RESOLUTION NO. 2021-82

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF GUADALUPE ADOPTING THE "CITY OF GUADALUPE 2021 WATER MASTER PLAN UPDATE"

WHEREAS, the City's Water Master Plan was last updated in 2014, and it is common industry practice to update utility master plans every five years; and

WHEREAS, the City Council contracted with Michael K Nunley & Associates, Inc. (MKN) to update the Water Master Plan; and

WHEREAS, disadvantaged community planning grant monies funded the project; and

WHEREAS, MKN submitted a final report to the City on September 22, 2021, in advance of the grant deadline and within available funds,

NOW, THEREFORE, BE IT RESOLVED, by the City Council of the City of Guadalupe as follows:

The City Council hereby adopts the "City of Guadalupe 2021 Water Master Plan Update."

PASSED, APPROVED AND ADOPTED at a regular meeting on the 26th day of October 2021 by the following vote:

MOTION: **TONY RAMIREZ / LILIANA CARDENAS**

AYES:	**5**	**Councilmembers:**	**Ramirez, Cardenas, Julian, Robles, Costa Jr.**
NOES:	**0**		
ABSENT:	**0**		
ABSTAIN:	**0**		

I, Amelia M. Villegas, City Clerk of the City of Guadalupe DO HEREBY CERTIFY that the foregoing Resolution, being **Resolution No. 2021-82** has been duly signed by the Mayor and attested by the City Clerk, all at a regular meeting of the City Council, held October 26, 2021, and that same was approved and adopted.

ATTEST:

Amelia M. Villegas, City Clerk

Ariston Julian, Mayor

APPROVED AS TO FORM:

Philip Sinco, City Attorney

CITY OF GUADALUPE

2021 Water Master Plan Update

MKN | 530 PAULDING CIRCLE, STE B | ARROYO GRANDE, CA 93420 | T 805.904.6530

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City of Guadalupe

2021 Water Master Plan Update

Final September 2021

City Council

Mayor – Ariston Julian

Mayor Pro Tem – Tony Ramirez

Council Member – Liliana Cardenas

Council Member – Gilbert Robles

Council Member – Eugene Costa Jr.

City Staff

Shannon Sweeney – Public Works Director/Engineer

Jaime Vidales – Water Department Supervisor

Michael K Nunley & Associates, Inc. Staff

Jon Hanlon, PE

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Prepared by:

Jon Hanlon, PE
Project Manager
MKN & Associates, Inc.

mkn

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Table of Contents

List of Tables

List of Figures

Previous Studies and Reports

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

1. Central Coast Water Authority Urban Water Management Plan Update dated June 2021 and prepared by Provost and Pritchard.

2. Regional Growth Forecast 2050 Santa Barbara County dated October 2018 and prepared by Santa Barbara County Association of Governments.

3. City of Guadalupe Water Master Plan Update Supplemental Analysis Report dated August 4, 2015 and prepared by MKN & Associates, Inc.

4. Bonita Tank, Booster Pump Station, and Tognazzini Waterline Assessment dated May 30, 2014 and prepared by MKN & Associates, Inc.

5. City of Guadalupe Water Master Plan Update dated May 13, 2014 and prepared by MKN & Associates, Inc.

6. Revised DJ Farms Specific Plan dated August 2012 and prepared by Urban Planning Concepts, Inc. and Bethel Engineering.

Appendices

Appendix A – City Fire Flow Testing

List of Acronyms

AC	Asbestos Cement
ADD	Average Day Demand
ADU	Accessory Dwelling Unit
AF	Acre Foot
AFY	Acre Foot per Year
APN	Assessors Parcel Number
AWWA	American Water Works Association
BGS	Below Ground Surface
BPS	Booster Pump Station
CAD	Computer Added Drafting
CAG	County Association of Governments
CCI	Consumer Confidence Index
CCWA	Central Coast Water Authority
CIP	Capital Improvement Project
City	City of Guadalupe
C-N	Neighborhood Commercial
C-S	Service Commercial
CUP	Conditional Use Permit
CUR	Curation
DOF	Department of Finance
DWR	Department of Water Resources
ENR	Engineering New Record
EWCIP	Existing Water Capital Improvement Project
FF	Fire Flow
FWCIP	Future Water Capital Improvement Project
G-C	General Commercial
G-I	General industrial
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPD	Gallons per Day
GPM	Gallons per Minute
GW	Groundwater
HP	Horsepower
LF	Linear Foot
M-C	Industrial Commercial
MDD	Maximum Day Demand
MG	Million Gallons
MGD	Million Gallons per Day
MKN	Michael K. Nunley & Associates, Inc.
MSL	Mean Sea Level
NA	Not Applicable/Not Available
O	Open Space
PF	Peaking Factor
PF	Public Facilities
PF-CZ	Public Facilities - Coastal Zone
PHD	Peak Hour Demand
PSI	Pounds per Square Inch
PVC	Polyvinyl chloride
R/N-SP-CZ	Neighborhood Residential - Specific Plan - Coastal Zone
R-1	Single Family Residential (Low density)
R-1-3000	Residential Small Lot
R-1-5000	Medium Density Residential
R-1-6000	Low Density Residential
R-1-7000	Very Low Density Residential
R-1-M	Single Family Residential (Medium Density)
R-1-SP	Single Family Residential - Specific Plan
R-2	Multiple Family Residential (Medium Density)
R-3	Multiple Family Residential (High Density)
REC	Recreation
SCADA	Supervisory Control and Data Acquisition
SCHOOL	School Site
SWP	State Water Project
UWMP	Urban Water Management Plan
VAC	Value Added Cooler
VFD	Variable Frequency Drive
WMP	Water Master Plan

1.0 INTRODUCTION AND OVERVIEW

1.1 Purpose and Scope

In 2014, MKN completed the City's Water Master Plan (2014 WMP) update. The 2014 WMP evaluated the City's water supply, storage, pumping facilities, and distribution system to support existing and future demands through buildout, and developed a list of recommended Capital Improvement Projects (CIPs) to address system deficiencies. In 2015, MKN completed a Supplemental Report to the 2014 WMP to address changes in water demand by Curation (formerly Apio), completion of a number of recommended CIPS from the 2014 WMP, and changes to the City's existing water system to serve the Pasadera Development (formerly DJ Farms).

Over the past six years, the Pasadera Development has been under construction and the City has completed several recommended CIPs from the 2015 Supplemental Report. The purpose of this project is to provide an update to the 2015 Supplemental Report and develop a revised 10-Year CIP plan to allow the City to continue to prioritize, plan, and implement critical water infrastructure projects. The scope of services for this project included the following:

1. Information Review including:
    a. Water billing data from 2016 to 2020
    b. Water production records from 2016 to 2020
    c. Projects completed since the 2015 WMP Supplemental Report
    d. Known future development and population data
    e. Changes in system operation
2. Update system-wide water demands for existing and buildout conditions
3. Update the hydraulic model and GIS database based on recent system improvements, completed CIPs and/or City input
4. Evaluate impacts to the Capital Improvement Program for:
    f. Supply
    g. Storage
    h. Distribution
5. Provide revised recommendations for improvements with associated construction cost estimates

This 2021 Water Master Plan Update (2021 WMP) is structured with sections that follow the overall format of the 2014 WMP and 2015 Supplemental Report with updated information provided by the City.

1.2 Status of 2015 Supplemental Report Recommended Improvements

The 2015 Supplemental Report identified revised recommendations for the required system improvements based on infrastructure changes to serve the Pasadera Development, overall system operations, and completed projects since the 2014 WMP. **Table 1-1** provides a summary of the remaining improvements from the 2015 Supplemental Report and current project status (completed, deferred, etc.) of the 2015 Supplemental Report improvements.

Table 1-1: Status of 2015 Supplemental Report Recommended Capital Improvement Projects				
Project Identification	**Project Title**	**Priority**	**Cost**	**Status**
EWCIP-1	Obispo Booster Station Fire Flow Pressure Setting Modification	High	$0	Completed
EWCIP-2	Bonita Reservoir Rehabilitation	Low	$450,000	Not Completed
	Bonita Pump Station Rehabilitation	Low	$80,000	Not Completed
EWCIP-3	Tognazzini Intertie	High	$110,000	Completed
EWCIP-4	New Water Supply Well	High	Variable	Not Completed
EWCIP-5	Kermit Mckenzie Jr School Water Main Upgrade	High	$420,000	Not Completed
EWCIP-6[1]	Mary Buren Elementary School Water Main Upgrade	High	$950,000	Not Completed
EWCIP-7	Tognazzini Street Water Main Upgrade	High	$300,000	Not Completed
EWCIP-8	Escalante Street Water Main Upgrade	High	$290,000	In Process under new development project
EWCIP-9	South Obispo Street Industrial Area Water Main Upgrade and Extension	High	$430,000	Not Completed
EWCIP-10	~~Eighth Street Waterline Extension~~	~~High~~	~~$90,000~~	Not Required
EWCIP-11[2]	North Obispo Street Industrial Area Pipe Upgrade	High	$400,000	Not Completed
FWCIP-1	DJ Farms Groundwater Supply Well	DJ Phase 1	Variable	Completed
FWCIP-2[3]	DJ Farms Phase 1 Storage Tank	DJ Phase 1	$760,000	Completed
FWCIP-3[4]	~~DJ Farms Booster Pump Station~~	~~DJ Phase 1~~	~~$600,000~~	Not Required per 2014 WMP
FWCIP-4[4]	~~DJ Farms Phase 2 Storage Tanks~~	~~DJ Phase 2~~	~~$760,000~~	Not Required per 2014 WMP
FWCIP-5[4]	~~DJ Farms Booster Pump Station Expansion~~	~~DJ Phase 2~~	~~$180,000~~	Not Required per 2014 WMP
FWCIP-6	New Water Supply Well	Low	Variable	Not Completed

Notes:
1. Approximately 500 linear feet has been replaced along this pipeline alignment.
2. Approximately 460 linear feet has been replaced along this pipeline alignment.
3. FWCIP-2 storage tank was constructed at the existing Obispo Street tank site and referred to as Obispo Tank No. 2.
4. FWCIP-3 through FWCIP-5 were determined to no longer be required per revised system analysis in the 2015 Supplemental Report.

This master plan update supersedes the analysis and recommendations from the 2014 WMP and 2015 Supplemental Report.

1.3 Overview

A number of planning and operational changes to the City's water distribution system have occurred since the completion of the 2015 Supplemental Report. Many of these changes may impact the scope, priority, or necessity of certain recommended CIPs from the 2015 Supplemental Report. Some of the significant planning changes include:

1. Several residential and commercial development projects not previously identified in the 2015 Supplemental Report.
2. Relocation of the Pasadera Development storage tank to the Obispo Street tank site and construction of a single 700,000 gallon storage tank in lieu of two (phased) 350,000 gallon storage tanks.

3. Pipeline changes associated with the Pasadera Development.
4. Tognazzini well interconnection improvements.
5. Failure of the Tognazzini Well.
6. Replacement of a portion of the recommended pipeline improvements on Obispo Street.
7. Construction of the Pasadera production well and transmission pipeline.
8. Inclusion of automated sprinkler system for new buildings per the City's Municipal Code Chapter 15.08.
9. Inclusion of accessory dwelling units per the City's Municipal Code Chapter 18.53.

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2.0 POPULATION AND LAND USE

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

2.1 General

The City of Guadalupe is an incorporated city of 8,081 residents as of 2020 (Department of Finance Table E-5) and located in northern Santa Barbara County, approximately four miles inland from the Pacific Ocean along the scenic coastal Highway 1. The City is approximately 1.4 square miles and is situated in the heart of the fertile Santa Maria Valley, an agricultural region of statewide and national importance. US Highway 101 (US 101), a regional highway linking California's coastal cities, is located 10 miles to the east. The City of Santa Barbara is located approximately 60 miles to the south and San Luis Obispo is located 25 miles to the north. Neighboring communities include the cities of Santa Maria, 10 miles to the west, and Pismo Beach, 15 miles to the north. The topography in the vicinity of the City is relatively flat and the average elevation is 85 feet above mean sea level. The predominant land use surrounding Guadalupe is agriculture (Guadalupe Community Plan, 2009).

2.2 Accessory Dwelling Unit

Per the City's Municipal Code Chapter 18.53[1], an Accessory Dwelling Unit (ADU) as an attached or detached residential dwelling unit that provides complete independent living facilities for one or more persons. It includes permanent provisions for living, sleeping, eating, cooking, and sanitation on the same parcel as a primary dwelling unit is situated. ADUs can only be built on R-1, R-1-SP, R-1-M, R-2, and R-3 land uses that are only occupied with one single family dwelling unit or are vacant with approved plans for the construction of a single-family dwelling unit.

Based on the definition above, **Table 2-1** provides a summary of the number of lots within the City that have the potential of add an ADU in the future.

Table 2-1: ADU Potential Population

Zoning	Description	Number of Parcels	Number of ADUs
R-1	Single Family Residential (Low density)	548	548
R-1-M	Single Family Residential (Medium Density)	396	396
R-1-SP	Single Family Residential - Specific Plan	257	257
	Total	**1,201**	**1,201**

Notes:
1. It was assumed that most existing R-2 (44 parcels) and R-3 lots (200 parcels) already have multiple family units and are therefore ineligible to add an ADU.

It should be noted that the information in **Table 2-1** is for reference only and future population/water demand projections do not include increases from ADUs since each parcel listed above would require planning and permitting to add an ADU.

[1] Guadalupe Municipal Code Amendments August 2017 to January 2019

2.3 Residential Development and Population

As identified in the City's 2014 WMP, the Pasadera development will increase the City's future population by 3,208 people once the project is built out in 2040. As of January 1, 2021, 327 dwelling units (out of 802) were issued certificates of occupancy. This leaves approximately 475 dwelling units remaining to be constructed. It should be noted that the DJ Farms Specific Plan identified a City buildout population of 10,288 persons in the year 2040, representing 1.25% growth per annum.

Additional development not previously included in the 2015 Supplemental Report includes the Escalante Meadows redevelopment project located on Escalante Street off of 11th St, which will replace 52 existing units with 80 new units and the addition of a duplex, triplex and two ADU's to the existing four duplexes on the northeast corner of 11th and Olivera.

For the purposes of the 2021 WMP, future population growth will be attributed to the Pasadera development, additional development described above, development of existing vacant lots, and the occupation of existing unoccupied residences per US Census data. Using this approach, the buildout population of the City was estimated to be 10,624 persons (excluding population associated with ADUs) as presented in **Table 2-2**.

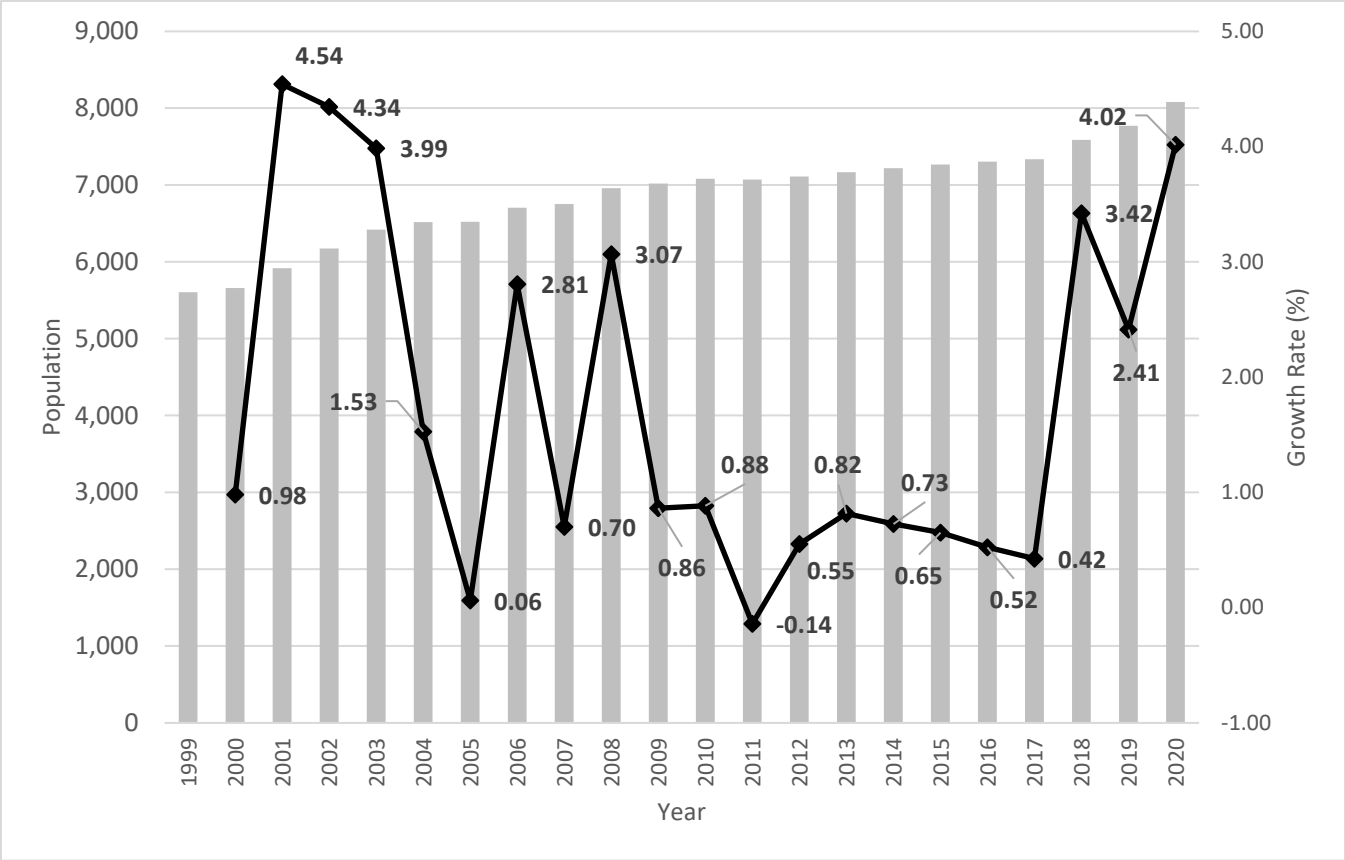
Table 2-2: Buildout Population Estimate

Population Served	Source	Notes	Persons
2020 Population	California Department of Finance	Population estimated as of January 1, 2020 per Table E-5	8,081
Unoccupied Dwellings as of 2020	2010 California Census	77 dwellings at 3.9[1] persons per dwelling	300
Planned Developments			
Pasadera Development	DJ Farms Specific Plan/City Staff Correspondence	475 remaining dwelling units at approximately 4.0[2] persons per dwelling	1,900
Escalante Meadows	City Staff Correspondence	13 additional dwellings at 3.9 persons per dwelling	51
11th and Olivera	City Staff Correspondence	Five units at 3.9 persons per dwelling with two ADUs at one person per ADU[3]	22
Vacant Residential Properties			
Vacant Developable Residential Lots R-1	City Land Use Information	11 dwellings at 3.9 persons per dwelling	43
Vacant Developable Residential Lots R-2 & R-3	City Land Use Information	5.4 acres medium and high density residential undeveloped at 29.6 persons per acre[1]	160
		2021 City WMP Population Estimate (Year 2040)	**10,556**
		DJ Farms Specific Plan Population Estimate (Year 2040)	10,288
		Santa Barbara CAG Population Estimate (Year 2040)	8,900

Notes:
1. Per City of Guadalupe Water Master Plan Update dated May 13, 2014 and prepared by MKN & Associates, Inc.
2. Revised DJ Farms Specific Plan dated August 2012 and prepared by Urban Planning Concepts, Inc. and Bethel Engineering.
3. Per direction from City Staff June 2021.

Figure 2-1 depicts the City's historical population growth rate over the past 20 years per California Department of Finance population data.

Figure 2-1: Population Growth Rate Chart



The chart above shows a peak population growth in 2001 and declining from 2002 to 2009. From 2009 to 2017 annual population growth is less than 1%, with an increase occurring in 2018.

2.4 Commercial Development

2.4.1 Curation Value Added Cooler

During the preparation of the 2015 Supplement Report, it was noted that Curation (previously Apio) was in the process of obtaining a Conditional Use Permit (CUP) for the expansion of their Value Added Cooler (VAC) production lines. The 2015 Supplemental Report noted that Curation would be required to limit their existing and future total water usage to 373 AFY. However, recent discussions with City staff indicated that this requirement was not included in the conditions of approval for the project in 2018. However, current usage (Section 3.1.1) from the City's 2019 and 2020 water billing records indicate that daily water usage associated with Curation has decreased.

2.4.2 Beachside Cooling Facility

The proposed project is located at 4529 11th Street and 1211 Peralta Street in the City of Guadalupe. The existing 10.41 acre cooling facility, warehouse, loading and storage development spans across seven parcels: APNs 115-020-028; 115-020-029; 115-020-030; 115-020-031; 115-020-025; 115-041-022; and 115-041-010. A

residence also exists on the property against the southern property line of APN 115-041-022. The existing development is currently being used for packing and shipping of produce only. The existing ammonia cooling facility on the property has been unused for approximately seven years. The project proposes to reinstate the ammonia cooling facility use and expand the packing and shipping capacities to accommodate an increased demand. The existing cooling system will be replaced with a new system. Additionally, portions of the warehouse will be reconstructed and additions will be added to expand the storage, packing, and product loading areas. The proposed reconstruction and expansions would be completed over three phases. Based on information provided by the project developer, the annual water usage for the facility is estimated as follows:

- Year 1: 12 AFY
- Years 2-3: 21 AFY
- Years 4-6: 25 AFY
- Years 7-10: 28 AFY

Since the 2015 Supplemental Report, reconstruction of the facility for Year 1 usage has been completed. For the purpose of the 2021 WMP, water usage of 16 AFY (14,284 gpd) associated with Years 2 - 10 will be used for the estimated buildout of the facility.

2.5 Land Use

As described previously, the Pasadera Development will increase the City's population by 3,208 at buildout. **Table 2-3** provides a summary of existing land uses withing the City including the land uses associated with the Pasadera Development.

Table 2-3: Existing Zoning for City			
Zoning	Description	Number of Parcels	Acres
G-C	General Commercial	129	42
G-I	General industrial	55	121
M-C	Industrial Commercial	21	8
O	Open Space	19	39
PF-CZ	Public Facilities - Coastal Zone	1	13
R/N-SP-CZ	Neighborhood Residential - Specific Plan - Coastal Zone	52	38
R-1	Single Family Residential (Low density)	548	105
R-1-M	Single Family Residential (Medium Density)	396	46
R-1-SP	Single Family Residential - Specific Plan	257	48
R-2	Multiple Family Residential (Medium Density)	44	19
R-3	Multiple Family Residential (High Density)	200	29
Pasadera (DJ Farms) Development			
C-N	Neighborhood Commercial	3	15
C-S	Service Commercial		7
PF	Public Facilities	4	13
R-1-3000	Residential Small Lot	322	45
R-1-5000	Medium Density Residential	357	71
R-1-6000	Low Density Residential	108	25
R-1-7000	Very Low Density Residential	15	5
REC	Recreation	16	16
SCHOOL	School Site	1	13
	Total	**2,548**	**715**

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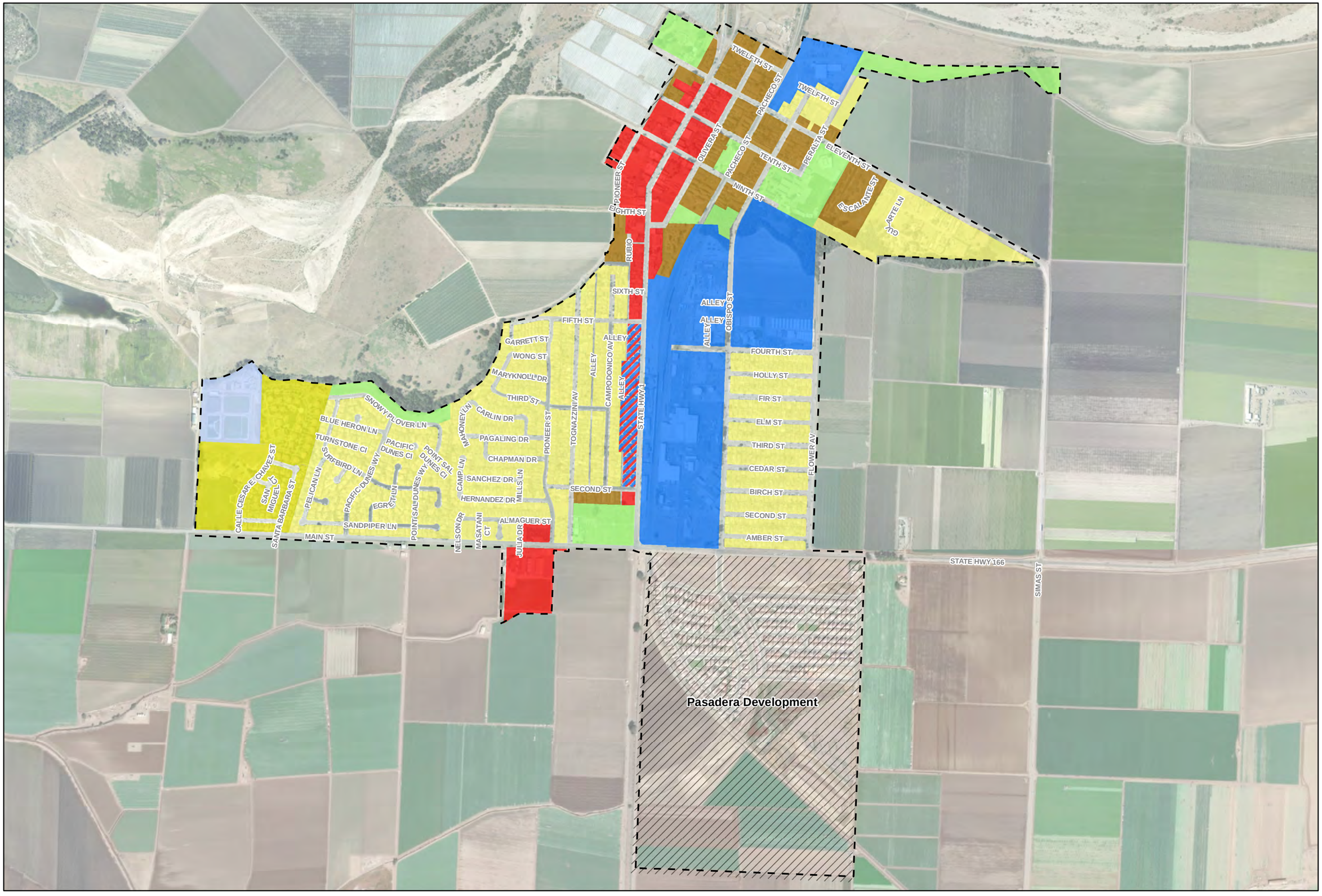
City of Guadalupe 2021 Water Master Plan Update

Figure 2-2:

Land Use Map



Legend

- City Limits

Zoning

- G-C
- G-I
- M-C
- O
- PF-CZ
- R-1
- R-1-M
- R-1-SP
- R-1/G-I
- R-2
- R-3
- R/N-SP-CZ
- Pasadera

1 inch:1,000 feet

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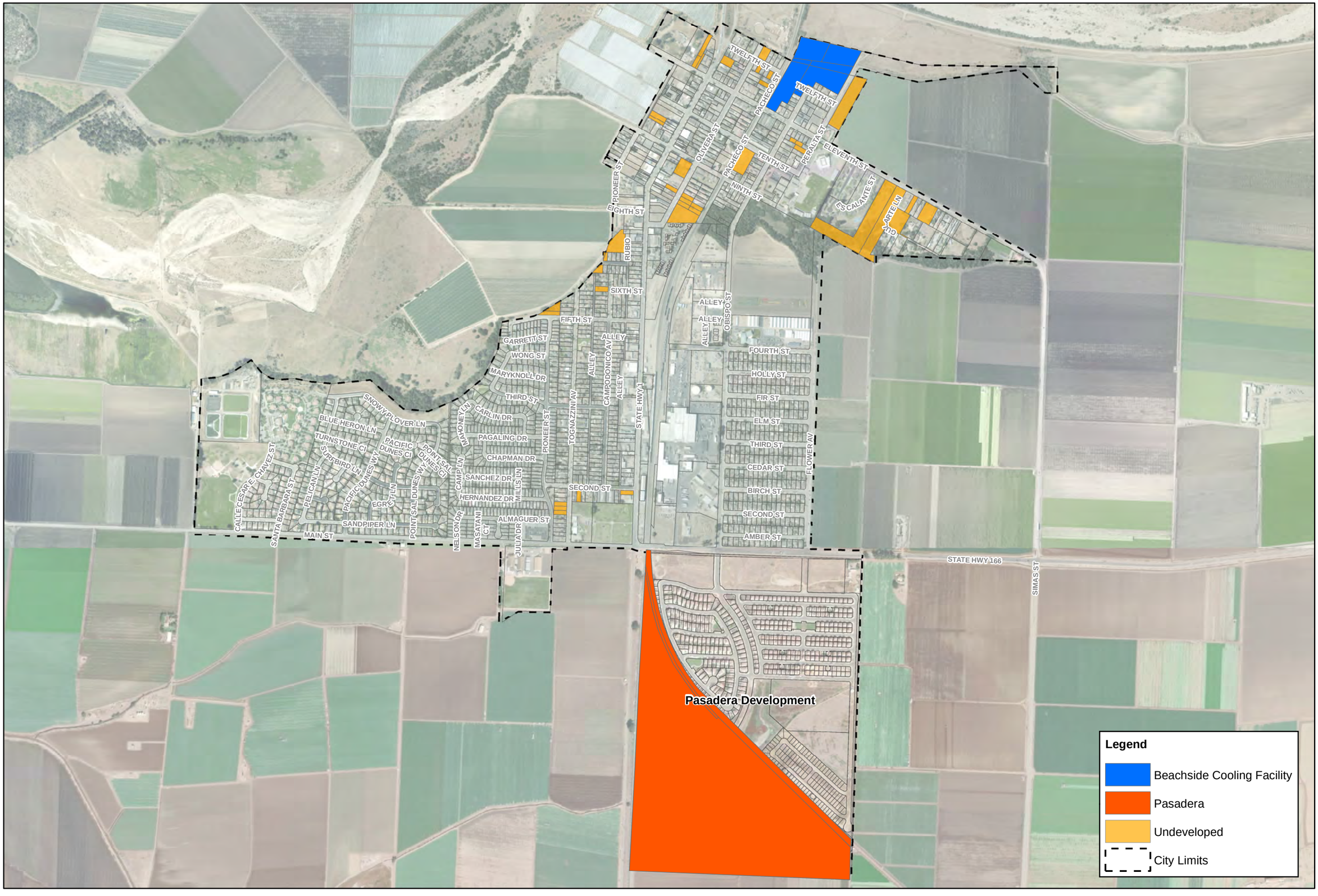
City of Guadalupe 2021 Water Master Plan Update

Figure 2-3:

Vacant Parcels



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3.0 EXISTING AND PROJECTED WATER DEMAND

This section provides an overview of historical water usage, current water demand conditions, and future demand projections associated with growth.

3.1 Historical Water Demand

Based on updated City billing records for calendar year 2015 through 2020, it is estimated that 55 percent of the total water sold was used for residential purposes, approximately 39 percent used for commercial (with significant usage by Curation) and the remaining 7 percent consisting of public authority, multi-family and irrigation usage as shown in **Table 3-1**.

Table 3-1: Historical Usage from Billing Information

Calendar Year	Usage (MGD)					
	Residential	Commercial	Public Authority	Multi-family Dwelling	Irrigation	Total
2020	0.54	0.26	0.00	0.01	0.07	0.88
2019	0.49	0.22	0.03	0.01	0.04	0.78
2018	0.42	0.45	0.03	0.00	0.04	0.94
2017	0.40	0.43	0.03	0.00	0.02	0.88
2016	0.39	0.42	0.00	0.01	0.03	0.84
2015	0.39	0.42	0.02	0.01	0.03	0.86
2014	0.47	0.45	0.03	0.01	0.04	0.99
2013	0.51	0.30	0.02	0.01	0.03	0.87
2012	0.54	0.28	0.01	0.01	0.03	0.86
2011	0.50	0.26	0.00	0.01	0.03	0.80
2010	0.50	0.27	0.00	0.01	0.03	0.80
2009	0.48	0.27	0.00	0.01	0.03	0.78

Figure 3-1 provides a graphical representation of the average annual historical water usage by customer type from 2009 to 2020.

Figure 3-1: Annual Average Water Usage by Type (2009 – 2020)

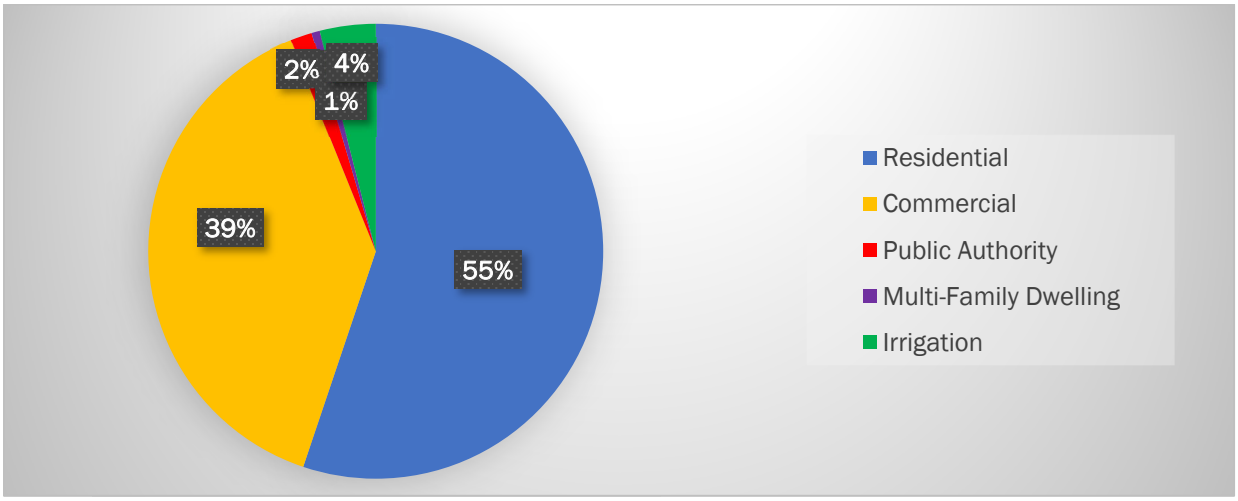


Table 3-2 provides an overview of the historical per capita water usage for the City from calendar year 2015 through 2020. Population based on Department of Finance (DOF) Population and Housing Estimates for Cities 2011-2020.

Table 3-2: Historical Per Capita Water Usage

Calendar Year	Population[1]	Gross Per Capita Water Use (GPD/Person)	Residential Per Capita Water Use (GPD/Person)[2]
2020	8,081	106	66
2019	7,769	98	62
2018	7,586	121	54
2017	7,335	117	53
2016	7,304	116	54
2015	7,266	118	54
2014	7,219	137	66
2013	7,167	121	72
2012	7,109	121	77
2011	7,070	113	72
2010	7,080	113	71
2009	7,018	111	69

Notes:
1. Population based on California Department of Finance Table E-4 and E-5.
2. Includes residential and multi-family usage only.

3.1.1 Curation Historical Water Demand

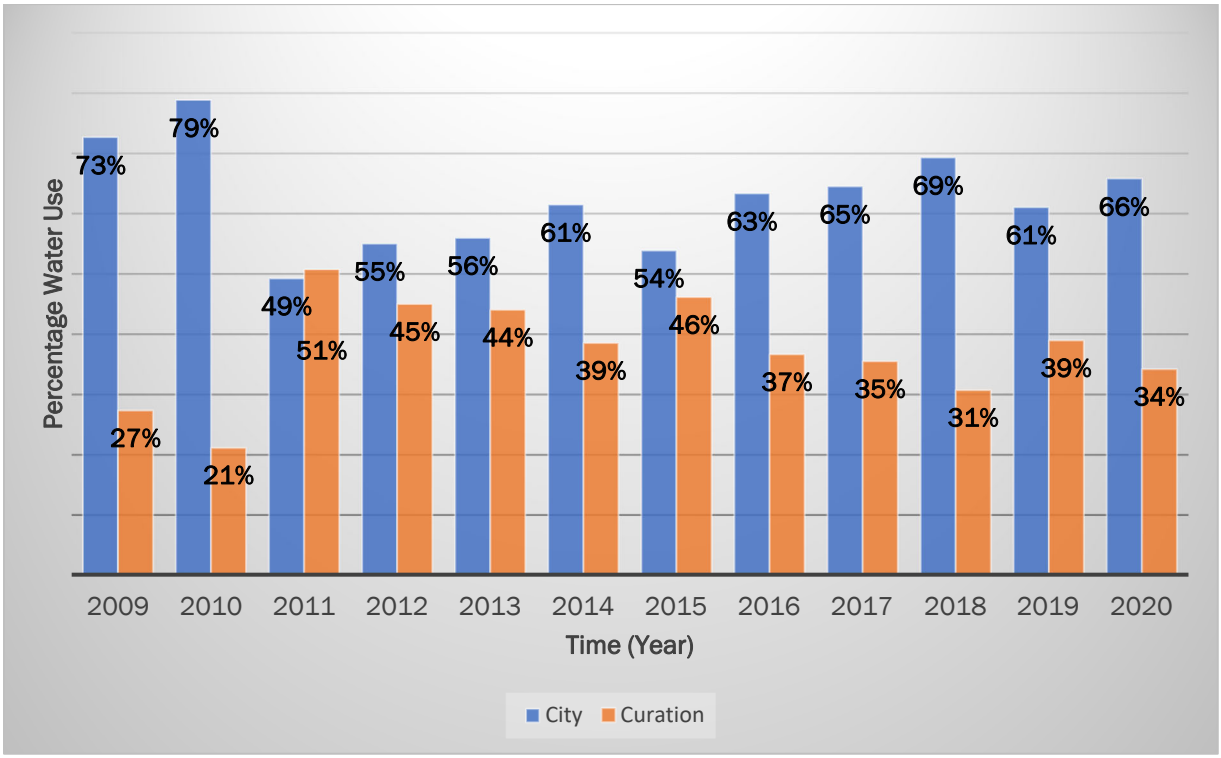
Table 3-3 below provides an overview of Curation's historical water usage for all onsite water meters from 2009 to 2020.

Table 3-3: Curation Historical Average Daily Water Use

Calendar Year	Usage (GPD)									Total ADD
	CUR 1	CUR 2	CUR 3	CUR 4	CUR 6	CUR 7	CUR 8	CUR 9	CUR 10	
2020	297	400	57,483	23	2,504	27,770	121	124,496	0	213,094
2019	291	621	25,053	23	3,082	27,862	109	111,436	184	168,661
2018	477	1250	189,568	20	6,134	29,520	86	178,473	59	405,588
2017	455	730	204,372	59	18,233	31,758	88	131,740	59	387,495
2016	449	547	226,189	68	26,096	36,183	37	93,465	64	383,097
2015	363	844	228,406	6	14,870	43,218	31	93,635	64	381,437
2014	447	721	229,900	10	22,711	40,947	20	102,421	47	397,224
2013	348	3,635	239,524	12	32,312	29,881	20	3,648	NA	309,380
2012	303	7,138	235,745	57	40,339	28,395	33	NA	NA	312,010
2011	289	7,611	214,981	51	32,963	32,488	18	NA	NA	288,402
2010	533	11,396	214,147	57	38,347	37,740	27	NA	NA	302,247
2009	547	19,389	204,802	137	30,209	45,567	12	NA	NA	300,663

Figure 3-2 provides a graphical representation of Curation's average annual historical water usage versus overall City usage from 2009 to 2020.

Figure 3-2: Curation Annual Average Water Usage (2009 – 2020)



3.2 Existing Water Demand

To determine current Average Day Demand (ADD) conditions for the 2021 WMP update, customer usage from the City's public water system statistics reports for calendar years 2015 through 2020 were reviewed. The billing information was used to estimate water usage and assign updated demands throughout the City. To remain consistent with the demand analysis completed for the 2015 Supplement Report, MKN averaged the last four years for water usage to determine the estimated ADD for the 2021 WMP.

Table 3-4: Current Average Day Demand

Calendar Year	Usage (MGD)					
	Residential	Commercial	Public Authority	Multi-family Dwelling	Irrigation	Total
2020	0.54	0.26	0.00	0.01	0.07	0.88
2019	0.49	0.22	0.03	0.01	0.04	0.78
2018	0.42	0.45	0.03	0.00	0.04	0.94
2017	0.40	0.43	0.03	0.00	0.02	0.88
					4-Year Average	**0.87**

Based on the last four years of water usage the current ADD for the City was estimated to be 0.87 MGD (0.01 MGD less than the 2015 Supplemental Report value of 0.88 MGD).

3.3 Unaccounted Water

Based on 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. Such use is typically associated with metered operational uses by the water utility, such as flushing programs that utilize temporary meters to track usage.
  - Unbilled Unmetered Consumption: Includes authorized uses by the utility that are not metered including reservoir draining, water quality testing, flushing water mains (hydrant flushing), storm inlets, culverts and sewers, firefighting and training, fire flow tests performed by the utility, street cleaning, landscaping/irrigation in public areas, and construction sites in the City.
- Apparent Losses – The nonphysical losses that occur when water is successfully delivered to the customer but is not measured or recorded accurately, and consisting 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.

Based on review of water production and consumption data (2009 to 2020), the City's non-revenue water volume has ranged from 5% to 17% of total water produced annually as shown in **Table 3-8**.

Table 3-5: Non-Revenue Water

Calendar Year	Production (AFY)[1]	Metered Water Delivery (AFY)[2]	Unaccounted for Water (AFY)	Percentage	Notes
2020	1,070	985	85	8%	
2019	1,045	870	175	17%	
2018	1,189	1,052	137	12%	
2017	1,102	986	117	11%	
2016	1,119	968	151	13%	
2015	1,101	988	113	10%	
2014	1,123	1,109	14	1%	Obispo Well flow meter replaced
2013	956	975	-19	-2%	
2012	924	965	-41	-4%	
2011	886	895	-9	-1%	
2010	881	894	-13	-2%	CCWA Not Received
2009	916	871	45	5%	

Notes:
1. Production values based on the City's annual reports to California DWR.
2. Usage values based on water usage information provided by the City.

In the previous sections, existing and future water demands were estimated for the City on an average annual basis. However, water use fluctuates notably according to time of day and with seasonal characteristics such as outdoor temperature and precipitation. For a typical community, seasonal demands are highest in July and August, and lowest in the months of January and February. However, the City is unique with peak water usage occurring during the fall-winter months as a result of Curation's production processes. The three demand conditions used to assess the distribution system were average day demand (ADD), maximum day demand (MDD), and peak hour demand (PHD). Based on updated water usage information from the City for calendar years 2017 to 2020, the estimated existing water demand and associated peaking factors are identified in **Tables 3-6**.

Table 3-6: Existing Demands & Peaking Factors			
Demand Condition	Demand (MGD)	Peaking Factor	Source
Average Day	0.87	-	-
Maximum Day	1.82	2.1	Peaking factor from 2014 WMP
Peak Hour	3.04	3.5	Peaking factor from 2014 WMP

3.4 Future Water Demand

For the 2021 WMP update, it was assumed that population growth within the City would be attributed not only to the development of the Pasadera development, but would also include development of existing vacant lots within the City, as well as the occupation of existing unoccupied residences. Although build-out is assumed to occur within the next 20 years, actual build-out may occur earlier or later, as future decisions by the City may alter the ultimate boundaries, population, and water demands of the City.

To estimate the City's build-out water demand, the General Plan, DJ Farms Specific Plan, and available information for planned residential and commercial projects were used to project future demands. These demands are summarized in **Table 3-7**. A future gross per capita water demand of 120 GPD was assumed for City unoccupied residential and vacant lots. This value is slightly less than the DJ Farms Specific Plan estimates, but provides a projected demand that is conservative compared to existing water usage.

Table 3-7: Future Water Demand			
Source	Population	Per Capita Demand (GPCD)	Average Day Demand (GPD)
Residential Development			
Pasadera Development (475 Remaining Units)	1,900	120	228,000
Escalante Meadows	51	120	6,120
11th and Olivera	22	120	2,640
Unoccupied Residential Dwellings	300	120	36,000
Vacant Developable R-1 Residential Lots	43	120	5,160
Vacant Developable R-2 & R-3 Residential Lots	160	120	19,200
		Residential Development Subtotal	297,120
Commercial Development			
Beachside Cooling Facility (Years 2-10)			14,284
		Future City Demand	311,404
		Existing City Demand	868,270
		Total Future Demand	**1,179,673**

The estimated future water demands and associated peaking factors for buildout are identified in **Tables 3-8**.

Table 3-8: Future Demands & Peaking Factors		
Demand Condition	Demand (MGD)	Peaking Factor
Average Day	1.18	-
Maximum Day	2.48	2.1
Peak Hour	4.13	3.5

4.0 EXISTING WATER SYSTEM OVERVIEW

This section provides an overview of the City's existing supply sources, storage facilities, booster pump stations, and distribution system pipelines.

4.1 Overview

There is one primary pressure zone within the City. Since the topography of the City is relatively flat, the City must rely on either elevated storage or pumping facilities to pressurize the City's water system to an adequate hydraulic grade. Water storage is primarily provided by Obispo Street Tank No. 1 and No. 2 with a total nominal storage of 2.5 MG. The Elevated Tank with total nominal storage of 0.1 MG is currently used only at night to meet nighttime demands and to improve circulation throughout the distribution system. During the nighttime hours, the Obispo Street Booster Pump Station can be called upon to supplement flows from the Elevated Tank. The Bonita Reservoir and booster pump station (total storage of 0.5 MG and an overflow elevation of 108 MSL) is currently offline and is not being used by the City. Detailed descriptions of the City's facilities are provided below.

4.2 Water Production Wells

The City currently operates two groundwater wells drawing from the Santa Maria Valley Groundwater Basin. The City has a current groundwater pumping limitation of 1,300 acre-feet per year for its developed water supply from Twitchell reservoir. The City also has unquantified prescriptive and appropriative groundwater rights. Until a water shortage is identified in the annual hydrogeologic report developed for the Twitchell management authority, the City does not have a defined limit on the amount of groundwater that may be pumped. In addition, as Pasadera develops there is approximately 25 acre feet of Twitchell Yield that will be transferred to the City. The Obispo Street Well, was constructed in 2008 and has a pumping capacity of 1,000 gpm. The second well is located within the Pasadera Development and has a pumping capacity of 1,000 gpm. There is also a dedicated 12-inch transmission pipeline from the Pasadera Well to the Obispo Tank Site. It should be noted that City has utilized several other wells in that past, but that those wells have been decommissioned because of water quality and/or operation issues. They include the 9th Street Well, 242 Obispo Well, 5th Street Well, and Tognazinni Well. **Table 4-1** provides a summary of the existing operating wells.

Table 4-1: Active City Production Wells

Description	Obispo Well	Pasadera Well
Year Installed	2008	2015 well bore, 2020 facility startup
Depth (feet)	750	940
Screened Interval (feet)	NA	570-930 BGS
Pump Horsepower	75	100
Capacity (GPM)	1,000	1000
Pump Head (feet)	NA	280
Standby Power	Yes	Yes
Water Quality Issues	Hardness	-

4.3 State Water Project

Since 1998, State Water Project (SWP) water has been imported into the Santa Maria Valley Groundwater Basin by the Central Coast Water Authority (CCWA) to provide supplemental water to the Oceano Community Service District, City of Pismo Beach, City of Guadalupe, City of Santa Maria, and Golden State Water Company. The City has a "Table A" allocation of 550 AFY, plus a drought buffer of 55 AFY to supplement the City's water supply.[2] Each year, prior to the start of the calendar year, the California Department of Water Resources (DWR) evaluates the availability of water and determines the year's allocation for each recipient. This allocation is adjusted each month as water availability conditions become known.

The long term reliability and allocations of State Water is not guaranteed. Many factors combine to affect SWP water delivery reliability. The primary factors affecting SWP supply availability include the availability of water at the source of supply in northern California, the ability to transport that water from the source to the primary SWP diversion point in the southern Delta, and the total user demand for that water. Typically, the amount of SWP supplied to users is less than their maximum Table A amounts, and can be significantly less in very dry years. **Table 4-2** below summarizes the SWP deliveries to Guadalupe from 2009 to 2020.

Table 4-2: State Water Deliveries to Guadalupe (2009-2020)

Calendar Year	Total Table A Amount (AFY)	Delivery Requested by City (AFY)	Delivery Received (AFY)	% of Table A Amount Delivered (AFY)	% of Requested Delivery (AFY)
2020	605	595	222	37%	37%
2019	605	595	483	80%	81%
2018	605	527	318	53%	60%
2017	605	120	584	97%	487%
2016	605	120	279	46%	233%
2015	605	120	0	0%	0%
2014	605	180	11	2%	6%
2013	605	485	294	49%	61%
2012	605	605	415	69%	69%
2011	605	605	176	29%	29%
2010	605	455	0	0%	0%
2009	605	455	39	6%	9%

Every two years, DWR publishes a reliability study, summarizing the hydrological conditions related to the SWP and estimating short and long-term reliability of the system. In addition, the CCWA has prepared their 2020 Urban Water Management Plan (UWMP) that includes future SWP deliverables to the City based on a long-term average delivery projection, a five year consecutive drought delivery projection of 25% of Table A, and a worst-case delivery projection of 5% of Table A. The SWP projections are presented in **Table 4-3** below.

[2] The Table A allocation represents the theoretical maximum amount of water that can be delivered and is used to determine the proportional share of the SWP the facilities that may be deliverable to project participants

Table 4-3: Future SWP Delivery Projections						
Delivery Projection (AFY)	2020	2025	2030	2035	2040	2045
Long Term Average Projection[1]	356	353	350	347	344	340
Five Year Drought Delivery Estimate (23% - 25% of Table A)[2]	137	140	142	145	148	151
Lowest Allocation on Record Year 2014 (5% of Table A)[3]	30	30	30	30	30	30

Notes:
1. Per Table 4-3 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
2. Per Table 6-5 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
3. Per Table 6-4 of the Central Coast Water Authority final 2020 Urban Water Management Plan.

It should be noted that for year 2021, the City of Guadalupe will only receive 5% of their 605 AFY allotment, which represents 30 AF total for 2021. This reduction in State Water allotment is due in part to continued drought conditions being experienced throughout California. MKN completed the supply and storage analysis (Sections 7 and 8) based on the delivery conditions identified in **Table 4-3** for long-term SWP delivery projections from CCWA,

4.4 Booster Pump Stations (BPS)

Due to the relatively flat topography of the City, there are no opportunities to provide pressure for the City's water distribution system by placing storage tanks on nearby hillsides. Although the City does operate a small elevated storage tank, costs associated with constructing large volumes of elevated storage make constructing additional elevated storage prohibitive. The City therefore relies primarily on the Obispo booster pump station to pressurize and supply water to the distribution system.

4.4.1 Obispo Street Booster Pump Station

The Obispo Street BPS consists of three low flow (booster) pumps and three high flow (fire) pumps, all utilizing variable frequency drives (VFDs). The booster pumps feature a 2+1 configuration (two operational pumps, with one standby). The booster pumps alternate and are used to maintain system pressure and low system demand. The three fire pumps are used to meet all other system demands including fire-flow. Each booster pump has a rated capacity of 500 gpm at the design head of 115 feet and each fire pump has a rated flow of 1,750 gpm at a design head of 115 feet. Based on input from City's Water Operation staff the Obispo Street BPS is regulated by an external pressure gauge to maintain a constant system pressure of no less than 70 psi. **Table 4-4** summarizes detailed information regarding each of the pumps.

Table 4-4: Obispo Booster Pump Station					
Pump	Design Flow (GPM)	Design Head (Ft)	Impeller Diameter (In)	Motor (HP)	Standby Power
Low Flow (Booster) Pump (3) Berkeley B70137 (B3TPM)	500	115	6.25	20 each	Yes
High Flow (Fire) (3) Berkeley B6JPBMS	1,750	115	12.625	75 each	Yes

4.4.2 Bonita Booster Pump Station

The booster pump station at the Bonita Reservoir is currently offline due to condition issues associated with the Bonita Reservoir. Under normal operating conditions, the Bonita Reservoir and BPS were only operated during off-peak hours. The Bonita BPS is currently equipped with two pumps. The existing generator at Bonita is no longer in service and is in need of replacement. In 2011, the City performed an upgrade to the Bonita BPS and replaced the existing pumps with the same pumps installed at the Obispo Street BPS. **Table 4-5** summarizes detailed information regarding each of the pumps.

Table 4-5: Bonita Booster Pump Station

Pump	Design Flow (GPM)	Design Head (Ft)	Impeller Diameter (In)	Motor (HP)	Standby Power
Booster Pump (2) Berkeley B3TPMS	500	115	6.25	20 each	Yes

4.5 Storage

The City has four storage facilities, but currently only utilizes three of the facilities for system storage and pressure. The first is the Obispo Tank No. 1 which receives water from the Obispo Well, and continually receives State Water on a 24-hour basis (when the SWP in online). The second is the Obispo Tank No. 2 and this tank receives water from the Pasadera Well. Both tanks are connected together to maintain a uniform water level between the two tanks. All water entering the distribution system is delivered to the Obispo tanks, which is then pumped into the distribution system through the Obispo Street BPS.

The third facility is the Elevated storage tank. This tank is operated during nighttime (off-peak) hours. The tank floats on the system (fills from the distribution system, through the Obispo Street BPS), and operates based on system pressure and a timer. The tank remains isolated during daytime hours with a solenoid-activated valve.

The fourth facility is the Bonita Reservoir, which is currently offline due to physical deterioration. **Table 4-6** summarizes detailed information regarding each tank.

Table 4-6: Existing Storage Facilities

Tank	Status	Year Installed	Material	Nominal Capacity (gallons)[1]	Diameter (feet)	Operational Height (feet)
Obispo Tank No. 1	Active	2006	Steel	1,790,000	100	30
Obispo Tank No. 2	Active	2018	Steel	730,000	64	30
Elevated Tank	Active	2007	Steel	110,000	30	139
Bonita Reservoir	Offline	1981	Steel	500,000	58	25

Notes:
1. Nominal capacity includes the height of the tank from the floor to the overflow.

4.5.1 Distribution System Control

The Obispo Reservoir level is controlled by telemetry and a level switch to fill the reservoir. When the Obispo Reservoir reaches a low level, the Obispo Well begins pumping to the reservoir where the well water is blended with

State Water, disinfected, and discharged to the distribution system. When the Obispo Reservoir reaches a specified fill level, the well and disinfection system shut off, but State Water continues to fill the reservoir. The elevated storage tank is controlled by system pressure, a timer, and a solenoid-activated valve. The Elevated Tank is allowed to fill and drain during the low demand hours (night). Water is provided to the Elevated tank from the distribution system, which is pressurized by the Obispo Street BPS. When in operation the Bonita Reservoir is controlled by a timer, level switches, and a solenoid-actuated valve. Like the Elevated Tank, the Bonita Reservoir was operated during nighttime hours to minimize storage time of the reservoir and to avoid nitrification and other issues associated with inadequate turnover.

4.6 Distribution and Transmission Pipelines

The existing distribution system contains over 18 miles of water mains ranging from 4-inch to 16-inch in size. The existing water supply, storage and distribution system is shown in **Figure 4-1**. An inventory of the existing water main distribution system by pipe size is summarized in **Table 4-7.**

Table 4-7: Existing Pipeline Inventory by Size

Diameter (Inches)	Length	
	Feet	Miles
4	8,710	1.7
6	22,424	4.2
8	55,522	10.5
12	11,461	2.2
16	372	0.1
Undefined	660	0.1
Total	**99,149**	**18.8**

The existing distribution system is composed of a variety of pipe material and sizes. There is some cast iron pipe still in service that was installed in 1928. It is uncertain how much of the cast iron pipe is lined or unlined. The approximate lineal footage associated with each water main material is summarized in **Table 4-8**.

Table 4-8: Existing Pipeline Inventory by Material

Material	Length	
	Feet	Miles
Asbestos Cement	19,581	3.7
Cast Iron	7,774	1.5
Galvanized	374	0.1
PVC	62,236	11.8
Steel	8,523	1.6
Undefined	660	0.1
Total	**99,149**	**18.8**

With the addition of the Pasadera Development, the City's distribution system will be expanded to include seven miles of pipeline as shown in **Figure 4-2**.

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City of Guadalupe 2021 Water Master Plan Update

Figure 4-1:

Existing Water Distribution System

Legend

- Well (Production)
- Tanks
- 4" or less
- 6"
- 8"
- 16"
- 12"
- City Limits

1 inch:1,000 feet

Elevated Tank
Obispo Well
Pasadera Well
Pasadera Development
TWELFTH ST
PERALTA ST
OLIVERA ST
PACHECO ST
TENTH ST
NINTH ST
PIONEER ST
EIGHTH ST
RUBIO
SIXTH ST
OBISPO ST
ESCALANTE ST
ARTE LN
ELEVENTH ST
ALLEY
FOURTH ST
HOLLY ST
FIR ST
ELM ST
THIRD ST
CEDAR ST
BIRCH ST
SECOND ST
AMBER ST
FLOWER AV
FIFTH ST
GARRETT ST
WONG ST
MARYKNOLL DR
SNOWY PLOVER LN
BLUE HERON LN
MAHONEY LN
CARLIN DR
PAGALING DR
CHAPMAN DR
SANCHEZ DR
HERNANDEZ DR
ALMAGUER ST
PACIFIC DUNES CI
SURFBIRD LN
PACIFIC DUNES WAY
POINT SAL DUNES WAY
CAMP LN
MILLUS LN
JULIA DR
SANDPIPER LN
MAIN ST
CALLE CESAR E CHAVEZ ST
LA PURISIMA ST
SANTA BARBARA ST
PELICAN LN
TOGNAZZINI AV
CAMPODONICO AV
STATE HWY 166
STATE HWY 1
SIMAS ST

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City of Guadalupe 2021 Water Master Plan Update

Figure 4-2:

Future Water Distribution System

Legend

- Well (Production)
- Tanks
- 4" or less
- 6"
- 8"
- 16"
- 12"
- City Limits

1 inch:1,000 feet

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5.0 DESIGN CRITERIA

This section summarizes the criteria that was used as a basis for analyzing the system's adequacy to provide for existing and build-out demands.

5.1 Supply Facilities

Adequacy of the City's water supply was assessed based on the ability of the City's annual allocations to meet existing and future demands. A redundancy assessment was performed to evaluate the ability to meet system demands in the event of a system failure. It is recommended that the City's supply be able to meet MDD under any of the following scenarios: [3]

- ❑ All water supplies intact
- ❑ Reduced and/or no State Water supply
- ❑ The largest groundwater well is out of service

5.2 Storage Facilities

To analyze the adequacy of a system's storage facilities, three criteria are typically considered: fire storage, emergency storage, and equalization (or operational) storage. These are defined in the following sections.

5.2.1 Equalization Storage

Equalization storage (also known as operational storage) is the volume of storage required meet short-term peak daily demands that are in excess of production, ideally without using water maintained for emergency or fire storage. Equalization volume criteria for this report are based on the recommendations found in the AWWA Water Distribution Systems Handbook4 as summarized in the table below:

Table 5-1: Typical Values for Equalization Volume

Type of Operation	Equalization volume needed as a fraction of MDD
Constant pumping	0.10 – 0.25
Follow demand (constant speed)	0.05 – 0.15
Off-peak pumping	0.25 – 0.50
Variable speed pumping	0

The City's current water production operation can be described as "follow demand (constant speed)". The well pumps turns on when Obispo Street tank level drops below a set point. The State Water is delivered at a constant

[3] It is good practice for a water distribution system that relies primarily on groundwater to have capacity to meet at a minimum its MDD with its largest well out of service. (AWWA Water Distribution Systems Handbook, Mays, 2000).

[4] American Water Works Association, 2000, Water Distribution Systems Handbook, Mays.

rate throughout the day. Based on this, a conservative factor of 0.15 from **Table 5-1** was used for equalization storage requirements.

5.2.2 Fire Storage

Fire storage is the volume of storage recommended to meet fire-flow requirements for the duration of the event. Fire flow requirements are set by the City of Guadalupe and are based on land use. The following fire-flow requirements were used as the criteria for this study, based on direction from City staff.

Table 5-2: Fire Flow Requirements

Land Use	Required Flow (gpm)	Duration (hours)
Existing Residential	1,000	1
Existing Commercial	2,500	2
Site Specific Fire Flow Requirements[2]		
Beachside Cooling	1,500	4
Mary Buren School	1,750	3
Kermit McKenzie School	3,750	3
Curation	3,250	3
Minimum Flow with Fire Sprinklers[3]		
New Residential	1,000	1
New Commercial	2,000	2
New Industrial	2,000	2

Notes:
1. Existing fire flows per City's 2014 Water Master Plan.
2. Per 2019 California Fire Code Appendix B, direction by City Engineering Department and Fire Department staff.
3. Based on 2019 California Fire Code Appendix B Tables B105.1(2) and B105.2.

The fire storage requirement for the City should be based on the most stringent requirement, which is the City's requirement for the Kermit McKenzie School. A 3,750 gpm fire-flow rate for a duration of three hours requires a minimum fire storage volume of 675,000 gallons.

5.2.3 Emergency Storage

Emergency storage is the volume of storage recommended to ensure ongoing supply in the event of a water supply emergency. Typically, the emergency storage requirement is calculated by multiplying the population by 50 gallons per day for three days.

5.2.4 Booster Pump Stations

The primary source of system flow and pressure is provided by the Obispo Street BPS. The BPS was simulated in the model as described in Section 4 and the ability to provide flow and pressure was evaluated through the hydraulic model. The fire-flow scenarios represent the greatest requirements for the BPS, which simulate a fire demand during MDD conditions. During future conditions, these demands also include City infill areas and the Pasadera Development. The model scenarios assume up to three fire pumps running.

5.3 Distribution Pipelines

To analyze the adequacy of the distribution pipelines, the following criteria was used:

- ❑ During ADD the system was assessed assuming a maximum allowable flow velocity of 5 fps during ADD and a minimum pressure of 40 psi. Maximum allowable system pressures were limited to 80 psi. Additionally, headloss was limited to 10 ft per 1,000 feet of pipe
- ❑ During MDD+FF conditions, the system was assessed assuming a minimum residual pressure of 20 psi and maximum velocities of 5 fps.
- ❑ During PHD, the system was assessed assuming a maximum allowable flow velocity of 10 fps and a minimum system pressure of 30 psi.

5.4 Criteria Summary

Table 5-3 provides a summary of the design criteria used to determine the system deficiencies and recommended improvement for the WMP update.

Table 5-3: Hydraulic Evaluation

Scenario	Criteria
Maximum Day Demand Factor	2.1 times ADD
Peak Hour Demand Factor	3.5 times ADD
Fire-flow Requirements	Existing Residential: 1,000 GPM Existing Commercial: 2,500 GPM **Site Specific Fire Flow Requirements[1]** Beachside Cooling: 1,500 GPM Mary Buren School: 1,750 GPM Curation: 3,250 GPM Kermit McKenzie School: 3,750 GPM **Minimum Flow with Fire Sprinklers** New Residential: 1,000 GPM New Commercial: 2,000 GPM New Industrial: 2,000 GPM
ADD Minimum Service Pressure	40 psi
MDD Minimum Service Pressure	30 psi
PHD Minimum Service Pressure	30 psi
MDD plus Fire-flow Minimum Residual Pressure	20 psi
ADD Pipeline Velocity	< 5 fps
MDD plus Fire-flow Pipeline Velocity	< 10 fps (< 15 fps near fire demand)
PHD Pipeline Velocity	< 10 fps

Notes:
1. Per 2019 California Fire Code Appendix B, direction by City Engineering Department and Fire Department staff.

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6.0 HYDRAULIC MODEL DEVELOPMENT

The section provides an overview of the existing water system hydraulic model and update for this project.

6.1 Initial Model Development

For the original 2014 WMP, a hydraulic model was prepared using WaterCAD software (by Bentley Systems) to simulate the operation of the water system. WaterCAD incorporates the Hazen-Williams formula as a basis for calculating flow distributions and pressures throughout the water system. MKN updated the existing hydraulic model per atlas map updated provided by City staff and current public improvement plans for the Pasadera Development. **Table 6-1** identifies the Hazen-Williams pipe roughness factors that were applied to the water distribution system within the model.

Table 6-1: Hazen-Williams Pipe Roughness Factors

C-Factor	Material
23	Cast Iron (Installed 1928)
40	Cast Iron (Installed 1929-1960)
60	Cast Iron (Installed 1960-1975)
90	Galvanized Iron
100	Steel
135	Asbestos Cement
130-140	Polyvinyl Chloride

The model was used to evaluate average day, maximum day, peak hour demands, fire protection, water main capacity, and system pressures throughout the community under existing and build-out demand scenarios.

6.1.1 Demand Allocation

In order to apply a demand pattern within the model, water usage account information was provided by the City's water billing system. Each account was assigned to its corresponding Assessor's Parcel Number (APN), water usage was summarized per APN and water demand was assigned to the closest hydraulic model node within a proximity of the parcel. These demands were then adjusted by peaking factors Section 3.3 to develop the necessary modeling scenarios used to conduct the analysis. To model the phased impacts from the Pasadera Development several scenarios were developed to analyze the anticipated project development. During a project meeting (for preparation of the 2014 WMP) with Bethel Engineering, the following scenarios were developed to model the phased construction of the development:

- Pasadera Phase 1: Corresponding to 368 dwelling units at Pasadera Development and the City's existing population
- Pasadera Phase 2: Corresponding to 473 dwelling units at Pasadera Development and the City's existing population

- Pasadera Phase 3: Corresponding to 473 dwelling units at Pasadera Development and the City's future (build-out) population
- Pasadera Phase 4: Corresponding to 802 dwelling units at Pasadera Development and the City's future (build-out) population

The demands for Pasadera were developed assuming four persons per dwelling unit (per Pasadera Specific Plan) and 120 GPCD.

6.1.2 Model Scenarios

The following model simulations were completed as part of the WMP project to evaluate pipeline capacities to serve existing and future demands:

- Existing conditions with 1) existing system; and 2) existing system including capital improvements
  - Average Daily Demand
  - Maximum Day Demand
  - Maximum Day Plus Fire-flow
  - Peak Hour Demand
- Future conditions with 1) existing system; and 2) existing system including capital improvements
  - Average Daily Demand
  - Max Day Demand
  - Max Day Plus Fire-flow
  - Peak Hour Demand

To evaluate MDD plus fire flow conditions, MKN configured an automated system-wide fire flow analysis tool within WaterCAD. All nodes within the model were assigned with a required fire flow based on land use classification (**Table 5-2**). 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-wide pressure remained greater than 20 psi. If the minimum residual pressure was not maintained at a specific node location, WaterCAD identified the available fire flow while maintaining 20 psi residential pressure. This reduction in fire flow was used to identify pipeline deficiencies.

6.1.3 Model Settings

Bonita Tank and BPS were not included in the model simulation because the facility is currently offline. The Elevated Tank was set as "inactive" in the model simulation because scenarios are based on daytime water usage conditions. Based on information provided by the City's water operations staff Elevated Tank is used during the night to meet lower demands conditions. Adequacy of the existing wells and storage facilities to meet existing and future demands are discussed in Sections 7 and 8.

To simulate the flow and pressure characteristics of the Obispo Street BPS, the manufacturer's pump curves for the booster and fire pumps were entered into the model and the pump on/off settings were adjusted for each scenario based on the required demand conditions. The BPS was modeled to maintain 65 psi on the discharge side of the pump station. The pump operation settings from the City's supervisory control and data acquisition (SCADA) system were used to simulate conditions for the pump flow and pressure in the hydraulic model. **Table 6-2** provides an overview of the pump settings from the City's SCADA system.

Table 6-2: Obispo Street BPS Pump Operations

Pump Operation	SCADA Setting	Flow (GPM)
1 Low Flow Pump On	Flow Band A	250 - 400
2 Low Flow Pumps On[5]	Flow Band B	400 - 800
1 High Flow Pump On	Flow Band C	800 - 1,400
2 High Flow Pumps On	Flow Band D	1,400 - 2,800
3 High Flow Pumps On	Flow Band E	2,800 - Max

The Obispo Street BPS was modeled to provide the required fire-flow during all existing and future MDD+FF scenarios for the City and Pasadera Development.

6.1.4 Model Calibration

MKN completed initial model calibration using fire flow testing data acquire for the 2014 WMP. A series of calibration runs were performed to determine how closely the computer model simulated actual field conditions. To accomplish this a series of four hydrant tests were conducted at various locations throughout the City. Static pressure was measured with a pressure gauge at the flowed and residual hydrant before each test. The hydrants were than equipped with a pitot measuring device and fully opened. While flowing, the pitot measurement and residual pressure were simultaneously recorded (taken at the same location as the static pressure). The static and residual pressure results of each test were compared when a similar flow and demand pattern was applied to the model. If the model predicted residual and static pressures within 5 psi, and residual pressures within 10 psi, the model was considered to be in reasonable agreement with field conditions. Overall, the fire flow and model results are within an acceptable range to consider the model to be calibrated.

[5] Obispo Booster Station is a triplex pump system for both the low flow and high flow pumps, however the booster pumps are operated as duplex (2+1) with one pump for backup.

For the 2021 WMP, City staff provided recent hydrant flow test data to test the calibration of the existing hydraulic model. **Table 6-3** summarizes the updated calibration results. The hydrant flow test reports include the following information:

- ❑ Flowed hydrant with identification number and field flow
- ❑ Read hydrant with identification number, static pressure, and residual pressure during field test
- ❑ Hypothetical flow at 20 psi

Table 6-3: Hydrant Tests for Model Calibration

Location	Flow Hydrant		Read Hydrant (Field Results)			Read Hydrant (Model Results)	
	Number	Flow (GPM)	Number	Static (psi)	Residual Pressure (psi)	Static (psi)	Residual Pressure (psi)
South Side Parking Lot McKenzie Jr High	McKenzie	817	65	62	32	67	54
		1,017			20	-	-3
Olivera St/Eleventh St	167	944	172	65	58	65	56
		2,581		-	20	-	-104
Tenth Street/Peralta St	181	944	183	61	58	64	63
		3,880			20	-	-281
1050 Peralta St	183	967	244	65	52	63	61
		2,100			20	-	-38
La Guardia/Gularte Ln	La Guardia/ Gularte Ln	944	189	59	46	55	52
		1,709			20	-	-135

Notes:
1. The flow at 20 psi during field conditions is a theoretical maximum flow based on extrapolating the actual field test data.
2. It was assumed that 2 fire pumps are running during actual field tests and 3 fire pumps are running during the theoretical 20 psi scenario.
3. Hydrant 65 is assumed to be located at the intersection of Highway 1 and West Main St.
4. Hydrant 189 is assumed to be located at the intersection of La Guardia Ln and Gularte Ln.
5. The pressure sustaining valve was assumed to be set at 70 psi.

It should be noted that the hypothetical flow at 20 psi only identities the maximum fire flow at the flowed hydrant based on the characteristics of the hydrant and does not consider negative pressure impacts through the water distribution system. The higher flow rates are not representative of actual fire flow availability. Fire Flow testing results provided by the City are included in Appendix A.

7.0 ABILITY OF SYSTEM TO MEET EXISTING DEMANDS

The section includes an evaluation of the City's existing water supply, storage and distribution system to serve existing demands.

7.1 Sources of Supply

The City's existing water supply consists of two sources – groundwater from the Santa Maria Valley Groundwater Basin and imported water from the Coastal Branch of the State Water Project.

7.1.1 State Water Project Deliveries

As identified in Section 4.3, the long term reliability and allocations of State Water to the City are not guaranteed and have varied greatly depending on drought conditions. **Table 7-1** includes an evaluation of the City's existing water supply sources to serve existing demands. This evaluation includes reduced and no State Water deliveries as described in Section 4.3.

Table 7-1: Water Supply Availability for Existing Demands

SWP Supply (AFY)		Minimum Santa Maria Groundwater Basin Supply, Twitchell Allocation Only (AFY)	Total Supply (AFY)	Average Annual Demand (AFY)	Supply Surplus / (Deficit) (AFY)
Full Table A Allocation	605	1,300	**1,905**	973	**932**
Long Term Average Table A Allocation[1]	340	1,300	**1,640**	973	**667**
25% Table A Allocation[2]	151	1,300	**1,451**	973	**479**
5% Table A Allocation[3]	30	1,300	**1,330**	973	**358**
No Allocation	0	1,300	**1,300**	973	**327**

Notes:
1. Per Table 4-3 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
2. Per Table 6-5 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
3. Per Table 6-4 of the Central Coast Water Authority final 2020 Urban Water Management Plan.

Assuming that the City can pump a minimum of 1,300 AFY from the Santa Maria Valley Groundwater Basin (not including unquantified prescriptive rights), supply allocations appear sufficient to meet existing demands, even with reduced or no State Water deliveries.

7.1.2 Groundwater Production Capacity

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 and provide redundancy is presented in **Table 7-2**. Criteria for redundancy requirements are summarized in Section 5. The assessment evaluates the City's ability to meet existing MDD with any one supply facility out of commission. It is

recommended that the City be able to meet all three criteria. The remaining surplus or deficit is calculated for each criteria scenario.

Table 7-2: Ability of Production Facilities to Meet Existing Demands						
Criteria	Production Capacity (gpm)				Demands (gpm)	Surplus / (Deficit) (gpm)
	State Water Project	GW Supply Obispo St Well	GW Supply Pasadera Well	Total Supply	Existing MDD	
Reduced State Water Supply						
Meet MDD with all supplies (Full SWP Allocation)	375	1,000	1,000	2,375	1,266	1,109
Meet MDD with all supplies (Average Long Term SWP)	211	1,000	1,000	2,211	1,266	945
Meet MDD with all supplies (25% SWP)	94	1,000	1,000	2,094	1,266	828
Meet MDD with all supplies (5% SWP)	19	1,000	1,000	2,019	1,266	753
Meet MDD with all supplies (No SWP)	0	1,000	1,000	2,000	1,266	734
Largest Well Out of Service						
Meet MDD with largest well out of service (Full SWP Allocation)	375	0	1,000	1,375	1,266	109
Meet MDD with largest well out of service (Average Long Term SWP)	211	0	1,000	1,211	1,266	(55)
Meet MDD with largest well out of service (25% SWP)	94	0	1,000	1,094	1,266	(172)
Meet MDD with largest well out of service (5% SWP)	19	0	1,001	1,020	1,266	(246)
Meet MDD with largest well out of service (No SWP)	0	0	1,002	1,002	1,266	(264)

Based on the evaluation completed in **Table 7-2**, the City has sufficient production capacity to serve existing MDD demands with no State Water delivery and both active production wells in service. However, with the recent failure of the Tognazzini Well the City does not have sufficient production redundancy to meet the existing MDD with the Obispo Well or the Pasadera Well offline unless the City received their full State Water Allocation, which is not guaranteed. It is recommended that the City consider the construction of a third production well to provide production redundancy.

7.2 Storage Facilities

The City has three active water storage facilities in operation including the Obispo Tank No. 1, Obispo Street Tank No. 2, and the Elevated Tank. However, the City is evaluating the feasibility of decommissioning the Elevated Tank because of extensive maintenance required to keep the facility in service. A fourth water storage facility, Bonita Reservoir, is currently out of service due to degraded physical condition. The Bonita Reservoir have a total storage volume of 0.50 MG, but was not considered as available storage for the purposes of this assessment. The existing available storage volumes are summarized in **Table 7-3** below and assumes "available volume" to be 10 feet from the bottom of the tanks to the high water level of the tanks.

Table 7-3: Available Storage Volume

Tank	Base Elevation (ft)[1]	Top pf Tank Outlet (ft)[2]	Overflow Elevation (ft)[3]	Nominal Volume (MG)	Available Volume (MG)[4]
Obispo Tank No. 1	91.22	93.22	121.72	1.79	1.20
Obispo Tank No. 2	91.22	93.22	121.72	0.73	0.49
Elevated Tank	-	-	-	0.10	0.10
			Total	**2.62**	1.80

Notes:
1. Elevation based on Obispo Street Water Storage Tank No. 2 and DJ Farms Well plan set dated 2016.
2. Pipe elevation based on Obispo Street Water Storage and Booster Station plan set dated 2004.
3. Elevation based on Obispo Street Water Storage Tank No. 2 and DJ Farms Well plan set dated 2016.
4. For Obispo Tank No. 1 and No. 2 it was assumed that the bottom 10 feet was not usable for available storage as to provide sufficient suction head to operate the pumps in the Obispo BPS.

The storage evaluation to serve existing City demands is summarized in **Table 7-4** below. Definitions and descriptions of the criteria used for the various storage components, fire, emergency, and equalization, are contained in Section 5. According to the Water Distribution System Handbook[6] 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 the purpose of the storage evaluation, it was assumed that the required emergency storage volume of 1.2 MG (50 gpcd x 3 days x 8,081 pp) could be served by one of the City's existing supply wells, which are fitted with emergency generators.

Table 7-4: Storage Evaluation for Existing Demands

Storage Type	Criteria	Storage Volume (Gallons)
Fire Storage	3,750 gpm x 3 hours	675,000
Equalization Storage	0.15 x MDD of 1.82 MGD	273,505
Emergency Storage	50 gpcd x 3 days x 8,081 pp	0 (Served by wells)
	Total Recommended Storage	**948,505**
Total Available Physical Storage		1,796,762
	Existing Surplus/(Deficit)	**848,257**

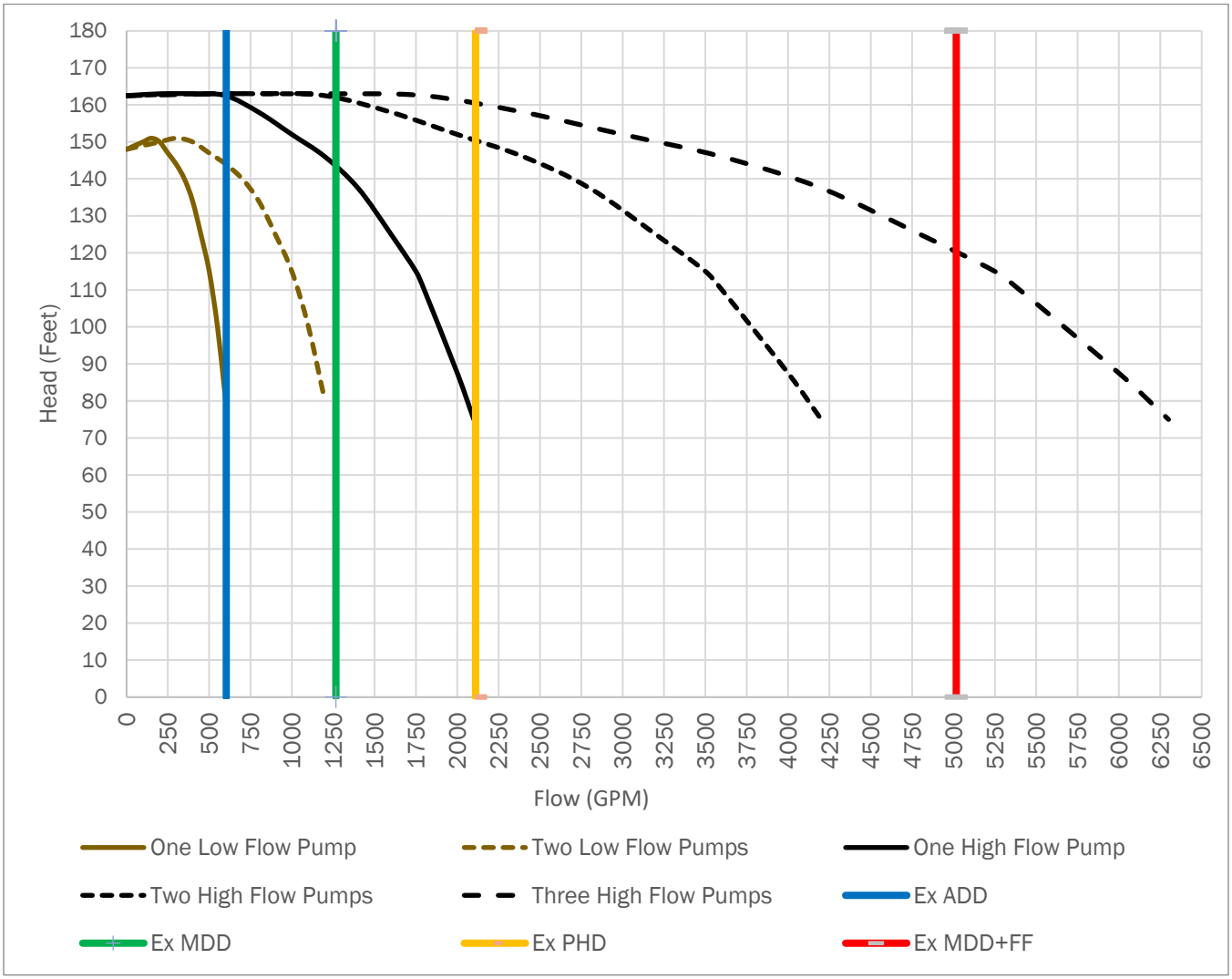
[6] McGraw-Hill Handbooks 2000 Chapter 10 Section 10.6.3.3 Emergency Storage

Based on the available physical storage as identified in **Table 7-4**, the analysis suggests a storage surplus of approximately 0.8 MG based on existing City demand. The City has indicated that they will meet emergency storage requirements through groundwater pumping therefore no additional physical storage is recommended.

7.3 Booster Pump Station

The hydraulic modeling results indicate the existing Obispo Street BPS is sufficient to meet existing ADD, MDD, PHD, and MDD plus FF for the City. The Obispo Street BPS is sufficient to provide the required pressure and flow during future ADD, MDD and PHD conditions. The greatest demand requirement for the Booster Pump Station is realized during fire flow conditions, which is modeled as a fire during MDD conditions. **Figure 7-1** provides an overview of the pumping operations of the Obispo Street BPS to serve existing demands.

Figure 7-1: Obispo Street BPS Pump Performance for Existing Demands



The following observations about the pumping performance of the BPS were concluded based on results of the hydraulic model and **Figure 7-1**:

- Two low flow (booster) pumps could serve existing ADD with a discharge pressure of approximately 61 PSI at the pump station
- One to two high flow (fire) pumps could serve existing MDD with discharge pressures ranging from 61 to 70 PSI at the pump station
- Two to three high flow (fire) pumps could serve existing PHD with discharge pressures ranging from 65 to 70 PSI at the pump station
- Three high flow (fire) pumps could serve existing MDD plus Fire Flow with a discharge pressure of approximately 52 PSI at the pump station

Based on the above-described pump performance, the BPS can provide the minimum system and residual pressures throughout the system.

7.4 Distribution and Transmission Pipelines

The City's existing water distribution system contains over 18 miles of water mains ranging from 4-inch to 16-inch in size and a variety of pipe material and sizes. There is some cast iron pipe still in service that was installed in 1928. It is uncertain how much of the cast iron pipe is lined or unlined. For existing ADD, MDD and PHD conditions, the existing water distribution is sufficient to meet the pressure and flow requirements as defined in Section 5.

The existing demand deficiencies are based largely on the ability of the existing water distribution system to provide the required fire-flow throughout the City during MDD+FF simulations. **Figure 7-2** identifies the required fire flow based on land use (user type) and **Figure 7-3** identifies the available fire flow while maintaining 20 psi residual throughout the distribution system. Improvements were recommended for pipeline segments that could not meet the required fire flow.

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City of Guadalupe 2021 Water Master Plan Update

Figure 7-2:

Required Fire Flow Based on Land Use

Legend

Fire Flow Needed (GPM)

- 1000
- 1750
- 2500
- 3250
- 3750
- Well (Production)
- Tanks
- City Water Mains
- City Limits

1 inch:1,000 feet

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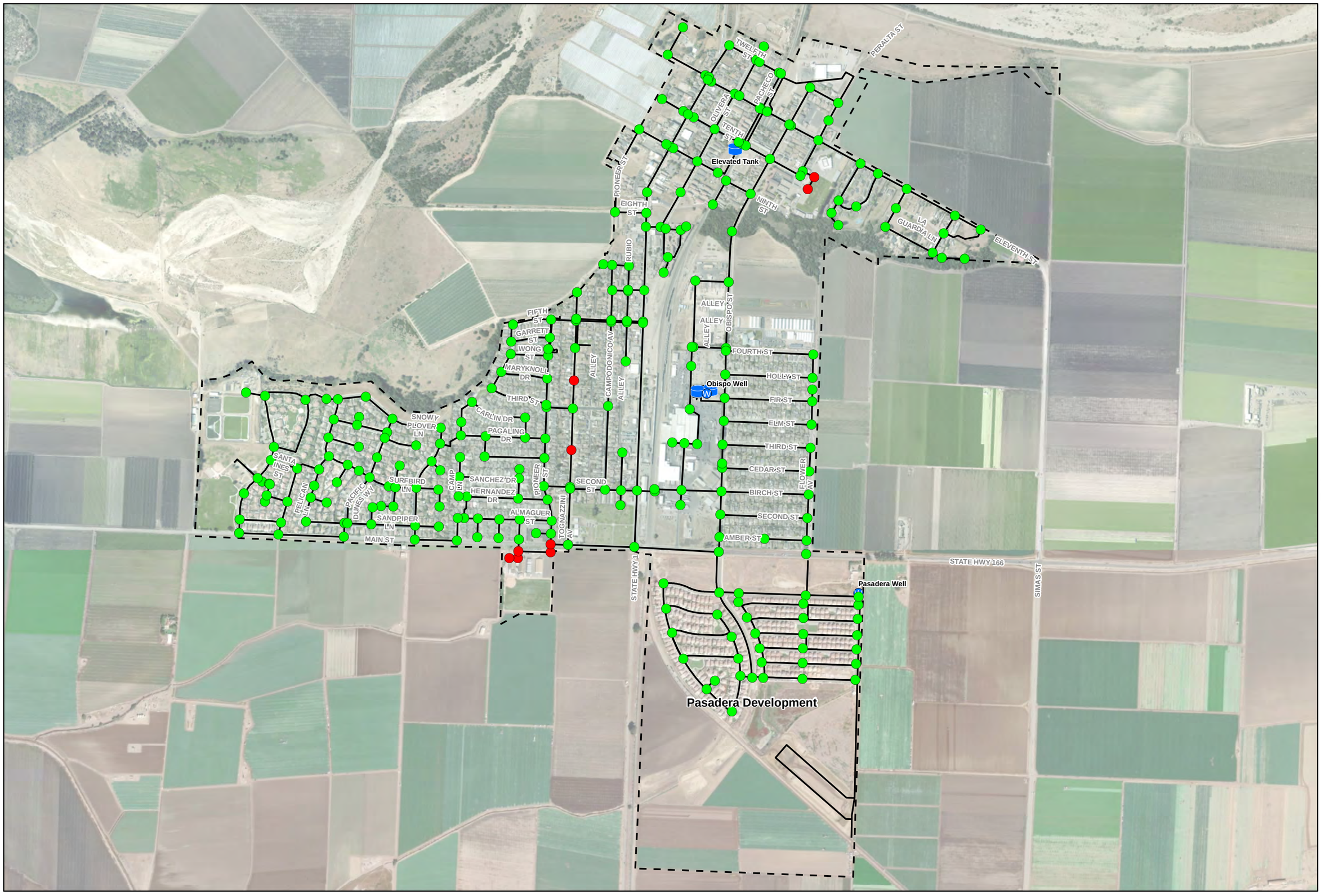

City of Guadalupe 2021 Water Master Plan Update

Figure 7-3:

Fire Flow Availability at 20 PSI Residual Pressure for Existing Demands

Legend

- Meets Minimum Fire Flow & Residual Pressure Requirements
- Does Not Meet Minimum Fire Flow & Residual Pressure Requirements
- Well (Production)
- Tanks
- City Water Mains
- City Limits

1 inch:1,000 feet

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The results of the hydraulic analysis under existing demand conditions, deficient pipelines, and recommended improvements are presented in **Table 7-5**. It should be noted that some of the pipeline projects below will require an increase in ultimate pipe size and/or additional piping to serve future MDD+FF demands.

Table 7-5: Water Distribution System Deficiencies based on Existing Demand

Project Name	Location	Existing Facility	Deficiency	Recommended Upgrade
Kermit Mckenzie Jr School Water Main Upgrade	Along West Main Street from Pioneer Street to Guadalupe Street	1,000 LF of 4-inch steel pipe	Fails 3,750 gpm fire-flow requirement. Model indicates 1,000 gpm available	Install 1,660 LF of 12-inch PVC pipe
	On Kermit Mckenzie Jr School property	660 LF of 8-inch PVC pipe		
Tognazzini Street Water Main Upgrade	Along Tognazzini Street from Second Street to Tognazzini Well	1,630 LF of 6-inch cast iron pipe	Fails 1,000 gpm residential fire-flow requirement	1,630 LF of 8-inch PVC pipe
Mary Buren Elementary School Water Main Upgrade	On Mary Buren Elementary School property	400 LF of 6-inch cast	Fails 1,750 gpm fire-flow requirement. Model indicates 950 gpm available	400 LF of 8-inch PVC pipe

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8.0 ABILITY OF SYSTEM TO MEET FUTURE DEMANDS

The section includes an evaluation of the City's existing water supply, storage and distribution system to serve future demands.

8.1 Sources of Supply

The City's existing water supply consists of two sources – the Santa Maria Valley Groundwater Basin and the State Water imported from the Coastal Branch of the State Water Project.

8.1.1 State Water Project Deliveries

As identified in Section 4.3, the long-term reliability and allocations of State Water to the City are not guaranteed and have varied greatly depending on drought conditions. **Table 8-1** includes an evaluation of the City's existing water supply sources to serve existing demands. This evaluation includes reduced and no State Water deliveries as described in Section 4.3.

Table 8-1: Water Supply Availability for Future Demands

SWP Supply (AFY)		Minimum Santa Maria Groundwater Basin Supply, Twitchell Allocation Only (AFY)	Total Supply (AFY)	Average Annual Demand (AFY)	Supply Surplus / (Deficit) (AFY)
Full Table A Allocation	605	1,325	**1,930**	1,321	**609**
Long Term Average Table A Allocation[1]	340	1,325	**1,665**	1,321	**344**
25% Table A Allocation[2]	151	1,325	**1,476**	1,321	**155**
5% Table A Allocation[3]	30	1,325	**1,355**	1,321	**34**
No Allocation	0	1,325	**1,325**	1,321	**4**

Notes:
1. Per Table 4-3 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
2. Per Table 6-5 of the Central Coast Water Authority final 2020 Urban Water Management Plan.
3. Per Table 6-4 of the Central Coast Water Authority final 2020 Urban Water Management Plan.

Assuming that the City can pump a minimum of 1,300 AFY from the Santa Maria Valley Groundwater Basin, and receives an additional 25 AFY of Twitchell Yield for Pasadera, supply allocations appear sufficient to meet future demands, even with reduced or no State Water deliveries. It should also be noted that City has additional prescriptive and appropriative water rights that could potentially also be made available to serve demands.

8.1.2 Groundwater Production Capacity

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 future demands and provide redundancy is presented in **Table 8-2**. Criteria for redundancy requirements are summarized in Section 5. The assessment evaluates the City's ability to meet future MDD with any one supply facility out of commission. It is

recommended that the City be able to meet all three criteria. The remaining surplus or deficit is calculated for each criteria scenario.

Table 8-2: Ability of Production Facilities to Meet Future Demands						
Criteria	Production Capacity (gpm)				Demands (gpm)	Surplus / (Deficit) (gpm)
	State Water Project	GW Supply Obispo St Well	GW Supply Pasadera Well	Total Supply	Future MDD	
Reduced State Water Supply						
Meet MDD with all supplies (Average Long Term SWP)	375	1,000	1,000	2,375	1,720	655
Meet MDD with all supplies (Average Long Term SWP)	211	1,000	1,000	2,211	1,720	490
Meet MDD with all supplies (25% SWP)	94	1,000	1,000	2,094	1,720	373
Meet MDD with all supplies (5% SWP)	19	1,000	1,000	2,019	1,720	298
Meet MDD with all supplies (No SWP)	0	1,000	1,000	2,000	1,720	280
Largest Well Out of Service						
Meet MDD with largest well out of service (Full SWP Allocation)	375	0	1,000	1,375	1,720	(345)
Meet MDD with largest well out of service (Average Long Term SWP)	211	0	1,000	1,211	1,720	(510)
Meet MDD with largest well out of service (25% SWP)	94	0	1,000	1,094	1,720	(627)
Meet MDD with largest well out of service (5% SWP)	19	0	1,001	1,020	1,720	(701)
Meet MDD with largest well out of service (No SWP)	0	0	1,002	1,002	1,720	(718)

Based on the evaluation completed in **Table 8-2**, the City has sufficient production capacity to serve future MDD demands with no State Water delivery and both active production wells in service. However, the City does not have sufficient production capacity (redundancy) to meet the future MDD with the Obispo Well or the Pasadera Well offline and with/without State Water. It is recommended that the consider the construction of a third production well with a minimum pumping capacity of 800 - 1,000 gpm.

8.2 Storage Facilities

The storage evaluation to serve future City demands is summarized in **Table 8-3** below. Definitions and descriptions of the criteria used for the various storage components, fire, emergency, and equalization, are contained in Section 5.

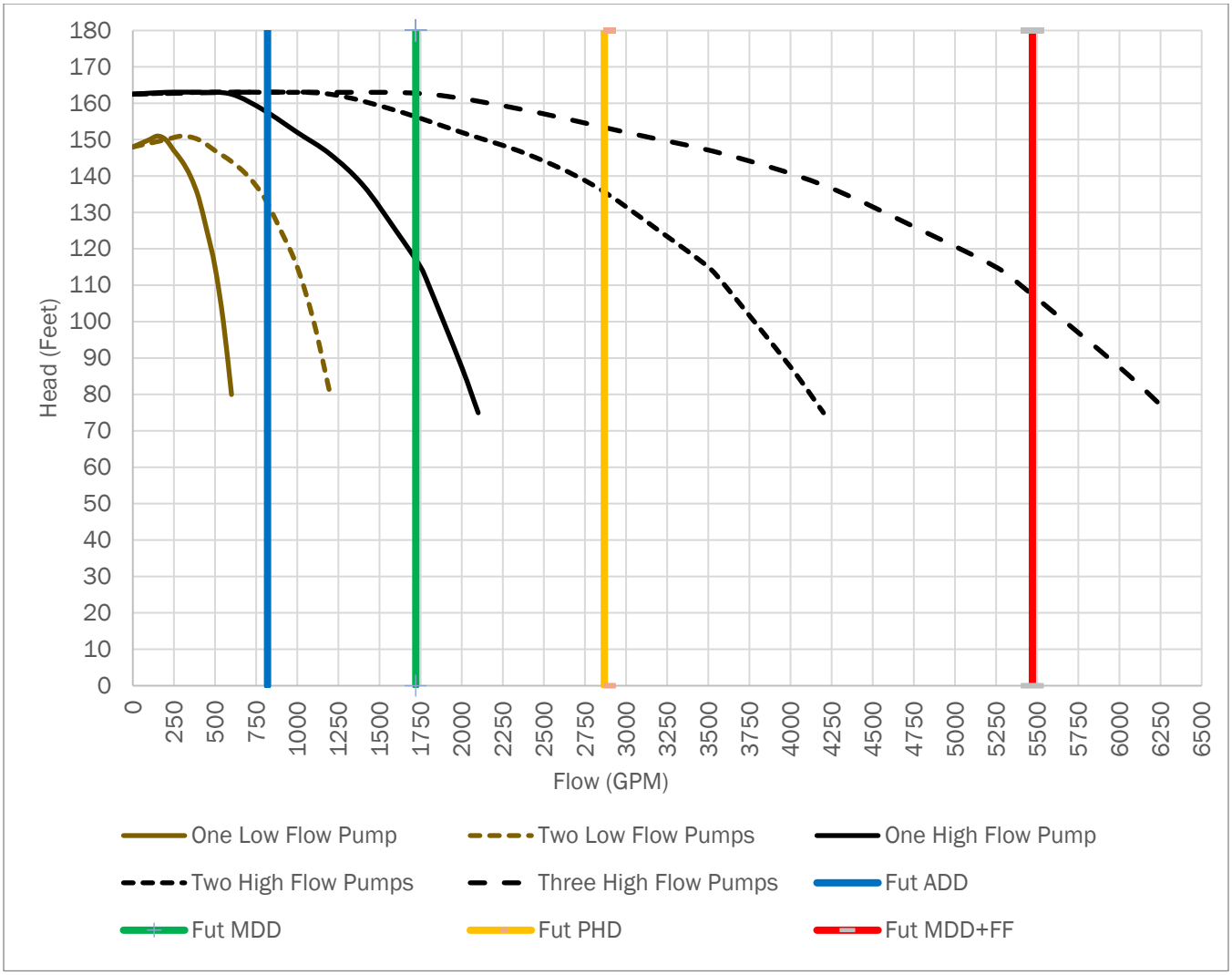
Table 8-3: Storage Evaluation for Future Demands		
Storage Type	Criteria	Storage Volume (Gallons)
Fire Storage	3,750 gpm x 3 hours	675,000
Equalization Storage	0.15 x MDD of 2.48 MGD	371,597
Emergency Storage	50 gpcd x 3 days x 10,556 pp	0 (Served by wells)
	Total Recommended Storage	**1,046,597**
Total Available Physical Storage		1,796,762
	Future Surplus/(Deficit)	**750,165**

Based on the available physical storage as identified in Table 8-3, the analysis suggests a storage surplus of approximately 0.75 MG based on future City demand. The City has indicated that they will meet emergency storage requirements through groundwater pumping therefore no additional physical storage is recommended.

8.3 Booster Pump Station

The hydraulic modeling results indicate the existing Obispo Street BPS is sufficient to meet future ADD, MDD, PHD, and MDD plus FF for the City and future development, including Pasadera. The Obispo Street BPS is sufficient to provide the required pressure and flow during future ADD, MDD and PHD conditions. The greatest demand requirement for the Booster Pump Station is realized during fire flow conditions, which is modeled as a fire during MDD conditions. **Figure 8-1** provides an overview of the pumping operations of the Obispo Street BPS to serve future demands.

Figure 8-1: Obispo Street BPS Pump Performance for Future Demands



The following observations about the pumping performance of the BPS were concluded based on results of the hydraulic model and **Figure 8-1**:

- Two low flow (booster) pumps or one high flow (fire) pump could serve future ADD with a discharge pressure of approximately 56 PSI and 67 PSI respectively at the pump station
- One to two high flow (fire) pumps could serve future MDD with discharge pressures ranging from 52 to 67 PSI at the pump station
- Two to three high flow (fire) pumps would be required to serve future PHD with discharge pressures ranging from 58 to 65 PSI at the pump station
- Three high flow (fire) pumps would be required to serve the existing MDD plus Fire Flow with a discharge pressure of approximately 48 PSI at the pump station. However, pressures below 20 PSI were observed at

Kermit Mckenzie School during a 3,750 gpm fire flow event. In addition, it should be noted that under this condition the three high flow pumps may be operating outside the manufacturer's recommended operating range

It is recommended that the City consider completing a detailed assessment of the pump station to determine the feasibility and requirements to add a fourth pump to serve future demands.

8.4 Distribution and Transmission Pipelines

To analyze impacts to the existing water distribution system with the addition of future water demands the 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 as recommended in **Table 7-5**

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 4. The future demand deficiencies are based largely on the ability of the existing water distribution system to provide the required fire-flow throughout the City during MDD+FF simulations. **Figure 8-2** identifies the available fire flow while maintaining 20 psi residual throughout the distribution system. Improvements were recommended for pipeline segments that could not meet the required fire flow as described in **Table 8-4**.

Table 8-4: Water Distribution System Deficiencies based on Future Demand

Project Name	Location	Existing Facility	Deficiency	Recommended Upgrade
Curation Water Main Extension	Connection between waterline on Curation property to Obispo Street at Third Street	New connection	Fails industrial 3,250 gpm fire-flow requirement	Install 400 LF of 10-inch PVC pipe

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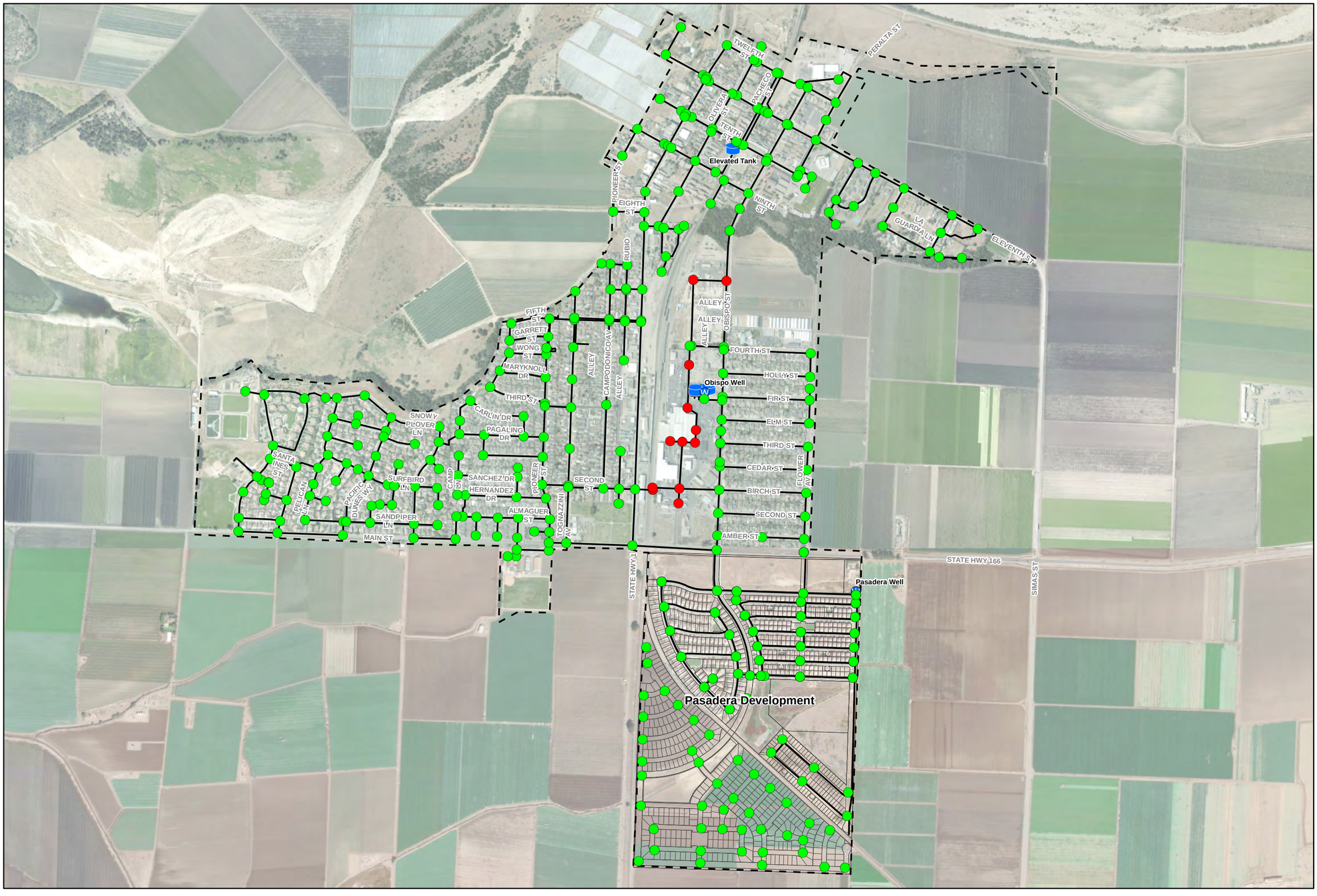

City of Guadalupe 2021 Water Master Plan Update

Figure 8-2:

Fire Flow Availability at 20 PSI Residual Pressure for Future Demands

Legend

- Meets Minimum Fire Flow & Residual Pressure Requirements
- Does Not Meet Minimum Fire Flow & Residual Pressure Requirements
- Well (Production)
- Tanks
- DJ_Farms
- City Water Mains
- City Limits

1 inch:1,000 feet

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9.0 RECOMMENDED IMPROVEMENTS

9.1 Capital Improvements Summary

Table 9-1 provides an overview of the recommended supply, storage, and distribution system improvements to serve existing and future demands.

Table 9-1: WMP Cost Summary

Improvement	Estimated Project Cost
Supply	$1,750,000
Storage	$250,000
Distribution System (Fire Flow Deficiencies)	$1,386,000
Total	**$3,386,000**

In addition, **Table 9-5** provides a recommended 10-Year capital improvement plan for completing the improvements.

9.2 Basis for Opinion of Probable Cost

Cost opinions for recommended project are based on the following assumptions:

Except where other data are available, cost opinions 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 July 2021. Use 20-Cities ENR CCI July 2021 = 12237 to escalate estimated cost to present value
- Engineering, project administration, and construction management were estimated at 30 percent of total construction costs.
- Construction contingency was estimated at 30 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.

The opinions of probable cost prepared by MKN represent our judgment and are supplied for the general guidance of the City. Assumptions have been included 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. Pipeline costs are based on work in existing streets and include excavation, installation, backfill, pavement repair, normal appurtenances, traffic control and connection of existing service to new main. **Table 9-2** contains the unit cost for the water infrastructure improvements recommended as part of this update.

Table 9-2: Construction Cost Criteria		
Item Description	**Unit**	**Unit Cost**
8-inch pipeline	Linear Foot	$140
10-inch pipeline		$150
12-inch pipeline		$200
8-inch isolation valve	Each	$2,800
10-inch isolation valve		$3,900
12-inch isolation valve		$4,400
New Storage	Gallon	$2
Engineering, project administration, and construction management	-	30%
Construction Contingency	-	30%

Notes:
1. Pipeline costs are based on work in existing streets and include excavation, installation, backfill, pavement repair, normal appurtenances, and traffic control.
2. Water main upgrades within distribution system assumed installation of two new isolation valves at point of connections and pavement repair.

9.3 Supply Sources

The City's existing supply facilities include the State Water turnout and two groundwater wells. The City will have sufficient production capacity to meet future demand, however it is recommended that one additional production well and/or supply source with a total capacity of 1,000 gpm be developed in the future to provide production redundancy if either existing well is out of service. Recommended improvements for supply are included in **Table 9-3**.

9.4 Storage Facilities

As identified in Sections 7.2 and 8.2, the City has indicated that they will meet emergency storage requirements through groundwater pumping for existing and future demand conditions, therefore no additional physical storage is recommended. Based on discussions with City staff it is understood that the Elevated Tank is a historic and iconic symbol for the City, but may be taken out of service in the near future. Based on the analysis, the City would have a surplus in storage if the Elevated Tank is abandoned. In addition, since no additional physical storage will be required it is recommended that the Bonita Reservoir and pump station be demolished. Recommended improvements for storage are included in **Table 9-3**.

9.5 Booster Pump Station

Based on the pump performance evaluation completed in Section 8.3, it is recommended that the City consider completing a detailed assessment of the pump station to determine the feasibility and requirements to add a fourth pump to serve future demands. Recommended improvements for pumping are included in **Table 9-4**.

9.6 Distribution and Transmission Pipelines

For the water distribution system, the recommended improvements to address pipeline deficiencies under existing and future Maximum Day Demand plus Fire-flow conditions are shown in **Table 9-4**. It should be noted that several pipelines require additional upgrades to meet future MDD+FF demands and have been sized accordingly. The location of the proposed improvements described above are shown on **Figure 9-1**.

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Table 9-3: Capital Improvements to address Water Supply and Storage Deficiencies

Project	Improvement	Location	Deficiency	Recommended Improvement	Priority	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Contingency Cost ($)	Opinion of Cost ($)
Supply									
WSCIP-1	Well Siting Study	NA	City cannot serve existing/future demands with largest existing supply well offline	Initial study to determine location and capacity of new supply well	System Redundancy	$0	$150,000	$0	$150,000
WSCIP-2	New Supply Well	NA	City cannot serve existing/future demands with largest existing supply well offline	Construction of new supply well with 1000 gpm capacity to service existing and future demands	System Redundancy	$1,000,000	$300,000	$300,000	$1,600,000
								Supply Subtotal	**$1,750,000**
Storage									
STCIP-1	Demolition of Bonita Reservoir and BPS	Pioneer Street at Wong Street	Existing facilities are not in use and future storage is assumed to be constructed at the Obispo Street tank site	Demolition of existing reservoir and BPS	Operational	$250,000	$0	$0	$250,000
								Storage Subtotal	**$250,000**

Notes:
1. Costs rounded to the nearest $1,000.
2. Engineering and Administration costs estimated at 30%.
3. Construction contingency estimated at 30%
4. Construction cost opinions were developed in July 2021. Use 20-Cities ENR CCI July 2021 = 12237 to escalate estimated cost to present value.
5. Bonita Reservoir cost estimate based on cost opinion from Bonita Tank, Booster Pump Station, and Tognazzini Waterline Assessment dated May 2014 and escalated to July 2021 dollars.

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Table 9-4: Capital Improvements to address Fire Flow Deficiencies

Project	Project Name	Location	Existing Facility	Deficiency	Recommended Improvement	Construction Cost ($)	Engineering, Project Administration, and Construction Management ($)	Contingency Cost ($)	Opinion of Cost ($)
WDCIP-1	Kermit Mckenzie Jr School Water Main Upgrade	Along West Main Street from Pioneer Street to Guadalupe Street	1,000 LF of 4-inch steel pipe	Fails school 3,750 gpm fire-flow requirement.	Install 1,660 LF of 12-inch PVC pipe	$350,000	$105,000	$105,000	$560,000
		At Kermit Mckenzie Jr High School	660 LF of 8-inch PVC pipe						
WDCIP-2	Mary Buren Elementary School Water Main Upgrade	On Mary Buren Elementary School property	400 LF of 6-inch cast	Fails 1,500 gpm fire-flow requirement. Model indicates 950 gpm available	Install 400 LF of 8-inch PVC pipe	$138,000	$42,000	$42,000	$222,000
WDCIP-3	Tognazzini Street Water Main Upgrade	Along Tognazzini Street From Second Street to Tognazzini Well	1,630 LF of 6-inch cast iron pipe	Fails residential fire flow requirement	Install 1,630 LF of 8-inch PVC pipe	$240,000	$72,000	$72,000	$384,000
WDCIP-4	Curation Water Main Extension	Connection between waterline on Curation property to Obispo Street at Third Street	New connection	Fails industrial 3,250 gpm fire-flow requirement	Install 400 LF of 10-inch PVC pipe	$106,000	$32,000	$32,000	$170,000
WDCIP-5	Obispo Street Booster Pump Station Assessment	Obispo Street Tank Site	Six pump system	Residual system pressures below 20 PSI during fire flow event at Kermit Mckenzie School and future demands	Complete a detailed assessment of the pump station to determine the feasibility and requirements to add a fourth pump to serve future demands.	TBD	$50,000	$0	$50,000
-	Escalante Water Main Upgrade	Escalante Street	1,600 LF of 4-inch pipe	Substandard pipeline size based on current City design standard	Existing 4-inch water main to be upgraded to 8-inch by others in 2021-2023	$0	$0	$0	$0
								Total	**$1,386,000**

Notes:
1. Costs rounded to the nearest $1,000.
2. Engineering and Administration costs estimated at 30%.
3. Construction contingency estimated at 30%.
4. Construction cost opinions were developed in July 2021. Use 20-Cities ENR CCI July 2021 = 12237 to escalate estimated cost to present value.
5. TBD = To be determined.

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Table 9-5: 5-Year Recommended Capital Improvements Program

Item	Project Name	Opinion of Cost - July 2021	FY 22-23	FY 23-24	FY 24-25	FY 25-26	FY 26-27
Recommended CIP for Supply							
WSCIP-1	Well Siting Study	$ 150,000	$ -	$ -	$ 150,000	$ -	$ -
WSCIP-2	New Supply Well	$ 1,600,000	$ -	$ -	$ -	$ -	$ 1,600,000
	Subtotal	**$ 1,750,000**	**$ -**	**$ -**	**$ 150,000**	**$ -**	**$ 1,600,000**
Recommended CIP for Storage							
STCIP-1	Demolition of Bonita Reservoir and BPS	$ 250,000	$ -	$ -	$ -	$ 250,000	$ -
	Subtotal	**$ 250,000**	**$ -**	**$ -**	**$ -**	**$ 250,000**	**$ -**
Recommended CIP for Distribution							
WDCIP-1	Kermit Mckenzie Jr School Water Main Upgrade	$ 560,000	$ 560,000	$ -	$ -	$ -	$ -
WDCIP-2	Mary Buren Elementary School Water Main Upgrade	$ 222,000	$ -	$ 222,000	$ -	$ -	$ -
WDCIP-3	Tognazzini Street Water MainUpgrade	$ 384,000	$ -		$ 384,000	$ -	$ -
WDCIP-4	Curation Water Main Extension	$ 170,000	$ -	$ -	$ -	$ 170,000	$ -
WDCIP-5	Obispo Street Booster Pump Station Assessment	$ 50,000	$ 50,000	$ -	$ -	$ -	$ -
	Subtotal	**$ 1,386,000**	**$ 610,000**	**$ 222,000**	**$ 384,000**	**$ 170,000**	**$ -**
	TOTAL	**$ 3,386,000**	**$ 610,000**	**$ 222,000**	**$ 534,000**	**$ 420,000**	**$ 1,600,000**

Notes:

1. Costs rounded to the nearest $1,000.
2. All costs shown in July 2021 dollars and no escalation factors are provided.
3. Construction cost opinions were developed in July 2021. Use 20-Cities ENR CCI July 2021 = 12237 to escalate estimated cost to present value.

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City of Guadalupe 2021 Water Master Plan Update

Figure 9-1:

Capital Improvements for Deficiencies Under Existing and Future Conditions

Legend

- WDCIP-1
- WDCIP-2
- WDCIP-3
- WDCIP-4
- Well (Production)
- Tanks
- Distribution System
- City Limits

1 inch:1,000 feet

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Appendix A

City Fire Flow Testing

Hydrant Flow Test Report

Test Date 4/23/2021 **Test Time** 1:45 min

Location

Olivera St / Eleventh St, Guadalupe CA 93434
Hydrant 167

Tested by

Notes

Residual Hydrant #172 (4526 Eleventh St) - S:65, R:58

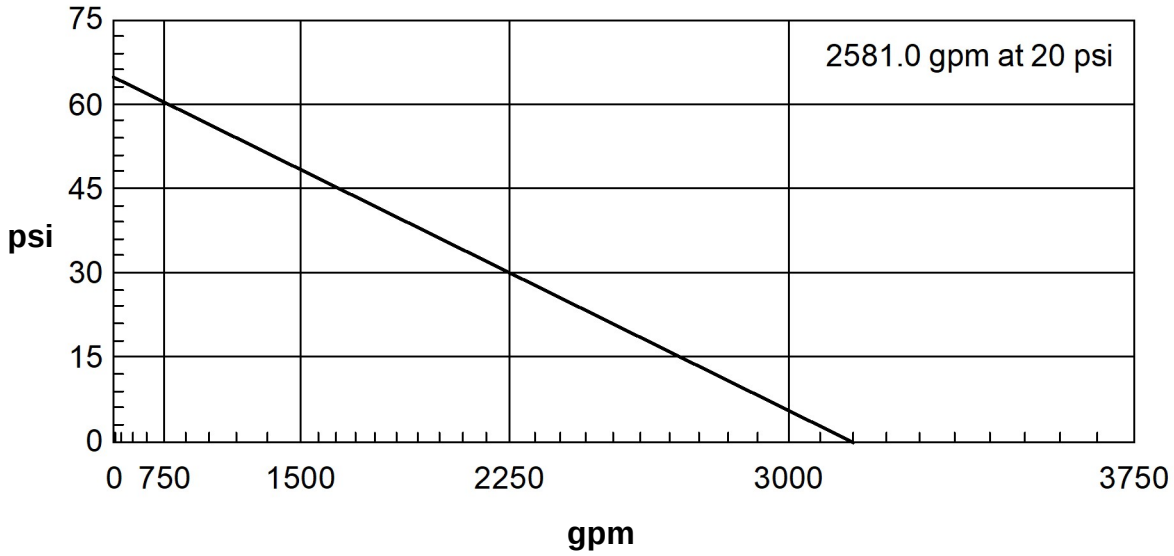
Read Hydrant

65 psi **static pressure**
58 psi **residual pressure**
70 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	2	2.5	0.80	40	944 gpm

Flow Graph



Hydrant Flow Test Report

Test Date 4/23/2021 **Test Time** 1:45 min

Location

Tenth St / Peralta St, Guadalupe CA 93434
Hydrant 181

Tested by

Notes

Residual Hydrant #183 (1050 Peralta St) - S:61, R:58

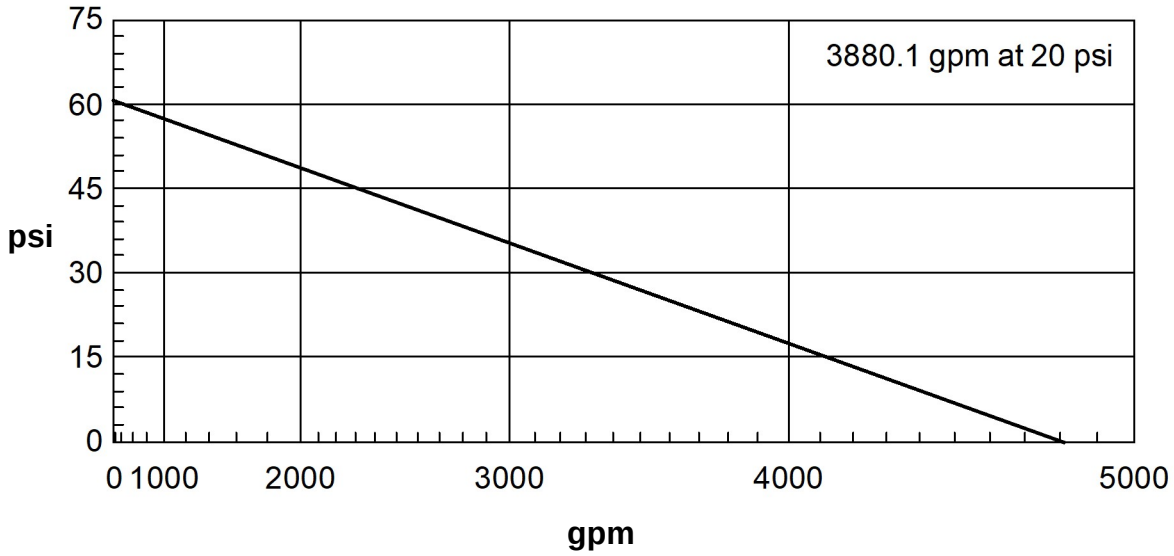
Read Hydrant

61 psi **static pressure**
58 psi **residual pressure**
76 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	2	2.5	0.80	40	944 gpm

Flow Graph



Hydrant Flow Test Report

Test Date 5/23/2021 **Test Time** 1:30

Location

1050 Peralta St, Guadalupe CA 93434
Hydrant 183

Tested by

Notes

Residual Hydrant# 244

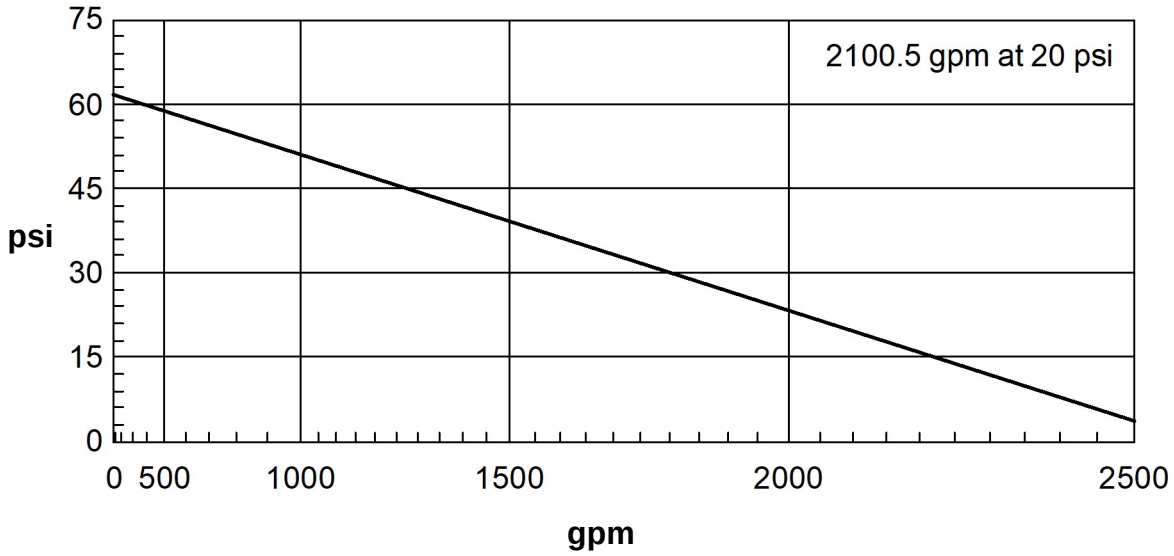
Read Hydrant

62 psi **static pressure**
52 psi **residual pressure**
74 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	2	2.5	0.80	42	967 gpm

Flow Graph



Hydrant Flow Test Report

Test Date 11/17/2018 **Test Time** 16:55

Location

La Guardia / Gularte Ln

Tested by

Patrick Schmitz

Notes

Hydrant 189
Test duration 00:03:05

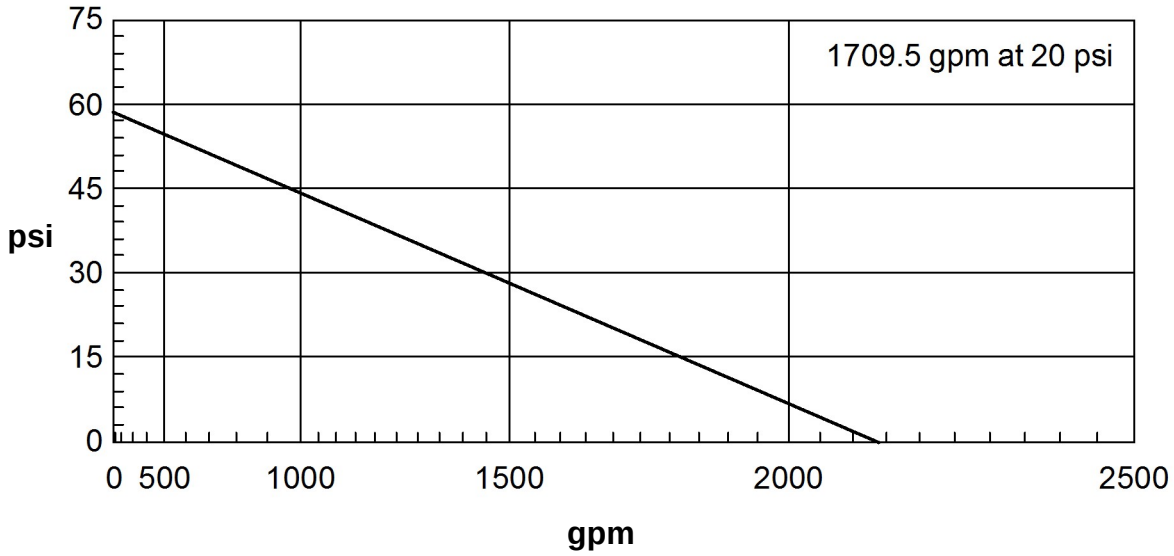
Read Hydrant

59 psi **static pressure**
46 psi **residual pressure**
70 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	2	2.5	0.80	40	944 gpm

Flow Graph



Hydrant Flow Test Report

Test Date 11/17/2018 **Test Time** 16:55

Location

South Side Parking Lot
McKenzie Jr. High

Tested by

Patrick Schmitz

Notes

Hydrant 65
Test duration 00:03:18

Read Hydrant

62 psi **static pressure**
34 psi **residual pressure**
80 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	2	2.5	0.80	30	817 gpm

Flow Graph