions of Approval has been adopted for the Project.

Exhibit 4 shows the recommended domestic water distribution system at ultimate development. It should be noted that interior system operation may require additional facilities to ensure adequate operation prior to ultimate development such as meters, backflow preventers, fire detector checks, etc. to individual commercial buildings. These devices will change the available

pressure. A review of the domestic water hydraulic model is recommended when the Project's grading plans as well as site plans are finalized.

The project is conditioned to build a portion of McElwain Road based upon the Tentative Tract Map. Improvement of McElwain Road will depend on phasing. The City may not condition the project to develop full improvements within the road right-of-way. The District has asked that regional facilities (water pipeline) may be conditioned for the Project along McElwain Road. Further analysis of these facilities will be performed by the District as master plan studies. Additional hydraulic analysis will be necessary as grades increase in elevation farther south of the Project.

Sewer

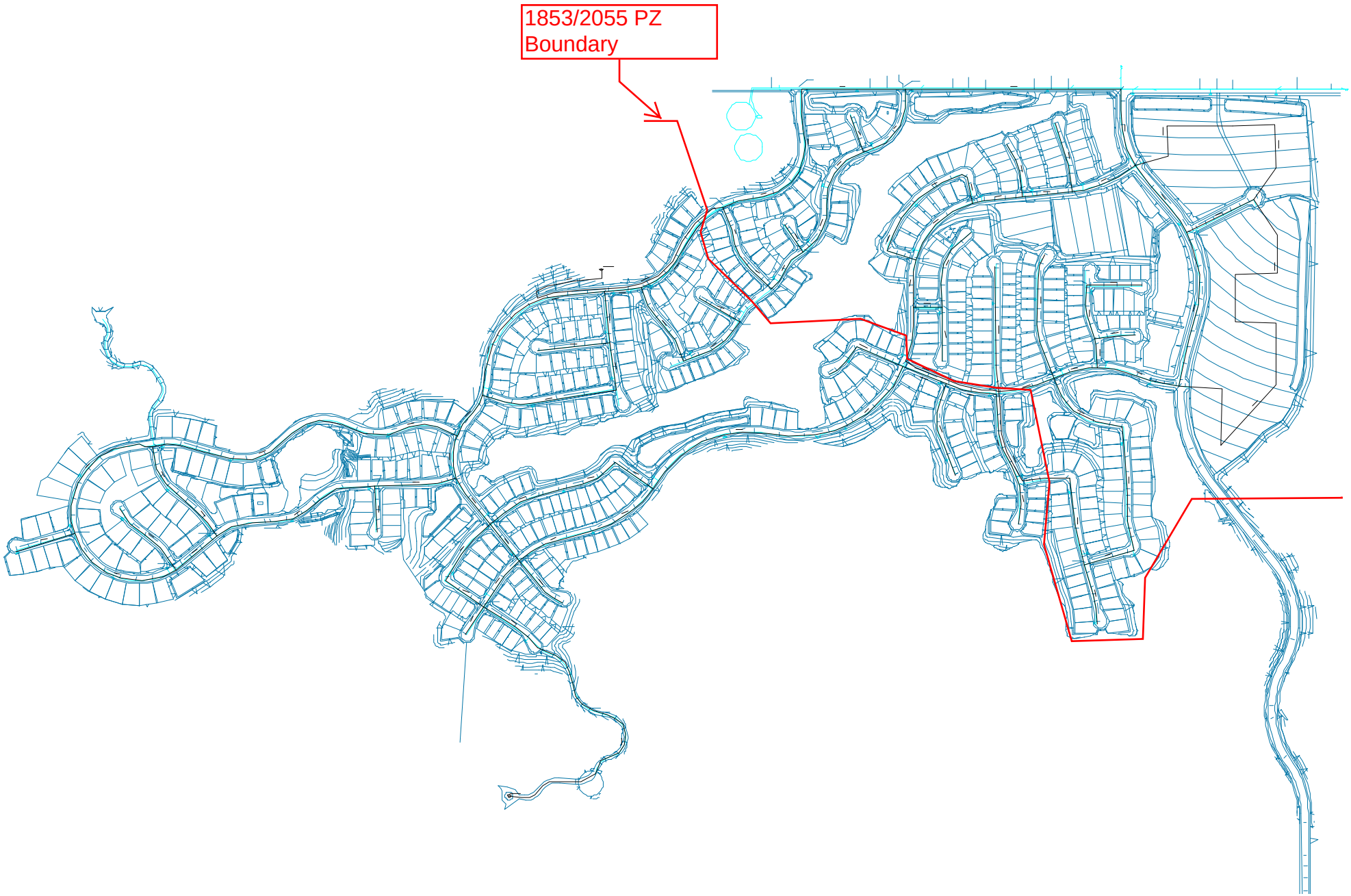
The sewer system analysis for the Project is based on EMWD's criteria and ensuring adequate system performance during peak conditions. Complete output results of the hydraulic analysis are found in Appendix B.

Recommended facilities for the wastewater collection system include 8, 10 and 12-inch sewer pipe mains as shown in Exhibit 5. The District may elect to oversize the sewer within Zeiders Road from 12 to 15-inch to accommodate potential future flows from the east or west at Keller Road. Cost for oversizing will be reimbursed by the District based upon reimbursement policies and agreements between the owner/developer and District.

It is understood that a grading site plan is not yet finalized. A review of the sewer system is recommended when the final grading plans as well as the site plans are finalized.

APPENDIX A – DOMESTIC WATER MODEL RESULTS

Scenario: Base



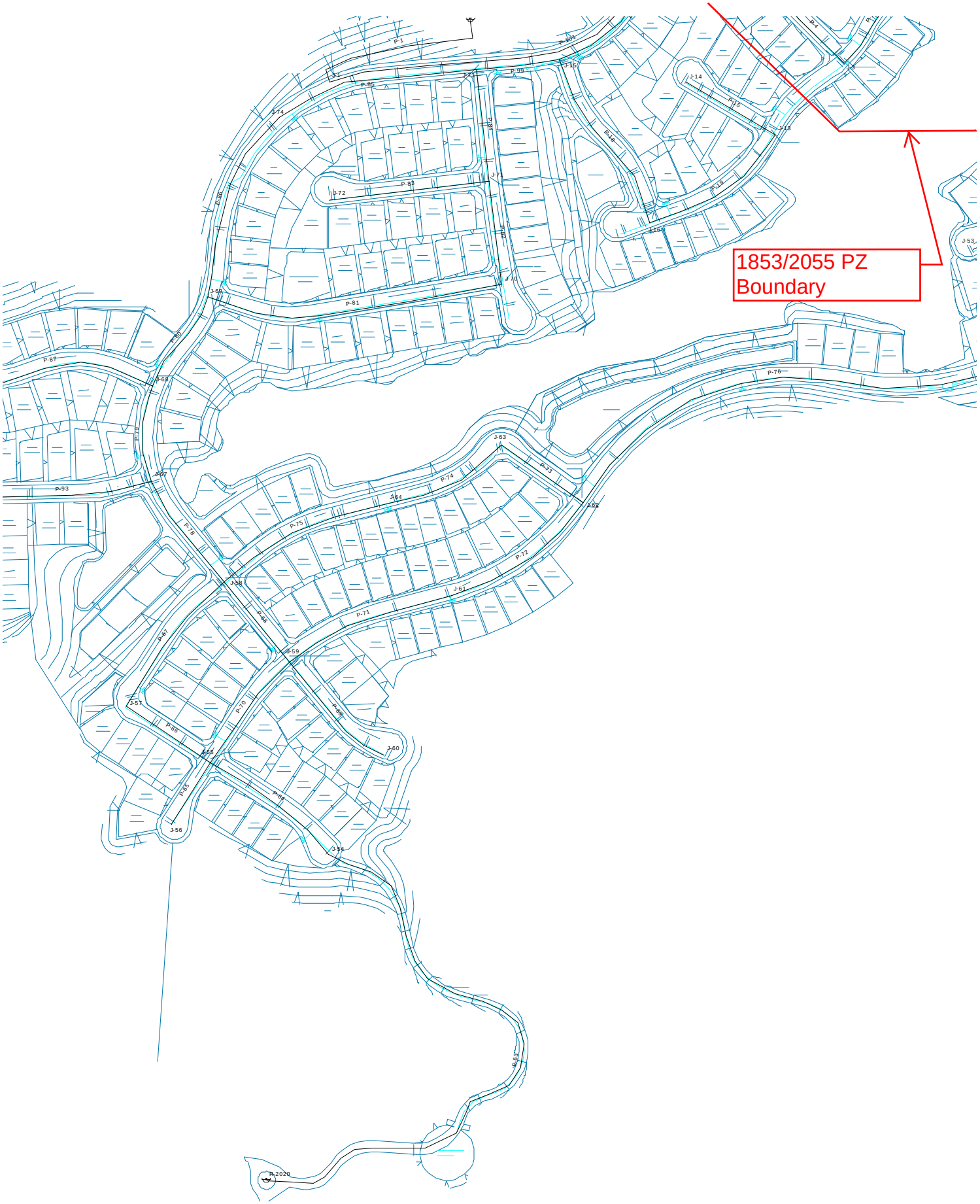
Scenario: Base

Title: Murrieta Hills
h:\...\calcs\water\models\murrietahills1.wcd
07/29/14 11:18:38 AM

RBF Consulting
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Michael Boeck
WaterCAD v5.0 [5.0037]

Scenario: Base



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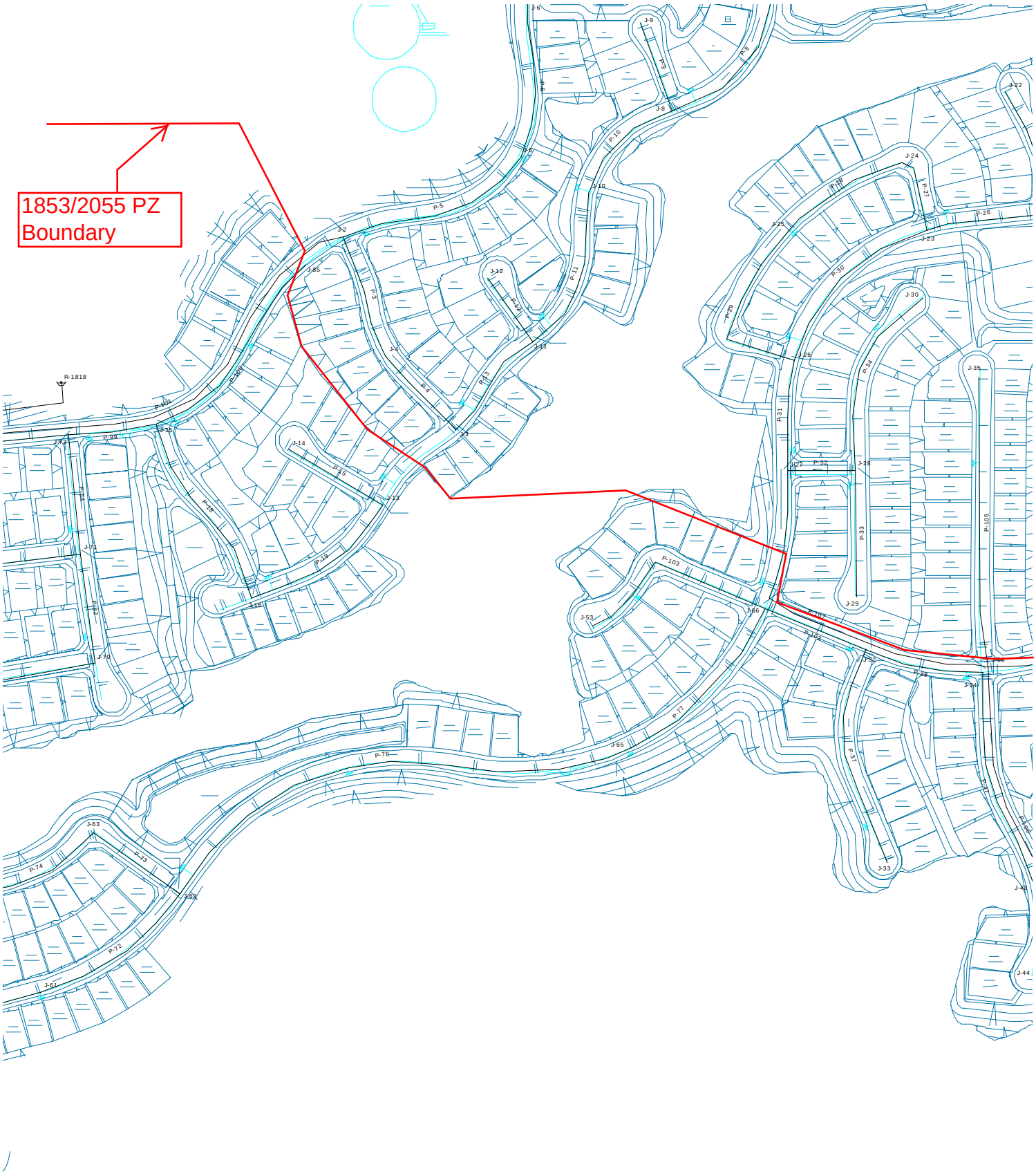

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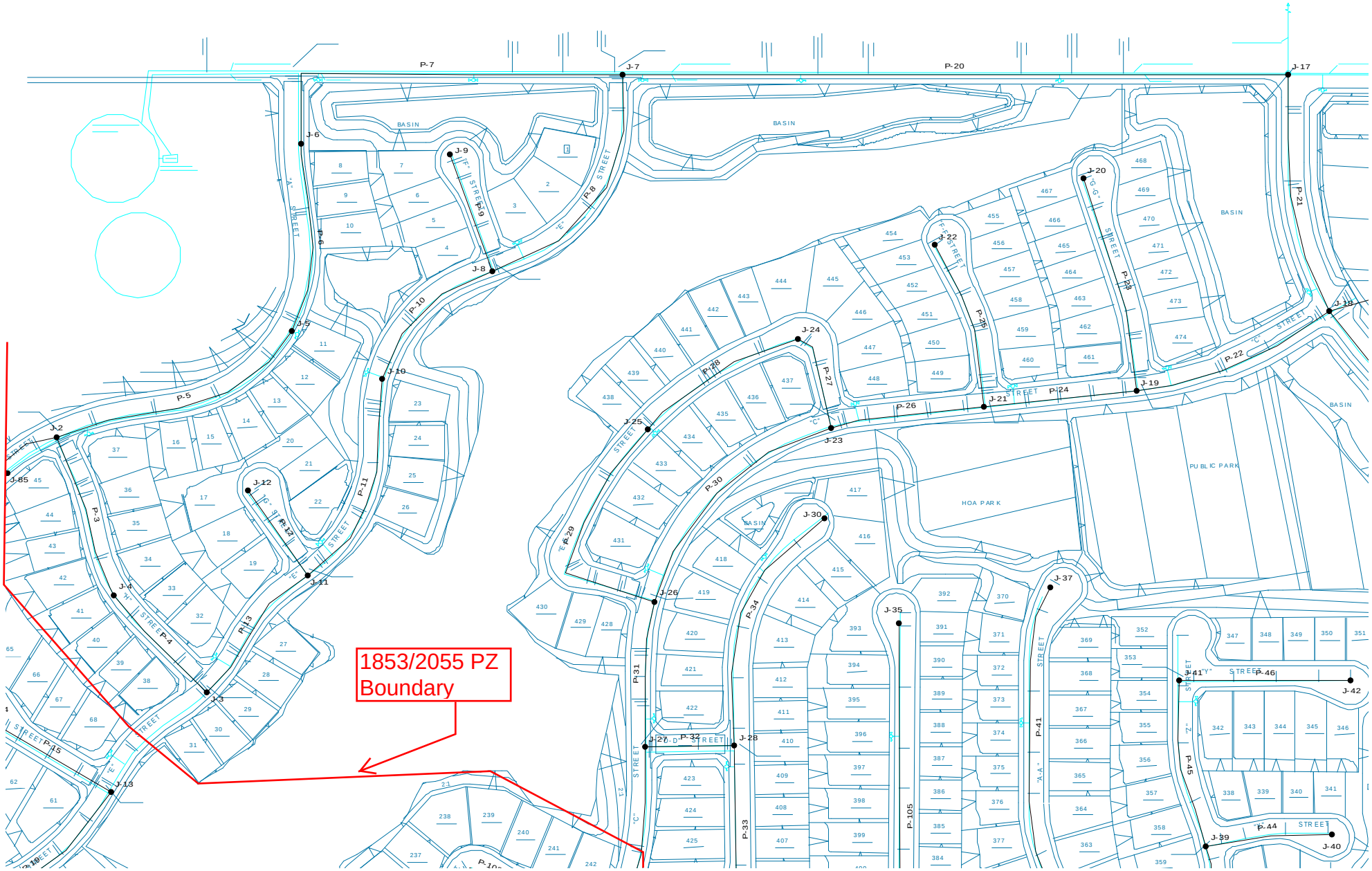
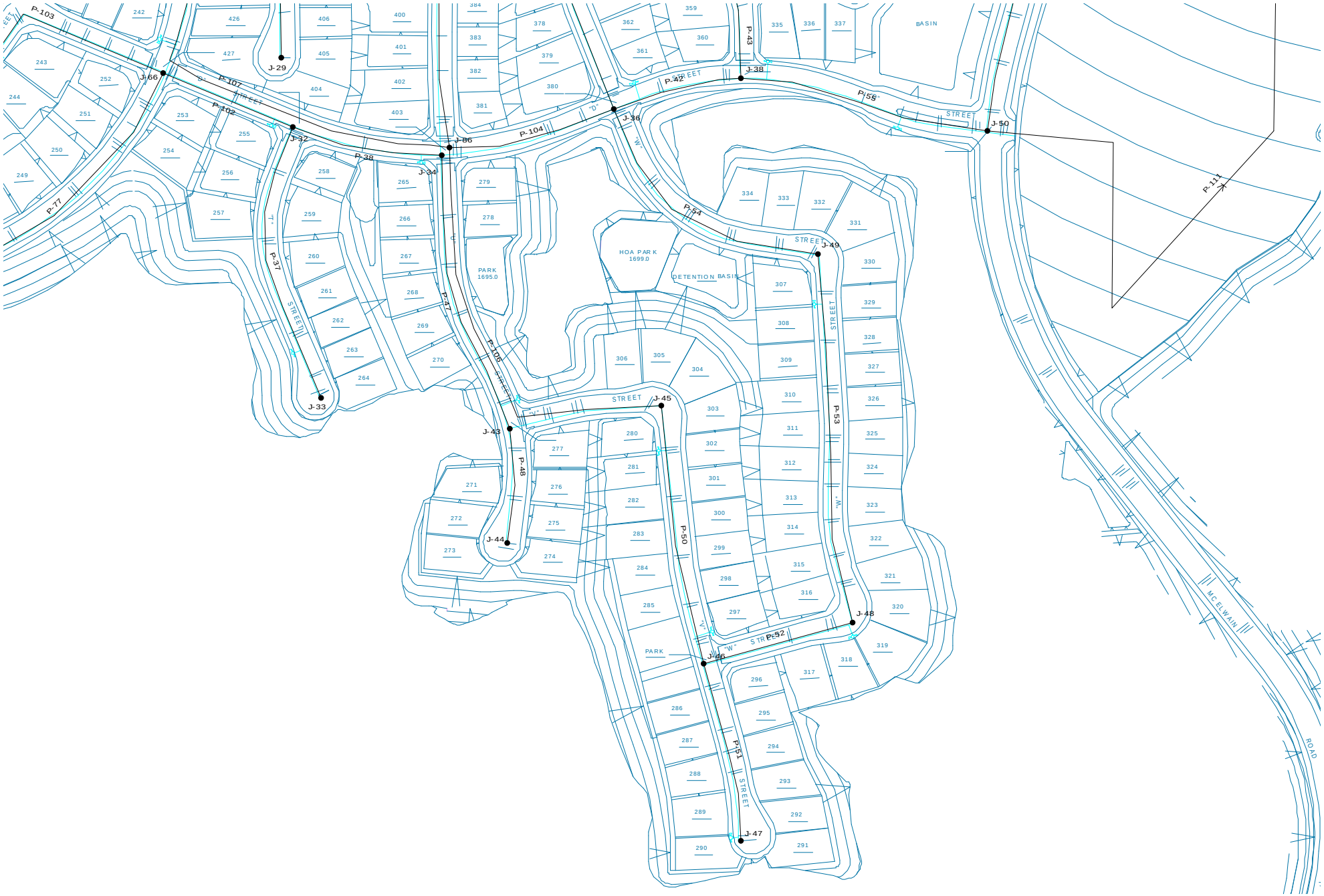


Scenario: Base



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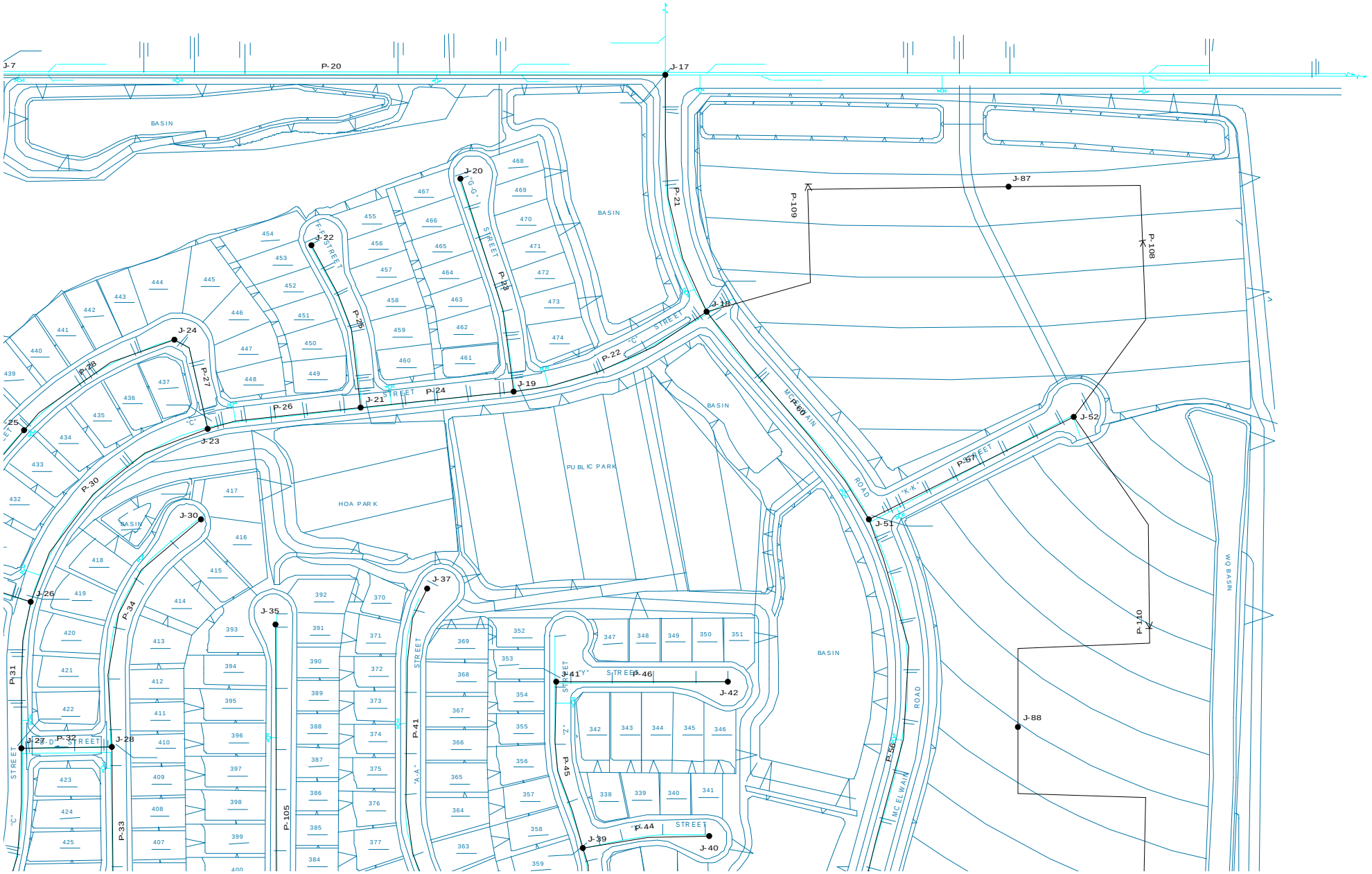
Scenario: Base



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WaterCAD Demands/Associated junctions
1853 Zone

Junction	irrigation	# lots	Avg Demand (gpm)	Max Demand (gpm)	Peak Demand (gpm)
J-1		0	0.0	0.0	0.0
J-2		6	2.6	7.9	18.4
J-3		5	2.2	6.6	15.3
J-4		8	3.5	10.5	24.5
J-5		6	2.6	7.9	18.4
J-6		0	0.0	0.0	0.0
J-7		0	0.0	0.0	0.0
J-8		3	1.3	3.9	9.2
J-9		4	1.8	5.3	12.3
J-10		4	1.8	5.3	12.3
J-11		0	0.0	0.0	0.0
J-12		6	2.6	7.9	18.4
J-17		0	0.0	0.0	0.0
J-18		0	0.0	0.0	0.0
J-19	26.2	0	0.0	26.2	26.2
J-20		14	6.1	18.4	42.9
J-21	12	0	0.0	12.0	12.0
J-22		12	5.3	15.8	36.8
J-23		0	0.0	0.0	0.0
J-24		7	3.1	9.2	21.4
J-25		11	4.8	14.4	33.7
J-26		3	1.3	3.9	9.2
J-27		0	0.0	0.0	0.0
J-28		7	3.1	9.2	21.4
J-29		7	3.1	9.2	21.4
J-30		10	4.4	13.1	30.6
J-35		23	10.1	30.2	70.4
J-36		0	0.0	0.0	0.0
J-37		20	8.8	26.3	61.3
J-38		0	0.0	0.0	0.0
J-39		6	2.6	7.9	18.4
J-40		5	2.2	6.6	15.3
J-41		7	3.1	9.2	21.4
J-42		8	3.5	10.5	24.5
J-45		11	4.8	14.4	33.7
J-46	1.8	10	4.4	14.9	32.4
J-47		11	4.8	14.4	33.7
J-48		16	7.0	21.0	49.0
J-49	2.8	15	6.6	22.5	48.7
J-50		0	0.0	0.0	0.0
J-51		0	0.0	0.0	0.0
J-52		0	0.0	0.0	0.0
J-86	0	0	0.0	0.0	0.0
J-87		26.5	36.8	55.2	73.6
J-88		172	35.8	53.8	89.6

WaterCAD Demands/Associated junctions
2055 Zone

J-13		0	0	0	0
J-14		8	3.5	10.5	24.5
J-15		12	5.25	15.75	36.75
J-16	9.6	11	4.8125	24.0375	43.2875
J-32		0	0	0	0
J-33		8	3.5	10.5	24.5
J-34		6	2.625	7.875	18.375
J-43	1.4	3	1.3125	3.9375	9.1875
J-44		4	1.75	5.25	12.25
J-53		9	3.9375	11.8125	27.5625
J-54		7	3.0625	9.1875	21.4375
J-55		4	1.75	5.25	12.25
J-56		2	0.875	2.625	6.125
J-57	1	5	2.1875	7.5625	16.3125
J-58		6	2.625	7.875	18.375
J-59		6	2.625	7.875	18.375
J-60	1	6	2.625	8.875	19.375
J-61		14	6.125	18.375	42.875
J-62		5	2.1875	6.5625	15.3125
J-63		4	1.75	5.25	12.25
J-64		8	3.5	10.5	24.5
J-65		6	2.625	7.875	18.375
J-66		6	2.625	7.875	18.375
J-67		3	1.3125	3.9375	9.1875
J-68		6	2.625	7.875	18.375
J-69	2.8	4	1.75	8.05	15.05
J-70		5	2.1875	6.5625	15.3125
J-71		6	2.625	7.875	18.375
J-72	1.4	8	3.5	11.9	25.9
J-73		4	1.75	5.25	12.25
J-74		7	3.0625	9.1875	21.4375
J-75		8	3.5	10.5	24.5
J-76		12	6.7	20.0	46.7
J-77	8.8	4	1.8	14.1	21.1
J-78		5	2.8	8.3	19.4
J-79		9	3.9	11.8	27.6
J-80		7	3.1	9.2	21.4
J-81	6	20	11.1	39.3	83.8
J-82		6	3.3	10.0	23.3
J-83		6	3.3	10.0	23.3
J-84		7	3.9	11.7	27.2
J-85		6	2.625	7.875	18.375

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.81	1.21
J-45	1,709.50	1853	Demand	33.70	Fixed	33.70	1,814.05	45.23
J-47	1,706.70	1853	Demand	33.70	Fixed	33.70	1,814.03	46.44
J-2	1,706.80	1853	Demand	18.40	Fixed	18.40	1,817.29	47.80
J-29	1,702.10	1853	Demand	21.40	Fixed	21.40	1,814.04	48.43
J-46	1,699.30	1853	Demand	32.40	Fixed	32.40	1,814.04	49.64
J-4	1,701.50	1853	Demand	24.50	Fixed	24.50	1,817.12	50.03
J-3	1,697.10	1853	Demand	15.30	Fixed	15.30	1,817.04	51.89
J-48	1,692.40	1853	Demand	49.00	Fixed	49.00	1,814.05	52.63
J-28	1,690.80	1853	Demand	21.40	Fixed	21.40	1,814.04	53.32
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,814.07	53.33
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,814.07	53.55
J-82	1,880.00	2055	Demand	23.30	Fixed	23.30	2,012.56	57.35
J-76	1,880.00	2055	Demand	46.70	Fixed	46.70	2,012.69	57.41
J-84	1,879.50	2055	Demand	27.20	Fixed	27.20	2,012.60	57.59
J-77	1,877.00	2055	Demand	21.10	Fixed	21.10	2,012.69	58.71
J-81	1,876.00	2055	Demand	83.90	Fixed	83.90	2,012.57	59.09
J-49	1,676.50	1853	Demand	48.70	Fixed	48.70	1,814.06	59.52
J-12	1,678.10	1853	Demand	18.40	Fixed	18.40	1,816.96	60.08
J-83	1,873.50	2055	Demand	23.30	Fixed	23.30	2,012.62	60.19
J-78	1,873.50	2055	Demand	19.40	Fixed	19.40	2,012.70	60.22
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,816.96	61.64
J-26	1,669.50	1853	Demand	9.20	Fixed	9.20	1,814.13	62.57
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,814.10	62.99
J-5	1,668.10	1853	Demand	18.40	Fixed	18.40	1,817.14	64.48
J-75	1,860.70	2055	Demand	24.50	Fixed	24.50	2,013.21	65.98
J-35	1,658.30	1853	Demand	70.40	Fixed	70.40	1,813.95	67.34
J-10	1,659.10	1853	Demand	12.30	Fixed	12.30	1,816.89	68.27
J-30	1,652.50	1853	Demand	30.60	Fixed	30.60	1,814.02	69.88
J-39	1,652.50	1853	Demand	18.40	Fixed	18.40	1,814.16	69.94
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,814.19	69.96
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,817.03	71.92
J-40	1,647.20	1853	Demand	15.30	Fixed	15.30	1,814.16	72.24
J-54	1,845.50	2055	Demand	21.40	Fixed	21.40	2,015.74	73.65
J-79	1,842.00	2055	Demand	27.60	Fixed	27.60	2,013.21	74.08
J-80	1,840.80	2055	Demand	21.40	Fixed	21.40	2,013.21	74.59
J-37	1,640.50	1853	Demand	61.30	Fixed	61.30	1,814.00	75.07
J-25	1,640.00	1853	Demand	33.70	Fixed	33.70	1,814.13	75.34
J-74	1,836.00	2055	Demand	21.40	Fixed	21.40	2,013.43	76.76
J-56	1,836.90	2055	Demand	6.10	Fixed	6.10	2,014.75	76.95
J-41	1,636.00	1853	Demand	21.40	Fixed	21.40	1,814.14	77.07
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,814.48	77.26
J-88	1,635.90	1853	Demand	89.60	Fixed	89.60	1,814.86	77.43
J-9	1,637.80	1853	Demand	12.30	Fixed	12.30	1,816.85	77.47
J-42	1,634.30	1853	Demand	24.50	Fixed	24.50	1,814.13	77.80
J-8	1,636.70	1853	Demand	9.20	Fixed	9.20	1,816.85	77.94
J-60	1,830.50	2055	Demand	19.40	Fixed	19.40	2,014.24	79.50
J-55	1,830.00	2055	Demand	12.30	Fixed	12.30	2,014.75	79.93
J-69	1,828.20	2055	Demand	15.10	Fixed	15.10	2,013.46	80.16
J-57	1,826.50	2055	Demand	16.30	Fixed	16.30	2,014.44	81.31
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,814.20	82.72
J-24	1,622.00	1853	Demand	21.40	Fixed	21.40	1,814.17	83.14
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,816.82	83.69
J-68	1,818.80	2055	Demand	18.40	Fixed	18.40	2,013.52	84.25

Scenario: Peak Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-59	1,816.50	2055	Demand	18.40	Fixed	18.40	2,014.25	85.56
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,815.00	86.10
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,814.38	86.17
J-22	1,613.60	1853	Demand	36.80	Fixed	36.80	1,814.36	86.86
J-72	1,811.50	2055	Demand	25.90	Fixed	25.90	2,013.22	87.28
J-58	1,808.30	2055	Demand	18.40	Fixed	18.40	2,014.02	89.01
J-67	1,806.50	2055	Demand	9.20	Fixed	9.20	2,013.66	89.63
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,814.68	90.07
J-20	1,605.70	1853	Demand	42.90	Fixed	42.90	1,814.65	90.40
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,814.89	92.11
J-61	1,798.30	2055	Demand	42.90	Fixed	42.90	2,013.98	93.31
J-64	1,795.70	2055	Demand	24.50	Fixed	24.50	2,013.91	94.41
J-73	1,793.90	2055	Demand	12.30	Fixed	12.30	2,013.23	94.89
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,815.41	95.19
J-87	1,590.00	1853	Demand	89.60	Fixed	89.60	1,815.38	97.51
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,816.43	98.40
J-62	1,785.00	2055	Demand	15.30	Fixed	15.30	2,013.85	99.01
J-71	1,783.80	2055	Demand	18.40	Fixed	18.40	2,013.23	99.27
J-63	1,783.50	2055	Demand	12.30	Fixed	12.30	2,013.87	99.67
J-70	1,776.20	2055	Demand	15.30	Fixed	15.30	2,013.28	102.57
J-15	1,761.50	1853	Demand	36.75	Fixed	36.75	2,013.13	108.87
J-65	1,741.50	2055	Demand	18.40	Fixed	18.40	2,013.23	117.56
J-16	1,739.10	1853	Demand	43.30	Fixed	43.30	2,013.05	118.53
J-44	1,727.40	2055	Demand	12.30	Fixed	12.30	2,012.98	123.56
J-53	1,723.90	1853	Demand	27.60	Fixed	27.60	2,013.03	125.09
J-14	1,722.60	1853	Demand	24.50	Fixed	24.50	2,013.04	125.66
J-43	1,722.30	2055	Demand	9.20	Fixed	9.20	2,012.98	125.76
J-85	1,721.50	2055	Demand	18.40	Fixed	18.40	2,013.12	126.17
J-33	1,719.40	2055	Demand	24.50	Fixed	24.50	2,013.00	127.02
J-66	1,713.10	2055	Demand	18.40	Fixed	18.40	2,013.05	129.77
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,013.04	130.03
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,013.01	134.52
J-34	1,690.30	2055	Demand	18.40	Fixed	18.40	2,012.99	139.61

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	913.45	2,020.00	2,015.74	4.26	2.49	2.59
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	892.05	2,015.74	2,014.75	0.99	2.38	2.53
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	843.60	1,816.43	1,815.41	1.03	2.15	2.39
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-670.76	2,014.25	2,014.75	0.50	1.40	1.90
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	260.79	1,815.41	1,814.68	0.73	1.76	1.66
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	577.35	2,014.02	2,013.66	0.37	1.06	1.64
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	493.21	1,815.41	1,815.00	0.41	0.79	1.40
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-493.15	2,014.02	2,014.25	0.23	0.79	1.40
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	202.89	2,014.75	2,014.44	0.31	1.10	1.30
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	972.40	1,818.00	1,817.81	0.19	0.39	1.23
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	972.40	1,817.81	1,817.29	0.52	0.39	1.23
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	191.69	1,814.68	1,814.38	0.30	0.99	1.22
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	186.59	2,014.44	2,014.02	0.42	0.95	1.19
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-180.88	2,013.21	2,013.66	0.44	0.89	1.15
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-403.61	1,814.48	1,815.00	0.52	0.55	1.14
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-403.61	1,814.19	1,814.48	0.28	0.55	1.14
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	387.27	2,013.66	2,013.52	0.14	0.51	1.10
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	843.60	1,816.82	1,816.43	0.39	0.30	1.06
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	823.24	1,817.29	1,817.14	0.15	0.28	1.04
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	804.84	1,817.14	1,817.03	0.10	0.27	1.01
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	804.84	1,817.03	1,816.82	0.21	0.27	1.01
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-324.01	1,814.10	1,814.19	0.10	0.36	0.92
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	142.89	1,814.38	1,814.20	0.18	0.58	0.91
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	139.80	2,014.25	2,013.98	0.27	0.55	0.89
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	137.52	2,013.52	2,013.21	0.31	0.54	0.88
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-131.88	2,012.70	2,013.21	0.52	0.50	0.84
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	130.76	1,817.29	1,817.12	0.16	0.49	0.83
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	128.80	2,013.85	2,013.23	0.62	0.48	0.82
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	122.95	2,013.23	2,013.13	0.10	0.44	0.78
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	113.02	2,013.21	2,012.69	0.52	0.37	0.72
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	110.40	2,013.23	2,013.05	0.18	0.36	0.70
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-109.18	2,013.23	2,013.43	0.20	0.35	0.70
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	106.26	1,817.12	1,817.04	0.09	0.33	0.68
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	231.35	2,013.52	2,013.46	0.06	0.20	0.66
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	96.90	2,013.98	2,013.85	0.13	0.28	0.62
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-91.56	2,012.62	2,012.70	0.08	0.25	0.58
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-90.96	1,816.96	1,817.04	0.08	0.25	0.58
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	89.60	1,815.00	1,814.89	0.11	0.24	0.57
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	85.67	2,013.46	2,013.28	0.18	0.22	0.55
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-84.00	2,013.91	2,014.02	0.11	0.22	0.54
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	79.60	1,814.19	1,814.16	0.03	0.20	0.51
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	78.59	1,814.13	1,814.07	0.05	0.19	0.50
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	74.82	1,814.20	1,814.17	0.03	0.17	0.48
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	73.40	1,814.07	1,814.04	0.03	0.17	0.47
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-72.56	1,816.89	1,816.96	0.07	0.16	0.46
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	70.40	1,814.07	1,813.95	0.12	0.16	0.45
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	70.37	2,013.28	2,013.23	0.04	0.16	0.45
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-68.07	1,814.13	1,814.20	0.07	0.15	0.43
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	67.80	2,013.13	2,013.05	0.08	0.15	0.43
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	66.14	2,012.69	2,012.57	0.12	0.14	0.42
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-64.40	2,013.01	2,013.05	0.04	0.13	0.41
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	140.19	1,814.10	1,814.07	0.03	0.08	0.40
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	61.30	1,814.10	1,814.00	0.09	0.12	0.39

Scenario: Peak Hour
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-60.26	1,816.85	1,816.89	0.04	0.12	0.38
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-59.50	2,013.87	2,013.91	0.04	0.11	0.38
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-130.58	2,013.43	2,013.46	0.04	0.07	0.37
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-122.52	1,814.06	1,814.10	0.03	0.06	0.35
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	53.42	1,814.17	1,814.13	0.03	0.09	0.34
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-47.20	2,013.85	2,013.87	0.02	0.07	0.30
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	45.90	1,814.16	1,814.14	0.02	0.07	0.29
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	42.90	1,814.68	1,814.65	0.03	0.06	0.27
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-41.06	2,012.57	2,012.62	0.04	0.06	0.26
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	39.90	2,013.01	2,012.99	0.02	0.05	0.25
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	89.60	1,815.41	1,815.38	0.03	0.03	0.25
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	89.60	1,814.89	1,814.86	0.03	0.03	0.25
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-38.76	1,816.82	1,816.85	0.03	0.05	0.25
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	36.80	1,814.38	1,814.36	0.02	0.05	0.23
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	33.70	1,814.04	1,814.03	0.01	0.04	0.22
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	74.98	1,814.07	1,814.05	0.02	0.02	0.21
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-73.82	1,814.05	1,814.06	0.02	0.02	0.21
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	30.60	1,814.04	1,814.02	0.02	0.03	0.20
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	27.60	2,013.05	2,013.03	0.02	0.03	0.18
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	27.20	2,012.62	2,012.60	0.01	0.03	0.17
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-26.07	2,013.23	2,013.23	0.01	0.02	0.17
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	25.90	2,013.23	2,013.22	0.01	0.02	0.17
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.05	2,013.04	0.01	0.02	0.16
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.04	2,013.04	0.01	0.02	0.16
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	24.50	2,013.01	2,013.00	0.01	0.02	0.16
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	24.50	1,814.14	1,814.13	0.01	0.02	0.16
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	23.30	2,012.57	2,012.56	0.01	0.02	0.15
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	21.50	2,012.99	2,012.98	0.01	0.02	0.14
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	21.40	1,814.04	1,814.04	0.01	0.02	0.14
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	21.40	2,013.21	2,013.21	0.00	0.02	0.14
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-20.92	2,012.69	2,012.70	0.01	0.02	0.13
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	19.72	1,814.13	1,814.13	0.01	0.01	0.13
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	19.40	2,014.25	2,014.24	0.01	0.01	0.12
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	18.40	2,013.13	2,013.12	0.01	0.01	0.12
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,816.96	1,816.96	0.00	0.01	0.12
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	41.28	1,814.05	1,814.04	0.00	0.01	0.12
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	15.30	1,814.16	1,814.16	0.00	0.01	0.10
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	12.30	1,816.85	1,816.85	0.00	0.01	0.08
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	12.30	2,012.98	2,012.98	0.00	0.01	0.08
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-24.82	1,814.04	1,814.05	0.00	0.00	0.07
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	6.10	2,014.75	2,014.75	0.00	0.00	0.04
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	5.19	1,814.07	1,814.07	0.00	0.00	0.03
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	0.18	2,012.69	2,012.69	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,814.89	1,815.38	0.00	0.00	0.00
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,814.48	1,814.86	0.00	0.00	0.00

Scenario: Max + Fire @ J-45
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.28	0.99
J-45	1,709.50	1853	Demand	1,514.40	Fixed	1,514.40	1,793.54	36.36
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,794.11	37.82
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,794.12	41.02
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,799.20	42.01
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,794.48	44.17
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,795.79	45.64
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,799.20	46.90
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,799.21	46.90
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,815.35	46.96
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,814.99	49.10
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,814.72	50.89
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,795.43	51.45
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,796.16	55.23
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,800.42	56.64
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,814.43	58.98
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,795.77	59.48
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,814.43	60.54
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,797.37	62.68
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,797.37	62.68
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,814.74	63.44
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,799.20	63.47
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,797.37	64.97
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,814.05	67.04
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,796.14	67.34
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,800.80	69.57
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,797.36	69.81
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,797.36	70.55
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,814.30	70.74
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,799.80	70.91
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,804.24	72.83
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,813.79	76.14
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,813.79	76.62
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,801.29	77.14
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,801.10	77.49
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,802.74	81.14
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,804.29	81.47
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,802.73	81.83
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,813.42	82.21

Scenario: Max + Fire @ J-45
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,804.33	85.59
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,804.32	85.93
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,804.25	87.50
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,806.93	91.52
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,806.92	93.85
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,811.63	96.32
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-45
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	1,918.30	1,811.63	1,806.93	4.71	9.82	5.44
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	1,345.93	1,806.93	1,804.29	2.63	5.10	3.82
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	1,292.13	1,799.80	1,804.29	4.49	4.73	3.67
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	1,292.13	1,797.37	1,799.80	2.42	4.73	3.67
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	1,257.93	1,796.16	1,797.37	1.21	4.50	3.57
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	517.17	1,806.93	1,804.33	2.60	6.25	3.30
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	472.57	1,804.33	1,802.74	1.59	5.29	3.02
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	444.77	1,802.74	1,801.29	1.45	4.72	2.84
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	417.27	1,800.42	1,799.21	1.21	4.20	2.66
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	935.00	1,795.79	1,793.54	2.25	2.60	2.65
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	1,973.60	1,818.00	1,817.28	0.72	1.44	2.49
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	1,973.60	1,817.28	1,815.35	1.93	1.44	2.49
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	385.77	1,799.21	1,795.79	3.42	3.63	2.46
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	1,918.30	1,813.42	1,811.63	1.78	1.36	2.42
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	1,762.73	1,815.35	1,814.74	0.61	1.17	2.22
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	1,754.83	1,814.30	1,813.42	0.89	1.16	2.21
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	1,754.83	1,814.74	1,814.30	0.43	1.16	2.21
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-652.20	1,795.43	1,796.16	0.73	1.33	1.85
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-629.70	1,794.48	1,795.43	0.94	1.25	1.79
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-608.70	1,794.12	1,794.48	0.37	1.17	1.73
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	579.43	1,796.16	1,795.79	0.37	1.07	1.64
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	-579.40	1,793.54	1,794.12	0.57	1.07	1.64
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-257.34	1,800.42	1,801.29	0.87	1.71	1.64
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	202.97	1,815.35	1,814.99	0.36	1.10	1.30
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	192.47	1,814.99	1,814.72	0.27	1.00	1.23
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	187.43	1,801.29	1,801.10	0.19	0.95	1.20
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-185.87	1,814.43	1,814.72	0.29	0.94	1.19
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	178.23	1,801.10	1,800.80	0.30	0.87	1.14
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-177.97	1,814.05	1,814.43	0.38	0.87	1.14
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-172.67	1,813.79	1,814.05	0.26	0.82	1.10
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	163.83	1,800.80	1,800.42	0.38	0.74	1.05
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-163.47	1,813.42	1,813.79	0.38	0.74	1.04
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	53.80	1,804.29	1,804.25	0.04	0.09	0.34
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26

Scenario: Max + Fire @ J-45
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,797.37	1,797.37	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,799.21	1,799.20	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,795.79	1,795.77	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,796.16	1,796.14	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,806.93	1,806.92	0.01	0.01	0.16
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,804.25	1,804.24	0.01	0.01	0.15
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,797.37	1,797.36	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,804.33	1,804.32	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,802.74	1,802.73	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,794.12	1,794.11	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,799.20	1,799.20	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,797.36	1,797.36	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,799.20	1,799.20	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,814.43	1,814.43	0.00	0.00	0.05
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,797.37	1,797.37	0.00	0.00	0.04
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,813.79	1,813.79	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,799.80	1,804.24	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,804.25	1,806.92	0.00	0.00	0.00

Scenario: Max + Fire @ J-88
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,815.95	0.41
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,770.72	26.49
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,770.69	27.69
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,770.69	30.89
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,775.61	31.80
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,770.68	33.87
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,770.78	34.82
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,775.61	36.69
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,775.62	36.70
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,770.67	40.74
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,770.67	44.20
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,810.45	44.84
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,777.28	46.63
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,809.49	46.72
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,808.76	48.31
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,770.76	48.65
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,770.56	51.08
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,770.57	51.08
J-88	1,635.90	1853	Demand	3,053.80	Fixed	3,053.80	1,755.47	51.73
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,775.61	53.26
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,770.56	53.37
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,807.94	56.17
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,770.65	56.31
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,807.94	57.73
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,770.42	58.20
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,770.56	58.22
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,770.56	58.95
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,777.82	59.63
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,808.68	60.82
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,806.83	63.92
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,778.48	67.27
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,778.23	67.59
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,807.43	67.77
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,759.90	68.31
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,775.94	69.20
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,780.44	71.49
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,780.43	72.18
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,806.05	72.79
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,806.05	73.27
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,782.56	76.17
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,782.55	76.52
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,804.86	78.51
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70

Scenario: Max + Fire @ J-88
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,785.94	82.44
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,785.93	84.77
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,799.66	91.14
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-88
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	3,418.30	1,799.66	1,785.94	13.72	28.64	9.70
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	1,322.85	1,775.94	1,759.90	16.04	35.57	8.44
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	2,766.53	1,785.94	1,775.94	10.01	19.35	7.85
P-111	841.00	12.0	PVC	120.0	true	0.00	Open	1,730.95	1,770.42	1,755.47	14.95	8.12	4.91
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	3,473.60	1,815.95	1,810.45	5.50	4.09	4.38
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	3,473.60	1,818.00	1,815.95	2.05	4.09	4.38
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	3,418.30	1,804.86	1,799.66	5.20	3.97	4.31
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	1,443.68	1,770.42	1,775.94	5.52	5.80	4.10
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	3,122.58	1,810.45	1,808.68	1.76	3.36	3.94
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	3,114.68	1,808.68	1,807.43	1.25	3.34	3.93
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	3,114.68	1,807.43	1,804.86	2.57	3.34	3.93
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	596.57	1,785.94	1,782.56	3.39	8.14	3.81
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	1,322.85	1,759.90	1,755.47	4.43	4.94	3.75
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	551.97	1,782.56	1,780.44	2.12	7.05	3.52
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	524.17	1,780.44	1,778.48	1.96	6.40	3.35
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	496.67	1,777.28	1,775.62	1.67	5.80	3.17
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	465.17	1,775.62	1,770.78	4.84	5.13	2.97
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	343.12	1,810.45	1,809.49	0.96	2.92	2.19
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	332.62	1,809.49	1,808.76	0.73	2.76	2.12
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-326.02	1,807.94	1,808.76	0.82	2.66	2.08
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-318.12	1,806.83	1,807.94	1.10	2.54	2.03
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-312.82	1,806.05	1,806.83	0.78	2.46	2.00
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-304.78	1,777.28	1,778.48	1.19	2.35	1.95
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-303.62	1,804.86	1,806.05	1.19	2.33	1.94
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	219.39	1,778.48	1,778.23	0.25	1.28	1.40
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	210.19	1,778.23	1,777.82	0.41	1.18	1.34
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	195.79	1,777.82	1,777.28	0.53	1.03	1.25
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	321.47	1,770.67	1,770.57	0.10	0.36	0.91
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	-306.20	1,770.67	1,770.78	0.11	0.33	0.87
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	287.27	1,770.57	1,770.42	0.15	0.29	0.81
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	128.77	1,770.78	1,770.72	0.06	0.07	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	114.37	1,770.72	1,770.69	0.03	0.05	0.32
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25

Scenario: Max + Fire @ J-88
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	85.07	1,770.69	1,770.68	0.01	0.03	0.24
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,770.57	1,770.56	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,775.62	1,775.61	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,770.78	1,770.76	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	64.07	1,770.68	1,770.67	0.01	0.02	0.18
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,770.67	1,770.65	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,785.94	1,785.93	0.01	0.01	0.16
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,770.56	1,770.56	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	41.57	1,770.67	1,770.67	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,782.56	1,782.55	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,780.44	1,780.43	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,770.69	1,770.69	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,775.61	1,775.61	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,770.56	1,770.56	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,775.61	1,775.61	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,807.94	1,807.94	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,770.56	1,770.56	0.00	0.00	0.04
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,806.05	1,806.05	0.00	0.00	0.03
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,759.90	1,785.93	0.00	0.00	0.00

Scenario: Max + Fire @ J-87
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,815.83	0.36
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,782.57	31.62
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,782.57	32.83
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,782.85	34.94
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,782.57	36.03
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,782.57	39.01
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,782.85	39.83
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,782.86	39.83
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,782.58	39.93
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,810.04	44.67
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,782.57	45.89
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,809.03	46.52
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,808.26	48.09
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,783.00	49.11
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,782.58	49.36
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,782.56	53.76
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,807.40	55.94
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,782.58	56.28
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,782.58	56.28
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,782.85	56.40
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,807.40	57.50
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,782.57	58.57
J-82	1,880.00	2055	Demand	10.00	Fixed	10.00	2,018.30	59.84
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	2,018.33	59.85
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	2,018.31	60.06
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,808.18	60.61
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	2,018.33	61.15
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,782.56	61.46
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	2,018.30	61.57
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,783.04	61.89
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	2,018.32	62.65
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	2,018.33	62.66
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,782.57	63.41
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,782.57	63.46
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,782.60	63.47
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,806.23	63.66
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,782.57	64.15
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,806.86	67.52
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	2,018.46	68.25
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,783.11	69.27
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,783.08	69.69
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,782.66	72.11
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,805.41	72.51
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,783.33	72.74
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,805.41	72.99
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,783.32	73.43
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,775.25	74.96
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,019.04	75.08
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	2,018.46	76.35
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,783.61	76.63
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	2,018.46	76.86
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,783.61	76.97
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,804.15	78.20
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	2,018.81	78.70

Scenario: Max + Fire @ J-87
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	2,018.51	78.96
J-87	1,590.00	1853	Demand	3,155.20	Fixed	3,155.20	1,773.52	79.40
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	2,018.70	81.42
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,784.19	81.68
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	2,018.81	81.69
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	2,018.52	82.34
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	2,018.74	83.17
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	2,018.53	86.41
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	2,018.70	87.48
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	2,018.46	89.54
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,798.66	90.71
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	2,018.65	91.01
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	2,018.56	91.75
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	2,018.64	95.33
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	2,018.63	96.45
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	2,018.46	97.16
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	2,018.61	101.07
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	2,018.46	101.53
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	2,018.62	101.72
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	2,018.47	104.82
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	2,018.43	111.16
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	2,018.48	119.84
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	2,018.41	120.84
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	2,018.43	125.92
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	2,018.44	127.43
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	2,018.41	127.98
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	2,018.43	128.12
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	2,018.43	128.47
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	2,018.43	129.38
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	2,018.45	132.11
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	2,018.41	132.35
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	2,018.44	136.86
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	2,018.43	141.97

Scenario: Max + Fire @ J-87
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	3,518.30	1,798.66	1,784.19	14.47	30.21	9.98
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	2,283.41	1,784.19	1,773.52	10.67	13.56	6.48
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	871.79	1,782.66	1,775.25	7.41	16.43	5.56
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	3,573.60	1,818.00	1,815.83	2.17	4.31	4.51
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	3,573.60	1,815.83	1,810.04	5.79	4.31	4.51
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	3,518.30	1,804.15	1,798.66	5.49	4.19	4.44
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	3,213.24	1,810.04	1,808.18	1.86	3.54	4.05
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	3,205.34	1,808.18	1,806.86	1.32	3.53	4.04
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	3,205.34	1,806.86	1,804.15	2.71	3.53	4.04
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	1,004.20	1,784.19	1,782.66	1.53	2.96	2.85
P-108	760.00	12.0	PVC	120.0	true	0.00	Open	871.79	1,775.25	1,773.52	1.73	2.28	2.47
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	352.46	1,810.04	1,809.03	1.01	3.07	2.25
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	341.96	1,809.03	1,808.26	0.77	2.90	2.18
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-335.36	1,807.40	1,808.26	0.86	2.80	2.14
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-327.46	1,806.23	1,807.40	1.17	2.68	2.09
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-322.16	1,805.41	1,806.23	0.83	2.60	2.06
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-312.96	1,804.15	1,805.41	1.26	2.46	2.00
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	230.68	1,784.19	1,783.61	0.58	1.40	1.47
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	186.08	1,783.61	1,783.33	0.28	0.94	1.19
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	409.33	2,020.00	2,019.04	0.96	0.56	1.16
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	400.13	2,019.04	2,018.81	0.22	0.54	1.14
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	158.28	1,783.33	1,783.11	0.21	0.70	1.01
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-300.83	2,018.70	2,018.81	0.11	0.32	0.85
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	130.78	1,783.00	1,782.86	0.14	0.49	0.83
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	263.89	2,018.65	2,018.56	0.09	0.25	0.75
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	99.28	1,782.86	1,782.58	0.28	0.29	0.63
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-223.08	2,018.65	2,018.70	0.05	0.18	0.63
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	91.40	2,018.81	2,018.74	0.07	0.25	0.58
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-86.35	1,783.00	1,783.11	0.12	0.23	0.55
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	83.80	2,018.74	2,018.65	0.09	0.21	0.53
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-82.16	2,018.46	2,018.56	0.10	0.21	0.52
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	177.83	2,018.56	2,018.53	0.03	0.12	0.50
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	71.93	1,783.11	1,783.08	0.03	0.16	0.46
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	62.74	2,018.53	2,018.46	0.07	0.13	0.40
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	62.73	1,783.08	1,783.04	0.04	0.13	0.40
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-61.16	2,018.33	2,018.46	0.12	0.12	0.39
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	60.95	2,018.70	2,018.64	0.06	0.12	0.39
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-132.42	1,782.60	1,782.66	0.07	0.07	0.38
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	2,018.46	2,018.43	0.03	0.11	0.37
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	2,018.61	2,018.48	0.13	0.10	0.35
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	52.24	2,018.46	2,018.33	0.12	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	2,018.46	2,018.51	0.05	0.08	0.32
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	48.33	1,783.04	1,783.00	0.04	0.08	0.31
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	2,018.53	2,018.52	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	2,018.48	2,018.45	0.04	0.07	0.30
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	42.55	2,018.64	2,018.61	0.03	0.06	0.27
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-41.07	2,018.32	2,018.33	0.02	0.06	0.26
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	2,018.52	2,018.47	0.04	0.05	0.25
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	-35.09	2,018.63	2,018.65	0.02	0.04	0.22
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-78.62	1,782.58	1,782.60	0.01	0.03	0.22
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	2,018.43	2,018.41	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,782.58	1,782.58	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	2,018.47	2,018.46	0.01	0.04	0.21

Scenario: Max + Fire @ J-87
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,782.86	1,782.85	0.01	0.04	0.20
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,782.58	1,782.56	0.02	0.03	0.19
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	29.93	2,018.33	2,018.30	0.03	0.03	0.19
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	2,018.44	2,018.45	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	2,018.51	2,018.52	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,782.58	1,782.56	0.02	0.03	0.17
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	-24.59	2,018.62	2,018.63	0.01	0.02	0.16
P-111	841.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,782.60	1,782.57	0.02	0.01	0.15
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-45.97	1,782.57	1,782.58	0.01	0.01	0.13
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-44.42	1,782.58	1,782.58	0.00	0.01	0.13
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,782.58	1,782.57	0.00	0.01	0.13
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-19.37	2,018.30	2,018.32	0.01	0.01	0.12
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	-19.29	2,018.61	2,018.62	0.00	0.01	0.12
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,783.61	1,783.61	0.01	0.01	0.12
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	41.23	1,782.58	1,782.57	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	2,018.44	2,018.43	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,783.33	1,783.32	0.00	0.01	0.10
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,782.57	1,782.57	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,782.85	1,782.85	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	2,018.46	2,018.46	0.00	0.01	0.08
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	-27.85	1,782.58	1,782.58	0.00	0.00	0.08
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	26.83	1,782.57	1,782.57	0.00	0.00	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	2,018.46	2,018.46	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	2,018.45	2,018.44	0.00	0.01	0.08
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-11.79	2,018.33	2,018.33	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	2,018.32	2,018.31	0.00	0.01	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.41	2,018.41	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	2,018.44	2,018.43	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,782.57	1,782.57	0.00	0.00	0.07
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-23.47	1,782.57	1,782.57	0.00	0.00	0.07
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	10.00	2,018.30	2,018.30	0.00	0.00	0.06
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	2,018.43	2,018.43	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	2,018.46	2,018.46	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,782.85	1,782.85	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	2,018.70	2,018.70	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	2,018.43	2,018.43	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,807.40	1,807.40	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,782.58	1,782.57	0.00	0.00	0.04
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,805.41	1,805.41	0.00	0.00	0.03
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	2,018.43	2,018.43	0.00	0.00	0.03
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	2,018.81	2,018.81	0.00	0.00	0.02
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	2.31	2,018.33	2,018.33	0.00	0.00	0.01
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-2.47	1,782.57	1,782.57	0.00	0.00	0.01
P-110	897.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,775.25	1,782.57	0.00	0.00	0.00

Scenario: Max + Fire @ J-82
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,815.00	1853	Demand	0.00	Fixed	0.00	1,817.95	1.28
J-82	1,880.00	2055	Demand	1,510.00	Fixed	1,510.00	1,938.17	25.17
J-81	1,876.00	2055	Demand	39.30	Fixed	39.30	1,955.12	34.23
J-84	1,879.50	2055	Demand	11.70	Fixed	11.70	1,963.98	36.55
J-76	1,880.00	2055	Demand	20.00	Fixed	20.00	1,967.79	37.98
J-83	1,873.50	2055	Demand	10.00	Fixed	10.00	1,963.99	39.15
J-77	1,877.00	2055	Demand	14.10	Fixed	14.10	1,967.89	39.32
J-78	1,873.50	2055	Demand	8.30	Fixed	8.30	1,967.99	40.88
J-45	1,709.50	1853	Demand	14.40	Fixed	14.40	1,816.98	46.50
J-47	1,706.70	1853	Demand	14.40	Fixed	14.40	1,816.98	47.71
J-2	1,706.80	1853	Demand	7.90	Fixed	7.90	1,817.81	48.03
J-29	1,702.10	1853	Demand	9.20	Fixed	9.20	1,816.98	49.70
J-4	1,701.50	1853	Demand	10.50	Fixed	10.50	1,817.77	50.31
J-46	1,699.30	1853	Demand	14.90	Fixed	14.90	1,816.98	50.92
J-3	1,697.10	1853	Demand	6.60	Fixed	6.60	1,817.75	52.20
J-75	1,860.70	2055	Demand	10.50	Fixed	10.50	1,984.98	53.77
J-48	1,692.40	1853	Demand	21.00	Fixed	21.00	1,816.98	53.90
J-28	1,690.80	1853	Demand	9.20	Fixed	9.20	1,816.98	54.59
J-27	1,690.80	1853	Demand	0.00	Fixed	0.00	1,816.99	54.59
J-86	1,690.30	1853	Demand	0.00	Fixed	0.00	1,816.99	54.81
J-12	1,678.10	1853	Demand	7.90	Fixed	7.90	1,817.73	60.41
J-49	1,676.50	1853	Demand	22.50	Fixed	22.50	1,816.99	60.78
J-79	1,842.00	2055	Demand	11.80	Fixed	11.80	1,984.69	61.73
J-11	1,674.50	1853	Demand	0.00	Fixed	0.00	1,817.73	61.97
J-80	1,840.80	2055	Demand	9.20	Fixed	9.20	1,984.69	62.25
J-26	1,669.50	1853	Demand	3.90	Fixed	3.90	1,817.00	63.81
J-36	1,668.50	1853	Demand	0.00	Fixed	0.00	1,816.99	64.25
J-5	1,668.10	1853	Demand	7.90	Fixed	7.90	1,817.77	64.76
J-74	1,836.00	2055	Demand	9.20	Fixed	9.20	1,992.43	67.68
J-54	1,845.50	2055	Demand	9.20	Fixed	9.20	2,003.30	68.27
J-10	1,659.10	1853	Demand	5.30	Fixed	5.30	1,817.71	68.62
J-35	1,658.30	1853	Demand	30.20	Fixed	30.20	1,816.96	68.65
J-56	1,836.90	2055	Demand	2.60	Fixed	2.60	1,999.28	70.26
J-69	1,828.20	2055	Demand	8.10	Fixed	8.10	1,992.44	71.06
J-30	1,652.50	1853	Demand	13.10	Fixed	13.10	1,816.98	71.16
J-39	1,652.50	1853	Demand	7.90	Fixed	7.90	1,817.01	71.18
J-38	1,652.50	1853	Demand	0.00	Fixed	0.00	1,817.02	71.18
J-60	1,830.50	2055	Demand	8.90	Fixed	8.90	1,997.21	72.13
J-6	1,650.80	1853	Demand	0.00	Fixed	0.00	1,817.74	72.23
J-55	1,830.00	2055	Demand	5.30	Fixed	5.30	1,999.28	73.24
J-40	1,647.20	1853	Demand	6.60	Fixed	6.60	1,817.01	73.47
J-57	1,826.50	2055	Demand	7.60	Fixed	7.60	1,997.97	74.19
J-68	1,818.80	2055	Demand	7.90	Fixed	7.90	1,992.45	75.13
J-37	1,640.50	1853	Demand	26.30	Fixed	26.30	1,816.97	76.35
J-25	1,640.00	1853	Demand	14.40	Fixed	14.40	1,817.00	76.58
J-9	1,637.80	1853	Demand	5.30	Fixed	5.30	1,817.70	77.83
J-59	1,816.50	2055	Demand	7.90	Fixed	7.90	1,997.21	78.19
J-72	1,811.50	2055	Demand	11.90	Fixed	11.90	1,992.38	78.26
J-8	1,636.70	1853	Demand	3.90	Fixed	3.90	1,817.70	78.31
J-41	1,636.00	1853	Demand	9.20	Fixed	9.20	1,817.00	78.31
J-50	1,635.90	1853	Demand	0.00	Fixed	0.00	1,817.08	78.39
J-88	1,635.90	1853	Demand	53.80	Fixed	53.80	1,817.14	78.42
J-42	1,634.30	1853	Demand	10.50	Fixed	10.50	1,817.00	79.05
J-67	1,806.50	2055	Demand	3.90	Fixed	3.90	1,993.07	80.72

Scenario: Max + Fire @ J-82
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-58	1,808.30	2055	Demand	7.90	Fixed	7.90	1,995.97	81.19
J-23	1,623.00	1853	Demand	0.00	Fixed	0.00	1,817.01	83.94
J-7	1,623.40	1853	Demand	0.00	Fixed	0.00	1,817.69	84.06
J-24	1,622.00	1853	Demand	9.20	Fixed	9.20	1,817.00	84.37
J-61	1,798.30	2055	Demand	18.40	Fixed	18.40	1,996.72	85.85
J-73	1,793.90	2055	Demand	5.30	Fixed	5.30	1,992.38	85.87
J-64	1,795.70	2055	Demand	10.50	Fixed	10.50	1,996.11	86.71
J-51	1,616.00	1853	Demand	0.00	Fixed	0.00	1,817.20	87.05
J-21	1,615.20	1853	Demand	12.00	Fixed	12.00	1,817.04	87.33
J-22	1,613.60	1853	Demand	15.80	Fixed	15.80	1,817.04	88.02
J-71	1,783.80	2055	Demand	7.90	Fixed	7.90	1,992.39	90.25
J-19	1,606.50	1853	Demand	26.20	Fixed	26.20	1,817.10	91.12
J-62	1,785.00	2055	Demand	6.60	Fixed	6.60	1,996.34	91.44
J-20	1,605.70	1853	Demand	18.40	Fixed	18.40	1,817.10	91.46
J-63	1,783.50	2055	Demand	5.30	Fixed	5.30	1,996.23	92.04
J-52	1,602.00	1853	Demand	0.00	Fixed	0.00	1,817.15	93.09
J-70	1,776.20	2055	Demand	6.60	Fixed	6.60	1,992.40	93.54
J-18	1,595.40	1853	Demand	0.00	Fixed	0.00	1,817.30	96.01
J-87	1,590.00	1853	Demand	55.20	Fixed	55.20	1,817.29	98.34
J-17	1,589.00	1853	Demand	0.00	Fixed	0.00	1,817.58	98.90
J-15	1,761.50	1853	Demand	15.75	Fixed	15.75	1,992.36	99.88
J-16	1,739.10	1853	Demand	24.04	Fixed	24.04	1,992.34	109.56
J-65	1,741.50	2055	Demand	7.90	Fixed	7.90	1,996.21	110.20
J-44	1,727.40	2055	Demand	5.30	Fixed	5.30	1,996.16	116.28
J-14	1,722.60	1853	Demand	10.50	Fixed	10.50	1,992.33	116.70
J-85	1,721.50	2055	Demand	7.90	Fixed	7.90	1,992.36	117.19
J-53	1,723.90	1853	Demand	11.80	Fixed	11.80	1,996.17	117.80
J-43	1,722.30	2055	Demand	3.94	Fixed	3.94	1,996.16	118.48
J-33	1,719.40	2055	Demand	10.50	Fixed	10.50	1,996.16	119.74
J-13	1,712.50	1853	Demand	0.00	Fixed	0.00	1,992.34	121.07
J-66	1,713.10	2055	Demand	7.90	Fixed	7.90	1,996.17	122.47
J-32	1,702.10	2055	Demand	0.00	Fixed	0.00	1,996.16	127.23
J-34	1,690.30	2055	Demand	7.90	Fixed	7.90	1,996.16	132.33

Scenario: Max + Fire @ J-82
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-95	373.00	8.0	PVC	120.0	false	0.00	Open	1,510.00	1,955.12	1,938.17	16.95	45.45	9.64
P-93	498.00	8.0	PVC	120.0	false	0.00	Open	-883.38	1,984.69	1,993.07	8.39	16.84	5.64
P-91	037.00	8.0	PVC	120.0	false	0.00	Open	-862.38	1,967.99	1,984.69	16.70	16.10	5.50
P-63	715.00	12.0	PVC	120.0	false	0.00	Open	1,909.33	2,020.00	2,003.30	16.70	9.74	5.42
P-64	416.00	12.0	PVC	120.0	false	0.00	Open	1,900.13	2,003.30	1,999.28	4.02	9.65	5.39
P-94	862.00	8.0	PVC	120.0	false	0.00	Open	821.06	1,967.79	1,955.12	12.68	14.70	5.24
P-78	344.00	12.0	PVC	120.0	false	0.00	Open	1,763.89	1,995.97	1,993.07	2.89	8.41	5.00
P-87	584.00	8.0	PVC	120.0	false	0.00	Open	761.52	1,992.45	1,984.98	7.47	12.79	4.86
P-88	379.00	8.0	PVC	120.0	false	0.00	Open	751.02	1,984.98	1,967.79	17.19	12.47	4.79
P-98	322.00	8.0	PVC	120.0	false	0.00	Open	-749.94	1,963.99	1,967.99	4.00	12.43	4.79
P-96	753.00	8.0	PVC	120.0	false	0.00	Open	-728.24	1,955.12	1,963.99	8.87	11.77	4.65
P-70	355.00	12.0	PVC	120.0	false	0.00	Open	-1,448.52	1,997.21	1,999.28	2.07	5.84	4.11
P-68	285.00	12.0	PVC	120.0	false	0.00	Open	-1,238.15	1,995.97	1,997.21	1.24	4.37	3.51
P-66	280.00	8.0	PVC	120.0	false	0.00	Open	443.71	1,999.28	1,997.97	1.32	4.70	2.83
P-67	439.00	8.0	PVC	120.0	false	0.00	Open	436.11	1,997.97	1,995.97	2.00	4.56	2.78
P-79	269.00	12.0	PVC	120.0	false	0.00	Open	876.61	1,993.07	1,992.45	0.62	2.30	2.49
P-71	485.00	8.0	PVC	120.0	false	0.00	Open	193.57	1,997.21	1,996.72	0.49	1.01	1.24
P-21	479.00	12.0	PVC	120.0	false	0.00	Open	418.30	1,817.58	1,817.30	0.28	0.59	1.19
P-72	454.00	8.0	PVC	120.0	false	0.00	Open	175.17	1,996.72	1,996.34	0.38	0.84	1.12
P-22	416.00	8.0	PVC	120.0	false	0.00	Open	128.50	1,817.30	1,817.10	0.20	0.47	0.82
P-73	276.00	8.0	PVC	120.0	false	0.00	Open	113.33	1,996.34	1,996.23	0.10	0.38	0.72
P-74	365.00	8.0	PVC	120.0	false	0.00	Open	108.03	1,996.23	1,996.11	0.13	0.34	0.69
P-60	517.00	12.0	PVC	120.0	false	0.00	Open	234.60	1,817.30	1,817.20	0.10	0.20	0.67
P-90	317.00	8.0	PVC	120.0	false	0.00	Open	-104.15	1,967.89	1,967.99	0.10	0.32	0.66
P-75	501.00	8.0	PVC	120.0	false	0.00	Open	97.53	1,996.11	1,995.97	0.14	0.28	0.62
P-101	343.00	18.0	PVC	120.0	false	0.00	Open	473.60	1,817.95	1,817.81	0.14	0.10	0.60
P-1	502.00	18.0	PVC	120.0	false	0.00	Open	473.60	1,818.00	1,817.95	0.05	0.10	0.60
P-89	378.00	8.0	PVC	120.0	false	0.00	Open	-90.05	1,967.79	1,967.89	0.09	0.25	0.57
P-24	301.00	8.0	PVC	120.0	false	0.00	Open	83.90	1,817.10	1,817.04	0.06	0.21	0.54
P-20	309.00	18.0	PVC	120.0	false	0.00	Open	418.30	1,817.69	1,817.58	0.11	0.08	0.53
P-56	951.00	12.0	PVC	120.0	false	0.00	Open	-180.80	1,817.08	1,817.20	0.12	0.12	0.51
P-55	513.00	12.0	PVC	120.0	false	0.00	Open	-180.80	1,817.02	1,817.08	0.06	0.12	0.51
P-5	525.00	18.0	PVC	120.0	false	0.00	Open	404.05	1,817.81	1,817.77	0.04	0.08	0.51
P-6	375.00	18.0	PVC	120.0	false	0.00	Open	396.15	1,817.77	1,817.74	0.03	0.07	0.50
P-7	768.00	18.0	PVC	120.0	false	0.00	Open	396.15	1,817.74	1,817.69	0.06	0.07	0.50
P-42	270.00	12.0	PVC	120.0	false	0.00	Open	-146.60	1,816.99	1,817.02	0.02	0.08	0.42
P-3	329.00	8.0	PVC	120.0	false	0.00	Open	61.65	1,817.81	1,817.77	0.04	0.12	0.39
P-99	230.00	8.0	PVC	120.0	false	0.00	Open	58.19	1,992.38	1,992.36	0.03	0.11	0.37
P-26	306.00	8.0	PVC	120.0	false	0.00	Open	56.10	1,817.04	1,817.01	0.03	0.10	0.36
P-76	309.00	8.0	PVC	120.0	false	0.00	Open	55.24	1,996.34	1,996.21	0.13	0.10	0.35
P-57	451.00	8.0	PVC	120.0	false	0.00	Open	53.80	1,817.20	1,817.15	0.04	0.09	0.34
P-4	265.00	8.0	PVC	120.0	false	0.00	Open	51.15	1,817.77	1,817.75	0.02	0.09	0.33
P-85	570.00	8.0	PVC	120.0	false	0.00	Open	-50.52	1,992.38	1,992.43	0.05	0.08	0.32
P-80	289.00	12.0	PVC	120.0	false	0.00	Open	107.19	1,992.45	1,992.44	0.01	0.05	0.30
P-77	514.00	8.0	PVC	120.0	false	0.00	Open	47.34	1,996.21	1,996.17	0.04	0.07	0.30
P-13	308.00	8.0	PVC	120.0	false	0.00	Open	-44.55	1,817.73	1,817.75	0.02	0.07	0.28
P-81	826.00	8.0	PVC	120.0	false	0.00	Open	39.37	1,992.44	1,992.40	0.04	0.05	0.25
P-11	435.00	8.0	PVC	120.0	false	0.00	Open	-36.65	1,817.71	1,817.73	0.02	0.05	0.23
P-18	521.00	8.0	PVC	120.0	false	0.00	Open	34.54	1,992.36	1,992.34	0.02	0.04	0.22
P-43	173.00	8.0	PVC	120.0	false	0.00	Open	34.20	1,817.02	1,817.01	0.01	0.04	0.22
P-82	286.00	8.0	PVC	120.0	false	0.00	Open	32.77	1,992.40	1,992.39	0.01	0.04	0.21
P-32	176.00	8.0	PVC	120.0	false	0.00	Open	31.50	1,816.99	1,816.98	0.01	0.03	0.20
P-10	318.00	8.0	PVC	120.0	false	0.00	Open	-31.35	1,817.70	1,817.71	0.01	0.03	0.20

Scenario: Max + Fire @ J-82
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Velocity (ft/s)
P-105	755.00	8.0	PVC	120.0	false	0.00	Open	30.20	1,816.99	1,816.96	0.02	0.03	0.19
P-27	196.00	8.0	PVC	120.0	false	0.00	Open	29.85	1,817.01	1,817.00	0.01	0.03	0.19
P-104	345.00	12.0	PVC	120.0	false	0.00	Open	65.19	1,816.99	1,816.99	0.01	0.02	0.18
P-31	288.00	8.0	PVC	120.0	false	0.00	Open	28.60	1,817.00	1,816.99	0.01	0.03	0.18
P-102	286.00	8.0	PVC	120.0	false	0.00	Open	-27.64	1,996.16	1,996.17	0.01	0.03	0.18
P-86	548.00	12.0	PVC	120.0	false	0.00	Open	-59.72	1,992.43	1,992.44	0.01	0.02	0.17
P-41	770.00	8.0	PVC	120.0	false	0.00	Open	26.30	1,816.99	1,816.97	0.02	0.03	0.17
P-30	508.00	8.0	PVC	120.0	false	0.00	Open	-26.26	1,817.00	1,817.01	0.01	0.02	0.17
P-109	787.00	12.0	PVC	120.0	true	0.00	Open	55.20	1,817.30	1,817.29	0.01	0.01	0.16
P-54	551.00	12.0	PVC	120.0	false	0.00	Open	-55.11	1,816.99	1,816.99	0.01	0.01	0.16
P-110	897.00	12.0	PVC	120.0	true	0.00	Open	53.80	1,817.15	1,817.14	0.01	0.01	0.15
P-8	510.00	8.0	PVC	120.0	false	0.00	Open	-22.15	1,817.69	1,817.70	0.01	0.02	0.14
P-28	349.00	8.0	PVC	120.0	false	0.00	Open	20.65	1,817.00	1,817.00	0.01	0.02	0.13
P-45	334.00	8.0	PVC	120.0	false	0.00	Open	19.70	1,817.01	1,817.00	0.00	0.01	0.13
P-23	432.00	8.0	PVC	120.0	false	0.00	Open	18.40	1,817.10	1,817.10	0.01	0.01	0.12
P-38	310.00	8.0	PVC	120.0	false	0.00	Open	17.14	1,996.16	1,996.16	0.00	0.01	0.11
P-25	339.00	8.0	PVC	120.0	false	0.00	Open	15.80	1,817.04	1,817.04	0.00	0.01	0.10
P-53	755.00	12.0	PVC	120.0	false	0.00	Open	-32.61	1,816.98	1,816.99	0.00	0.01	0.09
P-51	369.00	8.0	PVC	120.0	false	0.00	Open	14.40	1,816.98	1,816.98	0.00	0.01	0.09
P-106	866.00	12.0	PVC	120.0	false	0.00	Open	32.09	1,816.99	1,816.98	0.00	0.01	0.09
P-34	513.00	8.0	PVC	120.0	false	0.00	Open	13.10	1,816.98	1,816.98	0.00	0.01	0.08
P-84	311.00	8.0	PVC	120.0	false	0.00	Open	-12.97	1,992.38	1,992.39	0.00	0.01	0.08
P-83	440.00	8.0	PVC	120.0	false	0.00	Open	11.90	1,992.39	1,992.38	0.00	0.01	0.08
P-103	546.00	8.0	PVC	120.0	false	0.00	Open	11.80	1,996.17	1,996.17	0.00	0.01	0.08
P-97	506.00	8.0	PVC	120.0	false	0.00	Open	11.70	1,963.99	1,963.98	0.00	0.01	0.07
P-19	433.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,992.34	1,992.34	0.00	0.00	0.07
P-37	583.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,996.16	1,996.16	0.00	0.00	0.07
P-46	336.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,817.00	1,817.00	0.00	0.00	0.07
P-15	284.00	8.0	PVC	120.0	false	0.00	Open	10.50	1,992.34	1,992.33	0.00	0.00	0.07
P-47	583.00	8.0	PVC	120.0	false	0.00	Open	9.24	1,996.16	1,996.16	0.00	0.00	0.06
P-33	328.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,816.98	1,816.98	0.00	0.00	0.06
P-92	275.00	8.0	PVC	120.0	false	0.00	Open	9.20	1,984.69	1,984.69	0.00	0.00	0.06
P-69	369.00	8.0	PVC	120.0	false	0.00	Open	8.90	1,997.21	1,997.21	0.00	0.00	0.06
P-100	586.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,992.36	1,992.36	0.00	0.00	0.05
P-12	203.00	8.0	PVC	120.0	false	0.00	Open	7.90	1,817.73	1,817.73	0.00	0.00	0.05
P-50	534.00	12.0	PVC	120.0	false	0.00	Open	17.69	1,816.98	1,816.98	0.00	0.00	0.05
P-44	248.00	8.0	PVC	120.0	false	0.00	Open	6.60	1,817.01	1,817.01	0.00	0.00	0.04
P-29	513.00	8.0	PVC	120.0	false	0.00	Open	6.25	1,817.00	1,817.00	0.00	0.00	0.04
P-48	234.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,996.16	1,996.16	0.00	0.00	0.03
P-9	245.00	8.0	PVC	120.0	false	0.00	Open	5.30	1,817.70	1,817.70	0.00	0.00	0.03
P-52	315.00	12.0	PVC	120.0	false	0.00	Open	-11.61	1,816.98	1,816.98	0.00	0.00	0.03
P-107	942.00	8.0	PVC	120.0	false	0.00	Open	-2.90	1,816.99	1,816.99	0.00	0.00	0.02
P-65	199.00	8.0	PVC	120.0	false	0.00	Open	2.60	1,999.28	1,999.28	0.00	0.00	0.02
P-111	841.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,817.08	1,817.14	0.00	0.00	0.00
P-108	760.00	12.0	PVC	120.0	true	0.00	Closed	0.00	1,817.15	1,817.29	0.00	0.00	0.00

EMWD's 2009 Master Plan Requirements For Storage

1853 A (Phase 1 Tank) - excludes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	210 Units	- Units	- Acres	- Acres	5.3 Acres	- Acres	1,500 gpm	266 gpm	266 gpm	- gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	2 Hrs	0.25	0.25	0.10	266	266	266	
- gpd ADD	113,400 gpd ADD	- gpd ADD	- gpd ADD	- gpd ADD	24 AF/YR ADD	- AF/YR		66 gpm	66 gpm	- gpm	-	-	0.50	
- gpm ADD	78.8 gpm ADD	- gpm ADD	- gpm ADD	- gpm ADD	14.8 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	133	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		3,987 gph	3,987 gph	- gph	60	60	60	
- GPM MDD	236 GPM MDD	- GPM MDD	- GPM MDD	- GPM MDD	30 GPM MDD	- GPM MDD		24	24	24	-	-	7,975	
- GPD MDD	340,200 GPD MDD	- GPD MDD	- GPD MDD	- GPD MDD	42,584 GPD MDD	- GPD MDD					24	24	24	
					Total =	266 GPM MDD								
					Total =	382,784 GPD MDD	180,000 gal	95,696 gal	95,696 gal	- gal	-		191,392	562,784 gal
							32.0%	17.0%	17.0%	0.0%	0.0%	0.0%	34.0%	100.0%

EMWD's 2009 Master Plan Requirements For Storage

1853 B (Phase 2 Tank) - Includes Pump through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	30 Units	172 Units	26.5 Acres	- Acres	5.3 Acres	- Acres	3,000 gpm	209 gpm	209 gpm	427 gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	209	209	209	
- gpd ADD	16,200 gpd ADD	51,600 gpd ADD	53,000 gpd ADD	- gpd ADD	24 AF/YR ADD	- AF/YR		52 gpm	52 gpm	43 gpm	-	-	0.50	
- gpm ADD	11.3 gpm ADD	35.8 gpm ADD	36.8 gpm ADD	- gpm ADD	14.8 gpm ADD	- gpm ADD	less two-hr FF	60 min	60 min	60 min	-	-	104	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		3,129 gph	3,129 gph	2,562 gph	60	60	60	
- GPM MDD	34 GPM MDD	72 GPM MDD	74 GPM MDD	- GPM MDD	30 GPM MDD	- GPM MDD		24	24	24	-	-	6,258	
- GPD MDD	48,600 GPD MDD	103,200 GPD MDD	106,000 GPD MDD	- GPD MDD	42,584 GPD MDD	- GPD MDD					24	24	24	
					Total =	209 GPM MDD								
					Total =	300,384 GPD MDD	360,000 gal	75,096 gal	75,096 gal	61,488 gal	-		150,192	721,872 gal
							49.9%	10.4%	10.4%	8.5%	0.0%	0.0%	20.8%	100.0%
														gal

EMWD's 2009 Master Plan Requirements For Storage

1853 (Combined ultimate Tank) - Includes Pump Through to 2055 PZ -

Low Density Residential	Medium Density Residential	High Density Residential & Mobile Homes	Commercial & Industrial	Schools & Other Public Institutions (Institutional)	Parks & Golf Courses	Agriculture	Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
- Units	240 Units	172 Units	26.5 Acres	- Acres	10.6 Acres	- Acres	3,000 gpm	474 gpm	474 gpm	427 gpm				
680 gpd/Unit	540 gpd/Unit	300 gpd/Unit	2,000 gpd/Acre	3,000 gpd/Acre	4.5 AF/AC/YR	4.0 AF/AC/YR	3 Hrs	0.25	0.25	0.10	474	474	474	
- gpd ADD	129,600 gpd ADD	51,600 gpd ADD	53,000 gpd ADD	- gpd ADD	48 AF/YR ADD	- AF/YR		119 gpm	119 gpm	43 gpm	-	-	0.50	
- gpm ADD	90.0 gpm ADD	35.8 gpm ADD	36.8 gpm ADD	- gpm ADD	29.6 gpm ADD	- gpm ADD		60 min	60 min	60 min	-	-	237	
3.0 PF	3.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF	2.0 PF		7,116 gph	7,116 gph	2,562 gph	60	60	60	
- GPM MDD	270 GPM MDD	72 GPM MDD	74 GPM MDD	- GPM MDD	59 GPM MDD	- GPM MDD		24	24	24	-	-	14,233	
- GPD MDD	388,800 GPD MDD	103,200 GPD MDD	106,000 GPD MDD	- GPD MDD	85,168 GPD MDD	- GPD MDD					24	24	24	
					Total =	474 GPM MDD								
					Total =	683,168 GPD MDD	540,000 gal	170,792 gal	170,792 gal	61,488 gal	-		341,584	1,284,656 gal
							42.0%	13.3%	13.3%	4.8%	0.0%	0.0%	26.6%	100.0%
Check 0	270	72	74	0	59	0		170,792	170,792	61,488	-	-	341,584	

X 1.2 Multiplier for 40-ft tank, to define total Operational storage =

MDD Of 2055 PZ (Upper Zone), for Pump Through Calculations: 427 GPM

indicates cells with data entry

123,456 indicates cells with auto-computation

Note 1: Time Of Use storage requirement is subject to review and discussion with Brian Powell, to decide on Inclusion or Exclusion, in the Planning Criteria

If Building One Tank, Total Operational Tank Volume: 1,541,587 GAL

If Building Two Tanks, in two phases, each tank volume is: 770,793 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

EMWD's Master Plan Requirements For Storage

2055 PZ

Low Density Residential		Medium Density Residential		High Density Residential & Mobile Homes		Commercial & Industrial		Schools & Other Public Institutions (Institutional)		Parks & Golf Courses		Agriculture		Fire Storage Requirements: Fire Flow Demand	Operational Requirements: Equalization 0.25 x MDD	Operational Requirements: Time Of use 0.25 x MDD	Operational Requirements: Pump Through 0.1 x flow pumped to higher PZ	Emergency Storage: Zone with multiple pump stations: 0.5 x (flow from remaining pumps)	Emergency Storage: Minimum volume for zone with multiple pump stations: 0.25 x MDD	Emergency Storage: Zone with single pump station: 0.5 x MDD	Total Usable Storage
60	Units	278	Units	-	Units	-	Acres	-	Acres	5	Acres	-	Acres	1,500 gpm	427 gpm	427 gpm	- gpm	427	427	427	
680	gpd/Unit	540	gpd/Unit	300	gpd/Unit	2,000	gpd/Acre	3,000	gpd/Acre	4.5	AF/AC/YR	4.0	AF/AC/YR	2 Hrs	0.25	0.25	0.10				
40,800	gpd ADD	150,120	gpd ADD	-	gpd ADD	-	gpd ADD	-	gpd ADD	24	AF/YR ADD	-	AF/YR		107 gpm	107 gpm	- gpm	-	-	0.50	
28.3	gpm ADD	104.3	gpm ADD	-	gpm ADD	-	gpm ADD	-	gpm ADD	14.8	gpm ADD	-	gpm ADD		60 min	60 min	60 min	-	-	214	
3.0	PF	3.0	PF	2.0	PF	2.0	PF	2.0	PF	2.0	PF	2.0	PF		6,410 gph	6,410 gph	- gph	60	60	60	
85	**GPM MDD**	**313**	**GPM MDD**	**-**	**GPM MDD**	**-**	**GPM MDD**	**-**	**GPM MDD**	**30**	**GPM MDD**	**-**	**GPM MDD**		24	24	24	-	-	12,820	
122,400	**GPD MDD**	**450,360**	**GPD MDD**	**-**	**GPD MDD**	**-**	**GPD MDD**	**-**	**GPD MDD**	**42,584**	**GPD MDD**	**-**	**GPD MDD**					24	24	24	
											Total =	**427**	**GPM MDD**								
											Total =	**615,344**	**GPD MDD**	**180,000 gal**	**153,836 gal**	**153,836 gal**	**- gal**	-		**307,672**	**795,344 gal**
														22.6%	19.3%	19.3%	0.0%	0.0%	0.0%	38.7%	100.0%

X 1.2

Multiplier for 40-ft tank, to define total Operational storage =

Total Operational Tank Volume: 954,413 GAL

Subject to potential EMWD over-sizing for regional benefit - To be considered prior to final design and Plan Check

APPENDIX B – WASTEWATER MODEL RESULTS

Commercial/Multi Family Combined Flows

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	137.90	gal/min

Results

Normal Depth	3.53	in
Flow Area	0.15	ft^2
Wetted Perimeter	0.97	ft
Hydraulic Radius	1.84	in
Top Width	0.66	ft
Critical Depth	0.26	ft
Percent Full	44.1	%
Critical Slope	0.00655	ft/ft
Velocity	2.07	ft/s
Velocity Head	0.07	ft
Specific Energy	0.36	ft
Froude Number	0.77	
Maximum Discharge	0.82	ft^3/s
Discharge Full	0.76	ft^3/s
Slope Full	0.00065	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	44.08	%
Downstream Velocity	Infinity	ft/s

Commercial/Multi Family Combined Flows

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.53	in
Critical Depth	0.26	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00655	ft/ft

Max flow for 8" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00400	ft/ft
Diameter	8.00	in
Discharge	150.00	gal/min

Results

Normal Depth	4.02	in
Flow Area	0.18	ft^2
Wetted Perimeter	1.05	ft
Hydraulic Radius	2.01	in
Top Width	0.67	ft
Critical Depth	0.27	ft
Percent Full	50.3	%
Critical Slope	0.00878	ft/ft
Velocity	1.90	ft/s
Velocity Head	0.06	ft
Specific Energy	0.39	ft
Froude Number	0.65	
Maximum Discharge	0.71	ft^3/s
Discharge Full	0.66	ft^3/s
Slope Full	0.00102	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.26	%
Downstream Velocity	Infinity	ft/s

Max flow for 8" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.02	in
Critical Depth	0.27	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.00878	ft/ft

Max flow for 10" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00320	ft/ft
Diameter	10.00	in
Discharge	241.00	gal/min

Results

Normal Depth	5.00	in
Flow Area	0.27	ft^2
Wetted Perimeter	1.31	ft
Hydraulic Radius	2.50	in
Top Width	0.83	ft
Critical Depth	0.32	ft
Percent Full	50.0	%
Critical Slope	0.00809	ft/ft
Velocity	1.97	ft/s
Velocity Head	0.06	ft
Specific Energy	0.48	ft
Froude Number	0.61	
Maximum Discharge	1.16	ft^3/s
Discharge Full	1.07	ft^3/s
Slope Full	0.00080	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	49.98	%
Downstream Velocity	Infinity	ft/s

Max flow for 10" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.00	in
Critical Depth	0.32	ft
Channel Slope	0.00320	ft/ft
Critical Slope	0.00809	ft/ft

Max flow for 12" at min slope

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.00240	ft/ft
Diameter	12.00	in
Discharge	340.00	gal/min

Results

Normal Depth	6.00	in
Flow Area	0.39	ft^2
Wetted Perimeter	1.57	ft
Hydraulic Radius	3.00	in
Top Width	1.00	ft
Critical Depth	0.36	ft
Percent Full	50.0	%
Critical Slope	0.00757	ft/ft
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.56	ft
Froude Number	0.54	
Maximum Discharge	1.63	ft^3/s
Discharge Full	1.51	ft^3/s
Slope Full	0.00060	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.03	%
Downstream Velocity	Infinity	ft/s

Max flow for 12" at min slope

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	6.00	in
Critical Depth	0.36	ft
Channel Slope	0.00240	ft/ft
Critical Slope	0.00757	ft/ft

Total Flow 12' @ 1.2%

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.01200	ft/ft
Diameter	12.00	in
Discharge	462.00	gal/min

Results

Normal Depth	4.54	in
Flow Area	0.27	ft^2
Wetted Perimeter	1.33	ft
Hydraulic Radius	2.47	in
Top Width	0.97	ft
Critical Depth	0.43	ft
Percent Full	37.8	%
Critical Slope	0.00776	ft/ft
Velocity	3.78	ft/s
Velocity Head	0.22	ft
Specific Energy	0.60	ft
Froude Number	1.26	
Maximum Discharge	3.64	ft^3/s
Discharge Full	3.38	ft^3/s
Slope Full	0.00111	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	37.84	%
Downstream Velocity	Infinity	ft/s

Total Flow 12' @ 1.2%

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.54	in
Critical Depth	0.43	ft
Channel Slope	0.01200	ft/ft
Critical Slope	0.00776	ft/ft

APPENDIX C – SUPPORTING DOCUMENTS

NBD-001
Rev. 03/2013

EASTERN MUNICIPAL WATER DISTRICT

FIRE FLOW REQUEST FORM

Date: 10/18/2013

☐	Residential Fire Sprinkler System	$ 155	Fee
☐	Fire Hydrant Letter	$ 155	Fee
☒	2 Hour Fire Flow Test	$ 155	Fee
☐	3-4 Hour Fire Flow Test	$ 1,200	Deposit – Based on Actual

Only 1 fee applies when requesting both a Residential Fire Sprinkler System test and either a Fire Hydrant Letter or a 2 hour Fire Flow Test on the same application.

PLEASE NOTE The average processing time for this request runs between 2 to 4 weeks from the date received by EMWD. AN INCOMPLETE APPLICATION WILL NOT BE ACCEPTED OR HELD.

Customer Name: PacTen Partners/RBF Consulting

Contact Name: (if applicable) Michael Boeck/Kaveh Haghighi

Mailing Address: 40810 County Center Drive, Suite 100

City, State ZIP: Temecula, CA 92591

Phone: 951-676-8042 Fax: 951-676-7240 E-Mail: mboeck@rbf.com

Cell: Mailing and Contact information is for ☐ Customer ☒ Contact

Assessors Parcel Number (APN): 384-150-008, 009, 010

Tract or Parcel Map Number: CP1: PP21452; CP2: PP22280

Project Name: Commerce Pointe I & II

Project Address: Zieders Road

City, State ZIP: Menifee, CA

Hydrant(s), Gallons per Minute (GPM): 2990

Duration (Hours): 2

Number of Hydrants: 1

Project Average Day Demand (GPM): 71

Residential Fire Sprinkler System (GPM):

Project Type: ☐ Residential Single Lot ☐ Tract ☐ School ☒ Commercial ☒ Industrial

TO CONFIRM AGENCY REQUIREMENTS, PLEASE ATTACH THE PROJECT'S "CONDITIONS OF APPROVAL," OR FIRE FLOW VERIFICATION FORM, RECEIVED FROM THE FIRE DEPARTMENT OR THE CITY. This reference lists the number of gallons per minute (GPM) and the duration (number of hours) required for the fire flow test. Without this form, this request is considered incomplete, and will not be accepted. EMWD'S Fire Flow test results are valid for six (6) months from the date of testing.

By signing this form, the undersigned affirms she or he has been advised of both the cost of the service requested, and the time required to complete his or her request.

Michael Boeck
Customer Signature

10/18/13
Date

OFFICE USE ONLY

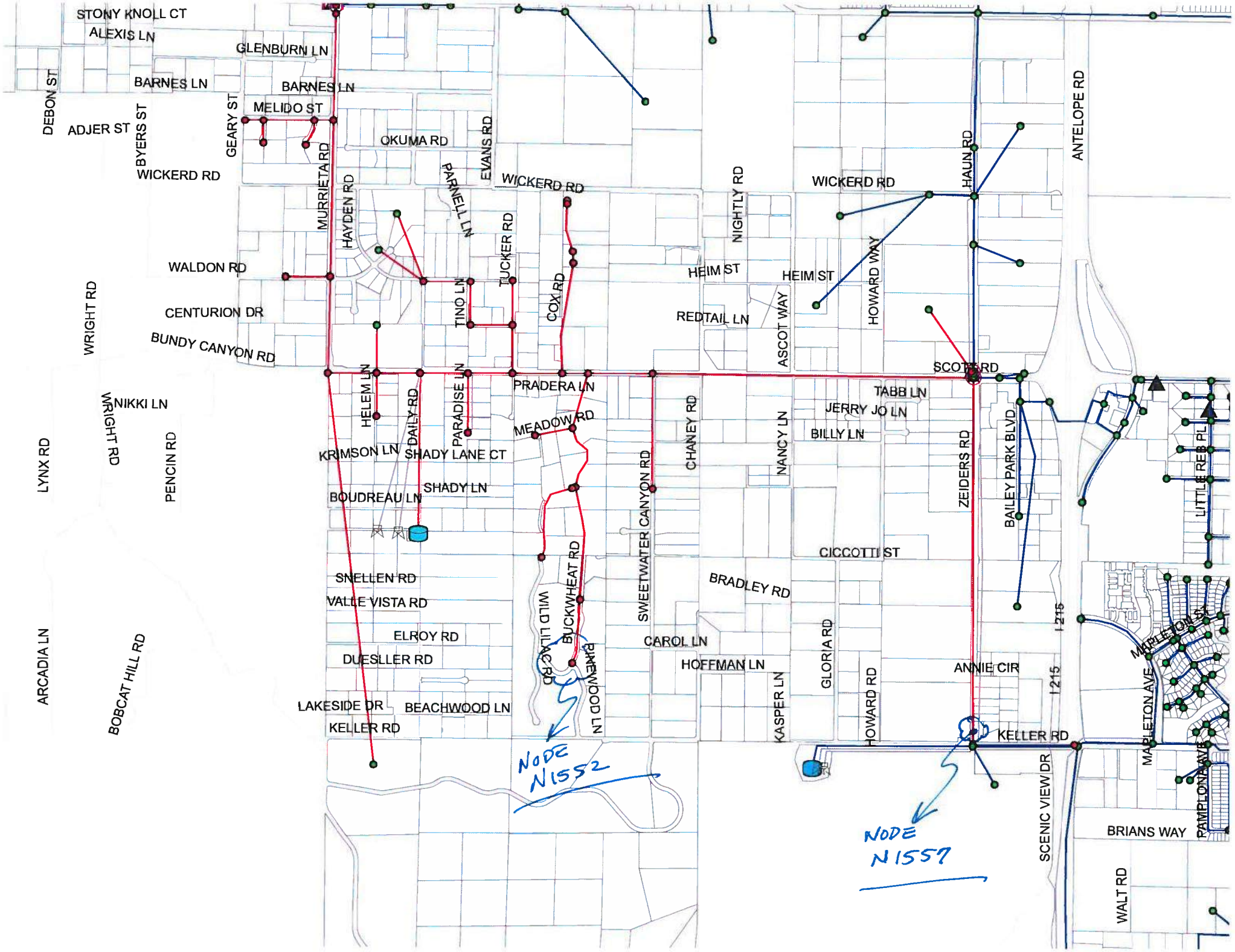
Date Form Received: _____ *Form must be complete to accept & acknowledge as "received"

☐ Payment Received Date: _____ Receipt: _____ ☐ Logged

Date to Engineer: _____ Received from Engineer: _____

Customer Notification Date: _____ AdminAsst Signature: _____
First Name, Last Initial

Comments: PP1 2013-493


STONY KNOLL CT
ALEXIS LN
GLENBURN LN
BARNES LN
BARNES LN
DEBON ST
ADJER ST
BYERS ST
GEARY ST
MELIDO ST
OKUMA RD
EVANS RD
WICKERD RD
MURRIETA RD
HAYDEN RD
PARNELL LN
WICKERD RD
NIGHTLY RD
WICKERD RD
HAUN RD
ANTELOPE RD
WALDON RD
TUCKER RD
COX RD
HEIM ST
HEIM ST
HOWARD WAY
WRIGHT RD
CENTURION DR
TINO LN
REDTAIL LN
ASCOT WAY
BUNDY CANYON RD
SCOTT RD
TABB LN
JERRY JO LN
BILLY LN
NIKKI LN
WRIGHT RD
HELEM LN
DAILY RD
PARADISE LN
PRADERA LN
MEADOW RD
CHANEY RD
NANCY LN
ZEIDERS RD
BAILEY PARK BLVD
LITTLE REB PL
LYNX RD
PENCIN RD
KRIMSON LN
SHADY LANE CT
SHADY LN
BOUDREAU LN
SWEETWATER CANYON RD
CICCOTTI ST
BRADLEY RD
SNELLEN RD
VALLE VISTA RD
WILD LILAC RD
BUCKWHEAT RD
BLUEWOOD LN
ELROY RD
CAROL LN
GLORIA RD
I-215
MARLETON AVE
ARCADIA LN
DUESLLER RD
HOFFMAN LN
ANNIE CIR
BOBCAT HILL RD
KASPER LN
HOWARD RD
I-215
LAKESIDE DR
BEACHWOOD LN
KELLER RD
KELLER RD
NODE N1552
NODE N1557
SCENIC VIEW DR
MARLETON AVE
PAMPLONA AVE
BRIANS WAY
WALT RD

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	3,029.54	1,590.90	1,412.16	-77.45
2	N7620	37.68	1,585.40	1,659.73	32.20
3	N7616	35.13	1,677.33	1,734.64	24.83
4	N1553	30.09	1,699.22	1,683.97	-6.61
5	N7619	28.68	1,628.09	1,659.68	13.69
6	N1548	21.15	1,594.43	1,684.34	38.96
7	N7615	18.78	1,647.60	1,734.98	37.86
8	N1549	17.58	1,520.24	1,543.76	10.19
9	N1546	12.12	1,610.84	1,696.36	37.06

THIS RUN HAS YOUR 2990 GPM ADDED TO N1557

YOU ALSO NEED TO CALCULATE THE HEAD LOST FROM N1557 TO YOUR PROJECT SITE

THANKS

FRED.

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	39.54	1,590.90	1,834.31	105.47

WITHOUT ANY ADDED DEMAND (EXISTING)

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	1,039.54	1,590.90	1,767.92	76.70
2	N7620	37.68	1,585.40	1,802.67	94.14
3	N7616	35.13	1,677.33	1,814.93	59.62
4	N1553	30.09	1,699.22	1,806.07	46.30
5	N7619	28.68	1,628.09	1,802.62	75.62
6	N1548	21.15	1,594.43	1,806.44	91.86
7	N7615	18.78	1,647.60	1,815.27	72.65
8	N1549	17.58	1,520.24	1,786.11	115.20

THIS RUN IS WITH ADDED 1000 GPM at N 1557

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	1,539.54	1,590.90	1,704.97	49.43
2	N7620	37.68	1,585.40	1,776.27	82.70
3	N7616	35.13	1,677.33	1,799.68	53.01
4	N1553	30.09	1,699.22	1,783.32	36.44
5	N7619	28.68	1,628.09	1,776.22	64.19
6	N1548	21.15	1,594.43	1,783.69	82.01
7	N7615	18.78	1,647.60	1,800.02	66.05
8	N1549	17.58	1,520.24	1,742.58	96.34

THIS RUN IS WITH ADDED 1500 GPM at N 1557

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	N1557	2,039.54	1,590.90	1,623.85	14.28
2	N7620	37.68	1,585.40	1,743.35	68.44
3	N7616	35.13	1,677.33	1,781.06	44.95
4	N1553	30.09	1,699.22	1,755.14	24.23
5	N7619	28.68	1,628.09	1,743.30	49.92
6	N1548	21.15	1,594.43	1,755.50	69.79
7	N7615	18.78	1,647.60	1,781.40	57.98
8	N1549	17.58	1,520.24	1,687.12	72.31

THIS RUN IS WITH ADDED 2,000 GPM at N 1557

EXISTING LOW PRESSURE IN 1853 ZONE

Test Report Print Title

	ID	Pressure (psi)
1	N1552	13.27
2	N14772	55.41
3	N1553	58.47
4	N1538	60.21
5	N7617	61.85
6	N7614	64.66
7	N7616	68.19
8	N1540	75.18
9	N7615	81.22
10	N7618	84.07
11	N14977	84.62
12	N1551	87.66
13	N1541	87.72
14	N7619	89.40
15	WAL-MUR	90.42
16	N1550	91.83
17	WAL-END	92.19
18	ORT-TIN	93.70
19	WAL-END2	96.34
20	N1546	96.97
21	TIN-WAL	100.92
22	TUC-WAL	101.09
23	TUC-ORT	102.67
24	N1548	104.04
25	N1557	105.47
26	N7620	107.92
27	N7623	108.24
28	N7624	110.69
29	MEL-END	111.20
30	N7613	114.31
31	N7388	115.83
32	N1539	116.23
33	COX2	116.42
34	COX1	116.48
35	N7612	116.66
36	N1547	122.30
37	N14978	122.69
38	DISCH	128.73
39	N1526	130.62
40	N5180	130.62
41	N4572	130.62
42	N1536	135.27

WHEN I ADD 1000 GPM THE ZONE PRESSURE DROPS.

Test Report Print Title

	ID	Pressure (psi)
1	N1552	1.10
2	N14772	43.24
3	N1553	46.30
4	N1538	53.18
5	N7617	54.82
6	N7614	57.64
7	N7816	59.62
8	N1540	68.15
9	N7618	71.90
10	N14977	72.45
11	N7615	72.65
12	N1551	75.49
13	N7619	75.62
14	N1557	76.70
15	N1541	77.82
16	N1550	79.66
17	WAL-MUR	83.80
18	ORT-TIN	83.80
19	WAL-END	85.17
20	N1546	85.64
21	WAL-END2	86.43
22	N7388	87.06
23	TIN-WAL	91.02
24	TUC-WAL	91.18
25	N1548	91.86
26	TUC-ORT	92.77
27	N7620	94.14
28	N7623	101.21
29	N7624	103.67
30	MEL-END	104.18
31	COX2	105.09
32	COX1	105.15
33	N7613	107.28
34	N1539	109.20
35	N7612	109.63
36	N1547	110.97
37	N14978	111.36
38	N1536	114.32
39	N1549	115.20
40	REG1M8	115.90
41	N5104	116.40
42	DISCH	121.71

WHEN I ADD 1500 GPM THE ZONE GETS ITS FIRST NEGATIVE PRESSURE

Test Report Print Title

	ID	Pressure (psi)
1	N1552	-8.76
2	N14772	33.38
3	N1553	36.44
4	N1538	47.90
5	N1557	49.43
6	N7617	49.54
7	N7614	52.36
8	N7616	53.01
9	N7388	59.79
10	N7618	62.04
11	N14977	62.59
12	N1540	62.87
13	N7619	64.19
14	N1551	65.63
15	N7615	66.05
16	N1550	69.80
17	N1541	70.03
18	ORT-TIN	76.01
19	N1546	76.55
20	WAL-MUR	78.12
21	WAL-END2	78.65
22	WAL-END	79.83
23	N1548	82.01
24	N7620	82.70
25	TIN-WAL	83.23
26	TUC-WAL	83.40
27	TUC-ORT	84.98
28	N1536	95.42
29	N7623	95.93
30	COX2	96.00
31	COX1	96.06
32	N1549	96.34
33	REG1M8	97.04
34	N5104	97.54
35	N7624	98.38
36	MEL-END	98.90
37	N1547	101.88
38	N7613	102.00
39	N14978	102.27
40	N1539	103.92
41	N7612	104.35
42	DISCH	116.42

WHEN I ADD 2000 GPM

THE ZONE SHOWS

Test Report Print Title

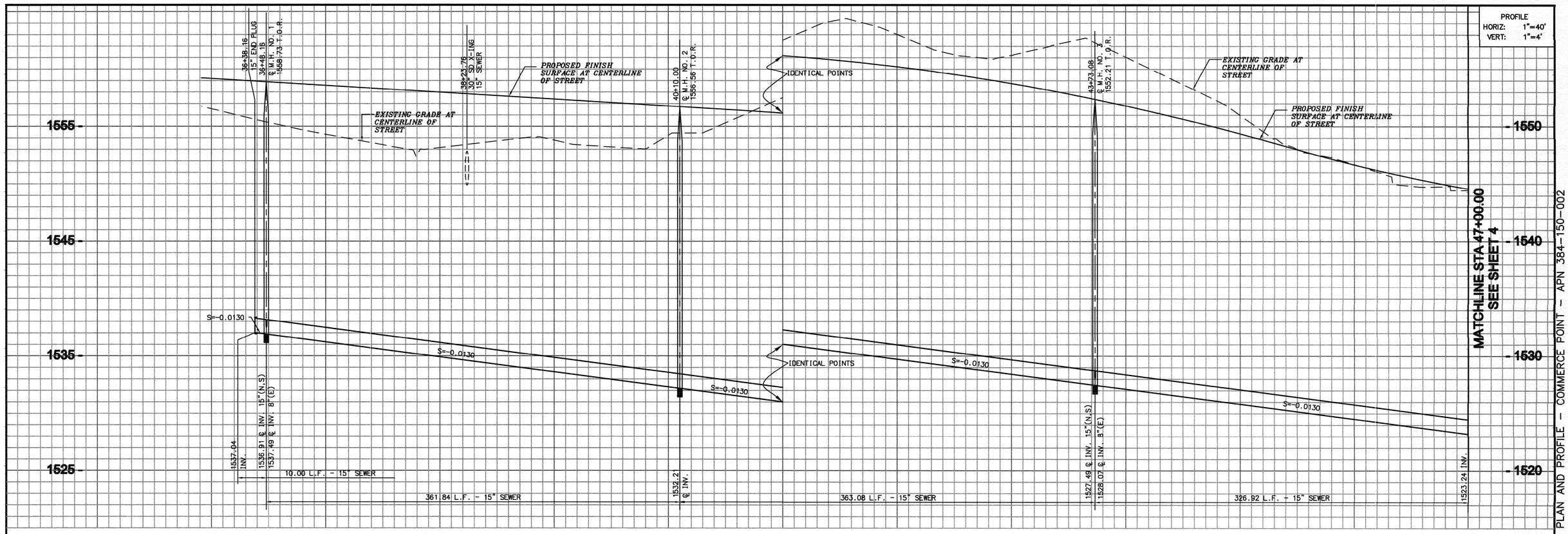
	ID	Pressure (psi)
1	N1552	-20.98
2	N1557	14.28
3	N14772	21.16
4	N1553	24.23
5	N7388	24.63
6	N1538	41.50
7	N7617	43.15
8	N7616	44.95
9	N7614	45.96
10	N7618	49.83
11	N7619	49.92
12	N14977	50.37
13	N1551	53.42
14	N1540	56.47
15	N1550	57.59
16	N7615	57.98
17	N1541	60.47
18	N1546	65.33
19	ORT-TIN	66.44
20	N7620	68.44
21	WAL-END2	69.08
22	N1548	69.79
23	N1536	71.34
24	WAL-MUR	71.72
25	N1549	72.31
26	REG1M8	73.02
27	WAL-END	73.83
28	N5104	73.92
29	TIN-WAL	73.66
30	TUC-WAL	73.83
31	TUC-ORT	75.41
32	COX2	84.78
33	COX1	84.84
34	N7623	89.54
35	N1547	90.66
36	N14978	91.04
37	N7624	91.99
38	MEL-END	92.50
39	N7613	95.60
40	N1539	97.53
41	N7612	97.95
42	DISCH	110.03

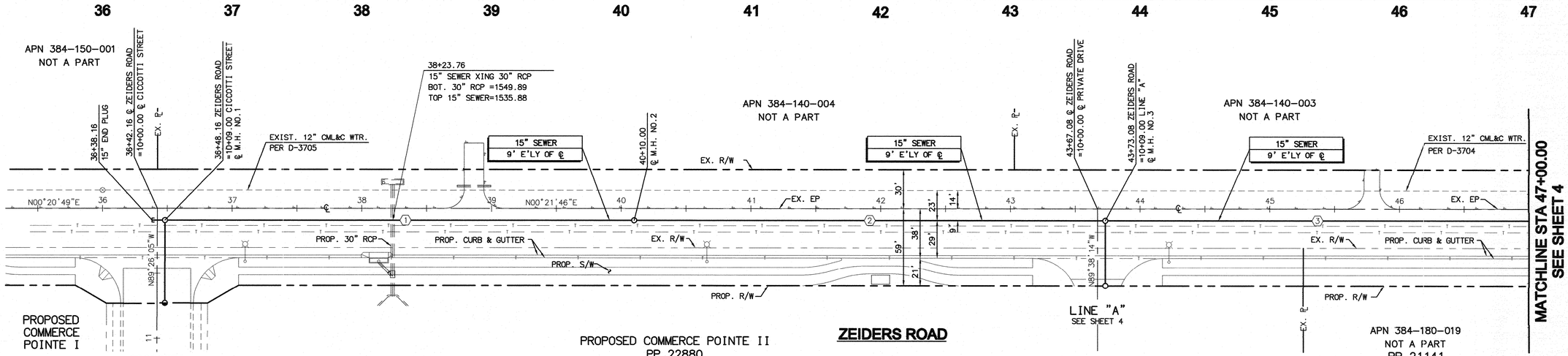
Test Report Print Title

this is WITH
ADD ⇒ 2990 GPM

	ID	Pressure (psi)
1	N1557	-77.45
2	N7388	-67.09
3	N1552	-51.81
4	N14772	-9.67
5	N1553	-6.61
6	N1536	9.07
7	N1549	10.19
8	REG1M8	10.90
9	N5104	11.40
10	N7619	13.69
11	N7618	18.99
12	N14977	19.54
13	N1551	22.58
14	N7616	24.83
15	N1538	25.67
16	N1550	26.75
17	N7617	27.31
18	N7614	30.12
19	N7620	32.20
20	N1541	36.49
21	N1546	37.06
22	N7615	37.86
23	N1548	38.96
24	N1540	40.64
25	ORT-TIN	42.47
26	WAL-END2	45.10
27	TIN-WAL	49.68
28	TUC-WAL	49.85
29	TUC-ORT	51.43
30	WAL-MUR	55.89
31	COX2	56.51
32	COX1	56.57
33	WAL-END	57.65
34	N1547	62.39
35	N14978	62.78
36	N7623	73.70
37	N7624	76.15
38	MEL-END	76.66
39	N7613	79.77
40	N1539	81.69
41	N7612	82.12
42	DISCH	94.19

PROFILE
HORIZ: 1"=40'
VERT: 1"=4'





SCALE: 1"=40'

40 0 40 80 120

SCALE: 1"=40'

SEWER DATA - ZEIDERS ROAD					
⬡	BEARING/DELTA	RADIUS	LENGTH	TANGENT	NOTE
1	N 00°21'46" E	--	361.84'	--	15" SEWER
2	N 00°21'46" E	--	363.08'	--	15" SEWER
3	N 00°21'46" E	--	326.92'	--	15" SEWER

811 Know what's below. Call before you dig.

SEAL-CITY OF MENIFEE
REGISTERED PROFESSIONAL ENGINEER DONALD ALLISON No. 19486 Exp. 09/30/11 CIVIL STATE OF CALIFORNIA

CITY OF MENIFEE ENGINEERING DEPARTMENT
RECOMMENDED: DATE: 11/4/10

REGISTERED PROFESSIONAL ENGINEER MICHAEL J. BOECK No. 66417 Exp. 6/30/12 CIVIL STATE OF CALIFORNIA

Prepared Under the Supervision of:
MICHAEL J. BOECK
R.C.E. 66417
EXP. 6/30/12
DATE 10/20/2010

RBF CONSULTING
PLANNING ■ DESIGN ■ CONSTRUCTION
40810 COUNTY CENTER DRIVE, SUITE 100
TEMECULA, CALIFORNIA 92591-6022
951.676.8042 • FAX 951.676.7240 • www.RBF.com

DRAWN	JDC/FMM
DESIGNED	FMM
CHECKED	MJB/KH
SCALE	AS SHOWN
JOB NUMBER	15-101822

MARK	INIT	DESCRIPTION	APPR	DATE
	E.O.R.	REVISION	E.M.W.D.	

SEWER APPROVED BY:
EASTERN MUNICIPAL WATER DISTRICT
CIVIL ENGINEER OF SUBDIVISIONS — DATE 10/22/10

APPROVALS

	INITIAL	DATE
PROJECT ENG.	L.A.M.	10/22/10

CITY OF MENIFEE
COMMERCE POINTE APN 384-150-002
OFFSITE SEWER IMPROVEMENT PLANS
ZEIDERS ROAD

STA. 36+38.16 - 47+00.00

I.D.	U35
S.A.	33
W.O.	12-852
C.O.	
COORD.	18A-24
SHT	3 OF 4

D- 42142

SEWER PLAN AND PROFILE - COMMERCE POINT - APN 384-150-002

30"CML&C, CL-150 STEEL PIPE, W/TELEMETRY @ 7' SOUTH OF ℄ KELLER RD

EX. 12" CML&C STL PIPE @ 14' W/O ℄ ZEIDERS RD PER EMWD DWG. D-3705

30"CML&C, CL-150 STEEL PIPE, W/TELEMETRY @ 7' SOUTH OF ℄ KELLER RD

STA 14+53.06 ℄ KELLER RD =STA 10+00.00 ℄ GLORIA RD

STA 12+31.36 KELLER RD INSTALL 30°- 90° FLG'D BEND

STA 40+77.74 ℄ KELLER RD =STA 10+00.00 ℄ TRAVIS CT.

STA 45+82.79 ℄ KELLER RD =STA 10+00.00 ℄ SCENIC VIEW DR.

STA 49+00.00 KELLER RD BLOW-OFF ASSEMBLY PER EMWD STD. B-653

STA 12+31.36 (3+75.32) KELLER RD 20' (6.1 m) SOUTH OF R/W CONNECT TO TANK SITE PIPING, SEE D-24425

4 GLORIA ROAD

5

6 ZEIDERS ROAD

7 215 FWY ANTELOPE ROAD

TRAVIS CT

STA 31+00.00 KELLER RD INSTALL ITC STATION PER EMWD STD. B-662

350-490-017 | 350-470-020 | 350-470-010 | 350-490-002 | 350-100-010 | 350-100-011 | 350-100-012 | 350-490-003 | 350-490-008 | 350-490-007 | 350-120-001

350-190-024 | 350-180-005 | 350-180-006 | 350-350-001

PROPOSED KELLER RD TANK SITE 350-190-022

STA 34+20.00 ℄ KELLER RD =STA 10+00.00 ℄ ZEIDERS RD

STA 49+91.23 KELLER RD = STA 10+08.83 ANTELOPE RD
30"X24" ECC.REDUCER, 3-24"X24" FLG'D CROSS 2-24" FXF RSGV(W & E), 1-24" BLIND FLANGES (N) REMOVE EX.24" BLIND FLANGE (S), JOIN EX.24" BFV PER DWG. D-22985, JOIN EX.TELEMETRY WIRE END CONSTRUCTION. 1-24" 45° BEND (E) AND JOIN TO EXST. 24" PVC PER D-23875

EXISTING 12" CML & C STEEL PIPE @ 14'-20.5' S/O ℄ KELLER RD PER EMWD PLAN D-3706

SCENIC VIEW DR. | 215 FWY | ANTELOPE ROAD

EX.24" CML&C STL PIPE @ 5' W/O ℄ ANTELOPE RD PER DWG. D-22985

EX.12" CML&C STL PIPE @ 14' S/O ℄ KELLER RD PER EMWD DWG. D-3706

30" FLG'D 90° BEND — PROPOSED 30" CML\C — 30" CML&C SEE D-24425

1700 (KELLER) — PROPOSED 30" CML\C — HOT TAP — EXISTING 12" CML\C (1853 DAILY)

ZONE SPLIT
12" RSGV, NORMALLY CLOSED

REMOVE EX. 24" BLIND FLANGE JOIN EX. 24" BFV PER DWG. D-22985

EXST. 24" PVC D-23875

REMOVE CAP AND JOIN

30"X24" REDUCER(W) 24"X24" CROSS 3-24" RSGV (E, W & N) 2-24" BLD FLG(N & E)

EX. 24" BFV W/BLIND FLG W/ 24"X12" FAB.STL OUTLET EX.12" RSGV NORMALLY CLOSED PER DWG. D-22985

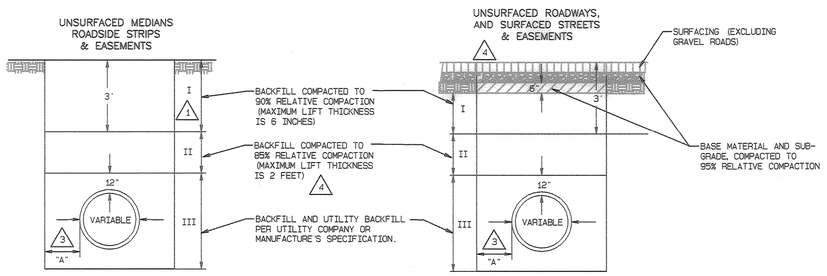
EX. 24" CML\C WTR PER DWG. D-22985

EX. 12" BFV W/2-45° ELBOWS EX. 12 CML\C WATRE LINE PER EMWD DWG. D-3706

KELLER ROAD

LEGEND

- FxF RESILIENT SEAL GATE VALVE
- FxF BUTTERFLY VALVE
- BLOW-OFF ASSEMBLY PER EMWD STD. B-653
- TEMP. BLOW-OFF PER EMWD STD. B-561
- ACCESS MANWAY PER EMWD STD. B-271
- I.T.C. TEST STATION PER EMWD STD. B-662
- PROPOSED 30" - 90° FLG'D BEND
- PROPOSED 30" CML\C STL PIPE
- EXISTING 24" CML\C STL WATER LINE
- EXISTING 12" CML\C STL WATER LINE
- EXISTING TELEPHONE LINE
- EXISTING AT&T BURIED OPTIC CABLE
- EXISTING FXF BUTTERFLY VALVE
- EXISTING FXF RESILIENT SEAL GATE VALVE
- EXISTING FIRE HYDRANT
- EXISTING WATER SERVICE
- EXISTING COMBINATION A.V. & A.R. PER STD. DWG. B-598
- EXISTING POWER POLE
- EXISTING 45° ELBOW



3 CLEARANCE "A"

1. PIPE SIZES THROUGH 12": "A" = 6" - 9"
2. PIPE SIZES OVER 12": "A" = 1' - 0" MIN

I. STRUCTURAL ZONE
II. INTERMADIATE ZONE
III. PIPE AND UTILITY ZONE

TRENCH BACKFILL DETAILS

N.T.S.

REPLACE STRUCTURAL SECTION AS FOLLOWS:

SURFACING - EXISTING THICKNESS PLUS 1" OR 3" MINIMUM

BASE - CLASS II, THICKNESS SHALL EQUAL TO
1 EXISTING BASE MATERIAL, 4" MINIMUM OR AS SPECIFIED

NOTE

BACKFILL SHALL BE COMPACTED TO 95% COMPACTION WITHIN CALTRANS RIGHT-WAY

WHEN A FIRM FOUNDATION IS NOT ENCOUNTERED, DUE TO SOFT, SPONGY, OR OTHER UNSUITABLE MATERIAL, SUCH MATERIAL SHALL BE REMOVED TO THE LIMITS DIRECTED BY THE ENGINEER, AND THE RESULTING EXCAVATION BACKFILL WITH PIPE BEDDING MATERIAL COMPACTED TO 90% RELATIVE COMPACTION.

QUANTITY ESTIMATES

NOTE: CONTRACTOR SHALL CONFIRM ALL QUANTITIES AND MATERIALS NEEDED

1

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	STD. DWG.
①	30" CML\C STEEL PIPE WITH LOCATION	3,806	L.F.	———
	WIRE & TELEMETRY WIRE	1,160	M	
②	30"X30"X12" FLANGED TEE	1	EA.	———
③	30"X24" ECC. REDUCER	1	EA.	———
④	24"X24"X24"X24" FLANGED CROSS	1	EA.	———
⑤	30" BLIND FLANGE W/4" OUTLET	1	EA.	———
⑥	24" FXF RESILIENT SEAT GATE VALVE	2	EA.	———
⑦	24" BLIND FLANGE	2	EA.	———
⑧	12" FXF RESILIENT SEAT GATE VALVE	1	EA.	———
⑨	30"-90° FLANGED BEND	1	EA.	———
⑩	BLOW-OFF ASSEMBLY	5	EA.	B-653
⑪	30" FXF BUTTERFLY VALVE	0	EA.	———
⑫	TEMP. BLOW-OFF	0	EA.	B-561
⑬	24" ACCESS MANWAY	2	EA.	B-271
⑭	ITC STATION	1	EA.	B-662
⑮	30" FXF RESILIENT SEAT GATE VALVE	2	EA.	———

N W E S

GRAPHIC SCALE 1"=200'
0 200 400 600

2 EMWD INSPECTOR: ANTHONY VALENZUELA - SPEC. 840W

SPEC. 840W

UNDERGROUND SERVICE ALERT
CALL: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

ALBERT A WEBB ASSOCIATES ENGINEERING CONSULTANTS
3788 MCCRAY STREET, RIVERSIDE, CA 92506
(909) 686-1070
FAX (909) 788-1256

REVISIONS				
NO.	DATE	INITIAL	DESCRIPTION	APP'VD / DATE
1	11-18-02	JLG	CONFORMED PLANS TO ADDENDUM NO.2	JLG/11-18-02
2	2/19/04	SKS	AS CONST. PER C.O. 64710 CR.11/20/03	AV 2-27-04

SEAL-ENGINEER

REGISTERED PROFESSIONAL ENGINEER — BRUCE A. DAVIS — NO. C47200 EXP. 12-31-03 — CIVIL — STATE OF CALIFORNIA

APPROVED BY:

BRUCE A. DAVIS C47200 EXP. 12-31-03 — 3/19/02 DATE

REFERENCES

EASTERN MUNICIPAL WATER DISTRICT

BY Michael L. Meyer 5-10-02 DATE

APPROVALS	INITIAL	DATE
PROJ. MGR.	[illegible]	5-10-02
PROJ. ENG	JLG	5-20-02
INSPECTION	AZW	5/14/02
WTR. OPERATIONS	[illegible]	6/17/02

DESIGNED	S.Z.
DRAWN	S.Z.
TRACED	
CHECKED	B.A.D.
SUBMITTED	

EASTERN MUNICIPAL WATER DISTRICT
RIVERSIDE COUNTY, CALIFORNIA

ASSESSMENT DISTRICT NO. 20
KELLER ROAD 30" TRANSMISSION PIPELINE
INDEX MAP, LEGEND & MISELLANEOUS

FOR: EASTERN MUNICIPAL WATER DISTRICT — DWG: 01-0010.PRO

I.D.	21
S.A.	41
W.O.	99-669
C.O.	64710
COORD.	18-C-36
SHT.	2 OF 7
	D- 24412

2

S.H. 6/12/03

G:\2001\01-0010\0010DWG.pro | Mar 15, 2002 | 11:10:41AM

PROJECT REVIEW COMMENTS

Project: Murrieta Hills (SP 320 / TTM 35853)
W.O.: 415273
Phase: Plan of Service

COMMENTS Provided: *9/10/2014* from NBD POS to RBF
12/18/2014 from RBF to NBD POS
2/19/2015 from NBD POS to RBF
6/22/2015 from NBD POS to RBF

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	**Sect / Page #**	**Title / Heading**	**Comment**	**Design Impacts/Proposed Resolution**	**By**	**Date**	**Code***	**Response**	**By**	**Date**	**Response**	**By**	**Date**
~~1~~	~~Cover~~	~~TECHNICAL MEMORANDUM~~	~~Sign & Seal by Engineer of Record~~	~~see comment~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Will be included in the next submittal.~~	~~RBF~~		Completed	BAR	2/6/2015
~~1A~~	~~Cover~~	~~TM~~	~~Add "Specific Plan 320 / TTM 35853" to cover page~~	~~see comment~~	~~MEH/ BAR~~	~~2/6/15~~	?				Completed	BAR	4/27/2015
~~2~~	~~I / 1~~	~~Introduction~~	~~Project states it is in the City of Murrieta~~	~~Please confirm this has been annexed into City or note status if still just within county.~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Proposing annexation.~~	~~RBF~~		Completed, noted proposing annexation in description.	BAR	2/6/2015
~~3~~	~~I / 1~~	~~Introduction~~	~~"At this time, the Project…"~~	~~"At that time, the Project…"~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Changed as noted.~~	~~RBF~~		Completed	BAR	2/6/2015
~~4~~	~~I / 1~~	~~Introduction~~	~~"The current land use…"~~	~~"The proposed land use…"~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Changed as noted.~~	~~RBF~~		Completed	BAR	2/6/2015
~~5~~	~~II / 1~~	~~Project Background~~	~~"Two storage tanks…"~~	~~"One storage tank…" Note that project may need additional storage tank per master plan.~~	~~BAR~~	~~9/3/14~~	~~C~~	~~Changed as noted.~~	~~RBF~~		Completed	BAR	2/6/2015
~~6~~	~~II / 1~~	~~Project Background~~	~~"A booster station from this…"~~	~~proposing a hydro-pneumatic booster station system? Please clarify.~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Per meeting discussions, a booster station is proposed, not a hydro-pneumatic booster station.~~	~~RBF~~		Completed	BAR	2/6/2015
~~7~~	~~II / 1~~	~~Project Background~~	~~"In summary, the facilities are as follows:"~~	~~Nothing is listed after this statement, please provide.~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Line to be deleted.~~	~~RBF~~		Completed	BAR	2/6/2015
~~8~~	~~II / 1~~	~~Project Background~~	~~"…and correspondences were used…"~~	~~What correspondences were used? None provided, please provide.~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Due-diligence Meeting on 8/27/13 and subsequent emails that followed~~	~~RBF~~		OK, noted and some included.	BAR	2/6/2015
~~9~~	~~II / 1~~	~~Project Background~~	~~Meetings with EMWD staff~~	~~please provide record(s) of these meetings as referenced.~~	~~MEH~~	~~9/3/14~~	~~C~~	~~Due-diligence Meeting on 8/27/13 and subsequent emails that followed~~	~~RBF~~		OK, noted and some included.	BAR	2/6/2015
10	~~II / 1~~	~~Project Background~~	~~EMWD Facilites Planning Report (Oct 6, 2008); Hydraulic Boundary Conditions at Points of Connection (Done / Dated?); Menifee West Water Study (April 2008 by IEC)~~	~~Add / request / note references per comment~~	~~MEH / BAR~~	~~9/3/14~~	~~C~~	~~Added to references~~	~~RBF~~		Completed	BAR	2/6/2015
11	~~III / 2~~	~~Land Use~~	~~"shwon"~~	~~replace with "shown"~~	~~BAR~~	~~9/3/14~~	~~C~~	~~Corrected.~~	~~RBF~~		Completed	BAR	2/6/2015
~~12~~	~~III / 3~~	~~Exhibit 2~~	~~Need to show Legend, PZ's and Pipeline sizes. Also, too small, need to make 11 x 17 / legible.~~	~~see comment~~	~~MEH / BAR~~	~~9/3/14~~	~~R~~	~~This exhibit was provided as a pdf from EMWD's atlas maps. Data can not be extracted from this file. It will be extended to 11 x17.~~	~~RBF~~		Completed w/ assistance from Ron in GIS.	BAR	4/27/2015
~~13~~	~~III / 4~~	~~Exhibit 3~~	~~Park acreage doesn't match Table 1 on pg. 5; Residential Units do not match Table 5 on pg. 7~~	~~please revise exhibits / tables to match acreage / unit count.~~	~~BAR~~	~~9/3/14~~	~~C~~	~~Total parks/HOA area is 16.0. The Table will be revised from 16.2 to 16.0. Total residential units is 750. The multi-family total is 172.~~	~~RBF~~		Completed, Areas & Quantities seem to match now.	BAR	2/6/2015
~~14~~	~~III / 5~~	~~Table 1~~	~~see comment #13 above; looks like you are double counting OS2 in OS1 acreage (s/b 639 acres); PA1 - PA7 needs to inclued 60 low-density residential; peaking factors for notes [3] & [4] are based on use - need to separate by tenant type (commercial vs. residential peaking factors); Use Peaking Factor of 2.0 x MDD for PH (see attached design criteria revisions) - numbers come out equivalent to as published guidelines.~~	~~see comment~~	~~MEH / BAR~~	~~9/8/14~~	~~C~~	~~The 639 acres accounts for streets (23.2 acres) and OS1 (615.8 acres) to reach the 639 acre total. Will separate units and peaking factors.~~	~~RBF~~		Completed	BAR	2/6/2015
~~15~~	~~III / 5~~	~~Table 2~~	~~Reversed Range of Elevations served for 2055 PZ~~	~~see comment~~	~~BAR~~	~~9/8/14~~	~~C~~	~~Elevations were revised to go from low to high.~~	~~RBF~~		Completed	BAR	2/6/2015
~~16~~	~~IV / 5~~	~~Domestic Water Demands~~	~~"EMWD's Low Density Residential…of 630 gpd/du…"~~	~~"EMWD's Med Density Residential… of 630 gpd/du…"~~	~~BAR~~	~~9/8/14~~	~~C~~	~~Corrected.~~	~~RBF~~		Completed	BAR	2/6/2015
17	V / 7	Reservoirs	District performed EPS model run to evaluate storage requirements based on 2008 WFMP criteria, results have been provided for reference in updating your POS. Consider equal reservoir sizes for 1853A/1853B.	see comment	MEH	9/8/14	R	Revised storage calcs for 1853 and 2055 based on District's spreadsheets. Estimated reservoir sizes are shown for planning purposes. Actual size will be determined during the preliminary design phase.	RBF		Update per storage calculations provided 6/18/15 and submit as Final document with cover letter for signature.	BAR	6/22/2015

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	Sect / Page #	Title / Heading	Comment	Design Impacts/Proposed Resolution	By	Date	Code*	Response	By	Date	Response	By	Date
18	V / 7	Table 5	Add column for phasing; where does [1] factor of 1.3 come from?; see proposed storage spreadsheet noted in comment #17	see comment	MEH / BAR	9/8/14	R	Factor of 1.3 is the safety factor used for peaking needs (as stated in the previous paragraph). This factor includes "pump through" flows. This can be removed as a factor of 10% is used as the District's criteria. District's spreadsheet was revised and included within the report.	RBF		Update per storage calculations provided 6/18/15 and submit as Final document with cover letter for signature.	BAR	6/22/2015
~~19~~	~~V / 7-8~~	~~Booster Stations~~	~~Proposed booster stations will have to be relocated to proper suction of 50 psi.~~	~~see comment~~	~~BAR~~	~~9/8/14~~	~~C~~	~~Based upon 11/17/14 meeting, it is acceptable to have lower suction pressure of 50 psi. Actual location of the booster station will be determined during the preliminary design stage. A note was added stating that locations can be determined at the preliminary design stage and that the MSHCP open space is a viable location for infrastructure.~~	~~RBF~~		Completed	BAR	2/12/2015
~~20~~	~~VI / 8~~	~~Domestic Water Analysis~~	~~Is storage available in 1698 PZ (~150k Gal per 2008 WFMP criteria)? This will need to be reviewed against 5-yr CIP requirements.~~	~~see comment~~	~~MEH~~	~~9/8/14~~	~~D~~	~~Per 11/17/14 meeting, it appeared that adequate storage at the 6.2 MG reservoir at the 1698 PZ would be sufficient to support the project.~~	~~RBF~~		Completed	BAR	4/27/2015
~~21~~	~~VI / 8~~	~~" " "~~	~~"The development will be initially supplied by EMWD's 1698 Zone..."~~	~~Please elaborate, how is this shown on the exhibit? What is meant by "initially" vs. ultimate supply? Is it a proposed hydropneumatic system?~~	~~MEH~~	~~9/8/14~~	~~C~~	~~"Initially" meaning that water supply will originate from the 1698 PZ. Water will be further pumped from 1853 PZ to 2055 PZ. Water pumped from the 1698 PZ is the ultimate condition.~~	~~RBF~~		Completed	BAR	2/17/2015
~~22~~	~~VI / 8~~	~~" " "~~	~~Do you have the boundary conditions at proposed Points of Connection?~~	~~District to provide boundary conditions if not used to evaluate on-site hydraulics. Please advise.~~	~~MEH~~	~~9/8/14~~	~~D~~	~~The boundary condition would be connection at the reservoir. Further analysis would be performed at the preliminary design stage.~~	~~RBF~~		Completed but noted it will be reviewed during Preliminary Design and with Facilities Planning during then current 5-yr CIP.	BAR	6/22/2015
~~23~~	~~VI / 9~~	~~Exhibit 4~~	~~Please clearly show 1853 / 2055 PZ split, move proposed 1853 to 2055 BPS to lower elevation to ensure proper suction pressures under all conditions, relocate proposed 1698 to 1853 BPS to Zeiders Rd(?) per 2008 Menifee West Water Study & Where is initial 1698 PZ service area? Hydropneumatic zone area?~~	~~see comment~~	~~MEH / BAR~~	~~9/9/14~~	~~R~~	~~Exhibit will be revised to show Pressure Zone split. As stated in the 11/17/14 meeting, the actual location of the booster stations will be determined at the preliminary design stage. We are currrently showing the booster stations near the reservoirs. A lot may be dedicated for booster pumping.~~	~~RBF~~		Completed as noted.	BAR	6/22/2015
~~24~~	~~VII / 10~~	~~(none provided)~~	~~No title provided as section would indicate, please provide.~~	~~see comment~~	~~BAR~~	~~9/9/14~~	~~R~~	~~There is no title change - we are still talking about the water analysis.~~	~~RBF~~		Completed	BAR	6/22/2015
~~25~~	~~App A~~	~~Scenario: base~~	~~Show boundaries for PZ's splits on maps as appropriate for reference~~	~~see comment~~	~~MEH / BAR~~	~~9/10/14~~	~~R~~	~~Changed as noted.~~	~~RBF~~		Completed	BAR	6/22/2015
~~26~~	~~App A~~	~~Scenario: all~~	~~Junction Reports: Shows 2 zones (1853 & 2020), no 2053?~~	~~Please revise to reflect appropriate zone HWL's.~~	~~MEH / BAR~~	~~9/10/14~~	~~R~~	~~2020 is the pad elevation for the 2055 zone. 1818 is the pad elevation for the 1853 zone.~~	~~RBF~~		Completed	BAR	6/22/2015
~~27~~	~~General~~	~~n/a~~	~~Project is required to install street section and right-of-way for McElwain Rd from Tentative Tract Map south to Linnel Lane for access / fire protection services.~~	~~District / project may need to install facilities to better serve project / regional development. This needs to be studied further through the POS process.~~	~~MEH / BAR~~	~~9/15/14~~	~~C~~	~~Topic of McElwain infrastructure will be added for the District's discussion purposes. As discussed in the 11/17/14 meeting, road improvements along McElwain Road may not be conditioned for the project. Additional analysis by the District will be necessary as the McElwain alignment increases in grade/elevation and may not be suitable hydraulically for piping connections.~~	~~RBF~~		Completed, addressed as noted.	BAR	2/19/2015
~~28~~	~~Sewer Comments~~		~~Please correct table 8 on pg. 11 to reflect the correct Peaking Factors of 2.26 for SFR and 2.5 as correctly noted in note [3] for the MFR and Commercial. This will affect the Peak Flow shown for SFR. The commercial flow calculations for Average and Peak flow are too high based on our calculations of the acreage and correct unit flow factor provided. Your total peak flow should be lower as well.~~		~~BAR~~	~~email dated 11/14/14~~	~~C~~	~~Corrected.~~	~~RBF~~		Completed	BAR	2/19/2015
~~29~~	~~Sewer Comments~~		~~Exhibit 5 pg. 13 - District may oversize the conveyance in Zeiders Rd from 12" to 15" at District cost to accommodate potential future flows from the east or west at Keller Rd.~~		~~BAR~~	~~email dated 11/14/14~~	~~R~~	~~Note added to text and exhibit.~~	~~RBF~~		Completed	BAR	6/22/2015

REVIEWER INPUT							RESPONSE				Reviewer Response		
No.	Sect / Page #	Title / Heading	Comment	Design Impacts/Proposed Resolution	By	Date	Code*	Response	By	Date	Response	By	Date
~~30~~	~~Sewer Comments~~		~~Section X. Wastewater Analysis pg. 14 - shallow sewer manholes will be resolved through the plan check process.~~		~~BAR~~	~~email dated 11/14/14~~	~~C~~	~~Statement added to report.~~	~~RBF~~		Completed	BAR	2/19/2015
~~31~~	~~VI / pg. 12~~	~~Table 7~~	~~Description of 1853 & 2055 PZ's.~~	~~S/B 1853 HWL & 2055 HWL (not LWL)~~	~~BAR~~	~~2/19/15~~	~~C~~	~~footnoted Table 7 to reflect HWL & LWL, accordingly~~	~~RBF~~		Completed	BAR	6/22/2015

*** CODES: C = Concur R = Revise D = Discussion NA = Not Applicable W = Withdrawn**

Interoffice Memo

TO: Developer

FROM: Development Services Engineer

DATE: December 20, 2018

SUBJECT: DCDA vs. RPDA – Hazardous Contaminant Identification

EASTERN MUNICIPAL WATER DISTRICT

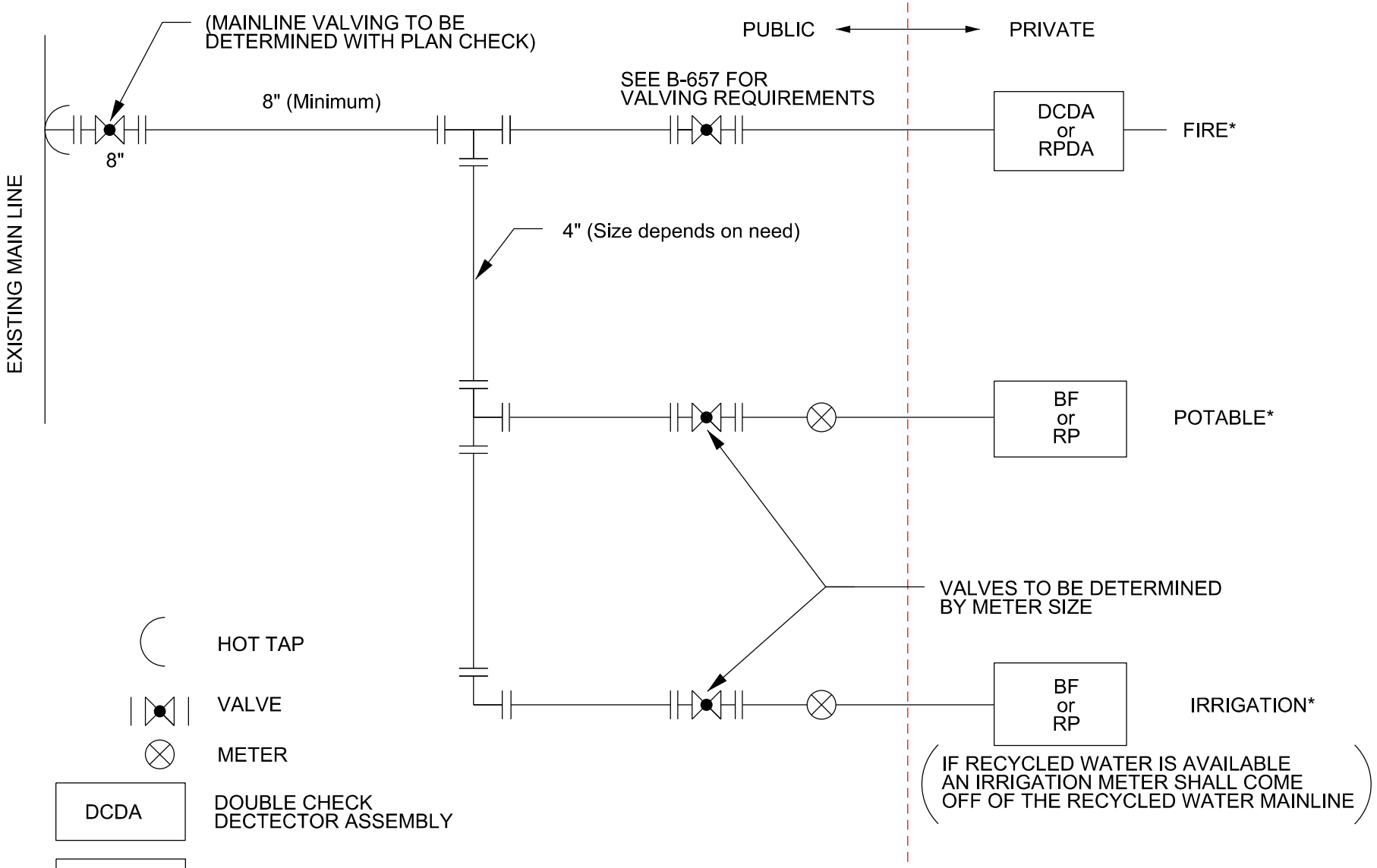
As part of your Plan of Service and in order to assist you through the Plan Check process, the New Business Department through the Admin Code has identified the need to know all the potential hazards which could contaminate EMWD's water system through the proposed private and dedicated Fire Service. While a double check detector fire protection backflow prevention assembly (DCDA) protects against low health hazard pollutants, a reduced pressure detector fire protection backflow prevention assembly (RPDA) protects against high health hazard pollutants and contaminants. All dedicated and private fire protection services must utilize, at a minimum, a DCDA at each point of connection to EMWD's public water system. In addition, an RPDA device must be used in the event of a potential onsite contaminant. Examples of potential contaminants we require you to identify (but not limited to) are:

- Use of chemicals, such as an industrial use
- Chemical-additive injection (for fire-fighting)
- On-site water storage
- On-site well
- Un-approved auxiliary water supply (i.e. on-site wells not properly abandoned or destroyed)
- Sites with marine facilities (such as lakes and water parks)

Please provide a list of process and potential hazards (pollutants or contaminants) for your proposed project as soon as possible during the plan of service process. This will ensure the appropriate backflow prevention device is utilized for onsite hydraulic design and plan check to review.

If a customer has concerns with EMWD's condition to use an RPDA (i.e. Fire Marshall, low pressure concerns), then a site survey shall be conducted to demonstrate that the use of a DCDA would provide adequate protection to EMWD's source water system. If you have any further questions or concerns regarding this notification, please feel free to contact the New Business Department staff for further information.

EMWD STANDARD FOR PRIVATE CONNECTIONS FOR EXISTING WATERLINES

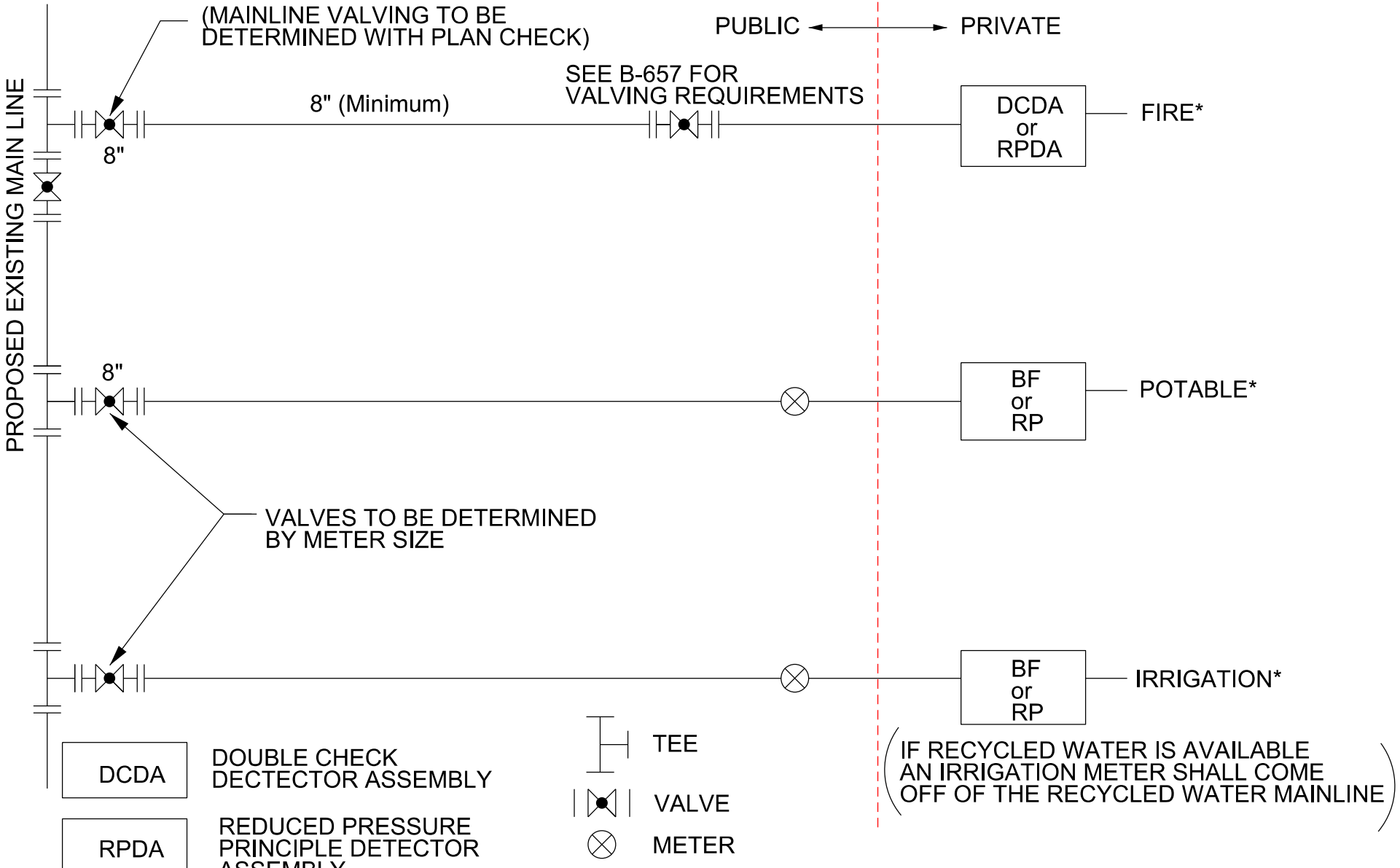


* Please note that EMWD does not inspect onsite private potable water and/or private fire systems, however, EMWD does require that there is no cross-connections onsite. Each service connection must maintain their separate systems onsite. (Example: domestic potable, fire services must remain a dual system onsite).

DATE 1-23-2015

\KAUAI\engineering\esparza\DGNv8

EMWD STANDARD FOR PRIVATE CONNECTIONS FOR PROPOSED WATERLINES



✳ Please note that EMWD does not inspect onsite private potable water and/or private fire systems, however, EMWD does require that there is no cross-connections onsite. Each service connection must maintain their separate systems onsite. (Example: domestic potable, fire services must remain a dual system onsite).

DATE 1-23-2015
\KAUAI\engineering\esparza\DGNv8

Community Facilities District (CFD) Letter

Re: **SPECIAL FUNDING DISTRICTS**

Project Name _____

Tract Number _____

Work Order Number _____

Special Funding Districts have a special set of requirements for construction. In some cases, EMWD is not aware of the need to process projects differently using CFD requirements. In order to make sure your project is processed correctly, please have the project owner/developer complete the questions below:

1. Will the project be funded using Assessment District or Community Facilities District funds? ☐ Yes ☐ No

   If YES, please answer questions 2 through 5:

2. Who will be the lead agency? (Supply CFD number and name of project, if known)

   _____

3. Will the CFD fund the water and/or sewer financial participation fees? ☐ Yes ☐ No
4. Will the CFD fund the water facilities? ☐ Yes ☐ No
5. Will the CFD fund the sewer facilities? ☐ Yes ☐ No

If you answered **YES** to Question 1, please contact Heidi Schoeppe, Senior Finance Manager, Albert A. Webb & Associates at (951) 200-8604, for CFD formation requirements.

I AM THE OWNER OR DEVELOPER OF TRACT_____. THE INFORMATION ABOVE IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE. FURTHERMORE, I UNDERSTAND THAT DEVELOPER AGREEMENTS FOR PROJECTS, INCLUDING FACILITIES TO BE FUNDED BY A CFD, MUST BE IN PLACE PRIOR TO SCHEDULING A BID OPENING FOR THE PROJECT.

Signature	Company Name
Print Name	Address
Title	City, State ZIP
Contact Number	Contact Number
Date	

RETURN THIS FORM WITH THE NEXT PLAN OF SERVICE / PLAN CHECK SUBMITTAL

EASTERN MUNICIPAL WATER DISTRICT
New Business Department

Work Order Deposit[1] Work Sheet (for POS & PC)

Project:
Meeting Date:
Plan of Service Engineer: Brian Raines
File Name: NBD-053 DD Deposit Worksheet

Form: NBD-053
Version Date: 8/11/2015

		Deposit[1] Amount Required For This Project
Phase I: Due Diligence Phase		
1 **Water, Sewer & Recycled water**	(No Charge for initial research and Due Diligence meeting)	**$0**

Phase II: Plan Of Service Phase	Project Size: EDUs:	Small 1-100	Medium 101-200	Large Over 200	
1 **Water POS**		$ 2,000	$ 2,500	$ 3,000	
2 **3 or 4-Hour Fire Flow Tests**		$ 1,200	$ 1,200	$ 1,200	
3 **Sewer POS**		$ 2,000	$ 2,500	$ 3,000	
4 **Recycled Water Use Exhibit**	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
5 **Recycled Water Public Facilities (Plan Of Service)**		$ 2,000	$ 2,500	$ 3,000	
6 **Sewer Flow Monitoring By Applicant**		$ -	$ -	$ -	
7 **Sewer Flow Monitoring By District Staff**	Amount Varies (min. $2,000 per manhole)				
8 **Plan Check Support (if needed)**		$ 1,500	$ 1,500	$ 1,500	
9 **Project Complexity, such as: PZ Realignment, Storage, Booster/Lift Station**		$ -	$ -	$ -	
		Phase II (Plan Of Service) Total:			**$ -**

Phase III: Plan Check Phase					
On-site Recycled Water Irrigation Plan Check:					
1 Single source park, Streetscape, Tract	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
2 Commercial, Dual source[2] park, School	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
Recycled Water Construction Inspection:					
3 Single source park	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
4 Commercial, Dual source[2] park, School, Tract	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
5 School, Streetscape	(Varies: use RW Deposit Work Sheet - Form NBD-042)				
Water & Sewer[3]					
	Number Of Sheets		**Deposit**	**With Easement, Add**	**CFD Specs, Add**
6	1-2 sheets	One or more systems	$ 2,000	$ 1,000	$ 3,000
7	3-8 sheets	one system	$ 4,000	$ 1,500	$ 3,000
8		two or more systems	$ 6,000	$ 1,500	$ 3,000
9	9-13 sheets	one system	$ 7,000	$ 1,500	$ 3,000
10		two or more systems	$ 9,000	$ 1,500	$ 3,000
11	14-20 sheets	one system	$ 10,000	$ 2,000	$ 3,000
12		two or more systems	$ 13,000	$ 2,000	$ 3,000
13	21-25 sheets	one system	$ 15,000	$ 2,000	$ 3,000
14		two or more systems	$ 18,000	$ 2,000	$ 3,000
15	26-35 sheets	one system	$ 20,000	$ 2,000	$ 3,000
16		two or more systems	$ 23,000	$ 2,000	$ 3,000
17 **Hydro-Pneumatic Booster Station**			$ 35,000		
18 **Booster Pump Station**			$ 35,000		
19 **Water Storage Reservoir**			$ 27,000		
20 **Small Sewer Lift Station**			$ 27,000		
(Deposit amount varies for Medium & Large LS)			**Phase III (Plan Check) Total:**		**$ -**

(1) Deposit amount is based on the average District cost to review and process a typical project.
(1) During the POS and the Plan Check phases, the District reserves the right to review charges to a project and request additional funds if necessary.
(1) Initial deposits may be increased based on project complexity, as determined by District staff.
(1) All Plan Check charges must be paid prior to approval of the plans.
(2) Dual Source Site: Project site that has both potable and recycled water served onsite. Dual source sites are required per CDPH and EMWD to have cross connection test performed prior to acceptance and release of the project site.
(3) Recheck of approved plans: Apply 2/3 of the above Plan Check deposit (Additional fees to be determined based on the amount of design changes)

Date: _____

Project: _____

NBD-063
Rev. 04/29/15

DOCUMENTS REQUIRED FOR PLAN CHECK

NEW BUSINESS DEVELOPMENT DEPARTMENT

Note: EMWD will perform a completeness check of the documents identified below within the first week of submittal. If the package is found to be incomplete, your submittal will not be accepted. A submittal will **NOT** be placed in the queue for the next available plan checker until it is found to be complete.

We are providing the following:

Yes	N/A	
☐	☐	An Approved Plan of Service (POS) Summary Spreadsheet
☐	☐	2 Sets of Water & Sewer Improvement Plans (Per EMWD Standards and Guidelines)
☐	☐	1 Set of Street Improvement Plans
☐	☐	1 set of Storm Drain Plans (if not included with Street Improvement Plans)
☐	☐	1 Set of Grading Plans
☐	☐	1 Set of the Recorded Map
☐	☐	A Legible Site Plan Reduced to 11" x 17" size It can contain 2 or more sheets, if necessary to cover the project
☐	☐	1 Set of the Conditions of Approval, including Fire Flow Requirements If the Conditions of Approval are not available, provide one set of Fire Flow Conditions from the governing Fire Prevention Agency.
☐	☐	A Plan Check Deposit: Attached Amount $_____ Refer to Work Order Deposit Work Sheet (Form: NBD-053) for plan check deposit amount.
☐	☐	A Community Facilities District (CFD) Letter

Current guidelines for preparation of sewer and water plans and standard drawings are available on our website at www.emwd.org.

_____
Signature of Registered Civil Engineer

_____
Print name:

_____
Phone:

_____
Company Name

_____
Address

_____
City, State, Zip Code

Professional Engineer Stamp

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Appendix C

Murrieta Hills Fire Protection Plan (Pending)

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Eastern Municipal Water District
2015 Urban Water Management Plan

FINAL

Prepared by

June 2016

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List of Acronyms and Abbreviations

AB	Assembly Bill
Act	Urban Water Management Planning Act of 1983
AF	acre-feet
AFY	acre-feet per year
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
Bay-Delta	San Francisco Bay/Sacramento-San Joaquin Delta
BDCP	Bay Delta Conservancy Plan
BMPs	Best Management Practices
CDFW	California Department of Fish and Wildlife
CFS	Cubic feet per second
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
CUWCC	California Urban Water Conservation Council
CWC	California Water Code
DBPs	Disinfection byproducts
DMM	Demand Measurements Measure
DOE	US Department of Energy
DoF	California Department of Finance
DWR	California Department of Water Resources
ECs	Emerging constituents
EDU	Equivalent Dwelling Unit
EMWD	Eastern Municipal Water District
ERRP	Enhanced Recharge and Recovery Program
ESA	Endangered Species Act
ETAF	Evapotranspiration Adjustment Factor
ETo	Reference Evapotranspiration
EVMWD	Elsinore Valley Municipal Water District
Forum	Colorado River Basin Salinity Control Forum
FY	Fiscal Year
GIS	Geographic Information System
GPCD	gallons per capita per day
gpm	gallons per minute
HECW	High Efficiency Clothes Washers
Hemet/San Jacinto Basin	Hemet/San Jacinto Water Management Plan area
HET	High-Efficiency Toilets
HSJ Management Plan	Hemet/San Jacinto Groundwater Management Area Water Management Plan
IPR	Indirect Potable Recharge
IRP	Integrated Resource Plan

IRRP	Integrated Recharge and Recovery Program
IRWM	Integrated Regional Water Management
LHMWD	Lake Hemet Municipal Water District
MAF	million acre-feet
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
Mills	Henry J. Mills
MOU	Memorandum of Understanding
MFR	Multi-Family Residential
MWD	Metropolitan Water District of Southern California
MWD IRP	Metropolitan Water District of Southern California's Integrated Water Resources Plan
MWELO	Model Water Efficient Landscape Ordinance
NDMA	N-Nitrosodimethylamine
OEHHA	Office of Environmental Health Hazard Assessment
PG&E	Pacific Gas and Electric
PHG	Public Health Goal
PPCPs	Pharmaceuticals and Personal Care Products
QWEL	Qualified Water Efficient Landscaper
RCWD	Rancho California Water District
R&R	Replacement and Refurbishment
RWRF	Regional Water Reclamation Facility
SARCCUP	Santa Ana River Conservation & Conjunctive Use Program
SAWPA	Santa Ana Watershed Planning Authority
SB	Senate Bill
SDCWA	San Diego County Water Authority
SFR	Single Family Residential
Skinner	Robert F. Skinner
SNMP	Salt and Nutrient Management Plan
Soboba Settlement Act	Soboba Band of Luiseño Indians Settlement Act of 2007
Soboba Settlement Agreement	Soboba Band of Luiseño Indians Water Settlement
Soboba Tribe	Soboba Band of Luiseño Indians
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAF	thousand acre-feet
TDS	total dissolved solids
TOC	Total Organic Carbon
µg/L	micrograms per liter
ULFT	Ultra Low-Flush Toilets
USBR	U.S. Department of the Interior, Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
UWMP	Urban Water Management Plan
VOCs	Volatile organic compounds
Watermaster	Hemet-San Jacinto Watermaster

WBIC	Weather-based irrigation controller
West San Jacinto Basin	West San Jacinto Groundwater Basin Management Plan area
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDMP	Water Surplus and Drought Management Plan
WSEOP	Water Shortage Emergency Operations Plan
WSJ Management Plan	West San Jacinto Groundwater Basin Management Plan
WSO	Water System Optimization
WSS	WaterSense Specified

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Executive Summary

ES-1 Plan Purpose and Overview

The Urban Water Management Planning Act (UWMP Act), adopted in 1983, requires every urban water supplier that provides water for municipal purposes to more than 3,000 connections or supplies more than 3,000 acre-feet of water annually to adopt and submit an Urban Water Management Plan (UWMP) to the California Department of Water Resources (DWR) every five years. The main purpose of developing and updating an UWMP is to forecast water demands and supplies under normal, single-dry, and multiple-dry year conditions; assess supply reliability; and describe methods of reducing demands under potential water shortages.

This 2015 UWMP satisfies the requirements of the UWMP Act and its amendments, and provides an overview of Eastern Municipal Water District's (EMWD)'s long-term supplies and demands. The 2015 UWMP also reports EMWD's progress towards meeting the water use efficiency targets set by the Water Conservation Act of 2009 (SBx7-7).

In addition to significant conservation efforts made since the enactment of SBx7-7, the 2015 UWMP also documents EMWD's significant per capita water use reduction as a result of emergency requirements set by the State Water Resources Control Board (SWRCB). In response to California Governor Brown's April 2014 Proclamation declaring severe drought conditions in the state of California, the SWRCB has required water suppliers to reduce water usage statewide. EMWD was assigned a required demand reduction of 28 percent relative to 2013 water usage. This 2015 UWMP documents EMWD's significant per capita water use reduction in response to the SWRCB's water conservation requirements.

Table ES-1 summarizes the information contained within EMWD's 2015 UWMP.

Table ES-1: Organizational Overview of the 2015 UWMP

Chapter Name	Information Contained within Chapter
Chapter 1 – Introduction and Overview	• General legal requirements for 2015 UWMPs • Local planning efforts
Chapter 2 – Plan Preparation	• Plan preparation • Agency coordination and outreach
Chapter 3 – System Description	• General description of EMWD's retail and wholesale service areas • Description of EMWD's distribution systems • Climate characteristics of EMWD's service area • Current and projected population and demographic figures
Chapter 4 – System Water Use	• Overview of past, current, and projected water use • System water losses • Climate change impacts on water use
Chapter 5 – Baselines and Targets	• Information on the Water Conservation Act of 2009 • Baseline gross per capita water use • Updated water use targets for 2015 and 2020 • 2015 target compliance confirmation

Chapter Name	Information Contained within Chapter
Chapter 6 – System Supplies	• Information about current and projected supplies • Background on imported water supply, including the Metropolitan Water District of Southern California • Description of groundwater basin management and supplies • Description of EMWD's recycled water system and the beneficial uses of recycled water • Description of planned water projects • Climate change impacts to supplies
Chapter 7 – Water Supply Reliability Assessment	• Overview of the reliability of each of EMWD's supplies • Water quality of supplies • Projections for water supply and water demands under normal, single dry, and multiple dry year hydrologic conditions • Regional supply reliability
Chapter 8 – Water Shortage Contingency Planning	• Overview of EMWD's water shortage stages and associated prohibitions for each stage • Methods for reducing water use • Minimum supply available for the next three years
Chapter 9 – Demand Management Measures	• Overview of the California Urban Water Conservation Council • Summary of EMWD's retail and wholesale demand management measures
Chapter 10 – Plan Adoption, Submittal, and Implementation	• Overview of the UWMP adoption process • Implementation of the 2015 Plan

ES-2 Service Area and Water Supplies

EMWD provides potable water, recycled water, and wastewater services to an area of approximately 555 square miles in western Riverside County. EMWD is both a retail and wholesale agency, serving a retail population of 546,146 people and a wholesale population of 215,075 people. The agency was initially formed in 1950 to bring imported water to the area and in 1951 was annexed into the Metropolitan Water District of Southern California (MWD). EMWD is now one of MWD's 26 member agencies.

The majority of EMWD's supplies are imported water purchased through MWD from the State Water Project (SWP) and the Colorado River Aqueduct (CRA). Imported water is delivered to EMWD either as potable water treated by MWD, or as raw water that EMWD can either treat at one of its two local filtration plants or deliver as raw water for non-potable uses.

EMWD's local supplies include groundwater, desalinated groundwater, and recycled water. Groundwater is pumped from the Hemet/San Jacinto and West San Jacinto areas of the San Jacinto Groundwater Basin. Groundwater in portions of the West San Jacinto Basin is high in salinity and requires desalination for potable use. EMWD owns and operates two desalination plants that convert brackish groundwater from the West San Jacinto Basin into potable water. EMWD also owns, operates, and maintains its own recycled water system that consists of four Regional Water Reclamation Facilities and several storage ponds spread throughout EMWD's service area that are all connected through the recycled water system. As of 2014, EMWD has used 100 percent of the recycled water it produces.

ES-3 Water Demands

Since its formation as a water agency, EMWD has shifted from primarily serving agricultural uses to primarily serving urban uses. Today, EMWD's retail customers are mostly residential, with other uses consisting of commercial, industrial, institutional, landscape and agricultural. In addition to retail potable water demand, EMWD delivers water to seven wholesale customer agencies and meets a significant portion of demand with recycled water.

In 2015, the SWRCB in its Emergency Regulation required water suppliers to reduce water usage by 25 percent statewide as a means of reducing stress on California's water supplies during the ongoing drought. The mandatory water restrictions required EMWD to implement Stage 4 of its Water Shortage Contingency Plan (WSCP) to meet conservation targets which helped EMWD reduce demands in 2015 by over 20 percent.

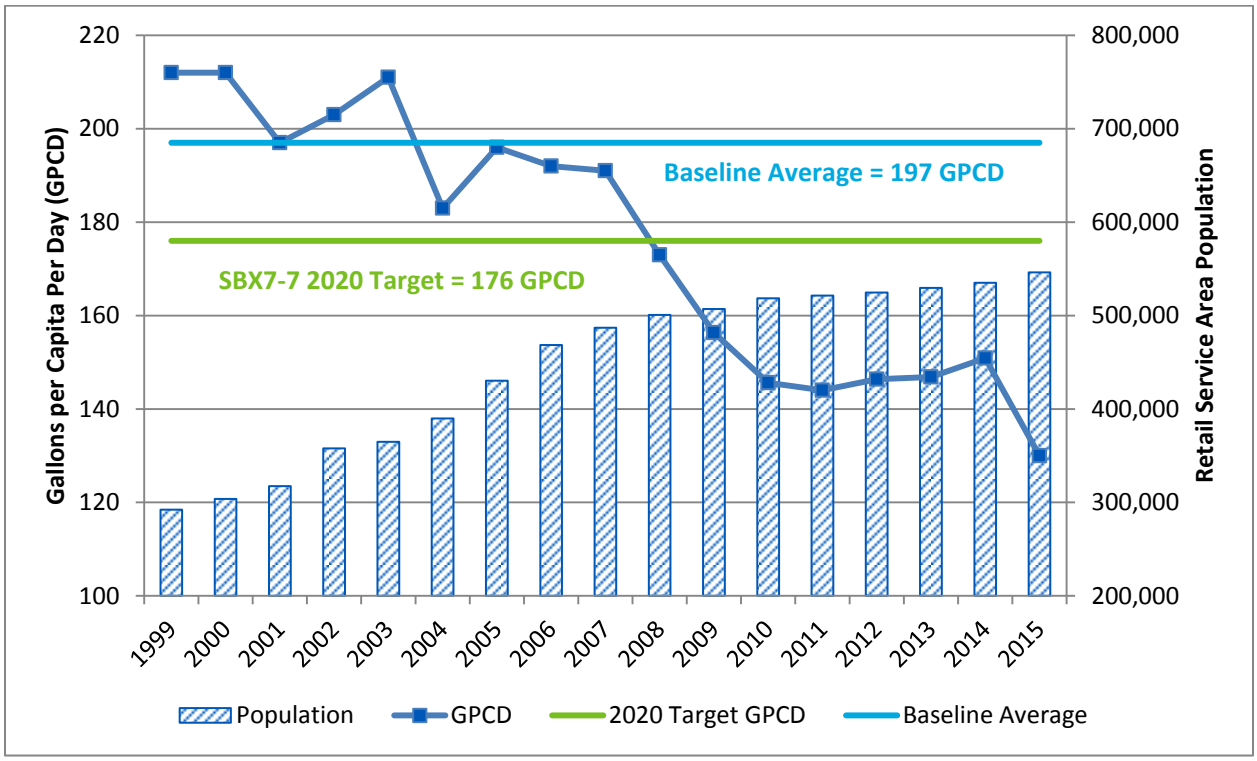
Demands projections for EMWD were developed using information about planned development and land use. These future demand projections assume the return of typical hydrologic conditions during the planning horizon that will allow a relaxation of the SWRCB's Emergency Regulation requirements. Although development has slowed in recent years, growth is expected to increase as the overall economy grows. EMWD's retail and wholesale demand projections for its potable and non-potable systems are presented in Table ES-2.

Table ES-2: Total Demand Projections

	2015	2020	2025	2030	2035	2040
Retail Potable and Raw Water Demand	78,937	100,500	111,500	122,900	134,000	144,500
Wholesale Potable and Raw Water Demand	21,768	50,500	54,100	57,700	61,200	64,800
Total Potable and Raw Water Demand	**100,705**	**151,000**	**165,600**	**180,600**	**195,200**	**209,300**
Retail Recycled Water Demand	44,150	45,245	48,334	50,017	51,800	53,300
Wholesale Recycled Water Demand	1,235	1,656	4,766	5,183	5,600	5,600
Total Recycled Water Demand	**45,385**	**46,901**	**53,100**	**55,200**	**57,400**	**58,900**
Total Water Demand	**146,090**	**197,901**	**218,700**	**235,800**	**252,600**	**268,200**

As part of this UWMP, EMWD was required to update its baseline and target per capita water use numbers in compliance with SBx7-7. The overall goal of SBx7-7 is to reach a 20 percent statewide reduction of per capita urban water use by 2020. EMWD established a 10-year baseline period from 1999 to 2008 with a baseline water usage of 197 gallons per capita per day (GPCD). The 2020 target was calculated using DWR's Method 2, which uses an efficiency standard with targets for indoor use, landscape use, and commercial, industrial and institutional use and an optional target for agricultural use. EMWD's 2020 target was set at 176 GPCD, with a 2015 interim target of 187 GPCD. EMWD's actual 2015 per capita water use was calculated as 129 GPCD, well below the 2015 interim target. EMWD anticipates that even if demands increase when regulations are lifted, it will still meet its 2020 compliance target. Figure ES-1 illustrates EMWD's progress toward meeting its conservation target.

Figure ES-1: Progress Toward Meeting SBx7-7 Targets



ES-4 Water Supply Forecast

EMWD plans to meet increases in projected demands through a combination of local supply development and ongoing water conservation. EMWD is in the process of completing master planning documents that investigate optimal supply portfolios to meet the agency's needs. Future supply projects described in this 2015 UMWP include: continuing full utilization of recycled water, expansion of the desalter program, increasing local groundwater banking, and developing additional regional water transfers and exchanges. Reasonably available volumes from local supply development were incorporated into EMWD's supply projections, and are presented in Table ES-3.

Table ES-3: Total Retail and Wholesale Water Supply (AFY)

Supply	2015	2020	2025	2030	2035	2040
Retail						
Imported Water	56,397	81,197	89,097	100,497	111,597	122,097
Groundwater	15,252	12,303	12,303	12,303	12,303	12,303
Desalinated Groundwater	7,288	7,000	10,100	10,100	10,100	10,100
Recycled Water	44,150	45,245	48,334	50,017	51,800	53,300
Total Retail Supply	**123,087**	**145,745**	**159,834**	**172,917**	**185,800**	**197,800**
Wholesale						
Imported Water	21,768	50,500	54,100	57,700	61,200	64,800
Recycled Water	1,235	1,656	4,766	5,183	5,600	5,600
Total Wholesale Supply	**23,003**	**52,156**	**58,866**	**62,883**	**66,800**	**70,400**
Total Water Supply	**146,090**	**197,901**	**218,700**	**235,800**	**252,600**	**268,200**

ES-5 Supply Reliability and Contingency Planning

EMWD will continue to rely on imported water from MWD as the main source of supply for its retail and wholesale customers, yet recognizes the need to increase local supplies and water conservation to manage supply and demand. MWD evaluated challenges to supply reliability in its 2015 UWMP, including drought conditions, environmental regulations, water quality concerns, and infrastructure vulnerability. MWD has undertaken several planning initiatives to assess and prepare for vulnerabilities including its Integrated Water Resources Plan, its Water Surplus and Drought Management Plan, and its Water Supply Allocation Plan (WSAP). Additionally, MWD has developed dry-year storage through groundwater and surface water reservoirs that help meet dry-year demands. Based on the information provided in MWD's 2015 UWMP, MWD has sufficient supply capabilities to meet the expected demands of its member agencies from 2020 through 2040 under normal, historic single-dry and historic multiple-dry year conditions.

EMWD recognizes that recent and ongoing dry conditions have impacted the reliability of the SWP and CRA imported supplies, causing significant withdrawals from MWD's storage reservoirs during the last few years. If another multiple-dry year period were to occur over the next three years, MWD could face supply shortages. EMWD is able to respond to supply shortages through implementation of its WSCP and MWD's WSAP. EMWD has the ability to meet current and projected water demands through 2040 under normal, historic single-dry and historic multiple-dry year conditions using a combination of imported water from MWD and existing local supply resources. Table ES-4 and Table ES-5 demonstrate the supply-demand balance for EMWD's service area under single-dry and multiple-dry hydrologic scenarios.

Table ES-4: Single Dry Year Supply and Demand Comparison

	2020	2025	2030	2035	2040
Retail					
Supply totals	166,300	182,400	197,400	212,000	225,700
Demand totals	166,300	182,400	197,400	212,000	225,700
Difference	0	0	0	0	0
Wholesale					
Supply totals	58,500	66,200	70,700	75,200	79,300
Demand totals	58,500	66,200	70,700	75,200	79,300
Difference	0	0	0	0	0

Table ES-5: Multiple Dry Year Supply and Demand Comparison

		2020	2025	2030	2035	2040
Retail						
First year	Supply totals	166,300	182,400	197,400	212,000	225,700
	Demand totals	166,300	182,400	197,400	212,000	225,700
	Difference	0	0	0	0	0
Second year	Supply totals	142,500	155,400	167,400	179,000	190,100
	Demand totals	142,500	155,400	167,400	179,000	190,100
	Difference	0	0	0	0	0
Third year	Supply totals	149,500	162,700	175,100	186,900	198,600
	Demand totals	149,500	162,700	175,100	186,900	198,600
	Difference	0	0	0	0	0
Wholesale						
First year	Supply totals	58,500	66,200	70,700	75,200	79,300
	Demand totals	58,500	66,200	70,700	75,200	79,300
	Difference	0	0	0	0	0
Second year	Supply totals	48,500	54,700	58,200	61,700	64,900
	Demand totals	48,500	54,700	58,200	61,700	64,900
	Difference	0	0	0	0	0
Third year	Supply totals	52,000	57,400	61,100	64,600	68,000
	Demand totals	52,000	57,400	61,100	64,600	68,000
	Difference	0	0	0	0	0

Chapter 1 Introduction and Overview

1.1 Background and Purpose

The Urban Water Management Planning Act (Act), adopted in 1983, requires water suppliers to conduct long-term water resources planning. Prior to adoption of the Act, water agencies were more vulnerable to supply disruptions during periods of drought or supply shortages. The Act sought to minimize susceptibility to supply shortages by requiring a minimum level of long-term resource assessment and planning by water suppliers. The planning requirements established by the Act and subsequent legislation encourage regional coordination and focus on water use efficiency as described in the sections below. This 2015 Urban Water Management Plan (UWMP) addresses the water supply sources, projected demands, and supply reliability for Eastern Municipal Water District's (EMWD) service area.

1.2 Urban Water Management Planning Act and the California Water Code

California Water Code (CWC) Section 10620 (a) of the Urban Water Management Act, states "Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640)". These plans are to be updated every five years and submitted to the California Department of Water Resources (DWR). Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

In November of 2009, the State legislation passed Senate Bill (SB) 7 as part of the Seventh Extraordinary Session, referred to as SBx7-7 or the Water Conservation Act of 2009. SBx7-7 sets the goal of achieving a 20 percent reduction in urban per capita water use statewide by 2020. Retail water agencies are required to set targets and track progress toward decreasing daily per capita urban water use in their service areas, which will assist the State in meeting its 20 percent reduction goal by 2020. This law requires that every UWMP include:

- Baseline per capita water use
- Urban water use target for 2020
- Interim urban water use target for 2015
- Compliance daily per capita water use

This 2015 UWMP has been prepared to comply with the Urban Water Management Planning Act and SBx7-7. In addition to meeting the requirements of the Act, this report will be used to support water supply assessments and written verifications of water supply required by SB 610 and SB 221 of 2001. These bills require that water supply information be provided to counties and cities for projects of a certain size, prior to discretionary project approval. Both bills allow an UWMP to be used as a source document to fulfill these legislative requirements.

Since 2010, several amendments have been added to the Act. These include requirements for: describing the water supplier's Demand Management Measures and establishing a submittal date to DWR of July 1, 2016 (Assembly Bill (AB) 2067, 2014); analyzing and defining water features that are artificially supplied with water (AB 2409, 2010); submitting the plan electronically, using standardized tables and

forms, quantifying and reporting distribution system water losses, and guidance for voluntary reporting of passive water savings (SB 1420, 2014); and guidance for voluntary reporting of energy intensity (SB 1036, 2014). This 2015 UWMP was developed to incorporate these new requirements, under the guidance of DWR's 2015 UWMPs Guidebook for Urban Water Suppliers. A checklist to document compliance of this 2015 UWMP with the Act and the CWC is provided in Appendix A.

This UWMP includes all required DWR standardized tables within relevant chapters and they are compiled in Appendix B. Within the UWMP chapters, DWR's standardized tables include the DWR-assigned table number in the first row of the table. This 2015 UWMP also includes all required SBx7-7 tables in Appendix C to verify compliance with the SBx7-7 targets.

1.3 Urban Water Management Plans in Relation to Other Planning Efforts

UWMPs allow for integration of information from other planning documents, as well as regional planning efforts. EMWD has recently completed, or is about to complete, a number of planning documents that were used to inform estimates of water supplies and water use projections for the 2015 UWMP update. Additionally, regional planning efforts conducted by Metropolitan Water District of Southern California (MWD) were used to assess the EMWD imported water supply reliability. Relevant planning documents are summarized in Table 1-1 below.

Table 1-1: Planning Documents in Relation to the 2015 UWMP

Planning Document	Summary
Water Master Plan, EMWD 2016	This document analyzes EMWD's facilities needs to meet current and future customer demands.
Recycled Water Strategic and Master Plan, EMWD 2016	The document analyzes EMWD's recycled water opportunities and contains recycled water projections through the year 2045, including descriptions of planned recycled water projects and facilities.
Wastewater Collection Master Plan, EMWD 2016	This document analyzes EMWD's facilities needs to collect existing and future wastewater.
Regional Water Reclamation Facilities Master Plan	This document analyzes EMWD's reclamation facility needs for treating existing and future wastewater.
Integrated Resources Plan, MWD 2015	The document describes MWD's plan for providing adequate and reliable supplies to member agencies and is used as the basis for MWD's 2015 UWMP.
2015 Urban Water Management Plan, MWD	The document describes MWD's demand and supply reliability and is used as the basis EMWD's imported water supply reliability.

Chapter 2 Plan Preparation

2.1 Basis for Preparing the Plan

EMWD operates a Public Water System that qualifies as an "Urban Water Supplier" under the CWC Section 10617, serving more than 3,000 customers and more than 3,000 acre-feet per year (AFY). Table 2-1 provides qualifying information about EMWD, as required in the 2015 UWMP Guidebook.

Table 2-1: Retail Public Water System

DWR Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	**Public Water System Name**	**Number of Municipal Connections 2015[1]**	**Volume of Water Supplied 2015 (AFY)**
CA3310009	Eastern Municipal Water District	147,300	78,937
	Total	**147,300**	**78,937**

1) The number of connections and volume of water supplied in this table reflect EMWD's potable water system only. Recycled water connections (500) and volume supplied (44,150 AF) in 2015 is not included.

For the 2015 update of the UWMP, an individual plan was prepared in coordination with the appropriate regional agencies and constituents. The plan will report solely on the EMWD service area and will address all the requirements of the CWC. Table 2-2 documents the Plan Identification for EMWD's 2015 update of the UWMP.

Table 2-2: Plan Identification

DWR Table 2-2: Plan Identification	
	Type of Plan
☑	Individual UWMP
☐	Regional UWMP

EMWD is both a retail and wholesale Urban Water Supplier and has selected to report UWMP data in calendar years and in units of acre-feet (AF). Table 2-3 documents the Agency Identification for the update of the 2015 UWMP.

Table 2-3: Agency Identification

DWR Table 2-3: Agency Identification	
	Type of Agency
☑	Agency is a wholesaler
☑	Agency is a retailer
	Fiscal or Calendar Year
☑	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
	Units of Measure Used in UWMP
Unit	AF

2.2 Coordination and Outreach

As noted in Section 2.1, EMWD is both a retail and wholesale agency. As a retail agency, EMWD is required to provide its wholesaler, MWD, with projected water demand in five-year increments for 20 years. As a wholesale agency, EMWD is required to provide information to its customer urban water suppliers identifying and quantifying water supplies available to those agencies in five-year increments. Table 2-4 and Table 2-5 list the wholesale and retail agencies, respectively, that EMWD exchanged water supplier information with for the development of the 2015 UWMPs.

Table 2-4: Retail Water Supplier Information Exchange

DWR Table 2-4 Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesale Water Supplier Name
Metropolitan Water District of Southern California

1) EMWD participated in the development of the 2015 MWD IRP Update and the MWD 2015 UWMP

Table 2-5: Wholesale Water Supplier Information Exchange

DWR Table 2-4 Wholesale: Water Supplier Information Exchange	
☑	Supplier has informed 10 or fewer other water suppliers of water supplies available in accordance with CWC 10631.
Water Supplier Name	
City of Hemet	
City of Perris	
City of San Jacinto	
Lake Hemet Municipal Water District	
Nuevo Water Company	
Rancho California Water District	
Western Municipal Water District	

Article 3, Section 10642 of the UWMP Act requires each urban water supplier to encourage the active involvement of diverse social, cultural and economic elements of the population within the service area. EMWD has encouraged the participation of sub agencies, cities and the County of Riverside and other public groups. Public participation and coordination efforts are detailed in Table 2-6.

Table 2-6: Coordination for UWMP Preparation

Organization/ Agency Name	Participated in Developing the UWMP	Was Contacted for Assistance	Was Sent a Notification of 2015 UWMP Preparation	Attended Public Meetings	Was Sent a Copy of the 2015 UWMP
Metropolitan Water District of Southern California	✓	✓	✓		✓
Lake Hemet Municipal Water District	✓	✓	✓		✓
City of Hemet	✓	✓	✓		✓
City of Temecula			✓		✓
City of Murrieta			✓		✓
City of San Jacinto	✓	✓	✓		✓
City of Perris	✓	✓	✓		✓
Rancho California Water District	✓	✓	✓		✓
Nuevo Water Company	✓	✓	✓		✓
City of Menifee			✓		✓
County of Riverside			✓		✓
General Public				✓	✓

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Chapter 3 System Description

3.1 Eastern Municipal Water District

EMWD is a public water agency formed in 1950 by popular vote. In 1951, it was annexed into the MWD and gained access to a supply of imported water from the Colorado River Aqueduct (CRA). Today, EMWD remains one of MWD's 26 member agencies and receives water from Northern California through the State Water Project (SWP) in addition to deliveries through the CRA.

EMWD's initial mission was to deliver imported water to supplement local groundwater for a small, mostly agricultural, community. Over time, EMWD's list of services has evolved to include groundwater production, desalination, water filtration, wastewater collection and treatment, and regional water recycling. EMWD provides both retail and wholesale water service covering a total population of over 750,000. EMWD's mission is "to provide safe and reliable water and wastewater management services to our community in an economical, efficient, and responsible manner, now and in the future."

A five-member Board of Directors governs EMWD. Each Director serves an area of equivalent population size within EMWD's boundaries and is elected to office every four years. As a member agency of MWD, EMWD also has a member appointed to the MWD Board.

3.2 Service Area Physical Description

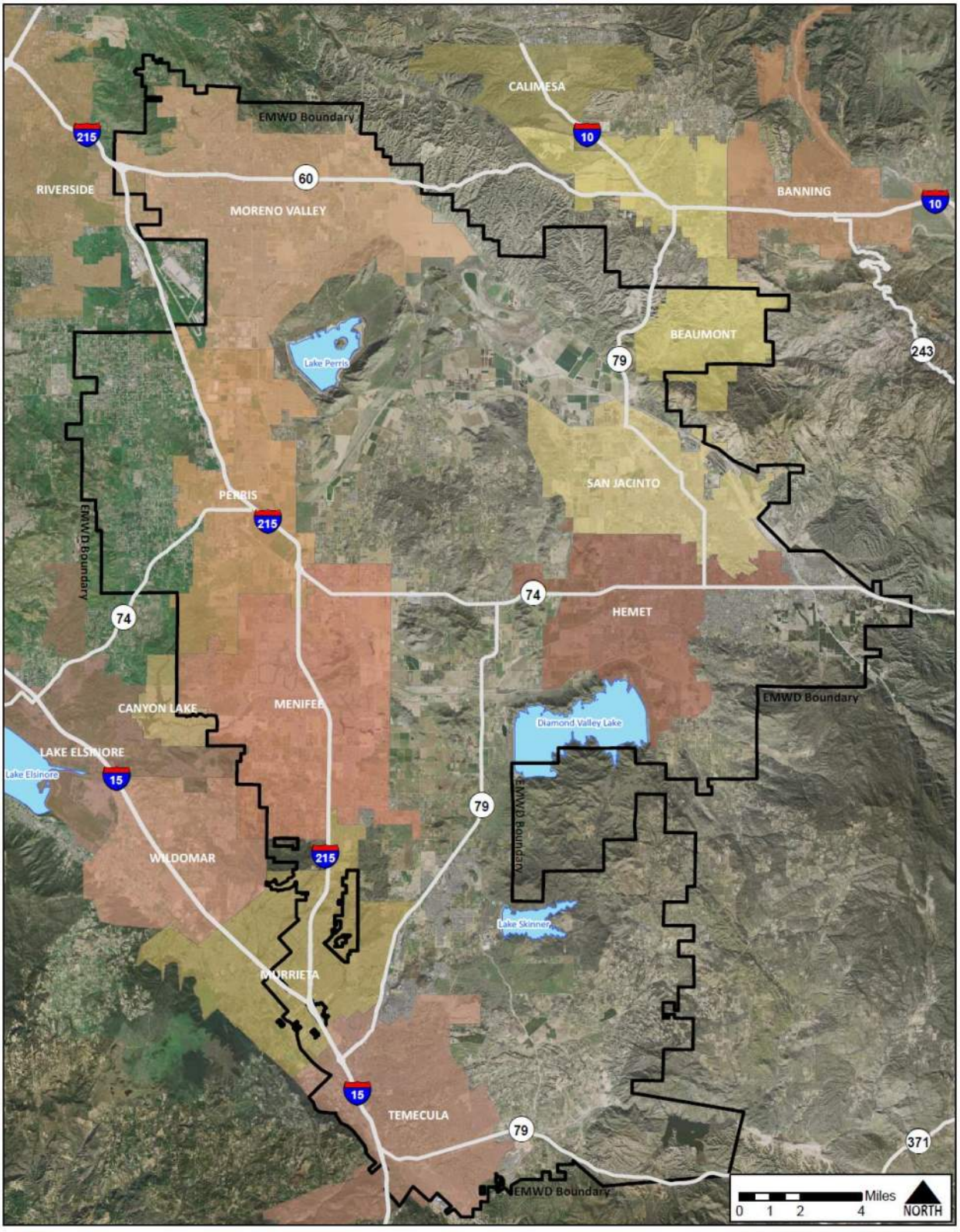
EMWD is located in western Riverside County, approximately 75 miles east of Los Angeles. The 555 square mile service area includes seven incorporated cities in addition to unincorporated areas in the County of Riverside.

The cities and unincorporated areas within EMWD's boundary include:

- City of Hemet
- City of Menifee
- City of Moreno Valley
- City of Murrieta
- City of Perris
- City of San Jacinto
- City of Temecula
- Homeland
- Lakeview
- Nuevo
- Quail Valley
- Romoland
- Valle Vista
- Winchester

In most of the listed areas, EMWD provides both water and sewer service. However, in some places EMWD provides only sewer or water service, or provides wholesale water to a purveyor agency. EMWD's service area boundary and the cities within that boundary are shown in Figure 3-1.

Figure 3-1: Areas Within EMWD Boundaries



EMWD is a wholesale potable provider to the following agencies:

- City of Hemet Water Department
- City of Perris Water System
- City of San Jacinto Water Department
- Lake Hemet Municipal Water District (LHMWD)
- Nuevo Water Company
- Rancho California Water District (RCWD)

Additionally, EMWD sells recycled water to RCWD and Elsinore Valley Municipal Water District (EVMWD) and has an emergency connection with the City of Perris' North Perris Water System.

Several of these agencies have prepared or will prepare their own UWMP. EMWD has discussed and reviewed the supplemental water demands required by each agency with representatives of those agencies. The demand and water supply requirements are discussed in this UWMP.

3.3 Treatment and Distribution Systems

EMWD has four sources of water supply: imported water from MWD, local groundwater, desalinated groundwater, and recycled water. Delivery points for each source of water are located throughout the EMWD service area.

Potable imported water is treated and delivered to EMWD directly from MWD's two large filtration plants. The Henry J. Mills (Mills) Water Treatment Plant treats water from Northern California and provides it to EMWD through two connection points located in the northeast portion of EMWD's service area. The Robert F. Skinner (Skinner) Water Treatment Plant treats a blend of Colorado River water and water from Northern California and provides it to EMWD through a connection point in the southwest portion of EMWD's service area.

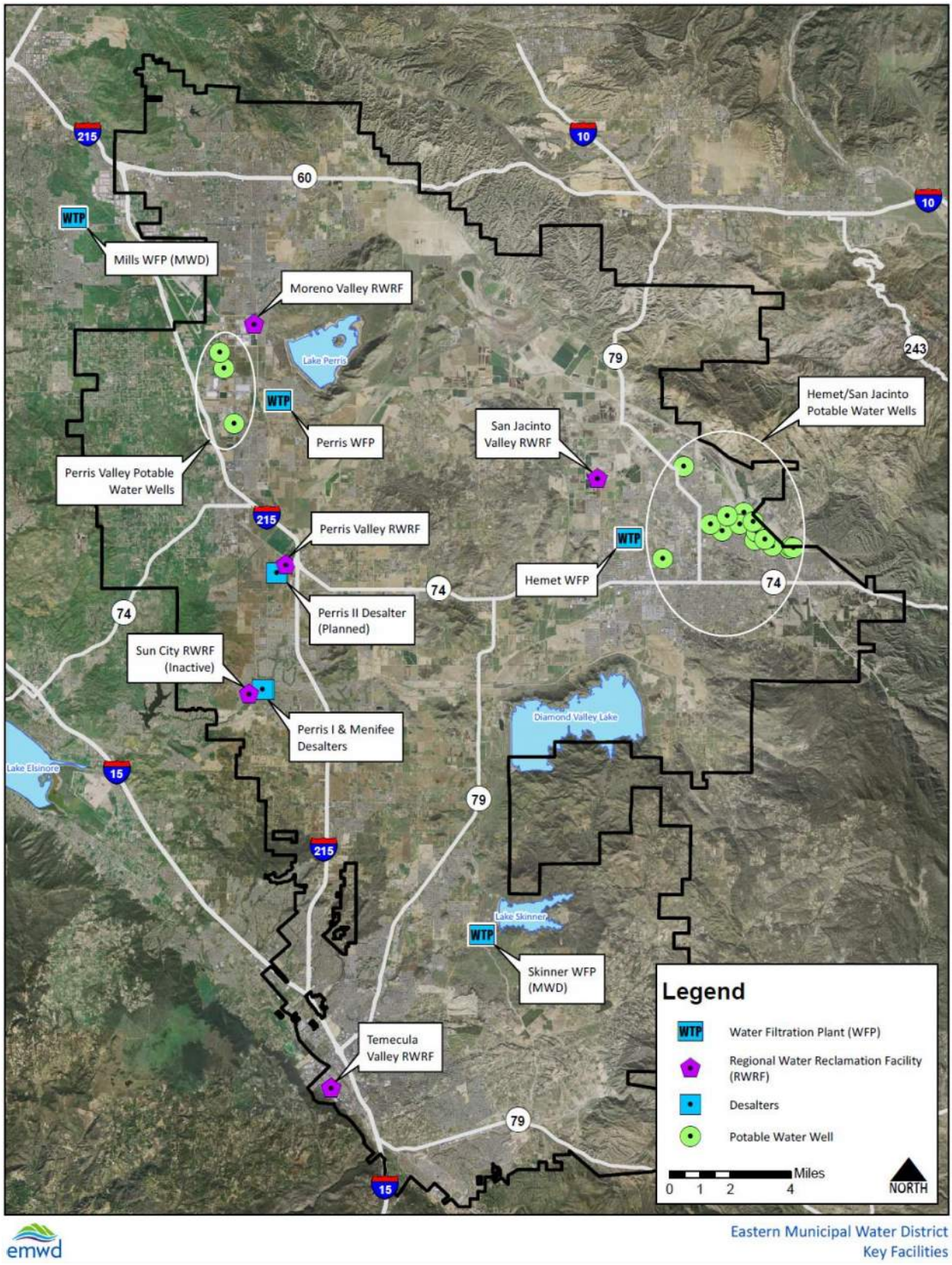
EMWD owns and operates two microfiltration plants that filter raw imported water delivered through MWD, removing particulate contaminants to achieve potable water standards. The two treatment plants, the Perris Water Filtration Plant and the Hemet Water Filtration Plant, are located in Perris and Hemet, respectively. Raw water from MWD is also used for groundwater replenishment in the eastern part of EMWD. EMWD and others can extract this water at a later date for beneficial uses. Untreated water from MWD used for agricultural purposes is delivered in the northeast for use by EMWD retail and wholesale accounts and in the south for RCWD agricultural accounts.

EMWD produces potable and brackish groundwater from the San Jacinto Groundwater Basin that underlies the EMWD service area. Groundwater wells are mostly located within the San Jacinto Watershed and serve the northern portion of EMWD, with the largest amount of production taking place around the cities of Hemet and San Jacinto. EMWD owns and operates two desalination plants in Sun City, the Menifee Desalter and the Perris I Desalter, which treat brackish groundwater through reverse osmosis to achieve potable water standards.

In addition to the potable system, EMWD maintains a regional recycled water system that provides tertiary-treated recycled water to customers for agricultural, landscape irrigation, environmental, and industrial use. EMWD's recycled water system consists of four regional water reclamation facilities (RWRFs) that treat municipal sewage and produce water for recycling. The four RWRFs, the San Jacinto Valley RWRF, the Moreno Valley RWRF, the Temecula Valley RWRF, and the Perris Valley RWRF, are spread throughout EMWD's service area. An intricate web of pipelines connects the four RWRFs, as well as several distribution storage ponds, to manage the delivery of recycled water.

EMWD's water supplies and facilities are described in more detail in *Chapter 6 – System Supplies*. The location of EMWD's treatment and distribution facilities are shown in Figure 3-2.

Figure 3-2: Location of Treatment and Distribution Facilities in EMWD's Service Area



3.4 Climate

EMWD has a semi-arid climate characterized by hot, dry summers and cooler winters. The region experiences a wide variation in rainfall and periodic drought. The average total rainfall in the service area is approximately 7.6 inches, occurring mostly December through March. Table 3-1 provides a summary of average reference evapotranspiration (ETo), temperature and precipitation for EMWD's service area taken from the California Irrigation Management Information System (CIMIS) Winchester-179 local climate station between the years 2002 and 2015.

Table 3-1: EMWD Climate

	Standard Monthly Average Eto (inches)	Average Rainfall (inches)	Average Max Temperature (Fahrenheit)	Average Min Temperature (Fahrenheit)
January	2.29	1.16	67.12	33.96
February	2.69	1.78	66.67	35.42
March	4.29	0.83	70.22	38.89
April	5.18	0.51	72.79	42.18
May	6.55	0.24	77.48	47.75
June	7.17	0.01	84.93	52.84
July	7.85	0.30	92.26	59.48
August	7.64	0.10	93.33	58.70
September	6.21	0.20	91.33	56.23
October	4.21	0.41	80.40	47.89
November	2.70	0.57	72.70	39.51
December	2.04	1.51	64.16	33.71
Total / Average	**58.82**	**7.60**	**77.78**	**45.55**

California is currently experiencing a historic drought with record high temperatures and limited rainfall. Through 2014, EMWD saw an increase in demand corresponding to these two factors. On April 1, 2015, California Governor Brown directed the State Water Resources Control Board (SWRCB) to require water suppliers to reduce water usage by 25 percent statewide as a means of reducing stress on California water supplies during the drought. Mandatory water use reduction targets for each water provider were determined by the SWRCB, and EMWD was assigned a water use reduction target of 28 percent. The mandatory water restrictions required EMWD to implement Stage 4 of its Water Shortage Contingency Plan (WSCP) to meet conservation targets. EMWD customers responded with a 20 percent reduction in demand. EMWD's WSCP and water use prohibitions are described in *Chapter 8 – Water Shortage Contingency Planning*.

3.5 Population

Through the past decade, EMWD's service area was one of the fastest growing regions in California. Since 1990, more than 350,000 people have been added to the service area, doubling the population. Table 3-2 summarizes EMWD's historical retail and wholesale service populations.

The population within EMWD's retail service area represents the area directly served by EMWD's distribution system. Population for EMWD's retail and wholesale service areas has been calculated based on data available from the 1990, 2000, and 2010 Censuses. Previous estimates included in the 2010 UWMP from the Riverside County Center for Demographics research underestimated EMWD's service area population for 2010. For this 2015 UWMP, the final 2010 Census data were used to recalculate

EMWD's retail and wholesale populations. DWR's Population Tool was used to estimate EMWD's historical retail population as described in Section 5.4. California Department of Finance (DoF) growth projections were used in combination with Census data and Geographic Information System (GIS) software to estimate historical population for EMWD's wholesale service area.

Table 3-2: Historical Population within EMWD's Boundary – 1990 – 2010

Water Service Area	1990	1995	2000	2005	2010
EMWD Retail Service Area[1]	240,293	277,013	297,111	430,314	519,880
EMWD Wholesale Service Area[2,3]	102,362	134,932	167,104	185,420	200,789
Total	**342,655**	**411,945**	**464,215**	**615,734**	**720,669**

1) Retail population was estimated using Census data and DWR's Population Tool.
2) Wholesale population for 2005 was interpolated based on California Department of Finance growth estimates.
3) Wholesale population for 2010 was estimated using 2010 Census tracts and GIS.

3.5.1 Current and Projected Population

To ensure that planning efforts for future growth are comprehensive, EMWD incorporates regional projections in its UWMP. The 2015 populations for EMWD and its sub agencies were primarily estimated using data from the 2014 American Community Survey at the Census tract level. An overlay of the Census tracts and the respective agency service areas in GIS was used to attribute populations to each agency. Projections for the remainder of the planning period (2020 – 2040) were prepared based on EMWD's proposed development projects and land uses within EMWD's borders as well as current demographic information such as household size. Table 3-3 and Table 3-4 show EMWD's current and projected retail and wholesale populations, respectively.

Table 3-3: Retail Population – Current and Projected

DWR Table 3-1 Retail: Population - Current and Projected						
Population Served[1,2]	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
	546,146	617,100	699,800	784,100	864,200	939,100

1) Retail population for 2015 was estimated using a SWRCB reporting method using 2010 Census data and the American Community Survey for 2014. DWR pre-approved EMWD's methodology for estimating population.
2) Retail population projections for 2020-2040 were estimated using EMWD's Database of Proposed Projects and the 2015 SWRCB estimated population. DWR pre-approved EMWD's methodology for estimating population.

Table 3-4: Wholesale Population –Current and Projected

DWR Table 3-1 Wholesale: Population - Current and Projected						
Population Served[1,2]	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
	215,075	239,400	267,300	291,100	314,400	335,500

1) Wholesale population for 2015 was estimated using GIS and 2010 Census tract data.
2) Wholesale population projections for 2020-2040 were estimated using EMWD's Database of Proposed Projects and the 2015 population. DWR pre-approved EMWD's methodology for estimating population.

3.6 Other Demographic Factors

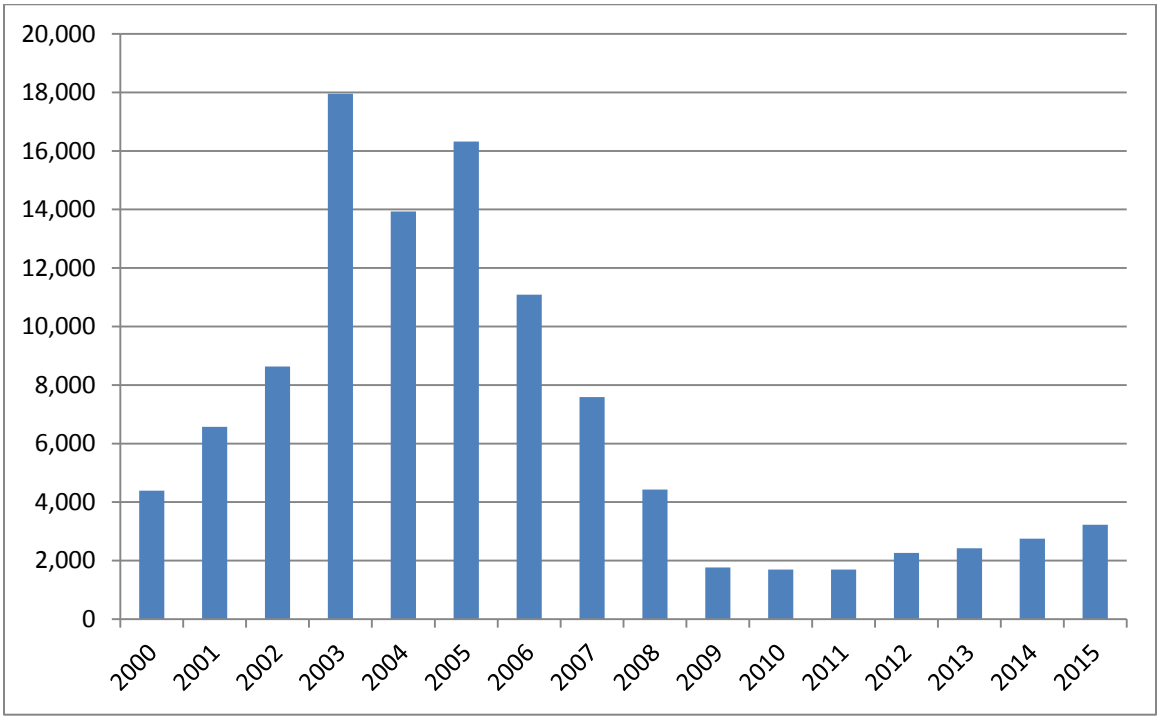
As the population within EMWD's service area continues to grow, the characteristics of the service area are continually changing. Tract homes, commercial centers and new industrial warehouses are replacing areas of agriculture and vacant land. Over the next 25 years, EMWD's total population is projected to grow by over 500,000 people, a 67 percent increase over the current population.

EMWD has a history of boom and bust development cycles. From the mid- 1980's to 1990's, population growth in EMWD routinely exceeded 10 percent per year. In the early 1990's, growth slowed during an economic recession. During the late 1990's, growth began to steadily increase, and the first five years of the 2000's again brought accelerated population growth to the area. Growth within EMWD's service area reached its peak rate in 2005, but then there was a major decline in housing development and growth slowed again. Starting in 2006 EMWD saw a sharp decline in the number of new connections added, reaching a low point in 2010. Since 2010, new connections have slowly been increasing; but they remain well below the peak levels of new development seen in the early 2000's.

The cycle of booming growth followed by depressed development makes new development in EMWD's service area difficult to predict. On average, 6,700 new equivalent dwelling units (EDUs) per year were added to EMWD's service area from 2000 through 2015; but over that 15-year time period there have been two years with more than 15,000 EDUs added and three years with less than 2,000 EDU's added. Because of the variability in demand cycles, EMWD has developed a comprehensive database of planned projects that tracks proposed new development and land use changes. This database is used in facility and supply planning to project future demands.

Ultimate demand estimates indicate that before EMWD reaches build out, the population will more than double compared to the current size. Land will continue to be developed in western Riverside County as more and more people move into the area. Just as it has in the past, EMWD will continue to meet the challenges of new development with innovation, efficiency and responsibility. Figure 3-2 shows EMWD new EDUs for the years 2000 through 2015.

Figure 3-3: EMWD New EDUs– 2000 – 2015



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Chapter 4 System Water Use

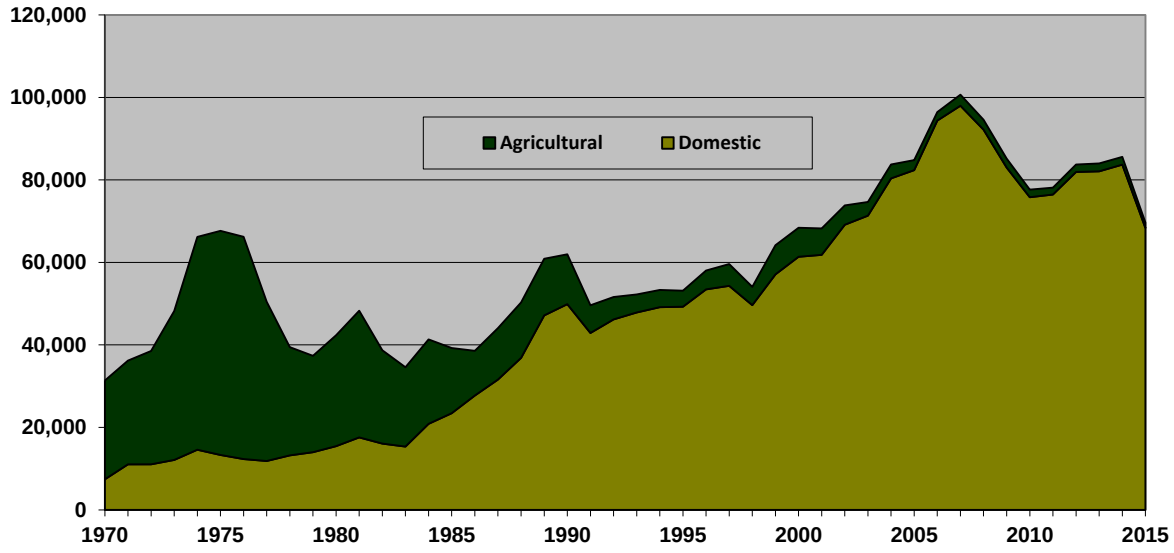
4.1 Overview

When EMWD was formed in 1950 it was a small agency, primarily serving agricultural customers. Since then, potable water use in EMWD's service area has shifted from primarily agricultural to urban use. The reduction in agricultural demand has two major causes: rural farm land has been transformed to urban housing, and most remaining agricultural demands have been shifted to the recycled water system.

The development of new homes and the accompanying increase in population led to the increasing demand for domestic water. Influenced by the last construction boom and drier than average weather conditions, total water demands grew through 2007 before declining significantly reaching a low point in 2010. The reduced demand can be attributed to several different factors including the implementation of an allocation-based tiered rate billing structure and an overall decline in the economy.

Since 2010, EMWD has experienced some increases in demand as the region has experienced dry weather patterns and a growing economy. Even with the warmer, drier weather, and improvements in the economy, demand has remained well below the peak seen in 2007. EMWD's proactive conservation program, including an allocation-based tiered rate billing structure, has reduced demand even as the agency has added almost 7,000 new dwelling units since 2010. In 2015, EMWD implemented Stage 4 of its WSCP in response to the 28 percent reduction requirement mandated by the SWRCB. In response, EMWD's customers reduced demand by more than 30 percent when compared to its peak demand in 2007.

Figure 4-1: Retail Potable Water Sales – 1970 – 2015



In addition to retail potable water demand, EMWD delivers water to seven wholesale customer agencies and meets a significant portion of demand with recycled water. The sections below summarize the past and projected retail and wholesale water use within EMWD's service area.

4.2 Water Use by Sector

Demands for EMWD were developed using information about planned development and land use. To track new developments, EMWD updates a GIS database that tracks proposed development quarterly. Currently, EMWD is tracking the status of over 700 proposed projects and over 150,000 residential units.

Growth rates were based on a forecast of new development prepared by Empire Economic in 2015. Although development has slowed significantly in recent years, new connections are still being added to EMWD's water and wastewater systems annually; and growth is expected to increase as the overall economy continues to grow. EMWD's growth forecasts include both the retail and wholesale service areas.

EMWD's retail demand projections include the water savings needed to meet the Water Conservation Act of 2009, SBx7-7 requirements. Demand forecasts for wholesale customers are developed from growth projections and through collaboration with sub agencies.

4.2.1 Retail Market Segments

EMWD's primary retail customers can be divided into residential, commercial, industrial, institutional, landscape and agricultural irrigation sectors. Although the residential sector is by far EMWD's largest customer segment, each market segment plays a role in the growth and development of EMWD's service area. Table 4-1 shows the past and current number of accounts by customer type. Table 4-2, Table 4-3, and Table 4-4 show EMWD's retail historical, current, and projected water use by customer type, respectively.

Table 4-1: Potable Retail Accounts by Customer Type – Actual and Projected

	Actual			Projected				
Use Type	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Single Family	114,100	129,400	136,200	154,300	173,600	193,200	212,000	230,500
Multi-Family	1,000	4,300	4,300	4,900	5,500	6,100	6,800	7,300
Commercial	1,500	2,100	2,600	3,000	3,300	3,700	4,100	4,400
Industrial	100	100	200	200	200	200	200	300
Institutional/ Governmental	40	500	500	600	700	800	900	900
Landscape[1]	1,500	2,200	2,800	2,200	2,200	2,200	2,200	2,100
Agricultural irrigation	200	100	700	700	700	700	700	700
Total	**118,440**	**138,700**	**147,300**	**165,900**	**186,200**	**206,900**	**226,900**	**246,200**

1) Landscape accounts are projected to remain constant/decrease over time due to anticipated conversion to recycled water

Table 4-2: Retail Demands for Potable and Raw Water – Historical (AFY)

Use Type	**Additional Description**	**2005**	**2010**
Single Family		62,300	54,000
Multi-Family		5,500	6,100
Commercial		3,900	4,200
Industrial		400	400
Institutional / Governmental		2,900	2,300
Landscape		7,500	8,900
Agricultural irrigation	Potable Water	2,400	1,800
Agricultural irrigation	Raw Water	100	500
Losses	System losses & unbilled, authorized consumption	9,677	8,200
	Total	**94,677**	**86,400**

Table 4-3: Retail Demands for Potable and Raw Water – Current (AFY)

DWR Table 4-1 Retail: Demands for Potable and Raw Water – Actual			
Use Type	**2015 Actual**		
	Additional Description	**Level of Treatment When Delivered**	**Volume**
Single Family		Drinking Water	45,735
Multi-Family		Drinking Water	5,830
Commercial		Drinking Water	4,603
Industrial		Drinking Water	270
Institutional /Governmental		Drinking Water	2,083
Landscape		Drinking Water	7,735
Agricultural irrigation	Potable Water	Drinking Water	1,924
Agricultural irrigation	Raw Water	Raw Water	941
Agricultural irrigation[1]	Brackish groundwater used to supplement the recycled water system	Raw Water	682
Other	Temporary construction meters, etc.	Drinking Water	1,507
Other	Unbilled, authorized consumption	Drinking Water	3,444
Losses[2]	Real and apparent losses	Drinking Water	4,183
		Total	**78,937**

1) In 2015, brackish groundwater was used to supplement the recycled water system due to higher than average agricultural demands.
2) Losses reflect real and apparent losses for fiscal year 2014/2015.

Table 4-4: Retail Demands for Potable and Raw Water – Projected (AFY)

DWR Table 4-2 Retail: Demands for Potable and Raw Water – Projected						
Use Type	**Additional Description**	**Projected Water Use[1]**				
		2020	**2025**	**2030**	**2035**	**2040**
Single Family		64,800	72,900	81,100	89,000	96,800
Multi-Family		8,300	9,300	10,300	11,400	12,300
Commercial		6,500	7,300	8,100	8,900	9,700
Industrial		400	400	500	500	600
Institutional / Governmental		3,000	3,300	3,700	4,100	4,400
Landscape[2]		7,500	7,500	7,500	7,500	7,300
Agricultural irrigation	Potable Water	1,900	1,900	1,900	1,900	1,900
Agricultural irrigation	Raw Water	1,000	1,000	1,000	1,000	1,000
Losses[3]	System losses & unbilled, authorized consumption	7,100	7,900	8,800	9,700	10,500
Total		**100,500**	**111,500**	**122,900**	**134,000**	**144,500**

1) Passive water savings due to the restrictions outlined in the Administrative Code are included in the demand projections for EMWD's retail service area.
2) Landscape demands remain constant/decrease over time as landscape accounts are offset by conversion to the recycled water system.
3) Projections for losses in the table include system losses (real and apparent) and unbilled, authorized consumption.

Residential consumption is the dominant demand for EMWD and this will continue in the future according to current general plans for the County of Riverside and local cities. Residential accounts are required to keep their demands below a budgeted allocation or pay a high rate for water use. Accounts dedicated to irrigating landscaped areas have the second highest consumption rate. Just as with residential accounts, landscape accounts are subject to a budgeted allocation or pay a higher rate for over budget use. New development in both of these account classes are provided with lower budget allocations to account for water use efficiency requirements for new development. Additional efficiency may occur in the future due to the recent 2015 update to the Model Water Efficient Landscape Ordinance (MWELO). The impact of the revised MWELO is still being estimated. Section 5, Article 6 of EMWD's Administrative Code details EMWD's rate structure. Passive water savings due to the restrictions outlined in the Administrative Code are included in the demand projections for EMWD's retail service area in Table 4-4.

Commercial developments will also continue to increase and will be focused along the major transportation corridors through EMWD's boundary (Interstate Highway 15, Interstate Highway 215, Highway 79, and Highway 74). Currently, commercial demands account for about six percent of EMWD's retail demand. Land use based projections indicate that the ratio of commercial demand to retail demand will increase slightly over time.

EMWD has a very small industrial use sector, accounting for less than 0.5 percent of retail demand. Industrial developments are proposed around Interstate Highway 215 and other main transportation corridors. Much of the proposed growth consists of large warehouse projects with minimal water demand. As much as feasible, EMWD will meet the needs of high water demand industrial customers with recycled water.

Currently, the demand from institutional accounts account for about three percent of retail demand for potable water. EMWD works closely with institutional and government accounts to help reduce their demand and promote the efficient use of water. Whenever possible, recycled water is used for landscape irrigation for schools and other government facilities. EMWD has also developed conservation programs designed to assist public sector accounts like schools to reduce demand through the retrofit of inefficient devices. These programs are discussed further in *Chapter 9 – Demand Management Measures*.

EMWD's service area has gone through a major transformation from a farming community to a residential community. Currently, agricultural demand accounts for less than four percent of EMWD's potable and raw water market, with a substantial portion of the agricultural community being served by the recycled water system. Agricultural demand for potable and raw water is expected to remain relatively stable for the next twenty years with some fluctuations from year to year due to changes in weather or crop rotations. It is also possible that a general decline over time may be observed both as a result of continued urbanization and increased recycled water usage.

4.2.2 Wholesale to Other Agencies

EMWD wholesales water to seven different agencies. The demand from each agency differs based on its need each year. These demands can be unstable at times as these agencies use water from EMWD to supplement their system when their local facilities are inadequate or fail. EMWD will also provide backup for the North Perris Water System if an emergency should occur.

Under the Hemet/San Jacinto Groundwater Management Area Water Management Plan (HSJ Management Plan), EMWD will be responsible for providing water to recharge the groundwater basin. A portion of the water supplied will be SWP water imported through MWD to meet the requirements of the Soboba Band of Luiseño Indians Water Settlement Agreement (detailed in Section 6.3.2) and to improve the reliability of groundwater in the area. Individual agencies, including EMWD, will extract their allotted amount of the recharged water from the basin using wells already in place and new wells yet to be constructed. As described in *Chapter 6 – System Supplies*, MWD will deliver a long-term average of 7,500 AFY to EMWD for groundwater recharge as part of the agreement; but due to drought conditions, no recharge occurred in 2015.

A portion of the water EMWD wholesales to LHMWD is raw water for agricultural uses. This water is needed especially when surface water is not available to LHMWD in dry years.

Table 4-5 shows the historical wholesale water sales to other agencies. The total current and projected wholesale demands are summarized in Table 4-6 and Table 4-7, respectively. Wholesale demand projections are based on communications with sub agencies and respective growth projections for those agencies.

Table 4-5: Wholesale to Other Agencies – Historical (AFY)

	Actual Sales	
Water Agency	**2005**	**2010**
City of Hemet	100	0
City of Perris Water System	1,900	1,700
City of San Jacinto	0	0
Nuevo Water Company	800	600
Murrieta Water Company	100	1,600
Rancho California Water District	26,300	21,900
Lake Hemet Municipal Water District[1]	100	1,300
Hemet-San Jacinto Watermaster[2]	0	0
Total	**29,300**	**27,100**

1) Sales of water to Lake Hemet are for non-potable supplies used to meet agricultural demand
2) Water to the Hemet-San Jacinto Watermaster is for groundwater recharge that will occur under the Hemet/San Jacinto Water Management Plan

Table 4-6: Wholesale Demands for Potable and Raw Water – Actual (AFY)

DWR Table 4-1 Wholesale: Demands for Potable and Raw Water – Actual			
Use Type	**2015 Actual**		
	Additional Description	**Level of Treatment When Delivered**	**Volume**
Sales to other agencies	City of Hemet	Drinking Water	0
Sales to other agencies	City of Perris Water System	Drinking Water	1,542
Sales to other agencies	City of San Jacinto	Drinking Water	0
Sales to other agencies	Nuevo Water Company	Drinking Water	247
Sales to other agencies	Western Municipal Water District Murrieta Division	Drinking Water	728
Sales to other agencies	Rancho California Water District	Drinking Water	4,015
Sales to other agencies	Rancho California Water District	Raw Water	10,925
Sales to other agencies	Lake Hemet Municipal Water District	Raw Water	4,311
Groundwater recharge[1]	Imported water recharge to the Hemet/San Jacinto Basin	Raw Water	0
		Total	**21,768**

1) Groundwater recharge will occur under the Hemet/San Jacinto Water Management Plan

Table 4-7: Wholesale Demands for Potable and Raw Water – Projected (AFY)

DWR Table 4-2 Wholesale: Demands for Potable and Raw Water – Projected						
Use Type	Additional Description	Projected Water Use				
		2020	2025	2030	2035	2040
Sales to other agencies	City of Hemet	0	0	0	0	0
Sales to other agencies	City of Perris Water System	1,800	1,900	2,000	2,100	2,200
Sales to other agencies	City of San Jacinto	0	0	0	0	0
Sales to other agencies	Nuevo Water Company	400	500	600	600	700
Sales to other agencies	Western Municipal Water District Murrieta Division	2,500	3,900	5,200	6,500	7,900
Sales to other agencies	Rancho California Water District	33,600	35,200	36,900	38,600	40,200
Sales to other agencies[1]	Raw Water to Lake Hemet Municipal Water District	4,700	5,100	5,500	5,900	6,300
Groundwater recharge[2]	Imported water recharge to the Hemet/San Jacinto Basin	7,500	7,500	7,500	7,500	7,500
Total		50,500	54,100	57,700	61,200	64,800

1) Deliveries to Lake Hemet Municipal Water District may be in the form of recharge managed through the Hemet/San Jacinto Water Management Plan.
2) Groundwater recharge will occur under the Hemet/San Jacinto Water Management Plan.

4.2.3 Other Water Uses

In addition to potable and raw water demands, EMWD also uses recycled water for beneficial uses such as municipal, industrial, landscape, agricultural and environmental use. These uses are described in more detail in *Chapter 6 – System Supplies*. Total current and projected retail and wholesale recycled water demands are summarized in Table 4-8 and Table 4-9, respectively, along with retail and wholesale total potable and raw water use.

Table 4-8: Retail Total Water Demands (AFY)

DWR Table 4-3 Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	78,937	100,500	111,500	122,900	134,000	144,500
Recycled Water Demand	44,150	45,245	48,334	50,017	51,800	53,300
Total Water Demand	**123,087**	**145,745**	**159,834**	**172,917**	**185,800**	**197,800**

Table 4-9: Wholesale Total Water Demands (AFY)

DWR Table 4-3 Wholesale: Total Water Demands						
	2015	2020	2025	2030	2035	2040
Potable and Raw Water	21,768	50,500	54,100	57,700	61,200	64,800
Recycled Water Demand	1,235	1,656	4,766	5,183	5,600	5,600
Total Water Demand	**23,003**	**52,156**	**58,866**	**62,883**	**66,800**	**70,400**

4.3 Distribution System Water Losses

Water loss is a combination of apparent losses and real losses. Apparent losses are attributed to unauthorized consumption, customer metering inaccuracies and systematic data handling errors. Real losses are attributed to such physical water losses as leakage along the pipe system, at the storage tanks, or at the service connections. Real losses in EMWD's potable system are highest where pipelines are older and smaller in size, especially in the Hemet and San Jacinto areas that were once owned by the Fruitvale Mutual Water Company. EMWD tracks pipe leaks and identifies pipes for replacement as part of its capital improvement program. These efforts are described in more detail in *Chapter 9 – Demand Management Measures*.

EMWD used the American Water Works Association (AWWA) water system balance methodology to quantify water loss for fiscal year (FY) 2014/2015. This water loss represents the most recent 12-month period calculated using the AWWA methodology. While EMWD provides both retail and wholesale services and generally reports these services separately throughout this UWMP, its physical facilities are shared. Therefore, losses cannot be easily attributed to one system or the other. For this reason, all of EMWD's water losses for this 12-month period are reported in a single table. Table 4-10 summarizes the water loss results of the AWWA water audit for EMWD's combined retail and wholesale system. A copy of EMWD's AWWA water audit for FY 2014/2015 is included as Appendix D.

Table 4-10: EMWD's 12 Month Water Loss Audit Reporting

DWR Table 4-4 Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date	**Volume of Water Loss[1, 2]* (AFY)**
07/2014	4,183
** Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*	

1) EMWD's retail and wholesale physical facilities are shared. Therefore, losses cannot be easily attributed to one system or the other. For this reason, all of EMWD's water losses are reported in the DWR Table 4-4 for retail.
2) Water Loss includes Real losses (3,497 AF) and Apparent losses (686 AF)

4.4 Estimating Future Water Savings

EMWD demand projections include water savings that result from a progressive conservation rate structure. EMWD uses an allocation-based tiered rate structure to encourage conservation by sending a strong price signal for water use over a budget allocation. Indoor budgets are based on an allocation of 60 gallons per capita per day. Outdoor budgets are based on the irrigated area and a percent of evapotranspiration. The percent of evapotranspiration is tied to the date the landscaping is installed. The rate structure is used to enforce codes and standards in place to promote efficiency. As codes and standards increase efficiency over time, EMWD has the ability to adjust the allocations. The most recent update to EMWD's allocations occurred in May of 2015, when a fifty percent evapotranspiration standard was adopted for all new non-functional landscape installed after June 1, 2015. The impact of the revised restrictions on new landscape is still being evaluated and not included in current water saving estimates. The details on EMWD's rate structure can be found in Section 5, Article 6 of EMWD's Administrative Code. Table 4-11 confirms that future water savings and low income demands are included in projections.

Table 4-11: Inclusion in Water Use Projections

DWR Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook)	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc… utilized in demand projections are found.	Section 4.2.1 and Section 4.4
Are Lower Income Residential Demands Included In Projections?	Yes

4.5 Lower Income Housing Demand

Senate Bill 1087 requires that water use projections in an UWMP include the projected water use for single family and multi-family residential housing for lower income households as identified in the housing element of any city and county in the service area of the supplier. EMWD used the percent of low income and very low income housing identified in the Housing Needs Assessment Allocation Plan for January 1, 2014 through October 1, 2021, approved by the Southern California Association of Governments, to estimate the number of new low income housing units that may require service within EMWD's retail service area. The number of low income housing units and their associated demands are shown in Table 4-12. The demands for these units are included in the total projected residential retail demands in Table 4-4.

Table 4-12: Projected New Retail Low Income Housing Units and Demands – 2020 – 2040

		Retail Service Area								
		City of Hemet	City of Menifee	City of Moreno Valley	City of Murrieta	City of Perris	City of San Jacinto	City of Temecula	Riverside County	**Total**
2020	Housing Units	1,400	2,200	1,900	600	1,500	1,900	100	2,900	**12,500**
	Demand (AFY)	600	900	800	300	600	800	40	1,100	**5,140**
2025	Housing Units	1,300	1,500	1,900	600	1,400	1,300	300	3,400	**11,700**
	Demand (AFY)	500	600	700	200	600	500	120	1,400	**4,620**
2030	Housing Units	1,600	1,500	2,300	600	1,400	900	100	3,100	**11,500**
	Demand (AFY)	600	600	900	200	600	400	40	1,200	**4,540**
2035	Housing Units	1,700	1,800	1,500	700	1,400	800	100	3,300	**11,300**
	Demand (AFY)	600	700	600	200	600	200	40	1,400	**4,340**
2040	Housing Units	1,800	1,900	1,700	700	1,600	800	100	3,600	**12,200**
	Demand (AFY)	700	800	700	300	700	300	50	1,400	**4,950**

4.6 Climate Change Impacts

EMWD has considered the impacts of climate change on water demands as part of long-term strategic planning. Climate change is expected to cause a rise in temperatures in the region which will increase evapotranspiration and water demand. This is particularly true for EMWD's agricultural sector. Additionally, in urbanized areas with limited vegetation, climate change can exacerbate the heat island effect which may result in increased energy and cooling demands.

EMWD's service area lies within the Santa Ana River and Santa Margarita River Watersheds. The Santa Ana River Watershed is covered under the Santa Ana Watershed Planning Authority's (SAWPA)'s Integrated Regional Water Management (IRWM) Plan for the Santa Ana River Watershed. A climate change vulnerability assessment was completed for the region as part of the 2014 IRWM Plan update. Key demand vulnerabilities identified by the SAWPA Region that relate to EMWD's service area include:

- Increased temperature could lead to increases in industrial cooling water needs
- Seasonal outdoor water use is expected to increase
- Climate-sensitive crops will be impacted
- Continued education and increased employment of efficient use technologies will be required

- Changes in snowmelt patterns in the future may make it difficult to balance water demands

EMWD continues to work toward decreasing demands for potable water through water conservation programs and full utilization of recycled water. EMWD's conversion of agricultural, landscape and industrial uses to recycled water has helped EMWD mitigate climate change impacts on these demands.

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Chapter 5 Baseline and Targets

5.1 Water Conservation Act of 2009

The Water Conservation Act of 2009, SBx7-7, set a requirement for water agencies to reduce their per capita water use by the year 2020. The overall goal is to reach a statewide reduction of per capita urban water use of 20 percent by December 31, 2020, with an intermediate 10 percent reduction by December 31, 2015. Demand reduction can be achieved through both conservation and the use of recycled water as a potable demand offset.

An urban water provider's 2015 UWMP must include a target for per capita water use in 2020 and must demonstrate compliance with the established interim water use target for 2015. Effective 2016, urban water retailers who do not meet their water conservation targets are ineligible for state water grants or loans unless one of two exceptions is applicable. The first exception states that an urban supplier may be eligible if they have submitted a compliance schedule, financing plan and budget to DWR for approval, showing how they will meet their target per capita water use by 2020. The second exception states that an urban water supplier may be eligible for funding if their entire water service area qualifies as a disadvantaged community.

Any one of four methods can be used to determine the per capita water use targets. Three methods were specified in the legislation, and the fourth was developed by DWR. The four methods are:

- **Method 1:** Use 80 percent of the baseline as the per capita water use target.
- **Method 2:** Use an efficiency standard with targets for indoor use, landscape use, and commercial, industrial and institutional (CII) use and an optional target for agricultural use.
- **Method 3:** Use 95 percent of the applicable state hydrologic region target developed by DWR and published in the state's 20X2020 Water Conservation Plan.
- **Method 4:** Use an alternative method developed by DWR that accounts for water savings due to water metering and achieving water conservation measures in three water use sectors.

DWR, through a public process, developed and published Methodologies for Calculating Baseline and Compliance Urban Water Per Capita Use, last updated February 2011, for consistent application of SBx7-7 throughout the state.

For the 2015 UWMP, water purveyors are required to recalculate baseline population using 2010 Census data. Agencies may change the years selected for their baseline periods compared to the 2010 UWMP based on changes to the calculated population. Agencies may also select a different target methodology than was used for the 2010 UWMP, though this methodology must remain consistent for the 2020 UWMP.

5.2 Baseline Periods

Water purveyors must define a continuous 10- to 15-year baseline period ending between December 31, 2004 and December 31, 2010 and calculate an average water use over this period. If the percentage of recycled water used in the year 2008 was at least 10 percent of the total water used, the agency may use up to a 15-year period. If the percentage of recycled water was less than 10 percent, a 10-year baseline period is required. Additionally, a continuous five-year period ending between December 31, 2007 and December 31, 2010 is used to confirm that the selected 2020 target meets the minimum water use reduction requirements.

EMWD selected a 10-year baseline period beginning 1999 and ending 2008 despite providing more than 10 percent recycled water in 2008. A 5-year baseline period was chosen between 2003 and 2007 for the target confirmation. Table 5-1 summarizes the base period ranges.

Table 5-1: Base Period Ranges

Baseline	Parameter	Value	Units
10- to 15-Year Base Period	2008 total water deliveries	125,284	AF
	2008 total volume of delivered recycled water	28,100	AF
	2008 recycled water as a percent of total deliveries	22.4	percent
	Number of years in base period	10	years
	Year beginning base period range	1999	--
	Year ending base period range	2008	--
5-Year Base Period	Number of years in base period	5	years
	Year beginning base period range	2003	--
	Year ending base period range	2007	--

5.3 Gross Water Use

Gross water use was calculated using the best available meter data for water entering and exiting EMWD's distribution system. The distribution system includes potable water service for both domestic and agricultural demand, and raw water service to a few agricultural customers.

Potable sources include potable groundwater wells, treated water from two desalination plants, imported water from MWD and water imported from other agencies. Imported water from MWD includes water delivered directly to the potable distribution system and raw water treated at EMWD facilities. Small amounts of water are also delivered from Western Municipal Water District. Only water delivered to the distribution system is included in the gross water calculations. The single source for the raw water system is imported raw water from MWD.

EMWD sells a portion of the water that enters its distribution system to wholesale customers. Some MWD connections also have a portion of water that is diverted to other agencies without entering EMWD's distribution system. RCWD, EMWD's largest wholesale customer, has dedicated connections to MWD's system and does not impact EMWD's distribution system. Table 5-2 summarizes the gross water use calculations.

Table 5-2: Gross Water Use Calculations (AFY) – 1999-2008

	Potable Wells	Desalters	MWD Treated Imported Water	MWD Raw Water	EMWD Water Filtration Plants	Imported from other Agencies	Exported to other Utilities	Gross Water Use
1999	20,280	0	62,896	0	0	76	-13,862	**69,390**
2000	21,287	0	68,454	0	0	111	-17,847	**72,005**
2001	18,536	0	68,260	0	0	39	-16,776	**70,059**
2002	18,861	4	77,313	1,064	0	36	-15,995	**81,283**
2003	17,574	999	74,516	760	3,741	35	-11,309	**86,316**
2004	16,564	1,440	60,798	233	7,911	37	-7,006	**79,977**
2005	18,064	855	73,029	108	5,636	31	-3,046	**94,677**
2006	19,644	4,802	72,515	91	8,405	39	-4,665	**100,831**
2007	19,489	4,792	70,430	41	17,271	37	-7,682	**104,378**
2008	20,043	2,973	62,900	353	16,594	831	-6,510	**97,184**

5.4 Service Area Population

EMWD's retail baseline population was calculated using data from the 1990, 2000, and 2010 U.S. Census and DWR's Population Tool. The Population Tool uses preloaded Census data for the years 1990, 2000, and 2010 and uploaded service area boundary maps for the corresponding years to calculate service area population in Census years. The annual numbers of single family and multi-family connections in EMWD's retail service area to were used to calculate a population-per-connection ratio for Census years using data on the number of single family and multi-family households. The Population Tool interpolated the population-per-connection ratio between Census years and used the annual numbers of single family and multi-family connections in EMWD's service are to estimate population for non-Census years.

To estimate population for the 2015 interim water use target, EMWD used a methodology similar to DWR's Population Tool, but consistent with annual reporting to the SWRCB. To determine 2015 retail population, EMWD added the number of new EDUs that have been installed since 2010 and multiplied the new EDUs by the estimated persons-per-connection factor. This alternative methodology was pre-approved by DWR. EMWD's retail baseline and 2015 population is summarized in Table 5-3.

Table 5-3: Baseline Retail Population

Baseline Year	Year	Population
Year 1	1999	292,123
Year 2	2000	303,678
Year 3	2001	317,457
Year 4	2002	357,783
Year 5	2003	364,893
Year 6	2004	389,897
Year 7	2005	430,314
Year 8	2006	468,467
Year 9	2007	486,901
Year 10	2008	500,589
--	2015	546,146

5.5 Baseline Daily per Capita Water Use

Table 5-4 summarizes the retail service area population and daily per capita water use, reported in gallons per capita per day (GPCD), for the 10-year baseline period that are used to calculate the baseline per capita use. Table 5-5 summarizes the retail service area population and daily per capita use values used to calculate the minimum per capita reduction estimated for the five-year baseline period.

Using the methodology established by DWR, EMWD has calculated its baseline water use to be 197 GPCD, based on the average GPCD between 1999 and 2008.

Table 5-4: 10-Year Baseline Daily Per Capita Use – 1999-2008

Base Years	Service Area Population	Gross Water Use (AF)	Daily Per Capita Water Use (GPCD)
1999	292,123	69,390	212
2000	303,678	72,005	212
2001	317,457	70,059	197
2002	357,783	81,283	203
2003	364,893	86,289	211
2004	389,897	79,977	183
2005	430,314	94,677	196
2006	468,467	100,831	192
2007	486,901	104,378	191
2008	500,589	97,184	173
10-Year Average Baseline GPCD			**197**

Table 5-5: Five-Year Baseline Daily Per Capita Use – 2003-2007

Base Years	Service Area Population	Gross Water Use (AF)	Daily Per Capita Water Use (GPCD)
2003	364,893	86,289	211
2004	389,897	79,977	183
2005	430,314	94,677	196
2006	468,467	100,821	192
2007	486,901	104,378	191
5-Year Average Baseline GPCD			**195**

5.6 Water Use Targets

EMWD has selected DWR's Target Method 2 to determine compliance with SBx7-7. Target Method 2 utilizes the sum of three efficiency standards for water demand to calculate the 2015 and 2020 targets:

- **Efficient Indoor Residential Use:** Indoor residential per capita use to meet target demand of 55 GPCD.
- **Landscape Water Use Equivalent to Model Ordinance:** Landscape irrigation, delivered either through a residential meter or a dedicated landscape meter to meet the efficiency standards of the MWELO. Agricultural water use also to meet the efficiency standards of the MWELO.
- **CII Water Use:** Ten percent reduction in water use from baseline CII use.

In 2009, EMWD implemented a budget-based tiered rate program. For residential and landscape customers, these budgets are based on persons per household and the irrigated landscape areas. To develop budgets for over 130,000 accounts, EMWD estimated irrigated areas using parcel data supplied by the County of Riverside. Since 2009, EMWD has measured over 13,000 acres of landscape area using GIS and aerial photography or field verification. This information was used to estimate the remaining irrigated area for 2020. Actual irrigated area will be determined in the compliance year.

Agricultural areas were also measured using aerial photography and are anticipated to decrease through 2020. Agricultural areas are referred to as "Special Landscape Areas" and receive an Evapotranspiration Adjustment Factor (ETAF) of up to1.0. Actual ETAF is based on the crop coefficient; 0.55 for citrus, 0.8 for vegetables and other row crops and 1.0 for grain. EMWD has also assessed all of its dedicated meters at school sites to determine recreational landscape areas. These have been added to the Special Landscape Areas. Landscape installed pre-2010 receives an ETAF of 0.8 and landscape installed after 2010 receives an ETAF of 0.7 according to the MWELO. Table 5-6 summarizes the pre-2010 landscape, post-2010 landscape and agricultural landscape irrigated areas and target water uses.

Table 5-6: Landscape Irrigated Area Efficiency Standard

ETo for Service Area (inches/year) from Landscape Parcels Table		58.8
Landscape Parcels	**Acres**	**Water Use (AF)**
Acres of landscape installed pre-2010 (ETAF 0.8)[1]	15,559	61,014
Acres of landscape installed post-2010 (ETAF 0.7)[1]	999	3,428
Acres of Special Landscape Area (ETAF 0.55)[1]	134	361
Acres of Special Landscape Area (ETAF 0.8)[1]	1,500	5,882
Acres of Special Landscape Area (ETAF 1.0)[1]	384	1,885
Target Landscape Water Use for 2015		**72,570**

1) ETAF - Evapotranspiration Adjustment Factor. Refer to the Model Water Efficient Landscape Ordinance.

Table 5-7 contains the calculation for the CII target per capita water use. CII water use does not include multifamily.

Table 5-7: Commercial, Industrial and Institutional, Daily Per Capita Use – 1999-2008

Base Years	Service Area Population	CII Water Use (AF)	CII Daily Per Capita Water Use (GPCD)
1999	292,123	6,740	20.6
2000	303,678	7,170	21.1
2001	317,457	7,120	20.0
2002	357,783	7,280	18.2
2003	364,893	7,230	17.7
2004	389,897	7,850	18.0
2005	430,314	7,280	15.1
2006	468,467	8,240	15.7
2007	486,901	8,370	15.3
2008	500,589	8,190	14.6
		Average GPCD	**17.6**
		CII Target GPCD (10% Reduction of Base)	**16**

Table 5-8 summarizes the three efficiency targets for a 2020 compliance target of 176 GPCD and a 2015 interim target of 187 GPCD. The 2020 compliance target is lower than the minimum five percent reduction of the five-year average GPCD, or 195 GPCD. The baselines and targets are summarized in Table 5-9.

Table 5-8: Target Method 2 Compliance Water Use Summary (GPCD)

2020 Population	617,100	
Sector	**Volume (AF)**	**GPCD**
Target Indoor Residential Water Use	38,016	55
Target Landscape Water Use	72,570	105
Target CII Water Use	10,966	16
2020 Target	**121,552**	**176**

Table 5-9: Baselines and Targets Summary

DWR Table 5-1 Baselines and Targets Summary *Retail Agency or Regional Alliance Only*					
Baseline Period	**Start Year**	**End Year**	**Average Baseline GPCD**	**2015 Interim Target GPCD**	**Confirmed 2020 Target GPCD**
10-15 year	1999	2008	197	187	176
5 Year	2003	2007	195	--	--

5.7 2015 Compliance Daily per Capita Water Use

Agencies must demonstrate compliance with the 2015 interim water use target. In 2015, EMWD's gross water use was 78,937 AF as shown in Table 5-10. Gross water use includes all potable and raw water into EMWD's retail distribution, excluding exports to other agencies as described in Section 5.3. EMWD's retail population in 2015 is estimated at 546,146 as described in Section 5.4. Therefore, EMWD's actual 2015 per capita use is 129 GPCD, which is well below the 2015 interim water use target as shown in Table 5-11. No optional adjustments were employed to reduce the 2015 actual GPCD any further.

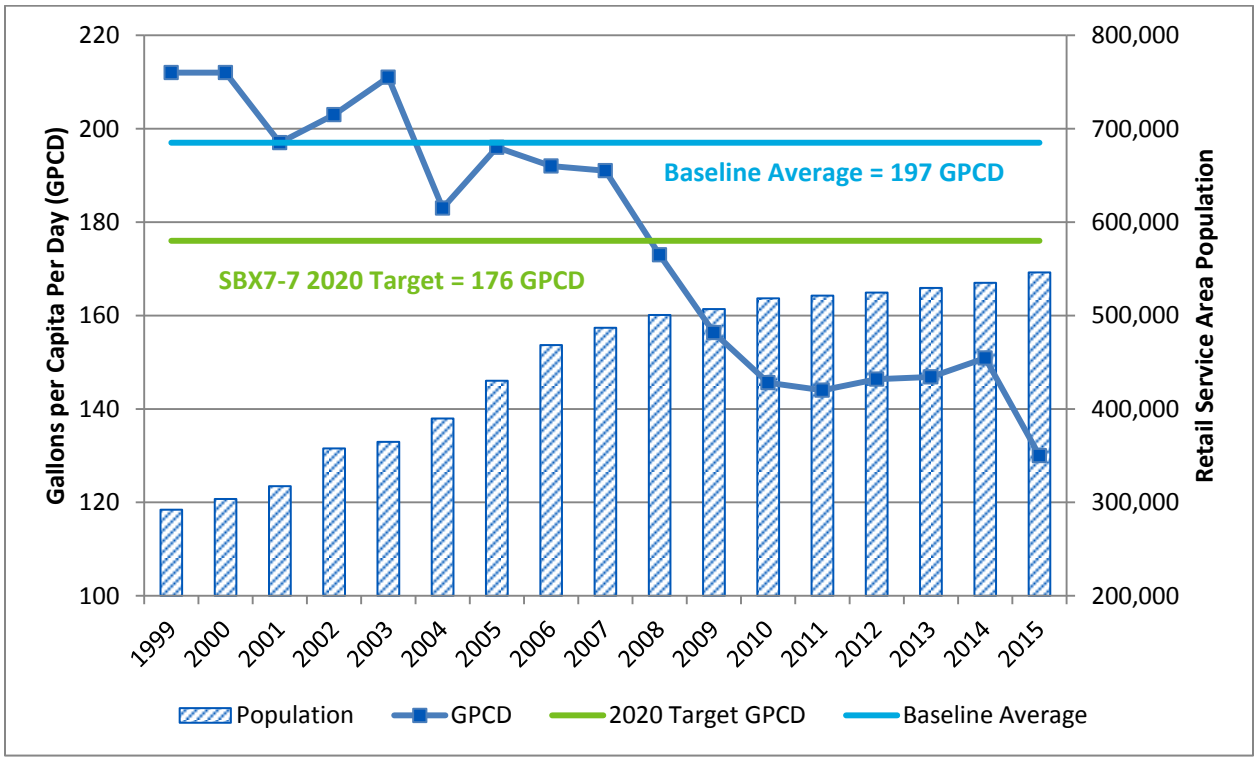
Table 5-10: Gross Water Use for 2015 (AFY)

Supply Source	**2015**
Potable Wells	14,570
Desalters	7,288
Mills and Skinner Plants	39,344
MWD Raw Water	941
EMWD Water Filtration Plants	18,628
Raw Water Augmentation	682
Exported to other Utilities	-2,516
Gross Water Use	**78,937**

Table 5-11: 2015 Compliance

DWR Table 5-2: 2015 Compliance *Retail Agency or Regional Alliance Only**								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments to 2015 GPCD					2015 GPCD	Did Supplier Achieve Targeted Reduction for 2015?
		Extra-ordinary Events	Economic Adjustment	Weather Normalization	TOTAL Adjustments	Adjusted 2015 GPCD		
129	187	0	0	0	0	129	129	Yes

Figure 5-1: Progress Towards SBx7-7 Target



As seen in Figure 5-1, EMWD's GPCD dropped significantly in 2015 due to mandatory conservation standards in place. Even before mandatory restrictions were implemented, EMWD's GPCD was trending lower than both its 2015 and 2020 target. EMWD will continue to reduce potable water demand to meet the goals of SBx7-7 by using recycled water to offset potable demand and reducing demand for water through conservation. Conservation efforts are focused on three methods: 1) a budget-based tiered rate, 2) requirements for water efficiency in new construction and 3) an active conservation program. Water use reduction will continue to be focused on outdoor demand reduction by all customer types. Using the above three conservation methods and expanded use of recycled water, EMWD anticipates it will be able to meet its 2020 water use target of 176 GPCD and comply with all the requirements of SBx7-7. EMWD's retail water use efficiency methods are described in more detail in *Chapter 9 – Demand Management Measures*.

5.8 Measures to Reduce Wholesale Customer Demands

As a wholesaler, EMWD is required to provide an assessment of its present and proposed future measures, programs, and policies that will help its wholesale customers achieve their SBx7-7 water use reduction targets. As both a wholesaler and a retailer, EMWD currently participates in and supports programs developed and implemented by MWD that benefit its entire service area, including wholesale customers. These programs include region-wide rebates for both commercial and residential customers, conservation messaging and outreach, and research and development of new conservation programs and devices. EMWD also actively promotes conservation throughout Riverside County through participation in organizations such as the Riverside County Water Task Force and the San Jacinto Valley Conservation League. EMWD will continue to support water reduction by wholesale customers through the use of outreach, technical support and participation in regional programs. EMWD's wholesale water conservation efforts are described in more detail in *Chapter 9 – Demand Management Measures*.

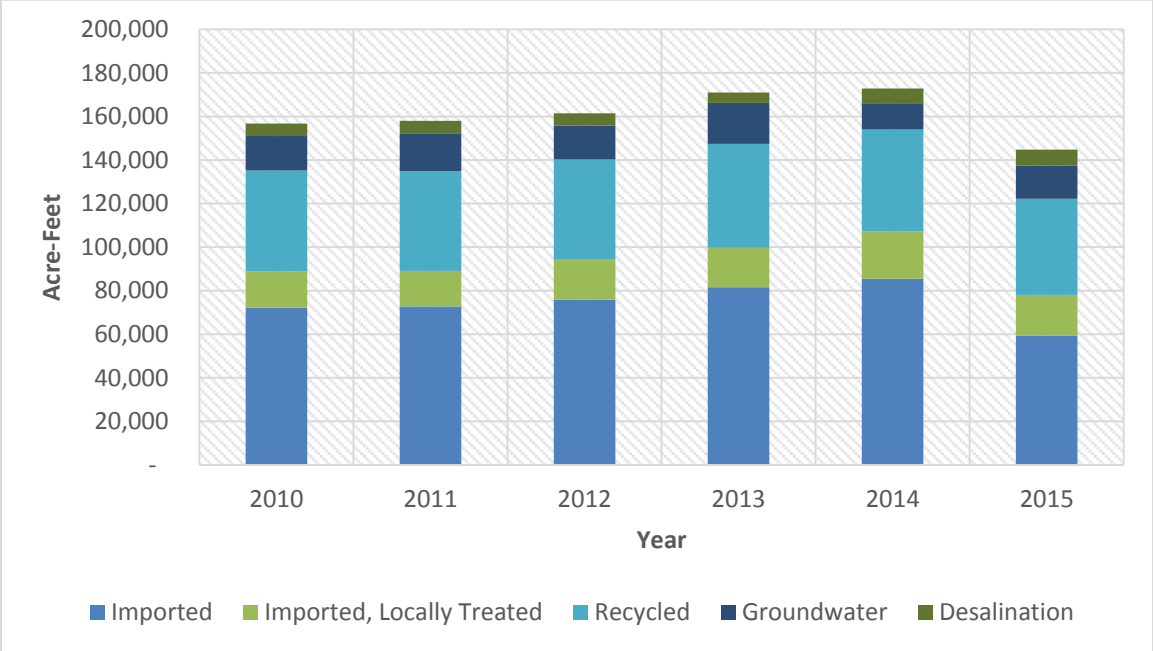
Chapter 6 System Supplies

6.1 Supply Overview

EMWD has a diverse portfolio of local and imported supplies. Local supplies include recycled water, potable groundwater, and desalinated groundwater. EMWD is a leader in recycled water production and use. Since 2014, EMWD has used 100 percent of its recycled water to irrigate landscape and agricultural fields and provide water for industrial customers. Groundwater is produced from two management areas within the service area. EMWD works diligently with other stakeholders to protect the quality and integrity of the groundwater basins. These efforts include recharging the basins with imported water and limiting native groundwater production when appropriate. Currently, EMWD is developing a plan to expand groundwater recharge to improve reliability for its customers during normal and dry year demand periods. In addition to the production of potable groundwater, EMWD treats brackish groundwater at two locations. EMWD's groundwater desalination program has the benefit of not only providing a sustainable, reliable source of potable water for its customers, but also protecting higher quality groundwater from rising levels of brackish groundwater. These local supplies help EMWD meet regional goals for supply reliability and help limit the impact of imported water shortages.

In addition to local supplies EMWD receives imported water from MWD in three forms: delivered directly as potable water, delivered to EMWD as raw water and then treated at EMWD's two local filtration plants, or delivered to EMWD as raw water for non-potable use and groundwater recharge. Figure 6-1 illustrates the volumes of EMWD's imported water, locally imported water, recycled water, groundwater, and desalinated groundwater supplies from 2010 to 2015 in AFY.

Figure 6-1: Water Received by Source (AF) – 2010 – 2015



EMWD depends on MWD for approximately half of its retail water supply. For the past five years, EMWD has been able to maintain a balance of local and imported water even as new connections were added. This was accomplished through the implementation of local supply projects and increased water use efficiency. In 2015, EMWD's reliance on MWD was lower than average due to mandatory restrictions put in place by SWRCB, which required EMWD customers to reduce their demands. This demand reduction resulted in reduced imported water purchases by EMWD in 2015.

Information about EMWD's historical and current water supplies for its retail and wholesale service areas is included in Table 6-1 and Table 6-2, respectively. These supplies are discussed in more detail in the sections that follow.

Table 6-1: Total Historical and Current Retail Water Supply (AFY) – 2010 – 2015

Type	Source	2010	2011	2012	2013	2014	2015
Imported – Treated	MWD	49,709	46,979	53,181	52,293	52,910	36,828
Imported – Locally Treated	MWD	16,629	16,266	18,283	18,154	21,616	18,628
Imported – Raw	MWD	512	691	554	764	768	941
Groundwater	Hemet/San Jacinto and West San Jacinto Basins	15,748	17,465	15,490	18,824	12,037	15,252[1]
Desalination	West San Jacinto Basin	5,787	5,706	5,665	4,800	6,776	7,288
Recycled	EMWD Regional Water Reclamation Facilities	46,451	45,756	46,021	47,638	46,872	44,150
	Total	**134,836**	**132,863**	**139,194**	**142,473**	**140,979**	**123,087**

1) Includes raw, brackish groundwater used to augment the recycled water system.

Table 6-2: Total Historical and Current Wholesale Water Supply (AFY) – 2010 – 2015

Type	Source	2010	2011	2012	2013	2014	2015
Imported – Treated	MWD	11,004	11,667	12,092	13,445	17,303	6,532
Imported – Raw	MWD	10,924	13,461	10,127	15,105	14,532	15,236
Recycled	EMWD Regional Water Reclamation Facilities	871	728	812	1,239	1,172	1,235
	Total	**22,799**	**25,856**	**23,031**	**29,789**	**33,007**	**23,003**

6.2 Imported Water

EMWD relies on MWD for the majority of its potable water supply. Over the past five years, deliveries from MWD to EMWD's retail service area ranged between 56,397 AF and 75,294 AF. In 2015, approximately 40 percent of EMWD's total retail supply was imported water delivered through MWD. Reduced imported water use in 2015 was a direct result of the SWRCB's mandatory restrictions put in place to meet a statewide reduction of 25 percent. The sections that follow provide background information on MWD and its relationship to EMWD.

6.2.1 MWD Overview

MWD was formed in 1928 by thirteen Southern California cities to develop, store and distribute water for domestic and municipal purposes to the residents of Southern California. Today, the MWD service area stretches across the Southern California coastal plain to 26 member agencies and includes portions of Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties. In 2014, MWD's service area

population was estimated to be 18,508,000 people, approximately 86 percent of the population in the six counties served by MWD.

MWD is a wholesale water provider and has no retail customers. It provides treated and untreated water directly to its member agencies. Over the last ten years, MWD has provided between 50 percent and 60 percent of the municipal, industrial, and agricultural water used in its nearly 5,200-square mile service area. The remaining water is provided through local resources and imported water from other sources.

EMWD is one of the 26 member agencies that make up MWD, which include fourteen cities, ten other municipal water districts and one county water authority. The statutory relationship between MWD and its member agencies establishes the scope of EMWD's entitlements from MWD. EMWD, like other member agencies, receives deliveries at different points in the system and pays for the service through a rate structure made up of multiple components. Each year member agencies advise MWD how much water they anticipate they will need during the next five years. MWD then works with member agencies to develop forecasts of long-term future water supply. MWD delivers supply to member agencies from two sources, the CRA, which it owns and operates, and the SWP, owned and operated by DWR. Figure 6-2 shows MWD facilities in California. Additional information about MWD is provided in MWD's 2015 UWMP.

Current Challenges

In the past five years, MWD has encountered several challenges in delivering an adequate, reliable, high quality water supply to its member agencies. Many of these challenges can be tied to dry hydrologic conditions that persisted through 2015. The water conditions were shaped by several extraordinary events including:

- Historic drought in California leading to record low SWP allocation of five percent in 2014 and 20 percent in 2015;
- An extended 16-year drought on the Colorado River watershed that has decreased storage levels in Lake Mead and Lake Powell and kept storage below surplus levels through 2015;
- Low groundwater and local reservoir levels throughout Southern California due to dry hydrology;
- Significant reduction in SWP deliveries due to the restrictions in place to protect endangered Delta smelt and salmon which result in sizable losses of water supply to the ocean;
- Lake Oroville dropping within ten thousand AF (TAF) of its historic lowest operating levels in 2014; and
- Drought and environmental mitigation impacting the supply available from the Los Angeles Aqueduct.

These challenges led to significant withdrawals from MWD's surface reservations and groundwater banking and conjunctive use programs to meet demand. MWD also responded with a record amount of water-saving rebates and refocused its efforts to develop local resources.

Hydrologic conditions show signs of improvement in 2016 with snow pack and rain fall close to average in Northern California and an expected SWP allocation of 45 percent or better. However a single year cannot restore all of the storage that has been depleted over several years. It remains important that MWD and its member agencies maintain flexible and adaptive regional planning strategies.

Figure 6-2: MWD Facilities in California

6.2.2 Colorado River Aqueduct Overview

MWD was established more than eighty years ago to obtain an allotment of Colorado River water and today the CRA continues to be a core supply for Southern California. The CRA, with a 1.2 million AF (MAF) capacity, transports water from Lake Havasu, at the border of California and Arizona, approximately 242 miles to Lake Mathews in Riverside County.

Since 1999, the Colorado River has been experiencing a prolonged drought. During 2005, 2008 and 2009, drought conditions eased somewhat with near or above average inflow conditions and net gains in storage. Drought conditions resumed in 2012 with the runoff situation being among the four driest in history. During the drought conditions, Colorado system storage has decreased to approximately 50 percent of capacity.

MWD's goal for the CRA is to "maintain current supplies and programs, while also maintaining flexibility through dry-year programs and storage." MWD has a legal right to receive water from the Colorado River under a permanent service agreement with the Secretary of the Interior and holds a basic apportionment of 550 TAF of water from the Colorado River. In 2003, the Quantification Settlement Agreement among Imperial Irrigation District, Coachella Valley Water District, and MWD established entitlements for each agency and facilitated the transfer of water from agricultural agencies to urban uses. Over the years, MWD has increased the reliable supply from the CRA through funding and implementing programs including: farm and irrigation district conservation programs, land management programs, improved reservoir system operations, and water transfers and exchanges through arrangements with agricultural water districts in Southern California and entities in Arizona and Nevada that use Colorado River delivered by the U.S. Department of the Interior, Bureau of Reclamation (USBR). Through these efforts MWD is able to obtain between 1.16 and 1.39 MAF of water during normal, historic single-dry and historic multiple-dry years. MWD also has an additional 25 TAF of supplies under development. In addition to MWD supplies, the CRA is also used to convey non-MWD supplies to other parties including over 200 TAF to the San Diego County Water Authority (SDCWA) as part of an agreement between SDCWA and the Imperial Irrigation District. Since the capacity of the CRA is limited to 1.2 MAF, the maximum supply MWD can deliver is limited to 1.2 MAF in any given year, including conveyance obligations. A detailed description of the limitations and management strategy for the CRA can be found in Section 3.1 of MWD's 2015 UWMP.

6.2.3 State Water Project Overview

The SWP is owned by the State of California and operated by the DWR. More than two thirds of California's residents depend on the SWP for a portion of their drinking water. The SWP faces several environmental and water quality challenges as well as concerns about vulnerability to natural disasters.

The 600 mile SWP delivers water to Southern California from Northern California through a series of pump stations, reservoirs and aqueducts. At the hub of the SWP is the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta). The Bay-Delta's declining ecosystem, caused by a number of factors including agricultural runoff and operation of water pumps that can alter the direction of flow, has led to historic restrictions on water supply deliveries from the SWP.

In 1960, MWD signed a contract with DWR to receive water from the SWP. MWD is one of the 29 agencies with long-term contracts for water service from DWR; and it is the largest agency in terms of population served, contracted amount of SWP water (46 percent), and annual payments made to DWR. The original contract MWD held was for 1,911 TAF of SWP water. Before 1994 the SWP water reliability was rapidly deteriorating. MWD estimated its SWP delivery would be reduced to 171 TAF, about 8.9 percent of its SWP contract, under a dry year scenario. After the 1994 Bay-Delta Accord established new operating criteria, DWR estimated that MWD's allocation under a dry year scenario would increase to 418 TAF. Although the Bay-Delta Accord improved conditions, MWD continues to address concerns that threaten reliability in the SWP.

The listing of several species as threatened or endangered in the Bay-Delta region has impacted operations and limited the flexibility of the SWP. Operations have been curtailed due to restrictions put into place to protect Delta smelt, salmon, and other species that spawn in rivers flowing to the Bay-Delta, which are federal and state-listed threatened fish species that inhabit the estuaries of the region. Changes in SWP operation have affected the manner in which water is diverted from the Bay-Delta and have limited deliveries. Between 2008 and 2014, restrictions on Bay-Delta pumping reduced deliveries of SWP

water to MWD by approximately 1.5 MAF. SWP operations may also be restricted by new biological opinions for listed species under the federal Endangered Species Act (ESA) or by the California Department of Fish and Wildlife (CDFW)'s issuance of incidental take authorizations under the California ESA. Additional new litigation, listing of additional species, or new regulatory requirements could also restrict operations and limit water supply. To address potential constraints on the SWP, MWD has developed near- and long-term action plans to increase water supply reliability.

MWD is also working with stakeholders throughout the state to develop and implement long-term solutions to the problem in the Bay-Delta. The Bay Delta Conservation Plan (BDCP) and preferred alternative called the California WaterFix are being prepared through a collaboration of state and federal agencies, local water agencies, environmental organizations, and other interested parties. The purpose is to design physical and operational improvements to the SWP system in the Bay-Delta to improve supply reliability, improve water quality, and restore and protect ecosystem health. In evaluating the supply reliability for the 2015 UWMP, MWD assumed the long-term Bay-Delta improvements would be fully operational by 2030.

In Section 3.2 of MWD's 2015 UWMP, MWD provides details about the planned actions and achievements to date in improving the reliability of the SWP. MWD also describes other challenges affecting the SWP including water quality and climate change.

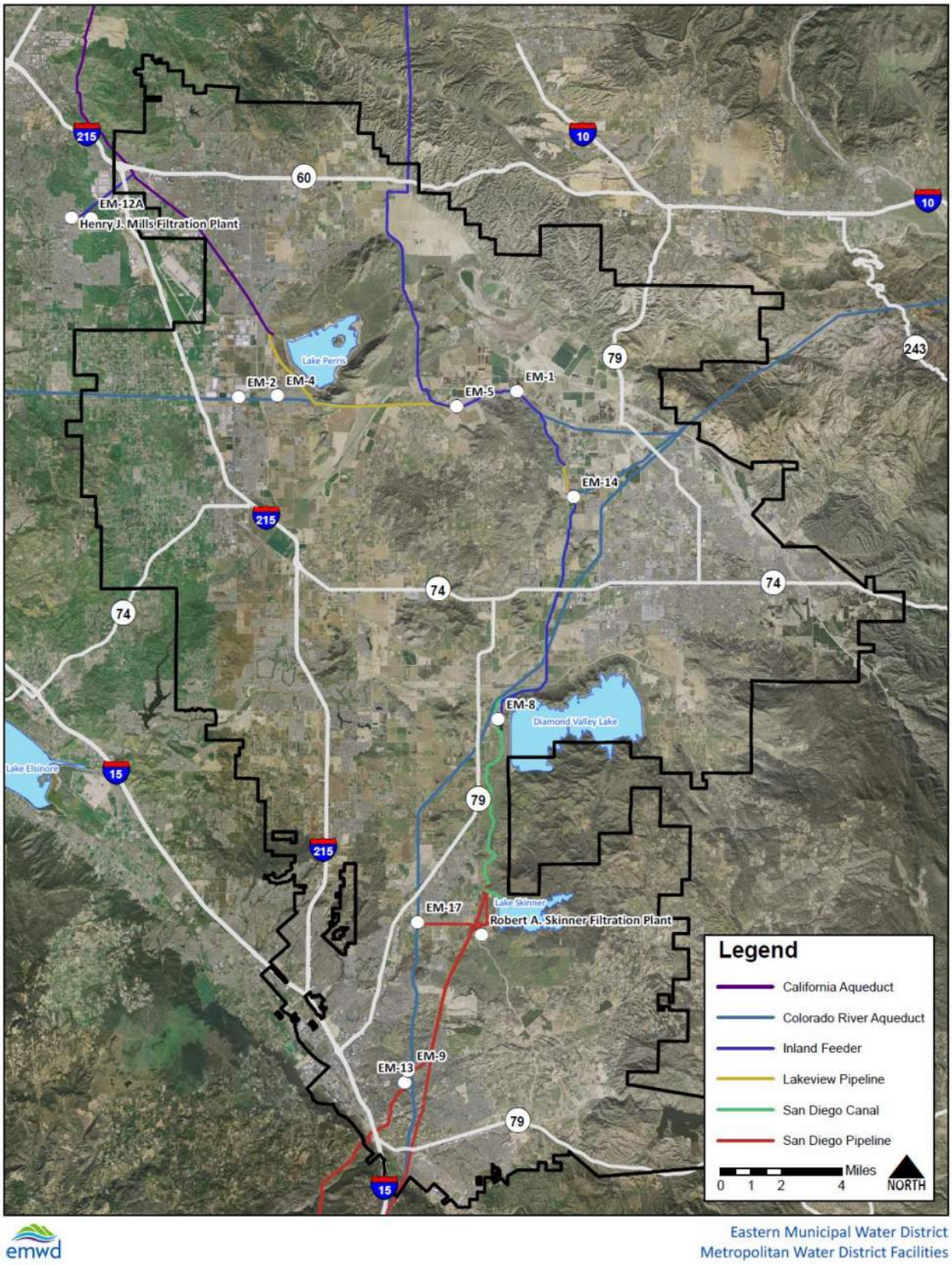
6.2.4 EMWD and MWD

The original mission of MWD was to build the CRA, bringing Colorado River water to Southern California. As MWD was constructing the San Jacinto Tunnel Portion of the project, a large amount of seepage was encountered in the pipeline. As the seepage began to affect local water resources within the region, residents began to organize to protect their water supply. Around the same time, the region experienced a period of dry weather conditions and the groundwater basin began to experience overdraft. It became clear that a source of imported water was necessary. EMWD was formed in 1950 to bring imported water into the area. In 1951, it was annexed into MWD and the first major sale of Colorado River water within EMWD began in July of 1952.

In 1960, MWD contracted for additional water supplies from the SWP, operated by DWR. In 1972, the SWP began conveying water from the wet climate of northern California to the dry climate of Southern California. Through the 1980s, EMWD built facilities to take advantage of the SWP water available, and today, the largest portion of EMWD's water supply is provided from Northern California. Treated potable water is available in the North from the Mills Water Treatment Plant and in the south through the Skinner Water Treatment Plant. EMWD also owns and operates two water filtration plants that treat raw imported water: Perris Water Treatment Plant and Hemet Water Treatment Plant. Raw imported water is also used for recharge purposes and to meet agricultural demands.

MWD does not provide supply projections for each member agency. Instead MWD uses a regional approach to developing projections. MWD calculates the demand for the entire region as discussed in Appendix A.1 of the MWD's 2015 UWMP. Using information about existing and proposed local projects, MWD then determines the amount of imported water supply and demand. Throughout the preparation of the 2015 UWMP, EMWD has provided to MWD information about local supply and projects, clarifications on boundary information, and population projections. Based on this information and information provided by other member agencies, MWD has determined it is able to meet the demands of all member agencies through 2040.

Figure 6-3: MWD Facilities within EMWD's Service Area



6.3 Groundwater

EMWD produces potable groundwater from two management plan areas within the San Jacinto Groundwater Basin. The areas are the West San Jacinto Groundwater Basin Management Plan area (West San Jacinto Basin) and the Hemet/San Jacinto Water Management Plan area (Hemet/San Jacinto Basin). EMWD also owns and operates two desalination plants that convert brackish groundwater from the West San Jacinto Basin into potable water. These plants not only provide a reliable source of potable water, they also protect potable sources of groundwater and support EMWD's groundwater salinity management program.

EMWD is a key player in three cooperative efforts to protect groundwater quality and reliability. The West San Jacinto Basin is subject to the West San Jacinto Groundwater Basin Management Plan (WSJ Management Plan), developed in 1995 and included in Appendix E of this UWMP. The Hemet/San Jacinto Basin is subject to the HSJ Management Plan, developed in 2007 and included in Appendix F of this UWMP. The HSJ Management Plan is implemented by the Hemet-San Jacinto Watermaster (Watermaster). The Watermaster was appointed and supervised by the Superior Court of the State of California for the County of Riverside, pursuant to the Stipulated Judgment entered in April 2013 (Appendix G). Additionally, a subset of participants (EMWD, LHMWD and the Soboba Band of Luiseño Indians [Soboba Tribe]) also actively manage water levels under a separate agreement under the Canyon Operating Plan.

Native potable groundwater production in the Hemet/San Jacinto Basin is limited according to HSJ Management Plan provisions to prevent continued overdraft. EMWD anticipated the limitations on native groundwater production it has experienced and has developed alternatives to assure reliability including an Integrated Recharge and Recovery Program (IRRP), filtration plants to treat and deliver imported water to areas dependent on groundwater, and recycled water use for irrigation of landscape and agriculture. In addition to the existing IRRP, EMWD is developing the Enhanced Recharge and Recovery Program (ERRP) to increase conjunctive use and facilitate groundwater banking. Phase 1 of the ERRP program is included in the Santa Ana River Conservation & Conjunctive Use Program (SARCCUP), a cooperative program to store imported water during wet years for use during dry years. Both management plan areas are part of the San Jacinto Groundwater Basin (DWR Bulletin 118 Groundwater Basin Number 8-05).

Portions of EMWD also overlay the Santa Margarita Valley Groundwater Basin. Pumping from the Santa Margarita Valley Groundwater Basin is not addressed further in this document because EMWD does not extract groundwater from the Santa Margarita Valley Groundwater Basin and has no plans to do so.

6.3.1 Basin Descriptions

The West San Jacinto Basin and the Hemet/San Jacinto Basin are both located within the San Jacinto Groundwater Basin. Groundwater management zones within the San Jacinto Groundwater Basin were delineated based areas of lower groundwater flow, groundwater divides, and changes in groundwater quality (Santa Ana River Basin Plan, 2004 Revision). The Hemet/San Jacinto Basin is comprised of the Hemet South, Canyon, and San Jacinto Upper Pressure Management Zones, as well as the Hemet North portion of the Lakeview/Hemet North Management Zone. The West San Jacinto Basin covers the Perris North, Perris South, San Jacinto Lower Pressure, and Menifee Management Zones, and the Lakeview portion of the Lakeview/Hemet North Management Zone. EMWD produces water for potable use or blending in four of the management zones: Perris North, Hemet South, San Jacinto Upper Pressure and Canyon. Desalter production wells are located in the Perris South and Lakeview/Hemet North Management Zones. The Groundwater Management Zones are outlined in Figure 6-4 and are described below.

Canyon Management Zone

The boundaries of the Canyon Management Zone include the San Jacinto Mountains to the east, north, and south, as well as the San Jacinto fault zone to the west. The San Jacinto Mountains are composed of

consolidated crystalline bedrock and semi-consolidated sedimentary rocks. These rocks are relatively impermeable, providing limited groundwater seepage into the basin and bound the water-bearing, alluvium-filled canyons within this management zone. A branch of the San Jacinto fault zone extends southeast along the channel of Bautista Creek until it intersects the Park Hill fault and acts as an impermeable barrier at depth. The barrier effect of the fault forces groundwater upwards within the San Jacinto River upstream of the fault causing muddy areas at the surface. This area is known as the Cienega and is an area of significant municipal groundwater production.

San Jacinto Upper Pressure Management Zone

The San Jacinto Upper Pressure Management Zone is bounded by the San Jacinto fault to the northeast, the Casa Loma and Bautista Creek fault zones to the southwest and the flow system boundary with the San Jacinto Lower Pressure Management Zone to the northwest. The Claremont fault is a known barrier to groundwater flow, and separates the San Jacinto Graben from both the San Timoteo Badlands and the San Jacinto Mountains. East of the City of San Jacinto, a branch of the San Jacinto fault zone cuts the alluvial fill by extending southeast across the San Jacinto River and along the channel of Bautista Creek until it intersects the Park Hill fault. This branch of the San Jacinto fault zone separates the San Jacinto Upper Pressure Management Zone from the Canyon Management Zone. The Casa Loma and Bautista Creek fault zones are generally known barriers to groundwater flow. However, studies show groundwater leaks across portions of the Casa Loma Fault zones as underflow along the Hemet South and Lakeview/Hemet North Management Zones.

San Jacinto Lower Pressure Management Zone

Boundaries of the San Jacinto Lower Pressure Management Zone include the Claremont fault to the northeast; the Casa Loma fault and its northwestward extension; various crystalline bedrock outcrops to the north and west; and the flow system boundary with the San Jacinto Upper Pressure Management Zone to the southeast. The Casa Loma fault zone is a leaky barrier to groundwater flow to the Perris North Management Zone in this section of the San Jacinto Groundwater Basin. Recharge rates along with water quality differences between San Jacinto Upper Pressure and San Jacinto Lower Pressure characterize the location of the barrier between the two zones.

Lakeview/Hemet North Management Zone

Boundaries of the Lakeview/Hemet North Management Zone include the Casa Loma fault zone to the east; the groundwater divide near Esplanade Avenue to the south; the Lakeview Mountains to the west and south; the Bernasconi Hills to the north; and a bedrock constriction/saddle to the west. The Casa Loma fault zone is a partial barrier to groundwater flow. Generally, groundwater leaks across the fault zone as underflow from the San Jacinto Upper Pressure Management Zone. Impermeable, crystalline bedrock outcrops that compose the Bernasconi Hills and the Lakeview Mountains to the north and south, respectively, are hard rock barriers to groundwater flow. To the west, the gap between the Bernasconi Hills and the Lakeview Mountains becomes narrow and the buried bedrock surface forms a saddle. This area of constriction in the water-bearing alluvium is the boundary between the Perris South and Lakeview/Hemet North Management Zones.

Hemet South Management Zone

The Hemet South Management Zone boundaries include the Casa Loma and Bautista Creek fault zones to the east; the groundwater divide near Esplanade Avenue to the north; the Lakeview Mountains to the northwest; the groundwater divide in the Winchester area to the west; and various crystalline bedrock outcrops to the south. The Casa Loma and Bautista Creek fault zones are generally known barriers to groundwater. However, groundwater leaks across portions of the Casa Loma Fault Zone as underflow into the San Jacinto Upper Pressure Management Zone.

Perris North Management Zone

Boundaries of the Perris North Management Zone include the Casa Loma fault to the northeast bordering the San Jacinto Lower Pressure Management Zone; a bedrock constriction to the south bordering the

Perris South Management Zone; the Bernasconi Hills and the Lakeview Mountains to the west; and the bedrock and surrounding hills the north and west. The Casa Loma fault zone is a generally not a barrier to groundwater flow in this section of the fault. Therefore, groundwater leaks across the fault zone as underflow from the San Jacinto Lower Pressure Management Zone.

Lake Perris is located to the east of the Perris North Management Zone and is surrounded by the Bernasconi Hills and Lakeview Mountains to the north, east, and south, and a dam on the west side. Seepage is known to occur under the dam through a subterranean channel into the Perris North Management Zone.

Perris South Management Zone

Boundaries of the Perris South Management Zone include a groundwater divide in the Winchester area; bedrock constrictions/saddles bordering the Menifee Management Zone; a bedrock constriction/saddle bordering the Lakeview/Hemet North Management Zone; a bedrock constriction bordering the Perris North Management Zone; and the surrounding bedrock mountains and hills. A groundwater high exists in the Winchester area near Highway 79. The divide is likely an artifact of natural and artificial recharge and groundwater production patterns. As such, the position (or the very existence) of this groundwater divide may vary with changing seasons, artificial recharge and/or production patterns.

Southwest of EMWD's Winchester Ponds, a narrow constriction in the bedrock coincides with a buried bedrock saddle. This area of constriction in the water-bearing alluvium is a boundary between the Perris South and Menifee Management Zones. Groundwater can flow through this bedrock gap from the Winchester area into the Menifee Management Zone; this is especially true during times of high groundwater levels. Southeast of Sun City, a bedrock constriction in the water-bearing alluvium is also a boundary between the Perris South and Menifee Management Zones. Groundwater flows through this bedrock gap from the Sun City area into the Menifee Management Zone.

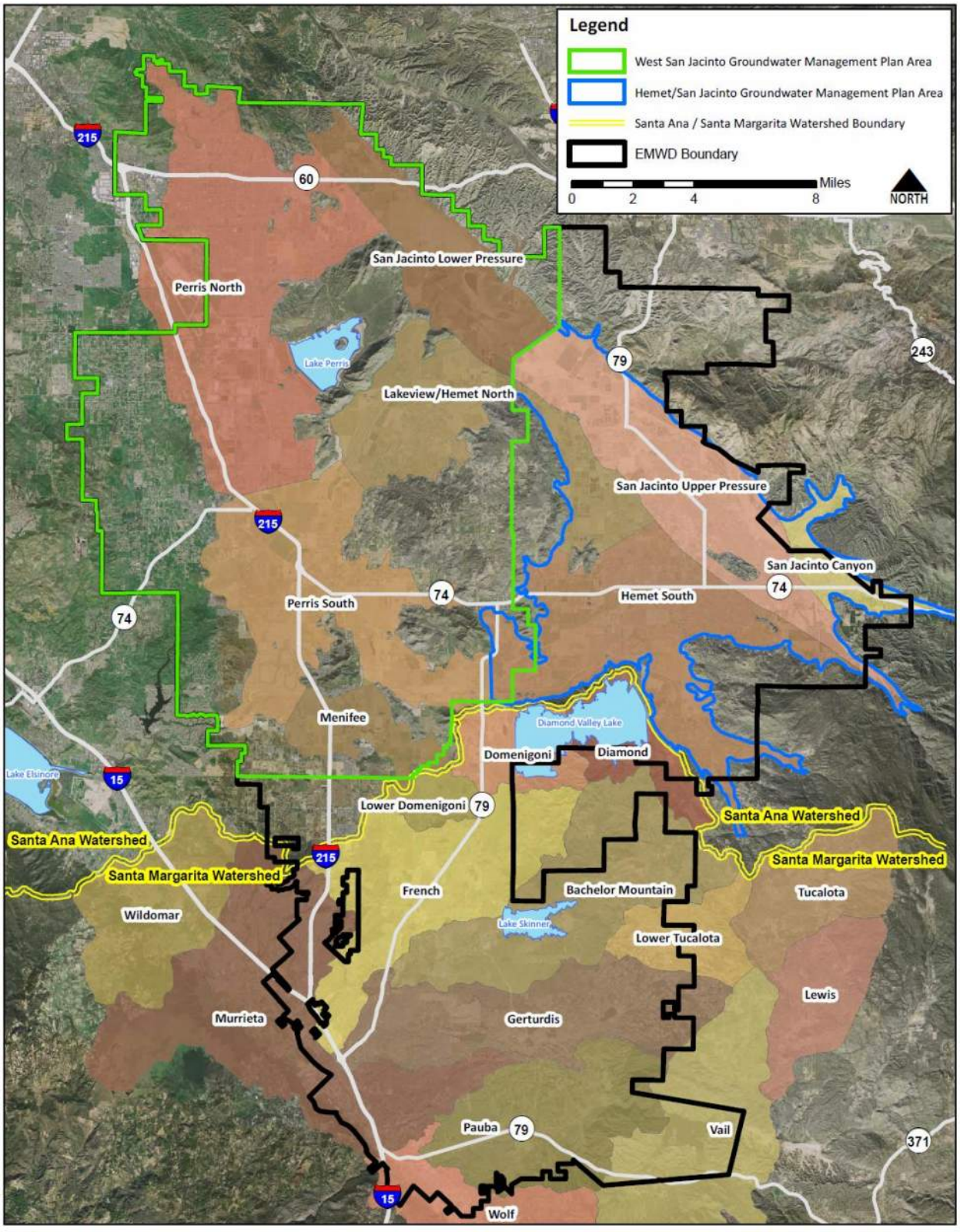
To the northeast, the gap between the Bernasconi Hills and the Lakeview Mountains becomes narrow and the buried bedrock surface forms a saddle. This area of constriction in the water-bearing alluvium is the boundary between the Perris South and Lakeview Management Zones. Under historic flow conditions, groundwater flowed westward from Lakeview into Perris South. However, groundwater currently flows from Perris South eastward into Lakeview toward a “pumping depression” in the groundwater table.

Menifee Management Zone

Boundaries of the Menifee Management Zone include the bedrock constrictions/saddles bordering the Perris South Management Zone, a bedrock constriction to the east, and the surrounding bedrock mountains and hills. Southwest of the Winchester Ponds, a narrow constriction in the bedrock coincides with a buried bedrock saddle surface. This area of constriction in the water-bearing alluvium is a boundary between the Perris South and Menifee Management Zones. Groundwater can flow through this bedrock gap from the Winchester area into the Menifee Management Zone, especially during times of high groundwater levels.

Southeast of Sun City, a bedrock constriction in the water-bearing alluvium is also a boundary between the Perris South and Menifee Management Zones. Groundwater flows through this bedrock gap from the Sun City area into the Menifee Management Zone. The groundwater management zones in the San Jacinto Watershed within EMWD's service area are shown on Figure 6-4.

Figure 6-4: Groundwater Management Zones



6.3.2 Groundwater Management

West San Jacinto Basin

In the West San Jacinto area, a cooperative groundwater management plan is already in place to insure the reliability and quality of the water supply. In June 1995, EMWD adopted the WSJ Management Plan in accordance with the statutes in the California Water Code Sections 10750 through 10755 resulting from the passage of AB 3030. The plan was adopted after extensive public outreach and meetings with interested individuals and agencies. A copy of the Management Plan is included in Appendix E.

Implementation of the WSJ Management Plan began directly after its adoption. Initial efforts to implement the WSJ Management Plan included establishing an advisory committee; prioritizing the management zones; evaluating groundwater resources including establishing groundwater quality, level, and extraction monitoring programs; and conducting hydro-geophysical investigations. The West San Jacinto Groundwater Basin Management Plan Annual Report, documenting the implementation of the plan and activities in the groundwater management zones, has been published annually since 1996.

Hemet/San Jacinto Basin

In 2001, the Cities of Hemet and San Jacinto, LHMWD, EMWD, and representatives of the private groundwater producers, with DWR acting as an impartial mediator, began working on a groundwater management plan for the Hemet/San Jacinto Basin. The group discussed and resolved several controversial issues, including San Jacinto Tunnel seepage water, the Fruitvale Judgment and Decree, export of groundwater from the basins, and how to maximize the use of recycled water. As a result of their efforts, a final HSJ Management Plan was completed in 2007 (Appendix F) and a Stipulated Judgment was entered with the Superior Court of the State of California for the County of Riverside in April of 2013 (Appendix G).

The HSJ Management Plan:

- Limits the amount of water being extracted from the basin free of the replenishment charge to a sustainable yield.
- Implements continued recharge of the basin using imported water through the IRRP.
- Ensures settlement claims by the Soboba Tribe are facilitated and accommodated.
- Expands the existing water production and water services system to meet future urban growth through the use of imported water recharged into the basin.
- Protects and/or enhances water quality in the Hemet/San Jacinto Basin.
- Supports cost-effective water supplies and treatment by the public agencies.
- Eliminates groundwater overdraft and enhances basin yield.
- Continues the monitoring program to promote and provide for best management and engineering principles to protect water resources.

Long-term groundwater management includes plans for artificial recharge using MWD replenishment water via permanent facilities through the IRRP Program. An agreement with the Soboba Tribe (described in the following section) requires MWD to deliver, on average, 7,500 AFY of water for the next 30 years to EMWD, LHMWD, and the Cities of Hemet and San Jacinto as part of an effort to recharge groundwater in the Hemet/San Jacinto Basin, fulfilling the Soboba Tribe's water rights and addressing chronic groundwater overdraft.

EMWD's rights under the HSJ Management Plan will be a long-term base groundwater production right of 7,303 AFY. EMWD's base production right will be gradually reduced to the long-term value. In 2015, EMWD's base production right was 9,300 AF, not including previously recharged water credited to it. Any pumping above that amount is subject to replenishment fees.

Soboba Settlement Act

On June 7, 2006, after eleven years of negotiations, the Soboba Tribe, MWD, EMWD, and LHMWD signed the Soboba Band of Luiseño Indians Water Settlement Agreement (Soboba Settlement Agreement) at a 4:00 pm ceremony at The Country Club at Soboba Springs in San Jacinto. Tribal Chairman Robert Salgado, Jr., signed the Settlement Agreement for the Soboba Tribe. A copy of the Agreement is included in Appendix H.

On March 1, 2007, Congresswoman Mary Bono (CA-45) introduced The Soboba Band of Luiseño Indians Settlement Act of 2007 (Soboba Settlement Act) which was co-sponsored by Congressmen Jerry Lewis (R, CA-41), Joe Baca (D, CA-43), and Dale Kildee (D, MI-5), and codifies the agreement between the Soboba Tribe, MWD, EMWD, and LHMWD.

In 2008, Congress passed and the President signed the Soboba Settlement Act that provided to the Soboba Tribe an annual water supply of 9,000 AF, 128 acres of land near Diamond Valley Lake for commercial development, and approves and ratifies the Soboba Settlement Agreement that set forth $17 million from the local water districts for economic development. Additionally, the United States government provided the Soboba Tribe with $11 million for water development.

The agreement terminated litigation against MWD and EMWD, which was filed by the Soboba Tribe in April 2000 (Soboba Band of Luiseño Indians v. MWD). The lawsuit sought damages and injunctive relief for the continuing drainage of water from the Soboba Reservation into MWD's nearby San Jacinto Tunnel which was constructed in the 1930s. The bill mandates, on average, an annual delivery of 7,500 AF of water by MWD for the next 30 years to EMWD, LHMWD, and the cities of Hemet and San Jacinto, as part of an effort to recharge the San Jacinto Groundwater Basin, fulfilling the Soboba Tribe's water rights and addressing chronic groundwater overdraft.

As outlined in the Soboba Settlement Act, the cities and agencies also received $10 million in federal funds to build the facilities to recharge the aquifer with the imported water, and between 6,100 and 4,900 AFY of the Soboba Tribe's water (on a declining scale over a 50 year period) to be used towards basin replenishment. The Soboba Tribe will also make 98 acres of Soboba Reservation land available for endangered species habitat, on an acre for acre basis, to replace EMWD land found to be not suitable for mitigation.

In 2015, the Canyon Operating Plan, an agreement between EMWD, LHMWD and the Soboba Tribe, was completed as a result of a Memorandum of Understanding (MOU) related to the Soboba Settlement Act. The Canyon Operating Plan provides a framework for operating the Canyon Management Zone in a manner to avoid significant impacts to the Soboba Tribe's wells and does not reduce the overall supply available in the Hemet/San Jacinto Basin.

6.3.3 Groundwater Overdraft and Replenishment

The HSJ Management Plan recognizes that the Hemet/San Jacinto Basin is presently in a condition of groundwater overdraft. In 2007, the overdraft was estimated to range from 10,000 to 15,000 AFY. The Watermaster has implemented long-term base production rights that will eliminate overdraft conditions within the Hemet/San Jacinto Basin, with interim production rights that step down gradually. In 2015, EMWD's annual base production right in the Hemet/San Jacinto Basin was 9,300 AF. The long-term annual base production right for EMWD is 7,303 AF.

Through pilot programs and using temporary facilities, EMWD has recharged groundwater in the Hemet/San Jacinto Basin with imported surplus water from MWD since 1990. In April of 2004, EMWD, LHMWD, and the Cities of Hemet and San Jacinto executed a MOU for an Interim Water Supply Plan. The purpose of the plan was to address the deteriorating situation in the Hemet/San Jacinto Basin by providing recharge of imported water from the SWP into the aquifer at two sites – the Conjunctive Use Ponds in the Intake portion of the San Jacinto Upper Pressure Management Zone, and the Grant Avenue Ponds in the Canyon Management Zone. Approximately 20,819 AF of imported water from the SWP was

recharged into the aquifer in the period spanning from 2004 through 2007. Due to dry conditions, environmental restriction, and the level of demands in its service area, MWD curtailed Replenishment Service effective as of May 1, 2007. Since then, permits to recharge water at the two sites have expired. To replace the temporary recharge facilities, long-term facilities are being operated as part of the IRRP, an integral piece of the HSJ Management Plan and the Soboba Settlement Agreement. The IRRP consists of 35 acres of basins or ponds for recharging SWP from MWD; three extraction wells; three monitoring wells; modification to two existing pump stations; and pipelines within, and adjacent to, the San Jacinto River.

EMWD and the other three local agencies are also contributing to the replenishment of the basin by providing recycled water in lieu of groundwater production. The Recycled In-Lieu Program supplies recycled water for agricultural irrigation in-lieu of pumping native groundwater. The project can deliver up to 8,540 AFY to local agricultural water producers. The project costs are jointly funded by EMWD, LHMWD, and the Cities of Hemet and San Jacinto. Agreements that set limits on groundwater production and provide for a payment of a portion of the operation and maintenance costs have been in place since 2008.

6.3.4 Groundwater Pumping

EMWD has an existing potable well capacity of 43.7 cubic feet per second (CFS). In the Hemet/San Jacinto Basin, well capacity is 35.62 CFS, including three wells dedicated to the IRRP. The IRRP will recharge Soboba Settlement Water into the basin. In the West San Jacinto Basin, there is 8.06 CFS of well capacity. Table 6-3 summarizes the existing potable well capacities that deliver water to EMWD's distribution system.

Table 6-3: Existing Potable Groundwater Production Capability (CFS)

Facility	Capacity
San Jacinto Upper Pressure	
EMWD Wells	12.09
IRRP Wells	10.25
Hemet South	2.03
Canyon	11.25
Perris North	8.06
Total	**43.68**

EMWD's total potable groundwater extraction varied from a low of 12,037 AFY up to 18,824 AFY from 2011 through 2015. Potable groundwater in the West San Jacinto Basin is monitored by the WSJ Management Plan. There are no restrictions on the amount of water that can be extracted. Current production in the Hemet/San Jacinto Basin is limited by the base production rights set in the HSJ Management Plan and is administered by the Watermaster. Production in recent years is reflective of a reduction in demand due to conservation, economic conditions and weather patterns and not of supply reliability.

The volume of groundwater pumped by EMWD from 2011-2015 is reported in Table 6-4. The volumes in the table include potable groundwater pumped from the Hemet/San Jacinto Basin and the West San Jacinto Basin as well as brackish groundwater pumped from the West San Jacinto Basin that is treated at EMWD's desalters before being used as a potable supply. Brackish groundwater volumes reported in Table 6-4 below are reported as a desalinated water supply in other supply tables of this UWMP (Table 6-1, Table 6-18, and Table 6-20). As documented in Table 6-5, groundwater is not used to meet wholesale demands.

Table 6-4: Retail Groundwater Volume Pumped (AFY)

DWR Table 6-1 Retail: Groundwater Volume Pumped						
Groundwater Type	**Location or Basin Name**	**2011**	**2012**	**2013**	**2014**	**2015**
Alluvial Basin	Hemet/San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)[1]	12,709	10,091	13,828	8,021	9,559
Alluvial Basin	West San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)	4,756	5,399	4,996	4,016	5,011
Alluvial Basin	Brackish Groundwater from the West San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)[2]	7,533	7,139	6,501	9,897	10,089
	Total	**24,998**	**22,629**	**25,325**	**21,934**	**24,659**

1) There was additional EMWD pumping (641 AF in 2014; 1,284 AF in 2015) in the Hemet/San Jacinto Basin that was wheeled as part of sub-agency groundwater rights under the Hemet/San Jacinto Management Plan.
2) Brackish groundwater pumped from the West San Jacinto Basin is not a direct supply – it is used to feed desalination facilities. The treated volume of this supply is shown in the other supply tables of this chapter as desalinated water instead of groundwater.

Table 6-5: Wholesale Groundwater Volume Pumped

DWR Table 6-1 Wholesale: Groundwater Volume Pumped	
☑	Supplier does not pump groundwater[1].

1) EMWD does not pump groundwater for its wholesale customers.

6.4 Surface Water

EMWD holds a right to divert up to 5,760 AFY of San Jacinto River flows for recharge and subsequent use from September 1st through June 30th each year. EMWD's diversion and recharge of San Jacinto River surface water to the Canyon Management Zone takes place at EMWD's Grant Avenue Ponds in the Valle Vista area. EMWD's diverted water is recharged into the groundwater aquifer of the Canyon Management Zone and is not used for direct use or sale. The San Jacinto River is an ephemeral river and, consequently, river flows may be insufficient for any diversion at all in some years. Water that is recharged helps the regional water balance and contributes to the safe yield of the basin.

6.5 Stormwater

The San Jacinto Water Harvesting Project allows EMWD to capture stormwater for the purposes of recharging the groundwater aquifers in the Hemet/San Jacinto Basin. The San Jacinto Water Harvesting Project uses the San Jacinto Reservoir as a retention basin for flows rerouted from Riverside County Flood Control and Water Conservation District storm drain Line E. The San Jacinto Water Harvesting Project is currently not monitored; however, at time of construction, the project was estimated to capture 300 to 320 AFY of storm water on a long-term average.

Additionally, the planned ERRP project, discussed in Section 6.9, may have a stormwater capture component.

6.6 Desalinated Water

EMWD currently uses groundwater desalination to remove salts from basins in the West San Jacinto Basin. This 250 square mile area experiences increasing water levels due to the inward migration of high total dissolved solids (TDS) groundwater and decreased production. The high TDS groundwater is

migrating into the Lakeview portion of the Lakeview/Hemet North Management Zone, which is an area of good quality groundwater. Lowering groundwater levels and removal of saline groundwater is an integral element of the WSJ Management Plan. To address these concerns, EMWD implemented a Groundwater Salinity Management Program. This program currently consists of two desalination facilities owned and operated by EMWD. These facilities recover high TDS groundwater from the Menifee and Perris South Management Zones, and the Lakeview portion of the Lakeview/Hemet North Management Zone, for potable use. In addition to being a source of potable water, the main role of the desalters is to play a part in managing the groundwater management zones by addressing the migration of brackish groundwater into areas of good quality groundwater.

Desalter wells pump water to an integrated brackish water system that delivers water to the desalination plants where it is treated prior to entering the distribution system. The Menifee Desalter was the first desalter to be built. This facility began producing potable water in 2003. The second desalter, the Perris I Desalter, is located next to the Menifee Desalter in Sun City. This plant began production in 2006 and has a production capacity of 10.5 CFS. Groundwater extraction for use in the desalter program has caused local declines in water levels to date; but the overall West San Jacinto Basin shows groundwater levels that continue to exhibit a stable or upward trend.

High iron and manganese concentrations along with silica irreversibly impact the desalter membranes and have resulted in several brackish groundwater extraction wells being offline. In 2004, an effort was initiated to evaluate alternative technologies for removal of iron and manganese prior to desalination. In late 2013, iron and manganese removal facilities were placed online and allowed EMWD to begin producing from four previously inactive wells. Around 9,000 AF of brackish groundwater was pumped in 2014 and 2015, which fed roughly 7,000 AF of potable water into the retail system, a significant increase over the 4,800 AF of potable water generated from the desalters in 2013.

EMWD has designed a third desalter, the Perris II Desalter, which will be located across the street from the existing desalters to the north. The Perris II Desalter is designed to have a capacity of 3.5 to 5.4 million gallons per day and is scheduled to be built in two phases, with the first coming online sometime in the 2020 to 2025 timeframe.

6.7 Wastewater and Recycled Water

EMWD provides wastewater collection, treatment, and recycled water services throughout its service area. Recycled water is extensively used in EMWD's service area to meet non-potable demands. The supply of recycled water will continue to increase with EMWD's population size (though it is also impacted by conservation measures). The four RWRFs that EMWD operate have recently completed expansions. Recycled water is currently used for both municipal and agricultural purposes. Municipal customers use recycled water for landscape irrigation and industrial process water. Agricultural customers use recycled water for irrigation of crops. A portion of agricultural demand for recycled water is provided in-lieu of using groundwater. Due in part to drier conditions and higher demands, EMWD has been able to meet its goal of eliminating discharges and using all of the recycled water available within EMWD for the past two years. Some of the recycled water use offsets demands of existing potable customers

6.7.1 Recycled Water Planning and Coordination

As a full-spectrum provider of water, wastewater collection, and treatment and recycled water services, EMWD has been active in developing local and regional plans for expanded water recycling in its service area. EMWD's first Recycled Water Facilities Master Plan was developed in 1990 and was formally updated in 2010. In 2009, EMWD completed a Recycled Water System Strategic Plan that provides guidelines for moving forward with recycled water projects. Information from the strategic plan was incorporated into the EMWD Integrated Resource Plan (IRP) to evaluate potential recycled water projects. EMWD is in the process of updating all three planning efforts with the development of its 2015

Recycled Water Strategic and Master Plan and its 2015 IRP. EMWD's local water recycling plan is also incorporated into the 2014 IRWM Plan developed by SAWPA for the Santa Ana River Watershed.

EMWD has worked closely with the Santa Ana Regional Water Quality Control Board in updating local basin plans and developing a long-term salinity management plan to support and ensure compliance with local basin objectives for salinity and nitrogen. EMWD is also participating in the development of a Total Maximum Daily Load analysis for impacted surface waters in the Santa Ana River Watershed.

EMWD is involved with a variety of local agencies and public interest groups in recycled water planning efforts and has coordinated these agencies as part of the development of this UWMP as explained in *Chapter 2 – Plan Preparation*. Table 6-6 lists agencies participating in recycled water planning.

Table 6-6: Recycled Water Coordinating Agencies

Group/Agency	Role
1) Santa Ana Watershed Project Authority	Regional Cooperative Planning
2) Santa Ana Regional Water Quality Control Board	Basin Planning / Salinity Management.
3) Rancho California Water District	Facility Planning / Market Development
4) West San Jacinto Groundwater Management Plan Advisory Board	Plan Review / Public Oversight
5) Hemet/San Jacinto Groundwater Management Plan Policy Committee (Cities of Hemet and San Jacinto, and Lake Hemet Municipal Water District)	Plan Review / Public Oversight
6) Elsinore Valley Municipal Water District	Facility Planning / Market Development
7) EMWD Recycled Water Advisory Committee	Plan Review / Public Oversight
8) San Jacinto Watershed Council	Plan Review / Public Oversight
9) Lake Elsinore/San Jacinto Watershed Authority	Plan Review / Water Quality
10) Metropolitan Water District of Southern California	Regional Urban Water Mgmt. Planning / Funding

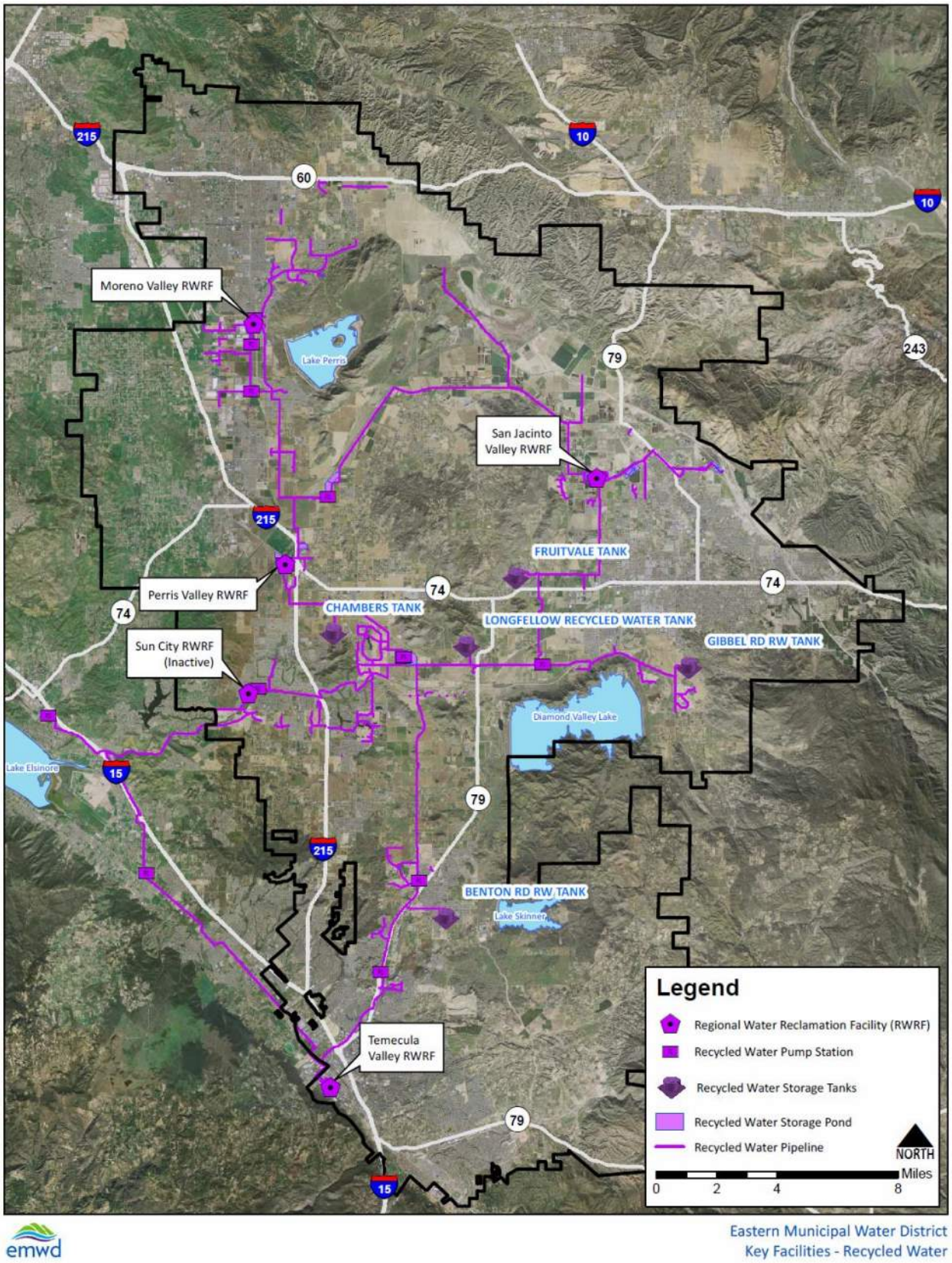
6.7.2 Wastewater Collection, Treatment, and Disposal

EMWD is responsible for all wastewater collection and treatment in its service area. It has four operational RWRFs located throughout EMWD as shown in Figure 6-5. Inter-connections between the local collections systems serving each treatment plant allow for operational flexibility, improved reliability, and expanded deliveries of recycled water. All of EMWD's RWRFs produce tertiary effluent, suitable for all Department of Health Services permitted uses, including irrigation of food crops and full-body contact. The four RWRFs have a combined capacity of 81,800 AFY as summarized in Table 6-7.

Table 6-7: RWRF Treatment Capacity (AFY)

Facility	Treatment Capacity (AFY)
San Jacinto Valley	15,700
Moreno Valley	17,900
Temecula Valley	20,200
Perris Valley	28,000
Total	**81,800**

Figure 6-5: Key Recycled Water Facilities



In addition to treatment facilities, EMWD has several recycled water storage ponds throughout EMWD (see Figure 6-5). Using existing storage ponds, EMWD is able to sell more than the recycled water produced by its treatment plants during the peak demand months (June – September). During the cooler, wetter parts of the year, surplus recycled water is stored in unlined surface impoundments, resulting in some degree of incidental groundwater recharge. If storage capacity is full, surplus recycled water is disposed of through a regional outfall pipeline to Temescal Creek and the Santa Ana River.

EMWD treats all of the wastewater collected in its service area to tertiary standards and disposes of its recycled water in one of three ways; 1) customer sales 2) discharge to Temescal Creek, or, 3) through percolation and evaporation while stored in ponds throughout EMWD. In 2015, EMWD collected and treated a total of 48,665 AF of wastewater at its four RWRFs. Table 6-8 and Table 6-9 summarize the amount of wastewater collected and treated in EMWD's service area in 2015. While EMWD sells recycled water to wholesale customers RCWD and EVMWD, the recycled water originates from wastewater collected and treated within EMWD's retail service area. Therefore, these volumes are accounted for in Table 6-9. EMWD does not provide supplemental treatment to the recycled water it distributes as documented in Table 6-10.

Table 6-8: Wastewater Collected within EMWD's Service Area

DWR Table 6-2 Retail: Wastewater Collected Within Service Area in 2015						
100	Percentage of 2015 service area covered by wastewater collection system					
100	Percentage of 2015 service area population covered by wastewater collection system					
Wastewater Collection			Receiving Wastewater Treatment			
Name of Wastewater Collection Agency	**Wastewater Volume Metered or Estimated?**	**Volume of Wastewater Collected in 2015[1]**	**Name of Wastewater Treatment Agency Receiving Collected Wastewater**	**Treatment Plant Name**	**Is WWTP Located Within UWMP Area?**	**Is WWTP Operation Contracted to a Third Party?**
Eastern Municipal Water District	Metered	7,382	Eastern Municipal Water District	San Jacinto Valley RWRF	Yes	No
Eastern Municipal Water District	Metered	12,389	Eastern Municipal Water District	Moreno Valley RWRF	Yes	No
Eastern Municipal Water District	Metered	15,088	Eastern Municipal Water District	Temecula Valley RWRF	Yes	No
Eastern Municipal Water District	Metered	13,806	Eastern Municipal Water District	Perris Valley RWRF	Yes	No
Total Wastewater Collected from Service Area in 2015:		**48,665**				

1) Total listed under "Volume of Wastewater Collected from UWMP Service Area 2015" differs from total listed under "Wastewater Treated" in DWR Table 6-3 due to losses in the treatment process.

Table 6-9: Wastewater Treatment and Discharge within EMWD's Service Area

DWR Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015									
Wastewater Treatment Plant Name	Discharge Location Name or Identifier[1]	Discharge Location Description	Method of Disposal	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level	2015 volumes			
						Wastewater Treated[2]	Discharged Treated Wastewater	Recycled Within Service Area[3,4,5]	Recycled Outside of Service Area
San Jacinto Valley RWRF	Reach 4 Dissipater	Temescal Creek	River or creek outfall	No	Tertiary	6,884	0	5,157	0
Moreno Valley RWRF	Reach 4 Dissipater	Temescal Creek	River or creek outfall	No	Tertiary	11,554	0	8,656	0
Temecula Valley RWRF	Reach 4 Dissipater	Temescal Creek	River or creek outfall	No	Tertiary	14,071	0	10,542	0
Perris Valley RWRF	Reach 4 Dissipater	Temescal Creek	River or creek outfall	No	Tertiary	12,876	0	9,646	0
					Total	**45,385**	**0**	**34,001**	**0**

1) All four of EMWD's RWRFs are connected through EMWD's regional recycled water system with one discharge point.
2) Total listed under "Wastewater Treated" differs from the total listed under "Volume of Wastewater Collected in 2015" in DWR Table 6-2 due to losses occurring during the treatment process.
3) Because all four RWRF's are connected through one regional recycled water system, it is not possible to distinguish the volume of water recycled from each individual facility. Volumes recycled from each facility in the table were estimated based on the proportion of wastewater collected and treated at each plant compared to the total volume of wastewater treated.
4) The balance between the total "Wastewater Treated" and the total volume "Recycled within Service Area" represents EMWD's system losses (such as storage pond evaporation and incidental recharge).
5) Recycled water sold to RCWD and EVMWD is included in the total volume recycled within EMWD's service area and not reported separately in DWR Table 6-3 for wholesale. Recycled water deliveries to wholesale customers are distinguished from retail sales in DWR Table 6-4.

Table 6-10: Wastewater Treatment and Discharge Within EMWD's Wholesale Service Area

DWR Table 6-3 Wholesale: Wastewater Treatment and Discharge Within Service Area in 2015	
☑	Wholesale supplier does not provide supplemental treatment to recycled water it distributes[1].

1) EMWD sells recycled water to wholesale customers RCWD and EVMWD. These volumes are accounted for in the wastewater treated, discharged, and recycled in DWR Table 6-3 for retail.

6.7.3 Recycled Water System

In 2015, EMWD produced 45,385 AF of recycled water for distribution to retail and wholesale customers throughout its service area. System losses such as storage pond evaporation and incidental recharge accounted for 11,384 AF of this quantity, and the remainder was available as a supply. The majority of recycled water sold is used for agricultural irrigation. A portion of the water sold for agriculture is used in lieu of groundwater, preserving the groundwater basin and improving water supply reliability. In addition to meeting agricultural demand, recycled sales to municipal customers are increasing rapidly as residential and urban development replaces irrigated farmland. Landscape irrigation is an emerging market and in 2008, EMWD started selling recycled water to a large industrial customer for cooling towers in a power generation plant. EMWD also sells recycled water to the CDFW for environmental use within the San Jacinto Wildlife Area and to recreational customers that are comprised of private duck clubs and bird sanctuaries that use recycled water for ponds. EMWD uses existing storage facilities to store water during off peak periods for delivery in peak months and maximize the amount of recycled water sold. EMWD's current and projected retail recycled water sales are summarized in Table 6-11.

Much of EMWD's increase in recycled water use will come from customers that will use recycled water for landscape irrigation or industrial processing. Agricultural use is projected to decrease as more agricultural land use is converted to residential. Currently, agricultural customers use recycled water to grow short-term row crops. Using potable water would not be cost-effective and their profitability is based on the availability of low-cost recycled water and low-cost land available for lease. The location of these agricultural accounts frequently changes each year depending on land availability. As more residential development takes place and the population grows, land is becoming less accessible for agricultural use. In the future, EMWD expects to have fewer and fewer agricultural accounts. Other agricultural accounts use recycled water to irrigate crops that require a long-term investment such as citrus trees. These accounts would use potable water, if needed, to protect their investment. Recycled water is also being used by some agricultural accounts in lieu of potable ground water.

EMWD's wholesale customer category consists of recycled water delivered to other agencies for use in their service areas. EMWD delivers recycled water to EVMWD and RCWD. EMWD's wholesale current and projected recycled water use is shown in Table 6-12.

Table 6-11: Current and Projected Retail Recycled Water Direct Beneficial Uses (AFY)

DWR Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area								
Name of Agency Producing (Treating) the Recycled Water:		Eastern Municipal Water District						
Name of Agency Operating the Recycled Water Distribution System:		Eastern Municipal Water District						
Supplemental Water Added in 2015[1]		682 AF						
Source of 2015 Supplemental Water		Raw, Brackish Groundwater from the West San Jacinto Basin						
Beneficial Use Type	**General Description of 2015 Uses**	**Level of Treatment**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Agricultural irrigation		Tertiary	22,979	18,784	17,912	17,784	17,756	17,756
Landscape irrigation (excludes golf courses)		Tertiary	2,464	5,124	6,124	7,124	8,124	9,624
Golf course irrigation		Tertiary	1,572	2,375	2,750	3,125	3,500	3,500
Commercial use		Tertiary	0	300	300	300	300	300
Industrial use		Tertiary	1,067	2,912	3,348	3,784	4,220	4,220
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment		Tertiary	1,177	1,250	1,400	1,400	1,400	1,400
Wetlands or wildlife habitat		Tertiary	3,507	4,500	4,500	4,500	4,500	4,500
Groundwater recharge (IPR)*[1]								
Surface water augmentation (IPR)*								
Direct potable reuse								
Other *(Provide General Description)*								
		Total:	**32,766**	**35,245**	**36,334**	**38,017**	**39,800**	**41,300**
**IPR - Indirect Potable Reuse*								

1) Raw, brackish groundwater from the West San Jacinto Basin was used in the recycled water system in 2015 to help meet higher than average agricultural demands for recycled water. This volume was removed from the agricultural beneficial uses volume in the table above.
2) Additional recycled water supply is available to EMWD from 2020 through 2040 that is planned for IPR. This volume is not included in the table as a projected beneficial use as IPR is still a conceptual project. The available supply will be redirected to other demands, including agricultural irrigation and landscape irrigation, if the IPR project is not implemented.

Table 6-12: Current and Projected Wholesale Recycled Water Direct Beneficial Uses (AFY)

DWR Table 6-4 Wholesale: Current and Projected Retailers Provided Recycled Water Within Service Area							
Name of Receiving Supplier or Direct Use by Wholesaler[1]	**Level of Treatment**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Elsinore Valley Municipal Water District	Tertiary	251	289	400	400	400	400
Rancho California Water District	Tertiary	984	1,367	4,366	4,783	5,200	5,200
Total		**1,235**	**1,656**	**4,766**	**5,183**	**5,600**	**5,600**

6.7.4 Planned Versus Actual Recycled Water Use

In 2015, EMWD delivered approximately 32,766 AF to retail customers. This is 134 AF less than projected in the 2010 UWMP, as shown in Table 6-13. Agricultural irrigation was higher than projected in 2010, which may be due to drought conditions increasing evapotranspiration. Additionally, the anticipated demands for the CDFW's San Jacinto Wildlife Area have increased since 2010. However, Landscape irrigation use was less than were projected in 2010, likely due to mandatory restrictions on outdoor water use decreasing irrigation demands across EMWD's service area.

EMWD has continued to increase the percentage of recycled water sold and decrease the amount of recycled water discharged. This was achieved through implementing operational practices that encourage the storage of water in the winter for use during peak periods. Recycled water was also used to recharge groundwater basins through an in lieu agricultural program. EMWD is aggressively pursuing recycled water policies and programs that reduce discharge and increase recycled water use.

Table 6-13: 2010 UWMP Retail Recycled Water Use Projection Compared to 2015 Actual

DWR Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual		
Use Type	**2010 Projection for 2015**	**2015 Actual Use**
Agricultural irrigation	20,000	22,979
Landscape irrigation (excludes golf courses)	5,100	2,464
Golf course irrigation	--	1,572
Commercial use	--	--
Industrial use	5,800	1,067
Geothermal and other energy production	--	--
Seawater intrusion barrier	--	--
Recreational impoundment	--	1,177
Wetlands or wildlife habitat	2,000	3,507
Groundwater recharge (IPR)	--	--
Surface water augmentation (IPR)	--	--
Direct potable reuse	--	--
Other	--	--
Total	**32,900**	**32,766**

In EMWD's 2010 UWMP, recycled water wholesale deliveries were not projected for 2015. Actual 2015 recycled water wholesale deliveries to RCWD and EVMWD are shown in Table 6-14.

Table 6-14: 2010 UWMP Wholesale Recycled Water Use Projection Compared to 2015 Actual

DWR Table 6-5 Wholesale: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual		
Name of Receiving Supplier or Direct Use by Wholesaler	**2010 Projection for 2015[1]**	**2015 Actual Use**
Elsinore Valley Municipal Water District	--	251
Rancho California Water District	--	984
Total	**0**	**1,235**

1) Projections for wholesale recycled water deliveries were not provided in the 2010 UWMP.

6.7.5 Actions to Encourage and Optimize Future Recycled Water Use

EMWD is in the process of completing its 2015 Recycled Water Strategic and Master Plan. The plan examines several options for the expansion of recycled water use in EMWD's service area and considers the current and potential constraints and opportunities for reducing discharge and increasing use of recycled water. Demand opportunities exceed projected supply through 2045, so an optimized profile of demands will be recommended as part of the strategic plan evaluation.

Historically, EMWD has used recycled water to meet the needs of agricultural development with increasing landscape demand, as land use changes from agricultural to urban. Water has also been used for environmental purposes at the CDFW's San Jacinto Wildlife Area. Recently, new demands have emerged for manufacturing and industrial processes and for use in lieu of groundwater. Other proposed special projects include Indirect Potable Reuse (IPR) using recycled water from the San Jacinto Valley RWRF for groundwater recharge.

IPR is included in EMWD's IRP and modeled under several hydraulic and supply conditions. EMWD's Recycled Water Strategic and Master Plan also evaluates the storage and system improvements needed to offset peak demand. Additional storage is not required to fully utilize EMWD's recycled water supply.

To ensure that recycled water continues to be used to the fullest extent possible, EMWD uses five methods to expand the use of recycled water within its service area. These methods are:

Mandatory Recycled Water Use Ordinance – EMWD has adopted an ordinance requiring new and existing customers to use recycled water for appropriate permitted uses when it is available. This ordinance provides a basis for denying potable water service and providing recycled water for permitted uses.

Rate Incentives – Recycled water is currently priced below the cost of potable water for both municipal and agricultural use.

Water Supply Assessments – EMWD's Water Supply Assessments require all major new developments to use recycled water as a condition of service where it is available and permitted.

Public Education – EMWD actively promotes the use of recycled water with its water education program. EMWD also places prominent signage at public recycled water use sites promoting the benefits of water recycling.

Facilities Financing – EMWD will work with private parties to arrange or provide financing for construction of facilities needed to convert potable demands to recycled water.

EMWD does not have any data to support a projection of how much increased recycled water sales will result from each of the listed methods of encouraging recycled water use. Historically, the low cost of recycled water was the primary inducement for agricultural customers to use recycled water in-lieu of groundwater. However, as municipal customers continue to replace agriculture, it is reasonable to assume that the mandatory provisions of EMWD's Recycled Water Use Ordinance will play a major role in program expansion. Table 6-15 summarizes EMWD's methods to expand future retail recycled water use.

Table 6-15: Methods to Expand Future Recycled Water Use

DWR Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
Name of Action	**Description**	**Planned Implementation Year**	**Expected Increase in Recycled Water Use[1]**
Mandatory Recycled Water Use Ordinance	The ordinance requiring new and existing customers to use recycled water for appropriate permitted uses when it is available	Ongoing	2,703
Rate Incentives	EMWD prices recycled water below the cost of potable water for both municipal and agricultural use	Ongoing	2,703
Water Supply Assessments	Assessments condition all major new developments to use recycled water as a condition of service where it is available and permitted	Ongoing	2,703
Public Education	EMWD has a recycled water public education campaign to promote the benefits of recycled water	Ongoing	2,703
Facilities Financing	EMWD helps arrange or provide financing for the construction of facilities needed to convert potable demands to recycled water	Ongoing	2,703
		Total	**13,515**

1) EMWD does not have any data to support a projection of how much increased recycled water sales will result from each of the listed methods of encouraging recycled water use. Historically, the low cost of recycled water was the primary inducement for agricultural customers to use recycled water in-lieu of groundwater. However, as municipal customers continue to replace agriculture, it is reasonable to assume that the mandatory provisions of EMWD's Recycled Water Use Ordinance will play a major role in program expansion.

6.8 Exchanges or Transfers

The five regional water agencies in the Santa Ana River Watershed have identified a watershed-scale project to store imported water during wet years in order to help meet dry-year demands, called SARCCUP. The group includes representatives from the following regional water agencies:

- Eastern Municipal Water District
- Inland Empire Utilities Agency
- Orange County Water District
- San Bernardino Valley Municipal Water District
- Western Municipal Water District

The program goals of SARCCUP include:

- Providing watershed-wide benefits based upon regional collaboration
- Creating significant new dry-year yield (about 70,000 AFY in Phase 1)
- Increasing resiliency and reliability of water supply

The SARCCUP includes four separate groundwater banks. The total storage proposed in Phase 1 of the program is about 180,000 AF. Each of the banks is expected to be able to recharge and extract one-third of its storage capacity in any year. The combined extraction capacity is 60,000 AFY. Since the participants are sharing the benefits equally, each agency receives 20 percent (1/5) of the total capacity, resulting in each of the SARCCUP agencies receiving 12,000 AFY of new dry-year yield. This will

require transfers, in-lieu, or exchanges between the five agencies in both wet and dry years. Phase 1 of EMWD's ERRP will be constructed as EMWD's contribution to the SARCCUP.

In early 2016, SAWPA was formally notified that it had been awarded $64,268,000 by DWR for its Proposition 84 2015 IRWM grant proposal, which included the SARCCUP. From the grant, SAWPA governance designated $55 million for SARCCUP implementation. The SARCCUP Proposition 84 grant award includes the development of a Watershed-Scale Master Plan which encompasses the proposed SARCCUP facilities, and identifies additional facilities that could be included in future phases of the program. The total cost of Phase 1 of the SARCCUP program is just over $100 million.

The SARCCUP agencies will continue work to finalize all of the individual agreements needed to facilitate construction, implementation, funding, and operations of the facilities and water purchases. These agreements would be presented to EMWD's Board for approval prior to completion of the SARCCUP facilities. Other agreements needed for the program include an agreement between the SARCCUP agencies and MWD to allow MWD facilities to be used to transfer water between the agencies under specified conditions, such as during droughts and emergencies.

6.9 Future Water Projects

6.9.1 EMWD Strategic Master Planning

EMWD is in the process of completing master planning documents for wastewater, water and recycled water supplies and facilities. The Water Supply Strategic Plan and Recycled Water Strategic and Master Plan build on EMWD's 2008 IRP to map out guidelines for EMWD's supply portfolio through build-out. The Water Supply Strategic Plan evaluated EMWD's demand assumptions and supply alternatives for potable water. The analysis covered the relative performance of different supply portfolios under different assumptions and determined a superior alternative. Scoring criteria included:

- Cost effectiveness
- System reliability
- Adaptability
- Water Quality
- Drought Reliability

EMWD will expand desalting, local treatment of imported water, and increase the amount of water being delivered from both the Mills and Skinner Water Treatment Plants.

The Recycled Water Strategic and Master Plan examines several options for the expansion of recycled water use in EMWD's service area and considers the current and potential constraints and opportunities for reducing discharge and increasing use of recycled water.

EMWD's expected future water supply projects and programs are discussed in the sections below. Those projects that have a quantifiable increase in supply and are reasonably expected to be implemented over the next 25 years are summarized in Table 6-16 and

Table 6-17 for EMWD's retail and wholesale systems. While other projects and programs are likely to be implemented in the future, they were not included in EMWD's supply projections and are, therefore, not quantified in Table 6-16 and Table 6-17.

6.9.2 Full Utilization of Recycled Water

The 2008 IRP results demonstrated the benefit of expanding the use of recycled water and examined multiple options for expanding the recycled water program, allowing for flexibility in implementation as EMWD's demands increase. The Recycled Water Strategic and Master Plan built on the earlier IRP and examines several options for the expansion of recycled water use in EMWD's service area. The plan considers the current and potential constraints and opportunities for reducing discharge and increasing use of recycled water.

Using EMWD's entire recycled water supply to offset demand for potable water will decrease the dependence of EMWD on imported water supplies and provide additional supply reliability. Several recycled water projects have been identified as candidates to assist EMWD in meeting its water supply goal. These potential projects include IPR, using advanced treated water for recharge of groundwater basins in the Hemet/San Jacinto area.

In addition to IPR, storage and/or augmentation is needed to offset the balance between winter and summer demands and fully utilize recycled water. As EMWD continues to invest in the development of the recycled water program, reliability will improve and all the recycled water produced by EMWD's treatment plants will be utilized. As recycled water is produced year-round, during all climate conditions, the supply can be used during average, dry, and multi-dry years.

6.9.3 Expanded Desalter Program

EMWD has an existing desalination program that recovers high TDS groundwater from the Menifee and Perris South Management Zones, and the Lakeview portion of the Lakeview/Hemet North Management Zone, for potable use. A third desalination plant, the Perris II Desalter, has been designed and is projected to be online in 2020. The Perris II Desalter is expected to provide 3,000 to 6,000 AFY of potable supply.

A fourth desalter could be warranted to meet salinity management requirements for the Hemet/San Jacinto Basin. The requirement to reduce salinity associated with the use of recycled water could also be met with the implementation of the IPR project.

6.9.4 Local Groundwater Banking

EMWD has initiated a groundwater banking project under the ERRP. The ultimate goal of the ERRP is to overcome up to three years of MWD cutbacks during drought years through the conjunctive use of groundwater. Lower cost imported water is to be recharged during wet years and pumped during dry years. Conceptually, new facilities may include a new MWD turnout, raw water pipeline, three recharge sites with the option to capture stormwater, and 11 new production wells. The San Jacinto portion of the ERRP is expected to provide an additional 45,000 AFY of potable supply during dry years. The first Phase of the ERRP will be EMWD's contribution to the SARCCUP program as discussed in Section 6.8.

6.9.5 Groundwater Development Programs

EMWD has initiated two programs to develop new groundwater supplies within the West San Jacinto Basin. Up to three new wells will be completed as part of the Moreno Valley Groundwater Development Program. Long-term estimates of groundwater yield in the area show that up to 2,000 AFY are available in the Moreno Valley area, which currently has limited pumping and rising groundwater levels. One of the new wells will replace an old EMWD well that collapsed. Within the northern portion of the City of Perris, EMWD is planning one new well under the North Perris Groundwater Development Program, which will augment the District's existing wells in the area and optimize production capabilities in an area of rising groundwater levels within the Perris North Groundwater Management Zone. The targeted yield of the North Perris Groundwater Development Program is 1,000 AFY.

6.9.6 Water Transfers

EMWD currently relies on MWD for any transfers or exchanges. As a member agency, EMWD benefits from MWD's efforts to improve supply reliability through transfers and exchanges, as detailed in MWD's 2015 UWMP.

In addition to relying on MWD, water transfers have been identified as a method of improving reliability, especially during periods of water shortage. As explained in Section 6.8, EMWD is one of five agencies developing the SARCCUP. This water banking program will recharge imported water in local groundwater basins in wet years for use in dry years. This will require transfers or exchanges between the five agencies in both wet and dry years. The SARCCUP agencies will continue work to finalize all of the

individual agreements needed to facilitate construction, implementation, funding, and operations of the facilities and water purchases.

Table 6-16: Expected Future Retail Water Supply Projects or Programs

DWR Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
Name of Future Projects or Programs	**Joint Project with other agencies?**		**Description**	**Planned Implementation Year**	**Planned for Use in Year Type**	**Expected Increase in Water Supply to Agency**
	Y/N	***If Yes, Agency Name***				
San Jacinto ERRP[1,2]	Yes	Inland Empire Utilities Agencies, Orange County Water District, San Bernardino Valley Municipal Water District, Western Municipal Water District, DWR	Project to be completed in phases and includes conjunctive use of groundwater recharge and stormwater capture.	2020	Multi-Dry Year	45,000 AFY
Moreno Valley Groundwater Development	No	--	Completion of up to 3 new wells in the Moreno Valley area	2020	Average Year	2,000 AFY
North Perris Groundwater Development	No	--	Completion of a new well in the North Perris area	2020	Average Year	1,000 AFY
Perris II Desalter	Yes	Army Corps of Engineers	Project includes 4 new wells, 2 of which will be drilled by Army Corps of Engineers	2020	Average Year	3,000-6,000 AFY
Full Utilization of Recycled Water (Potential IPR)[3]	No	--	Advanced treated recycled water used to recharge the Hemet/San Jacinto Basin	2020-2040	Average Year	18,500

1) EMWD is planning on meeting future demands with additional imported water. Implementation of future water supply projects or programs would be expected to result in reduced imported water usage with the exception of the ERRP project. The ERRP will include the use of imported water stored for dry weather use.
2) Phase 1 of the ERRP is EMWD's contribution to the SARCUPP. In addition to partnering with the SAWPA agencies, coordination will be required with the Hemet-San Jacinto Watermaster.
3) While the implementation of IPR is a potential future supply project, the volume is not included in EMWD's supply projections in DWR Table 6-9 for retail.

Table 6-17: Expected Future Wholesale Water Supply Projects or Programs

DWR Table 6-7 Wholesale: Expected Future Water Supply Projects or Programs	
☑	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply.

1) EMWD's future supply projects are included in DWR's Retail Table 6-7. Future wholesale demands are expected to be met with imported water.

6.10 Summary of Existing and Planned Sources of Water

As described throughout this chapter, EMWD has developed a number of local supplies to offset imported water demand including recycled water, groundwater, and desalinated groundwater. EMWD's planned supply projects will increase supply reliability to mitigate against impacts to supply during dry and multi-dry years as described in *Chapter 7 – Water Supply Reliability Assessment*. Table 6-18 through Table 6-21 summarize EMWD's retail and wholesale current and projected supplies.

Table 6-18: Retail Water Supplies – Actual (AFY)

DWR Table 6-8 Retail: Water Supplies — Actual			
Water Supply	Additional Detail on Water Supply	2015	
		Actual Volume	Water Quality
Purchased or Imported Water	Treated water purchased from MWD	36,828	Drinking Water
Purchased or Imported Water	Untreated water purchased from MWD, treated at EMWD Filtration Plants	18,628	Drinking Water
Purchased or Imported Water	Raw Water for Agriculture	941	Raw Water
Groundwater	Potable water pumped from the Hemet/San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)	9,559	Drinking Water
Groundwater	Potable water pumped from the West San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)	5,011	Drinking Water
Groundwater[1]	Brackish water pumped from the West San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05) used to supplement the recycled water system	682	Raw Water
Desalinated Water[2]	Desalinated water pumped from the West San Jacinto Basin portion of the San Jacinto Groundwater Basin (DWR 8-05)	7,288	Drinking Water
Recycled Water	Includes Storage Pond Incidental Recharge / Evaporation	44,150	Recycled Water
	Total	**123,087**	

1) In 2015, brackish groundwater from the West San Jacinto Basin was used to supplement the recycled water system.
2) Desalinated water is brackish groundwater pumped from the West San Jacinto Basin that has been desalinated to provide drinking water quality. The volume in the table reflects the volume after treatment that is available for potable supply. The 2015 volume pumped from the basin before treatment was reported in DWR Table 6-1 as brackish groundwater.

Table 6-19: Wholesale Water Supplies – Actual (AFY)

DWR Table 6-8 Wholesale: Water Supplies — Actual			
Water Supply	**Additional Detail on Water Supply**	**2015**	
		Actual Volume	**Water Quality**
Purchased or Imported Water	Treated Water purchased from MWD	6,532	Drinking Water
Purchased or Imported Water	Raw Water purchased from MWD	15,236	Raw Water
Recycled Water		1,235	Recycled Water
Total		**23,003**	

Table 6-20: Retail Water Supplies – Projected (AFY)

DWR Table 6-9 Retail: Water Supplies — Projected						
Water Supply	**Additional Detail on Water Supply**	**Projected Water Supply**				
		2020	**2025**	**2030**	**2035**	**2040**
Purchased or Imported Water	MWD Treated/ Untreated	73,697	81,597	92,997	104,097	114,597
Purchased or Imported Water	Soboba Settlement Water[1]	7,500	7,500	7,500	7,500	7,500
Groundwater	Pumped from the Hemet/San Jacinto Basin	7,303	7,303	7,303	7,303	7,303
Groundwater	Pumped from the West San Jacinto Basin	5,000	5,000	5,000	5,000	5,000
Desalinated Water[2]	Desalinated water from the West San Jacinto Basin	7,000	10,100	10,100	10,100	10,100
Recycled Water	Includes Storage Pond Incidental Recharge / Evaporation	45,245	48,334	50,017	51,800	53,300
Total		**145,745**	**159,834**	**172,917**	**185,800**	**197,800**

1) 7,500 AFY is the annual amount delivered by MWD to meet the Soboba Settlement Agreement. This water is delivered to EMWD as the member agency of MWD but the groundwater supplies that result from this recharged water are divided between the Soboba Tribe and the participants of the Hemet/San Jacinto Management Plan.
2) Desalinated water is brackish groundwater pumped from the West San Jacinto Basin that has be desalinated to provide drinking water quality.

Table 6-21: Wholesale Water Supplies – Projected (AFY)

DWR Table 6-9 Wholesale: Water Supplies — Projected						
Water Supply	**Additional Detail on Water Supply**	**Projected Water Supply**				
		2020	**2025**	**2030**	**2035**	**2040**
Purchased or Imported Water	MWD Treated/ Untreated	50,500	54,100	57,700	61,200	64,800
Recycled Water		1,656	4,766	5,183	5,600	5,600
Total		**52,156**	**58,866**	**62,883**	**66,800**	**70,400**

6.11 Climate Change Impacts to Supply

EMWD has considered the impact of climate change on water supplies as part of its long-term strategic planning. Climate change has the potential to affect not only local demand and supplies, but to reduce the amount of water available for import. Warmer temperatures will lead to higher demand for water within EMWD's service area and throughout California. An increase in intensity and frequency of extreme weather events can impact both local and imported supplies. EMWD gets the majority of its supply from MWD which imports water from the Bay-Delta system through the SWP. Rising sea levels can increase the risk of damage to the Bay-Delta from storms and erosion of levees which decreases imported water reliability.

In its climate change vulnerability assessment for the Santa Ana River Watershed (2014), the SAWPA Region identified key supply vulnerabilities to climate change. The vulnerabilities identified in the assessment related to EMWD's supplies include:

- Reduction in the Sierra Nevada snowpack;
- Increased strain on imported supplies
- Inability to meet water demands during drought
- Shortage of long-term water storage

One of the outcomes of climate change could be more frequent limitations on imported supplies. To limit the impact of climate change, EMWD's long-term planning focuses on the development of reliable local resources and the implementation of water use efficiency. This includes the full utilization of recycled water and the recharge of local groundwater basins to increase supply reliability during periods of water shortage. EMWD is also focused on reducing demand for water supplies, especially outdoors. Increasing the use of local resources and reducing the need for imported water has the duel benefit of not only improving water supply reliability, but reducing the energy required to import water to EMWD's service area.

6.12 Energy Intensity of Water Supplies

In 2014, EMWD completed its Energy Management Plan. This plan provides a comprehensive assessment of EMWD's current and future energy portfolio and provides assistance in developing a road map to meet EMWD's strategic objective of reducing cost while meeting regulatory requirements and maximizing available resources. It evaluated several options to improve EMWD's energy efficiency and developed an implementation plan. The plan included:

- Process Optimization at Perris Valley RWRF;
- Converting Internal Combustion Engines, where cost effective;
- Equipment and Process Optimization at Perris Water Treatment Plant;
- Install microturbines at Perris Valley RWRF;
- Equipment Optimization at Perris Valley RWRF;
- Install up to five one megawatt Solar Photovoltaic Projects; and
- Improving the Moreno Valley Fuel Cell Capacity

These actions are already underway and will result in both a financial and energy savings for EMWD's ratepayers.

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Chapter 7 Water Supply Reliability Assessment

7.1 Imported Water Supply Reliability

The majority of EMWD's current and projected water supplies are imported through MWD. MWD's resource management strategy depends on improving the reliability and availability of imported water supplies, increasing local storage and developing local resources. In MWD's 2015 UWMP, MWD evaluated challenges to supply reliability, including drought conditions, environmental regulations, water quality concerns, infrastructure vulnerabilities to natural disaster, and responses to variations in water supply availability from year to year.

MWD is facing significant challenges in providing adequate, reliable and high quality supplemental water for Southern California. Dry conditions have impacted water supply reliability on both the SWP and the CRA requiring MWD to make significant withdrawals from its storage reserves. MWD has progressively taken action to address these challenges including; increasing incentives for conservation and recycled water conversion, augmenting supplies through transfers and exchanges, and modifying its distribution system to increase CRA delivery capabilities. In 2015, MWD also implemented Level 3 (15 percent regional reduction) of is Water Supply Allocation Plan (WSAP) allocating water to its member agencies to preserve limited storage. MWD's forecast shows that under multiple-dry year hydrology, MWD could face reduced supply capabilities during the next three years. EMWD will respond to any potential shortages by reducing demand through its WSCP.

Moving forward, flexible and adaptive regional planning strategies are required. MWD's continued progress in developing a diverse resource will allow it to meet the region's water supply needs. MWD's 2015 UWMP detailed its planning initiatives and based on these efforts concluded that with the storage and transfer programs developed, MWD has sufficient supply capabilities to meet the expected demands of its member agencies from 2020 through 2040 under normal, historic single-dry and historic multiple-dry year conditions. EMWD is relying on MWD's 2015 UWMP to evaluate the reliability of imported supplies and the amount of imported water which will be available in EMWD's service area during normal, single dry, and multiple dry water year periods.

7.1.1 MWD Reliability Planning

MWD delivers water from two sources, the CRA and the SWP, and it takes a comprehensive and proactive approach to planning for future water supply needs. Through coordination with member agencies, MWD has developed regional targets for imported water, local resources and conservation to accommodate growth and face the challenges to future supply reliability. Through the past decade, MWD has undertaken several planning initiatives including the MWD Integrated Water Resources Plan (MWD IRP), the Water Surplus and Drought Management Plan (WSDMP), and the WSAP. These programs and plans provide a framework for future Southern California supply planning.

Integrated Resources Planning

In the 1990's, several years of drought and regulatory requirements began to affect the reliability of MWD water supplies. In response to this challenge, MWD and its member agencies began an IRP process to assess needed supply reliability and to find a cost-effective way to meet the goals established. The MWD IRP was a collective effort drawing input from several groups including MWD's Board of Directors; an IRP workgroup (comprised of MWD staff, member agencies and sub agency managers, as well as groundwater basin managers); and representatives from the environmental, agricultural, business and civic communities. It was important for the IRP process to be collaborative because its viability was contingent on the success of local projects and local plans in achieving their individual target goals for resource management and development.

The outcome of the IRP process was a "Preferred Resource Mix" which would ensure MWD and its member agencies' reliability through 2020. The MWD Board of Directors adopted the first IRP in

January of 1996. In November 2001, the MWD Board of Directors adopted a plan to update the IRP. The update focused on changed conditions, updated resource targets, and extending the planning horizon to 2025 and beyond. Again, the process was a collaborative effort. The 2003 MWD IRP Update was adopted in July of 2004.

MWD's 2010 IRP Update sought to stabilize MWD's traditional imported water supplies and establish additional water resources to withstand California's drought cycles. Challenges addressed in the 2010 MWD IRP included: limitations on SWP and CRA supplies due to environmental issues and drought, regulatory restrictions, economics and climate. The 2010 MWD IRP proposed an adaptive management strategy that balances the potential risks to water supplies with the need to avoid unnecessary investment in resources. The 2010 MWD IRP update demonstrated that MWD and its member agencies have moved the region toward the goal of long-term water reliability; major achievements include:

- Conservation
- Water recycling and groundwater recovery
- Storage and groundwater management programs within the Southern California region
- Storage programs related to the SWP and the Colorado River
- Other water supply management programs outside of the region

Throughout 2015, MWD developed its most recent update of its IRP. The 2015 MWD IRP Update approach recognizes that policy discussions will be essential to the development and maintenance of local supplies and conservation. The findings and conclusions of the 2015 MWD IRP Update include:

- Action is needed – Continued investment in conservation and local supplies is essential to avoiding an unacceptable level of shortage allocation frequency in the future.
- Maintain Colorado River supplies – To stabilize deliveries at 900,000 AFY, more than 900,000 AFY of planned actions will be required.
- Stabilize SWP supplies – Collaborate with state and federal agencies to resolve SWP operations and support better science and interagency collaboration to advance the coequal goals of Bay-Delta restoration and statewide supply reliability. Work collaboratively with state and federal agencies to invest in system modernization and support the California WaterFix and EcoRestore efforts.
- Develop and protect local supplies and water conservation – Increase targets for additional local supplies and conservation to embrace and advance regional self-sufficiency ethics.
- Maximize the effectiveness of storage and transfer – Utilize a comprehensive water transfer approach to stabilize and build storage reserves that will increase MWD's ability to meet water demands in dry years.
- Continue with the adaptive management approach – Update the MWD IRP and adaptive management strategies to incorporate improved understanding and changing conditions.

Water Surplus and Drought Management Plan

In order to ensure that water needs will be met during years of drought, surplus water must be managed during years of surplus. To accomplish this task, MWD developed the WSDMP. Adopted in April of 1999, this plan provides policy guidance for management of regional water to achieve the reliability goals of the IRP. The guiding principle of the WSDMP is to "Manage Metropolitan's water resources and management programs to maximize management of wet year supplies and minimize adverse impacts of water shortage to retail customers."

Water Supply Allocation Plan

In February 2008, MWD adopted its WSAP to allocate water based on need during periods of mandatory imported water allocations throughout the region. The WSAP contains a specific formula and methodology to determine member agency supply allocations. MWD works with member agencies to

periodically review the WSAP formula and make adjustments as needed. The most recent revision to the WSAP was completed in December of 2014. The plan takes into consideration:

a) The impact on retail customers and the economy

b) Population and growth

c) Changes and/or loss of local supply

d) Reclamation and recycling

e) Conservation

f) Investment in local resources

In the event allocation is required, the WSAP establishes base period demands and then adjusts them for population growth and changes in local supply; it then calculates the water supply allocation for each member agency based on the calculated needs. Regional shortages are defined in 10 stages and credits are given for conservation and investment in local supplies. It is MWD's intent to prevent member agencies from experiencing retail shortages that are greater than corresponding regional shortages.

In April 2015, MWD's Board approved implementation of the WSAP at a Level 3 Regional Shortage, effective July 1, 2015 through June 20, 2016. The WSAP allows member agencies to choose among various conservation strategies to help ensure that demands stay in balance with limited supplies.

7.1.2 MWD System Storage

Storage is an important element in MWD's dry-year water supply reliability. MWD has developed dry-year storage with a capacity of over 5.5 MAF through its groundwater storage and surface water reservoirs. Over the past several decades MWD has increased storage significantly through projects like Diamond Valley Lake (located within EMWD's service area) in order to ensure that water needs will be met during years of drought or during a catastrophic event such as an earthquake. The MWD WSDMP established long-term goals for in-basin storage and provides guidance for managing supplies in years of surplus and drought. MWD has been utilizing its dry year storage to meet demand when imported supplies are limited by hydrology.

The probability of MWD meeting dry year demands is dependent on the amount of water MWD has in its reserves. Under some conditions, MWD may choose to implement the WSAP proactively to preserve storage reserved for a future year.

7.2 Groundwater and Desalinated Groundwater Supply Reliability

Protecting the available groundwater supply is an integral component of EMWD's planning efforts. EMWD is actively working with other agencies and groups to ensure that groundwater will be a reliable resource far into the future. To improve groundwater reliability EMWD and other groundwater producers are reducing production of native groundwater and using imported water to supplement natural recharge.

EMWD and the other participants in the Hemet/San Jacinto area have agreed to reduce production. In 2015, EMWD's base production right for the Hemet/San Jacinto Basin was 9,300 AF. The long-term base production right for EMWD is 7,303 AFY.

Production over the base production right requires basin replenishment. There is a long-term agreement in place for MWD to provide an average of 7,500 AFY for replenishment in the Hemet/San Jacinto Basin. This water is to be used by the Soboba Tribe with any unused water available to the other municipal producers in the Hemet/San Jacinto Basin, as described in Section 6.3.2. EMWD has plans to expand recharge through the ERRP.

Potable groundwater production from the West San Jacinto Basin will remain stable, while brackish groundwater production will increase as EMWD's desalter program is expanded.

Desalination of groundwater from the West San Jacinto Basin increases groundwater supply reliability in the San Jacinto Basin by helping manage increasing groundwater levels that are due to decreased production. Desalination also prevents migration of brackish groundwater that could otherwise contaminate potable groundwater supplies.

7.3 Recycled Water Supply Reliability

As of 2014, EMWD reached its strategic goal of maximizing beneficial reuse of recycled water by reusing 100 percent of the wastewater generated in its service area as recycled water. Because recycled water supply is dependent on wastewater generation and not precipitation, it is considered a nearly 100 percent reliable, drought-resistant supply. EMWD also has optimization efforts underway to improve operation of the recycled water system, including the distribution storage facilities.

7.4 Water Quality

Promoting and protecting the quality of its water resources is a vital part of EMWD's planning and operations. Water quality constraints for imported water and groundwater are part of the criteria used to evaluate the value of a proposed project. EMWD does not anticipate a reduction in supply reliability due to water quality constraints. Contaminants of concern may require treatment or blending, but long-term supply planning indicates that the quantity of available water will not be diminished from projected levels due to quality.

7.4.1 Imported Water Quality

As part of the MWD IRP and other planning efforts, MWD has concentrated on maintaining the quality of source water and developing management programs that protect and enhance water quality. MWD has two water sources: the CRA and the SWP. MWD responds to water quality concerns by concentrating on protecting the quality of source water and developing water management programs that maintain and enhance water quality. Based on current knowledge, the only water quality threat to MWD water supplies that may require future treatment is the potential for increased salinity levels.

To date, MWD has not identified any other water quality issues that cannot be mitigated. Increased salinity may impact the amount of water available in the future. If additional treatment is required, MWD could experience a loss of up to 15 percent of the water processed. Since only a small portion of the total water supply would be treated and blended with the remaining unprocessed water, there is no significant risk to MWD's water supply availability.

Additional information and analysis of water quality is included in Section 4 of the 2010 RUWMP.

Colorado River

The most significant threat to the Colorado River supplies is salinity levels. Colorado River supplies are blended with SWP water to meet the MWD's adopted salinity standards. However, due to the recent severe drought, SWP is in limited supply and the Colorado River supply has not been blended. Therefore, salinity has increased. MWD has several programs in place to reduce the current salinity level of MWD supplies and protect salinity levels from rising in the Colorado River. In addition, MWD is also working to protect the Colorado River from threats of uranium, perchlorate and hexavalent chromium. MWD has also been active in efforts to protect CRA supplies from potential increases in nutrient loading, and occurrences of N-Nitrosodimethylamine (NDMA) and other the constituents of emerging concern. MWD fully expects its source protection efforts to be successful, therefore the only water quality concern with the potential to significantly impact the use of Colorado River water is salinity.

Salinity

Water imported via the CRA has the highest level of salinity of all of MWD's sources of supply, with TDS averaging around 630 milligrams per liter (mg/L) since 1976. Concerns about salinity led the seven Colorado River basin states to form the Colorado River Basin Salinity Control Forum (Forum) to

cooperatively address the issue. The Forum proposed and the U. S. Environmental Protection Agency (USEPA) approved water quality standards in 1975 that established numeric criteria for salt loading and required that the flow-weighted average annual salinity remain at or below the 1972 levels. The Forum developed and implemented the Colorado River Basin Salinity Control Program. The program is designed to prevent a portion of the salt supply from moving into the river system through the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs. Salinity control projects have reduced salinity concentrations of Colorado River water TDS on average by over 100 mg/L or $264 million per year (2005 dollars) in avoided damages. During periods of high flow, salinity levels have been known to drop to 525 mg/L, but drought has brought the return of higher salinity levels.

Uranium

Near Moab, Utah, 750 feet from the Colorado River, a 16 million ton pile of uranium mill tailings is a potential source of water contamination. In 1999, the US Department of Energy (DOE) began the remediation of the site, including the removal and offsite disposal of the tailings and onsite groundwater remediation. DOE projects that the cleanup should be completed by 2025. MWD is monitoring cleanup efforts and encourages the on-going funding and rapid cleanup of the site.

In recent years, an increase in mining claims filed near Grand Canyon National Park and the Colorado River has caused concern. MWD has responded with letters to the Secretary of the Interior to bring attention to the importance of source water protection and advocate for close federal oversight over these activities. In 2009, Secretary of Interior Ken Salazar announced a two-year hold on new mining claims on 1 million acres adjacent to the Grand Canyon. In 2012, the U.S. Department of Interior instituted a 20-year moratorium on new mining within the Grand Canyon watershed region, covering approximately two-thirds of the lands included in the Greater Grand Canyon Heritage National Monument proposal.

Perchlorate

In June of 1997, percolate was first detected in Colorado River water and attributed to a chemical manufacturing site in Henderson, Nevada. Another large perchlorate plume has also been detected in the Henderson area but is not known to have reached the Las Vegas wash. Remediation began in 1998 and has reduced perchlorate loading entering the Colorado River system by 90 percent. Levels of perchlorate in the Colorado River measured at Lake Havasu have decreased from a high of 9 micrograms per liter (µg/L) to 2 µg/L since June of 2006. California's maximum contaminant level (MCL) for perchlorate is 6 µg/L in finished drinking water. In 2015, Office of Environmental Health Hazard Assessment (OEHHA) adopted a new public health goal (PHG) of 1 µg/L for perchlorate.

Chromium VI

On July 27, 2011, The OEHHA established a final PHG of 0.02 µg/L for Chromium VI in drinking water. A PHG is the level of a contaminant in drinking water for which there is no known or expected risk to health. OEHHA based these goals on the best available toxicological data in the scientific literature. On July 1, 2014, a California MCL of 10 µg/L for hexavalent chromium became effective. Currently there is no federal MCL for hexavalent chromium, only for total chromium. Chromium VI has been detected in a groundwater aquifer on the site of Pacific Gas and Electric (PG&E) near the vicinity of the Colorado River at Topock, Arizona. Currently PG&E is operating an interim groundwater extraction and treatment system that is protecting the Colorado River. MWD participates in various stakeholder workgroups and forums that are involved in the corrective action report. Results from Chromium VI monitoring of the Colorado River from sites upstream and downstream of the Topock site have ranged from not detected (<0.03 µg/L) to 0.06 µg/L.

Nutrients

High levels of nutrients (phosphorous and nitrogen compounds) can stimulate algae and aquatic weed growth that affect consumer acceptability and produce taste and odor concerns. Nutrients and the resulting algae and aquatic weed growth can also impede conveyance, increase operational costs and

provide a food source for invasive mussel species. The Colorado River naturally has low concentrations of phosphorous but population increases in the future could increase loadings. Additional phosphorous loadings could impact MWD's ability to blend Colorado River water with SWP water, which has higher concentrations of nutrients. To prevent an increase in nutrient loading in CRA water, higher levels of wastewater treatment are required at existing reclamation facilities along the Colorado River. MWD is engaged with these agencies to encourage enhanced wastewater management.

N-Nitrosodimethylamine

NDMA is a byproduct of disinfection of some natural water with chloramines. MWD uses chloramines as secondary disinfection at all of its treatment plants. MWD is in the process of understanding the watershed sources and developing treatment strategies to minimize NDMA formation. OEHHA set a PHG for NDMA of 0.003 µg/L. MWD has monitored sources waters and treated water on a quarterly basis since 1999 with results ranging from not detected to 0.014 µg/L. Due to the frequency at which NDMA was detected in the national UCMR2 sample set, it is likely that NDMA will be regulated by the USEPA in the future.

Pharmaceuticals and Personal Care Products

Pharmaceuticals and personal care products (PPCPs) are an emerging concern for the water industry. In 2007, MWD began a monitoring program to determine the occurrence of PPCPs in drinking water treatment plants and source water locations. PPCPs have been detected in source waters at very low part per trillion levels, consistent with the results from other water agencies. More work is required to improve testing and analytical methods, characterize PPCPs in drinking water sources and then determine the effects PPCPs may have on recycled water use and groundwater recharge.

State Water Project

Water quality issues in SWP include total organic carbon (TOC), bromides, arsenic, nutrients, NDMA, PPCPs, and salinity. TOCs and bromides present the greatest water quality concern for the SWP because they cause operational constraints and require additional treatment at MWD facilities. Due to the recent severe drought, SWP supply has been limited.

Total Organic Carbon and Bromides

TOC and bromide concentrations in SWP supplies present a significant challenge for MWD to maintain safe drinking water quality. High levels of TOC and bromide form disinfection byproducts (DBPs) during the water treatment processes. Agricultural drainage and seawater intrusion also increase the levels of TOCs and bromide. The BDCP has outlined several options for improving water quality in the Bay-Delta. In addition to addressing the protection of source water, MWD uses CRA water to blend with SWP to reduce TOC and bromide concentrations in two of their existing plants. MWD has upgraded both the Skinner and Mills Water Treatment Plants by installing ozone treatment. Ozone readily oxidizes organic compounds to reduce the formation of disinfection byproducts, taste, and odor compounds. However, ozone can cause bromate formation when bromide is present in water from the SWP.

Arsenic

Historically, arsenic in MWD supplies has been detected at very low levels that do not require treatment or blending. However, some of the groundwater basins used by MWD for storage programs have higher levels of arsenic that are at or near the threshold requiring additional treatment. MWD has had to restrict flow from one program to meet arsenic limits in the SWP. One groundwater banking partner has installed a pilot treatment program increasing the cost of the groundwater banking program. MWD has also invested in solids handling facilities and implemented operational changes to manage arsenic in solids resulting from treatment.

Nutrients

The SWP has significantly higher nutrient levels than the CRA. Agricultural discharges, wastewater discharges and nutrient rich Bay-Delta soils contribute to higher concentrations of nutrients in the Bay-

Delta. Algae growing in nutrient rich water also can release taste and odor compounds into the water. MWD reservoirs containing SWP water have been bypassed at times to avoid taste and odor complaints, causing short-term supply reliability concerns. To address nutrient levels, MWD is working with other agencies receiving Bay-Delta water to reduce nutrient loading in the Bay-Delta. MWD also uses a comprehensive algae monitoring program to provide early warning of problems and to better monitor water quality in the system. Implementation of ozonation at the Mills and Skinner Water Treatment Plants has also helped with taste and odor problems associated with algae blooms. The water produced by EMWD's Hemet and Perris Water Treatment Plants, which may be sourced from the SWP, does not have the benefit of ozonation. When there is an algae bloom in the source water system, EMWD is unable to remove the taste and odor causing compounds.

N-Nitrosodimethylamine

As described under CRA supplies, NDMA is an emerging concern and MWD is active in efforts to monitor and address NDMA.

Pharmaceuticals and Personal Care Products

As described under CRA supplies, PPCPs are an emerging concern and MWD is active in efforts to monitor and address PPCPs.

7.4.2 Groundwater and Desalinated Groundwater Quality

EMWD has an extensive and proactive groundwater monitoring program that includes collecting, compiling and analyzing data related to groundwater quality. There are no known significant threats to EMWD's groundwater supply that cannot be mitigated by treatment or blending and EMWD does not anticipate a significant loss of supply due to water quality issues. EMWD may occasionally alter operational patterns to support treatment or blending.

EMWD protects groundwater supplies from potential water quality risks including contamination from salinity, nitrates, and chlorinated and other volatile organic compounds. Other contaminants have also been found in local groundwater sources at levels exceeding PHGs and may require additional treatment in the future.

Salinity and Nitrates

In partnership with other agencies, EMWD is responsible for the protection and preservation of local groundwater under the authority of the HSJ Management Plan and the WSJ Management Plan. Salinity and nitrate levels in groundwater increase due to agricultural activities, urban use, and recycled water use. EMWD monitors the salinity and nitrate levels in local basins as part of the groundwater management plan. EMWD also evaluates the ambient water quality for the basins and the data indicates that the basins are slowly increasing in concentrations of salinity and nutrients. Typically, the groundwater water quality meets the safe drinking water standards for salinity and nutrients and can be used directly. Where the salt and nutrients exceed the drinking water standards, EMWD addresses water quality through the efforts of the desalination program. Two operational desalination plants and one planned plant are part of EMWD's effort to remove salts and nutrients from the brackish water supply. In addition to supplying a source of drinking water, desalination also prevents the migration of brackish groundwater into other management zones.

Chlorinated Solvents and Other Volatile Organic Compounds

In the WSJ Management Plan, chlorinated solvents and other volatile organic compounds have been found in amounts that exceed PHGs. Chlorinated solvents are volatile organic compounds (VOCs) that contain chlorine. In general, they are used in aerospace and electronics industries, dry-cleaning, and degreasing industries. EMWD is vigilant in protecting groundwater basins from VOC contamination by closely monitoring the construction of new businesses such as gas stations and manufacturing within the vicinity of production wells. Through the review of proposed new development, EMWD works with local land agencies to ensure that groundwater quality is protected.

Arsenic

Arsenic is a naturally occurring compound found in rocks, soil, water and air. Arsenic has been found in several of EMWDs wells at levels that range from not detected to 12 µg/L (2015 data). In 2006, the MCL for arsenic in domestic water supplies was lowered to 10 µg/L by the USEPA. Currently, high arsenic concentration sources are blended with lower concentration sources to comply with the MCL. Should California lower the State's MCL below the federal level, some of EMWD's production wells could be impacted, requiring additional treatment facilities to utilize these wells.

Pharmaceuticals and Personal Care Products

PPCPs are constituents of emerging concern and EMWD has been and will continue to be proactive in addressing water quality concerns that arise. EMWD participates in the USEPA's Unregulated Contaminant Monitoring Rule program, which recently has included monitoring for PPCPs.

7.4.3 Recycled Water Quality

EMWD has an extensive recycled water program and this supply is used for landscape, agricultural, environmental, and industrial (cooling tower) uses. It significantly offsets non-potable water demands throughout the EMWD. Water quality issues with recycled water include high salinity, nutrients, and PPCPs.

Salinity and Nutrient Management

One of the challenges with the use of the recycled water is that it has salinity and nutrient concentrations that exceed the Santa Ana Region's basin plan objectives. EMWD has a Salinity and Nutrient Management Program (SNMP) specifically designed to evaluate and address the salinity and nutrient impacts that may be associated with the use of recycled water. The SNMP determines whether or not the recycled water complies with the basin plan water quality objectives. In the basins where the recycled water does not meet the water quality objectives, the SNMP determines the excess loading to the basin and describes EMWD's offset mitigation measure to address the added salt and nutrient load. Because recycled water offers a great benefit to the region and reduces the demand on the potable water system for non-potable water purposes, the basin plan allows the excess salt and nutrient load to be mitigated. The SNMP describes the approved offset mitigation measures utilized by EMWD. This offset program ensures that for every excess pound of salt or nutrient added to the basin, a corresponding pound is removed by desalinization wells or mitigated by replenishment with higher quality water.

Pharmaceuticals and Personal Care Products

PPCPs are a source of concern in EMWD's recycled water. In 2008, EMWD participated with SAWPA to form a Task Force to develop a plan to characterize emerging constituents (ECs) throughout the region. In 2009, the Task Force presented an acceptable monitoring plan to the Santa Ana Regional Water Quality Control Board to monitor specific ECs. The plan included monitoring by SAWPA members to evaluate EC levels in wastewater effluent, local receiving streams and other raw water supplies imported into the area. Samples were collected in the spring of 2010 and a final report was prepared by SAWPA in late 2010. The results indicated the presence of some ECs at trace levels (parts per trillion) in the wastewater effluent that are consistent with the results from other wastewater agencies. EMWD tests for ECs in recycled water every three years, and monitors efforts towards the development of regulations.

7.4.4 Summary of Potential Water Quality Impacts to Supplies

There are no known water quality concerns that will significantly impact water supply reliability. Water supplies will be managed to protect water quality to the greatest extent possible, and treatment will be implemented if necessary. Table 7-1 summarizes projected reductions in water supplies due to water quality issues.

Table 7-1: Estimated Reduction in Water Supplies Due to Water Quality

Water Source	Description of Condition	2015	2020	2025	2030	2035	2040
Imported Water	MWD has not identified any water quality issues that cannot be mitigated	0	0	0	0	0	0
Groundwater	EMWD has not identified any water quality issues that cannot be mitigated	0	0	0	0	0	0
Recycled Water	EMWD has not identified any water quality issues that cannot be mitigated	0	0	0	0	0	0

7.5 Reliability by Year Type

Since the majority of EMWD's retail and wholesale supplies are imported from MWD, EMWD's normal, single-dry and multi-dry year conditions are based on the same years used by MWD in its 2015 UWMP. As described in MWD's 2015 UWMP, these years are based on hydrological conditions impacting SWP supplies. EMWD's single-dry year condition is represented by 1977 hydrology and the multiple-dry year condition is represented by 1990-1992 hydrology. EMWD's average year is represented by the average of the 1922-2004 hydrologic conditions. Table 7-2 and Table 7-3 summarize the basis of water data for EMWD's retail and wholesale supplies, respectively.

Table 7-2: Retail Basis of Water Year Data

DWR Table 7-1 Retail: Basis of Water Year Data			
Year Type	Base Year	Available Supplies if Year Type Repeats Agency may provide volume only, percent only, or both	
		Volume Available	% of Average Supply[1]
Average Year	1922-2004	--	100%
Single-Dry Year	1977	--	100%
Multiple-Dry Years 1st Year	1990	--	100%
Multiple-Dry Years 2nd Year	1991	--	100%
Multiple-Dry Years 3rd Year	1992	--	100%

1) The MWD IRP simulations show no risk of shortages (allocation) for MWD supply, for the average, single-dry year (1977) and multiple-dry year (1990–1992) conditions.

Table 7-3: Wholesale Basis of Water Year Data

DWR Table 7-1 Wholesale: Basis of Water Year Data			
Year Type	Base Year	Available Supplies if Year Type Repeats	
		Agency may provide volume only, percent only, or both	
		Volume Available	% of Average Supply[1]
Average Year	1922-2004	--	100%
Single-Dry Year	1977	--	100%
Multiple-Dry Years 1st Year	1990	--	100%
Multiple-Dry Years 2nd Year	1991	--	100%
Multiple-Dry Years 3rd Year	1992	--	100%

1) The MWD IRP simulations show no risk of shortages (allocation) for MWD supply, for the average, single-dry year (1977) and multiple-dry year (1990–1992) conditions.

7.6 Supply and Demand Assessment

Based on the information provided in the MWD 2015 UWMP, EMWD has the ability to meet current and projected water demands through 2040 during normal, historic single-dry and historic multiple-dry year periods using imported water from MWD with existing supply resources. Planned local supplies will supplement imported supplies and improve reliability for EMWD and the region.

7.6.1 Average Year

The average water year selected by EMWD uses the historic average hydrology of years 1922-2004. Table 7-4 and Table 7-5 demonstrate that EMWD will have sufficient supplies to meet both retail and wholesale demands from 2020 to 2040 under average year conditions.

Table 7-4: Retail Normal Year Supply and Demand Comparison (AFY)

DWR Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	145,745	159,834	172,917	185,800	197,800
Demand totals	145,745	159,834	172,917	185,800	197,800
Difference	0	0	0	0	0

Table 7-5: Wholesale Normal Year Supply and Demand Comparison (AFY)

DWR Table 7-2 Wholesale: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	52,156	58,866	62,883	66,800	70,400
Demand totals	52,156	58,866	62,883	66,800	70,400
Difference	0	0	0	0	0

7.6.2 Single-Dry Year

The single-dry year represents the year with the lowest water supply available to the agency. EMWD's single-dry year is represented using 1977 hydrologic conditions. EMWD's Water Supply Strategic Plan (2016) conducted a study to analyze potential changes in demand due to dry, hot conditions. The study estimated up to a 14 percent increase in retail water demand could occur under these conditions. EMWD

has developed programs to help accommodate increases in demand during dry years including the planned ERRP project (described in Sections 6.8 and 6.9) which would allow EMWD to rely more heavily on groundwater supplies to meet demand in dry years. Additionally, EMWD would could import more water from MWD to meet increases in demand. Table 7-6 and Table 7-7 demonstrate that EMWD will have sufficient supplies to meet both retail and wholesale demands from 2020 to 2040 under single-dry year conditions, despite an increase in demands.

Table 7-6: Retail Single-Dry Year Supply and Demand Comparison (AFY)

DWR Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	166,300	182,400	197,400	212,000	225,700
Demand totals	166,300	182,400	197,400	212,000	225,700
Difference	0	0	0	0	0

Table 7-7: Wholesale Single-Dry Year Supply and Demand Comparison (AFY)

DWR Table 7-3 Wholesale: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040
Supply totals	58,500	66,200	70,700	75,200	79,300
Demand totals	58,500	66,200	70,700	75,200	79,300
Difference	0	0	0	0	0

7.6.3 Multiple-Dry Year

The multiple-dry year period represents the lowest average water supply availability to the agency for a consecutive three-year period. EMWD's multiple-dry year period is represented using hydrologic conditions similar to the 1990-1992 period. EMWD analyzed demands during the 1990-1992 hydrologic period and found an overall increase in demands of 14 percent of average in the first year of the multiple-dry year period. Demands during these conditions decreased to 88 percent of average during the second year, likely as the result of conservation messaging, followed by 92 percent of average in the third year. EMWD applied these demand fluctuations to its demand projections for a multiple-dry year period in Table 7-8 and Table 7-9 below. As demonstrated in the tables, EMWD will have sufficient supplies to meet both retail and wholesale demands from 2020 to 2040 under multiple-dry year conditions. During periods of increase demands, EMWD would be able to utilize stored groundwater from the proposed ERRP project (described in Sections 6.8 and 6.9) or import more water from MWD to meet demands, if needed.

Table 7-8: Retail Multiple-Dry Years Supply and Demand Comparison (AFY)

DWR Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	166,300	182,400	197,400	212,000	225,700
	Demand totals	166,300	182,400	197,400	212,000	225,700
	Difference	0	0	0	0	0
Second year	Supply totals	142,500	155,400	167,400	179,000	190,100
	Demand totals	142,500	155,400	167,400	179,000	190,100
	Difference	0	0	0	0	0
Third year	Supply totals	149,500	162,700	175,100	186,900	198,600
	Demand totals	149,500	162,700	175,100	186,900	198,600
	Difference	0	0	0	0	0

Table 7-9: Wholesale Multiple-Dry Years Supply and Demand Comparison (AFY)

DWR Table 7-4 Wholesale: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040
First year	Supply totals	58,500	66,200	70,700	75,200	79,300
	Demand totals	58,500	66,200	70,700	75,200	79,300
	Difference	0	0	0	0	0
Second year	Supply totals	48,500	54,700	58,200	61,700	64,900
	Demand totals	48,500	54,700	58,200	61,700	64,900
	Difference	0	0	0	0	0
Third year	Supply totals	52,000	57,400	61,100	64,600	68,000
	Demand totals	52,000	57,400	61,100	64,600	68,000
	Difference	0	0	0	0	0

7.7 Regional Supply Reliability

EMWD anticipates it will have enough supplies to meet demands under all water year conditions from 2020 through 2040. To supplement MWD imported sources and improve reliability, EMWD has several local resource programs. Production of local groundwater has been a source of supply for EMWD's service area for decades, but overproduction of groundwater has led to a need for groundwater management. Native production is limited and plans are in place to recharge local ground water basins to increase supply reliability. Desalination of high TDS groundwater also provides a reliable local supply of water.

Recycled water production and sales reduce the demand for imported water and provide a sustainable supply. EMWD's continued investment in improved facilities will continue to grow the market for recycled water, and innovative planning and recycled water management will allow EMWD's recycled water supply to bring an even greater benefit to the service area.

EMWD also has several planned projects that will increase regional supply reliability by increasing local supplies and decreasing demands for imported water from MWD. These projects include increasing local groundwater banking through the ERRP, expanding the desalter program with the Perris II Desalter, and full utilization of recycled water through implementation of IPR. These planned projects are described in detail in Section 6.9.

In addition to the development of local resources, EMWD aggressively promotes the efficient use of water. Through the implementation of local ordinances, conservation programs and an innovative tiered pricing structure, EMWD is reducing demands on retail accounts. Reducing demands allows existing and proposed water supplies to stretch farther and reduces the potential for water supply shortages.

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Chapter 8 Water Shortage Contingency Planning

Recognizing the need to preserve and protect public health and safety, EMWD's WSCP applies regulations and restrictions on the delivery and consumption of potable outdoor and indoor water use during water shortages. EMWD's WSCP, originally adopted by ordinance, is now Article 10 to Title 5 of EMWD's Administrative Code. Modification is made to the WSCP from time to time. The most recent modification, adopted January 20, 2016, included additional restriction on water use in Stage 4c of the WSCP. The WSCP is attached as Appendix I.

The WSCP is based on the following priorities:

- Public safety, health and welfare
- Sustaining economic vitality
- Quality of life

Restrictions are structured to protect the safety, health and welfare of the public and minimize the impact a water shortage may have on the local economy and quality of life. This is done mainly through the use of EMWD's allocation-based tiered rate structure, focusing on those customers with wasteful behaviors first and then targeting other customers as a shortage becomes more severe.

Over ninety percent of EMWD's customers are either single-family residential, multi-family residential or landscape customers. These customers are subject to allocation-based tiered rates. There are four tiers in EMWDs rate structure; the first two tiers apply to indoor and outdoor use respectively, the third tier is applied to water use up to 50 percent above the Tier 1 and 2 budgets, and Tier 4 is applied to any water use in excess of Tier 3. In times of water shortage the thresholds for Tiers 2 and 3 are reduced as shortage levels increase. Under the most extreme shortage conditions, no outdoor water use is allowed and indoor water use may be restricted up to 50 percent.

CII and agricultural customers must also reduce demand during periods of shortage. These customers face event-driven penalties and could face fines if found violating water use restrictions. Wholesale customers are allocated water using the formula and methodology in MWD's WSAP.

8.1 Stages of Action

The WSCP limits water demand during times of shortage in five stages. These stages can be triggered when there is water deficiency caused by limitations on supply or by limitations on EMWD's delivery system. The plan shall be implemented in case of a long or short-term water deficiency, or in case of an emergency water shortage.

EMWD will implement an appropriate stage based on current water conditions such as:

- EMWD water supply conditions and storage levels
- Statewide water supply conditions
- Local water supply and demand conditions
- MWD WSAP implementation or other actions requiring a reduction in water demand
- Actions of surrounding agencies

Higher stages will be implemented as shortages continue and/or if customer response does not bring about desired water savings.

When implementation of the WSCP is triggered by anticipated limitations in supply or delivery, EMWD's General Manager shall request the Board of Directors to authorize and implement the provisions of the WSCP. The request shall be made at a regular or special meeting of the Board of Directors, to implement provisions of the WSCP. The Board of Directors has the authority to initiate or terminate the water shortage contingency measures described in the WSCP. When a water shortage

emergency occurs, the WSCP authorizes the General Manager to declare the extent of a potable water shortage emergency and to implement the appropriate water shortage contingency measures.

8.1.1 Retail Stages of Action

The WSCP stages for EMWD's retail customers are summarized in the table below. The first two stages of the WSCP are voluntary, while the successive stages are mandatory and include sub-stages to reflect changes to the tiered rate structure. These stages are discussed further in Section 8.2.

Table 8-1: Retail Stages of WSCP

DWR Table 8-1 Retail: Stages of Water Shortage Contingency Plan		
Stage	**Percent Supply Reduction**	**Water Supply Condition[1]**
1	up to 10%	Supply watch. Customers will be asked to reduce up to 10% of demand voluntarily.
2	up to 25%	Supply alert. Customers will be asked to reduce 25% of demand voluntarily.
3	up to 25%	Mandatory Waste Reduction. At this stage efforts will be focused on a mandatory reduction of excessive water use.
4	up to 50%	Mandatory Outdoor Reduction. At this stage efforts will be focused on mandatory reduction of outdoor water use.
5	50% or greater	Mandatory Indoor Reduction. At this stage efforts will be focused on mandatory reduction of indoor water use. This stage would only be implemented in response to a catastrophic loss of supplies requiring a 50 percent or more reduction in demand.

1) EMWD has built flexibility into its WSCP. Stages are not directly tied to water supply conditions. The WSCP can be implemented as needed to meet a reduction in demand or to respond to other conditions. In 2015 and 2016, EMWD implemented Stage 4 of its WSCP to meet the requirements of the SWRCB Emergency Regulation. The required reduction did not reflect EMWD's supply reliability..

8.1.2 Wholesale Stages of Action

During mandatory water shortage stages, wholesale customers will be required to reduce their retail water demands such that they are equivalent to EMWD's retail water demand reductions. If MWD imposes limited supply allocations on EMWD and other member agencies, supply to EMWD's wholesale customers will be allocated using the formula and methodology based on MWD's WSAP. EMWD will establish base period demands and then adjust them for growth and changes in local supply. Regional shortages will be phased in 10 stages. At each stage, wholesale customers will not experience shortages on the wholesale level that are greater than one-and-a-half times the percentage shortage of regional water supplies. The wholesale customers will also not face a retail shortage less than the regional shortage. Credits will be given for conservation and investment in local supplies. Penalty rates apply for use over allocations.

Table 8-2: Wholesale Stages of Water Shortage Contingency Plan

DWR Table 8-1 Wholesale: Stages of Water Shortage Contingency Plan		
Stage	**Percent Supply Reduction[1]**	**Water Supply Condition**
1	5%	MWD regional shortage level 1
2	10%	MWD regional shortage level 2
3	15%	MWD regional shortage level 3
4	20%	MWD regional shortage level 4
5	25%	MWD regional shortage level 5
6	30%	MWD regional shortage level 6
7	35%	MWD regional shortage level 7
8	40%	MWD regional shortage level 8
9	45%	MWD regional shortage level 9
10	50%	MWD regional shortage level 10

1) Percentages represent MWD's regional shortage level and not retail shortages. EMWD will pass through MWD's WSAP to its wholesale customers.

8.2 Prohibitions on End Uses

The WSCP prohibitions and reduction methods are organized by customer groups with different limitations on each group. Stages 1 and 2 start with voluntary measures. As the water deficiency increases, measures become mandatory and are intended to lead to the needed reduction in water demand.

8.2.1 Reduction Requirements

The WSCP targets a reduction in demand in specific tiers for single-family residential, multi-family residential and landscape customers. Table 8-3 summarizes the required reduction in each tier by stage.

Table 8-3: Tiered-Rate Water Reduction Requirements

Stage	Tier 1 Indoor Use	Tier 2 Outdoor Use	Tier 3 Excessive Use	Tier 4 Wasteful Use
1	Voluntary Reduction up to 10%			
2	Voluntary Reduction up to 25%			
3a	No variances or adjustments will be allowed for filling swimming pools, establishing new landscapes or leaks that are not repaired within 48 hours.			
3b			50% reduction	
3c			100% reduction	
4a		10% reduction	100% reduction	
4b		up to 50% reduction	100% reduction	
4c		up to 100% reduction	100% reduction	
5a	10% reduction	100% reduction	100% reduction	
5b	30% reduction	100% reduction	100% reduction	
5c	50% reduction	100% reduction	100% reduction	

Due to the most recent drought, EMWD is currently implementing Stage 4b of its WSCP with a mandatory 30 percent water budget reduction for Tier 2 outdoor use. This action was taken to meet

SWRCB mandatory demand reduction requirements and does not reflect a shortage in EMWD's water supply.

CII, Agricultural customers and any other customer without a water budget will be assigned a water budget based on historical water use. Allocations will be decreased according to the percentages listed for Stages 5a-5c, and the current Tier 4 rate will be applied to any use above the decreased allocation value.

8.2.2 Prohibitions

In order to reduce EMWD's retail demand in the case of deficiency in water supply, EMWD developed water use efficiency requirements that are to be followed at all times. Additional prohibitions on end uses are implemented at higher stages of water shortage in addition to the on-going water use efficiency requirements. As part of EMWD's WSCP, voluntary and mandatory water use reductions are expected through the on-going enforcement of the water use efficiency requirements, EMWD's water allocation-based tiered rates, and penalties for run off. Table 8-4 summarizes the water use efficiency requirements and additional prohibitions for each stage of EMWD's WSCP. Under the most extreme deficiencies, these prohibitions would reduce demand by more than 50 percent.

Table 8-4: Restrictions and Prohibitions on End Uses

DWR Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses			
Stage	**Restrictions and Prohibitions on End Users**	**Additional Explanation or Reference**	**Penalty, Charge, or Other Enforcement?**
1	Other - Prohibit use of potable water for washing hard surfaces	Except for health or sanitary reasons	Yes
1	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	Repair leaks within 48 hours of occurrence	Yes
1	Landscape - Limit landscape irrigation to specific times	Only between 9:00 p.m. and 6:00 a.m. except when: -manually watering -establishing new landscape -temperatures are predicted to fall below freezing -it's for very short periods of time to adjust or repair an irrigation system	Yes
1	Landscape - Prohibit certain types of landscape irrigation	Unattended irrigation systems using potable water are prohibited unless they are limited to no more than fifteen (15) minutes watering per day, per station. This limitation can be extended for: -Very low flow drip irrigation systems when no emitter produces more than two (2) gallons of water per hour -Weather based controllers or stream rotor sprinklers that meet a 70% efficiency	Yes
1	Landscape - Restrict or prohibit runoff from landscape irrigation	Avoid over watering or watering of hardscape and the resulting runoff	Yes
1	Other water feature or swimming pool restriction	Decorative fountains must be equipped with a recycling system	Yes
1	Other	Allowing water to run while washing vehicles is prohibited	Yes

Table 8-4: Restrictions and Prohibitions on End Uses *(Continued)*

DWR Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses *(Continued)*			
Stage	Restrictions and Prohibitions on End Users	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement?
1	Other	Install new landscaping with low-water demand trees and plants. New turf shall only be installed for functional purposes	Yes
1	Landscape - Other landscape restriction or prohibition	Watering during rain, or within 48 hours after measurable rain, is prohibited	Yes
2	Landscape - Other landscape restriction or prohibition	Reduce watering or irrigating of lawn, landscape or other vegetated areas with sprinklers by one day a week	Yes
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	All leaks, breaks, or other malfunctions in the water user's plumbing or distribution system repaired within 72 hours	Yes
2	Other water feature or swimming pool restriction	Refrain from filling or re-filling of ornamental lakes or ponds	Yes
2	Other	Refrain from using potable water to wash or clean a vehicle, including but not limited to, any automobile, truck, van, bus, motorcycle, boat or trailer, whether motorized or not	Yes
3a	Other	No variances or adjustments will be allowed for filling swimming pools, establishing new landscapes or leaks that are not repaired within 48 hours	Yes
3b	Other	Tier 3 (Excessive Use) water budget decreased by 50%	Yes
3c	Other	Tier 3 (Excessive Use) water budget decreased by 100%	Yes
4	Landscape - Other landscape restriction or prohibition	Watering or irrigating of lawn, landscape, or other vegetated areas with sprinklers should be limited to the following schedule: -June – August: A maximum of two days a week -September – May: A maximum of one day a week	Yes
4a	Other	Tier 2 (Outdoor Use) water budget decreased by 10%	Yes
4b	Other	Tier 2 (Outdoor Use) water budget decreased by up to 50%	Yes
4c	Other	Tier 2 (Outdoor Use) water budget decreased by up to 100%	Yes
5a	Other	Tier 1 (Indoor Use) water budget decreased by 10%	Yes
5b	Other	Tier 1 (Indoor Use) water budget decreased by 30%	Yes
5c	Other	Tier 1 (Indoor Use) water budget decreased by 50%	Yes
5	Other	CII, Agricultural, and any other customer without a water budget will be given a water budget based on historical water use, and allocations will be reduced according to the percentages listed for stages 5a-5c (up to 50 percent)	Yes

8.3 Determining Water Shortage Reductions

EMWD measures and determines the actual water savings made by implementing each stage of the WSCP by relying on water meters that record the production and consumption of water. Each level of the WSCP has an associated metered reduction.

8.4 Penalties, Charges, Other Enforcement of Prohibitions

For Stages 1 and 2 of the WSCP, demand reduction is voluntary; but it will be encouraged through the on-going enforcement of EMWD's water budget based tiered rates and penalties for runoff. Stage 3 of the WSCP is focused on a mandatory reduction of excessive water use through following the conserving actions detailed in Stages 1 and 2. Beginning with Stage 3 event-driven penalties can be imposed for violating any of the restrictions in the WSCP.

Demand reductions will be enforced through changes to EMWD's water budget based tiered rate structure and observation-based penalties. Violations of the water runoff requirement are cumulative over a 12-month period. Table 8-5 lists penalties for event driven restrictions.

Table 8-5: Event Driven Penalties and Charges

Stage	Customer Category	First Violation	Second Violation	Third Violation	Fourth and Subsequent Violations
3	Single-Family	Written Notice	$25 Fine	$50 Fine	$100 Fine
	Multi-Family, CII, Agricultural, and Landscape	Written Notice	$100 Fine	$200 Fine	$300 Fine
4-5	Single-Family	Written Notice	$50 Fine	$100 Fine	$200 Fine
	Multi-Family, CII, Agricultural, and Landscape	Written Notice	$200 Fine	$400 Fine	$600 Fine

Any funds collected from penalties will be dedicated to funding EMWD's conservation programs.

8.5 Consumption Reduction Methods

EMWD utilizes consumption reduction methods to reduce demands for potable water within its service area. EMWD's methods include supplementing its water conservation program during WSCP implementation and implementing its allocation-based tiered rate billing structure by progressively reducing allocations for tiers as higher stages of the WSCP are implemented. Consumption reduction methods that can be used in EMWD's service area to comply with the WSCP are summarized in Table 8-6.

Table 8-6: Consumption Reduction Methods

DWR Table 8-3 Retail Only: Stages of Water Shortage Contingency Plan – Consumption Reduction Methods		
Stage	**Consumption Reduction Methods by Water Supplier**	**Additional Explanation or Reference**
1-5	Expand Public Information Campaign	EMWD will continue to implement its conservation program and may supplement programs during WSCP implementation.
3	Other[1]	Stage 3 progressively reduces the tier 3 allocation. Any water used over the allocations for tiers 1-3 is charged at the tier 4 rate[2].
4	Other[1]	Stage four eliminates the tier 3 allocation and progressively reduces the tier 2 allocation. Any water used over the allocations for tiers 1-2 is charged at the tier 4 rate[2].
5	Other[1]	Stage 5 eliminates the tier 3 and 4 allocations and progressively reduces the tier 1 allocation. Any water used over the allocations for tiers 1 is charged at the tier 4 rate[2].

1) EMWD has four tiers in its allocation-based tiered rate structure
2) The current tier 4 rate is $11.16 per hundred cubic feet

8.6 Resolution or Ordinance

EMWD's WSCP was added as Article 10 to Title 5 of EMWD's Administrative code by Resolution No. 2014-033 on March 26, 2014. The WSCP was amended on July 2, 2014 by Resolution No. 2014-098, on March 18, 2015 by Resolution No. 2015-011, on August 19, 2015 by Resolution No. 2015-103, and on January 20, 2016 by Resolution No. 2016-016. The amended WSCP is included as Appendix I of this UWMP.

8.7 Catastrophic Supply Interruption

EMWD is dependent on MWD for the majority of its supply. MWD has prepared for emergencies using a combination of storage, facility design and redundant power sources. Emergency storage requirements are based on the potential for a major earthquake that renders major water transportation facilities out of service for six months. Assuming 100 percent of its supplies are unavailable for six months, MWD has enough water storage to sustain 75 percent of normal year firm deliveries. In the event of a major power outage, water supply can be delivered by gravitational feed from recreational reservoirs, including Diamond Valley Lake Reservoir. For treatment plants, MWD has backup power generators in place in case of electrical outages. Additional information about addressing catastrophic supply interruption can be found in Section 2.5 of MWD's 2015 UWMP.

To protect EMWD customers in the case of an emergency, EMWD has developed the Water Shortage Emergency Operations Plan (WSEOP). This plan determines the operation response to many types of emergencies. It specifies chain of command and provides the authority to respond. Elements of that response can include interdepartmental staff notification and mobilization; activation of alternative water supply sources (i.e., interagency connections), use of temporary pumping facilities; use of power generators; public notification; and activation of conservation measures. An emergency is defined as any time period when MWD or EMWD facilities are incapable of supplying potable water. An emergency could be caused by a natural disaster such as an earthquake or through facility failures. The WSEOP describes the coordination required between operational staff, management, community involvement staff and other EMWD employees. In addition, communication and cooperation will be required with the community and other agencies such as the Department of Health Services and MWD. In the event that one or more water supply sources are unavailable, remaining sources of supply will be maximized to meet demand. If needed, the WSCP could be implemented to conserve water and reduce demand. If an electrical or gas power outages occur, some of EMWD's booster facilities have backup generators. Facilities without redundant power sources may be served on a priority basis by portable generators.

8.8 Revenue and Expenditure Impacts

As a result of a water shortage or emergency situation, there may be a reduction of revenue from water sales. To protect EMWD from financial hardship in such a situation, a financial reserve account (Rate Stabilization Reserve) has been established to meet the fixed costs associated with water delivery that may not be met in the case of reduced water sales. Table 8-7 and Table 8-8 summarize the anticipated WSCP implementation impacts on revenue and expenditures, respectively. Table 8-9 describes the proposed measures to overcome these potential impacts.

Table 8-7: Actions and Conditions that Impact Revenue

Type	Anticipated Revenue Reduction
Reduced Water Sales	Water sales are approximately 40% of EMWD's annual revenue. A reduction in the demand of water by 50% would also mean a reduction in revenue from water sales of 50% leaving a shortfall of approximately 20% of EMWD annual revenue. This reduction would be offset in part by a reduction in water purchased from MWD.

Table 8-8: Actions and Conditions that Impact Expenditures

Category	Anticipated Cost
Increased Staff Cost	Staff costs for implementing the WSCP could vary depending on the stage triggered by a deficiency in water supply. Stages 1 and 2 would probably be implemented with only current staff members. Stages 3 or 4 of the plan may require additional staff to implement. The amount and level of staff will vary greatly depending on the public's response to the plan.
O&M Cost	Operations and maintenance cost may be minimally impacted by the implementation of the WSCP, but these costs are projected to have minimal impact on EMWD's total revenue.
Cost of Supply and Treatment	Cost of supply would decrease due to a decrease in demand and would offset some of the costs associated with reduced water sales.
Public Outreach Costs	Costs associated with informing the public about implementing the WSCP will vary based on the public's response and the stage of the plan implemented.

Table 8-9: Proposed Measures to Overcome Revenue Impacts and Increased Expenditures

Name of Measure	Summary of Effect
Rate Adjustment	Part of the WSCP is the ability to impose a penalty rate. This may offset some of the lost revenue due to a decrease in water sales.
Reserve Policy	EMWD, as a matter of policy, keeps a reserve of funds equivalent to 90 days of operational expenses. This reserve fund could be used to mitigate revenue shortfalls.
Rate Stabilization Fund	EMWD also has a rate stabilization fund available to offset increased costs and decreased sales.

8.9 Estimate of Minimum Supply

The UWMP Act requires a retailer to quantify the minimum water supply available during the next three years (2016 to 2018), assuming a repeat of the driest three-year historic sequence. As detailed in *Chapter 7 – Water Supply Reliability Assessment*, this corresponds to the period of 1990, 1991 and 1992 for EMWD's supplies.

Under a typical dry year scenario, EMWD would increase deliveries from MWD to account for any losses in local supply. After several dry years, MWD could face reduced supply capabilities during the next three years. If a shortage occurs, MWD may implement its water supply allocation plan for member agencies in order to preserve storage reserves. The WSAP charges significantly higher rates for water deliveries over the allocated amount for each member agency.

EMWD and its sub agencies have already reduced demand significantly due to mandatory SWRCB reduction requirements. MWD water deliveries are well below the allocation EMWD received under the current implementation of the MWD WSAP Level 3 regional shortages. If dry conditions continue, EMWD will meet allocation targets through demand reductions as outlined in the EMWD WSCP.

Table 8-10 and Table 8-11 show the minimum supplies available by supply type for EMWD's retail and wholesale supplies, respectively. Comparing these supplies to the demand projections, EMWD would have adequate supplies available to meet projected demands should a multiple-dry year period occur the next three years. Table 8-12 and Table 8-13 summarize the total minimum supply available for the next three years for EMWD's retail and wholesale customers.

Table 8-10: Minimum Supply Next Three Years for Retail Service Area (AFY), by Supply Type

	2016	2017	2018
Imported Water	64,900	68,700	72,500
Groundwater	13,600	13,000	12,500
Groundwater Desalters	7,000	7,000	7,000
Recycled Water	43,000	43,000	43,000
Total Supply	**128,500**	**131,700**	**135,000**
Demand	128,500	131,700	135,000
% of Normal	**100%**	**100%**	**100%**

Table 8-11: Minimum Supply Next Three Years for Wholesale Service Area (AFY), by Supply Type

	2016	2017	2018
Imported Water	23,900	24,500	25,200
Recycled Water	2,000	2,000	2,000
Total Supply	**25,900**	**26,500**	**27,200**
Demand	25,900	26,500	27,200
% of Normal	**100%**	**100%**	**100%**

Table 8-12: Minimum Retail Supply Next Three Years (AFY)

DWR Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	128,500	131,700	135,000

Table 8-13: Minimum Wholesale Supply Next Three Years (AFY)

DWR Table 8-4 Wholesale: Minimum Supply Next Three Years			
	2016	**2017**	**2018**
Available Water Supply	25,900	26,500	27,200

Chapter 9 Demand Management Measures

The CWC and UWMP Act require water agencies to describe the Demand Management Measures (DMMs) that the agency is implementing as part of its overall water conservation program. These align with the best management practices (BMPs) identified by the California Urban Water Conservation Council (CUWCC) in its MOU Regarding Urban Water Conservation in California. As a signatory of the MOU, EMWD pledged to make a good faith effort to implement a prescribed set of urban water conservation BMPs. As both a retail and wholesale water agency, EMWD is responsible for fulfilling the requirements of both the retail and wholesale BMPs.

In December 2008, the Urban MOU was amended and the BMPs were revised. The revision reorganized CUWCC's 14 BMPs into five categories. Two of the categories, Utility Operations and Education, are referred to as "Foundational BMPs" because they are considered to be essential water conservation activities by any utility and are adopted for implementation by all signatories to the CUWCC as ongoing practices with no time limits. The remaining three categories are "Programmatic BMPs" and include Residential; CII; and Landscape. Table 9-1 provides a list of the CUWCC's 14 original BMPs and a mapping of the new BMPs Categories.

Programmatic BMPs are designed to achieve quantifiable water savings. Compliance with these BMPs can be demonstrated with two approaches: traditional implementation as prescribed by the components of the BMP category or by the Flex Track Menu Alternatives option, included in each programmatic BMP. Requirements for compliance are determined using base year data from single family residential (SFR) customers, multi-family residential (MFR) units, and CII customers. EMWD has chosen to use the Flex Track approach to demonstrate Programmatic BMP compliance.

Table 9-1: Original CUWCC BMPs and New BMP Categories

Original BMP Description	Applied to		New BMP Category
	Retail	Wholesale	
Residential Water Surveys	Yes	No	Programmatic: Residential
Residential Plumbing Retrofits	Yes	No	Programmatic: Residential
System Water Audits, Leak Detection	Yes	Yes	Foundational: Utility Operations – Water Loss Control
Metering and Commodity Rates	Yes	No	Foundational: Utility Operations – Metering
Large Landscape Audits	Yes	No	Programmatic: Landscape
High Efficiency Washing Machines	Yes	No	Programmatic: Residential
Public Information	Yes	Yes	Foundational: Education – Public Information Programs
School Information	Yes	Yes	Foundational: Education – School Education Programs
Commercial, Industrial, Institutional	Yes	No	Programmatic: Commercial, Industrial, Institutional
Wholesale Agency Assistance	No	Yes	Foundational: Utility Operations – Operations
Conservation pricing	Yes	Yes	Foundational: Utility Operations – Pricing
Conservation Coordinator	Yes	Yes	Foundational: Utility Operations – Operations
Water Waste Prohibition	Yes	No	Foundational: Utility Operations – Operations
Residential ULFT Replacement	Yes	No	Programmatic: Residential

In 2014, the section of the CWC addressing DMMs was significantly modified to simplify, clarify, and update the DMMs reporting requirements in UWMPs. The retail agency requirements were streamlined from 14 specific measures to six general requirements plus an "other" category. The requirements for wholesale agencies were streamlined to three specific measures, an "other" category, and a narrative description of asset management and wholesale supplier assistance programs. Table 9-2 provides a comparison of the CUWCC's 14 original BMPs with the new 2015 UWMP DMM groupings.

Table 9-2: UWMP Demand Management Measures and CUWCC Best Management Practices

UWMP DMMs	CUWCC BMP Organization and Names (2009 MOU)			
DMM Name	**BMP #**	**BMP Name**	**Type**	**Category**
(i) Water Waste Prevention Ordinances	1.1.2	Water Waste Prevention	Foundational	Utility Operations Program
(ii) Metering	1.3	Metering with commodity Rates		
(iii) Conservation Pricing	1.4	Retail Conservation Pricing		
(iv) Public Education and Outreach	2.1	Public Information Programs		Education Programs
	2.2	School Education Programs		
(v) Programs to Assess and Manage Distribution System Real Loss	1.2	Water Loss Control		Utility Operations Program
(vi) Water Conservation Program Coordination and Staffing Support	1.1.1	Conservation Coordinator		
(vii) Other Demand Management Measures	3.1	Residential Assistance Program	Programmatic	Residential
	3.2	Landscape Water Survey		
	3.3	High Efficiency Clothes Washers		
	3.4	WaterSense Specification (WSS) Toilets		
	4	Commercial, Industrial, and Institutional		Commercial, Industrial, and Institutional
	5	Landscape		Landscape
Wholesale Supplier Assistance Programs	1.1.3	Wholesale Agency Assistance Programs	Foundational	Utility Operations Program

9.1 CUWCC MOU Compliance

EMWD is both a retail and wholesale agency, and therefore is responsible for complying with all of the 14 CUWCC BMPs. As a signatory to the CUWCC MOU, EMWD continues to support and implement both the retail and wholesale BMPs and is in full compliance with the MOU. Signatories to the MOU that are in full compliance with the CUWCC's MOU are allowed by CWC Section 10631 to include their 2013-2014 annual CUWCC BMP reports in the 2015 UWMP to meet the requirements of the DMM sections of the UWMP Act. EMWD has chosen to comply with the requirements of the UWMP Act by providing its 2013-2014 BMP annual reports as well as describing the DMMs in the sections below.

EMWD's 2013-2014 retail and wholesale BMP annual reports are included as Appendix J along with documentation from the CUWCC that EMWD has met the MOU coverage requirements.

9.2 Retail Area Demand Management Measures

9.2.1 Water Waste Prevention Ordinances

Water Waste Prevention (BMP 1.1.2)

Coverage requirements: The water agency shall do one or more of the following: (a) enact and enforce an ordinance or establish terms of service that prohibit water waste; (b) enact and enforce an ordinance or establish terms of service for water efficient design in new development; (c) support legislation or regulations that prohibit water waste; (d) enact an ordinance or establish terms of service to facilitate implementation of water shortages response measures; (e) support local ordinances that prohibit water waste; and/or (f) support local ordinances that establish permit requirements for water efficient design in new development.

Compliance method: EMWD has met the coverage requirements in the following ways:

- Ordinance 72.25 – Water Use Efficiency Ordinance, implemented January 1991. EMWD reviews ordinances on a regular basis with the most recent revision effective February 2016. This ordinance prohibits water waste, imposes penalties for runoff, and requires efficient design in new development. The ordinance is enforced in two ways, (1) through EMWD's allocation-based tiered rate structure for single family, multi-family and landscape accounts utilizing the domestic water system; and (2) through penalties for runoff.
- Ordinance 117.2 – Water Shortage Contingency Plan, implemented July 2005. EMWD reviews the WSCP on a regular basis with the most recent modification adopted January 2016. This ordinance is designed for the purpose of protecting the integrity of water supply facilities (infrastructure), and implementing a contingency plan in times of drought, supply reductions, failure of water distribution systems or emergencies.
- EMWD supports legislation and local ordinances that prohibit water waste, and supports local ordinances that establish requirements for water efficient design in new development. As a member of the Riverside County Water Task Force, EMWD participated in updating Riverside County's Water Efficient Landscape Requirements Ordinance 859.
- In mid-2015, EMWD adopted new development standards to further promote conservation throughout its service area. Beginning in July 2015, all new developments are prohibited from having non-functional turf, including turf in the front yards of new homes. With more than 60 percent of water in EMWD's service area being used outdoors, this was designed to be a long-term strategy to minimize the impact of new development. EMWD's service area is currently 40 percent built out, making it one of the few regions in Southern California that will see significant population growth in the coming decades. EMWD also helped the County of Riverside adopt a similar ordinance prohibiting turf in the front yards of new homes in all unincorporated areas of Riverside County.
- EMWD has also prohibited the installation of non-functional turf in all new CII developments. While turf is being allowed in functional areas of new development, including parks and schools, it is no longer permitted within common area landscaping that provides no functional community benefit. Non-functional turf can best be described as turf that is only ever walked on when it is being mowed.

9.2.2 Metering

Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections (BMP 1.3)

For consistency with CWC Section 525b, this BMP refers to potable water systems. A water meter is defined as a device that measures the actual volume of water delivered to an account in conformance with the guidelines of the AWWA.

Coverage requirements: (1) Meter all new service connections; (2) Establish a retrofit program for existing unmetered service connections; (3) Read meters and bill customers by volume of use; (4) Prepare a written plan, policy or program for meters that includes census, testing, repair and replacement; (5) Identify barriers to retrofitting mixed use commercial accounts with dedicated landscape meters and conduct feasibility study(s) to assess the merits of providing incentives to switch mixed use accounts to dedicated landscape meters.

Compliance method: EMWD has met the coverage requirements for this measure; (1) meters are required on all new service connections; (2) all service connections in EMWD's service area are metered; (3) meters are read on a monthly basis and billed monthly in hundred cubic feet; (4) EMWD's program for meter testing and replacement is referenced in Table 9-3 below; (5) EMWD has identified and measured all commercial customers with mixed use meters and is in the process of creating water budgets for these customers; (6) in an effort to reduce leaks, a continuous water use notification system was implemented in February 2016 which notifies customers of the presence of a constant water flow running through their meter (for every hour for several days), which is a strong indication of a possible leak; (7) as part of the Water Loss Analysis that takes place every few years, EMWD now sends back approximately 30 small (5/8"-2") meters each month for random testing to ensure accuracy; (8) to better serve its customers in a more accurate and efficient manner, EMWD began installing Advanced Metering Infrastructure (AMI) meters in 2005 and to date has installed 39,000 AMI meters and 45,500 Flex Net Meters, with the goal of complete conversion to Flex Net meters for residential and commercial customers by 2026.

Table 9-3: Meter Testing and Replacement

Meter Type	Meter Size	Monthly Consumption (hundred cubic feet)	Meter Testing Frequency	Meter Replacement Frequency
Residential	5/8" – 2"	Not Applicable	Customer Request	Upon Failure
Commercial	3" and Larger	1001 – Above	6 Months	Upon Failure
Commercial	3" and Larger	401 – 1000	12 Months	Upon Failure
Commercial	3" and Larger	201 – 400	24 Months	Upon Failure
Commercial	3" and Larger	0 – 200	36 Months	Upon Failure
Sample	Not Applicable	Not Applicable	Bi-Annually[1]	Upon Failure

1) Based on age segment (1960's, 1961 – 1969, 1970 – 1979, etc.)

9.2.3 Conservation Pricing

Retail Conservation Pricing (BMP 1.4)

Retail Water Services Rates

Definition: Conservation pricing provides economic incentives (a price signal) to customers to use waster efficiently. Because conservation pricing requires a volumetric rate, metered water service is a necessary condition of conservation pricing.

This BMP is intended to reinforce the need for water agencies to establish a strong nexus between volume-related systems costs and volumetric commodity rates. Conservation pricing requires volumetric rates. The goal of this BMP is to recover the maximum amount of water sales revenue from volumetric rates that is consistent with utility costs (which may include utility long-run marginal costs), financial stability, revenue sufficiency, and customer equity. In addition to volumetric rates, conservation pricing may also include service connection charges, meter service charges and/or special rates and charges for temporary service, fire protection service and other irregular services provided by the utility.

The following volumetric rate designs are potentially consistent with the above definition:

1) Uniform rate in which the volumetric rate is constant regardless of the quantity consumed
2) Seasonal rates in which the volumetric rate reflects seasonal variation in water delivery costs
3) Tiered rates in which the volumetric rate increases as the quantity used increases
4) Allocation-based rates in which the consumption tiers and respective volumetric rates are based on water use norms and water delivery costs established by the utility

Coverage requirements: Maintain a rate structure that satisfies at least one of the two options listed in the CUWCC's MOU. Conformance will be assessed by using (1) most recent year data or (2) average revenue from three most recent years when most recent year data does not satisfy the option.

Compliance method: EMWD has met the coverage requirements in the following ways:

In February 2009, EMWD implemented an allocation-based tired rate structure for single family residential, multi-family residential and landscape accounts. The rate structure was instituted to promote the efficient use of water, and is designed to provide customers a significant economic incentive to use the proper amount of water required to serve indoor and outdoor (landscape) demands. This is accomplished by setting a customized "allocation" for each customer account based on a variety of factors such as: irrigated area, daily weather characteristics, size of household, and other more unique characteristics such as the presence of a pool, livestock or medical needs. Water is then sold to customers under a four tier structure based upon their monthly allocation which varies for landscape use relating to daily weather patterns. Customers using water within their allocation purchase water in the lower two tiers. Customers using in excess of their allocation also purchase water in the remaining two tiers that generally will result in relatively high water bills which can send a strong price signal for excessive use. The tiered rate structure was also designed so that 70 percent of the rate is variable.

Retail Wastewater Rates

Conservation pricing of sewer service provides incentives to reduce average or peak use, or both. Such pricing includes: (a) rates designed to recover the cost of providing service, and (b) billing for sewer service based on metered water use.

The following characterizes conservation pricing of sewer services:

1) Uniform rates in which the unit rate is the same across all units of service
2) Increasing block rates in which the unit rate increases as the quantity of units purchased increases
3) Rates in which the unit rate is based upon the long-run marginal cost or the cost of adding the next unit of capacity to the sewer system

Rates that charge customers a fixed amount per billing cycle for sewer service regardless of the unit of service consumed; and/or rates in which the typical bill is determined by high fixed charges and low commodity charges do not satisfy the definition of conservation pricing of sewer services.

Coverage requirements: Maintain a rate structure for sewer service consistent with the characteristics of conservation pricing for services.

Compliance method: EMWD has met the coverage requirements in the following ways:

EMWD complies with an at least as effective approach. EMWD and RCWD, its largest sub agency, both have allocation-based tiered rate billing structures. The allocation-based tiered rate billing structure sends a strong price signal against using excessive water both indoors and outdoors. EMWD also uses the household size provided water budgets to tier sewer pricing. Finally, EMWD recycles all of its wastewater and reuses it within the service area. These method are at least as effective as a conserving rate structure for wastewater.

9.2.4 Public Education and Outreach

California water agencies have played a major role in promoting water use efficiency through both public information and school education programs. EMWD's Public and Governmental Affairs and Education Programs for its retail service area are described below.

Public Information Programs (BMP 2.1)

Public information programs are an effective tool to educate customers about the need for water use efficiency and to influence customer behavior towards conservation. The following actions are necessary to implement a public information program to promote water conservation and related benefits:

- Public speakers to employees, community groups and the media
- Advertising using paid and public service
- Customer communication using bill inserts and on bill comparison charts for multi-year usage
- Coordination with government agencies, industry groups, public interest groups and media
- Marketing designed to change attitudes and influence behavior

Coverage requirements: Maintain an active public information program to promote and educate customers about water conservation and water use efficiency. Minimum program components consist of: (1) providing public speakers to employees, community groups and the media; using paid and public service advertising; using bill inserts; providing information on customers' bills; providing public information to promote water conservation measures and coordinating with other government agencies, industry groups, public interest groups and the media; (2) social marketing elements which are designed to change attitudes and influence behavior. This includes seeking input from the public to shape the water conservation message, training stakeholders outside the utility staff in water conservation priorities and techniques; and developing partnerships with stakeholders who carry the conservation message to their target markets; and (3) wholesale agency or another lead regional agency may operate all or part of the education program.

Compliance method: EMWD has met the coverage requirements in the following ways:

1) EMWD provides public speakers at new employee orientation which is conducted twice each year; provides information to employees via intranet updates on a regular basis; and occasionally provides employees with fact sheets or talking points on industry issues that may be topics of discussion with individuals outside of EMWD. Public speakers are also provided to community groups, in a variety of settings such as rotary clubs, homeowners associations, religious organizations, mobile home parks, etc. EMWD's active speakers' bureau provides multiple presentations each month. EMWD maintains an active relationship with reporters by phone, email and direct contact regarding topical issues relating the need to encourage water use efficiency throughout its service area. EMWD utilizes a number of means for paid advertising such as the Riverside County Fair program, various Chambers of Commerce programs and newsletters, and Community Council newsletters. Monthly cable slides are used for public service advertising. Customer communication includes bill inserts, bill messaging, monthly usage comparisons on the water bills and bi-monthly newsletters.

2) EMWD provides public information to promote water conservation measures. In an effort to affect changes in attitude and influence behavior, EMWD has active pages on common social

media sites that are updated regularly, and a conservation website that is updated on a regular basis. Addressing the subject of training stakeholders, EMWD has hosted and/or conducted workshops for landscape professionals, providing certification opportunities for smart irrigation controller technologies. EMWD's Board members hold Director Advisory Committee meetings with stakeholders throughout the year; and staff members attend/participate at local city councils, planning commissions, and chambers of commerce events.

3) EMWD's Education Program uses a variety of grade-appropriate curriculum to educate area students about the importance of water use efficiency. Through its wide range of programs, EMWD reaches more than 60,000 students per year. The long-term objective of the program is to establish positive water use efficiency habits at a young age in order to have a future generation of ratepayers who understand the importance of using water efficiently. Among the programs offered are: school assembly programs, field trips to the San Jacinto Wetlands and Education Center, classroom presentations, annual "Write-Off" contests where students write and illustrate a water-themed book, and participation in regional poster contests.

EMWD participates in MWD's regional rebate programs administered through SoCal Water$mart for residential and commercial customers.

School Education Programs (BMP 2.2)

School education programs have been implemented to reach the youngest water users at an early age and reinforce the need to engage in water conservation as a life-long behavior. The following actions are necessary to implement school education programs to promote water conservation and related benefits:

1) Provide instructional assistance to school districts and private schools within service area

2) Provide educational materials and classroom presentations that identify urban, agricultural and environmental issues and conditions in the local watershed

3) Develop and/or provide grade appropriate educational materials that meet the state education framework requirements

Coverage requirements: Maintain an active school education program to educate students in the agency's service area about water conservation and efficient water use. Minimum program components consist of: (1) implement a school education program to promote water conservation and related benefits; (2) work with school districts and private schools in the service area to provide instruction assistance, educational materials and classroom presentations that identify urban, agricultural, and environmental issues and conditions in the local watershed. Educational materials must meet the state education framework requirements; and (3) wholesale agency or another lead regional agency may operate all or part of the education program.

Compliance method: EMWD has met the coverage requirements in the following ways:

1) EMWD has a very robust school education program that promotes water conservation and all aspects of environmental education. Additionally, EMWD works very closely with public and private schools within both its retail and wholesale service areas to provide educational materials which are in alignment with the California content standards for grades K-12.

2) EMWD provides classroom presentations covering water conservation, potable water treatment, wastewater treatment, and all aspects of environmental education. EMWD sponsors weekly field trips for students in eleven school districts throughout EMWD's service area to tour one of EMWD's wastewater treatment facilities and wetlands project and includes water education activities that are conducted in the education facility. EMWD provides materials developed by EMWD education staff and the MWD and for K-12 students. EMWD has also developed a variety of curriculum for K-5 students including.

- Wastewater Treatment for All Curious Beings – activity book

- Dewie the Dragon – curriculum packet
- Gobi's Adventure – curriculum packet
- Otis the Turtle gets Water Wise – curriculum packet
- Lily and the Seven Drops
- Bartholomew the Bird Investigates How to Use Water Wisely

The following contests are also promoted by EMWD on a quarterly basis:

- Grades K-5 Students – Poster contest "Water Use it Wisely" and "Get Savvy About Water Conservation"
- Grades 6-8 Students – Language Arts contest (resulted in a published book, written & illustrated by 6-8 grade students)
- Grades 9-12 Students – Solar Cup event (MWD provides boat hull for students to assemble and EMWD provides financial support for students to outfit the boat with a motor and solar panels)

EMWD participates in the following school and community activities:

- Environmental, science, health, and community fairs – provide activities and materials
- Annual environmental youth conference – provided in partnership with other agencies
- Sponsoring an environmental assembly program for schools in EMWD's service area

EMWD offers the following assistance for teachers in the service area:

- Financial assistance to take the online college-level course "Teaching the Water Story" (EMWD, in partnership with other local agencies, developed an online college-level course, "Teaching the Water Story." This course is offered to students worldwide through Fresno Pacific University)
- Training programs offered by EMWD and MWD
- Training workshops offered by EMWD in partnership with other agencies to spotlight programs
- Training for Project WET offered

EMWD is one of MWD's member agencies, as such MWD has taken the lead as the wholesale agency in the Student Art Program and the Annual Solar Cup Event. MWD has also provided curriculum for K-12 students.

9.2.5 Programs to Assess and Management Distribution System Real Loss

Water Loss Control (BMP 1.2)

The goals of modern water loss control methods include both an increase in water use efficiency in the utility operations and proper economic valuation of water losses to support water loss control activities. In May 2009, the AWWA published the 3rd Edition M36 Manual "Water Audits and Loss Control Programs." BMP 1.2 incorporates these new water loss management procedures and applies them in California. Agencies are expected to use the AWWA Free Water Audit Software to complete their standard water audit and water balance. For the 2015 UWMP, water agencies are required to calculate water loss using the AWWA software as discussed in *Chapter 4 – System Water Use*.

Coverage requirements: (1) Compile the standard water audit and balance annually, using the AWWA software, and beginning in the 2nd year of implementation agencies are to test source, import, and production meters annually. (2) During the first four years of implementation, agencies shall improve the data accuracy and data completeness of the standard water balance, and achieve a "Water Audit Data Validity" score of 66 or higher using the AWWA software; and achieve data validity level IV no later than the end of the 5th year of implementation. (3) During the first four years of implementation, seek training in the AWWA water audit method and component analysis process, and complete a component analysis of real losses; and update analysis no less than every four years. (4) During years five through ten

of implementation, agencies shall demonstrate progress in water loss control performance as measured by the AWWA software real loss performance indicator "gallons per service connection per day;" gallons per mile of mains per day;" or achieving a performance indicator score that is (a) less than the agency's score the previous year; (b) less than the average of the agency's scores for the previous three years; (c) in the top 20 percent of all signatory agencies reporting with a Data Validity Level IV or (d) in year six and beyond, reducing real losses to or below the benchmark value determined by the Council's process. (5) Repair all reported leaks and breaks to the extent cost effective, establish and maintain a record keeping system for the repair of reported leaks by the end of year two, and include estimated leakage volume and repair cost to report by the end of year four. (6) Locate and repair unreported leaks to the extent cost effective.

Compliance method: EMWD has met the coverage requirements in the following ways:

1) EMWD has compiled the standard water audit report for FY 2014/2015 and submitted it to CUWCC in February of 2016. The following methods are used to test source, import and production meters:

   Source Meters: Well meters are recalibrated annually. Filtration Plant and Desalter system supply meters are monitored against the raw water supply meters and serviced as needed. A program for scheduled meter maintenance is being developed.

   Import Meters: MWD tests their connection meters bi-annually. EMWD's system meters are recalibrated annually and flows are monitored daily. Significant differences with MWD deliveries are addressed jointly between EMWD and MWD.

   Production Meters: Production meters are bench tested by a certified independent laboratory. A plan to do volumetric testing at the sites is being developed.

2) EMWD has contracted with a qualified water loss control consultant, Water System Optimization, Inc. (WSO) to do an audit and balance; evaluate existing data, methods and procedures, and recommend a phased program of improvements to data accuracy and completeness. EMWD will pursue phased implementation of recommended improvements based on justification and cost effectiveness. EMWD currently has a Water Audit Data Validity score of 78.

3) Staff has attended AWWA sponsored training and a large cross section of staff attended a kick-off meeting to explain objectives and methodology.

4) EMWD has completed two component analyses of real losses for FY 2009/2010 and FY 2013/2014.

5) EMWD repairs reported leaks and breaks to the extent that are cost effective. Currently, a work order tracking system is used to track pipeline and service leaks by type and completed repairs. This system is effective on a general scale; however, a more detailed system is needed to identify and track leaks more accurately. WSO will assist EMWD in developing a detailed tracking system.

6) In order to identify unreported leaks, a continuous water use notification system was implemented in February 2016 which notifies customers of the presence of a constant water flow running through their meter (for every hour for several days), which is a strong indication of a possible leak.

9.2.6 Water Conservation Program Coordination and Staffing Support

Conservation Coordinator (BMP 1.1.1)

Coverage requirements: Staff maintains the position of trained conservation coordinator, or equivalent consulting support, and provides that function with the necessary resources to implement BMPs.

Compliance method: EMWD has met the coverage requirements for this practice; full time Conservation staff consists of one conservation analyst one conservation program manager, two conservation program specialists, and one conservation program assistant.

The conservation analyst serves as a liaison between EMWD and other public agencies, community and industry groups, and the media; recommends, develops and coordinates implementation of EMWD conservation programs; and assists in analyzing program goals, performance measures, and sources of funding. The conservation program manager participates in the implementation of conservation programs; develops and implements programs to inform, educate and assist with efficient water use and conservation; represents EMWD with customers in community events and meetings regarding conservation issues; and develops and implements methods to measure improvements in water use efficiency and customer satisfaction. The conservation program specialists assist in the development and implementation of conservation programs; conduct water leak investigations; issue citations to enforce mandatory water conservation ordinances during times of water shortage; and represent EMWD with customers and community events and meetings on conservation issues. The conservation program assistant performs a variety of customer service functions related to water conservation; assists with residential, landscape and CII water surveys; measures landscape area for water budgets; sends water waste notices; researches problems; and conducts related duties assigned.

9.2.7 Other Demand Management Measures

Residential (BMPs 3.1, 3.2, 3.3, and 3.4)

Residential water users throughout California depend on a reliable and safe supply of water for their homes. This BMP will define the best and most proven water conservation methods and measures that SFR and MFR customers, working in conjunction with water agencies, can implement to increase water use efficiency and reliability.

Compliance with the Residential Programmatic BMP category can be achieved by two approaches; traditional implementation as prescribed by the components of the BMP category or by the Flex Track Menu Alternatives option.

The traditional approach includes completing the coverage requirements, as defined in the BMP category for residential water surveys, residential plumbing retrofits, high efficiency washing machines and toilet replacements.

The Flex Track Menu Alternative allows an agency to achieve water savings by implementing alternative programs that are able to track water savings and/or focusing on one or more of the prescribed components of the BMP category.

Residential Assistance Program (BMP 3.1)

Traditional coverage requirements: Determine the current number of SFR accounts and MFR units in EMWD's service area. Provide site specific leak detection assistance that may include, (a) water conservation surveys; (b) water efficiency suggestions; and/or (c) inspection, to an average of 1.5 percent per year of current SFR accounts and 1.5 percent per year of MFR units during the 10-year period covering FY 2009/2010 – FY 2018/2019. After meeting the 15 percent target, program maintenance will continue at a level of high-bill complaints with a minimum of 0.75 percent per year for SFR accounts and 0.75 percent per year MFR units. WSS showerheads and faucet aerators may be provided to customers as needed.

Approach: In 1997 EMWD's Conservation staff began performing residential surveys on a limited basis; during FY 2007/2008 and a portion of FY 2008/2009 these surveys were outsourced to a third party. In early 2009, the number of Conservation staff members increased, and in April 2009 the function of performing residential surveys was resumed by internal staff. With a dramatic increase in field and office work in August 2013, the residential surveys were outsourced to a new vendor "Water-Wise Consulting" and to date the vendor continues to perform both residential and multi-family home surveys. More than

4,111 surveys have been completed since 1997. Components of the indoor water survey include checking the water meter leak detector and testing the water meter for accuracy; testing flow rates for kitchen faucet, bathroom faucet(s) and showerhead(s) to determine gallons per minute (gpm); verify toilet(s) gallons per flush and perform a leak detection dye test on each toilet; verify use of dishwasher, hot water heater setting and clothes washer type. Upon completion of each survey, the customer is provided with a report that includes survey results and water efficient recommendations, along with information on incentives for eligible water saving devices when available. Showerheads, aerators and toilet flappers are distributed with surveys as needed.

In addition to surveys EMWD provides leak detection assistance to customers through the distribution of conservation packets. On average, staff members also distribute more than 250 conservation packets to residential customers each month. These packets are available in both English and Spanish to accommodate the needs of a majority of EMWD's residential retail customers. Conservation packets provide the customer with information on how to read their water meter, leak detection dye tablets for toilets, and instructions on how to identify leaks in the home.

In January 2010, EMWD began to distribute Outdoor Water Use Efficiency Kits to residential customers. The Outdoor Water Use Efficiency Kit is designed to help residential customers create a custom irrigation schedule, repair a leaky hose and eliminate water running from an unattended hose. To date 1,068 outdoor kits have been distributed. Since 1990, EMWD has maintained a program to provide residential customers with water efficient showerheads and faucet aerators; over 65,000 devices have been distributed to SFR and MFR customers. These devices continue to be distributed when needed and are made available to customers at EMWD's office, as part of the residential survey program and at various outreach events.

EMWD has determined that the current number of SFR accounts for FY 2013/2014 amount to 129,811 and MFR units amount to 30,568.

This BMP will continue to be met through the Flex Track option using various methods listed above.

Landscape Water Survey (BMP 3.2)

Traditional coverage requirements: Determine the current number of SFR accounts in EMWD's service area. Perform site specific landscape water surveys to an average of 1.5 percent per year of current SFR accounts during the first 10 years. After completing the 15 percent target, program maintenance will continue at a level of high-bill complaints with a minimum of 0.75 percent per year for SFR accounts.

Approach: EMWD has determined that the current number of SFR accounts for FY 2013/2014 amount to 129,811. The landscape water survey requirement is being met through the implementation of tiered rates. A water budget for efficient landscape irrigation was developed for all residential customers. The water budget is enforced monthly through a tiered billing system. For those who exceed budget targets a residential survey may be performed to assist the customer in identifying where water can be saved. Staff members and/or the vendor perform on-site landscape surveys as part of the complete residential survey. Components of the outdoor water survey for SFR accounts include checking the water meter leak detector and testing the water meter for accuracy; checking irrigation timer programming; running a one minute test for each irrigation station to obtain gpm data and checking for system leaks; checking system pressure; obtaining plant and soil type(s) for reporting and measuring irrigated landscape area. Upon completion of each survey, the customer is provided with a report that includes survey results and a watering schedule, water efficient recommendations, and information on incentives for eligible water saving devices when available. EMWD has also developed a cost share program for the direct installation of residential smart irrigation controllers, high-efficiency precision nozzles, and on-site landscape surveys as a component of this program.

This BMP will be met through the Flex Track option as described above.

High Efficiency Clothes Washers (BMP 3.3)

Traditional coverage requirements: Provide financial incentives or institute an ordinance requiring the purchase of High Efficiency Clothes Washers (HECW) to meet an average water factor value of 5.0. Financial incentives shall be provided for the purchase of HECWs to 0.9 percent of current SFR accounts during the first reporting period and 1.0 percent per year for the remainder of the 10-year period. An alternative method is to demonstrate 1.4 percent per year of the market penetration during the first ten years.

Approach: EMWD has determined that the current number of SFR accounts for FY 2013/2014 amount to 129,811 and MFR units amount to 30,568. EMWD has provided incentives for HECWs since 2001 and to date an estimated 15,788 HECWs have received financial incentives, of which approximately 14,736 have an average water factor of 5.0 or less. In late 2010, EMWD established partnerships with USBR through grant funding, and Southern California Gas Company, for the direct installation of 1,700 HECWs with a water factor of 4.0 or less.

This BMP will be met through the Flex Track option with EMWD's incentive program and direct install program.

WaterSense Specification Toilets (BMP 3.4)

Traditional coverage requirements: Provide incentives or an ordinance requiring the replacement of toilets using 3.5 or more gallons per flush with toilets meeting WSS. Compliance will entail demonstrating a number of toilet replacements of 3.5 gallons per flush or greater toilets at or above the level achieved through a retrofit on resale ordinance until 2014, or a market saturation of 75 percent is demonstrated, whichever is sooner.

Approach: EMWD began offering incentives for toilet retrofits in 1992, beginning with Ultra Low-Flush Toilets (ULFT). Incentives included customer rebates and free distribution events. Incentives for High Efficiency Toilets (HET) were added in 2005. HET incentive programs included customer rebates, free distribution events and a direct installation program which began in 2008. Since the program's beginning in 1992, EMWD has provided incentives for approximately 17,371 ULFTs and approximately 25,414 HETs. To continue to encourage the installation of water saving devices, the Replace and Save Multi-Family Toilet Program was implemented in 2014 and was targeted towards multi-family customers to help reduce or eliminate the cost associated with replacing older inefficient toilets with new efficient toilets. The program was completed in 2015 and resulted in the direct installation of 1,269 toilets with a water factor of 1.0 or less.

This BMP will be met through the Flex Track option with EMWD's direct installation programs conducted during FY 2008/2009 through FY 2013/2014.

Commercial, Industrial, and Institutional (BMP 4)

CII water demands make up a large percentage of total demand for California. CII water use varies dramatically between business sectors as well as within a given water agency's territory. The goal of this BMP is to implement comprehensive yet flexible BMPs, allowing each water agency to tailor the implementation of each practice to fit local needs and opportunities. The end result is a practice that is successful and will produce the greatest amount of cost-effective water savings.

Traditional coverage requirements: Implement measures to achieve the water savings goal for CII accounts of 10 percent of the 2008 baseline water use over a 10-year period. To remain on track to meet the annual water savings goal, estimated savings for the first two-year reporting period may be up to 0.5 percent followed by 2.4 percent by the end of year four; 4.3 percent by the end of year six; 6.4 percent by the end of year eight; and 9 percent by the end of year 10. EMWD uses FY data and reporting periods are as follows:

1) FY 2008/2009 – FY 2009/2010 (first two-year reporting period)

2) FY 2010/2011 – FY 2011/2012 (end of year four)
3) FY 2012/2013 – FY 2013/2014 (end of year six)
4) FY 2014/2015 – FY 2015/2016 (end of year eight)
5) FY 2016/2017 – FY 2017/2018 (end of year ten)

Compliance method for CII Programmatic BMP: Baseline water use for EMWD's CII customers in 2008 was a total of 7,763 AF. Credit for prior activities, as reported through the BMP database, will be given for up to 50 percent of the goal. EMWD is in compliance with the CII Programmatic BMP through an at-least-as-effective approach. Because of the savings potential and customer response to programs, EMWD has exceeded water conservation targets in the residential and landscape sectors. The sum of savings from BMP 3, 4 and 5 exceed the sum of the targets for BMP 3, 4 and 5. Therefore the additional saving in the residential and landscape sectors is at least as effective as implementing additional savings by CII customers. This is reflected in EMWD's 2013/2014 compliance report.

EMWD continues to encourage efficiency by CII customers. Financial incentives provided for by MWD for a variety of water efficient devices used in the CII sector are administered through the SoCal Water$mart regional rebate program. In 2008, EMWD implemented the Public School Retrofit program; providing surveys and direct installation of both indoor and outdoor devices for more than 40 school sites within EMWD's retail service area. In 2009, conservation staff developed a program to identify CII accounts with mixed use meters, accounts with the highest water use are contacted first and offered CII water use surveys; to date an estimated 4,406 accounts have been contacted and 365 surveys have been completed. Components of the CII water use survey include checking the water meter leak detector and testing the water meter for accuracy; checking irrigation timer programming; running a one minute test for each irrigation station obtain gpm data and check for system leaks; checking system pressure; obtaining plant and soil type(s) for reporting and measuring irrigated landscape area. Upon completion of each survey, the customer is provided with a report that includes survey results and a watering schedule, water efficient recommendations, and information on incentives for eligible water saving devices when available.

Landscape (BMP 5)

Irrigation accounts for a large portion of urban water use in California. Irrigation water use varies dramatically depending on water pricing and availability, plant choice, geographic locations, seasonal conditions, and the level of commitment to sound water efficiency practices. The goal of this BMP is that irrigators, with assistance from signatories, will achieve a higher level of water use efficiency consistent with the actual irrigation needs of the plant materials. Reaching this goal would reduce overall demands for water, reduce demands during the peak summer months, and still result in a healthy and vibrant landscape in California.

Agencies shall provide non-residential customers with support and incentives to improve their landscape water use efficiency. Credit will be given for documented water savings for prior activities through 2008.

Accounts with Dedicated Irrigation Meters

Traditional coverage requirements: (1) Identify accounts with dedicated irrigation meters and assign ETo-based water budgets equal to no more than an average of 70 percent of annual average local ETo per square foot of landscape area. (2) Provide notices each billing cycle showing the relationship between the budget and actual consumption. (3) Offer site-specific technical assistance to reduce water use to those accounts that are 20 percent over budget at a rate of nine percent per year with 90 percent over 10 years. (4) Implement and maintain a customer incentive program for irrigation equipment retrofits.

The MWELO currently requires 70 percent ETo; should this ordinance be revised to reduce water allowance, this BMP will be revised automatically to reflect that change.

Recreational areas (portions of parks, playgrounds, sports fields, golf courses, or school yards in public and private projects where turf provides a playing surface or serves other high-use recreational purposes) and areas permanently and solely dedicated to edible plants, such as orchards and vegetable gardens, may require water in addition to the water use budget. These designated areas may not exceed 100 percent ETo on an annual basis.

Approach: (1) Through the tiered rate process, EMWD has developed water budgets for 100 percent of dedicated landscape accounts; (2) Water bills for these accounts include data that reflect the relationship between the water budget 70 percent ETo and actual usage; (3) Each water bill for dedicated landscape meters provides a contact number with an offer for assistance. An audit program and technical assistance are made available to customers that make a request; and (4) EMWD has offered financial incentive programs for landscape since 1992, including large landscape audits, soil moisture sensors, weather-based irrigation controller (WBIC) rebates and distribution, large rotary nozzle rebates, and rotating nozzle and synthetic turf rebates. In 2006, EMWD implemented a program to supplement the cost of high efficiency nozzles, including labor for installation, for large landscape accounts. In 2008, EMWD also implemented a public school retrofit program that includes the direct installation of WBICs and high efficiency nozzles. In 2012, EMWD implemented the Large Landscape Assistance Program which provides large landscape customers with the option to have Toro precision nozzles directly installed or receive a voucher for high efficiency nozzles and smart controllers. To date, 41,347 nozzles and 102 smart controllers have been installed.

Commercial, Industrial, Institutional Accounts without Meters or with Mixed-Use Meters

Traditional coverage requirements: (1) Develop and implement a strategy, targeting and marketing large landscape water use surveys to CII accounts with mixed-use meters. (2) Complete irrigation water use surveys for not less than 15 percent of all CII accounts with mixed-use meters within 10 years at an average rate of 1.5 percent per year. (3) Implement and maintain a customer incentive program for irrigation equipment retrofits.

Approach: (1) EMWD's retail service area includes an estimated 4,500 CII accounts. (2) In July 2009, Conservation staff developed a program to identify CII accounts with mixed use meters and offer on-site surveys, to date 4,406 accounts have been contacted and 365 surveys have been completed. (3) EMWD has offered financial incentive programs for landscape since 1992, including large landscape audits, soil moisture sensors, WBIC rebate and distribution, large rotary nozzle rebates, rotating nozzle and synthetic turf rebates.

9.3 Wholesale Area Demand Management Measures

As a wholesale agency, EMWD is responsible for implementing a subset of the CUWCC BMPs as well as assisting its wholesale customers with their own BMP implementation. EMWD works closely with its wholesale customers to help fund, market, and implement a number of BMP programs.

9.3.1 Metering

All of EMWD's wholesale customers are fully metered and billed volumetrically each month.

9.3.2 Public Education and Outreach

As a wholesale agency, EMWD maintains extensive Public Information and School Education Programs for all of its wholesale customers.

Public Information Programs

As a wholesale agency, EMWD takes the lead in an annual landscaping competition with customers from EMWD, Western Municipal Water District, Inland Empire Utilities Agency, and the respective sub agencies. EMWD provides support to other water agencies during Community Water Conservation Festivals and other related functions. EMWD has initiated a long-term campaign to encourage all

customers to use water wisely. EMWD sponsors workshops on California-friendly plants to promote landscaping using drought tolerant plants and the Water Waste Program to report/correct the wasteful use of water. The New Residential Development Campaign is targeted at new residential customers and consists of a welcome letter, a quarterly newsletter containing seasonal tips and ideas for water conservation, and a survey. EMWD enforces local and state landscape ordinances through the use of budget based tiered rates.

School Education Programs

As discussed in Section 9.2.4, EMWD implements an Education Program to foster understanding of water and wastewater issues and to promote wise water use among the future leaders of the community. EMWD supports an extensive education program designed to provide a useful academic experience at all grade levels (K-12). Any school within EMWDs sphere of influence and beyond is eligible to benefit from the program. EMWD offers resources such as lesson plans, curriculum packets, and student materials.

As a wholesale agency, EMWD has created the language arts program "Write Off" for middle school students, and is the lead agency in partnership with RCWD, a sub agency of EMWD. Multiple presentations, which include complete curriculum packets, have resulted from this program, and agencies throughout California and other states have either duplicated the program or have requested materials to add to their current education programs.

9.3.3 Water Conservation Program Coordination and Staffing Support

Conservation Coordinator

As mentioned in Section 9.2.6, EMWD maintains full-time Conservation staff including one conservation analyst, one conservation program manager, two conservation program specialists, and one conservation program assistant.

9.3.4 Other Demand Management Measures

EMWD's wholesale agencies' customers are eligible to participate in the region-wide rebate program offered through MWD. EMWD has also worked with wholesale customers to implement agency administered programs funded in part by MWD. EMWD provides support and information about water use efficiency to sub agencies, and offers training opportunities in landscape efficiency. EMWD also partners with wholesale customers on an annual water festival for customers that promote water use efficiency.

EMWD has a volume based rate structure for wholesale customers.

9.3.5 Asset Management

EMWD's wholesale distribution system asset management program is the same as its retail asset management program.

The mission of EMWD is to deliver value to customers and the communities within the EMWD's service area by providing safe, reliable, economical and environmentally sustainable water, wastewater and recycled water services. One of the ways this mission is carried out is through the EMWD's Asset Management program. This program was established to effectively manage assets throughout their lifecycle. The underpinnings of this program are rooted research of other water agencies that have implemented Asset Management Plans.

One of the key components of the program is EMWD's Computerized Maintenance Management System. This system is a transactional database system that is used to capture physical attributes as well as work activities performed on assets. Asset technicians manage the asset records during new construction, refurbishment and replacements. Two of the initial attributes captured for asset records are installation date and original purchase price. In addition, other important data is collected such as horsepower, rpm,

power requirements, etc. Asset grouping is employed to compare histories of like assets. Further analysis may provide insight on premature failures and lead to the procurement of better performing assets.

The lifecycles of assets are determined by a number of factors. Due to the nature of business at EMWD, assets may be found in office, potable water, wastewater and recycled water operating environments. Wastewater produces the harshest operating conditions and, therefore, decreases the life of an asset more than other EMWD environments. Another factor that impacts the life of an asset is its expected life. Empirical data is the best indicator for predicting an asset's expected life. This takes into account the operating conditions of the asset at a particular location using real-world parameters. However, this method takes time to build history from maintenance activities. An alternative method entails using industry standards from similar operations. Combining these factors allows for the remaining life of assets to be calculated.

An Asset Management model was produced to provide a framework for business decisions related to the replacement and refurbishment (R&R) of EMWD's assets. The inputs to the model include the physical location, remaining life expectancy, and the corrective maintenance costs. The health of an asset can be determined, in part, by the cost of maintenance relative to like assets. For example, if a potable pump historically costs more to maintain than another potable pump operating under similar conditions it should be further analyzed to understand the cause. Another input to the model includes EMWD's Capital Improvement Projects. By including Capital Improvement Project commitments into the model, assets that are likely candidates based on maintenance costs or end of life may be excluded from R&R consideration.

Output from the Asset Management model is provided to management for budget preparation. Assets may be grouped by site for a holistic review. Furthermore, the model allows for grouping of assets by maintenance responsibility whether electrical, mechanical or other maintenance group. Management can easily review assets nearing end of life or with higher than usual maintenance costs. Assets are earmarked for budget inclusion or deferred to a future budget cycle. These decisions are recorded in the Asset Management model for future reference.

9.3.6 Wholesale Supplier Assistance Program

Wholesale Agency Assistance Programs (BMP 1.1.3)

Coverage requirements: (a) Wholesale agency programs include financial investments and building partnerships, when mutually agreeable and beneficial to a wholesaler and its retail agencies, and cost effectiveness assessments, including avoided cost per AF, for each BMP the wholesale agency is potentially obligated to support. (b) When requested, the wholesale agency will provide technical support, incentives, staff or consultant support, and equivalent resources to retail members to assist or otherwise support the implementation of BMPs. (c) When mutually beneficial to a wholesaler and its retail agencies, a wholesaler may offer program management and BMP reporting assistance to its retailers. Wholesale agencies have limited control over retail agencies, thus wholesale agencies cannot be held responsible for levels of implementation by individual retailers in their wholesale service area. (d) Water shortage allocation plans or policies will encourage and reward investment in long-term conservation. (e) Wholesale water agencies will report on non-signatory BMP implementation, when possible. (f) Wholesale agencies will encourage CUWCC membership and offer recruitment assistance.

Compliance method: EMWD has met the coverage requirements in the following ways:

a) Financial incentives provided for by MWD for a variety of water efficient devices are administered through the SoCal Water$mart regional rebate program for residential and commercial customers. Both residential and commercial customers of EMWD's sub agencies are eligible to participate in the regional rebate programs.

b) EMWD has hosted and/or conducted workshops for landscape professionals, including personnel and customers of EMWD's sub agencies, providing certification opportunities for smart irrigation

controller technologies. EMWD's Board members hold Director Advisory Committee meetings with stakeholders throughout the year; and staff members attend/participate at local city councils and planning commissions. EMWD also provides assistance to sub agencies with various GIS mapping requests.

c) EMWD is the first water agency in Riverside County to offer the Qualified Water Efficient Landscaper (QWEL) professional certification program which provides landscape professionals with 24 hours of education on principles of proper plant selection for the local climate, irrigation system design and maintenance, and irrigation system programming and operation. In order to obtain the QWEL certification an individual must demonstrate their ability to perform an irrigation system audit as well as pass the QWEL exam.

d) Staff meets with sub agencies to discuss conservation related topics. Regional incentive programs are administered though vendors assigned by MWD and sub agencies are encouraged to participate in these programs. MWD hosts monthly water use efficiency meetings to discuss the implementation of conservation programs; EMWD's sub agencies are encouraged to participate.

e) Under the WSCP, supply to wholesale customers will be allocated using the formula and methodology based on MWD's WSAP as described in *Chapter 7 – Water Supply Reliability Assessment*. This plan takes into consideration: the impact on retail customers and the economy; population and growth; changes and/or loss of local supply; reclamation and recycling; conservation; and investment in local resources. EMWD will establish base period demands and then adjust them for growth and changes in local supply. Regional shortages will be phased in 10 stages. At each stage the wholesale customers will not experience shortages on the wholesale level that are greater than one-and-a-half times the percentage shortage of regional water supplies; nor will they face a retail shortage less than the regional shortage. Credits will be given for conservation and investment in local supplies.

f) EMWD will evaluate the feasibility to provide BMP reports for sub agencies that are non-signatories with CUWCC.

EMWD has encouraged sub agencies to become signatories of the CUWCC.

9.4 EMWD Implementation Plan for Water Use Reduction

EMWD estimates water saving have occurred due to ordinances in place, the implementation of tiered rates and active conservation. As discussed in Section 9.5 below, EMWD will continue to improve water efficiency through a budget based tiered rate, requirements for water efficiency in new construction and an active conservation program. Water use reduction will be focused on outdoor demand reduction by all customer types. Even after surpassing its water efficiency target, EMWD estimates that there is the potential for additional conservation savings through 2040.

EMWD will continue to reduce potable water demand to meet the goals of SBx7-7 in two ways: using recycled water to offset potable water demand and reducing demand for water through conservation. In December 2015, EMWD completed a Water Use Efficiency Master Plan which articulates the goals, strategies, and tactics required to deliver long-term solutions for secure and reliable water supplies. The Water Use Efficiency Master Plan helped to identify and update the targets for saving water through active conservation and provided a portfolio of projects and actions that can meet or exceed the requirements of SBx7-7.

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Chapter 10 Plan Adoption, Submittal, and Implementation

10.1 Notice of Public Hearing

EMWD encouraged public participation during the development of the 2015 UWMP and provided opportunities for public review and comment. First, EMWD sent out notices to cities within its retail and wholesale service area and the County of Riverside to inform these stakeholders that the UWMP was being reviewed, modified, and prepared in advance of the 60-day period leading up to the public hearing. Additional notices went out to these agencies announcing when the draft UWMP would be available for public review and announcing the time and date of the public hearing, as documented in Table 10-1 and Table 10-2.

Notices of the public hearing were also published in the local newspaper and placed at the EMWD office. The notice included the time and date of the hearing and stated that the draft UWMP was available for public review and comment until June 15, 2016 at the EMWD office or on EMWD's website. A copy of the public notice is provided in Appendix K.

EMWD conducted the public hearing on June 15, 2016 at the EMWD office to hear and discuss public comments on the draft 2015 UWMP prior to EMWD Board adoption. No written comments were received on the draft UWMP.

Table 10-1: Retail Notification to Cities and Counties

DWR Table 10-1 Retail: Notification to Cities and Counties		
City Name	**60 Day Notice**	**Notice of Public Hearing**
City of Beaumont	☑	☑
City of Menifee	☑	☑
City of Moreno Valley	☑	☑
City of Murrieta	☑	☑
City of Riverside	☑	☑
City of Temecula	☑	☑
County Name	**60 Day Notice**	**Notice of Public Hearing**
Riverside County	☑	☑

Table 10-2: Wholesale Notification to Cities and Counties

DWR Table 10-1 Wholesale: Notification to Cities and Counties		
☑	Supplier has notified 10 or fewer cities or counties. **Complete the table below.**	
City Name	**60 Day Notice**	**Notice of Public Hearing**
City of Perris	☑	☑
City of Hemet	☑	☑
City of San Jacinto	☑	☑
Lake Hemet Municipal Water District	☑	☑
Nuevo Water Company	☑	☑
Rancho California Water District	☑	☑
Western Municipal Water District	☑	☑
Elsinore Valley Municipal Water District	☑	☑
Metropolitan Water District of Southern California	☑	☑
County Name	**60 Day Notice**	**Notice of Public Hearing**
Riverside County	☑	☑

10.2 Plan Adoption and Submittal

The 2015 UWMP was adopted by the EMWD Board of Directors on June 15, 2016 by Resolution No. 2016-074 after the public hearing to receive public comments. A copy of the resolution is provided in Appendix L.

The 2015 UWMP will be submitted to DWR electronically prior to the CWC's deadline of July 1, 2016. No later than 30 days after adoption, EMWD will also submit a copy of the 2015 UWMP to the California State Library and to Riverside County and the cities EMWD provides water to. A hard copy of the 2015 UWMP will be made publically available at the EMWD office and an electronic copy of the 2015 UWMP will be available for public viewing on the EMWD website.

10.3 Plan Implementation

EMWD plans to implement the adopted UWMP in accordance with the schedule described in the plan. The 2015 UWMP will be implemented to meet the 2020 urban water use target for retail demand. Daily per capita water use will be reduced through offsetting potable water demands using the methods described in this plan, including increasing the use of recycled water and implementing demand management measures. Any amendments made to this UWMP will require completion of the same series of notification, public hearing, adoption, and submittals as required in submittal of this original 2015 UWMP.