City of El Monte

2023 Water Master Plan - Final

August 2023

City of El Monte
Department of Public Works
3990 Arden Dr.
El Monte, CA 91731

MKN | 16310 BAKE PARKWAY | IRVINE, CA 92614 | T 714.213.9758

THIS PAGE LEFT INTENTIONALLY BLANK

City of El Monte

2023 Water Master Plan

Final - August 2023

City Council

Jessica Ancona - Major

Martin Herrera - Mayor Pro Tem

Alma Puente - Council Member

Victoria Martinez Muela - Council Member

Richard Rojo - Council Member

City Staff

Don Nguyen, Utilities Manager

George Cambero

Kristan Lloyd

MKN & Associates

Michael Nunley, PE

Robert Lepore, GISP

Henry Liang, PE

Cindy Sevilla Esparza, EIT

Chris Haugen, EIT

Prepared Under the Responsible Charge of:

Michael Nunley, PE
MKN & Associates, Inc.

THIS PAGE LEFT INTENTIONALLY BLANK

TABLE OF CONTENTS, LIST OF TABLES, AND FIGURES

THIS PAGE LEFT INTENTIONALLY BLANK

List of Tables

List of Figures

Appendices

List of Acronyms

AC	Asbestos Cement
ADD	Average Day Demand
AF	Acre Feet
AFY	Acre Feet per Year
AGWTP	Arden Groundwater Treatment Plant
AWWA	American Water Works Association
BPS	Booster Pump Station
CCR	California Code of Regulations Consumer Confidence Report
CFS	Cubic Feet per Second
CI	Cast Iron
CII	Commercial Industrial Institutional
CWD	Community Water District
CIP	Capital Improvements Program
DI	Ductile Iron
DLR	Detection Limit for Reporting
DOF	California Department of Finance
EMOU	El Monte Operable Unit
ENR	Engineering News-Record
EPA	Environmental Protection Agency
EX-WDCIP	Existing Water Distribution Capital Improvement Project
EX-WSCIP	Existing Water Supply Capital Improvement Project
EX-STCIP	Existing Storage Capital Improvement Project
F-WSCIP	Future Water Supply Capital Improvement Project
FF	Fire Flow
FPS	Feet per Second
FY	Fiscal Year
GAC	Granulated Activated Carbon
GIS	Geographic Information System
GPCD	Gallons per capita per day
GPD	Gallons per day
GPM	Gallons per Minute
GM	General Manager
HP	Horsepower
LACSD	Los Angeles County Sanitation District
LACFD	Los Angeles County Fire Department
LF	Linear Feet
LGAC	Liquid Phase Granular Activated Carbon
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDD	Maximum Day Demand
MDD+FF	Maximum Day Demand plus Fire-flow
MG	Million Gallons
MGD	Million Gallons per Day
MKN	MKN & Associates, Inc
MWD	Metropolitan Water District
N/A	Not Applicable
ND	No Detection
OSY	Operating Safe Yield
PHD	Peak Hour Demand
PHG	Public Health Goal
PRV	Pressure Reducing Valve
PSI	Pound per Square Inch
PV	Present Value
PVC	Polyvinyl Chloride
RDA	Water Resource Development Assessment
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SF	Square Feet
SFR	Single Family Residential
SMCL	Secondary Maximum Contaminant Level
STL	Steel
UWMP	Urban Water Management Plan
VOC	Volatile Organic Compounds
WMP	Water Master Plan
WQA	Water Quality Authority
$/LF	Dollars per Linear Foot

Previous Studies and Reports

The following reports, studies, and other resources were reviewed during preparation of this Water Master Plan report.

1. City of El Monte 2020 Urban Water Management Plan dated August 2022 and prepared by MKN & Associates
2. Permit Amendment No. 1910038PA-004 EMOU Permit Amendment dated January 25, 2019 and prepared by the State Water Resources Control Board
3. Corrosion Engineering Evaluation and Cleaning of Two Welded Steel Water Storage Tanks dated May 2019 and prepared by Harper & Associates Engineering, Inc.
4. City of El Monte Water Distribution System Model Memorandum dated May 7, 2018 and prepared by Geosyntec Consultants
5. El Monte Sanitary Survey dated October 1, 2018 and prepared by the State Water Resources Control Board
6. Modeling for New Well Supply Memorandum dated January 25, 2017 and prepared by Psomas
7. 2010 Water Master Plan Update dated February 2010 and prepared by Civil Tec Engineering
8. Water Distribution Systems Handbook by McGraw Hill

THIS PAGE LEFT INTENTIONALLY BLANK

EXECUTIVE SUMMARY

The City of El Monte's 2023 Water Master Plan (Master Plan) accomplished the following elements related to serving existing and future demand conditions within the City's service area:

- Updated water demands based on current water meter information
- Updated the analysis and design criteria
- Updated the City's existing hydraulic model
- Analyzed the water system with the updated hydraulic model and identified new hydraulic deficiencies
- Analyzed the City's water supply and storage capabilities compared with system demands
- Conducted a limited condition assessment of the City's major water facilities
- Developed a capital improvement program with recommended improvements to address existing and future deficiencies over a 20-year planning horizon

Capital Improvement Program Prioritization

Projects were assigned a priority based on the following capital improvement program prioritization schedule, which categorizes CIPs into four groups and are described as follows:

- Priority 1 – Highest: This project is highly recommended because of the significant near-term risk it mitigates or benefit it produces. Resources from other sources should be diverted to this project if available.
- Priority 2 – High: This project is less critical but is still considered a high priority because of the risk it mitigates or benefit it produces.
- Priority 3 – Medium: This project is needed to mitigate a moderate risk or deliver a moderate benefit or is a deferrable project that will need attention within a few years. This is needed to maintain or restore current service levels.
- Priority 4 – Low: This is a recommended project but does not meet any of the definitions above or is a deferrable project that needs attention within several years. If these projects are not completed in a timely manner, they may become higher priority projects later.

Capital Improvement Program Summary

To provide supply redundancy, the Master Plan recommends two (2) facility improvement projects. To address on-going operational and maintenance issues at the City's water supply and storage facilities, the Master Plan recommends seven (7) facility improvement projects.

The City's existing water system is capable of meeting all domestic demand scenarios, but the system is not able to meet fire flow scenarios throughout the City. The Master Plan recommends 53 pipeline improvement projects to address existing system deficiencies related to meeting fire flow demands. Pipeline improvements were prioritized based on the existing available fire flow (worst to best) that could be delivered prior to constructing new improvements.

Recommended Water Supply CIPs

The water supply projects include improvements for system redundancy and minor repairs at the existing wells based on the findings from the condition assessment of each well site. The condition assessment projects included ceiling repairs, addressing minor corrosion issues, adding anchorage supports, and painting/coating upgrades. The redundancy projects include the addition of standby power at two critical well sites.

Based on the cost analysis for future water supply sources, it was recommended that the City continue to purchase replenishment water from the Watermaster through the Water Resource Development Assessment (RDA) program as shown in **Table ES-1**.

Table ES-1: Summary of Supplemental Water Costs

Supply Options	Present Value for first five years
Water Resource Development Assessment (RDA)	$430,000
Leasing Water Rights	$1,760,000
Purchasing Water Rights	$2,130,000
Purchasing Imported Water from Upper San Gabriel Valley Municipal Water District	$3,140,000

The City has historically leased water rights when available and may consider continuing this practice as opportunities arise. Purchase of water rights would be preferred to enhance the City's long-term water security. However, availability of water rights for sale is not anticipated. Construction of an imported water intertie with the Upper San Gabriel Valley Municipal Water District is not a recommended option at this time. Imported water from the Upper San Gabriel Valley Municipal Water District is the most expensive option. The primary advantage of diversifying into imported water would be supply redundancy; however, the City currently maintains a number of emergency interties with neighboring water systems for such purposes.

Recommended Storage Facility CIPs

The storage facility projects include recommended repairs and rehabilitation of the existing tanks based on the findings from the condition assessment performed by Harper & Associates Engineering Inc. on May 2019 and projects described in the City's 2018 Sanitary Survey Report. The condition assessment projects included interior and exterior recoating, as well as multiple health and safety code feature upgrades. The Sanitary Survey Report projects included seismic upgrades and refurbishment.

Recommended Distribution System CIPs

The distribution system projects are specific upgrades to the existing system to address hydraulic deficiencies throughout the system based on fire flow deficiencies. The analysis results indicate the existing water distribution system can meet all potable water demand scenarios (average day demand, maximum day demand, and peak hour demand), and no improvements to address hydraulic deficiencies resulting from potable water demand scenarios are recommended. The upgrades consist of replacing existing undersized pipes with larger pipes, adding new pipes to address fire flow demands, and adding new facilities to serve demands.

Table ES-2 provides an overall summary of the recommended CIP costs by priorities and category of improvement.

Table ES-2: CIP Cost Summary by Priority

Category	Priority 1	Priority 2	Priority 3	Priority 4	Total
Water Supply – System Redundancy	$200,000	-	-	-	$200,000
Water Supply – Condition Deficiency	-	-	$93,000	-	$93,000
Storage – Condition Deficiency	$112,000	$1,500,000	$378,000	-	$1,990,000
Pipeline – Fire Flow Deficiency	$928,000	$2,370,000	$8,590,000	$8,219,000	$20,107,000
Total	**$1,240,000**	**$3,870,000**	**$9,061,000**	**$8,219,000**	**$22,390,000**

THIS PAGE LEFT INTENTIONALLY BLANK

1.0 INTRODUCTION AND OVERVIEW

This section provides an overview of the project study area, scope of work, and the status of recommended water system improvements from the City's 2010 Water Master Plan Update (2010 WMP).

1.1 Project Purpose

The goal for the 2023 Water Master Plan (Master Plan) update was to aid the City of El Monte (City) in developing a comprehensive capital improvement program for the existing water system. The major elements of the project included the following:

- Review of current water quality and water rights
- Capacity analysis of the existing water distribution system to service existing and future demand conditions
- Performance analysis including site inspections and limited condition assessment
- Development of recommended water system improvements to be included in the City's future Capital Improvement Program (CIP)

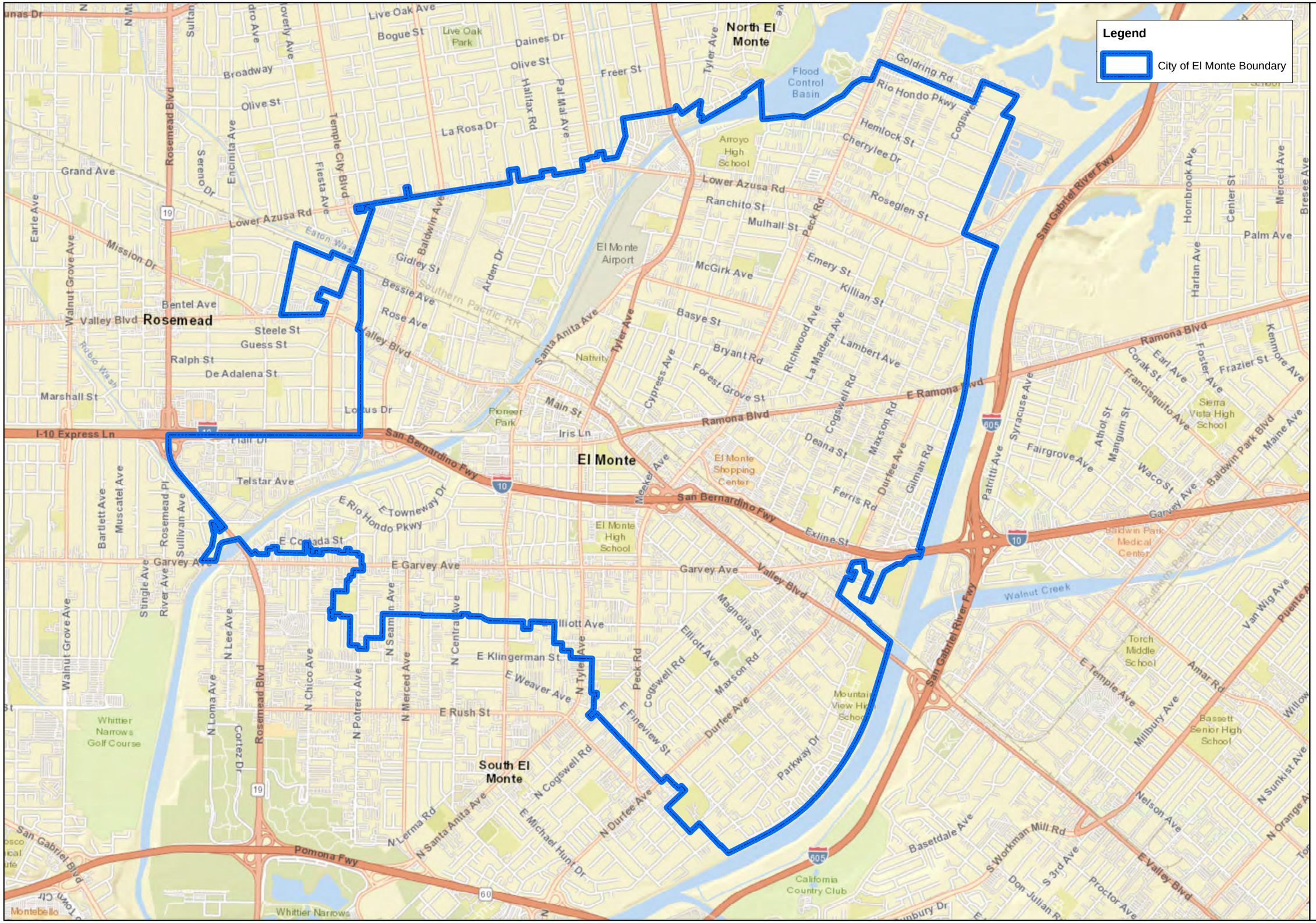
1.2 Study Area

The City is located in the south-central portion of Los Angeles County in Southern California. It is bordered to the north by the City of Arcadia and the City of Temple City, to the west by the City of Rosemead, to the east by the San Gabriel River and to the south by the City of South El Monte. The City occupies an area of 9.69 square miles. The City's water service area is about 17 percent of the City's total area, and the remainder is served by other purveyors.

The City's customers are a mix of primarily single and multi-family residential with numerous commercial, industrial and institutional services. Water service is provided to customers for domestic, irrigation, fire protection and manufacturing process use. The City's Water Department delivers potable water through a pressurized distribution system, which has approximately 42 miles of pipeline ranging from 2-inches to 16-inches in diameter. Other components of the City's water system include a one-million-gallon storage tank with three booster pumps, a 200,000-gallon elevated storage tank, nine wells with sodium hypochlorite disinfection, the Arden Groundwater Treatment Plant (AGWTP), and three emergency connections with neighboring water purveyors. Groundwater is treated with granulated activated carbon (GAC) filtration to remove volatile organic compounds (VOC).

The water service area population in 2020 was estimated at 20,300 and the water service area population is anticipated to increase to 23,070 by 2040. **Figure 1-1** shows the approximate location and boundary of the City of El Monte.

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

Figure 1-1:

Study Area Boundary Map

1 inch = 2,400 feet

THIS PAGE LEFT INTENTIONALLY BLANK

The City's Water Department provides water within a service area of 1,456 acres or 24% of the City's 6,154 acres. The water service area is divided into three districts: the Central District, the Northwestern District, and the Southern District. The Central District lies north of the San Bernardino Freeway, east of the Rio Hondo Channel and contains the principal business and shopping areas. The Northwestern District lies west of the Rio Hondo Channel and contains the heavier industries. The Southern District, which lies south of the San Bernardino Freeway, is predominantly residential. The remainder of the City is served by various water purveyors including the following: California American Water Company (10%), Del Rio Mutual Water Company (1%), Golden Station Water Company (2%), Hemlock Mutual Water Company (1%), Rurban Homes Mutual Water Company (2%), San Gabriel Valley Water Company (60%). **Figure 1-2** provides an overview of the City's Water Department water service area and the surrounding water purveyors.

1.3 Scope of Work

The following describes the scope of work executed to complete the Master Plan update for the City.

Data Collection and Review

MKN reviewed the following resources provided by the City for completing the Master Plan update and revising the current water system hydraulic model:

- ❑ 2010 Water Master Plan
- ❑ City Service Area Boundary Map
- ❑ Current Fire Flow Requirements
- ❑ Current Hydraulic Model
- ❑ Daily Production Data
- ❑ Data on Current Groundwater Rights
- ❑ Historical Water Billing Records
- ❑ Historical Water Supply Records
- ❑ Information Regarding the EMOU
- ❑ Map/GIS of Water System
- ❑ Previous Condition Assessments
- ❑ SCAG Population Data
- ❑ Water Audits for 2016 - 2020
- ❑ Water System Operating Permit

THIS PAGE LEFT INTENTIONALLY BLANK

Legend

- City of El Monte Boundary

City Water Purveyors (with % service area)

- California American Water Company (10%)
- Del Rio Mutual Water Company (1%)
- City of El Monte Water Department (24%)
- Golden Station Water Company (2%)
- Hemlock Mutual Water Company (1%)
- Rurban Homes Mutual Water Company (2%)
- San Gabriel Valley Water Company (60%)

City of El Monte

2023 Water Master Plan Update

Figure 1-2:

City Water Purveyors Map

1 inch = 2,400 feet

THIS PAGE LEFT INTENTIONALLY BLANK

Water Rights Assessment

Water rights issues were reviewed, and recommendations provided to continue to address the complex situation. Current and forecasted Metropolitan Water District (MWD) costs were reviewed for "on-demand" water supply. MKN reviewed documents regarding basin adjudications, water transfers, and contracts between the City and other agencies.

Limited Condition Assessment

A basic condition assessment of major existing facilities was conducted to determine their condition, capacity, and efficiency, compliance with code and safety requirements, and structural integrity. MKN conducted a facilities survey to identify and determine the overall operation efficiency of the facilities. Facilities that were reviewed included water storage facilities, treatment facilities, disinfection systems, wells, and interties with other agencies. Wells were evaluated based on an on-site visual inspection to make recommendations as to their usefulness. Additionally, operational data up to two years was reviewed and analyzed to assess the existing operational conditions.

Water Demand Projections

MKN reviewed 2010 Water Master Plan population projections and demands, including current population trends, and assessed the need for population projection adjustments. Information was obtained from the City Planning Department, SCAG, and other sources to project future growth to the year 2040. The 2020 Urban Water Management Plan (UWMP) incorporated these sources of information and was used to project future water demands.

Hydraulic Model and Calibration

MKN reviewed, updated, and calibrated the existing hydraulic model prior to using it for analysis, evaluating, testing, and planning upgrades for the system. The following demand scenarios were included in the exercise:

- ❑ Average day demand
- ❑ Maximum day demand
- ❑ Maximum day demand plus fire flows
- ❑ Peak hour demand

MKN modeled the existing system, identified or confirmed deficiencies in the existing system, and recommended improvements needed to resolve those deficiencies. The model was also used to analyze impacts of future development.

Water System Evaluation

The water system evaluation reviewed the ability of the existing water supply, storage, and distribution facilities to serve existing and future demand conditions. Improvements were recommended to ensure available supply capacity and address fire flow deficiencies.

Capital Improvement Program

MKN determined Capital Improvement Program (CIP) needs and emergency operational capabilities for the existing system and future development. A CIP structure was recommended to present improvement costs for the first 1-3 years, 5-year, 10-year, and 20-year plan. System improvement alternatives were evaluated to develop a water system improvement program, which will meet both the short- and long-range requirements of the City. Water system facilities that need to be replaced or upgraded were identified, such as pipelines, disinfection systems, and wells. Estimated construction costs, system improvement descriptions, and construction schedules were included.

2.0 LAND USE, POPULATION, AND FUTURE GROWTH

This section provides an overview of the land uses, population and future growth within the existing City water service area.

2.1 Land Use

The current City limits encompass approximately 9.69 square miles with the City providing service to approximately 24% of this area. **Table 2-1** provides an overview of existing land uses within the City water service area only. The City updated their 2011 General Plan with a 2021 - 2029 Housing Element and the existing land use from these documents is shown in **Figure 2-1**.

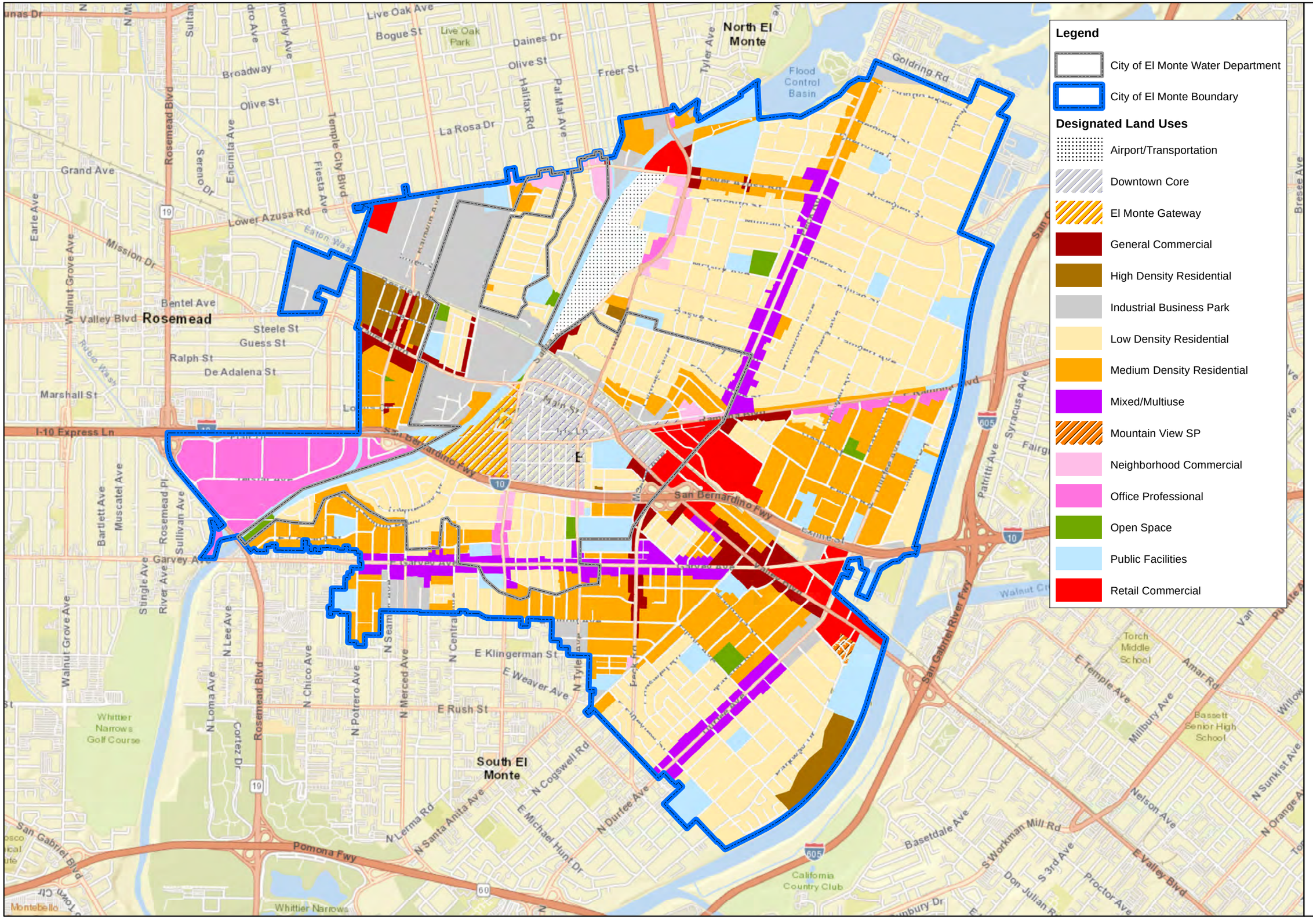
Table 2-1: Designated Land Uses

Category	General Plan Designation	Number of Parcels	Parcel Area (acres)
Residential	High Density Residential	2	3.7
	Medium Density Residential	401	96.0
	Medium Low Density Residential	23	5.0
	Low Density Residential	2,164	361.6
	Mixed/Multiuse	114	28.7
Commercial Industrial Institutional	Neighborhood Commercial	36	24.4
	Retail Commercial	84	28.7
	General Commercial	18	12.7
	Office Commercial	15	7.2
	Industrial Business Park	137	131.6
	Public Facilities	52	145.2
Open Space	Open Space	6	10.3
Transportation	Railroad	13	17.2
Specific Plan	Downtown Core	573	147.6
	El Monte Gateway	29	56.1
	Total	**3,667**	**1075.9**

2.2 Population and Future Growth

The City is designated by the Department of Water Resources as an economically disadvantaged community for purposes related to the California Water Plan, Integrated Regional Water Management, and Sustainable Groundwater Management. The City was incorporated in 1912, and historical population records were available from the State of California Department of Finance (DOF) beginning in 1920 through the year 2022. Future population projections for the Master Plan were based on available information from the Southern California Association of Governments (SCAG) through the year 2040.

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

Figure 2-1:

Existing Land Use Map

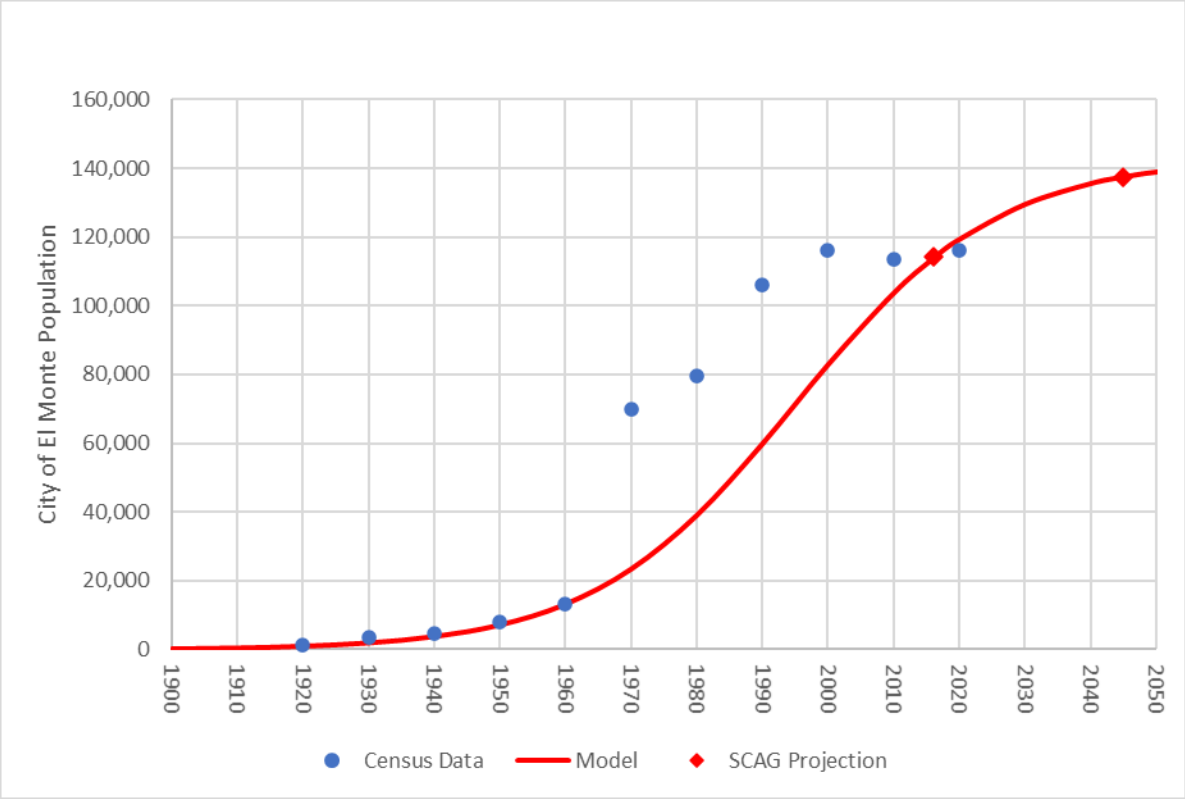
1 inch = 2,400 feet

mkn

THIS PAGE LEFT INTENTIONALLY BLANK

As presented in the City's 2020 UWMP, population within the water service area was estimated based on historical United States Census data for the City and the SCAG population growth forecast[1] for the City and is proportionate to the area served at 17% of the City's total parcel area. A model for the City's population projection is provided in **Figure 2-2**.

Figure 2-2: Population Projection from 2020 UWMP



The most current population estimate for the entire City is 109,907 based on 2021 population information. Applying the population projection model to the study period of this plan and assuming 17 percent of the City's population resides within the water service area, current and projected population estimates are provided in **Table 2-2** below.

Table 2-2: Population Forecast based on City's 2020 UWMP

Population Served	2020	2025	2030	2035	2040
Total	20,300	21,280	22,040	22,630	23,070
Notes: Future projections based on the City's 2020 Urban Water Management Plan					

[1] Southern California Association of Governments. (2020). Demographics and Growth Forecast Table 14: Jurisdiction-Level Growth Forecast https://scag.ca.gov/sites/main/files/file-attachments/0903fconnectsocal_demographics-and-growth-forecast.pdf?1606001579

THIS PAGE LEFT INTENTIONALLY BLANK

3.0 EXISTING AND PROJECTED WATER DEMANDS

This section provides an overview of historical water usage, existing water demand conditions, and future water demand projections.

3.1 Historical and Projected Water Usage

Figure 3-1 provides an overview of historical water use for residential, commercial, industrial, landscape uses, and system losses.

Figure 3-1: Average Historical Water Demands from 2015 to 2020

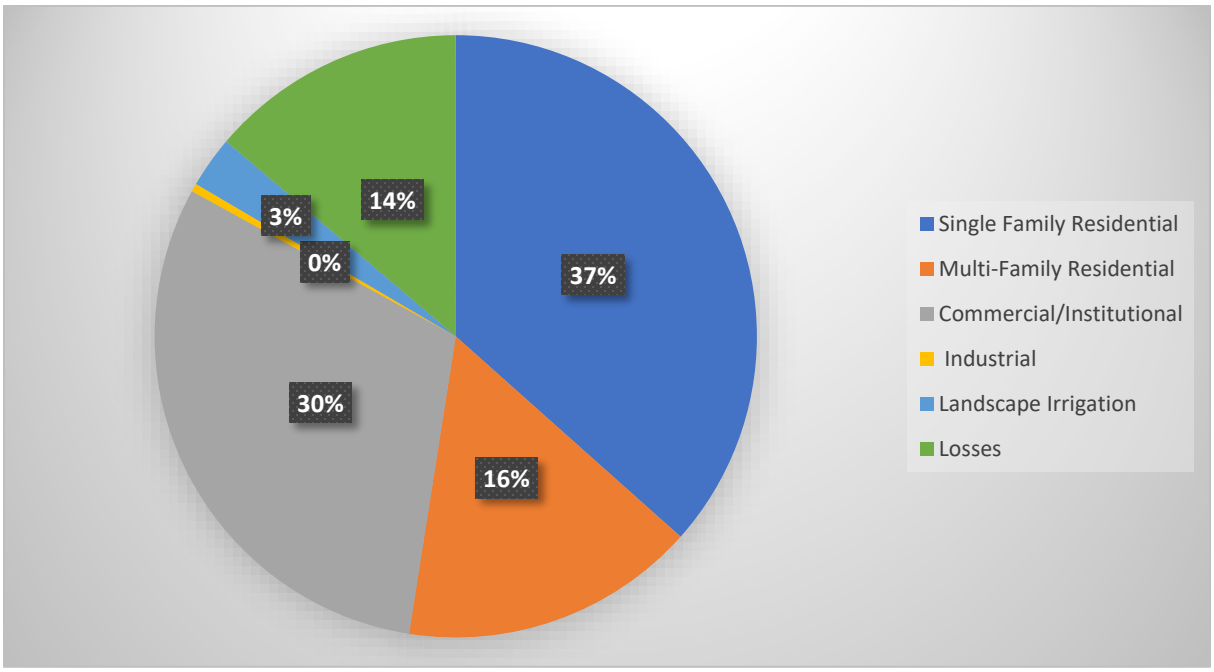


Table 3-1 provides a summary of historical and projected usage for residential, commercial, industrial, landscape uses, and system losses per the City's 2020 UWMP.

Table 3-1: Historical and Projected Potable Water Demands

Sector	2015	2020	2025	2030	2035	2040
Single Family Residential	832	833	915	948	973	992
Multi-Family Residential	344	362	398	412	423	431
Commercial/Institutional	657	695	764	791	812	828
Industrial	9	10	11	12	12	12
Landscape Irrigation	43	63	69	71	73	75
Losses	252	314	345	358	367	374
Total (AFY)	**2,137**	**2,277**	**2,502**	**2,592**	**2,660**	**2,712**
Total (MGD)	**1.9**	**2.0**	**2.2**	**2.3**	**2.4**	**2.4**

3.1.1 Non-Revenue Water

Based on a comparison of historical annual production and consumption reports (provided by the City), not all water supplied to the distribution system generates revenue for the City. This water loss is commonly referred to as Non-Revenue Water and can generally be accounted for as part of a system wide water audit. Based on the American Water Works Association (AWWA) Manual of Water Supply Practices M36 - Water Audits and Loss Control Programs, non-revenue water includes unbilled authorized consumption, apparent losses, and real losses as defined below:

- Unbilled Authorized Consumption – Typically authorized consumption by the utility that does not generate revenue and consists of the following:
    - Unbilled Metered Consumption: Includes all uses that are metered but do not generate revenue for the utility.
    - Unbilled Unmetered Consumption: Includes authorized uses by the utility that are not metered including reservoir draining, water quality testing, flushing water mains (hydrant flushing), firefighting, fire flow tests performed by the utility, street cleaning.
- Apparent Losses – The nonphysical losses that occur when water is successfully delivered to the customer but is not measured or recorded accurately, and consists of the following:
    - Unauthorized Consumption: Consumption that is not explicitly or implicitly authorized by the utility, commonly known as water theft.
    - Customer Metering Inaccuracies: Inaccuracies in registering water consumption by retail customer meters.
    - Systematic Data Handling Errors: Errors caused by accounting omissions, errant computer programming, data gaps, and data entry; inaccurate estimates used for accounts that fail to produce meter readings, and billing adjustments that manipulate billed consumption so as to generate a rightful financial credit in such a way that billed consumption does not reflect actual consumption.
- Real Losses – Physical water losses from the pressurized system (water mains and customer service connections) and the utility's storage tanks, up to the point of customer consumption. In metered systems this is the customer meter, whereas in unmetered situations this is the first point of consumption (stop tap/tap) within the property.

The city's annual water audits calculate these various factors as "water loss". Historical water losses per recent water audits are summarized in Table 3-2.

Table 3-2: Historical Water Losses			
Fiscal Year	Water Supplied (AFY)	Water Losses (AFY)	Water Losses (% of supply)
2016	Water Audit not available		
2017	Water Audit not available		
2018	2,340	288	12%
2019	2,158	324	15%
2020	2,277	314	14%

Based on the values shown in **Table 3-2**, the City's non-revenue water volume has ranged from 12% to 15% of total water produced annually.

3.1.2 Existing Demand Conditions

Three demand conditions were used to assess the existing water distribution system and include average day demand (ADD), maximum day demand (MDD), and peak hour demand (PHD). The following provides a brief description of each demand condition used throughout the Master Plan.

3.1.2.1. Average Day Demand

Average Day Demand is the total annual water usage averaged over the course of a year. This demand condition was developed as described in the UWMP and estimated to be 2.0 MGD or 1,412 gpm.

3.1.2.2. Maximum Day Demand

Maximum Day Demand represents the demand associated with the 24-hour period exhibiting the single highest demand for the entire year. For most agencies, MDD typically occurs during the summer as a result of increased irrigation demand but can vary. A peaking factor for MDD is most commonly determined by identifying the maximum day of production and comparing the maximum day to the average day production for that year. MKN compared the current MDD peaking with the previous master plan and found the factors to be similar. MKN utilized a MDD peaking factor of 1.55 x ADD. Using this approach, the MDD for the City was estimated to be 3.2 MGD or 2,188 gpm.

3.1.2.3. Peak Hour Demand

The PHD is generally determined by identifying and/or calculating the highest hourly demand within an existing water system based on best available system monitoring information such as tank levels, pumping records, supervisory control and data acquisition (SCADA). MKN compared the current PHD peaking with the previous master plan and found the factors to be similar. MKN utilized the PHD peaking factor of 2.65 x ADD. Using this approach, the PHD for the City was estimated to be 5.4 MGD or 3,741 gpm. **Table 3-3** provides a summary of the existing demand conditions and peaking factors used for the Master Plan.

Table 3-3: Existing Water Demand and Peaking Factors			
Demand Condition	Peaking Factor	Existing Water Demand (MGD)	Existing Water Demand (MGD)
Average Day Demand (ADD)	-	2.0	1,412
Maximum Day Demand (MDD)	1.55 x ADD	3.2	2,188
Peak Hour Demand (PHD)	2.65 x ADD	5.4	3,741

3.2 Future Demand Conditions

Per the City's 2020 UMWP, the City's water service area is essentially built out and will most likely experience modest development in the vicinity of the El Monte Metrolink Station. The estimated population increase within the City's water service was estimated at 23,070 in the year 2040. **Table 3-5** provides a summary of the 2040 future demand conditions used for the Master Plan.

Table 3-4: 2040 Future Water Demands			
Demand Condition	Peaking Factor	Future Water Demand (MGD)	Future Water Demand (MGD)
Average Day Demand (ADD)	-	2.4	1,681
Maximum Day Demand (MDD)	1.55 x ADD	3.8	2,606
Peak Hour Demand (PHD)	2.65 x ADD	6.4	4,456

4.0 WATER SUPPLY PORTFOLIO

This section provides an overview of the City's existing and future water supply.

4.1 Water Supply Overview

The City's existing water supply portfolio relies on groundwater wells and emergency interconnections with neighboring water agencies. There are currently no local or imported surface water sources of supply for the system.

4.1.1 Water Rights

The main source of water supply for the Water Department is groundwater pumped from the Main San Gabriel Basin. Water rights can vary year to year but are determined by the court and administered by the Main San Gabriel Basin Watermaster. Every year in the month of May, the Watermaster establishes an Operating Safe Yield (OSY) of the basin for the following fiscal year that corresponds to the Water Department's fiscal year (FY).

Per the Main San Gabriel Basin Watermaster 2020-2021 Annual Report, the City is identified as a pumper in the Main San Gabriel Groundwater Basin (Main Basin) with annual pumping rights of 1.41% of the Operating Safe Yield (OSY). The current OSY is 150,000 AFY and is anticipated to remain at this level through 2045. Under these conditions, the City's groundwater rights are 2,113 AFY.

Per the Watermaster, producers may pump in excess of annual pumping rights but must pay for supplemental untreated imported water to replenish the Main Basin. As such, the City will first exercise its pumping rights and then pump only as much additional water as is required to meet demand.

4.1.2 Historical and Existing Water Rights

Table 4-1 shows historical basin production water rights and the calculation of carryover. It includes total basin production water rights, water production, and transfers from FY 2009-2010 to 2020-2021, which were provided in the Main San Gabriel Basin Watermaster 2020-2021 Annual Report.

Table 4-1: Total Basin Production Rights and Production (AF)						
Fiscal Year	Basin OSY	Production Rights	Recorded Production	Replacement Water Requirement	Lost Carryover	Carryover to Next FY
2009-10	170,000	210,117	237,846	35,129	236	20,696
2010-11	170,000	201,220	227,657	33,084	168	21,696
2011-12	210,000	242,182	237,029	19,685	167	21,657
2012-13	200,000	254,314	242,914	5,979	268	44,143
2013-14	180,000	233,389	240,552	3,779	377	42,865
2014-15	150,000	197,280	208,339	12,319	420	35,226
2015-16	150,000	195,753	182,826	6,909	284	39,299
2016-17	150,000	199,994	197,243	7,526	286	34,894
2017-18	150,000	195,420	209,500	12,521	145	29,649
2018-19	150,000	189,435	190,156	10,747	299	34,603
2019-20	150,000	194,608	192,584	12,912	641	36,743
2020-21	150,000	197,340	207,822	10,776	176	25,117

Table 4-2 shows historical water production by the City from the Basin over the past five years. As discussed in the City's 2020 UWMP, these quantities exceeded the City's water rights allocation of 2,113 AFY. The City has relied on purchasing replenishment water from the Watermaster through the Water Resource Development Assessment (RDA) program in order to meet additional demands.

Table 4-2: Main Basin Historical Production						
Year	2016	2017	2018	2019	2020	Average
Production (AFY)	2,147	2,280	2,354	2,222	2,277	2,256

4.1.3 Analysis of Potential Supplemental Water Supplies

Following the recent reduction by the Watermaster in the Main San Gabriel Basin operating safe yield, the City has a reliable pumping allocation of 2,113 AFY. Based on current demand and demand projections, the reduced allocation will result in a supply shortfall (**Table 4-3**). To bridge the supply gap, the City may consider the following alternative sources of supply:

- ❑ Water Resource Development Assessment (RDA)
- ❑ Leasing Additional Water Rights
- ❑ Purchasing Additional Water Rights
- ❑ Constructing an Intertie and Purchasing Imported Water from Upper District

Note that water wheeling of imported water was not considered a viable option based on a discussion with the Upper District GM. The GM believes the City's neighbors do not have access to imported water and therefore cannot provide water wheeling services. In addition to new sources of water supply, the City may consider investing in water conservation to reduce demand. However, the City's per capita demand is already very low, so it is unlikely that conservation alone would bridge the supply gap.

4.1.4 Demand Projection and Supply Shortfall

The table below provides demand estimates by year consistent with the UWMP and the supply deficit assuming an ongoing allocation of 2,113 AFY (i.e. the City's allocation of the reduced safe yield in the Main San Gabriel Basin).

Table 4-3: Demand and Supply Deficit Projection		
Year	Demand (AF)	Supply Deficit (AF)
2020	2,277	164
2021	2,322	209
2022	2,367	254
2023	2,413	300
2024	2,458	345
2025	2,503	390
2026	2,521	408
2027	2,539	426
2028	2,556	443
2029	2,574	461
2030	2,592	479
2031	2,606	493
2032	2,620	507
2033	2,633	520
2034	2,647	534
2035	2,661	548
2036	2,671	558
2037	2,682	569
2038	2,692	579
2039	2,703	590
2040	2,713	600

The City's supply shortfall for the next five (5) years is provided in **Table 4-4** for use in the supplemental supply evaluation.

Table 4-4: Supply Shortfall 2023 – 2027			
Year Number	Year	Project Demand (AF)	Supply Shortfall (AF)
1	2023	2,413	300
2	2024	2,458	345
3	2025	2,503	390
4	2026	2,521	408
5	2027	2,539	426

A present value (PV) cost opinion was developed for each of the four supply options listed above based on a five-year projection of costs beginning in 2023. The following assumptions were applied to the cost opinions:

- Escalation Rate: The escalation rate represents inflation specific to water supply. Based on a review of recent cost escalation from MWD, 3.0% is a reasonable estimate for long-term increases.

- Discount Rate: The discount represents the cost of capital to the City. The 2.25% rate was established by the Bureau of Reclamation for 2022 concerning financing of water-related capital projects that are eligible for grant funding.
- Watermaster Pumping Assessment: $17/AF is an administrative fee assessed on all extractions from the Main San Gabriel Basin.
- Pumping O&M: This represents the unit cost for power to run the treatment, storage and distribution systems and is estimated as $32/AF.

4.1.5 Water Resource Development Assessment (RDA)

The Watermaster provides access to groundwater beyond a pumper's rights through the RDA program at a rate of $175/AF. The PV for five years of RDA supply is calculated at approximately $430,000 and shown in **Table 4-5**.

Table 4-5: Water Resource Development Assessment (RDA) Summary

Year	Demand (AF)	Escalation Rate	RDA	Assessment	O&M	Total Cost by Year	Present Value by Year
1	300	1.03	$54,075	$5,253	$9,888	$69,216	$67,693
2	345	1.06	$63,998	$6,217	$11,702	$81,917	$78,351
3	390	1.10	$75,075	$7,293	$13,728	$96,096	$89,891
4	408	1.13	$80,682	$7,838	$14,753	$103,273	$94,479
5	426	1.16	$86,478	$8,401	$15,813	$110,692	$99,037
						Total Present Value (Rounded)	**$430,000**

4.1.6 Leasing Additional Water Rights

Based on the transactions listed below, the 2022 cost to lease local water rights is estimated at $870/AF and shown in **Table 4-6**.

Table 4-6: 2022 Cost to Lease Local Water Rights

Lessee	Year	Volume (AF)	Cost	Unit Cost ($/AF)	Inflation Factor	Adjusted Unit Cost ($/AF)
La Puente Valley CWD	2021	43.89	$36,025.79	$821	1.0748	$882
City of Monrovia	2018	1000	$734,160.00	$734	1.1343	$833
City of Monrovia	2021	874.1	$717,671.36	$821	1.0748	$882
City of Industry	2021	350	$287,287.00	$821	1.0748	$882
					Average	**$870**

The Watermaster allows the lease of water rights based on agreements between parties within the basin. The PV for five years of leased water rights is calculated at approximately $1,760,000 and shown in **Table 4-7**.

Table 4-7: Five Years Leased Water Rights Cost							
Year	Demand (AF)	Escalation Rate	Lease	Assessment	O&M	Total Cost by Year	Present Value by Year
1	300	1.03	$268,830	$5,253	$9,888	$283,971	$277,722
2	345	1.06	$318,159	$6,217	$11,702	$336,078	$321,450
3	390	1.10	$373,230	$7,293	$13,728	$394,251	$368,793
4	408	1.13	$401,105	$7,838	$14,753	$423,696	$387,615
5	426	1.16	$429,919	$8,401	$15,813	$454,133	$406,318
						Total Present Value (Rounded)	$1,760,000

4.1.7 Purchasing Additional Water Rights

The City may opt to purchase water rights if they become available. The value of groundwater rights is estimated at $20,000/AFY for the purpose of this study, based on discussions with a confidential source. Cost will vary based on timing and availability of opportunities to purchase rights. For this estimate, 426 AFY (i.e. the supply shortfall in Year 5) is assumed to be purchased in Year 1 and financed for 30 years at an interest rate of 3.0%. The PV for five years of purchased water rights is calculated at approximately $2,130,000 and shown in **Table 4-8**.

Table 4-8: Five Years Purchased Water Rights Cost							
Year	Demand (AF)	Escalation Rate	Capitalized Purchase	Assessment	O&M	Total Cost by Year	Present Value by Year
1	300	1.03	$435,000	$5,253	$9,888	$450,141	$440,236
2	345	1.06	$435,000	$6,217	$11,702	$452,919	$433,206
3	390	1.10	$435,000	$7,293	$13,728	$456,021	$426,575
4	408	1.13	$435,000	$7,838	$14,753	$457,591	$418,624
5	426	1.16	$435,000	$8,401	$15,813	$459,214	$410,864
						Total Present Value (Rounded)	$2,130,000

4.1.8 Constructing an Intertie and Purchasing Imported Water from Upper District

The City is a member agency of the Upper District and may purchase imported treated surface water at a Tier 1 commodity rate of $1,246/AF plus an annual capacity charge of $12,200 per CFS based on an estimated capacity of 2 CFS. The capital cost to construct an intertie is estimated at $2,624,000 and shown in **Table 4-9**.

Table 4-9: Intertie Project Cost			
Item	Quantity	Unit Cost	Subtotal
Pipe	4,000[2]	$400	$1,600,000
Tie-in	2	$15,000	$30,000
Meter	1	$10,000	$10,000
Materials & Labor Subtotal			$1,640,000
Engineering (30% of Materials and Labor)			$292,000
Contingencies (30% of Materials and Labor)			$292,000
		Total	$2,624,000

[2] The nearest point of connection to the Middle Feeder is in the vicinity of the intersection Tyler Avenue and Rush Street approximately 4,000 feet from the southern boundary of the City's water service area.

This capital cost is consistent with the opinion of the Upper District GM based on discussions with MKN staff. For this estimate, the capital cost is assumed to be financed for 30 years at an interest rate of 3.0%. The PV for five years of purchased imported water is calculated at approximately $3,140,000 and shown in **Table 4-10**.

Table 4-10: Interconnection and Imported Water Cost

Year	Demand (AF)	Escalation Rate	Commodity Charge	Capacity Charge	Construction	Total Cost by Year	Present Value by Year
1	300	1.03	$385,014	$25,132	$134,000	$544,146	$532,172
2	345	1.06	$455,662	$25,864	$134,000	$615,526	$588,735
3	390	1.10	$534,534	$26,840	$134,000	$695,374	$650,472
4	408	1.13	$574,456	$27,572	$134,000	$736,028	$673,350
5	426	1.16	$615,723	$28,304	$134,000	$778,027	$696,110
						Total Present Value (Rounded)	**$3,140,000**

4.1.9 Summary of Potential Supplemental Water Supply Options

As shown below, continuing to purchase replenishment water from the Watermaster through the RDA program is the best value for the City as shown in **Table 4-11**.

Table 4-11: Summary of Supplemental Water Costs

Supply Options	Present Value for first five years
Water Resource Development Assessment (RDA)	$430,000
Leasing Water Rights	$1,760,000
Purchasing Water Rights	$2,130,000
Purchasing Imported Water from Upper District	$3,140,000

There may be limited availability of RDA supply in the future; however, the program is meeting City demands at this time. Upper District is working in coordination with MWD and Los Angeles County Sanitation District (LACSD) to bring advanced treated recycled water to the Main San Gabriel Basin for replenishment purposes, likely to supplement RDA; however, the project won't be completed for 10 years. The City has historically leased water rights when available and may consider continuing this practice as opportunities arise. Purchase of water rights would be preferred to enhance the City's long-term water security. However, availability of water rights for sale is not anticipated.

Construction of an imported water intertie with the Upper District is not a recommended option at this time. Imported water from the Upper District is the most expensive option. The primary advantage of diversifying into imported water would be supply redundancy; however, the City currently maintains a number of emergency interties with neighboring water systems for such purposes.

4.2 Current Water Quality Conditions

The City's drinking water quality is summarized in the City's 2021 Consumer Confidence Report (CCR) for groundwater and the City's distribution system (see **Appendix A)**. The CCR includes average concentrations for each constituent and a minimum and maximum concentration. The CCR also includes the Maximum Contaminant Level

(MCL), Public Health Goals (PHGs), Maximum Contaminant Level Goal (MCLG), and Detection Limit for Reporting purposes (DLR). **Table 4-12** provides a summary of the water quality in the City's groundwater supply.

Table 4-12: Groundwater Water Quality Summary

Constituents and (Units)	MCL	PHG or (MCLG)	DLR	Average Results	Range	Typical Origins
Primary Drinking Water Standards – Health Related Standards						
ORGANIC CHEMICALS (b)						
Tetrachloroethylene (PCE) (µg/L)	5	0.06	0.5	<0.5	ND - 2.1	Discharge from industrial activities
Trichloroethylene (TCE) (µg/L)	5	1.7	0.5	<0.5	ND - 0.51	
INORGANIC CHEMICALS						
Barium (mg/L)	1	2	0.1	0.1	ND - 0.11	Erosion of natural deposits
Flouride (mg/L)	2	1	0.1	0.1	0.23 - 0.89	
Nitrate as N (mg/L)	10	10	0.4	0.4	2.1 - 8.6	Leaching from fertilizer use
Nitrite as N (mg/L)	1	1	0.4	0.4	**ND - 1.1**	
RADIOACTIVITY (c)						
Gross Alpha Activity (pCi/L)	15	(0)	3	<3	ND - 7	Erosion of natural deposits
Uranium (pCi/L)	20	0.43	1	4	1.9 - 7.8	
Secondary Drinking Water Standards – Aesthetic Standards, Not Health-Related						
Chloride (mg/L)	500	N/A	N/A	20	14 - 29	Erosion of natural deposits
Copper (mg/L)	1	0.3	0.05	<0.05	ND - 0.13	
Iron (mg/L)	300	N/A	100	<100	ND - 210	Erosion of natural deposits; industrial wastes
Specific Conductance (µmho/cm)	1600	N/A	N/A	650	460 - 990	Substances that form ions in water
Sulfate (mg/L)	500	N/A	0.5	45	21 - 72	Erosion of natural deposits
Total Dissolved Solids (mg/L)	1000	N/A	N/A	380	250 - 570	
Turbidity (NTU)	5	N/A	0.1	0.15	ND - 0.51	
Other Constituents of Interest						
Hardness as CaCO3 (mg/L)	N/A	N/A	N/A	280	190 - 400	Erosion of natural deposits
Perflourohexane Sulfonic Acid (ng/L)	N/A	N/A	N/A	<4	ND - 5.2	Discharge from industrial activities
Perflourohexane Sulfonic Acid (ng/L)	NL = 6.5	N/A	N/A	<4	ND - 4.8	
Sodium (mg/L)	N/A	N/A	N/A	22	12 - 28	Erosion of natural deposits

Currently the City treats groundwater produced from Well No. 2 and 10 with Granular Activated Carbon Treatment Systems followed by chlorination, and Well No. 4 is chlorinated only. The constituents' concentrations in the City's groundwater are all below the MCL except for Nitrite as N. The average concentration of Nitrite as N in the City's groundwater is 0.4 mg/L which is below the MCL. However, the maximum concentration found is 1.1 mg/L, which exceeds the MCL by 0.1 mg/L. Currently Well No. 3 is impacted by volatile organic compounds and nitrate. To address the volatile organic compounds, the City installed a Granular Activated Carbon Treatment System at Well

No. 3. To address nitrate, the City blends groundwater from Well No. 3 with Well No. 2A and Well No. 3 is not operated independently.

The CCR also summarizes water quality results for the City's water distribution system shown in **Table 4-12** and the constituent concentrations in the City's distribution system are all below the MCL or Detection Limit for purposes of Reporting (DLR).

Table 4-13: Distribution Water Quality Summary						
CONSTITUENT AND (UNITS)	**MCL**	**PHG or (MCLG)**	**DLR**	**Average Results**	**Range**	**Typical Origins**
Primary Drinking Water Standards – Health Related Standards						
Microbiological						
E. Coli	0	0	NA	0	-	Human and animal fecal waste
Disinfectant Residual						
Chlorine Residual (mg/L)	4	4	NA	0.78	0.2-1.6	Drinking water disinfectant
Disinfectant By Products						
Total Trihalomethanes (TTHM) (ug/l)	80	NA	1	1.4	ND-2.9	Byproduct of drinking water disinfectant
Unregulated Constituents Requiring Monitoring						
CONSTITUENT AND (UNITS)	**NL**	**PHG or (MCLG)**		**Average Results**	**Range Minimum - Maximum**	**Most Recent Tests**
Bromide (µg/L)	N/A	N/A		160	90 - 280	2020
Manganese (µg/L) (d)	SMCL = 50	N/A		<0.4	ND - 0.72	2020
Total Organic Carbon (mg/L)	N/A	N/A		<1	ND - 1.6	2020

5.0 DISTRIBUTION SYSTEM OVERVIEW

This section provides an overview of the City's existing water distribution system including supply facilities, storage facilities, pump station, pipelines, and emergency interconnections.

5.1 Groundwater Supply

The City's Water Department currently has nine (9) wells consisting of wells 2A, 3, 4, 10, 12, 13, 14, 15, and 16 and are shown on **Figure 5-1.** All groundwater is treated to meet state and federal drinking water standards and pump from the Main San Gabriel Basin. **Table 5-1** provides a summary of each permitted well, associated capacity, and treatment.

Table 5-1: Groundwater Sources

Well No.	Pumping Capacity (gpm)	Status	Power Source	Backup Power	Treatment
2A	1,000	Active	Electric	Manual Transfer Switch	GAC treatment of water for VOC's followed by chlorination and blending with Well 3.
3	1,500	Inactive	Natural Gas	None	GAC treatment of water for VOC's followed by chlorination and Nitrate blending with Well 2A
4	1,300	Inactive	Natural Gas	Diesel	Chlorination
10	1,200	Active	Electric	None	GAC treatment for VOC's followed by chlorination
12	2,200	Active	Natural Gas	Diesel	GAC treatment for VOC's followed by chlorination
13	3,000	Inactive	Electric	Portable Diesel	Chlorination
14	360	Active	Electric	None	Arden Groundwater Treatment Plant (AGWTP) performs Liquid -Phase Granular Activated Carbon (LGAC) removal followed by chlorination
15	195	Active	Electric	None	
16	195	Active	Electric	None	

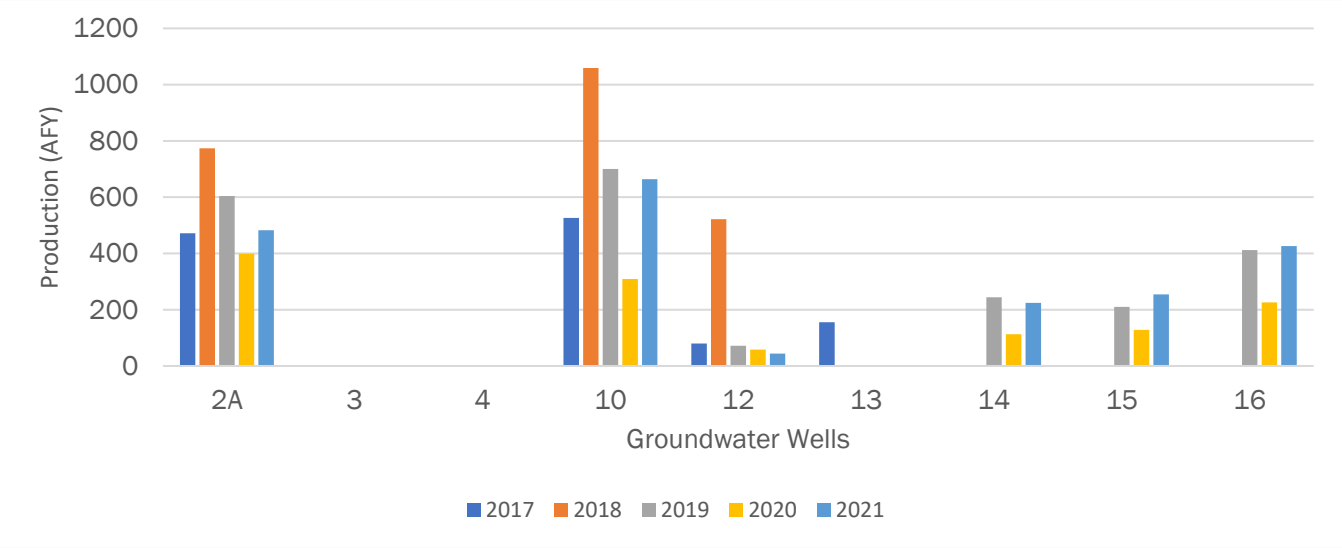
Notes:
1. Well No. 3 is currently out of service due to elevated VOC and nitrate concentrations
2. Well No. 4 is currently on standby status
3. Wells No. 3, 4 and 12 have existing natural gas engines
4. Pumping capacity based on values presented in the City's Permit Amendment No. 1910038PA-004 EMOU Permit Amendment dated January 25, 2019 and prepared by the State Water Resources Control Board

As documented in the El Monte Operable Unit (EMOU) Permit 1910038 (2019), all City wells have been affected by VOCs and/or nitrate contamination. Treatment systems are described above. EMOU addresses a 1-1/2 square mile area of contamination underlying parts of the City, the City of Rosemead, and Temple City. The primary contaminants are volatile organic compounds (VOCs). The San Gabriel Water Quality Authority (WQA) is a co-lead agency with the City for EMOU East Side Remedial Action Eastside Shallow Zone and Southern Deep Zone Remedy. The City completed construction of the Arden Groundwater Treatment Plant (AGWTP) in 2015 to treat Wells 14, 15,

and 16 which are located within the EMOU and the Permit included requirements for operating and monitoring the facility. The City coordinates with the EPA and other EMOU partners to remediate regional groundwater quality.

As identified in the "Modeling for New Well Supply Technical Memorandum[3] and verified with historical production records from 2017 to 2021, it was observed (**Figure 5-1**) that Well No. 2 and Well No. 10 are the primary production wells.

Figure 5-1: Historical Well Production



5.2 Emergency Interconnections

The City has three emergency interconnections to neighboring water agencies: California-American Water Company, San Gabriel Valley Water Company and Golden State Water Company, shown on **Figure 5-2**. The San Gabriel Valley Water Company and California American Water Company connections are used to delivery water to the Water Department with no return capability (except that the Golden State Water Company's connection is bi-directional). The San Gabriel Valley Water Company connection is manually operated by opening or closing a valve. The California American Water interconnection has an electronic control valve that is controlled through SCADA. Due to the Water Department typically carrying over the surplus of un-pumped groundwater rights each year, the emergency interconnections have not been recently utilized.

[3] Dated January 25, 2017 and prepared by Psomas

The existing formal agreements for these interconnections are lifetime agreements. Based on those agreements, the following design flows are available to supplement the Water Department's supply in times of emergency:

- San Gabriel Valley Water Company (Bryant Rd. at Cypress Ave.): 1,200 gpm through 6-inch connection
- California-American Water Company (Gibson Rd. north of Rose St.: 2,000 gpm through 8-inch connection
- Golden State Water Company (Pal Mal St. at Lower Azusa Rd.): 2,000 gpm through 8-inch connection

Therefore, the maximum amount of water that is potentially available from neighboring water agencies in the event of an emergency would be 5,200 gpm. The water availability through these connections is solely dependent on the ability of each water system to meet its own customer demands first. In consideration of a regional emergency event, like an earthquake, water from these connections is unlikely to be available.

5.3 Storage and Pumping Facilities

The Water Department has two water storage facilities including a 1-million gallon (MG) above-ground steel reservoir next to a 200,000-gallon elevated tank which is used for pressure regulation. Water distribution system reservoirs are typically used to supply the difference between peak diurnal changes in demand and the average daily demand and to meet fire flow demands. The 1-MG reservoir is currently not used for this purpose, but it is periodically drawn down to maintain water quality.

Water is pumped out of the reservoir through three booster pumps with a combined capacity of 2,400 gpm into the distribution system. The elevated tank regulates pressure and protects the system from surging by drawing water from the distribution system to relieve pressure and releasing water to the system to boost pressure.

5.4 Pipelines

The City's existing water distribution system consists of 42 miles of pipeline ranging from 1-inch to 16-inch with most of the system (67%) comprised of 6-inch and 8-inch pipelines. Approximately 46% of the distribution system consists of asbestos cement pipe (AC), with 33% cast iron pipe (CI), 18% steel (STL), and 3% ductile iron pipe (DI). The age of the system varies between 5 to 113 years old. **Table 5-1** summarize the existing water distribution system pipeline by size.

Table 5-2: Distribution System Inventory by Pipe Size

Diameter (Inches)	Length		
	Feet	Miles	Percent of Total
< 4	25,042	5	11%
6	75,578	14	34%
8	74,594	14	33%
10	32,336	6	15%
12	15,107	3	7%
16	56	0	0%
Total	**222,713**	**42**	**100%**

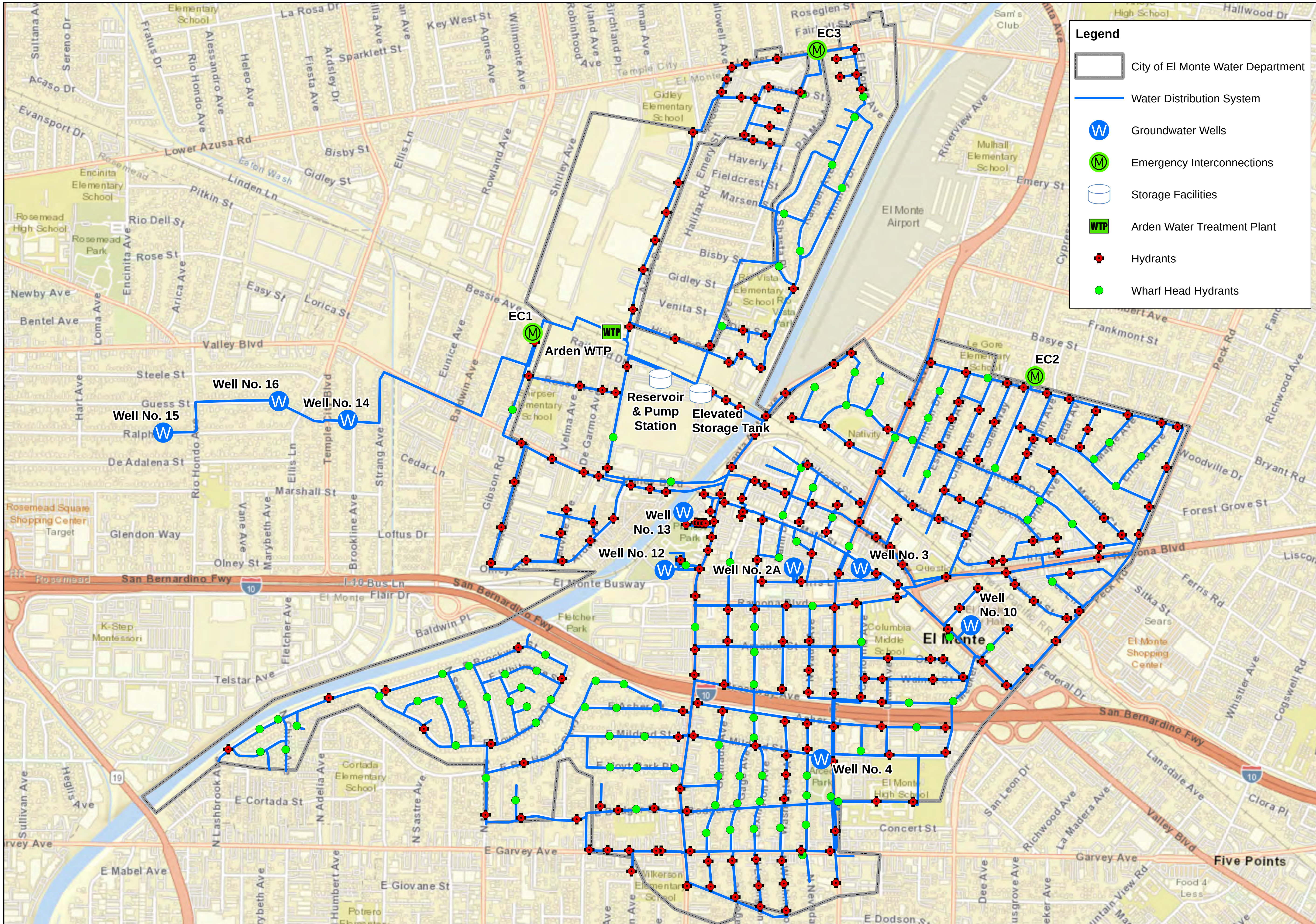
Table 5-2 summarizes the existing water distribution system by pipelines by material type.

Table 5-3: Distribution System Inventory by Pipe Material			
Material	Length		
	Feet	Miles	Percent of Total
Asbestos Cement	97,032	18	37%
Cast Iron	71,572	14	28%
Ductile Iron	14,992	3	6%
PVC	37,984	7	15%
Steel	37,984	7	15%
Total	**222,713**	**42**	**100%**

Table 5-3 summarizes the existing water distribution system by pipelines by installation period.

Table 5-4: Distribution System Inventory by Installation Year			
Installation Period	Length		
	Feet	Miles	Percent of Total
2001 - 2023	7,306	1	3%
1981 - 2000	9,140	2	4%
1961 - 1980	56,664	11	25%
1941 - 1960	92,533	18	42%
1921 - 1940	44,193	8	20%
1900 - 1920	1,229	0	1%
Unknown	11,648	2	5%
Total	222,713	42	100%

Figure 5-2 provides an overview of the existing distribution system, **Figure 5-3** is an updated hydraulic grade line schematic, **Figure 5-4** provides an overview of the City's existing distribution system based on diameter, and **Figure 5-5** provides an overview of the City's existing distribution system based on installation period.



City of El Monte

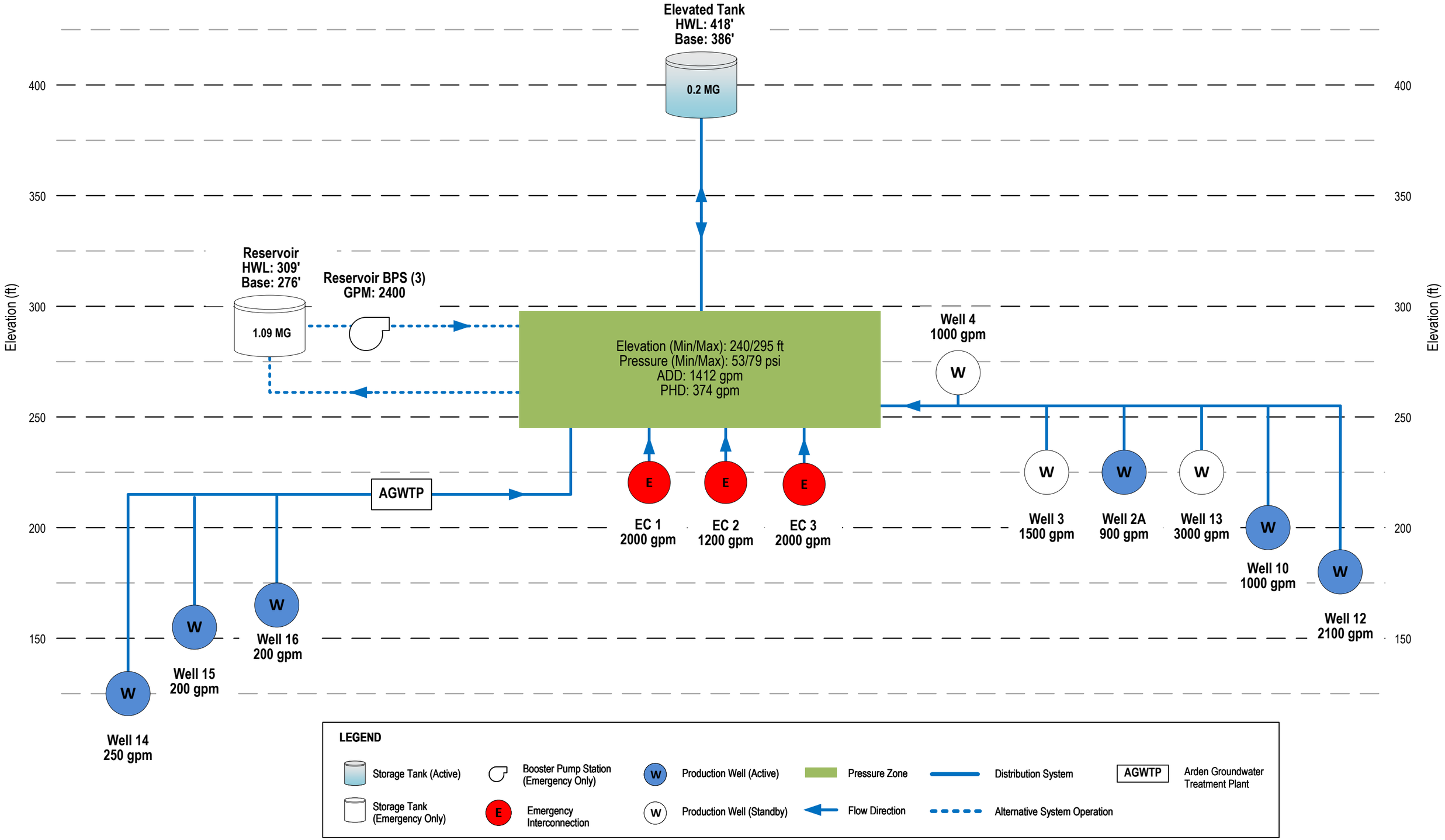
2023 Water Master Plan Update

Figure 5-2:

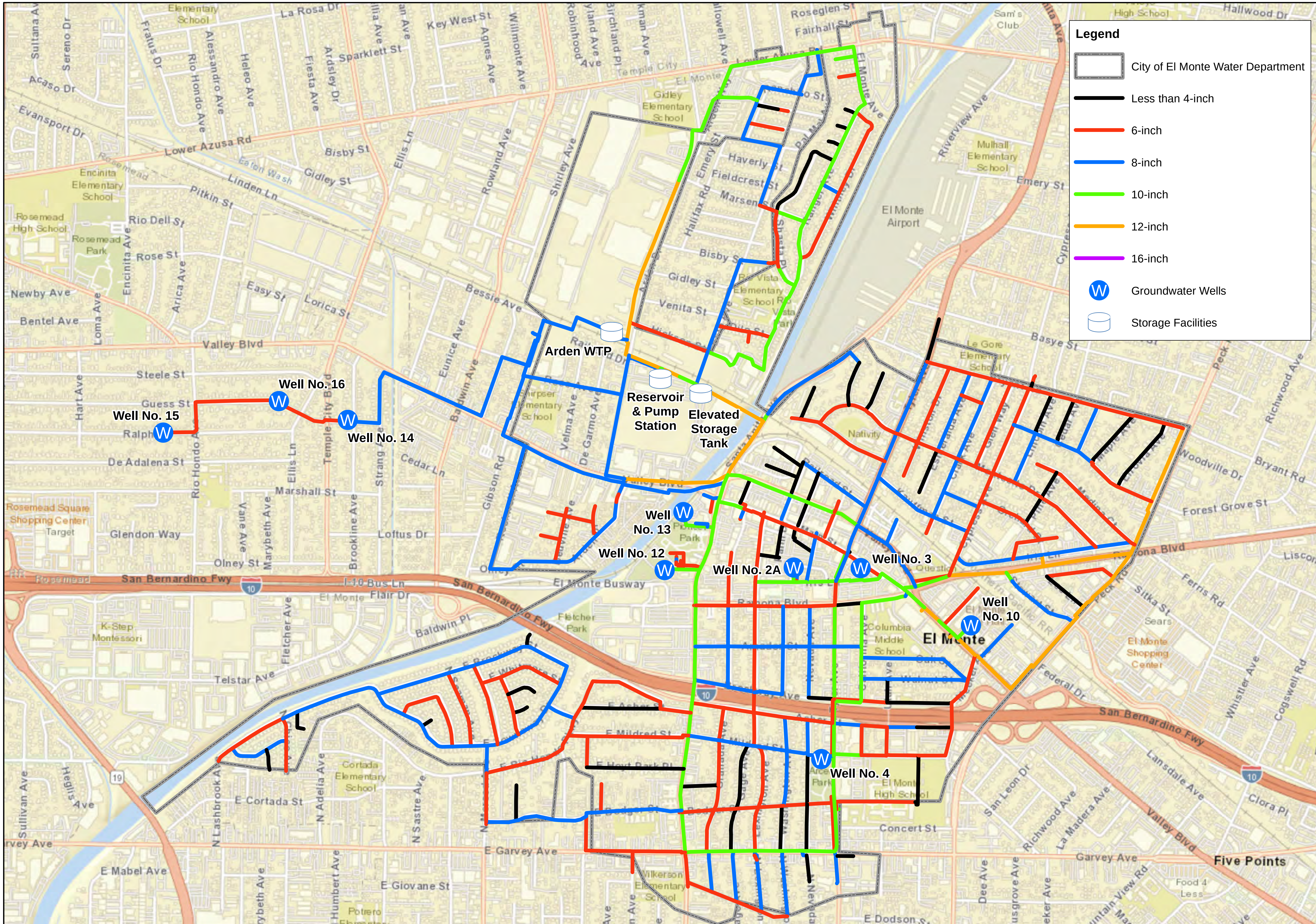
Existing Distribution System Map

1 inch = 1,200 feet

THIS PAGE LEFT INTENTIONALLY BLANK


Elevated Tank
HWL: 418'
Base: 386'
0.2 MG
400
350
300
250
200
150
Elevation (ft)
Reservoir
HWL: 309'
Base: 276'
1.09 MG
Reservoir BPS (3)
GPM: 2400
Elevation (Min/Max): 240/295 ft
Pressure (Min/Max): 53/79 psi
ADD: 1412 gpm
PHD: 374 gpm
Well 4
1000 gpm
W
AGWTP
E
EC 1
2000 gpm
EC 2
1200 gpm
EC 3
2000 gpm
Well 3
1500 gpm
Well 2A
900 gpm
Well 13
3000 gpm
Well 10
1000 gpm
Well 12
2100 gpm
Well 16
200 gpm
Well 15
200 gpm
Well 14
250 gpm
LEGEND
Storage Tank (Active)
Booster Pump Station (Emergency Only)
Production Well (Active)
Pressure Zone
Distribution System
AGWTP
Arden Groundwater Treatment Plant
Storage Tank (Emergency Only)
Emergency Interconnection
Production Well (Standby)
Flow Direction
Alternative System Operation

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

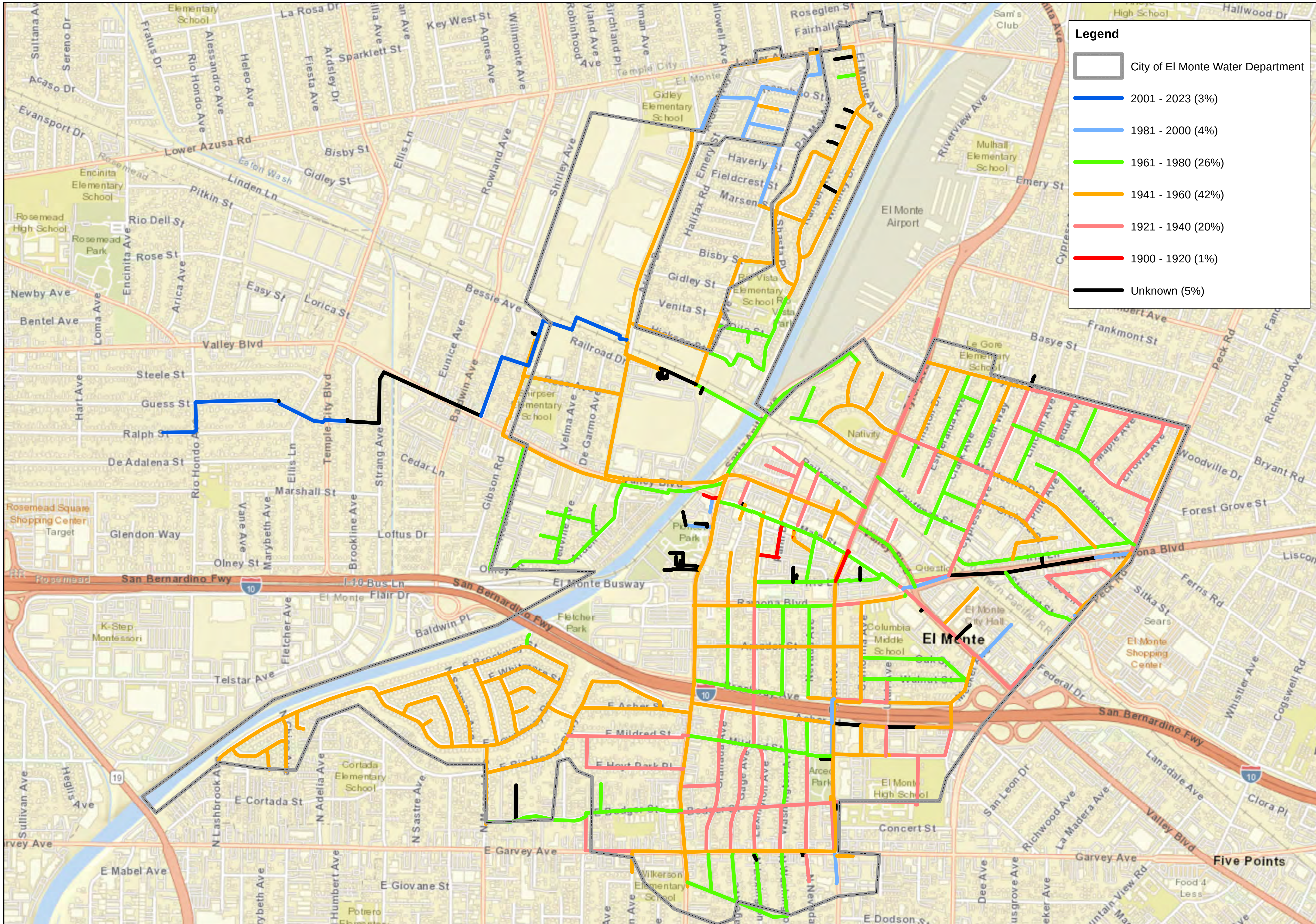
2023 Water Master Plan Update

Figure 5-4:

Existing Distribution System by Diameter

1 inch = 1,200 feet

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

Figure 5-5:

Existing Distribution System based on Installation Period

1 inch = 1,200 feet

mkn

THIS PAGE LEFT INTENTIONALLY BLANK

6.0 EVALUATION CRITERIA

This section provides a summary of the design criteria used to analyze the City's existing water distribution system and proposed improvements to serve existing and future demands.

6.1 Supply Criteria

The adequacy of the City's water supply was assessed based on the ability of the City's supply sources to meet existing and future demands. For evaluating source capacity deficiencies, MKN used the requirements from the current version of the California Regulations Related (CCR) Title 22, Chapter 16, Article 2. Permit Requirements, §64554 New and Existing Source Capacity, which states:

- ❑ At all times, a public water system's water source(s) shall have the capacity to meet the system's maximum day demand (MDD).
- ❑ (1) For systems with 1,000 or more service connections, the system shall be able to meet four hours of peak hourly demand (PHD) with source capacity, storage capacity, and/or emergency source connections.

6.2 Storage Criteria

To analyze the adequacy of the City's storage facilities to serve existing and future demands, available storage capacity was compared to the sum of three design criteria: operational (or equalization) storage, emergency storage, and fire storage. In addition to the City's existing physical storage, available pumping capacity from wells with permanent emergency power was also included in the storage evaluation. It was assumed that during emergency conditions, existing wells with permanent emergency power could supplement storage requirements within pressures zones and that flow from the emergency connections would not be available.

6.2.1 Operational Storage

Operational storage (also known as equalization storage) is the volume of storage required to meet short-term peak day demands that are in excess of production, ideally without using water maintained for emergency or fire storage. Operational volume criteria for this Master Plan are based on the recommendations found in the City's 2010 WMP and assumes 30% of the maximum day demand should be available.

6.2.2 Emergency Storage

Emergency storage is the volume of storage recommended to ensure ongoing supply in the event of a water supply emergency. For this Master Plan, the emergency storage requirement was calculated by multiplying the existing and future water service area population by 50 gallons per day (GPD) for three days.

6.2.3 Fire Protection Storage

The City follows the fire flow (FF) requirements as established by the Los Angeles County Fire Department (LACFD), which provides fire protection in the Water Department's service area. The water system shall be capable of providing the maximum day demand plus the minimum required fire flow at a single location with a minimum residual pressure of 20 psi. An exception to maintaining the minimum pressure requirement is for a fire hydrant located adjacent to a reservoir with no domestic water services between the fire hydrant and the reservoir. The LACFD has established both fire flow rates and durations for the various land uses within the City and **Table 6-1** contains a summary of the fire flow analysis criteria established for this Master Plan.

Table 6-1: Fire Flow Requirements

Land Use Type	Fire Flow (gpm)	Duration (hours)	Required Volume (MG)
Single Family Residential	1,250	2	0.15
Multi-Family Residential	2,000	2	0.24
Commercial	4,000	4	0.96
Industrial	4,000	4	0.96
Parks	750	2	0.09

In addition to the land use based fire flow requirements identified above, **Table 6-2** summarizes fire flow requirements for critical facilities within the water server area.

Table 6-2: Critical Fire Protection Locations and Requirements

Name	Fire Flow (gpm)	Duration (hours)	Required Volume (MG)
American Paper and Plastics	5,000	5	1.50
Columbia Elementary School	4,000	4	0.96
El Monte Civic Center	5,000	5	1.50
El Monte Comprehensive Health Center	4,000	4	0.96
Monte Union High School	4,000	4	0.96
El Monte-Rosemead Adult School Granada Campus	4,000	4	0.96
LA County Metro Transit Station	6,000	5	1.80
Le Gore Elementary School	4,000	4	0.96
Los Angeles Superior Court Rio Hondo Courthouse	5,000	5	1.50
New Lexington Elementary School	4,000	4	0.96
Rio Vista Elementary School	4,000	4	0.96
Shirpser Elementary School	4,000	4	0.96
Valley Mall Shopping Area	5,000	5	1.50

6.3 Pipeline Criteria

To analyze the adequacy of the existing water distribution pipelines to serve existing and future demands, the following pipeline criteria were evaluated during the analysis:

- ADD and MDD conditions:
  - Minimum system pressure of 40 pounds per square inch (PSI)
  - Maximum system pressure of 125 pounds per square inch (PSI)
  - Minimum pipeline velocities of 1 FPS
  - Maximum pipeline velocities of 5 FPS
- Maximum Day Demand plus fire-flow (MDD+FF) conditions:
  - Minimum residual pressure of 20 PSI
  - Maximum velocities of 15 FPS at fire flow event
- PHD condition:
  - Minimum system pressure of 30 PSI
  - Maximum pipeline velocities of 10 FPS
  - Pipeline headloss of 10 fps or less and friction losses no greater than 10 ft/1,000 ft

Under average day demands, it is recommended that the distribution system not exceed a maximum service pressure of 125 psi. Service pressures above 125 psi will require a pressure regulator (required by homeowner) as stated in the Uniform Plumbing Code.

6.3.1 Pipeline Size Requirements

The minimum diameter for a water main placed within the public right-of-way shall be 8-inch. Standard pipe diameters of 8-inch, 10-inch, 12-inch, 16-inch, 18-inch, and 24-inch shall be used.

6.4 Design Criteria Summary

Table 6-3 provides a summary of the water supply, storage, and distribution criteria used to evaluate the existing system facilities to serve existing and future demands.

Table 6-3: Design Criteria Summary	
Component	**Criteria**
Supply	
MDD	Meet at all times with supply source(s)
PHD	Meet 4 hours with supply sources, storage, and/or emergency interconnections
Storage	
Operational Storage	30% of MDD
Emergency Storage	Service area population x 50 GPD for 3 days
Fire Storage	Largest fire flow for specified duration
Pipeline	
ADD Conditions	
Minimum Pressure [psi]	40
Maximum Pressure [psi]	125
Minimum Velocity [ft/sec]	1
Maximum Velocity [ft/sec]	5
MDD Conditions	
Minimum Pressure [psi]	40
Maximum Velocity [ft/sec]	10
MDD Plus FF Conditions	
Minimum Pressure [psi] (at hydrant location)	20
Maximum Velocity [ft/sec]	15
PHD Conditions	
Minimum Pressure [psi]	30
Maximum Velocity [ft/sec]	10
New Pipelines	
Minimum Pipeline Size	8-inch diameter or larger
Fire Flow Requirement (flow [gpm] @ duration [hours])	
Single Family Residential	1,250 gpm @ 2 hours
Multi-Family Residential	2,000 gpm @ 2 hours
Commercial	4,000 gpm @ 4 hours
Industrial	4,000 gpm @ 4 hours
Parks	750 gpm @ 2 hours
Critical Locations	As defined in Table 6-2

7.0 HYDRAULIC COMPUTER MODEL

This section provides an overview of the hydraulic model update.

7.1 Hydraulic Model Development

MKN utilized the City's current WaterGEMS (by Bentley Systems) hydraulic model to simulate the operation of the existing water distribution system. WaterGEMS incorporates the Hazen-Williams formula as a basis for calculating flow distribution and pressure throughout the water system. The current model includes the following information and features:

- The El Monte Operable Unit (EMOU) pipeline and Wells No. 14, 15, and 16
- Pipe: diameter, material, Hazen-Williams C-factor, and length
- Junctions (nodes): ground elevations and demands
- Locations and capacity of supply sources, storage facilities, pump stations, and emergency interconnections
- Typical operating conditions (settings) for storage facilities, pump stations, and emergency interconnections

7.2 Water Demand Allocation

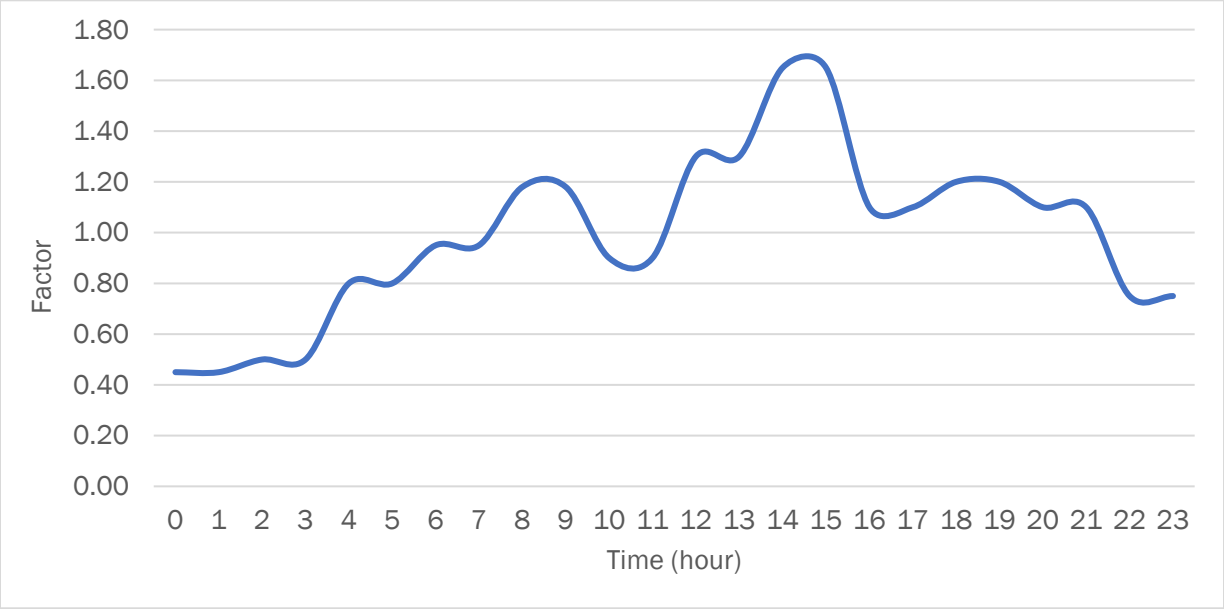
The City's 2020 UMWP identified existing water usage by customer type (residential, commercial, industrial, etc) and the current WaterGEMs model included 2018 demand and customer types. MKN scaled existing demands in the model to match existing demand conditions identified in the 2020 UWMP. For future demand conditions, MKN scaled the updated 2020 demands to match project system-wide demands in the year 2040.

7.2.1 Diurnal Curve

For the Master Plan, MKN reviewed and utilized the system-wide diurnal curve included in the 2018 WaterGEMs model[4]. **Figure 7-1** provides an overview of the diurnal curve and peaking factors included in the updated hydraulic model for this Master Plan.

[4] Modeling for New Well Supply Technical Memorandum prepared by PSOMAS

Figure 7-1: System-wide Diurnal Curve



7.3 Model Scenarios

The following demand scenarios were developed in the model to evaluate pipeline capacities to serve existing and future demands:

- Existing:
  - Average Day Demand, Maximum Day Demand, Peak Hour Demand
  - Maximum Day Demand plus Fire Flow
  - Capital Improvements to Address Existing Deficiencies
- Future:
  - Average Day Demand, Maximum Day Demand, Peak Hour Demand
  - Maximum Day Demand plus Fire Flow
  - Capital Improvements to Address Future Deficiencies

To evaluate MDD plus fire flow conditions, MKN configured an automated system-wide fire flow analysis tool within WaterGEMS. All nodes within the model were assigned with a required fire flow based on land use classification (**Table 6-3**). In addition, a minimum system-wide residual pressure of 20 PSI was required during any fire flow event. When the simulation was performed, a single fire flow was simulated at each system node while checking that residual system pressure remained greater than 20 PSI. If the minimum residual pressure was not achieved for the required fire flow at a specific node location, WaterGEMS reduced the fire flow until 20 PSI residential pressure was

available. This reduction in fire flow was used to identify existing system deficiencies so that system improvements could be made to achieve the required fire flow at a 20 PSI residential pressure.

7.4 Model Settings

In addition to loading existing and future demands within the model the following model parameters were configured prior to system evaluation:

- ❑ Pipeline Hazen-Williams roughness coefficient factors
- ❑ Typical storage tank operating levels
- ❑ Pump station flows

As described earlier, WaterGEMS incorporates the Hazen-Williams formula for pressure pipe system calculations. **Table 7-1** provides a summary of the Hazen-Williams roughness coefficient factors applied to all pipelines within the hydraulic model based on pipeline material type. It should be noted that fire hydrant flow testing was completed for the Master Plan (Appendix B) to confirm system pressures and to validate the C-Factors included in **Table 7-1**.

Table 7-1: Hazen-Williams Pipe Roughness Factors

C-Factor	Material
70 - 130	Asbestos Cement
70	Cast Iron
120	Ductile Iron
130	Polyvinyl Chloride
100	Steel
130	New Pipe

Table 7-2 provides a summary of the overall model settings used for each scenario analyzed for the Master Plan.

Table 7-2: Model Scenario Settings

Scenario	Storage Level[1, 2]	BPS Operation	Well Operation	Emergency Interconnections
Existing ADD	High Level	Off	Well 2A, 10, 14, 15, & 16	Off
Existing MDD, MDD+FF, and PHF	Low Level		Well 2A, 10, 12, 14, 15, & 16	
Proposed System Improvements	Adjusted to mitigate deficiencies			Adjusted to mitigate deficiencies
Future ADD	High Level	Off	Well 2A, 10, 14, 15, & 16	Off
Future MDD, MDD+FF, and PHF	Low Level		Well 2A, 10, 12, 14, 15, & 16	
Proposed System Improvements	Adjusted to mitigate deficiencies			Adjusted to mitigate deficiencies

Notes:
1. Ground-level reservoir assumed inactive for scenarios when BPS is off
2. Low level is 11 ft and high level is 27 ft for elevated tank

7.4.1 Hydraulic Model Pressure Verification

To confirm system pressures in the updated water model, MKN used fire hydrant flow testing (performed by the City and MKN) at designated locations throughout the water distribution system in March 2022. During the fire hydrant flow testing, time of day was recorded along with pressures at hydrants located upstream and downstream of the flowed hydrant location before and after the fire hydrant flow testing. MKN provided the City with the recommended testing locations and requirements for completing the fire hydrant flow testing. A detailed testing methodology and testing results are included in **Appendix B**. Following the completion of the field testing, MKN compared the measured field results with predicted results within the hydraulic model and **Table 7-3** provides an overview of static pressure differences.

Table 7-3: Hydraulic Model Static Pressure Verification

Location	Upstream Hydrant				Downstream Hydrant			
	Model Node	Model PSI	Field PSI	PSI Difference	Model Node	Model PSI	Field PSI	PSI Difference
Brockway Street	1158	70	78	8	J-25	75	70	5
Arden Drive	182	62	64	2	110	55	55	0
Bryant Road	452	58	55	3	366	54	50	4
Merced Street	1062	67	72	5	1078	69	70	1
Washington Avenue	912	66	72	6	938	69	68	1
Meeker Avenue	524	63	59	4	TEST224	62	56	6
Stewart Street	498	61	57	4	J-27	60	56	4
Medina Court	3076	58	56	2	384	54	52	2
Glen Way	282	56	55	1	304	55	54	1
Whitney	32	58	63	5	J-28	60	58	2
El Monte Avenue	1688	55	57	2	44	57	58	1

Based on **Table 7-3**, the static pressure differences between the hydraulic model and field-tested measurements ranged from 0 – 8 PSI, validating the accuracy of the hydraulic model.

Table 7-4 provides an overview of the pressure drop differences during the model fire flow conditions and field-tested measurements for the upstream hydrants.

Table 7-4: Upstream Hydrant Pressure Drop Verification									
Description	Pipe Material	Fire Flow (gpm)	Upstream Hydrant						
			Model Static PSI	Model Residual PSI	PSI Drop	Field Static PSI	Field Residual PSI	PSI Drop	PSI Difference
Brockway Street	AC	919	70	44	25	78	60	18	7
Arden Drive	STL	993	62	60	2	64	63	1	1
Bryant Road	CI	787	58	54	5	55	42	13	9
Merced Street	AC/CI	919	67	53	14	72	62	10	4
Washington Avenue	AC	950	66	57	9	72	65	7	2
Meeker Avenue	CI	950	64	59	4	59	51	8	4
Stewart Street	AC	888	61	51	9	57	30	27	18
Medina Court	AC	839	58	46	12	56	53	3	9
Glen Way	STL/AC	787	56	48	8	55	47	8	1
Whitney	AC	805	58	54	4	63	58	5	1
El Monte Avenue	CI/STL	872	55	48	7	57	53	4	3

Based on **Table 7-4**, the relative pressure drops during fire flow testing for the upstream hydrants based on the model and field-tested measurements ranged from 1 – 9 PSI with an 18 PSI difference at the Stewart Street location. It was unclear why the pressure drop at Stewart Street with so high, but could be attributed to a closed valve.

Table 7-5 provide an overview of the pressure drop differences during the model fire flow conditions and field-tested measurements for the downstream hydrants.

Table 7-5: Downstream Hydrant Pressure Drop Verification									
Description	Pipe Material	Fire Flow (gpm)	Upstream Hydrant						
			Model Static PSI	Model Residual PSI	PSI Drop	Field Static PSI	Field Residual PSI	PSI Drop	PSI Difference
Brockway Street	AC	919	75	41	34	70	46	24	10
Arden Drive	STL	993	55	50	5	55	52	3	2
Bryant Road	CI	787	54	49	6	50	32	18	12
Merced Street	AC/CI	919	69	39	30	70	50	20	10
Washington Avenue	AC	950	69	46	24	68	50	18	6
Meeker Avenue	CI	950	62	58	4	56	46	10	6
Stewart Street	AC	888	60	34	26	56	26	30	4
Medina Court	AC	839	54	34	20	52	44	8	12
Glen Way	STL/AC	787	55	47	9	54	42	12	3
Whitney	AC	805	60	30	31	58	32	26	5
El Monte Avenue	CI/STL	872	57	46	10	58	49	9	1

Based on Table 7-5, the relative pressure drops during fire flow testing for the downstream hydrants based on the model and field-tested measurements ranged from 1 – 12 PSI.

Based on the results of the comparison, field-tested to model pressures deviated between 0 - 8 PSI during static conditions and 1 – 12 PSI when comparing the relative pressure drop during the fire flow testing. These deviations in pressure are acceptable for the hydraulic model. Given the lack of condition information available for the water mains, the water model was considered “calibrated” based on the results of the testing and was used to complete the hydraulic analysis for existing and future demand conditions.

8.0 WATER SYSTEM EVALUATION

This section provides an overview of the hydraulic evaluation completed for the City's existing supply, storage, and distribution facilities to serve existing and future demand conditions.

8.1 Supply Analysis

8.1.1 Supply Allocation

As identified in the City's 2020 UWMP, it was identified that existing groundwater supplies will be sufficient to serve existing and future demand. In addition, the City should continue to purchase replenishment water from the Watermaster through the RDA program as described in Section 4.1.9.

Table 8-1: Water Supply Allocation to Serve Existing and Future Demands

Source	Existing	Future (Year 2040)
Average Annual Demand (AFY)	2,277	2,712
Main San Gabriel Basin	2,277	2,712
Supply Surplus / (Deficit)	**0**	**0**

8.1.2 Groundwater Production Redundancy

MKN reviewed the ability of the City's groundwater production facilities to deliver water to the system and provide system redundancy. The adequacy of the existing production facilities to meet existing demands, future demands, and provide redundancy are presented in **Table 8-2** and **Table 8-3**. Criteria for redundancy requirements are summarized in Section 6. The assessment evaluated the City's ability to meet existing MDD with the largest supply facility out of commission. The remaining surplus or deficit is calculated for each criteria scenario. Based on the evaluations, the City has sufficient production capacity to serve existing MDD conditions with Wells No. 2A and 10 only. However, under future MDD conditions Wells No. 2A, 10, and 12 or the Arden Groundwater Treatment Plant would need to be active to meet demands.

In addition, to assess existing and future MDD conditions, MKN evaluated the production capacity of the existing wells to serve four hours of existing and future PHD. The adequacy of the existing production facilities to meet existing and future PHD demands are presented in **Table 8-4** and **Table 8-5**. Based on the evaluations, the City has sufficient production capacity to serve existing PHD conditions with Wells No. 2A, 10, and 12. However, under future PHD conditions Wells No. 2, 10, 12, and the Arden Groundwater Treatment Plant (Wells 14, 15, and 16) would need to be active to serve demands.

To ensure availability of supply sources to serve existing/future MDD and PHD conditions it is recommended that the existing groundwater Wells No. 2A, 10, 12, 14, 15, and 16 are equipped with permanent standby power.

THIS PAGE LEFT INTENTIONALLY BLANK

Table 8-2: Ability of Production Facilities to Meet MDD													
Scenario	Criteria	SOURCE CAPACITY (GPM)									Total Supply (GPM)	Maximum Day Demand (GPM)	Source Capacity Surplus / (Deficit) (GPM)
		Groundwater Wells						Arden Groundwater Treatment Plant					
		Well No. 2A	Well No. 3[1]	Well No. 4[2]	Well No. 10	Well No. 12	Well No. 13[3]	Well No. 14	Well No. 15	Well No. 16			
1	Meet MDD with all groundwater supplies active	1,000	1,500	1,300	1,200	2,200	3,000	360	195	195	10,950	2,188	8,762
2	Meet MDD with groundwater operational restrictions in place[1]	1,000	-	-	1,200	2,200	-	360	195	195	5,150	2,188	2,962
3	Meet MDD with largest groundwater facility out of service	1,000	-	-	1,200	-	-	360	195	195	2,950	2,188	762
4	Meet MDD with Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	2,200	-	-	-	-	4,400	2,188	2,212
5	Meet MDD with largest groundwater facility and Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	-	-	-	-	-	2,200	2,188	12

Notes:

1. Well No. 3 is currently out of service due to elevated VOC and nitrate concentrations
2. Well No. 4 is currently on standby status
3. Per historical production records use of Well No. 13 is minimal

THIS PAGE LEFT INTENTIONALLY BLANK

Table 8-3: Ability of Production Facilities to Meet Future MDD												
Scenario	Criteria	SOURCE CAPACITY (GPM)									Total Supply (GPM)	Maximum Day Demand (GPM)	Source Capacity Surplus / (Deficit) (GPM)
		Groundwater Wells						Arden Groundwater Treatment Plant					
		Well No. 2A	Well No. 3[1]	Well No. 4[2]	Well No. 10	Well No. 12	Well No. 13[3]	Well No. 14	Well No. 15	Well No. 16			
1	Meet MDD with all groundwater supplies active	1,000	1,500	1,300	1,200	2,200	3,000	360	195	195	10,950	2,606	8,344
2	Meet MDD with groundwater operational restrictions in place[1]	1,000	-	-	1,200	2,200	-	360	195	195	5,150	2,606	2,544
3	Meet MDD with largest groundwater facility out of service	1,000	-	-	1,200	-	-	360	195	195	2,950	2,606	344
4	Meet MDD with Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	2,200	-	-	-	-	4,400	2,606	1,794
5	Meet MDD with largest groundwater facility and Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	-	-	-	-	-	2,200	2,606	(406)

Notes:

1. Well No. 3 is currently out of service due to elevated VOC and nitrate concentrations
2. Well No. 4 is currently on standby status
3. Per historical production records use of Well No. 13 is minimal

THIS PAGE LEFT INTENTIONALLY BLANK

Table 8-4: Ability of Production Facilities to Meet Existing PHD for Four Hours													
Scenario	Criteria	SOURCE CAPACITY (GPM)									Total Supply (Gallons)	Four Hours of PHD (Gallons)	Source Capacity Surplus / (Deficit) (Gallons)
		Groundwater Wells						Arden Groundwater Treatment Plant					
		Well No. 2A	Well No. 3[1]	Well No. 4[2]	Well No. 10	Well No. 12	Well No. 13[3]	Well No. 14	Well No. 15	Well No. 16			
1	Meet MDD with all groundwater supplies active	1,000	1,500	1,300	1,200	2,200	3,000	360	195	195	2,628,000	897,840	1,730,160
2	Meet MDD with groundwater operational restrictions in place[1]	1,000	-	-	1,200	2,200	-	360	195	195	1,236,000	897,840	338,160
3	Meet MDD with largest groundwater facility out of service	1,000	-	-	1,200	-	-	360	195	195	708,000	897,840	(189,840)
4	Meet MDD with Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	2,200	-	-	-	-	1,056,000	897,840	158,160
5	Meet MDD with largest groundwater facility and Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	-	-	-	-	-	528,000	897,840	(369,840)

Notes:

1. Well No. 3 is currently out of service due to elevated VOC and nitrate concentrations
2. Well No. 4 is currently on standby status
3. Per historical production records it was observed use of Well No. 13 is minimal

THIS PAGE LEFT INTENTIONALLY BLANK

Table 8-5: Ability of Production Facilities to Meet Future PHD for Four Hours													
Scenario	Criteria	SOURCE CAPACITY (GPM)									Total Supply (Gallons)	Four Hours of PHD (Gallons)	Source Capacity Surplus / (Deficit) (Gallons)
		Groundwater Wells						Arden Groundwater Treatment Plant					
		Well No. 2A	Well No. 3[1]	Well No. 4[2]	Well No. 10	Well No. 12	Well No. 13[3]	Well No. 14	Well No. 15	Well No. 16			
1	Meet MDD with all groundwater supplies active	1,000	1,500	1,300	1,200	2,200	3,000	360	195	195	2,628,000	1,069,440	1,558,560
2	Meet MDD with groundwater operational restrictions in place[1]	1,000	-	-	1,200	2,200	-	360	195	195	1,236,000	1,069,440	166,560
3	Meet MDD with largest groundwater facility out of service	1,000	-	-	1,200	-	-	360	195	195	708,000	1,069,440	(361,440)
4	Meet MDD with Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	2,200	-	-	-	-	1,056,000	1,069,440	(13,440)
5	Meet MDD with largest groundwater facility and Arden Groundwater Treatment Plant out of service	1,000	-	-	1,200	-	-	-	-	-	528,000	1,069,440	(541,440)

Notes:

1. Well No. 3 is currently out of service due to elevated VOC and nitrate concentrations
2. Well No. 4 is currently on standby status
3. Per historical production records use of Well No. 13 is minimal

8.2 Storage Analysis

The City has two active water storage facilities in operation including the Elevated Tank and Ground-Level Reservoir located adjacent to City hall and the existing available storage volumes are summarized in Table 8-6.

Table 8-6: Available Storage Volume		
Facility	**Nominal Volume (MG)**	**Available Volume (MG)[4]**
Ground-Level Reservoir	1.09	0.92
Elevated Tank	0.20	0.16
Total	**1.29**	**1.08**

Notes:
1. Storage assumed to be available from the Ground-Level Reservoir since the existing BPS has an onsite backup generator
2. Total height of the Ground-Level Reservoir is 33-feet and available volume is based on 28-feet of storage
3. Available volume for the Elevated Tank was assumed to be 80% as identified in the 2010 WMP

Definitions and descriptions of the criteria used for the various storage components, fire, emergency, and equalization, are contained in Section 6. According to the Water Distribution System Handbook[5], if an agency has several supply sources with auxiliary power (standby generator), the requirement for emergency storage can be reduced and served by the supply source. For auxiliary power it was assumed that a standby generator could be refueled during an emergency to allow supply facilities to serve demands. Wells powered by natural gas were not included as being available since a rupture in a natural gas line would negate the use of the well during emergency conditions. The storage evaluation to serve existing City demands is summarized in **Table 8-7**.

Table 8-7: Storage Evaluation for Existing Demands		
Storage Type	**Criteria**	**Storage Volume (Gallons)**
Fire Storage[1]	6,000 gpm x 5 hours	1,800,000
Operational Storage	30% of 3.2 MGD (MDD)	960,000
Emergency Storage	50 gpcd x 3 days x 20,300 pp	3,045,000
	Total Recommended Storage	**5,805,000**
Total Available Physical Storage		1,084,809
	Surplus / (Deficit)	**(4,720,192)**
Supplemental Storage via Supply[2]		
	Well 2A at 1,000 for 24 hours	1,440,000
	Well 10 at 1,200 for 24 hours	1,728,000
	Well 12 at 2,200 for 24 hours	3,168,000
Total Available Physical + Supplement Storage from Wells		6,336,000
	Surplus / (Deficit)	**1,615,809**

Notes:
1. Require fire storage for LA County Metro Transit Station
2. Pumping capacities per EMOU Permit Amendment dated January 25, 2019

[5] McGraw-Hill Handbooks 2000 Chapter 10 Section 10.6.3.3 Emergency Storage

Based on the available physical storage as identified in **Table 8-6**, the analysis suggests a storage deficit of approximately 4.7 MG based on existing City demands. If Wells No. 2A and 10 can be equipped with standby generators the City will have a storage surplus of 1.6 MG.

The storage evaluation to serve future City demands is summarized in **Table 8-8**.

Table 8-8: Storage Evaluation for Future Demands		
Storage Type	**Criteria**	**Storage Volume (Gallons)**
Fire Storage[1]	6,000 gpm x 5 hours	1,800,000
Operational Storage	30% of 3.8 MGD (MDD)	1,140,000
Emergency Storage	50 gpcd x 3 days x 23,070 pp	3,460,500
	Total Recommended Storage	**6,400,500**
Total Available Physical Storage		1,084,809
	Surplus / (Deficit)	**(5,315,692)**
Supplemental Storage via Supply		
	Well 2A at 1,000 for 24 hours	1,440,000
	Well 10 at 1,200 for 24 hours	1,728,000
	Well 12 at 2,200 for 24 hours	3,168,000
	Surplus / (Deficit)	**1,020,309**
Notes: 1. Required fire storage for LA County Metro Transit Station		

Based on the available physical storage as identified in **Table 8-6**, the analysis suggests a storage deficit of approximately 5.3 MG based on future City demands. If Wells No. 2A and 10 can be equipped with standby generators the City will have a storage surplus of 1.0 MG.

8.3 Booster Pump Station Analysis

The existing booster pump station (BPS) located at the Ground-level Reservoir consists of three pumps with a design flow of 850 gpm and design head of 150 feet with a total nominal flow of 1,700 gpm with two pumps in operation and 2,550 gpm with all three pumps in operation. It is MKN's understanding that there is limited use of the existing Ground-level Reservoir and BPS to serve system demands and the City operates these facilities once a week to turn over the reservoir. As described in the "Modeling for New Well Supply Technical Memorandum"[6], the City could operate the BPS as a lead supply source prior to operating the main groundwater production wells.

Table 8-9: BPS Evaluation to Serve Demands or Existing Demands				
Demand Condition	**Pump Operation**	**Pumping Capacity (gpm)**	**System Demand (gpm)**	**Surplus / (Deficit) (GPM)**
Existing ADD	2	1,700	1,412	288
Future ADD	2	1,700	1,681	19
Existing MDD	3	2,550	2,188	362
Future MDD	3	2,550	2,606	**(56)**

[6] Dated January 25, 2017 and prepared by PSOMAS

Based on the BPS evaluation completed in **Table 8-9**, the BPS could serve existing ADD, MDD, and future ADD with the existing pumps. With three pumps running the existing BPS would be deficient by 56 gpm to serve future MDD conditions. If the City elects to operate the BPS as described in the Modeling for New Well Supply Technical Memorandum it is recommended that the pumping capacity for the existing BPS be increased so that two pumps in operation (with one on standby) could serve future MDD. This would require replacing the existing pumps at the BPS.

8.4 Distribution System Analysis

The City's existing water distribution system consists of 42 miles of pipeline ranging from 1-inch to 16-inch with most of the system (67%) comprised of 6-inch and 8-inch pipelines. Approximately 46% of the distribution system consists of asbestos cement pipe (AC), with 33% cast iron pipe (CI), 18% steel (STL), and 3% ductile iron pipe (DI). For the distribution system analysis, MKN evaluated the existing system (pressures and flows) based on the following existing and future demand scenarios (10 total):

- Existing:
  - Average Day Demand (ADD)
  - Maximum Day Demand (MDD)
  - Peak Hour Demand (PHD)
  - Maximum Day Demand plus Fire Flow (MDD+FF)
  - Capital Improvements to Address Existing Deficiencies
- Future:
  - Average Day Demand (ADD)
  - Maximum Day Demand (MDD)
  - Peak Hour Demand (PHD)
  - Maximum Day Demand plus Fire Flow (MDD+FF)
  - Capital Improvements to Address Future Deficiencies

8.4.1 ADD, MDD, and PHD System Analysis

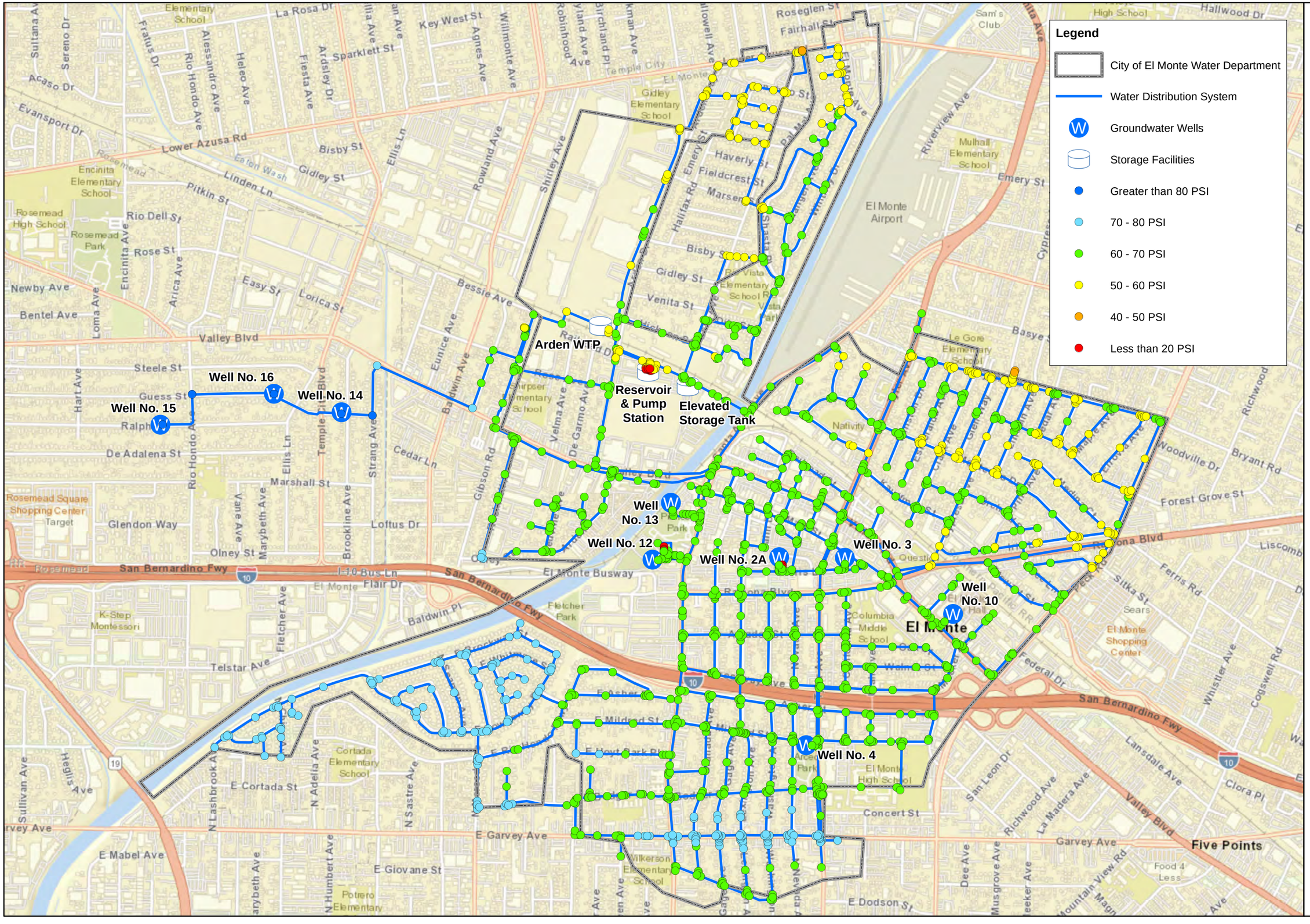
MKN evaluated the existing distribution system under existing and future ADD, MDD, and PHD conditions to identify low pressure areas, high pressure conditions, and/or high pipeline velocities. Since the City's water distribution system only consists of one zone, MKN reviewed the summary statistics for pressure and velocity from model runs for each scenario and **Table 8-10** provides a summary of the analysis.

Table 8-10: City-wide Hydraulic Modeling Results

Scenario		Lowest Customer Pressure (psi)	Highest Customer Pressure (psi)	Maximum Pipe Velocity (fps)
Existing	ADD	53	90	5
	MDD	46	87	8
	PHD	45	86	8
Future	ADD	53	90	5
	MDD	46	85	8
	PHD	45	86	8

Based on the existing and future demand scenarios from **Table 8-10**, the City's system is sufficient in meeting the minimum pressure, maximum pressure, and velocity criteria as defined in **Table 6-3**. **Figure 8-1** provides an overview of typical system pressures during existing ADD conditions.

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

Figure 8-1:

City-wide Pressure during Existing ADD

1 inch = 1,200 feet

THIS PAGE LEFT INTENTIONALLY BLANK

8.4.2 Fire Flow Analysis

Pipeline deficiencies within an existing distribution system are generally associated with constrained pipelines (small size and/or material) to serve the required flows and pressures during MDD plus fire flow conditions. **Table 8-11** provides a summary of the fire flow requirements based on land use category that was applied to customer nodes within the hydraulic model and **Figure 8-2** identifies the required fire flow at each hydrant node based on land uses throughout the water service area.

Table 8-11: Typical Model Fire Flow Requirements

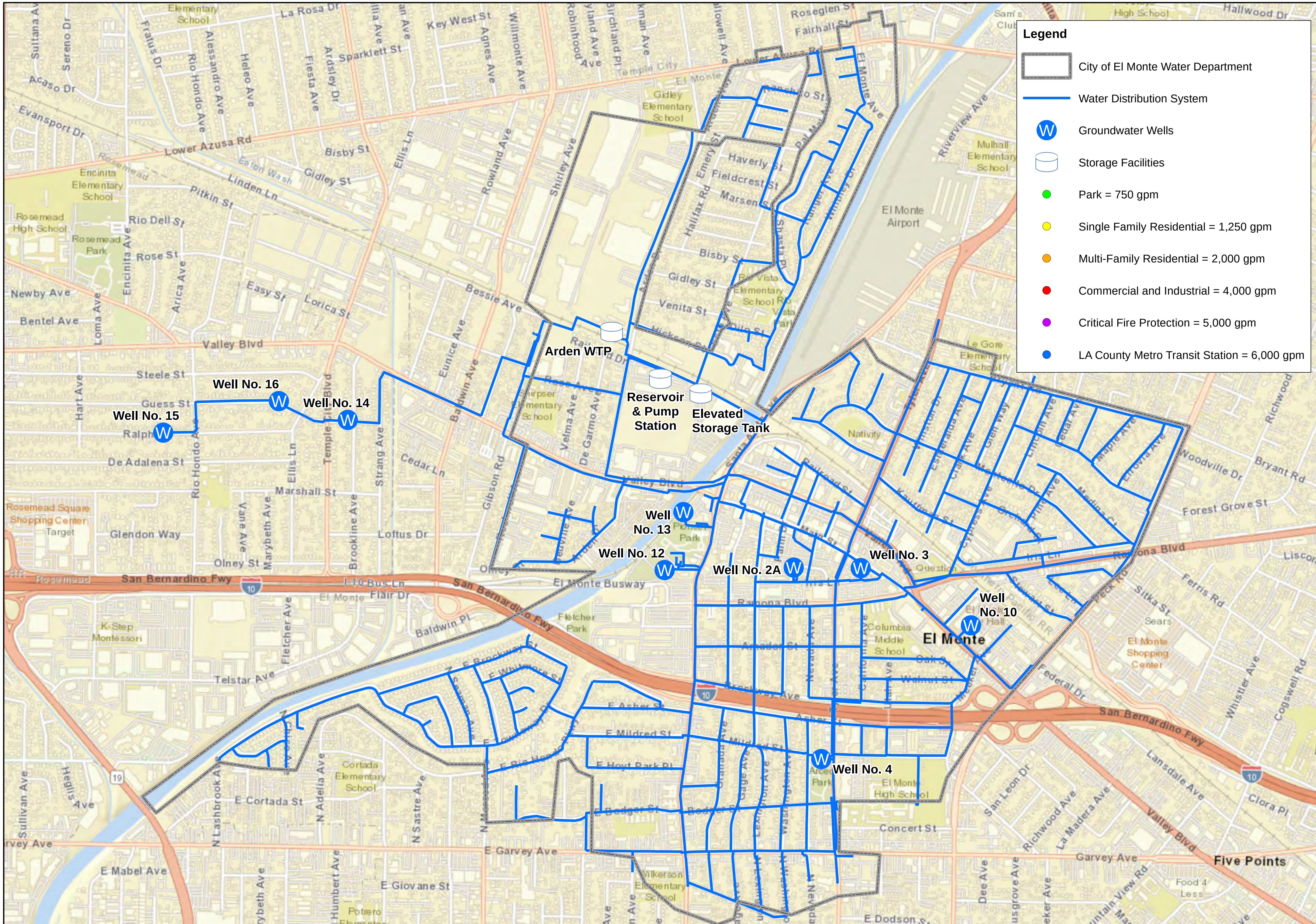
Land Use Type	Fire Flow (gpm)
Single Family Residential	1,250
Multi-Family Residential	1,500
Commercial	4,500
Industrial	4,500
Parks	750
Critical Fire Flow Locations	4,000 – 6,000

To evaluate MDD plus fire flow conditions, MKN configured an automated system-wide fire flow analysis tool within WaterGEMS. All nodes within the model were assigned with a required fire flow based on land use classification (**Table 8-10**). In addition, a minimum system-wide residual pressure of 20 PSI was required during any fire flow event. When the simulation was performed, a single fire flow was simulated at each system node while checking that residual system pressure remained greater than 20 PSI. If the minimum residual pressure was not maintained at a specific node location, WaterGEMS identified the available fire flow while maintaining 20 PSI residential pressure. This reduction in fire flow was used to identify existing system deficiencies. Fire flow deficiencies identified in the hydraulic model were categorized as follows:

- *Residual Pressure Deficiency:* when a fire flow event is applied at a local hydrant node and the node location cannot meet the minimum residual pressure of 20 PSI during a fire flow event
- *Zone Pressure Deficiency:* when a fire flow event is applied at a local hydrant node and the node location meets or exceeds the minimum residual pressure of 20 PSI but causes other hydrant nodes within the zone to experience residual pressures below 20 PSI during a fire flow event. In this situation WaterGEMS will continue to reduce the required fire flow at the tested location until 20 PSI can be achieved throughout all nodes within the pressure zone
- *Residual Pressure and Zone Pressure Deficiency:* combination of the deficiencies described above

Figure 8-3 provides an overview of the fire flow methodology used to determine system deficiencies, verify the accuracy of the model results, provide operational modifications to address deficiencies, and/or recommend infrastructure improvements to address the deficiencies.

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

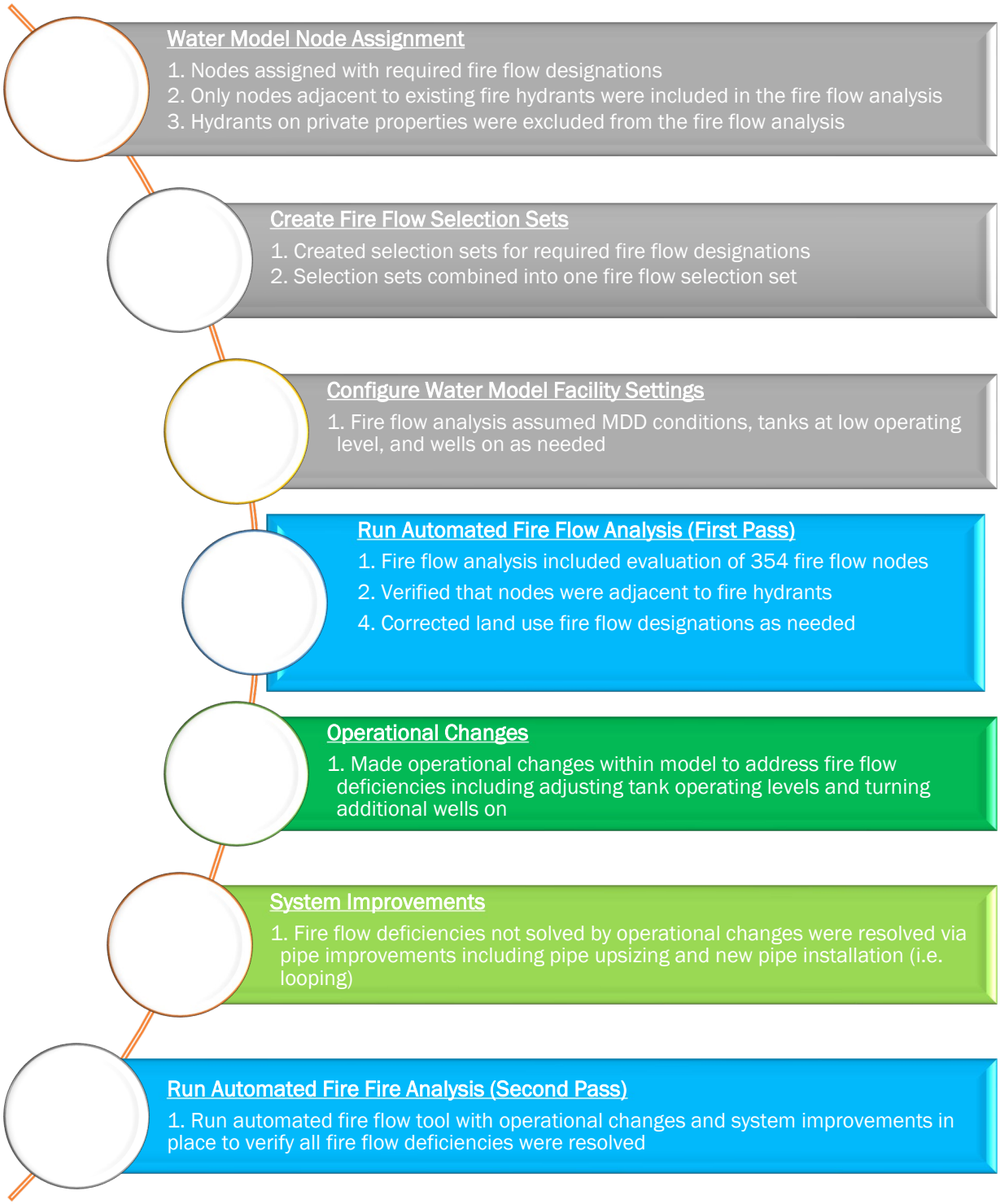
Figure 8-2:

City-wide Fire Flow Requirements

1 inch = 1,200 feet

THIS PAGE LEFT INTENTIONALLY BLANK

Figure 8-3: WaterGEMS Automated Fire Flow Methodology



8.4.3 Existing Conditions Fire Flow Analysis

Table 8-12 and **Figure 8-4** identifies the node (hydrant) locations throughout the existing distribution system that did not meet the required fire flows. The fire flow deficiencies represent 50% of the existing fire hydrant locations throughout the distribution system. It should be noted that the fire flow analysis assumed serving a fire flow event from a single hydrant and/or distribution pipeline. However, for the higher fire flow requirements (commercial and industrial), a fire flow could be served by multiple hydrants. It is recommended that the higher fire flow deficiencies be reevaluated prior to design of the proposed project.

Table 8-12: Existing Fire Flow Deficiencies and Recommendations

Mode Node	Land Use	Required Fire Flow (gpm)	Fire Flow Available (gpm)	% Required FF	Recommended Improvements
204	SFR	1250	300	24%	Upgrade 259 ft of 6" CI to 8"
400	SFR	1250	351	28%	Upgrade 301 ft of 4" AC / DI to 6"
1068	SFR	1250	451	36%	Upgrade 147 ft of 4" CI to 6"
210	SFR	1250	467	37%	Upgrade 552 ft of 4" CI to 8" & 523 ft of 6" CI to 8"
350	SFR	1250	522	42%	Construct 144 of 8"
1102	SFR	1250	567	45%	Upgrade 1017 ft of 6" CI to 8"
102	SFR	1250	587	47%	Upgrade 1070 ft of 4" CI to 6"
360	SFR	1250	597	48%	Upgrade 63 ft of 4" CI to 6"
866	SFR	1250	688	55%	Upgrade 472 ft of 4" CI to 8"
1122	SFR	1250	737	59%	Upgrade 392 ft of 4" CI to 6"
1226	SFR	1250	771	62%	Upgrade 346 ft of 4" CI to 6"
1210	SFR	1250	777	62%	Upgrade 57 ft of 4" CI to 6"
1212	SFR	1250	782	63%	Upgrade 49 ft of 4" CI to 6"
1120	SFR	1250	784	63%	Upgrade 229 ft of 6" CI to 8"
948	SFR	1250	790	63%	Upgrade 436ft of 4" CI to 6"
196	SFR	1250	792	63%	Upgrade 72 ft of 4" CI to 6"
952	SFR	1250	833	67%	Upgrade 231 ft of 4" CI to 6"
932	SFR	1250	860	69%	Upgrade 309 ft of 4" CI to 6"
1100	SFR	1250	885	71%	Upgrade 281 ft of 4" CI to 6"
1034	SFR	1250	892	71%	Upgrade 277 ft of 4" CI to 6"
436	SFR	1250	899	72%	Upgrade 115 ft of 4" CI to 6"
358	SFR	1250	912	73%	Upgrade 281 ft of 6" CI to 8"
1104	SFR	1250	926	74%	Upgrade 261 ft of 4" CI to 6"
960	SFR	1250	944	76%	Upgrade 520 ft of 6" CI to 8"
50	SFR	1250	959	77%	Upgrade 432 ft of 6" CI to 8"
872	SFR	1250	988	79%	Upgrade 630 ft of 6" CI to 8"
384	SFR	1250	990	79%	Upgrade 63 ft of 4" CI to 6"
1096	SFR	1250	1021	82%	Upgrade 1,066 ft of 4" CI to 6"
1124	SFR	1250	1030	82%	Upgrade 50 ft of 4" CI to 6"
1242	SFR	1250	1034	83%	Upgrade 558 ft of 6" CI to 8"
868	SFR	1250	1055	84%	Upgrade 980 ft of 4" CI to 6"
430	SFR	1250	1058	85%	Upgrade 623 ft of 4" CI to 6"
1094	SFR	1250	1061	85%	Upgrade 114ft of 4" CI to 6"
1248	SFR	1250	1070	86%	Upgrade 201 ft of 4" CI to 6"
1236	SFR	1250	1074	86%	Upgrade 203 ft of 4" CI to 6"
1082	SFR	1250	1080	86%	Upgrade 630 ft of 6" CI to 8"

Table 8-12: Existing Fire Flow Deficiencies and Recommendations					
1232	SFR	1250	1097	88%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
214	SFR	1250	1116	89%	Upgrade 205 ft of 4" CI to 8" & Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
432	SFR	1250	1130	90%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
1230	SFR	1250	1140	91%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
1220	SFR	1250	1190	95%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
1112	SFR	1250	1231	98%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
1218	SFR	1250	1244	100%	Add an emergency interconnection to pipe 1423 w/ 1250 gpm (EC 4)
578	MFR	2000	664	33%	Upgrade 864 ft of 4" CI to 8"
594	MFR	2000	1377	69%	Upgrade 1,180 ft of 4" CI to 8"
TEST52	MFR	2000	1450	73%	Upgrade 864 ft of 4" CI to 8"
590	MFR	2000	1501	75%	Upgrade 469 ft of 4" CI to 10"
584	MFR	2000	1587	79%	Upgrade 340 ft of 6" CI to 10"
556	MFR	2000	1729	86%	Upgrade 433 ft of 6" DI to 8"
816	MFR	2000	1879	94%	Turn EC 1
1384	CII	4000	481	12%	Turn on EC 3
1432	CII	4000	554	14%	Turn on EC 3
500	CII	4000	706	18%	Turn on EC 3
206	CII	4000	745	19%	Turn on EC 3
604	CII	4000	819	20%	Turn on EC 3
504	CII	4000	927	23%	Turn on EC 3
606	CII	4000	1001	25%	Turn on EC 3
506	CII	4000	1040	26%	Turn on EC 3
216	CII	4000	1149	29%	Turn on EC 3
1038	CII	4000	1242	31%	Install 325 ft of 10"
1036	CII	4000	1255	31%	Upgrade 528 ft of 6" CI to 8" & Recommend fire suppression system
3078	CII	4000	1279	32%	Turn on EC 2 and Upgrade 1,907 ft of 12" CI to 14"
1040	CII	4000	1298	32%	Turn on EC 2 and Upgrade 1,260 ft of 12" CI to 14"
586	CII	4000	1336	33%	Construct 142 of 8"
3080	CII	4000	1383	35%	Upgrade 222 ft of 8" AC to 10"
1398	CII	4000	1394	35%	Upgrade 714 ft of 8" AC to 10"
1596	CII	4000	1426	36%	Upgrade 854 ft of 8" AC to 10"
514	CII	4000	1427	36%	Turn on EC 2 and Upgrade 559 ft of 12" CI to 14"

Table 8-12: Existing Fire Flow Deficiencies and Recommendations					
1030	CII	4000	1452	36%	Turn on EC 2 and Upgrade 684 ft of 12" CI to 14"
1500	CII	4000	1491	37%	Turn on EC 2
1028	CII	4000	1527	38%	Turn on EC 2
TEST224	CII	4000	1579	39%	Turn on EC 2
1506	CII	4000	1698	42%	Upgrade 57 ft of 8" AC to 10"
1608	CII	4000	1733	43%	Turn on EC 2 & Upgrade 606 ft of 8" AC to 10"
608	CII	4000	1761	44%	Turn on EC 2
362	CII	4000	1863	47%	Turn on EC 2 and Upgrade 534 ft of 4" CI to 12"
1332	CII	4000	2042	51%	Turn on EC 2 and Upgrade 1,554 ft of 4"&6" to 10"
674	CII	4000	2069	52%	Turn on EC 2 and Upgrade 675 ft of 6" AC to 12"
1420	CII	4000	2393	60%	Upgrade 469 ft of 4" CI to 10" & recommend sprinkler system installation
1278	CII	4000	2427	61%	Upgrade 22 ft of 10" AC to 12" & 628 ft of 6" CI to 12" & 689 ft of 4" to 8"
366	CII	4000	2446	61%	Upgrade 22 ft of 10" AC to 12" & 628 ft of 6" CI to 12" & 689 ft of 4" to 8"
1374	CII	4000	2463	62%	Upgrade 22 ft of 10" AC to 12" & 139 ft of 6" CI to 12"
972	CII	4000	2569	64%	Upgrade 343 ft of 8" AC to 10"
1054	CII	4000	2581	65%	Upgrade 523 ft of 8" AC to 10"
64	CII	4000	2632	66%	Upgrade 296 ft of 8" AC to 10"
1262	CII	4000	2646	66%	Upgrade 364 ft of 4" CI to 10"
62	CII	4000	2660	67%	Upgrade 38 ft of 6" AC to 8"
496	CII	4000	2687	67%	Upgrade 46 ft of 6" AC to 8"
740	CII	4000	2703	68%	Upgrade 76 ft of 6" STL to 8"
60	CII	4000	2717	68%	Upgrade 545 ft of 6" STL to 8"
442	CII	4000	2733	68%	Upgrade 545 ft of 6" STL to 8"
1052	CII	4000	2790	70%	Upgrade 55 ft of 6" CI to 10"
448	CII	4000	2799	70%	Upgrade 141 ft of 8"AC to 10"
446	CII	4000	2851	71%	Upgrade 137 ft of 8" AC to 10"
452	CII	4000	2851	71%	Upgrade 67 ft of 6" AC to 8"
1492	CII	4000	2872	72%	Upgrade 137 ft of 8" AC to 10"
802	CII	4000	2883	72%	Upgrade 77 ft of 6" CI to 10"
1378	CII	4000	2995	75%	Upgrade 62 ft of 8" AC to 8"
1346	CII	4000	3017	75%	Upgrade 325 ft of 6" CI to 12"
1266	CII	4000	3059	76%	Upgrade 392 ft of 6" CI to 12"
444	CII	4000	3083	77%	Upgrade 753 ft of 6" CI to 12"
1050	CII	4000	3119	78%	Upgrade 1,805 ft of 6" CI to 12"
110	CII	4000	3120	78%	Upgrade 1,805 ft of 6" CI to 12"
736	CII	4000	3190	80%	Upgrade 363 ft of 8" AC to 12"
498	CII	4000	3207	80%	Upgrade 606 ft of 8" AC to 12"
454	CII	4000	3237	81%	Upgrade 848 ft of 8" AC to 12"
626	CII	4000	3275	82%	Upgrade 491 ft of 8" AC to 10" & Turn on EC 1

Table 8-12: Existing Fire Flow Deficiencies and Recommendations					
1270	CII	4000	3302	83%	Upgrade 52 ft of 8" AC to 10" & Turn on EC 1
494	CII	4000	3332	83%	Upgrade 1,013 ft of 8" AC to 10"
742	CII	4000	3349	84%	Turn on EC 1
904	CII	4000	3382	85%	Upgrade 68 ft of 8" AC to 10" & Turn on EC 1
1428	CII	4000	3508	88%	Upgrade 640 ft of 6" STL to 10"
628	CII	4000	3534	88%	Upgrade 346 ft of 8" CI to 12"
112	CII	4000	3549	89%	Upgrade 358 ft of 8" CI to 10" & 150 ft of 6" CI to 8"
458	CII	4000	3617	90%	Upgrade 358 ft of 8" CI to 10" & 80 ft of 6" CI to 8"
938	CII	4000	3648	91%	Upgrade 290 ft of 8" CI to 10"
1272	CII	4000	3657	91%	Upgrade 341 ft of 6" CI to 8"
480	CII	4000	3717	93%	Install 443 ft of 10"
756	CII	4000	3724	93%	Install 253 ft of 10"
860	CII	4000	3739	93%	Upgrade 430 ft of 4" CI to 8"
160	CII	4000	3768	94%	Upgrade 430 ft of 4" CI to 8"
114	CII	4000	3799	95%	Upgrade 339 ft of 4" to 10"
156	CII	4000	3806	95%	Upgrade 23 ft of 4" CI to 8" and 198 ft of 6" to 8"
882	CII	4000	3812	95%	Upgrade 65 ft of 6" STL to 8"
476	CII	4000	3833	96%	Upgrade 213 ft of 6" STL to 12" & 77ft of 6" STL to 10"
682	CII	4000	3833	96%	Upgrade 284 ft of 6" STL to 8"
1010	CII	4000	3864	97%	Upgrade 204 ft of 6" CI to 8"
152	CII	4000	3936	98%	Upgrade 143 ft of 6" CI to 8"
678	CII	4000	3940	99%	Upgrade 209 ft of 4" STL to 8"
632	CII	4000	3945	99%	Upgrade 430 ft of 4" CI to 8"
484	CII	4000	3956	99%	Upgrade 540 ft of 8" CI to 12"
528	CFPL	5000	2366	47%	Upgrade 208 ft of 8" CI to 12" & Turn on EC 2
1344	CFPL	5000	2550	51%	Upgrade 73ft of 10" CI to 12" & 359 ft of 6" STL to 8" & Turn EC 2 on
1498	CFPL	5000	2599	52%	Upgrade 770 ft of 8" CI to 12"
1502	CFPL	5000	2833	57%	Upgrade 300 ft of 8" CI to 10"
1436	CFPL	5000	4299	86%	Upgrade 213 ft of 6" STL to 12"
650	CFPL	5000	4307	86%	Install 53 ft of 8"
762	CFPL	6000	5127	85%	Upgrade 552 ft of 10" STL to 12" & Run EC 2 + 3

Notes:

1. Red highlighted cell = available fire flow less than 25% of required
2. Orange highlighted cell = available fire flow between 25% to 50% of required
3. Green highlighted cell = available fire flow between 50% to 75% of required
4. Blue highlighted cell = available fire flow greater than 75% of required

THIS PAGE LEFT INTENTIONALLY BLANK

Legend

- City of El Monte Water Department
- Water Distribution System
- Groundwater Wells
- Storage Facilities

Fire Flow Deficiencies

- Passed (219 nodes)
- Zone Pressure Deficiency (9 nodes)
- Residual Pressure Deficiency (125 nodes)
- Residual Pressure and Zone Pressure Deficiency (1 node)

Well No. 15
Well No. 16
Well No. 14
Arden WTP
Reservoir & Pump Station
Elevated Storage Tank
Well No. 13
Well No. 12
Well No. 2A
Well No. 3
Well No. 10
Well No. 4
El Monte
Five Points

1 inch = 1,200 feet

City of El Monte

2023 Water Master Plan Update

Figure 8-4:

Fire Flow Deficiencies by Type

THIS PAGE LEFT INTENTIONALLY BLANK

8.4.4 Future Conditions Fire Flow Analysis

To analyze impacts to the existing water distribution system with the addition of future water demands the future modeling scenarios were configured as follows:

- Additional future water demands were added to the existing system water demands
- Pipelines identified as being deficient to serve existing MDD+FF simulations were upsized

For future ADD, MDD, PHD condition simulations, the existing water distribution system is sufficient to meet the pressure and flow requirements as defined in Section 6. Based on the future MDD plus fire flow evaluation, no additional pipeline deficiencies were identified/triggered by the additional demands associated with future growth.

8.5 Limited Facility Condition Assessment

MKN completed a basic condition assessment of major existing water system facilities to determine their condition, capacity, efficiency, compliance with code and safety requirements, and structural integrity. MKN conducted a facilities survey to identify and determine the overall operation efficiency of the facilities. Facilities that were reviewed in the field included the following:

- Wells No. 2A, 3, 4, 10, 12, 13
- Arden Reservoir

The following provides a summary of the observed deficiencies at the facilities identified above and recommended improvements to address the deficiencies:

Well No. 2A

- Observation: Minor deficiencies observed during visual condition assessment
- Recommendation: Reduction of pump noise and future planning for maintenance workspace

Well No. 3

- Observation: Various deficiencies observed during visual condition assessment
- Recommendation: Ceiling repairs, anchor pump per manufacturer recommendations, paint coating upgrades on valves and piping
- As identified by City staff this well will become inactive

Well No. 4

- Observation: Minor deficiencies observed during visual condition assessment
- Recommendation: Site access upgrades

- As identified by City staff this well will become inactive

Well No. 10

- Observation: Various deficiencies observed during visual condition assessment
- Recommendation: Address minor corrosion issues on access safety ladder

Well No. 12

- Observation: Various deficiencies observed during visual condition assessment
- Recommendation: Address minor corrosion issues on the flow meter piping in the below-ground vaults and above ground piping

Well No. 13

- Observation: Various deficiencies observed during visual condition assessment
- Recommendation: Base slab in the lower-level upgrades, additional anchor bolts for pipe supports
- As identified by City staff this well will become inactive

Detailed inspection forms with site photos are included in **Appendix C** and cost opinions for the recommendations are include in Section 9 of the Master Plan.

8.5.1 Storage Facilities

In May 2019, the City contracted with Harper & Associates Engineering, Inc. to complete a corrosion evaluation and cleaning of the City's existing welded steel storage tanks. The report identified existing deficiencies associated with the storage tanks exterior, interior, and health and safety requirements. The City completed the exterior surfaces, interior surfaces, safety, health, and code recommendations for the ground level steel tank. However, recommendations for the elevated tank have not been completed are identified below:

- Exterior Surfaces
  - Abrasive blast clean all exterior surfaces and apply an epoxy/urethane paint system to all exterior
- Interior Surfaces
  - Abrasive blast clean all interior coated surfaces and apply a three-coat epoxy coating system
- Safety, Health, and Code Features
  - Install new guard railing on the catwalk around the tank and a self-closing gate
  - Install a new 36" x 36" roof hatch
  - Install new exterior and interior ladders

- Install a new upper portion of the exterior ladder over the bowl
- Install a new fall prevention device on the exterior ladder
- Replace the center vent screening
- Install an air break in the overflow pipe
- Install a personal fall restraint system to provide access to all areas of the roof

Cost opinions for the recommended storage improvements are included in Section 9 of the Master Plan.

THIS PAGE LEFT INTENTIONALLY BLANK

9.0 CAPITAL IMPROVEMENT PROGRAM

This section provides an overview of the recommended capital improvements to address the capacity and condition-based deficiencies identified in the Master Plan.

9.1 Capital Improvement Program

The capital improvements proposed in the Master Plan address hydraulic deficiencies associated with existing and future demands and physical condition-based deficiencies at existing facilities. The City should consider the projects identified in the Master Plan and incorporate into the City's Capital Improvement Program.

9.1.1 Development of Unit Costs for Capital Improvement Projects

Cost opinions are based on the following assumptions:

- Include full capitalization inclusive of engineering, design, permitting, and construction administration/management costs
- Costs are generally derived from bid prices from similar water utility projects, with adjustments for inflation, size, complexity, and location
- Construction cost opinions were developed in April 2023 and used the 20-Cities Engineering News-Record (ENR) Construction Cost Index (CCI) April 2023 = 13,729.03 to escalate estimated cost to present value
- Engineering, project administration, and construction management were estimated at 30 percent of total construction costs
- Project contingency was estimated at 50 percent of total construction costs.
- Cost opinions are "budget-level" and may not fully account for site-specific conditions or design decisions that will affect the actual costs.
- All costs rounded to the nearest $1000

The opinions of probable cost prepared by MKN represent our judgment and are supplied for the general guidance of the City. Assumptions have been stated based on the information available at the time of preparation. Since MKN has no control over the cost of labor and material, or over competitive bidding or market conditions, MKN does not guarantee the accuracy of such opinions as compared to contractor bids or actual project costs. As part of the final design for the improvements described below, it is recommended that a preliminary design report be completed to determine final equipment selection and/or pipe materials.

Table 9-1 contains the unit construction costs for water pipeline improvements and factors for estimating the non-construction costs associated with a pipeline improvement project such as engineering, administration, construction management, and contingency to arrive at a total project cost.

Table 9-1: Unit Construction Costs	
Item Description	**Budgetary Unit Cost($/LF)**
8-inch pipeline	$210
10-inch pipeline	$250
12-inch pipeline	$280
14-inch pipeline	$320
16-inch pipeline	$340
Non-Construction Costs	
Engineering, Project Administration, and Construction Management	30% of construction cost
Project Contingency	50% of construction cost
Notes: 1. Pipeline budgetary costs are based on work in existing streets and include excavation, installation of pipe, backfill, pavement removal and repair, normal appurtenances, and traffic control. The budgetary unit costs presented above represent the construction cost only and do not include contingency or other non-construction costs. 2. Water main improvements on dead-end streets assumed installation of one new isolation valve at point of connection, one new blowoff assembly and pavement repair. 3. Water main upgrades within distribution system assumed installation of two new isolation valves at point of connections and pavement repair.	

9.1.2 CIP Prioritization

Projects were assigned a priority based on the following CIP prioritization schedule, which categorizes CIPs into four groups and are described as follows:

- Priority 1 – Highest: This project is highly recommended because of the significant near-term risk it mitigates or benefit it produces. Resources from other sources should be diverted to this project if available.
- Priority 2 – High: This project is less critical but is considered a high priority because of the risk it mitigates or benefit it produces.
- Priority 3 – Medium: This project is needed to mitigate a moderate risk or deliver a moderate benefit or is a deferrable project that will need attention within a few years. This is needed to maintain or restore current service levels.
- Priority 4 – Low: This is a recommended project but does not meet any of the definitions above or is a deferable project that needs attention within several years. If these projects are not completed in a timely manner, they may become higher priority projects later.

9.2 Capital Improvement Program Summary

To provide supply redundancy, the Master Plan recommends two (2) facility improvement projects. To address on-going operational and maintenance issues at the City's water supply and storage facilities, the Master Plan recommends seven (7) facility improvement projects.

The City's existing water system is capable of meeting all domestic demand scenarios, but the system is not able to meet fire flow scenarios throughout the City. The Master Plan recommends 53 pipeline improvement projects to address existing system deficiencies related to meeting fire flow demands. Pipeline improvements were prioritized based on the existing available fire flow (worst to best) that could be delivered prior to constructing new improvements.

Table 9-2 provides an overall summary of the recommended CIP costs by priorities and category of improvement.

Table 9-2: CIP Cost Summary by Priority

Category	Priority 1	Priority 2	Priority 3	Priority 4	Total
Water Supply – System Redundancy	$200,000	-	-	-	$200,000
Water Supply – Condition Deficiency	-	-	$93,000	-	$93,000
Storage – Condition Deficiency	$112,000	$1,500,000	$378,000	-	$1,990,000
Pipeline – Fire Flow Deficiency	$928,000	$2,370,000	$8,590,000	$8,219,000	$20,107,000
Total	**$1,240,000**	**$3,870,000**	**$9,061,000**	**$8,219,000**	**$22,390,000**

The following sections summarize the recommended CIPs for the City's existing water supply, storage facilities, and distribution system.

9.2.1 Recommended Water Supply CIPs

The water supply projects include improvements for system redundancy and minor repairs at the existing wells based on the findings from the condition assessment of each well site. The condition assessment projects included ceiling repairs, addressing minor corrosion issues, adding anchorage supports, and painting/coating upgrades. As mentioned in Section 8.1.2, the redundancy projects include the addition of standby power at two critical well sites. **Table 9-3** presents the recommended water supply projects.

9.2.2 Recommended Storage Facility CIPs

The storage facility projects include recommended repairs and rehabilitation of the existing tanks based on the findings from the condition assessment performed by Harper & Associates Engineering Inc. on May 2019 and projects described in the City's 2018 Sanitary Survey Report. The condition assessment projects included interior and exterior recoating, as well as multiple health and safety code feature upgrades. The Sanitary Survey Report projects included seismic upgrades and refurbishment. **Table 9-4** presents the recommended tank projects.

9.2.3 Recommended Distribution System CIPs

The distribution system projects are specific upgrades to the existing system to address hydraulic deficiencies throughout the system based on fire flow deficiencies. The analysis results indicate the existing water distribution system can meet all potable water demand scenarios (average day demand, maximum day demand, and peak hour demand), and no improvements to address hydraulic deficiencies resulting from potable water demand scenarios are recommended. The upgrades consist of replacing existing undersized pipes with larger pipes, adding new pipes to address fire flow demands, or adding new facilities to serve demands. **Table 9-5** presents the recommended pipeline projects and **Figure 9-1** identifies the locations of each project throughout the system.

Table 9-3: Capital Improvements for Water Supply									
Project Identification	**Project Name**	**Location**	**Deficiency**	**Recommended Improvement**	**Priority**	**Construction Cost ($)**	**Engineering, Project Administration, and Construction Management ($)**	**Project Contingency ($)**	**Opinion of Cost ($)**
System Redundancy									
EX-WSCIP-1	Well No. 2A Facility Improvements	Well No. 2A	Redundancy of supply sources required to serve existing and future demands in case of emergencies	Dedicated portable backup generator	1	$100,000	-	-	$100,000
EX-WSCIP-2	Well No. 10 Facility Improvements	Well No. 10	Redundancy of supply sources required to serve existing and future demands in case of emergencies	Dedicated portable backup generator	1	$100,000	-	-	$100,000
								Subtotal	**$200,000**
Condition Deficiency									
EX-WSCIP-3	Well No. 2A Facility Improvements	Well No. 2A	Minor deficiencies observed during visual condition assessment	Reduction of pump noise, and future planning for maintenance work space	3	$23,000	$7,000	$12,000	$42,000
EX-WSCIP-4	Well No. 10 Facility Improvements	Well No. 10	Various deficiencies observed during visual condition assessment	Address minor corrosion issues on access safety ladder.	3	$8,000	$3,000	$4,000	$15,000
EX-WSCIP-5	Well No. 12 Facility Improvements	Well No. 12	Various deficiencies observed during visual condition assessment	Address minor corrosion issues on the flow meter piping in the below-ground vaults and above ground piping.	3	$20,000	$6,000	$10,000	$36,000
								Subtotal	**$93,000**
								Total	**$293,000**

Notes:
1. EX-WSCIP = Existing Water Supply Capital Improvement Project
2. Costs rounded to the nearest $1,000.
3. Engineering and Administration costs estimated at 30% and Construction contingency estimated at 50%
4. Construction cost opinions were developed in April 2023. Use 20-Cities ENR CCI April 2023 = 13729.03 to escalate estimated cost to present value.

THIS PAGE LEFT INTENTIONALLY BLANK

Table 9-4: Capital Improvements for Storage Facilities									
Project Identification	**Project Name**	**Location**	**Deficiency**	**Recommended Improvement**	**Priority**	**Total Construction Cost ($)**	**Engineering, Project Administration, and Construction Management ($)**	**Project Contingency ($)**	**Opinion of Cost ($)**
Condition Deficiency									
EX-STCIP-1	Elevated Tank Interior Improvements	Reservoir Site	Various deficiencies observed during visual condition assessment (May 2022) and Corrosion Engineering Evaluation (May 2019)	Abrasive blast cleaning all interior surfaces	3	$210,000	$63,000	$105,000	$378,000
EX-STCIP-2	Elevated Tank Safety, Health and Code Improvements	Reservoir Site	Various deficiencies observed during visual condition assessment (May 2022) and Corrosion Engineering Evaluation (May 2019)	Safety, Health and Code Features include new guardrail, roof hatch, exterior and interior ladders, fall prevention device, and vent screening	1	$62,000	$19,000	$31,000	$112,000
EX-STCIP-3	Reservoir Seismic Upgrade	Reservoir Site	Various deficiencies reported in the City's 2018 Sanitary Survey Report (2018) and included in the City's design and construction of capital improvement projects		2	$1,300,000	-	-	$1,300,000
EX-STCIP-4	Reservoir Refurbishment	Reservoir Site	Various deficiencies reported in the City's 2018 Sanitary Survey Report (2018) and included in the City's design and construction of capital improvement projects		2	$200,000	-	-	$200,000
								Total	**$1,990,000**

Engineering and Administration costs estimated at 30% and Construction contingency estimated at 50%, per 2010 WMP
Construction cost opinions were developed in April 2023. Use 20-Cities ENR CCI April 2023 = 13729.03 to escalate estimated cost to present value.

THIS PAGE LEFT INTENTIONALLY BLANK

Table 9-5: Capital Improvements for Distribution System											
Project Identification	Project Name	Location	Deficiency	Available Fire Flow (%)	Recommended Improvement		Priority	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Project Contingency ($)	Opinion of Cost ($)
					Diameter (inches)	Length (feet)					
EX-WDCIP-1	Las Flores Dr Waterline Installation	Las Flores Dr & Irsis Ln to Node 1384	Fails commercial, industrial, or institutional fire flow	12%	10	443	1	$111,000	$34,000	$56,000	$201,000
EX-WDCIP-2	Valley Blvd & Granada Ave Waterline Upgrade	Granada Ave & Valley Blvd to Node 1506	Fails commercial, industrial, or institutional fire flow	22%	8	285	1	$60,000	$18,000	$30,000	$108,000
EX-WDCIP-3	El Monte Ave & Valley Blvd Waterline Upgrade	Node 3078 to 1432	Fails commercial, industrial, or institutional fire flow	23%	10	292	1	$73,000	$22,000	$37,000	$132,000
					8	209		$44,000	$14,000	$22,000	$80,000
EX-WDCIP-4	Montecito Dr & Daleview Ave Waterline Upgrade	Montecito Dr & Tyler Ave to Montecito Dr & Daleview Ave to end of Daleview Ave	Fails single family residential fire flow	24%	8	1075	1	$226,000	$68,000	$113,000	$407,000
										Priority 1 Subtotal	**$928,000**
EX-WDCIP-5	Saint Louis Dr & Santa Anita Ave Waterline Upgrade	Saint Louis Dr to Santa Anita Ave	Fails single family residential fire flow and fails commercial, industrial, or institutional fire flow	28%	10	325	2	$81,000	$25,000	$41,000	$147,000
					8	144		$30,000	$9,000	$15,000	$54,000
EX-WDCIP-6	El Monte High School Waterline Upgrade	El Monte High School	Fails commercial, industrial, or institutional fire flow	30%	8	748		$157,000	$48,000	$79,000	$284,000
EX-WDCIP-7	Santa Anita Ave & Santa Fe Dr Waterline Upgrade	Node 1356 to Node 1596 / Node 1600 to Node 1608	Fails commercial, industrial, or institutional fire flow	39%	8	1040	2	$218,000	$66,000	$109,000	$393,000
EX-WDCIP-8	Garvey Ave, Central Ave, & Doreen Ave Waterline Upgrade	Bodger St & Central Ave to Garvey Ave & Santa Anita Ave	Fails commercial, industrial, or institutional fire flow	40%	12	1804	2	$505,000	$152,000	$253,000	$910,000
					8	282		$59,000	$18,000	$30,000	$107,000
EX-WDCIP-9	Elrovia Ave Waterline Upgrade	Elrovia Ave & Bryant Rd to Elrovia Ave & Forest Grove St	Fails single family residential fire flow	42%	8	1070	2	$225,000	$68,000	$113,000	$406,000
EX-WDCIP-10	Mulhall St Waterline Upgrade	Mulhall St & Doreen Ave to Node 102	Fails single family residential fire flow	47%	8	182	2	$38,000	$12,000	$19,000	$69,000
										Priority 2 Subtotal	**$2,370,000**

THIS PAGE LEFT INTENTIONALLY BLANK

Table 9-5: Capital Improvements for Distribution System											
Project Identification	Project Name	Location	Deficiency	Available Fire Flow (%)	Recommended Improvement		Priority	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Project Contingency ($)	Opinion of Cost ($)
					Diameter (inches)	Length (feet)					
EX-WDCIP-11	Hickson St Waterline Upgrade	Hickson St & Arden Dr to Node 1332	Fails commercial, industrial, or institutional fire flow	51%	10	640	3	$160,000	$48,000	$80,000	$288,000
EX-WDCIP-12	Center Ave & Valley Blvd Waterline Upgrade	Node 1500 to 1492 along Center Ave	Fails commercial, industrial, or institutional fire flow	54%	8	97	3	$20,000	$6,000	$10,000	$36,000
					10	213		$53,000	$16,000	$27,000	$96,000
					12	77		$22,000	$7,000	$11,000	$40,000
EX-WDCIP-13	Meeker Ave & Valley Blvd Waterline Upgrade	Meeker Ave & Walnut St to Valley Blvd & Meeker Ave, Valley Blvd & Meeker Ave to Node TEST224, Node 538 to 542 along Valley Blvd	Fails commercial, industrial, or institutional fire flow	58%	12	613	3	$172,000	$52,000	$86,000	$310,000
					8	359		$75,000	$23,000	$38,000	$136,000
EX-WDCIP-14	Saint Louis Dr Waterline Upgrade	Saint Louis Dr & Tyler Ave to Saint Louis Dr & Montecito Dr. Recommend fire supression system.	Fails single family residential fire flow and fails commercial, industrial, or institutional fire flow	59%	8	1017	3	$214,000	$65,000	$107,000	$386,000
EX-WDCIP-15	Maple Ave Waterline Upgrade	Maple Ave & Bryant Rd to Maple Ave & Forest Grove St	Fails single family residential fire flow	60%	8	841	3	$177,000	$54,000	$89,000	$320,000
EX-WDCIP-16	Brockway Pl Waterline Upgrade	Brockway St & Brockway Pl to Node 1226	Fails single family residential fire flow	61%	8	205	3	$43,000	$13,000	$22,000	$78,000
EX-WDCIP-17	Hoyt Park Pl Waterline Upgrade	Hoyt Park Pl & Santa Anita Ave to Node 1120	Fails single family residential fire flow	61%	8	980	3	$206,000	$62,000	$103,000	$371,000
EX-WDCIP-18	Monterey Ave Waterline Upgrade	Node 1418 to 1416 along Monterey Ave	Fails commercial, industrial, or institutional fire flow	61%	8	430	3	$90,000	$27,000	$45,000	$162,000
EX-WDCIP-19	Edwards Ave & Asher St Waterline Upgrade	Edwards Ave & Asher St to Node 1212	Fails single family residential fire flow	62%	8	203	3	$43,000	$13,000	$22,000	$78,000
					8	201		$42,000	$13,000	$21,000	$76,000
EX-WDCIP-20	Gibson Rd & Rose Ave Waterline Upgrade	Node 1278 to Gibson Rd & Rose Ave to Node 1262	Fails commercial, industrial, or institutional fire flow	63%	10	560	3	$140,000	$42,000	$70,000	$252,000
EX-WDCIP-21	Riverview Ave Waterline Upgrade	Node 196 to 194 along Riverview Ave	Fails single family residential fire flow	63%	8	147	3	$31,000	$10,000	$16,000	$57,000
EX-WDCIP-22	Peck Rd Waterline Upgrade	Bryant Rd & Peck Rd to Ramona Blvd & Peck Rd	Fails commercial, industrial, or institutional fire flow	65%	14	1907	3	$610,000	$183,000	$305,000	$1,098,000
EX-WDCIP-23	Valley Mall Waterline Upgrade	Node 1378 to Lexington Ave & Valley Mall to Monterey Ave & Palm Dr / Node J-35 to 1448 along Monterey Ave	Fails commercial, industrial, or institutional fire flow	66%	8	394	3	$83,000	$25,000	$42,000	$150,000

THIS PAGE LEFT INTENTIONALLY BLANK

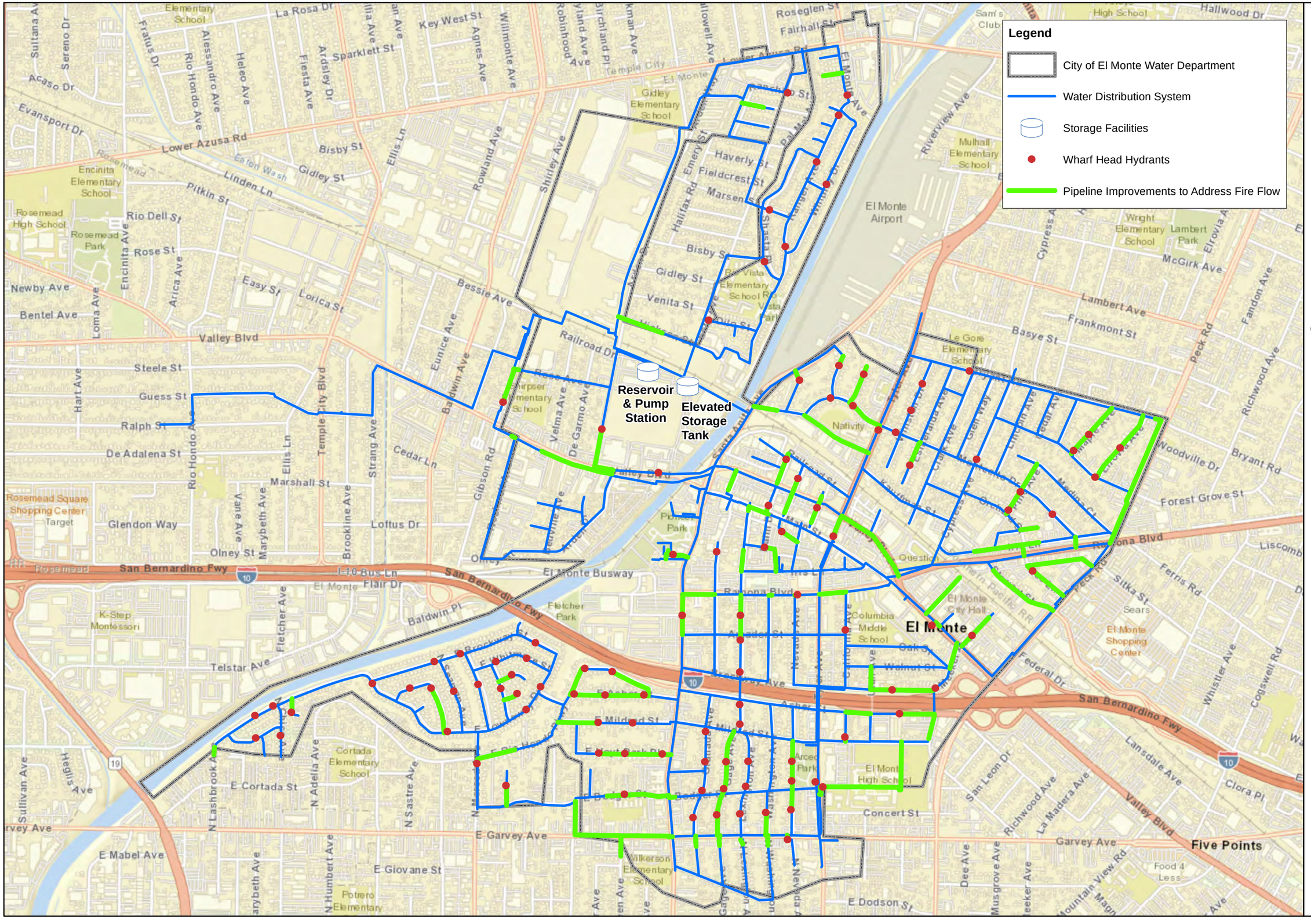
Table 9-5: Capital Improvements for Distribution System											
Project Identification	Project Name	Location	Deficiency	Available Fire Flow (%)	Recommended Improvement		Priority	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Project Contingency ($)	Opinion of Cost ($)
					Diameter (inches)	Length (feet)					
EX-WDCIP-24	Utah Ave & Brockway Ave Waterline Upgrade	Walnut St & Utah Ave to Utah & Brockway Ave to Brockway Ave & Meeker Ave	Fails multi- family residential fire flow	66%	8	1181	3	$248,000	$75,000	$124,000	$447,000
EX-WDCIP-25	Nevada Ave Waterline Upgrade	Mildred St & Nevada St to Node 952	Fails single family residential fire flow	68%	8	940	3	$197,000	$60,000	$99,000	$356,000
EX-WDCIP-26	Ramona Blvd & Iris Ln Waterline Installation	Ramona Blvd to Iris Ln	Fails commercial, industrial, or institutional fire flow	68%	8	142	3	$30,000	$9,000	$15,000	$54,000
EX-WDCIP-27	Bodger St Waterline Upgrade	Node 972 to 1054 along Bodger St	Fails commercial, industrial, or institutional fire flow	69%	12	848	3	$237,000	$72,000	$119,000	$428,000
					10	77		$19,000	$6,000	$10,000	$35,000
EX-WDCIP-28	Valley Blvd & Arden Dr Waterline Upgrade	Node 1270 to Valley Blvd & Esto Ave / Node 1344 to Valley Blvd & Esto Ave	Fails commercial, industrial, or institutional fire flow	70%	12	771	3	$216,000	$65,000	$108,000	$389,000
					10	1,021		$255,000	$77,000	$128,000	$460,000
EX-WDCIP-29	Coffield Ave Waterline Upgrade	Coffield Ave & Orchard St to end of street	Fails single family residential fire flow	71%	8	229	3	$48,000	$15,000	$24,000	$87,000
EX-WDCIP-30	Rio Hondo Pkwy & Asher St Waterline Upgrade	Asher St / Rio Hondo Pkwy Neighborhood Loop	Fails single family residential fire flow	71%	8	2127	3	$447,000	$135,000	$224,000	$806,000
EX-WDCIP-31	California Ave Waterline Upgrade	California Ave & Mildred St to Node 802	Fails commercial, industrial, or institutional fire flow	72%	10	55	3	$14,000	$5,000	$7,000	$26,000
EX-WDCIP-32	Asher St & Meeker Ave Waterline Upgrade	Node 590 to Meeker Ave & Asher St to Node 594	Fails multi- family residential fire flow	72%	8	814	3	$171,000	$52,000	$86,000	$309,000
EX-WDCIP-33	Lexington Ave Waterline Upgrade	Node 736 to Node 1374 along Lexington Ave	Fails commercial, industrial, or institutional fire flow	73%	10	290	3	$73,000	$22,000	$37,000	$132,000
					8	621		$130,000	$39,000	$65,000	$234,000
EX-WDCIP-34	Iris Ln Waterline Upgrade and Installation	Node 448 to 444 along Iris Ln / Lee Ln to Iris Ln	Fails commercial, industrial, or institutional fire flow	73%	12	156	3	$44,000	$14,000	$22,000	$80,000
					10	799		$200,000	$60,000	$100,000	$360,000
EX-WDCIP-35	Stewart St Waterline Upgrade	Stewart St & Peck Rd to Node 492	Fails commercial, industrial, or institutional fire flow	75%	10	1002	3	$251,000	$76,000	$126,000	$453,000
										Priority 3 Subtotal	**$8,590,000**

THIS PAGE LEFT INTENTIONALLY BLANK

Table 9-5: Capital Improvements for Distribution System											
Project Identification	Project Name	Location	Deficiency	Available Fire Flow (%)	Recommended Improvement		Priority	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Project Contingency ($)	Opinion of Cost ($)
					Diameter (inches)	Length (feet)					
EX-WDCIP-36	Valley Blvd & Rockwell Ave Waterline Upgrade	Valley Blvd & Rockwell Ave to Node 1266	Fails commercial, industrial, or institutional fire flow	76%	10	52	4	$13,000	$4,000	$7,000	$24,000
EX-WDCIP-37	Ellen St Waterline Upgrade	Ellen St & El Monte Ave to end of street	Fails single family residential fire flow	76%	8	259	4	$54,000	$17,000	$27,000	$98,000
EX-WDCIP-38	Gage Ave Waterline Upgrade	Node 882 to 834 along	Fails single family residential fire flow	78%	10	138	4	$35,000	$11,000	$18,000	$64,000
					8	1457		$306,000	$92,000	$153,000	$551,000
EX-WDCIP-39	Washington Ave Waterlin eUpgrade	Node 938 to 932 along Washington Ave	Fails single family residential fire flow	80%	10	309	4	$77,000	$24,000	$39,000	$140,000
					8	137		$29,000	$9,000	$15,000	$53,000
EX-WDCIP-40	Ramona Blvd Waterline Upgrade	Ramona Blvd & Washington Ave to California Ave & Ramona Blvd	Fails commercial, industrial, or institutional fire flow	82%	10	95	4	$24,000	$8,000	$12,000	$44,000
					8	84		$18,000	$6,000	$9,000	$33,000
EX-WDCIP-41	Pine Ave Waterline Upgrade	Pine Ave & Medina Ct to Pine Ave & Orchard St	Fails single family residential fire flow	84%	8	797	4	$167,000	$51,000	$84,000	$302,000
EX-WDCIP-42	Lexington Ave & Garvey Ave Waterline Upgrade	Lexington Ave & Garvey Ave to Node 904	Fails commercial, industrial, or institutional fire flow	85%	8	67	4	$14,000	$5,000	$7,000	$26,000
EX-WDCIP-43	Rio Hondo Pkwy Waterline Upgrade	Merced Ave & Rio Hondo Pkwy to Node 1082	Fails single family residential fire flow	86%	8	520	4	$109,000	$33,000	$55,000	$197,000
EX-WDCIP-44	Utilize all Emergency Interconnections	Varies	Fails commercial, industrial, or institutional fire flow	86%	-	-	4	$0	$0	$0	$0
EX-WDCIP-45	Add new Emergency Interconnection #4 from San Gabriel Valley Water Company	End of Brockway St service area	Fails single family residential fire flow	88%	-	-	4	$150,000	$45,000	$75,000	$270,000
EX-WDCIP-46	Santa Anita Ave & Ramona Blvd Waterlin eUpgrade	Santa Anita Ave & Amador St to Santa Anita Ave & Ramona Blvd to Ramona Blvd & Granada Ave	Fails commercial, industrial, or institutional fire flow	89%	12	552	4	$155,000	$47,000	$78,000	$280,000
					8	437		$92,000	$28,000	$46,000	$166,000
EX-WDCIP-47	Valley Blvd & Tyler Ave Waterline Upgrade	Ramon Blvd & Valley Blvd to Tyler Ave & Valley Blvd to Node 1436	Fails commercial, industrial, or institutional fire flow	89%	10	1457	4	$364,000	$110,000	$182,000	$656,000
EX-WDCIP-48	Granada Ave & Garvey Ave Waterline Upgrade	Granada Ave & Garvey Ave to Node 860	Fails commercial, industrial, or institutional fire flow	93%	10	141	4	$35,000	$11,000	$18,000	$64,000
EX-WDCIP-49	Asher & California Ave Waterline Upgrade	California Ave & Asher St to Utah Ave & Asher St	Fails multi- family residential fire flow	94%	8	340	4	$71,000	$22,000	$36,000	$129,000
EX-WDCIP-50	Nevada Ave & Garvey Ave Waterline Upgrade	Nevada Ave & Garvey Ave to Node 1010	Fails commercial, industrial, or institutional fire flow	97%	10	62	4	$16,000	$5,000	$8,000	$29,000
EX-WDCIP-51	Mildred St Waterline Upgrade	Rio Hondo Pkwy & Mildred St to Node 1112	Fails single family residential fire flow	98%	8	558	4	$117,000	$36,000	$59,000	$212,000
EX-WDCIP-52	Sastre Ave Waterline Upgrade	Towneway Dr & Sastre Dr to Node 1218	Fails single family residential fire flow	99%	8	630	4	$132,000	$40,000	$66,000	$238,000
EX-WDCIP-53	Main Replacement Program	Various deficiencies reported in the City's 2018 Sanitary Survey Report (2018)						$4,643,000	$0	$0	$4,643,000
										Priority 4 Subtotal	**$8,219,000**
										Total	**$20,107,000**

Notes:
EX-WDCIP = Existing Water Distribution Capital Improvement Project
Costs rounded to the nearest $1,000.
Engineering and Administration costs estimated at 30% and Construction contingency estimated at 50%, per 2010 WMP
Construction cost opinions were developed in April 2023. Use 20-Cities ENR CCI April 2023 = 13729.03 to escalate estimated cost to present value.

THIS PAGE LEFT INTENTIONALLY BLANK



City of El Monte

2023 Water Master Plan Update

Figure 9-1:

Capital Improvements for the Distribution System

1 inch = 1,200 feet

THIS PAGE LEFT INTENTIONALLY BLANK

Appendix A:

Consumer Confidence Report

THIS PAGE LEFT INTENTIONALLY BLANK

What Contaminants May Be Present In Sources Of Drinking Water?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Radioactive contaminants that can be naturally-occurring or be the result of oil and gas production and mining activities.

Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gasoline stations, urban stormwater runoff, agricultural application and septic systems.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).

PRSRT STD
U.S. POSTAGE
PAID
PERMIT NO. 800
GOLDSTREET
97301

City of El Monte Water Department
3990 Arden Drive
El Monte, California 91731

CITY OF EL MONTE WATER DEPARTMENT

2021 ANNUAL CONSUMER CONFIDENCE REPORT

The City of El Monte is committed to keeping you informed about the quality of your drinking water. This water quality report is provided to you annually. It includes information describing where your drinking water comes from, the constituents found in your drinking water and how the water quality compares with the regulatory standards.

Regularly scheduled meetings of the City of El Monte's City Council are held on the first and third Tuesday of each month at 6:30 PM at 11333 East Valley Boulevard, El Monte, California, 91731-3293. These meetings provide an opportunity for public participation in decisions that may affect the quality of your water.

Where Does My Drinking Water Come From?

The City of El Monte's water supply comes from groundwater in the Main San Gabriel Groundwater Basin extracted by production wells located in the City of El Monte and City of Rosemead. The water is disinfected with chlorine before it is delivered to your home.

What Is The Quality Of My Drinking Water?

The City of El Monte routinely tests for chemical and biological contaminants in your drinking water in accordance with the United States Environmental Protection Agency (USEPA) and the State Water Resources Control Board, Division of Drinking Water (DDW) monitoring requirements. The chart in this report shows the results of our testing for the year 2021. The State allows us to test for some contaminants less than once per year because the concentrations of these contaminants in groundwater do not change frequently. Some of our data, although representative, are more than one year old. The chart lists all the contaminants detected in your drinking water that have Federal and State drinking water standards. Detected unregulated contaminants of interest are also included.

During 2021, drinking water provided by the City of El Monte met or surpassed all Federal and State drinking water standards. We remain dedicated to providing you with a reliable supply of high quality drinking water.

What Are Water Quality Standards?

In order to ensure that tap water is safe to drink, USEPA and DDW prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulations and California law also establish limits for contaminants in bottled water that provide the same protection for public health.

Drinking water standards established by USEPA and DDW set limits for substances that may affect consumer health or aesthetic qualities of drinking water. The chart in this report shows the following types of water quality standards:

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the Public Health Goals (PHGs) (or Maximum Contaminant Level Goals (MCLGs)) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial pathogens.

Primary Drinking Water Standard: MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements and water treatment requirements.

Regulatory Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Notification Level (NL): An advisory level which, if exceeded, requires the drinking water system to notify the governing body of the local agency in which users of the drinking water reside (i.e. city council, county board of supervisors).

What Is A Water Quality Goal?

In addition to mandatory water quality standards, USEPA and DDW have set voluntary water quality goals for some contaminants. Water quality goals are often set at such low levels that they are not achievable in practice and are not directly measurable. Nevertheless, these

goals provide useful guideposts and direction for water management practices. The chart in this report includes three types of water quality goals:

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a disinfectant added for water treatment below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

City of El Monte 2021 Drinking Water Quality

CITY OF EL MONTE GROUNDWATER

CONSTITUENT AND (UNITS)	MCL	PHG or (MCLG)	DLR	Average Results (a)	Range (a) Minimum - Maximum	Most Recent Tests	Typical Origins
Primary Drinking Water Standards -- Health Related Standards							
ORGANIC CHEMICALS (b)							
Tetrachloroethylene (PCE) (µg/l)	5	0.06	0.5	<0.5	ND - 2.1	2021	Discharge from industrial activities
Trichloroethylene (TCE) (µg/l)	5	1.7	0.5	<0.5	ND - 0.51	2021	Discharge from industrial activities
INORGANIC CHEMICALS							
Barium (mg/L)	1	2	0.1	<0.1	ND - 0.11	2020	Erosion of natural deposits
Fluoride (mg/l)	2	1	0.1	0.53	0.23 - 0.89	2021	
Nitrate as N (mg/l)	10	10	0.4	5.2	2.1 - 8.6	2021	Leaching from fertilizer use
Nitrite as N (mg/l) (h)	1	1	0.4	<0.4	ND - 1.1	2021	
RADIOACTIVITY (c)							
Gross Alpha Activity (pCi/l)	15	(0)	3	<3	ND - 7	2021	Erosion of natural deposits
Uranium (pCi/l)	20	0.43	1	4	1.9 - 7.8	2020	
Secondary Drinking Water Standards -- Aesthetic Standards, Not Health-Related							
Chloride (mg/l)	500	NA	NA	20	14 - 29	2021	Erosion of natural deposits
Copper (mg/l)	1	0.3	0.05	<0.05	ND - 0.13	2021	
Iron (mg/l)	300	NA	100	<100	ND - 210	2021	Erosion of natural deposits; industrial wastes
Specific Conductance (µmho/cm)	1600	NA	NA	650	460 - 990	2021	Substances that form ions in water
Sulfate (mg/l)	500	NA	0.5	45	21 - 72	2021	Erosion of natural deposits
Total Dissolved Solids (mg/l)	1000	NA	NA	380	250 - 570	2021	
Turbidity (NTU)	5	NA	0.1	0.15	ND - 0.51	2021	
Other Constituents of Interest							
Hardness as CaCO3 (mg/l)	NA	NA	NA	280	190 - 400	2021	Erosion of natural deposits
Perfluorohexane Sulfonic Acid (ng/l)	NA	NA	NA	<4	ND - 5.2	2021	Discharge from industrial activities
Perfluorooctane Sulfonic Acid (ng/l)	NL = 6.5	NA	NA	<4	ND - 4.8	2021	
Sodium (mg/l)	NA	NA	NA	22	12 - 28	2021	Erosion of natural deposits

Unregulated Constituents Requiring Monitoring

CONSTITUENT AND (UNITS)	NL	PHG or (MCLG)	Average Results	Range Minimum - Maximum	Most Recent Tests
Bromide (µg/l)	NA	NA	160	90 - 280	2020
Manganese (µg/l) (d)	SMCL = 50	NA	<0.4	ND - 0.72	2020
Total Organic Carbon (mg/l)	NA	NA	<1	ND - 1.6	2020

CITY OF EL MONTE DISTRIBUTION SYSTEM

CONSTITUENT AND (UNITS)	MCL or [MRDL]	(MCLG) or [MRDLG]	DLR	Average Results (a)	Range (a) Minimum - Maximum	Most Recent Tests	Typical Origins
Primary Drinking Water Standards -- Health Related Standards							
MICROBIOLOGICAL							
E. coli (e)	0 positive monthly sample	(0)	NA	0 (highest number of detections in a month)	--	2021	Human and animal fecal waste
DISINFECTANT RESIDUAL (f)							
Chlorine Residual (mg/l)	[4]	[4]	NA	0.78	0.2 - 1.6	2021	Drinking water disinfectant
DISINFECTANT BY PRODUCTS (f)							
Total Trihalomethanes (TTHM) (µg/l)	80	NA	1	1.4	ND - 2.9	2021	By product of drinking water disinfection

Unregulated Constituents Requiring Monitoring

CONSTITUENT AND (UNITS)	NL	PHG or (MCLG)	Average Results	Range Minimum - Maximum	Most Recent Tests
Haloacetic acids (HAA5) (µg/l)	NA	NA	0.15	ND - 0.45	2020
Haloacetic acids (HAA6Br) (µg/l)	NA	NA	0.27	ND - 0.93	2020
Haloacetic acids (HAA9) (µg/l)	NA	NA	0.27	ND - 0.93	2020

CITY OF EL MONTE RESIDENTIAL TAPS

CONSTITUENT AND (UNITS)	ACTION LEVEL (AL)	PHG	DLR	90th Percentile Value	Sites Exceeding AL/ Number Of Sites	Most Recent Tests	Typical Origins
Copper (mg/l) (g)	1.3	0.3	0.05	0.66	0 / 30	2021	Corrosion of household plumbing system
Lead (µg/l) (g)	15	0.2	5	ND	0 / 30	2021	

(a) The results reported in the table are average and range (minimum and maximum) concentrations of the constituents detected in your drinking water during 2020 or from the most recent tests, except for TTHM, Lead, Copper and Chlorine Residual which are described below.

(b) All wells and treated water were sampled in 2020.

(c) Wells were sampled in 2012, 2014, 2016, 2017, 2018, and 2020 for radioactivity according to the monitoring requirements.

(d) Manganese is regulated with a secondary MCL of 50 µg/l but was not detected, based on the DLR of 20 µg/l. Manganese was included as part of the unregulated chemicals requiring monitoring.

(e) The result is the highest number of positive samples collected in a month during year 2020. No more than one monthly sample may be positive for total coliform. During May 2020 and September 2020, one sample tested positive for total coliform bacteria. However, all follow-up repeat samples were negative for total coliform bacteria.

(f) Samples were collected in the distribution system in 2020. The highest running annual averages for Chlorine Residual and TTHM are reported as "Result." The maximum and minimum of the individual results for Chlorine Residual and TTHM are reported as "Range."

(g) Lead and Copper samples were collected at 30 residences in September 2018 and October 2018. The 90th percentile concentrations are reported in the table. Copper was detected in 23 samples. None of the Copper samples exceeded the Action Level. Lead was detected in five samples. None of the Lead samples exceeded the Action Level. During 2020, no school submitted a request to be sampled for lead.

NOTES

AL = Action Level

DLR = Detection Limit for purposes of Reporting

< = Detected but average of all samples is below the DLR

MCL = Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

mg/l = parts per million or milligrams per liter

MRDL = Maximum Residual Disinfectant Level

MRDLG = Maximum Residual Disinfectant Level Goal

NA = No Applicable Limit

ND = Not Detected at DLR

ng/l = parts per trillion or nanograms per liter

NL = Notification Level

NTU = Nephelometric Turbidity Units

pCi/l = picoCuries per liter

PHG = Public Health Goal

µg/l = parts per billion or micrograms per liter

µmho/cm = micromhos per centimeter

Are There Any Precautions The Public Should Consider?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, elderly persons, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

About Nitrate

Although nitrate in your drinking water never exceeds the MCL of 10 milligrams per liter (mg/l), nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. Nitrate in drinking water at levels above 10 mg/l is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/l may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask for advice from your health care provider.

Lead In Tap Water

If present, elevated levels of lead can cause serious problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of El Monte is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at: **https://www.epa.gov/lead.**

Coliform Bacteria

This Consumer Confidence Report (CCR) reflects changes in drinking water regulatory requirements during 2021. These revisions add the requirements of the federal Revised Total Coliform Rule, effective since April 1, 2016, to the existing state Total Coliform Rule. The revised rule maintains the purpose to protect public health by ensuring the integrity of the drinking water distribution system and monitoring for the presence of microbials (i.e., total coliform and E. coli bacteria). The USEPA anticipates greater public health protection as the rule requires water systems that are vulnerable to microbial contamination to identify and fix problems. Water systems that exceed a specified frequency of total coliform occurrences are required to conduct an assessment to determine if any sanitary defects exist. If found, these must be corrected by the water system. The state Revised Total Coliform Rule became effective July 1, 2021.

Drinking Water Source Assessment

In accordance with the Federal Safe Drinking Water Act, an assessment of the drinking water sources for the City of El Monte was completed in December 2002. The purpose of the drinking water source assessment is to promote source water protection by identifying types of activities in the proximity of the drinking water sources which could pose a threat to the water quality. The assessment concluded that the City of El Monte's sources are considered most vulnerable to the following activities or facilities associated with contaminants detected in the water supply: airport maintenance/fueling areas, dry cleaners, metal plating finishing/fabricating, fleet/truck/bus terminals and gasoline stations. In addition, the sources are considered most vulnerable to the following activities or facilities not associated with contaminants detected in the water supply: boat services/repair/refinishing and leaking underground storage tanks. A copy of the complete assessment is available at the City of El Monte Water Department, 3990 Arden Drive, El Monte, California 91731. You may request a summary of the assessment to be sent to you by contacting George Cambero at 626-258-8603.

Questions?

For more information or questions regarding this report, please contact George Cambero at 626-258-8603.

Este informe contiene información muy importante sobre su agua potable. Para mas información ó traducción, favor de contactar a George Cambero. Telefono: 626-258-8603.

此份有關你的食水報告,內有重要資料和訊息,請找他人為你翻譯及解釋清楚。

Appendix B:

Fire Flow Field Testing

THIS PAGE LEFT INTENTIONALLY BLANK

City of El Monte

Water Master Plan

Hydrant Flow Test Procedures and Field Notebook

Wednesday, March 9, 2022

El Monte Water Master Plan

Hydrant Flow Test Procedures and Field Notebook

Purpose

Hydrant flow testing is a method to collect field data for the steady state calibration of the hydraulic model. Steady state calibration refers to quantifying pipe performance in terms of head loss due to friction.

Methodology

Test locations were identified for collecting three data point during each test along an isolated length of pipe.

1. Flow (i.e. calculated from pitot tube reading, aka velocity pressure)
2. Upstream pressure
3. Downstream pressure

Some tests may require an isolation valve to be closed in order to isolate the subject pipe segment.

All data will be collected at hydrants.

Using Bernoulli's equation, we will calculate the head loss in the subject pipe segment between the tee to the upstream hydrant (Point 1) and tee to the flow hydrant (Point 2).

$$z_1 + \frac{P_1}{\rho_w} + \frac{v_1^2}{2g} = z_2 + \frac{P_2}{\rho_w} + \frac{v_2^2}{2g} + h_{loss}$$

Where:

z_i is elevation

P_i is pressure

v_i is velocity

ρ_w is the weight of water

g is the acceleration of gravity

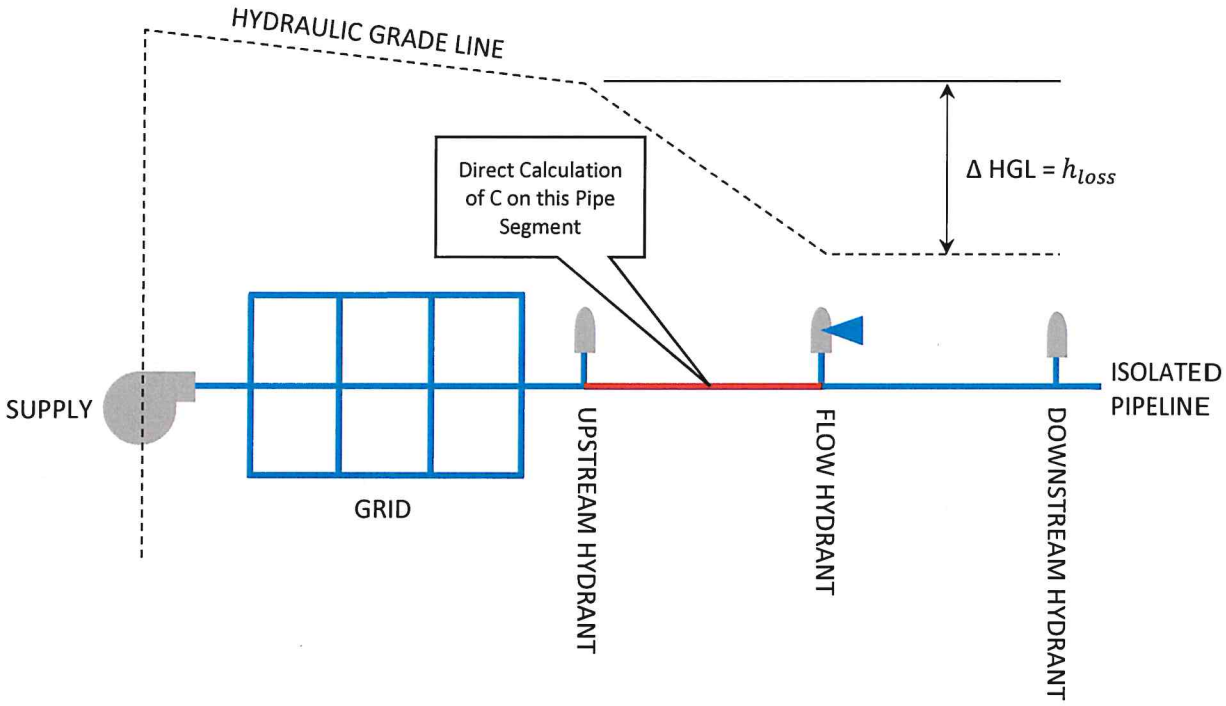
h_{loss} is head loss due to friction

In our tests, pipe diameter is constant, therefore velocity is constant and differential velocity head cancels out:

$$z_1 + \frac{P_1}{\rho_w} = z_2 + \frac{P_2}{\rho_w} + h_{loss} \quad \Rightarrow \quad h_{loss} = (z_1 - z_2) + \frac{P_1 - P_2}{\rho_w}$$

Using the Hazen-Williams equation, we will calculate the friction coefficient, C, for the subject pipe segment. The Hazen-Williams equation includes four variables: diameter, length, flow, and friction coefficient. If three variables are known, the fourth can be derived. We know diameter and length from the City's GIS, and we know flow from the hydrant test. This allows for a direct calculation of the Hazen-William friction coefficient, C.

The schematic hydraulic profile below shows the change in HGL for the subject pipe segment the test is intended to measure.



We will prepare a database of the calculated C-factors and extrapolate to the remaining pipes in the hydraulic model accounting for diameter, material, and age.

We will prepare scenarios in the hydraulic model that duplicate the conditions in the field at the time of each hydrant test (i.e. supply and demand allocations, isolation valve position, and hydrant flow rate).

We will make incremental adjustments to C-factors to bring modeling results for upstream and downstream pressure into alignment with field data per the tolerances specified in the scope of work.

Equipment

- 1 pitot tube
- 1 hydrant diffuser
- 2 pressure gauges with hydrant nozzle attachments
- 3 hydrant wrenches
- 1 valve key
- Field Notebook

It is recommended to use recently calibrated pressure gauges to avoid excessive accumulation of errors in field measurements.

Personnel

MKN will provide two personnel to assist with hydrant testing and recording field data. We understand the City will provide equipment and additional personnel as needed to conduct the tests.

Safety Protocols

MKN has identified 14 hydrant test locations. In the event a test location is unsuitable due to safety or operational concerns, skip it and move on to the next one. We would prefer to complete at least 10 tests.

Wear an orange vest or equivalent. Heavy boots and gloves may be desirable. A hardhat is not necessary: all measurements will be taken outdoors in the public right-of-way.

Take precautions to avoid heat exhaustion.

On the flow hydrant, attach the diffuser to a 2 ½ inch nozzle to direct flow away from traffic or sensitive property. Use cones or a vehicle to divert traffic around the discharge of the flow hydrant. Care was taken to avoid hydrant test locations in congested areas.

Open and close hydrants with a slow steady turning motion.

Open and close isolation valves with a slow steady turning motion.

Data Collection

A Field Notebook has been prepared to facilitate data recording.

Verify the location/designation of the subject hydrants. If a different hydrant is used for the test than one indicated in the field notebook, make a clear indication in the Field Notebook.

For each test, first record the date and time. This information will be critical for setting supply and demand allocations.

At the flow hydrant, record the following:

- Nozzle Diameter (2 ½ inch is preferred)
- Flow Characteristics (i.e. laminar, normal, or turbulent)
- Highest pitot tube reading in psi after steady state flow has been achieved

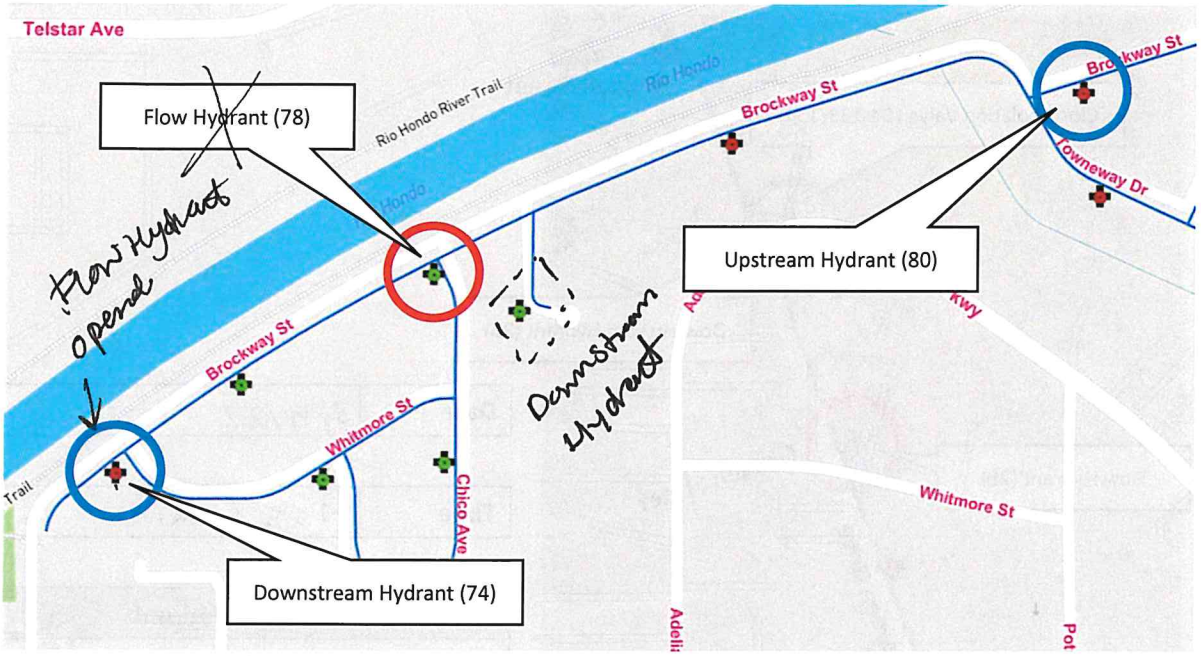
At the pressure hydrants, record the following:

- Pressure in psi before the test
- Pressure in psi after steady state flow has been achieved

On the following pages, hydrant flow test locations are described in detail:

1. Brockway Street
2. Arden Drive
3. Bryan Road
4. Merced Street
5. Washington Avenue
6. Hoyt Park Place
7. Meeker Avenue
8. Stewart Street
9. Medina Court
10. Glen Way
11. Brockway Street
12. Riverview Avenue
13. Whitney Drive
14. El Monte Avenue

1. Brockway Street



Date	3/9/22

Time	3:00 PM

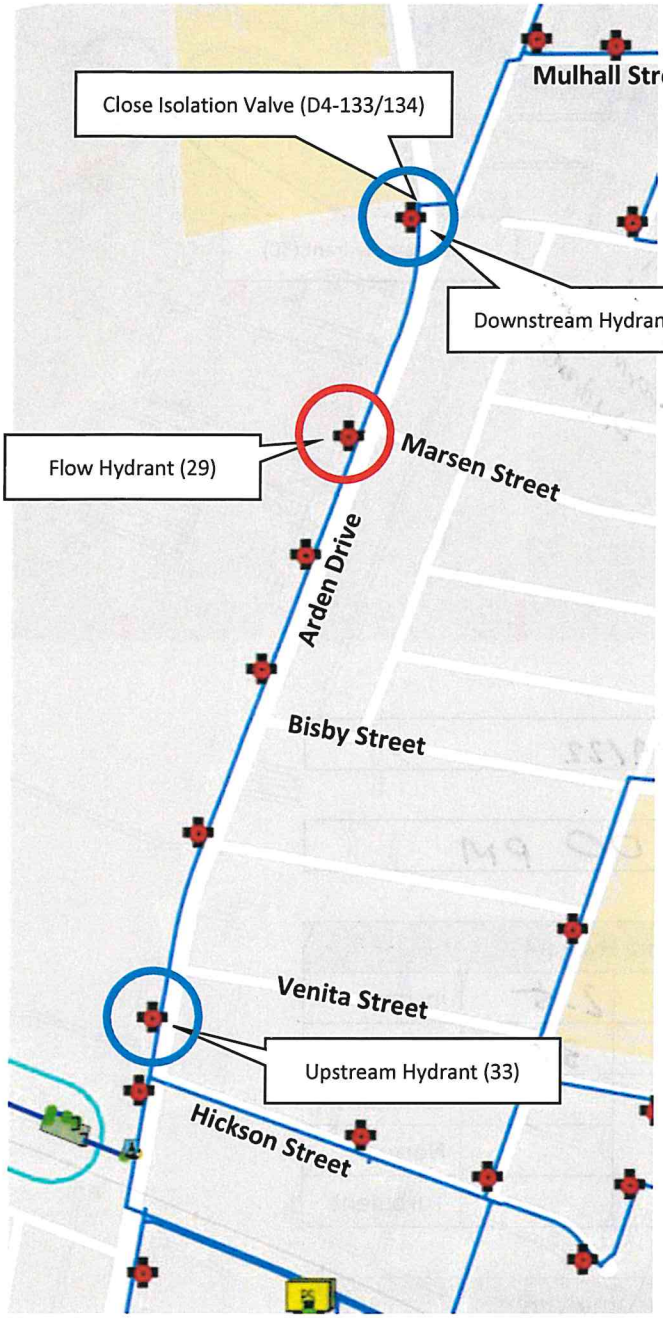
for all tests →

Flow Hydrant		
Nozzle Diameter	2.5	inches
Pitot Tube Reading	30	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	78	psi
Pressure During Test	60	psi

Downstream Hydrant		
Pressure Before Test	70	psi
Pressure During Test	46	psi

2. Arden Drive



Date	3/9/22

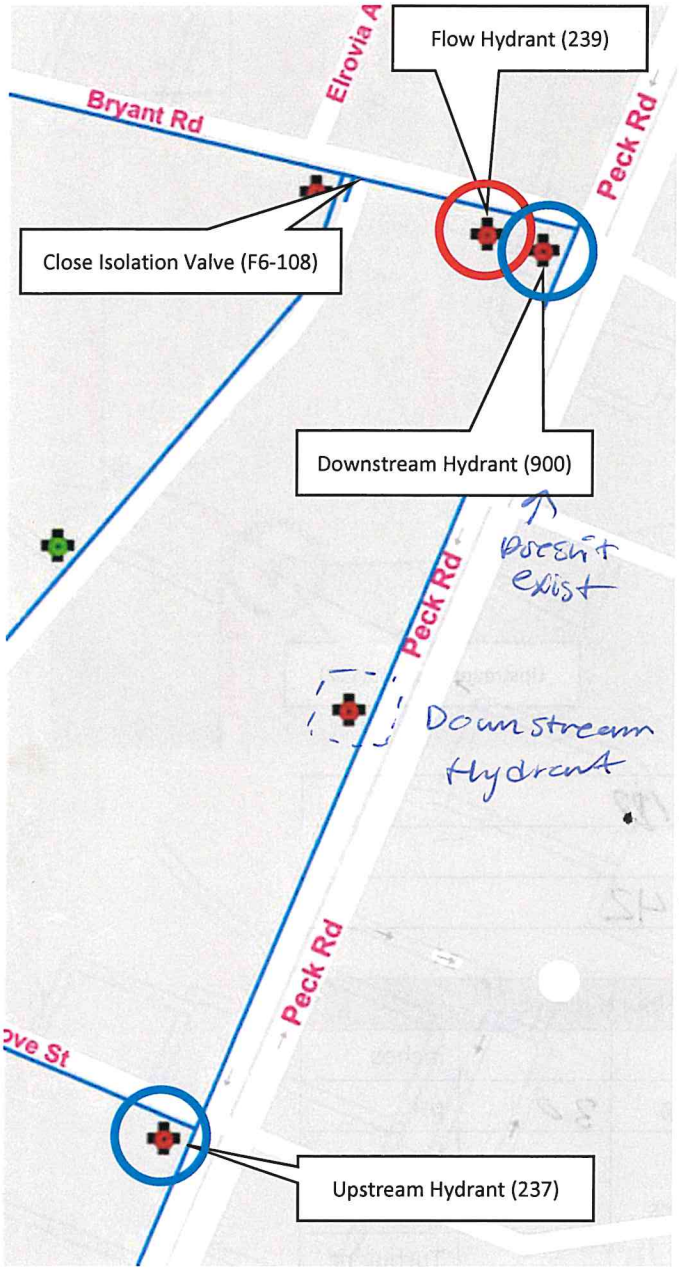
Time	9:53 AM

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	35	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	64	psi
Pressure During Test	63	psi

Downstream Hydrant		
Pressure Before Test	55	psi
Pressure During Test	52	psi

3. Bryan Road



Note: Hydrants 900 and 239 can be used either for flow or downstream pressure, since they are so close together. Choose whichever is less disruptive to traffic.

Date	3/9/22

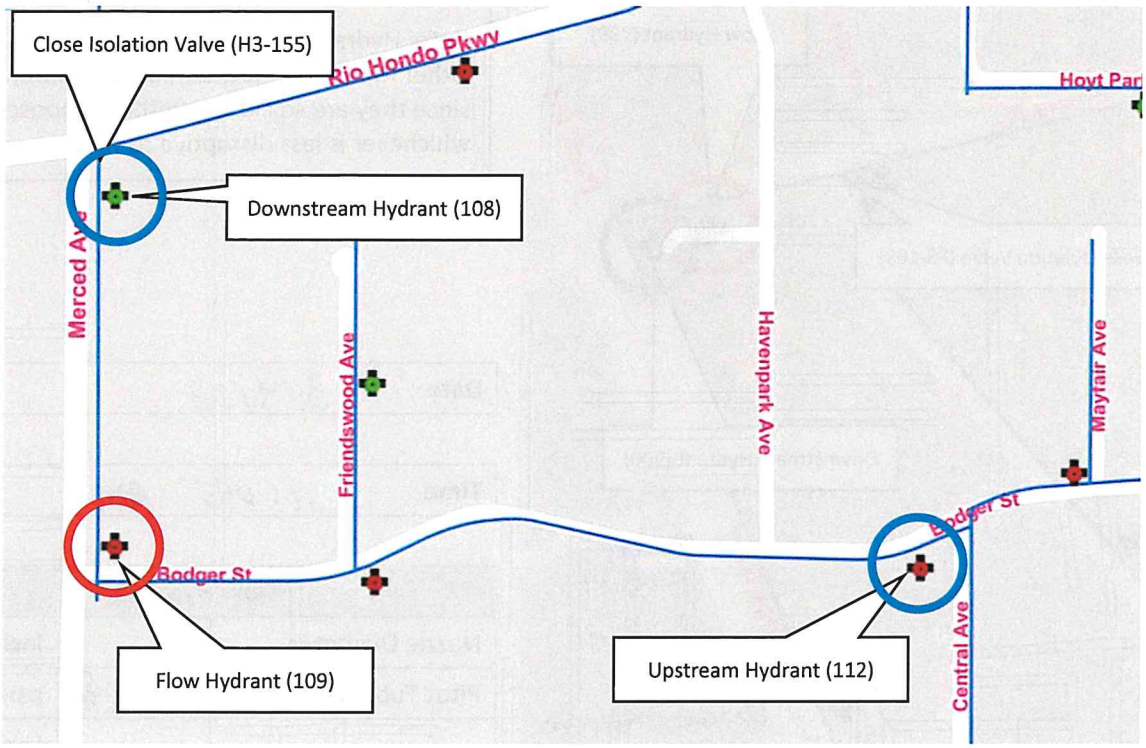
Time	11:05 AM

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	~~28~~	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	55	psi
Pressure During Test	42	psi

Downstream Hydrant		
Pressure Before Test	50	psi
Pressure During Test	32	psi

4. Merced Street



Date	3/9/22

Time	2:42

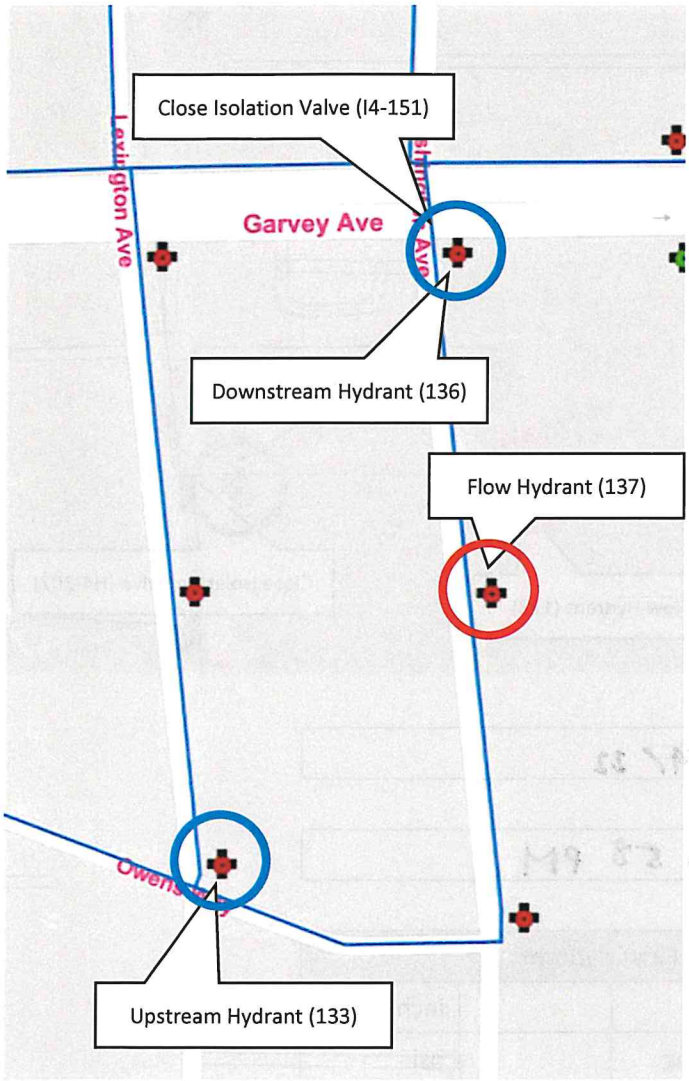
Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	30	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	72	psi
Pressure During Test	62	psi

Downstream Hydrant		
Pressure Before Test	~~70~~	psi
Pressure During Test	60	psi

Poor drainage on this street
- pass onto PW

5. Washington Avenue



Date	8/9/22

Time	2:20 PM

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	32	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	72	psi
Pressure During Test	65	psi

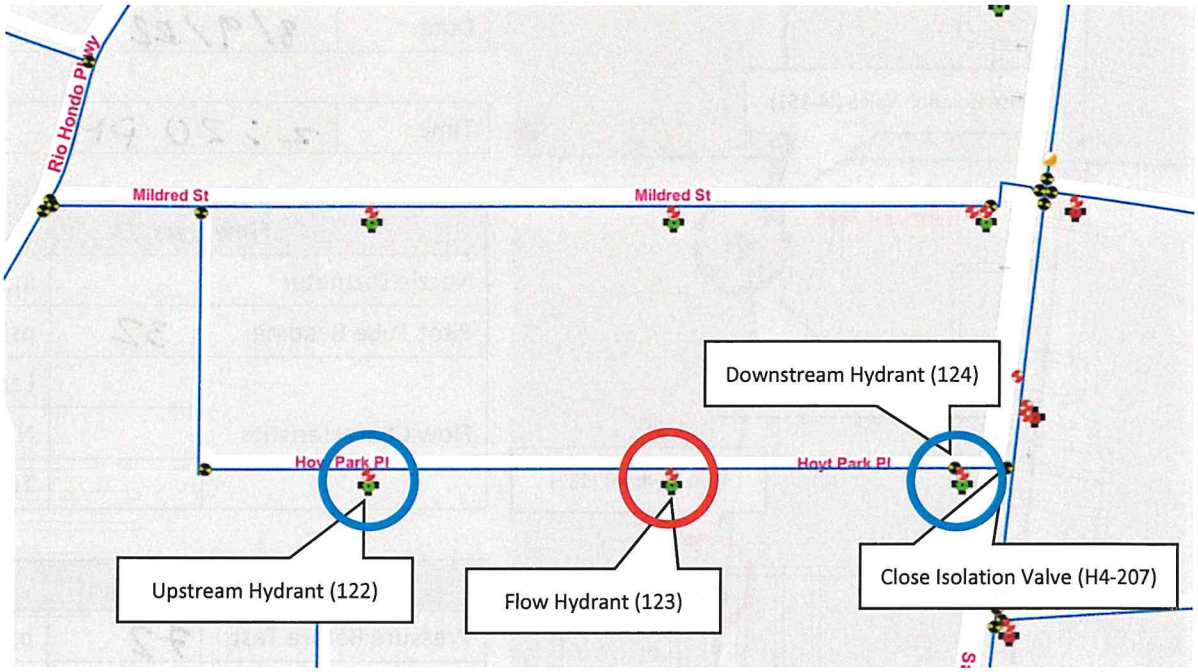
Downstream Hydrant		
Pressure Before Test	68	psi
Pressure During Test	50	psi

very low flow

004 gpm

pretty low flow

6. Hoyt Park Place



Date	3/9/22

Time	1:58 PM

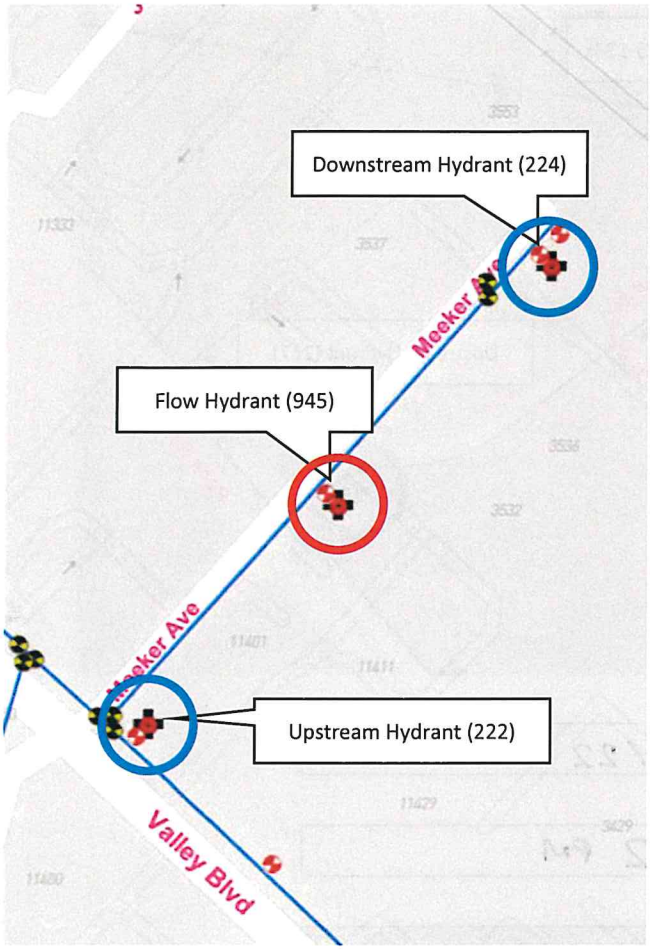
Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading		psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	70	psi
Pressure During Test	43	psi

Downstream Hydrant		
Pressure Before Test	62	psi
Pressure During Test	20	psi

pitot tube values a little faulty

7. Meeker Avenue



Date	3/9/22

Time	1:37 PM

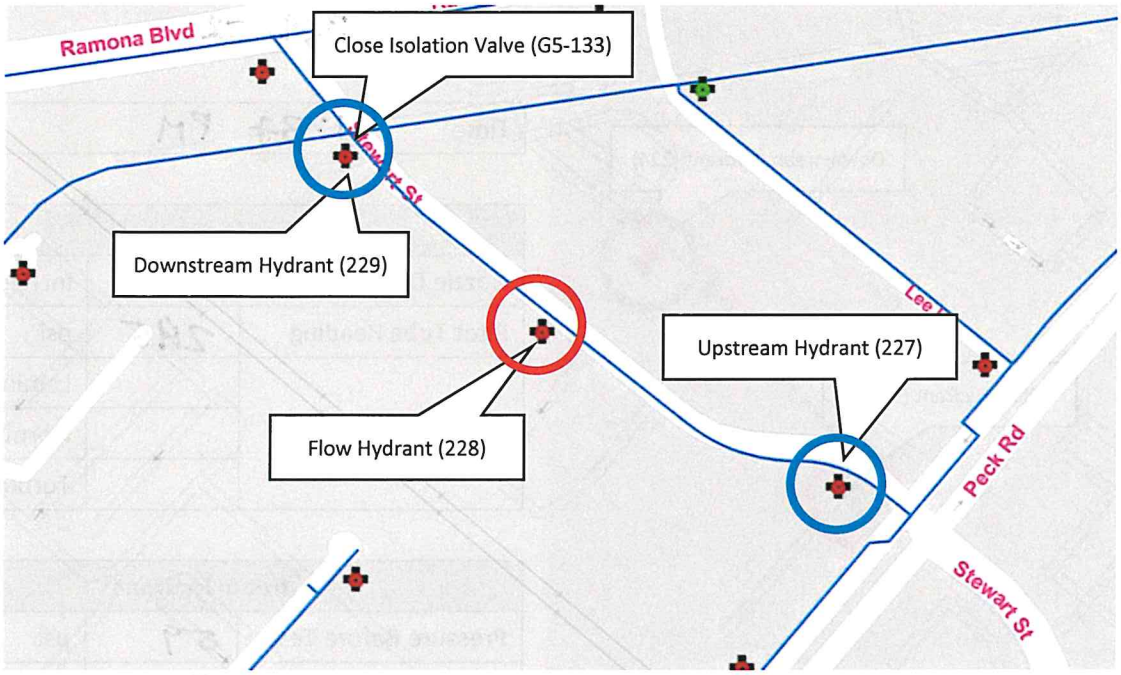
Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	245	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

(32)

Upstream Hydrant		
Pressure Before Test	59	psi
Pressure During Test	51	psi

Downstream Hydrant		
Pressure Before Test	56	psi
Pressure During Test	46	psi

8. Stewart Street



Date	8/9/22

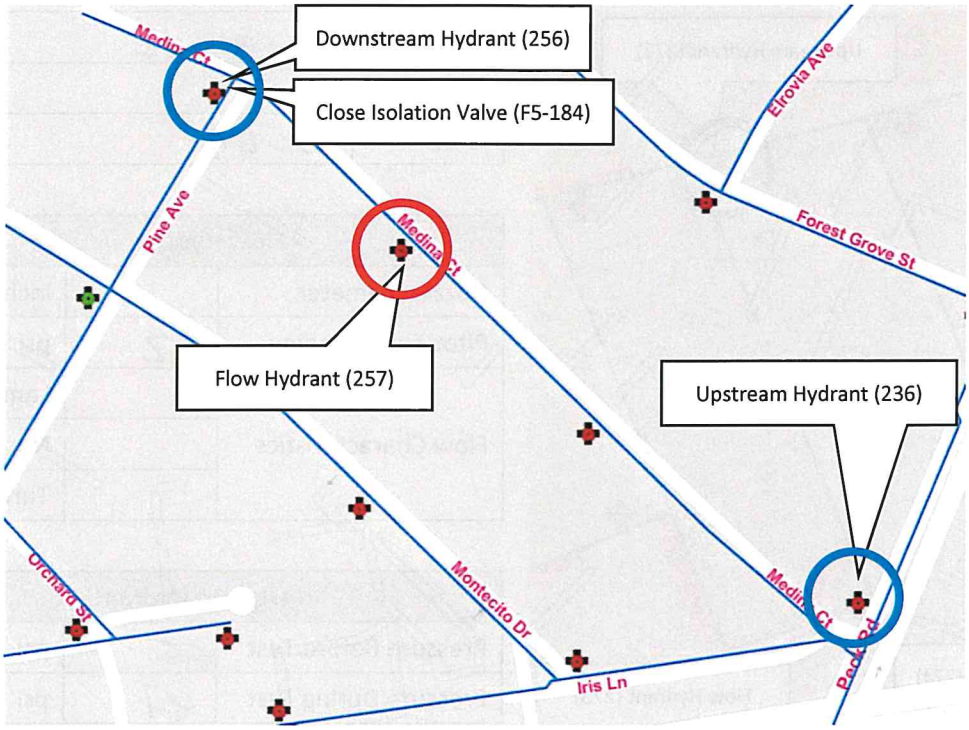
Time	1:22 PM

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	12 28	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	57	psi
Pressure During Test	30	psi

Downstream Hydrant		
Pressure Before Test	56	psi
Pressure During Test	24	psi

9. Medina Court



Date	3/9/22

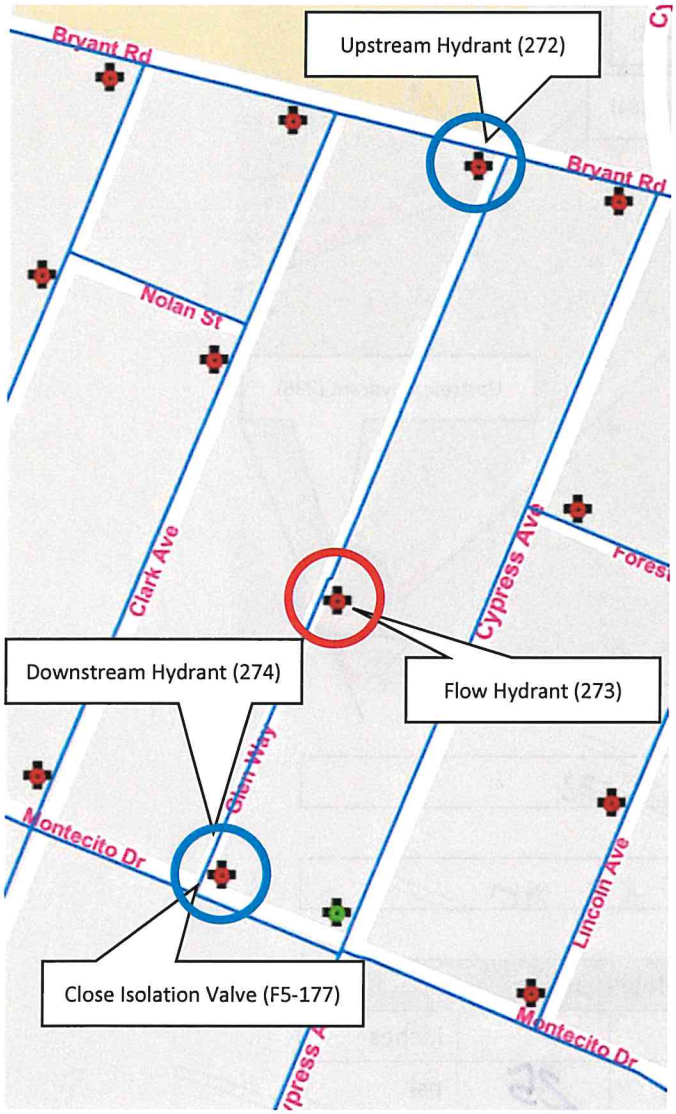
Time	11:32 AM

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	25	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	56	psi
Pressure During Test	53	psi

Downstream Hydrant		
Pressure Before Test	52	psi
Pressure During Test	44	psi

10. Glen Way



Date	3/9/22

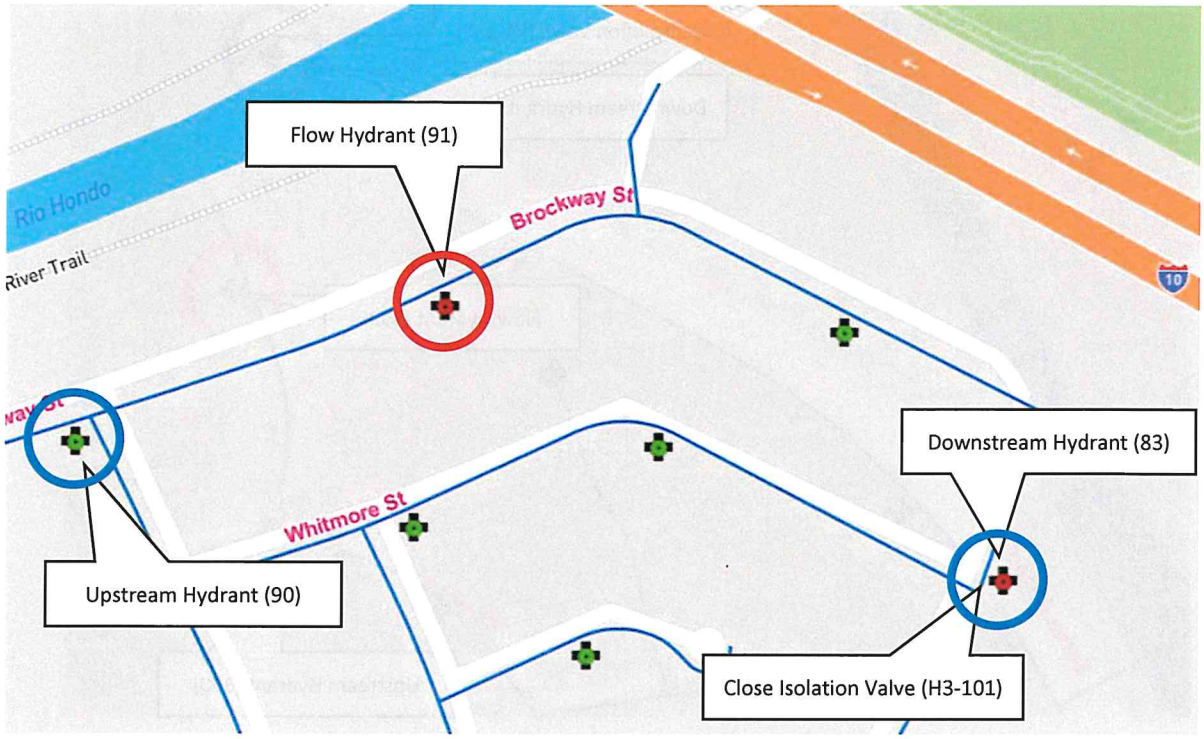
Time	10:42

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	22	psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	55	psi
Pressure During Test	47	psi

Downstream Hydrant		
Pressure Before Test	54	psi
Pressure During Test	42	psi

11. Brockway Street



Date	

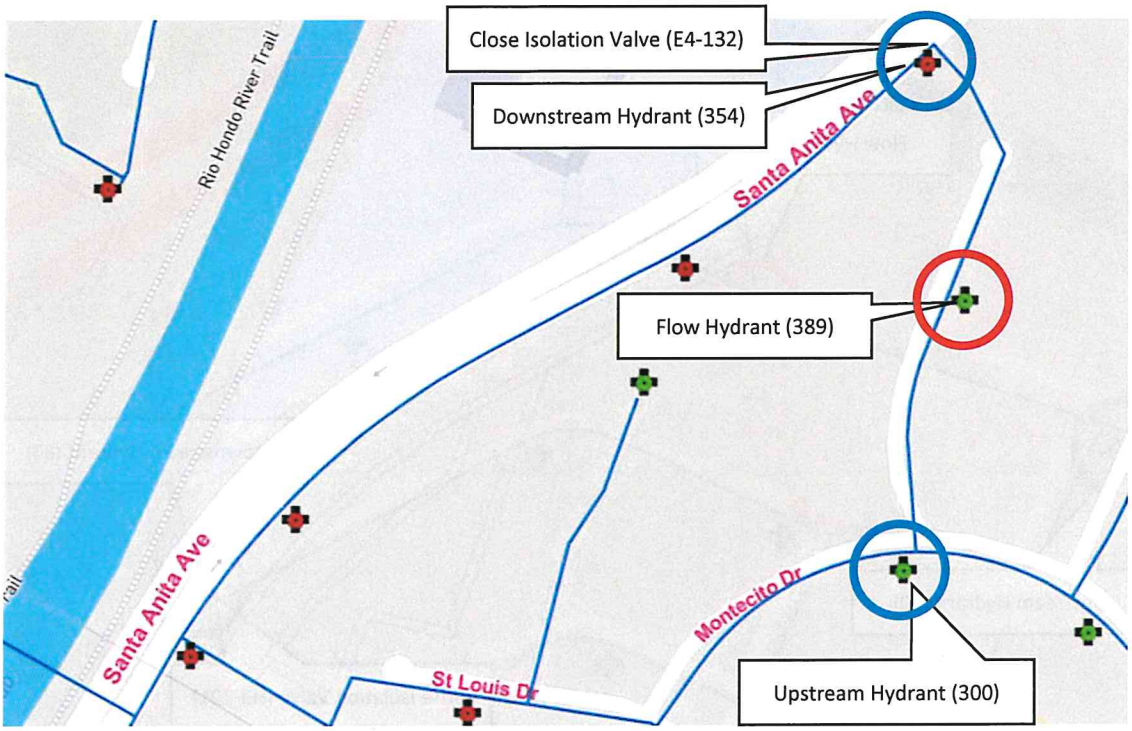
Time	

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading		psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test		psi
Pressure During Test		psi

Downstream Hydrant		
Pressure Before Test		psi
Pressure During Test		psi

12. Riverview Avenue



Low Flow
≈ 300 gpm
Judgement call

≈ 4-inch line

Date	3/9/22

Time	10:

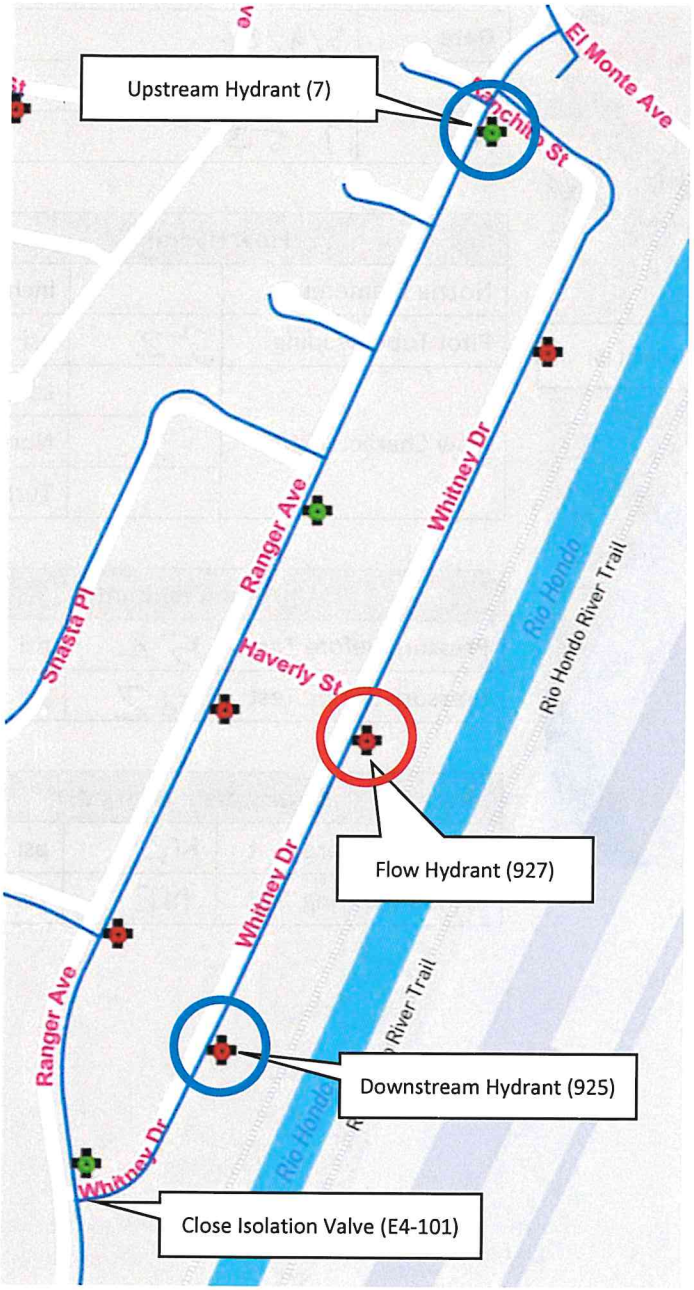
Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading		psi
Flow Characteristics		Laminar
		Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	101	psi
Pressure During Test	59	psi

Downstream Hydrant		
Pressure Before Test		psi
Pressure During Test		psi

Hydrant Flow Test Field Notebook

13. Whitney Drive



Date	3/9/22

Time	8:3~~0~~ 4

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	23	psi
Flow Characteristics		Laminar
	X	Normal
		Turbulent

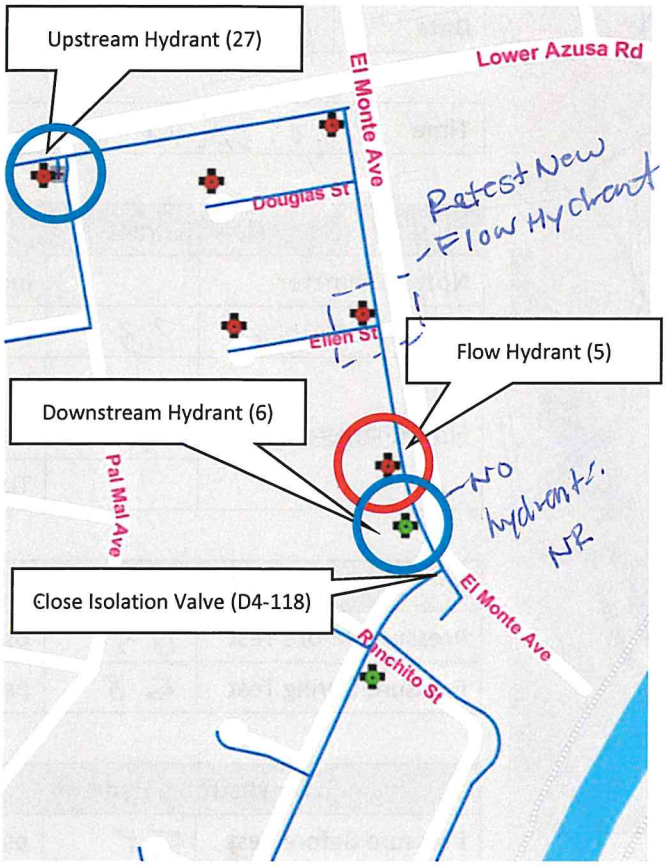
Upstream Hydrant		
Pressure Before Test	63	psi
Pressure During Test	58	psi

Downstream Hydrant		
Pressure Before Test	58	psi
Pressure During Test	32	psi

2 (V)

Hydrant Flow Test Field Notebook

14. El Monte Avenue



Date	3/9/22

Time	7:53

Flow Hydrant		
Nozzle Diameter		inches
Pitot Tube Reading	32	psi
Flow Characteristics		Laminar
	X	Normal
		Turbulent

Upstream Hydrant		
Pressure Before Test	52	psi
Pressure During Test	42	psi

Downstream Hydrant		
Pressure Before Test	NR	psi
Pressure During Test	NR	psi

Ellen St
Retest Time: 8:06
Hydrant psi: 27/28
Flow: Charact. Normal

Upstream:
Before- 57
During- 53

Downstream: psi
Before- 58
During- 49

Back to 58

THIS PAGE LEFT INTENTIONALLY BLANK

Appendix C:

Condition Assessment Forms

THIS PAGE LEFT INTENTIONALLY BLANK

FACILITY AND REVIEWING INFORMATION

Date/Time of Assessment:
Site Name/ Facility ID: Well No. 2A
Assessor Name: KEB

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year originally constructed	2008	
As-builts available?	Yes	**No site as builts provided as of 4/6/22. Pump Curve and performance Data (Dwg No. 10969 AB)**
Submersible Pumps or Vertical Turbine?	Vertical Turbine	
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing	Yes	Located in walled and gated parcel
Fall protection / Safety	No	
Safety ladder/ Stairs		Stairs over site piping for access to electrical and communication equipment
Handrails for dry pits	NA	
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading	**Yes**	Concrete slab located off road
Site Access (Road, Gates, etc.)	Yes	Adjacent to residential road, in residential community
Space for Maintenance Activities	Yes	Some space on site for maintenance work but congested
Surface Improvements (landscape, bollards, etc.)	Yes	All concrete surrounding equipment; walls present with decorative gate. Immediately adjacent to residential property.
STRUCTURES		
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Roof - MCC Enclosure	NA	Building enclosure for Sodium Hypochlorite Chemical Storage and Injection
Exterior Walls - Chemical Enclosure	CMU Block Walls	
Floor/Slab - Chemical Enclosure		Good condition
Windows/Openings - Chemical Enclosure	NA	NA
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1/2/3)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)	1000 gpm @ 285' TDH	
Model	12 RL 6-stage	
Manufacturer	Peerless Lo-Mo Turbo	L&B Verti-line
Pump Configuration	Vertical Turbine	Vertical turbine pump and discharge head
Year Installed	2008	
Speed Settings		1780 RPM
Clogging/Ragging issues?		None reported
Overheating issues?		None reported
Excessive noise?	Yes	Pump noise is excessive as observed during operation. (IMG_5493.MOV) - High pitched, continuous.
Leaking or seal failures?	Yes	
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Condition		Making high-pitched noise during operation
Piping		In-line static mixer (M-1)(2013)
Bypass Capability	Yes	Bypass is present on discharge line with valve and camlock with no cap.
ELECTRICAL/INSTRUMENTATION		

GENERAL (GG)	FIELD DATA	REVIEWER COMMENTS
Manual or automatic transfer switch	Manual	
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Arc-flash labeling?	Generic Arcflash Labels	Generic arcflash labels are present on deadfront of power cabinets.
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Flowmeter (if applicable)	McCrometer Ultra Mag	McCrometer Ultra Mag (UP20-1261/E20-06137) above-ground/exposed. Appears in good condition. Transmitter located in electrical room
Main Electrical Panel		EATON Subpanel 8
Pump Motor	NIDEC Motor Corp	100 HP; 1785 RPM; Catalog #H0100V2SLG; 460/60 Hz/ 3 -phase
Communications	XiO Network	XiO Network (FIU 12, FIU 11, UPS)
PLC Controller		


HACH
sc200
WELL 2A
NITRATE CONC.
3.1
NOx-N
mg/l
10:42:46 AM
05-15-2022
OUT1: 5.00mA OUT2: 4.00mA
menu
home
back
enter


DANGER
IGH VOLTAGE

FACILITY AND REVIEWING INFORMATION

Date/Time of Assessment:
Site Name/ Facility ID: Well No. 3, LGAC
Assessor Name: KEB

THIS WELL IS ONLY TURNED ON TO TEST FLUSH TEST TO 2A FROM 3.
Poor water quality in Well 3.

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year originally constructed	2014	**3/12/2014**
As-builts available?	Yes	**Dwg. No. 12519AB, Job. No. 12519**
Submerged Pumps or Dry Pit?	Dry	**Vertical Turbine Well Pump and discharge head**
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fall protection / Safety	NA	
Ventilation (confined space areas)	Louvers/roof fan	
Safety ladder/ Stairs	NA	
Handrails for dry pits	NA	
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading		Concrete pad, large retaining wall on north side, block wall around other sides, site drains to street
Site Access (Road, Gates, etc.)		Well/structure adjacent to road/parking area, no main gate or fenced off area. In between multiple parking area.
Space for Maintenance Activities		Yes
Surface Improvements (landscape, bollards, etc.)		Asphalt paving and drainage to grated inlets
STRUCTURES		
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Ceiling - Electrical Room/Pump Buiding		Ceiling needs repair in some locations. Signs of water intrusion, minor deterioration.
Floor/Slab - Electrical Room	Concrete slab	Base slab in good condition
Windows/Openings - Electrical Room	Pipe Wall Penetrations	
Doors - Electrical Room	Entry Door	
Large Equipment Anchorage (Generators, Pumps, etc.)		Pump not anchored to floor slab per manufacturer's recommendations. Secondary anchorage system installed.
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)		1200 gpm @ 295 ft TDH (5-stages) - National Pump Co.
Model		(Serial No. D23826) Vertical Turbine
Manufacturer		Verti-Line Pump, Layne & Bowler Verti-Line Pumps (General Pump Company)
Pump Configuration		Vertical Turbine
Year Installed	2014	Operators indicated pump installed in 2014.
Level settings (On/Off)	Yes	
Speed Settings	1780 RPM	
Clogging/Ragging issues?		None reported
Overheating issues?		None reported
Excessive noise?		None reported
Leaking or seal failures?		None observed or reported
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Condition	Good	Good (reported by operators)
Pressure Gauges	Yes	Pressure meter (digital, Rosemont) located on disharge piping

Valves		Good condition, paint coating failures on valves and piping
Piping		general mild corrosion on piping, new paint coatings recommended. Flange of piping to bldg exterior is cast in wall.
Bypass Capability		
ELECTRICAL/INSTRUMENTATION		
GENERAL (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
List local annunciation alarms	None	
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Arc-flash labeling?	Generic Arcflash Labels	Generic arcflash labels are present on some equipment only.
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Flowmeter (if applicable)		Outside in underground structure/vault (did not see) ("IMG_5693.JPG")
Level Sensor		Level Sensor in well pump column shaft, telemetry in electrical room
Ventilation	Pump Room Exh Fan	
Lighting	T8 Fluorescent	
Pump Motor		US Motors, Model # DN11, 150 hp, 1780 RPM, 460 Volts/60 Hz/3-Phase (see "IMG_5642.JPG")
Communications	XiO Network	XiO Network (FIU 10, UPS)


WELL 3
EMERGENCY
PHONE (626)580-2100
NO TRESPASSING
ANY PERSON ENTERING THIS PROPERTY WITHOUT PERMISSION IS SUBJECT TO IMMEDIATE ARREST, $1,000 FINE, OR BOTH.
CALIFORNIA PENAL CODE SECTION 602


IMPORTANT INSTALLATION DOCUMENTATION LOCATED BEHIND THIS COVER
DANGER
POWER MONITOR & PHASE RELAY
PANEL "A"
DANGER

FACILITY AND REVIEWING INFORMATION

Date/Time of Assessment:
Site Name/ Facility ID: Well No. 4 Structure
Assessor Name: KEB, CSE

THIS WELL HAS BEEN OFFLINE FOR 10+ YEARS AS REPORTED BY OPERATORS

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year orginally constructed	2007	
As-builts available?	No	
Submerged Pumps or Dry Pit?	Dry pit (Vert Turb)	**Worthington Corporation, Serial No. VTP-9021**
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing	No	Building and sodium hypochlorite storage in a building at a park location
Fall protection / Safety	NA	
Ventilation (confined space areas)	Yes	Louvers and fans in electrical/pump room interior/exhaust opening for diesel engine.
Safety ladder/ Stairs	NA	
Handrails for dry pits	NA	
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading		Located in a park, access by truck over the grass
Site Access (Road, Gates, etc.)		No dedicated access road
Space for Maintenance Activities		Yes, on park property and within the building
Surface Improvements (landscape, bollards, etc.)		grass, trees, park development
STRUCTURES		
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Roof		Removable Ceiling/Roof for pump/equipment removal
Exterior Walls		brick walls inside
Floor/Slab	Concrete	minor cracking near equipment pads and supports.
Doors	2 doors	double door front of pump room, one door in the rear
Pipe Supports	NA	No pipe supports
Large Equipment Anchorage (Generators, Pumps, etc.)	Yes	Right angle gear concrete support pedestal, Anchorage for diesel engine (backup power generation)
Platforms (if present)	Yes	Good Condition
Access hatch	NA	
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1/2/3)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)		?
Level settings (On/Off)	Yes	Water Level Gauge (dial) at well discharge
Speed Settings		1785 rpm (180 - 1800 rpm)
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Right Angle Gear Drive	Yes	Amarillo, Serial No. CA150A/ 150 hp at 1760 vertical rpm (Ratio Horiz.: 1, Vertical: 1)
Pressure Gauges	Yes	Well pressure and discharge line pressure gauges
Valves	Yes	Good condition, Swing check valve and flow control valve
Piping	Yes	Good condition
ELECTRICAL/INSTRUMENTATION		
GENERAL (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Permanent Back up Power? Type & Rating	Diesel Engine backup	Diesel Engine backup; Waukesha Motor Company/G-16140/ Serial No. 122495/ Model F554GU/70 hp

Manual or automatic transfer switch	Automatic	ASCO 7000 Series, Automatic Transfer Switch
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Arc-flash labeling?	Generic Arcflash Labels	Generic arcflash labels are present on some equipment only.
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Generator (if applicable)	Diesel Engine backup	Natural Gas Engine; Waukesha Motor Company/Model F444GU, Spec. G-16140
Transfer Switch	Automatic	ASCO 7000 Series, Automatic Transfer Switch
Motor Control Center		Square D Model 6 MCC (4 sections)
Pump Motor		100 hp/460 volt/60 hz/3-phase (US Motors) Model: AA87
Communications	XiO Network	XiO Network (FIU 8, UPS)
PLC Controller		Allen-Bradley


480 V
480 V


ProMinent
QUICK START GUIDE

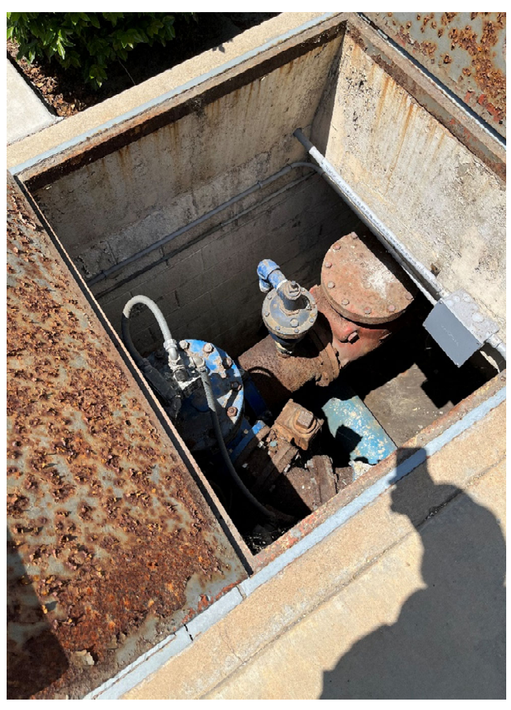

SODIUM HYPOCHLOR
3
0
1
CORROSIVE
8
WARNING

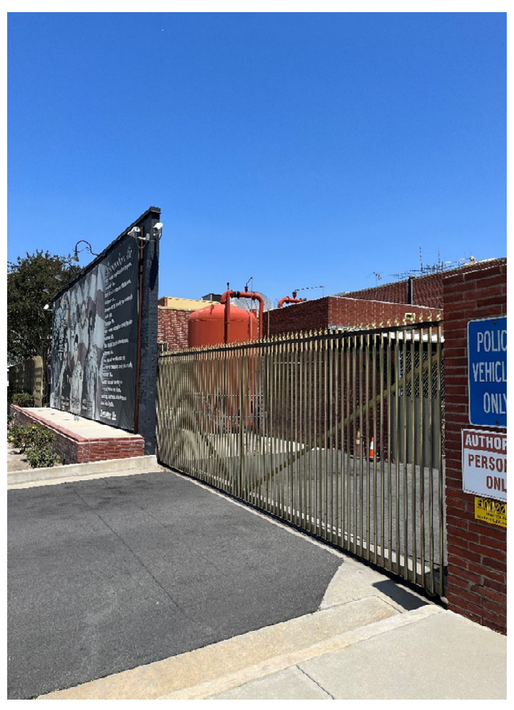
FACILITY AND REVIEWING INFORMATION
Date/Time of Assessment:
Site Name/ Facility ID: Well No. 10
Assessor Name: KEB

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year originally constructed	2000	**June 2000, +/-**
As-builts available?	Yes	
Submerged Pumps or Dry Pit?	Submersible Well Pump	
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing	No	
Hatch lock	Yes	
Fall protection / Safety	No	
Pump removal lifting equipment	No	
Ventilation (confined space areas)	Yes	Vents at underground vault
Safety ladder/ Stairs	Ladder	Heavy corrosion on access ladder in vault.
Handrails for dry pits	NA	
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading		access hatch in sidewalk in front of police station access gate, concrete sidewalk, planters and landscaping
Site Access (Road, Gates, etc.)	Yes	From main street and police entrance. Sidewalk access
Space for Maintenance Activities	Yes	
Surface Improvements (landscape, bollards, etc.)	Yes	vents from underground vault structure
STRUCTURES		
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Roof		Housing/structure for chemical injection/storage.
Interior Walls		delamination of coatings on interior walls near access hatch
Access hatch		Corrosion and coating failure on underside of access hatch
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1/2/3)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)	1500 gpm @ 312' TDH	1500 gpm @ 312' TDH
Model	12 ENL	Model 12 ENL (6-stage, 9.6" Trim)
Manufacturer	Flowserve	Flowserve (General Pump Company)
Pump Configuration	Submersible Well Pump	
Year Installed	6/22/1905	
Level settings (On/Off)	Yes	level measurement monitoring and telemetry
Speed Settings	Yes	1770 rpm
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Valves		mild corrosion and paint coating failure on valves in underground vault
Piping		heavy corrosion on piping and valves in underground vault
ELECTRICAL/INSTRUMENTATION		
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Motor		Hitachi 4-pole, 460 volt, 1750 rpm, 200 HP


WORKING DIMENSIONS - 48"W x 48"T
QUICK START GUIDE
ProMinen


ODIUM HYPOCHLOR E




POLI
VEHICL
ONL
AUTHO
PERSO
ONL

City of El Monte Water Master Plan
CONDITION ASSESSMENT FORM

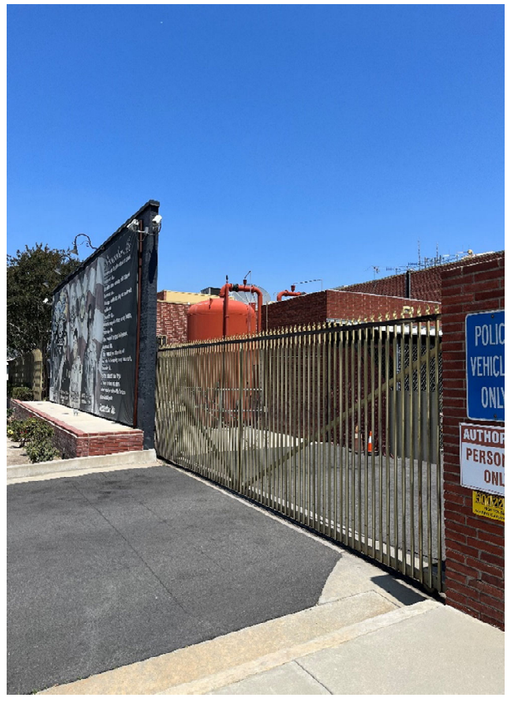
FACILITY AND REVIEWING INFORMATION
Date/Time of Assessment:
Site Name/ Facility ID: Well No. 12 Relief Valve (12A) LGAC (1975)
Assessor Name: KEB, CSE

**Request As-built plans for this site.

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year originally constructed	2015	**7/6/2015**
As-builts available?	Yes	**Yes, General Pump Company, Inc. DWG No. 13262AB, Also Equipping Well No. 12 Site Plan & Details (Nov. 1975)**
Submerged Pumps or Dry Pit?	Dry Pit (VT)	**Vertical Turbine with discharge head.**
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing	Yes	Yes, site located behind residential building and Metro station.
Hatch lock/Fence lock	Yes	NA,
Security system, gate or intrusion alarm	Yes	Yes. Operators report issues with site intrusion over the top of gates/fences.
Fall protection / Safety	No	
Pump removal lifting equipment	No	Pump discharge head and motor accessible via large side double doors.
Ventilation (confined space areas)	Yes	Yes, vent pipes located on hatch covers.
Safety ladder/ Stairs	No	steps built into vaults for access. No safety ladders.
Handrails for dry pits	NA	NA, above ground pump discharge in pumping housing structure with XiO SCADA/Network and Motor Control Cabinet
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading	**Yes**	AC Pavement with bollards and protection. Pump building and treatment vessels at grade (all areas paved)
Site Access (Road, Gates, etc.)	Yes	Gate, paved road access behind residental building
Space for Maintenance Activities	Yes	Yes.
Surface Improvements (landscape, bollards, etc.)	Yes	Yes, bollards, paving, walls, no landscape. Bollard surrounding buildings and treatment equipment
STRUCTURES		
GENERAL	**FIELD DATA**	**REVIEWER COMMENTS**
Shape	Rectangular	Rectangular
Dimensions	21' x 18' (approx.)	21' x 18' pump house building dimensions (approx.)
Space for Maintenance Activities	Yes	
Sump Pump	No.	
STRUCTURAL EVALUATION	**FIELD DATA**	**REVIEWER COMMENTS**
Roof		Roof in good condition based on inspection from interior
Exterior Walls - Building	CMU/Concrete	Site Updated in 2015
Exterior Walls - Pump Room		CMU Block Walls
Interior Walls		CMU Block Walls
Floor/Slab	Concrete floor/base slab	Concrete floor/slab in good condition.
Windows/Openings		NA
Doors	Metal doors	Doors in good condition.
Pipe Supports	Floor support	Pipe Supports in good condition
Large Equipment Anchorage (Generators, Pumps, etc.)	Generator	Generator anchorage in good condition
Platforms (if present)	NA	No platforms
Access hatch		Access hatches in good condition
MECHANICAL		

GENERAL - PUMP INFORMATION (MKN)	FIELD DATA PUMP (1/2/3)	REVIEWER COMMENTS
Design/Field Capacity (gpm)		1850 GPM @ 300' TDH; Toshiba VFD
Model		14LH; 4-stage
Manufacturer		Johnston Vertical Pumps; Serial No. TH-15006; Manufactured by Hydroflo Pumps
Pump Configuration		Vertical Turbine
Year Installed		2015
Level settings (On/Off)	NA	NA
Speed Settings		1700 RPM
Clogging/Ragging issues?		NA, no.
Overheating issues?		None reported
Excessive noise?		None reported
Leaking or seal failures?		None reported
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Condition		Good
Pressure Gauges	Yes, digital & gauge only	Gauge on discharge piping. 2 gauges, one digital and one local display gauge
Valves		Valves appear to be in good working condition
Piping		Steel pipe, good condition (above ground). Corrosion visible on flowmeter piping (heavier) in below-ground vaults and above-ground piping (minor)
Bypass Capability	Yes	Below ground valve vaults around treatment vessels
ELECTRICAL/INSTRUMENTATION		
GENERAL (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
PLC Controller present (install year and condition)	-2015	
Permanent Back up Power? Type & Rating	Yes	Spectrum 200 Detroit Diesel
Manual or automatic transfer switch	Automatic	GE Zenith ZTG Automatic Transfer Switch in electrical room/building
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Explosion proof seals at conduit penetrations?	Yes	
Arc-flash labeling?	Generic Arcflash Labels	Generic arcflash labels are present on deadfront of power cabinets.
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Flowmeter (if applicable)	McCrometer Ultra Mag	in vault (see photo "IMG_5423.JPG") - good condition. Bolts not coated. McCrometer Ultra Mag (UP19-0194/E19-05582). Appears in good condition. Transmitter located in electrical room/building ("IMG_5413.JPG" and "IMG_5420.JPG").
Ventilation	Supply fan and exhaust fan	Electrical room fans and exhaust louvers.
Lighting	Fluorescent	Fluorescent lamps.
Generator (if applicable)	Spectrum	Spectrum 200 Detroit Diesel
Transfer Switch	GE Zenith ZTG	GE Zenith ZTG Automatic Transfer Switch in electrical room/building
Main Electrical Panel		Circuit breakers in Main Service Panel
Pump Motor	US Electrical Motors	200 HP; 1780 RPM; Frame: 445TP16; 460/60 Hz/ 3 -phase (STD High Thrust)
Communications	XiO Network	XiO Network (FIU 14, FIU 13, UPS)


QUICK START GUIDE
ProMinen

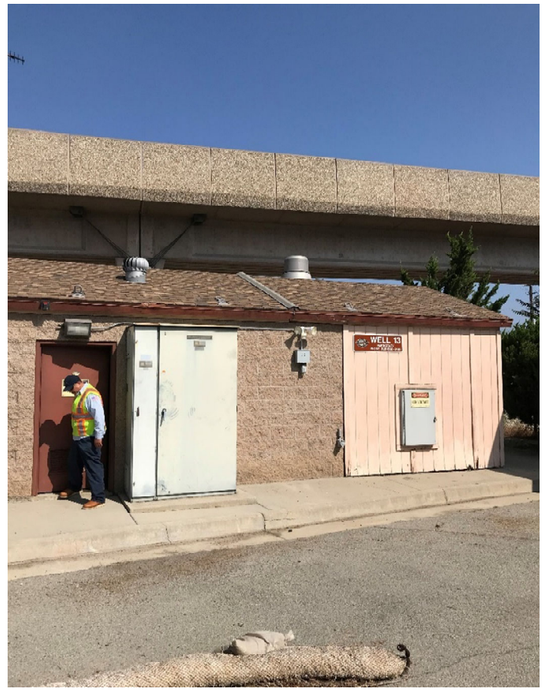


City of El Monte Water Master Plan
CONDITION ASSESSMENT FORM

FACILITY AND REVIEWING INFORMATION	
Date/Time of Assessment:	
Site Name/ Facility ID: Well No. 13	Backup Well (to Operable Unit)
Assessor Name: KEB, CSE	**Roof is removable for removing pump motors

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year orginally constructed	1993	**See General Pump Co, Inc. Install Data Sheet**
As-builts available?	Yes	**Yes, see General Pump Co., Inc.**
Submerged Pumps or Dry Pit?	Dry Pit (VT)	**Vertical Turbine well pump with above-ground discharge head**
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing	Yes	Fencing surrounding site
Hatch lock		Door lock on the door to the structure
Security system, gate or intrusion alarm	Yes	Building indicator at door
Fall protection / Safety	NA	NA
Pump removal lifting equipment	No	No, but roof is removable to allow for removal of pump equipment and motor.
Ventilation (confined space areas)	Yes	Not confined space. Above-ground building structure with adequate ventilation. Replacement of AC Ventilation in progress
Safety ladder/ Stairs	NA	NA
Handrails for dry pits	NA	NA
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading	**Yes**	Located paved portion of larger property (fire protection district), AC pavement
Site Access (Road, Gates, etc.)	Yes	Site access behind fire station. Shares road with fire station entrance and training facility in the rear of the fire house
Space for Maintenance Activities	Yes	Yes, and storage of spare parts, treatment vessels, and equipment in parking lot area
Surface Improvements (landscape, bollards, etc.)	Yes	AC pavement and fencing. Materials stored at the site for general operations use.
STRUCTURES		
GENERAL - DRY WELL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Shape	Rectangular	Rectangular building
Space for Maintenance Activities	Yes	
Sump Pump	Yes	Yes, raised above-grade by 2-inches
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Roof	Yes	Roof in good condition based on inspection from interior
Exterior Walls	CMU Block/Wood	partial wood structure, partial CMU block structure. Walls in good in good condition
Interior Walls	NA	No interior walls
Floor/Slab	Concrete floor/Base slab	Concrete floor/slab in good condition. base slab in lower level in fair condition with thin cracks spanning the width of the room near the well opening in slab
Windows/Openings	No	No windows
Doors	Metal Door at entrance	one man-door, primary entrance. Door in good condition.
Pipe Supports	Yes	Pipe Supports in good condition. Some supports not fully anchored to concrete floor (2 of 4 anchor bolts missing)
Large Equipment Anchorage (Generators, Pumps, etc.)		Yes, Vertical Turbine pump plate anchorage
Platforms (if present)		NA
Access hatch		NA
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1/2/3)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)		2500 gpm at 344 TDH
Model		Aurora Pump/Well Pump, Type 14 RH, 4-stage, Bronze Impeller

Manufacturer		General Pump Company, Inc.
Pump Configuration		Vertical Turbine
Year Installed		1993
Excessive noise?		NA
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Condition		Pump in good operating condition.
Pressure Gauges		Yes, on discharge downstream of gate valve. Pressure gauge and transducer. (up to 100 psi)
Valves		Good condition. Swing Check valve, Air release valve, and handwheel-operated gate valve
Piping		Good condition. 12-inch piping
Bypass Capability		None observed. Pump waste discharge pipeline to adjacent creek for pump testing and maintenance operation.
ELECTRICAL/INSTRUMENTATION		
GENERAL (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Type of level sensor		polyethylene tube inserted via access pipe (IMG_5320.JPG)
List remote alarms		
List local annunciation alarms		
Manual or automatic transfer switch	Manual	**Zenith Controls Power Switching Systems**
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Hazardous rating for outlets?		
Automatic exhaust fan (NFPA 820 requirements)?		
Explosion proof seals at conduit penetrations?		
Arc-flash labeling?	Generic Arcflash Labels	Generic arcflash labels are present on deadfront of power cabinets.
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Flowmeter (if applicable)	McCrometer Ultra Mag	Yes, McCrometer Ultra Mag (Magnetic flow meter); Sensor Serial No. UP20-1264; Model No. UM06-12WSR100A1; 150 psi Max
Level Sensor		
Ventilation	Supply fan and exhaust fan	**Good. Ventilation HVAC ducting throughout**
Lighting	Fluorescent	**Good condition. Fluorescent lamps.**
Generator (if applicable)	NA	NA
Transfer Switch	Manual TS	**Zenith Controls Power Switching Systems**


WELL 13


ProMinent
OUTLET

FACILITY AND REVIEWING INFORMATION

Date/Time of Assessment:	
Site Name/ Facility ID: Arden Reservoir (main Yard)	Daniel - Cla Val - Costa Mesa
Assessor Name: KEB, CSE	Reservoir/Booster Station, 1MG Reservoir

GENERAL		
GENERAL INFORMATION (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Year orginally constructed		
As-builts available?		
Submerged Pumps or Dry Pit?		
SAFETY FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Fencing		
Hatch lock		
Security system, gate or intrusion alarm		
Fall protection / Safety		
Pump removal lifting equipment		
Ventilation (confined space areas)		
Safety ladder/ Stairs		
Handrails for dry pits		
SITE ACCESS/FEATURES (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Site Grading		
Site Access (Road, Gates, etc.)		
Space for Maintenance Activities		
Surface Improvements (landscape, bollards, etc.)		
STRUCTURES		
GENERAL - WET WELL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Shape		
Dimensions		
Wet Well Hatch Opening Size		
Overflow Level		
Year of Wet Well Lining (if applicable)		
Lining Condition (if applicable)		
Concrete or rebar exposed?		
Is grease build up visible (FOG)?		
Odor control system/Vent Size		
# of odor complaints in past 12 months?		
Evidence of high water levels?		
GENERAL - DRY WELL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Shape		
Dimensions		
Space for Maintenance Activities		
Sump Pump		
STRUCTURAL EVALUATION (PSE)	**FIELD DATA**	**REVIEWER COMMENTS**
Roof		
Exterior Walls		

Interior Walls		
Floor/Slab		
Windows/Openings		
Doors		
Pipe Supports		
Large Equipment Anchorage (Generators, Pumps, etc.)		
Platforms (if present)		
Access hatch		
MECHANICAL		
GENERAL - PUMP INFORMATION (MKN)	**FIELD DATA PUMP (1/2/3)**	**REVIEWER COMMENTS**
Design/Field Capacity (gpm)		(see pictures IMG_5125.jpg) 850 gpm/3550 rpm/150 TDH/ Serial No. 247098
Model		
Manufacturer		Byron Jackson Pumps
Pump Configuration		
Year Installed		
Level settings (On/Off)		On. Based on system pressure and tank levels in ground storage tank
Speed Settings		
~~Clogging/Ragging issues?~~		NA
Overheating issues?		
Excessive noise?		Did not hear the pumps running. No feedback from operators that pumps were excessively loud.
Leaking or seal failures?		
MECHANICAL (MKN)	**FIELD DATA**	**REVIEWER COMMENTS**
Pump Condition	Ground Tank Booster	Motors were recently replaced, new. Motor anchorage to existing concrete pads appears to be misssing.
Pressure Gauges	Ground Tank Booster	
Valves	Ground Tank Booster	Corrosion on valve bodies. In need of new protective coating. Cla-Vals are outdated. In the process of replacing check valves.
Piping	Ground Tank Booster	Corrosion on valve bodies. In need of new protective coating. Some portions of tank discharge piping repainted during tank maintenance.
Bypass Capability	Ground Tank Booster	
ELECTRICAL/INSTRUMENTATION		
GENERAL (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
PLC Controller present (install year and condition)		
Permanent Back up Power? Type & Rating		Back up generator at site, portable.
Type of level sensor		
List remote alarms		
List local annunciation alarms		
Manual or automatic transfer switch		
ELECTRICAL SAFETY (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Hazardous rating for outlets?		
Automatic exhaust fan (NFPA 820 requirements)?		
Explosion proof seals at conduit penetrations?		
Arc-flash labeling?		
ELECTRICAL EVALUATION (GG)	**FIELD DATA**	**REVIEWER COMMENTS**
Flowmeter (if applicable)		
Level Sensor		Altitude valve allows water from the elevated tank to fill the ground storage tank.
Ventilation		

Lighting		
Generator (if applicable)		Portable generator on site. Permanent generator at the reservoir
Transfer Switch		
Main Electrical Panel		New control shed and electrical equipment in good condition
Motor Control Center		
Pump Motor		**Pump Motors are new and recently replaced at the booster station serving the ground storage tank at the main yard (1 MG tank)**
Communications		Two SCADA systems for redundancy
PLC Controller		

Water in the electrical shed for the ground storage tank observed during site visit
Existing Cla-vals are 70 years old
Looking at upgrading the entire booster station or constructing a new booster station
No direct line from a pump coming into the station, comes in from the main distribution system
Offline with its own supply. A new reservoir with a new pumping station
Only thing the booster station is good for is supplementing fire flow
Cycle booster station once a week to keep the water turned over in the tank
turn on booster station if there is a major system demand (fire), on pressure setpoints/switches
System is equalized by elevated tank, keeps it at 58 psi continuosly, all the time. If pressure drops below 45 psi, the booster pumps at the ground tank will turn on
Usually when the volume goes down…County may call and request a pressure boost, so they will manually turn on the booster pumps for service from the ground storage tank
Ground storage tank is fed by distribution system
Main line goes directly into elevated tank. Ground storage tank only fills when the altitude valve is opened, but it doesn't open automatically
When they cycle it down once a week, they will pump out and then open the altitude valve to refill the ground storage tank
Brand new motors at booster station (Ground storage tank). Recently replaced.
Ground storage tank was re-coated
Ground storage tank needs a seismic retrofit (discussed in the inspection report?)
Rust corrosion goes on after one year inspection
SCADA system, hooked up to two SCADA systems, Murphy switches (pressure switches);
SCADA , one cloud-based, and Wonder Ware, one controlled by cell sites and the other is radio-based.
XIO is all brand new, doing some upgrades on Wonder Ware (redundancy)
Generator also at well #12.

Only thing at the elevated tank is the tank and SCADA. Also a generator (20 years old) at the end of useful life

Adding a fence for locked storage and security
All site storage is public works. Separate storage for Public Utilities
Security risks with people following service trucks into the gate
Upgrading site security as well.

going to do a seismic study on the elevated tank. Will repaint the elevated tank

Pressure relief valve off to the side (off of the distribution system) - various locations have PRVs. (above-ground)
Operable Unit - fairly new, probably just look at the plans
Pictures also taken of the SCADA room


BOOSTER STATION
EMERGENCY
PHONE (626)580-2100