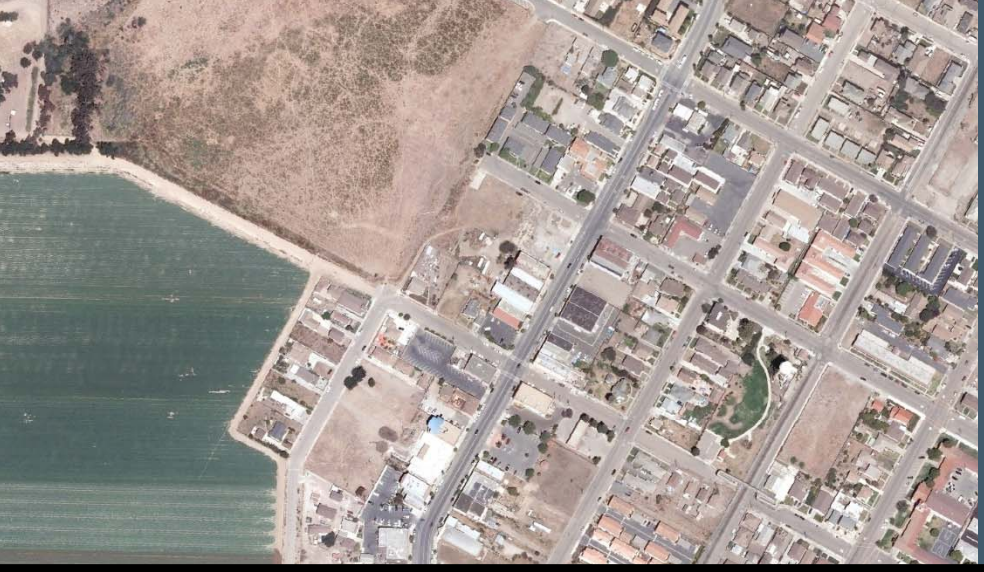

Final May 13, 2014

City of Guadalupe Water Master Plan Update

System Evaluation, Condition Assessment and Capital Improvement Plan

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City of Guadalupe

Final Water Master Plan Update 2014

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Appendix A Fluid Resource Management Fire Hydrant Flow Test Worksheets, October 3, 2013

List of Acronyms

ADD	Average Day Demand
AFY	Acre Feet per Year
APN	Assessor's Parcel Number
AWWA	American Water Works Association
BPS	Booster Pump Station
CCWA	Central Coast Water Authority
CDPH	California Department of Health
CIP(S)	Capital Improvement Project(s)
DWR	Department of Water Resources
EWCIP	Existing Water Capital Improvement Project
FWCIP	Future Water Capital Improvement Project
FRM	Fluid Resource Management
GIS	Geographic Information System
GPCD	Gallons per Capita Day
GPD	Gallons per Day
GPM	Gallons per Minute
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MDD+FF	Maximum Day Demand plus Fire-flow
MG	Million Gallons
MGD	Million Gallons per Day
MKN	Michael K. Nunley & Associates, Inc
MSL	Mean Sea Level
NA	Not Available
PHD	Peak Hour Demand
PSI	Pound per Square Inch
PVC	Poly Vinyl Chloride
SBCAG	Santa Barbara County Association of Governments
SCADA	Supervisory Control and Data Acquisition
SWP	State Water Project
TBD	To Be Determined
TDS	Total Dissolved Solids
TMA	Twitchell Management Authority
WMP	Water Master Plan

EXECUTIVE SUMMARY

Overview

The City of Guadalupe is an incorporated city of 7,080 residents (based on 2010 Census) 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)

Population

According to the 2000 census, the population of Guadalupe was 5,659. The population of the City increased to 7,080 in 2010. This represents a growth rate of approximately 2.3% per annum (2000-2010). The Census also identified 1,810 occupied housing units in the City, representing approximately 3.9 persons per dwelling. By comparison, the City of Santa Maria recorded populations of 77,423 and 99,553 for 2000 and 2010 respectively, representing an annual growth rate of 2.5%. The average dwelling unit occupancy for Santa Maria is approximately 3.7 persons per occupied dwelling.

According to the adopted DJ Farms Specific Plan, growth within the City for the past two decades has been almost entirely associated with new residential development. In the DJ Farms Specific Plan, it was assumed that the City's growth through build-out will be attributed solely to the build-out of DJ Farms, and that an additional 3,208 persons would be associated with the development. In the DJ Farms Specific Plan, City buildout was estimated to be 10,288 persons in the year 2040, representing 1.25% growth per annum. Estimated future populations is shown in **Table ES-1**.

Table ES-1: Buildout Population

Population	Source	Notes	Persons
2010 Population	2010 California Census		7,080
Unoccupied Dwellings	2010 California Census	77 dwellings at 3.9 persons per dwelling	300
DJ Farms	DJ Farms Specific Plan		3,208
Vacant Developable Residential Lots R-1	City Land Use Information	29 dwellings at 3.9 persons per dwelling	113
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	160
		Buildout Population	**10,861**

Significant Planning Changes Since the 2002 Water Master Plan

The following changes since the completion 2002 Water Master Plan have a significant impact on the City's existing and future water supply, storage and distribution facilities and were reviewed as part of this master plan update.

DJ Farms Specific Plan Revision

In August 2012, the City Council adopted the Revised DJ Farms Specific Plan. This Revised Specific Plan establishes land uses and development standards that will govern development of the 209 acre DJ Farms property. The plan

accommodates development of approximately 802 single-family lots in varying sizes and 21.5 acres of commercial land uses that would be phased through the year 2040. The number of residential units to be developed increased from 481 in the 1995 Specific Plan, to 802 units in the 2013 Plan.

Completion of Point Sal Dunes Development

At the time of the 2002 Master plan, the Point Sal Dunes Development was at 70% buildout, with 77 lots undeveloped (177 units developed). There are currently 10 lots undeveloped within Point Sal Dunes Development.

Apio Production Line Expansion

In 2002, the City's biggest water user, Apio (a vegetable processing, washing and packaging facility), consumed an average of 55,000 gallons per day, representing approximately 10% of the total City water sales. It was noted in the 2002 Master Plan that there were plans to double Apio's water demand. The average daily demand (ADD) for the overall Apio facility during calendar year 2012 was 312,010 GPD, representing approximately 36% of the total City 2012 water sales. Apio's production line averages 270,000 GPD. In July 2013 Apio submitted an after-the fact application to the City of Guadalupe's Planning Department for a revision to their Design Review Permit (DRP) approved on May 12, 2009. The 2009 Design Review Permit allowed expansion of existing uses by approximately 56,880 square feet of cold storage space. The requested revision to the 2009 Design Review Permit would allow Apio to utilize approximately 24,000 square feet of the existing onsite cold-storage warehouse space for vegetable processing facilities, hereafter referred to as the Value Added Cooler (VAC). Approximately 12,000 square feet of this VAC line expansion was installed in August 2013 and is currently in operation. It is estimated that the already installed VAC line will increase existing daily water usage by 56,160 GPD with a projected peak/maximum day increase of 122,655 GPD. In addition to the 56,160 GPD originally requested in the revised DRP application submitted last year, Apio recently requested an amendment to the revised DRP application to allow for a second VAC line to be added to the facility at some point in the future. This second VAC line would also consume approximately 56,160 GPD. With the existing VAC, along with two additional VAC lines, the total future water usage is estimated to be 383,000 GPD during average conditions, and a peak day use of 449,000 GPD.

Santa Maria Valley Groundwater Basin Adjudication

In January 2008, the Superior Court of California entered a single judgment, adjudicating the Santa Maria Valley Groundwater Basin. As a result of the adjudication, the City's rights to water from the basin are limited to 1,300 AFY. Prior to this time, the City could pump from the basin on an as-needed basis.

Existing Water System Demands

Based on the City's billing records for calendar years 2009 to 2013, it is estimated that 62 percent of the total water sold is used for residential purposes, approximately 33 percent is used for commercial (with significant usage by Apio) and the remaining 5 percent consisting of public authority, multi-family and irrigation usage. **Table ES-2** summarizes the total historic usage for residential, commercial, and landscape.

Table ES-2: Historical Usage from Billing Information

Calendar Year	Usage (MGD)					
	Residential	Commercial	Public Authority	Multi-family Dwelling	Irrigation	Total
2013	0.509	0.302	0.020	0.006	0.033	0.870
2012	0.541	0.281	0.006	0.005	0.028	0.861
2011	0.504	0.259	0.001	0.005	0.030	0.799
2010	0.499	0.267	0.001	0.005	0.026	0.798
2009	0.481	0.265	0.002	0.005	0.027	0.780

Table ES-3 identifies the existing water demand scenarios and associated peaking factors reviewed as part of this master plan update.

Table ES-3: Existing Demands & Peaking Factors		
Demand Condition	Peaking Factor	Demand (MGD)
Average Day	-	0.84
Maximum Day	2.1	1.77
Peak Hour	3.5	2.95

Future Water System Demands

For the purposes of this Master Plan, it was assumed that population growth within the City would be attributed not only to the development of DJ Farms, but would also include development of existing vacant or underutilized residential lots within the City, as well as the occupation of existing unoccupied residences. Although build-out is estimated to occur in the year 2044, 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. In addition, Apio proposed expansion will contribute to future water demands.

Many pipelines will have sufficient capacity to deliver more water if the need arises, particularly since the sizing of most water mains is largely dictated by fire-flow requirements. There may be instances where new development will result in required hydraulic capacities that exceed the capacity of existing mains. Such cases will need to be analyzed on a case-by-case basis when the developments are proposed to determine if supplemental system improvements are needed. To estimate the City's build-out water demand, the General Plan land use, DJ Farms Specific Plan, and potential future usage from Apio were used to project future demand and is summarized in **Table ES-4**. A future per capita water demand of 120 GPD was assumed for City unoccupied residential and developable 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. Based on the population from 2013 and the ADD estimated from the billing records, the residential per capita demand is 73 GPCD the existing gross per capita average demand is 123 GPCD. It is anticipated that much of the future development will be lower density residential housing.

Table ES-4: Future Water Demand			
Source	**Population**	**Per Capita Demand (GPCD)**	**Average Day Demand (GPD)**
Demand Associated with Future City Infill			
Unoccupied Residential Dwellings	300	120	36,000
Vacant Developable R-1 Residential Lots	113	120	13,560
Vacant Developable R-2 & R-3 Residential Lots	160	120	19,200
		Future City Infill Subtotal	68,760
		Existing City Demand	843,409
		Future City Demand	912,169
		Future Apio Expansion	112,320
Future DJ Farms	3208	135	433,080
		Total Future Demand	**1,457,569**

Table ES-5 identifies the future water demand estimates for the City's water distribution system

Table ES-5: Future Demands & Peaking Factors		
Demand Condition	Peaking Factor	MGD
Average Day	-	1.46
Maximum Day	2.1	3.06
Peak Hour	3.5	5.10

Capital Improvements Summary

The recommended capital improvements were developed to meet the City's existing and future water needs based on assumptions and discussions in this report.

Supply

The City's existing supply facilities include the State Water turnout and one groundwater well. Two additional groundwater wells with a total combined capacity of 2,000 are recommended to meet existing and buildout demands for the City. One well is needed to provide 100% redundancy for the Obispo Street well – to be available in case Obispo Street Well is offline for any reason – and should be installed within the next one to five years. The second well will be needed to provide supply for future demand conditions. It is assumed that one of these wells will be installed with the first phase of the DJ Farms Development.

The City is undertaking a project to utilize the 5th Street and Tognazzini Wells as an emergency supply during drought conditions, and as backup wells to the Obispo Street well. As mentioned in Section 7.2 significant blending or treatment is required for the 5th Street Well to allow it to be used beyond short-term emergency operations. The Tognazzini Well has secondary MCL requirements that can be managed by blending, but does not have sufficient pumping capacity to provide 100% redundancy if the Obispo Street Well was offline. The 5th and Tognazzini Wells can produced 1000 gpm and 385 respectively.

For the DJ Farms development there is a developer's agreement between the City and DJ Farms for DJ Farms to construct either two 600 gpm wells (for total pumping capacity of 1,200 gpm), or a single 1,000 gpm well. The final number of wells to be provided by DJ Farms will be dependent on the quality and capacity of the first water well constructed for the development project. The recommended supply improvements are shown in **Table ES-6** and **Table ES-7.**

Storage and Booster Pump Stations

Obispo Street Reservoir and BPS

For the Obispo Street BPS it is recommended that the operations set points be adjusted to allow pressures at the pump station above 60 psi (up to approximately 70 psi) during fire flow conditions. For the hydraulic modeling effort it was assumed that this CIP would be completed. This CIP resolved fire-flow deficiencies for the downtown commercial area and residential fire-flow in the Point Sal Dunes area. It is recommended that the Obispo Street Reservoir have an interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection.

Bonita Reservoir and BPS

An additional 430,000 gallons of storage is needed to meet the recommended storage requirements for existing conditions. This Master Plan assumes that the Bonita Reservoir may be rehabilitated or replaced, which will add 500,000 gallons to the City's storage facilities. An assessment of the reservoir and booster station will be completed in 2014 to determine if the Bonita Reservoir and associated facilities should be rehabilitated or replaced. The planning level cost in this Master Plan associated to rehabilitate the Bonita BPS consists of utilizing the existing pumps, replacement of the BPS supply line from the tank to the BPS, general repair/maintenance of the existing BPS building, evaluation and repairs of the electrical system, site piping, general site work, and disinfection system. Once the Bonita Reservoir is restored/replaced, it is recommended that the Bonita Reservoir have an interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection.

DJ Farms Reservoir and BPS

In addition to rehabilitation or replacement of the Bonita Tank, an additional 700,000 gallons of storage (minimum) will be required to meet storage requirements for future conditions. It is assumed that this storage will be implemented with the DJ Farms Development. To reduce potential for excess water age (which can lead to nitrification and other water quality issues), it is recommended that two 350,000-gallon tanks be installed in two phases, the first tank with

the Phase 1 of the DJ Farms Development, and the second with Phase 2. Once the DJ Farms tanks are online, it is recommended that the DJ Farms Reservoirs have an interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection. Per the developer's agreement between the City and DJ Farms, the City may require DJ Farms to provide total storage of 1 MG as part of their development project.

For the DJ Farms Development, a booster pump station will be required to draw water from the storage tanks and deliver it to the distribution system. For planning purposes, it is assumed the booster pump station will have similar features as the Obispo Street Booster Pump Station (pumps with variable frequency drives, a building for equipment and controls, and a standby generator). The pump station should be sized to meet the buildout PHD conditions of the DJ Farms Development, with regard to the site, building, piping, and electrical facilities. However, the pumps need to be sized appropriately for initial conditions and adjustable for future phases either by replacement or expansion. It is recommended that the booster pump station be implemented in two phases. The general pump requirements were estimated for the high flow condition (PHD) using the hydraulic model. For fire-flow pumping redundancy, the City may want to require that the DJ Farms BPS have the pumping capability to provide city-wide fire-flow if the Obispo Street reservoir and BPS were offline for any reason. It is assumed that the DJ Farms BPS will be connected with a 12-inch discharge pipeline to the 12-inch transmission main within the development.

Cost opinions were developed for the DJ Farms storage tanks and booster pump station to assist the City with planning, as presented in Section 9.4. The costs for the storage tanks assume welded steel tanks will be constructed. The opinion of cost for the Phase 1 BPS project includes three pumps with VFDs, an 800 SF building, on-site piping, valves, and appurtenances, a standby generator, site work, and electrical and instrumentation. The cost opinion for the Booster Pump Station expansion (Phase 2) assumes replacement of three pumps and VFDs, minor piping improvements, and upgrades to electrical and instrumentation. These cost opinions do not consider site-specific requirements and should be reevaluated and refined with the preliminary design.

It was assumed that the DJ Farms BPS would be designed to provide baseline flows, with Obispo Street BPS providing fire-flows. The hydraulic model indicates that some adjustments to the operations set points are required for the Obispo Street BPS to provide the required fire-flow during existing and future demand conditions. The recommended storage and booster station improvements are shown in **Table ES-6** and **Table ES-7.**

Distribution and Transmission Pipelines

For the water distribution system, the recommended improvements as shown in **Table ES-6** address pipeline deficiencies under existing demand conditions during Maximum Day Demand plus Fire-flow conditions. If these existing pipeline deficiencies are corrected, the DJ Farms Development and future City expansion do not trigger additional CIPs for the water distribution system. The criteria used for the hydraulic analysis is outlined in Sections 5 and 6. The smallest recommended pipe size was 8-inch, per the City's Design Standards. The analysis was completed under the assumption that these CIPs are completed before City buildout.

Table ES-6: Capital Improvements for Existing Demand Deficiencies

Project	Project Name	Location	Existing Facility	Deficiency	Capital Improvement Project (CIP)	Priority	Opinion of Cost ($)
EWCIP-1	Obispo Booster Station Fire Flow Pressure Setting Modification	Obispo Street	Obispo Booster Station	Existing 60 PSI setting limits fire flow capabilities for downtown commercial and Point Sal Dunes areas	Review and revise pressure setting to allow BPS to operate above 60 PSI set point	High	variable
EWCIP-2	Bonita Reservoir Rehabilitation	Pioneer Street at Wong Street	0.5 MGD tank	Existing storage deficit	Rehabilitate existing tank	High	$400,000
	Bonita Pump Station Rehabilitation	Pioneer Street at Wong Street	(2) 500 GPM pumps	Rehabilitation required to disinfect & transfer water from tank to system	Rehabilitate existing booster pump station	High	$250,000
	New Bonita Reservoir	Pioneer Street at Wong Street	0.5 MGD tank	Replace Bonita Tank with new 0.5MG steel tank (same site)	Construct new tank	High	$1,200,000
EWCIP-3	Tognazzini Inter-Tie	Tognazzini to 5th Street	Not Existing - New Facility Recommended	Existing supply redundancy deficit	300 LF of 8-inch PVC pipe and connection to SWP	High	$110,000
EWCIP-4	New Water Supply Well	TBD	Not Existing - New Facility Recommended	Existing supply redundancy deficit	Install new groundwater well, min. 1,200 gpm	High	variable
EWCIP-5	Kermit Mckenzie Jr High School Water Main Upgrade	From Pioneer Street to Guadalupe Street	1,000 LF of 4-inch steel pipe	Fails fire flow requirement. Model indicates 1000 gpm available during MDD+FF conditions	Upgrade to 1,000 LF of 12-inch PVC pipe	High	$380,000
		At Kermit Mckenzie Jr High School	660 LF of 8-inch PVC pipe		Upgrade to 660 LF of 10-inch PVC pipe		
EWCIP-6	Elementary School Water Main Upgrade	Fir Street to 10th Street	470 LF of 6-inch cast iron & 2,490 LF of 8-inch AC pipe	Fails fire flow requirement. Model indicates 950 gpm available during MDD+FF conditions	2,960 LF of 12-inch PVC pipe	High	$910,000
		Obispo Street to Peralta Street	460 LF of 8-inch steel & 340 LF of 6-inch cast iron pipe		800 LF of 10-inch PVC pipe		
EWCIP-7	Tognazzini Street Water Main Upgrade	From Second Street to Bonita Tank	1,630 LF of 6-inch cast iron pipe	Fails residential fire flow requirement	Upgrade to 1,630 LF of 8-inch PVC pipe	Medium	$300,000
EWCIP-8	Escalante Street Water Main Upgrade	Escalante Street at Eleventh Street	1,600 LF of 4-inch cast iron pipe	Fails residential fire flow requirement	Upgrade to 1,600 LF of 8-inch PVC pipe	Medium	$290,000
EWCIP-9	South Obispo Street Industrial Area Water Main Upgrade and Extension	From Fir Street to 3rd Street	500 LF 8-inch AC pipe	Fails industrial fire flow requirement	Upgrade to 500 LF of 10-inch PVC pipe	Medium	$450,000
		At 3rd Street to existing Apio Water Main	300 LF of new water main recommended		Install 300 LF 10-PVC pipe		
		Apio property from Obispo Street to Guadalupe Street	1,500 LF 8-inch AC pipe		Upgrade to 1,500 LF of 10-inch PVC pipe		
EWCIP-10	8th Street Waterline Extension	From 10th Street to 9th Street	500 LF of new water main recommended	Fails commercial fire flow requirement (Dead-end main)	Install 500 LF of 8-inch PVC pipe	Medium	$90,000
EWCIP-11	North Obispo Street Industrial Area Pipe Upgrade*	From 10th Street to 12th Street	960 LF of 4-inch AC pipe	Fails industrial fire flow requirement	960 LF of 10-inch AC pipe	Medium	$190,000

*This project requires that the EWCIP-6 pipeline upgrade is completed

Table ES-7: Capital Improvements for Deficiencies Under Future Conditions							
Project	**Project Name**	**Location**	**Existing Facility**	**Deficiency**	**Capital Improvement Project (CIP)**	**Priority (Development Phase)**	**Cost ($)**
FWCIP-1	DJ Farms Groundwater Supply Well	TBD	NA	Future Supply	Min. 800 gpm well	DJ Phase 1	variable
FWCIP-2	DJ Farms Phase 1 Storage Tank	DJ Farms Development	NA	Future Storage	One 350,000 gallon Storage Tank	DJ Phase 1	$760,000
FWCIP-3	DJ Farms Booster Pump Station	DJ Farms Development	NA	Future Pressure and Flow Demands	Booster Pump Station (Facilities sized for buildout)	DJ Phase 1	$600,000
FWCIP-4	DJ Farms Phase 2 Storage Tank	DJ Farms Development	NA	Future Storage	Second 350,000 gallon Storage Tank	DJ Phase 2	$760,000
FWCIP-5	DJ Farms Booster Pump Station Expansion	DJ Farms Development	NA	Future Pressure and Flow Demands	Replace pumps and VFDs	DJ Phase 2	$180,000

SECTION 1 INTRODUCTION

1.1 Purpose and Scope

The planning horizon for the Water Master Plan (WMP) is the City of Guadalupe's (City) build-out population estimate of 10,861 residents estimated to occur in the year 2044. The purpose of this study is to identify improvements to the water production and distribution systems necessary to meet existing and projected demands, and to develop a water facilities improvement program to assist the City in long term planning and budgeting. A summary of the tasks undertaken to accomplish this are provided below:

Data Collection and Review

Water data collected included consumption and production records, existing and build-out land use information, citywide topographic information, existing and projected population estimates, prior planning documents, water quality data pertaining to State Water and the City's well sites, and water system infrastructure information such as:

- Pump curves and settings for City well and booster pumps;
- Well production and delivery information;
- Flow meter data
- State Water delivery records;
- Pipe, valve, and hydrant information;
- Control valve settings;
- Reservoir data including ground elevation, overflow height, and active volume;
- Hydrant flow test data;
- Updated water atlas and record drawing information; and
- Summertime demand diurnals

Water Demand

Existing Average Day Demand (ADD) was determined using historic billing records from 2011 to 2013. Existing Maximum Day Demand (MDD) was determined via production records provided by City staff and was characterized as the average MDD between 2011 and 2012. Build-out ADD was estimated using updated per capita demand factors within the City limits (excluding DJ Farms), Apio planned expansion, and the DJ Farms Development.

Design Criteria

Maximum day and peak hour peaking factors for the system were estimated using the 2002 Water Master Plan and published planning information. The peaking factors used were found to be consistent with other communities on the Central Coast. System fire-flow, storage capacity, flow capabilities, and flow velocities were estimated using a hydraulic model and were utilized as governing criteria for distribution system improvement recommendations.

Updated Hydraulic Model of Distribution System

As the basis of the hydraulic model update, a Geographic Information System (GIS) database and mapping was developed for the existing City water distribution system. Pipe characteristics, facility elevations and water demands were developed in the GIS database and imported into the hydraulic model. Bentley's WaterCAD V8i hydraulic

modeling software was used to simulate the operation of the water production and distribution system. The hydraulic model was calibrated using results of fire hydrant flow tests performed by Fluid Resources Management (FRM).

Improvements and Recommendations

The hydraulic and storage analyses were performed to analyze the adequacy of existing distribution piping and water storage structures under existing and future demand scenarios. Upgrades were recommended based on identified deficiencies.

Capital Improvement Program Cost and Prioritization

The capital improvement program has two objectives: (1) to identify improvements necessary to correct hydraulic deficiencies in the existing system, and (2) to identify improvements necessary to meet the demands of new development. Planning-level cost opinions and prioritizations for these facilities are also provided.

1.2 Significant Planning Changes Since the 2002 Water Master Plan

The following changes since the completion 2002 Water Master Plan have a significant impact on the City's existing and future water supply, storage and distribution facilities and were reviewed as part of this master plan update.

DJ Farms Specific Plan Revision

In August 2012, the City Council adopted the Revised DJ Farms Specific Plan. This Revised Specific Plan establishes land uses and development standards that will govern development of the 209 acre DJ Farms property. The plan accommodates development of approximately 802 single-family lots in varying sizes and 21.5 acres of commercial land uses that would be phased through the year 2040. The number of residential units to be developed increased from 481 in the 1995 Specific Plan, to 802 units in the 2013 Plan.

Completion of Point Sal Dunes Development

At the time of the 2002 Master plan, the Point Sal Dunes Development was at 70% buildout, with 77 lots undeveloped (177 units developed). There are currently 10 lots undeveloped within Point Sal Dunes Development.

Apio Production Line Expansion

In 2002, the City's biggest water user, Apio (a vegetable processing, washing and packaging facility), consumed an average of 55,000 gallons per day, representing approximately 10% of the total City water sales. It was noted in the 2002 Master Plan that there were plans to double Apio's water demand. The average daily demand (ADD) for the overall Apio facility during calendar year 2012 was 312,010 GPD, representing approximately 36% of the total City 2012 water sales. Apio's production line averages 270,000 GPD. In July 2013 Apio submitted an after-the fact application to the City of Guadalupe's Planning Department for a revision to their Design Review Permit (DRP) approved on May 12, 2009. The 2009 Design Review Permit allowed expansion of existing uses by approximately 56,880 square feet of cold storage space. The requested revision to the 2009 Design Review Permit would allow Apio to utilize approximately 24,000 square feet of the existing onsite cold-storage warehouse space for vegetable processing facilities, hereafter referred to as the Value Added Cooler (VAC). Approximately 12,000 square feet of this VAC line expansion was installed in August 2013 and is currently in operation. It is estimated that the already installed VAC line will increase existing daily water usage by 56,160 GPD with a projected peak/maximum day increase of 122,655 GPD. In addition to the 56,160 GPD originally requested in the revised DRP application submitted last year, Apio recently requested an amendment to the revised DRP application to allow for a second VAC line to be added to the facility at some point in the future. This second VAC line would also consume approximately 56,160 GPD. With the existing VAC, along with two additional VAC lines, the total future water usage is estimated to be 383,000 GPD during average conditions, and a peak day use of 449,000 GPD.

Santa Maria Valley Groundwater Basin Adjudication

In January 2008, the Superior Court of California entered a single judgment, adjudicating the Santa Maria Valley Groundwater Basin. As a result of the adjudication, the City's rights to water from the basin are limited to 1,300 AFY. Prior to this time, the City could pump from the basin on an as-needed basis.

SECTION 2 POPULATION AND LAND USE

2.1 General

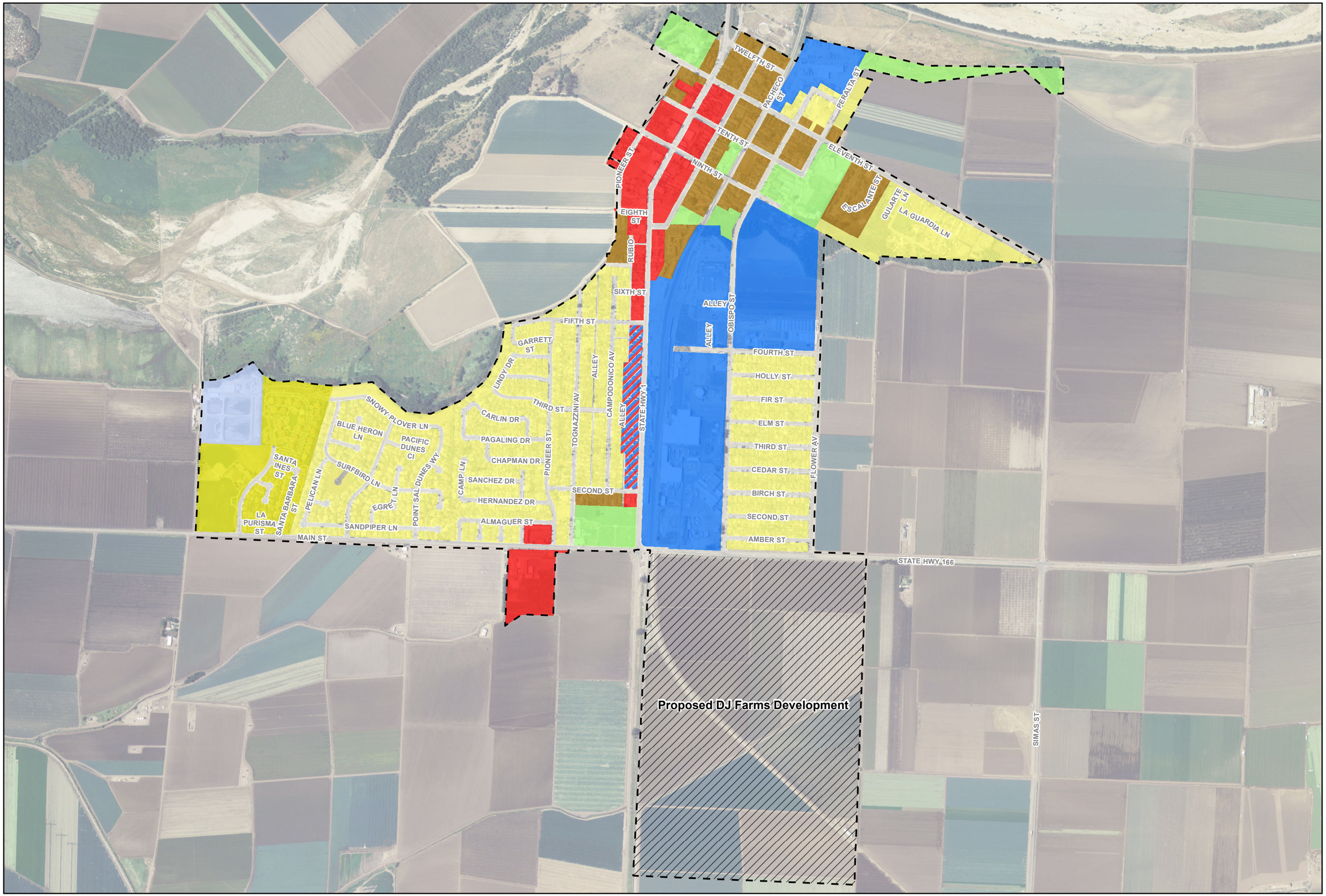
The City of Guadalupe is an incorporated city of 7,080 residents (based on 2010 Census) and located in northern Santa Barbara County, approximately four miles inland from the Pacific Ocean along the scenic coastal Highway 1. The City is approximately 1.4 square miles and is situated in the heart of the 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 Population

According to the 2000 census, the population of Guadalupe was 5,659. The population of the City increased to 7,080 in 2010. This represents a growth rate of approximately 2.3% per annum (2000-2010). The Census also identified 1,810 occupied housing units in the City, representing approximately 3.9 persons per dwelling. By comparison, the City of Santa Maria recorded populations of 77,423 and 99,553 for 2000 and 2010 respectively, representing an annual growth rate of 2.5%. The average dwelling unit occupancy for Santa Maria is approximately 3.7 persons per occupied dwelling. **Table 2-1** provides an overview of the existing zoning within the City, excluding the DJ Farms Development.

Table 2-1: Existing Zoning for City

Zoning	Description	Parcels	Acres
G-C	General Commercial	129	41.7
G-I	General industrial	55	120.5
M-C	Industrial Commercial	21	8.2
O	Open Space	19	39.3
PF-CZ	Public Facilities - Coastal Zone	1	13.4
R/N-SP-CZ	Neighborhood Residential - Specific Plan - Coastal Zone	52	37.6
R-1	Single Family Residential (low density)	548	104.6
R-1-M	Single Family Residential (Medium Density)	396	45.5
R-1-SP	Single Family Residential - Specific Plan	257	47.6
R-2	Multiple Family Residential (Medium Density)	44	18.7
R-3	Multiple Family Residential (High Density)	200	28.8
	DJ Farms Development	2	209.0
	Total	**1,726**	**715**



City of Guadalupe Water Master Plan Update

Figure 2-1:

Existing City Zoning

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
- DJ Farms

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.

According to the adopted DJ Farms Specific Plan, growth within the City for the past two decades has been almost entirely associated with new residential development. In the DJ Farms Specific Plan, it was assumed that the City's growth through build-out will be attributed solely to the build-out of DJ Farms, and that an additional 3,208 persons would be associated with the development. **Table 2-2** identifies the proposed zoning planned for the DJ Farms Development.

Table 2-2: DJ Farms Development Proposed Zoning

Zoning	Description	Parcels	Acres
C-N	Neighborhood Commercial	3	14.6
C-S	Service Commercial		6.9
PF	Public Facilities	4	13.1
R-1-3000	Residential Small Lot	322	44.6
R-1-5000	Medium Density Residential	357	71.4
R-1-6000	Low Density Residential	108	25.4
R-1-7000	Very Low Density Residential	15	4.6
REC	Recreation	16	15.9
SCHOOL	School Site	1	12.5
	Total	**826**	**209.0**

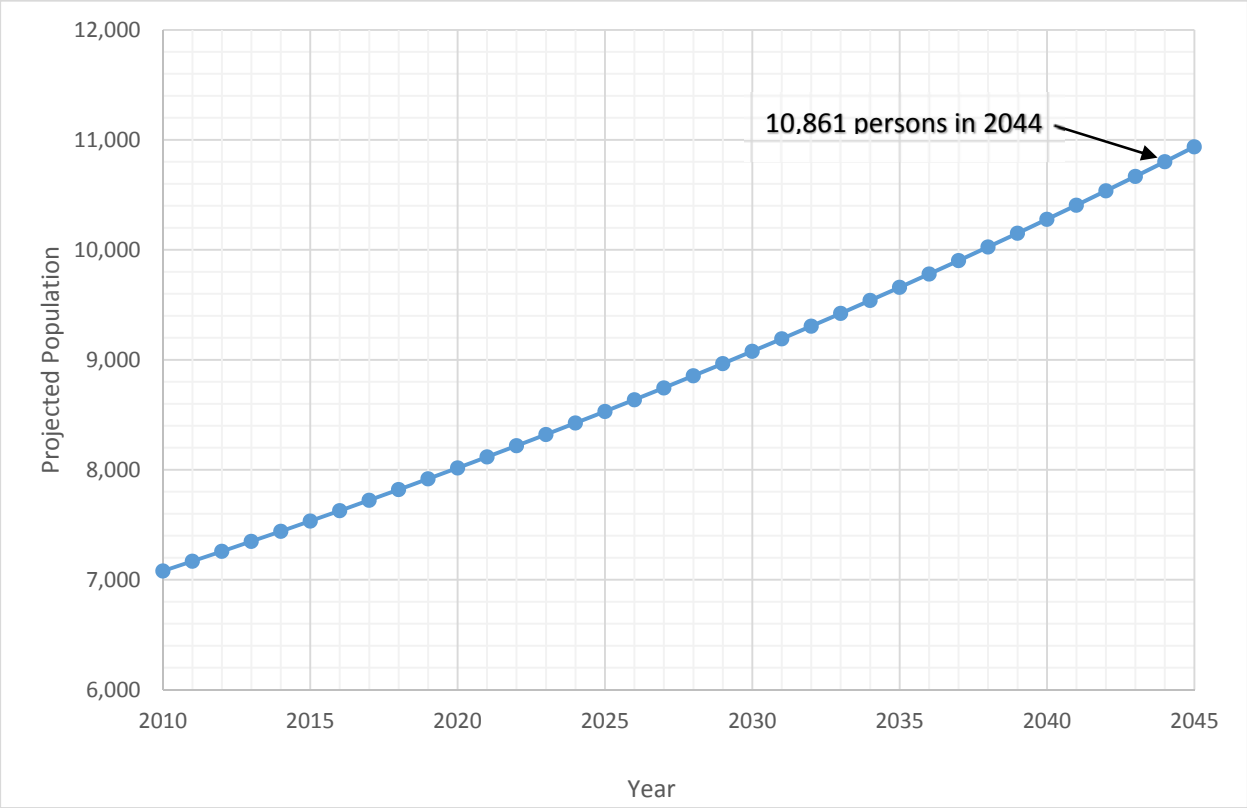
In the DJ Farms Specific Plan, City buildout was estimated to be 10,288 persons in the year 2040, representing 1.25% growth per annum. For the purposes of this Master Plan, it was assumed that population growth within the City would be attributed not only to the development of DJ Farms, but would also include development of existing vacant or underutilized residential lots within the City, and the occupation of existing unoccupied residences. Using this approach, the buildout population of Guadalupe was estimated to be 10,861 persons as presented in **Table 2-3**.

Table 2-3: Buildout Population

Population	Source	Notes	Persons
2010 Population	2010 California Census		7,080
Unoccupied Dwellings	2010 California Census	77 dwellings at 3.9 persons per dwelling	300
DJ Farms	DJ Farms Specific Plan		3,208
Vacant Developable Residential Lots R-1	City Land Use Information	29 dwellings at 3.9 persons per dwelling	113
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	160
		Buildout Population	**10,861**

Using the 1.25% per annum growth rate stated in the DJ Farms Master Plan (1.25%), a buildout population estimate of 10,861 would occur in the year 2044. This assumed growth rate is also consistent with other planning documents such as the Santa Barbara County Association of Governments (SBCAG) 2010-2040 Regional Growth Forecast (1.06%), and the 2002 Guadalupe Water Master Plan (1.9%). **Figure 2-2** below shows the anticipated growth projection to build-out using 1.25% growth per annum.

Figure 2-2: City of Guadalupe Projected Population Growth (i=1.25% per annum)



2.3 Existing Distribution System

The City's water system is composed of a State Water turnout, one active groundwater well (Obispo Street Well), two standby wells (5th Street and Tognazzini 2A), one active BPS (Obispo Street), one offline BPS (Bonita), and two active reservoirs: 1.6 MG Obispo Street Reservoir and the 0.1 MG Elevated Storage Tank for total existing system storage of 1.7 MG, and one offline reservoir: 0.5 MG Bonita Reservoir. The distribution system is composed of roughly 19 miles of water pipe ranging in size from 2-inch to 16-inch, serving approximately 1,785 residential, 97 commercial, 5 public facilities, and 24 irrigation customers within the City of Guadalupe.

Planned Changes to the Distribution System

With the addition of the DJ Farms Development, the City's water supply, storage and distribution facilities will be expanded to include new well(s), water storage tank(s) with a BPS facility, seven miles of 6-inch, 8-inch and 12-inch water mains, and associated appurtenances.

2.4 Water Sources

The City of Guadalupe utilizes two water supply sources; the Santa Maria Valley Groundwater Basin, and the State Water Project.

Groundwater

The City groundwater wells draw from the Santa Maria Valley Groundwater Basin. In 1997, the Santa Maria Valley Water Conservation District filed a lawsuit to adjudicate water rights in the Basin. The matter was tried in five phases. Basin boundaries were adjudicated in phases I and II. Phase III explored the question of whether the Basin was in overdraft. Phases IV and V dealt with issues of prescriptive rights, quiet title claims, and a physical solution.

After the Phase 3 Decision, the majority of the parties negotiated a Stipulation that specified terms and conditions for management of the Basin. The Stipulation provides the City with certain Basin water rights, and establishes defined

water shortage response measures in anticipation of reduce availability of groundwater. The Stipulation called for the creation of the Twitchell Management Authority (TMA), the members of which are the District, Santa Maria, Golden State Water Company, Guadalupe, and stipulating landowners located within District boundaries. The Stipulation specifies that, on average, the Twitchell project adds 32,000 acre-feet per year to the Basin. The Stipulation refers to this volume as the "Twitchell Yield" and allocates 100 percent of the Twitchell Yield to the TMA members. Santa Maria, Golden State Water Company, and Guadalupe are allocated 80 percent and the stipulating landowners 20 percent.

The trial court entered a single judgment on January 25, 2008, incorporating the Stipulation. Ultimately, the City of Guadalupe was allocated 1,300 AFY from the basin.

State Water

Since 1998 the City has imported water from the State Water Project (SWP) via the Coastal Branch of the SWP. Completed in 1997, the Coastal Branch Aqueduct extends from Kettleman City in Kings County to Vandenberg Air Force Base in Santa Barbara County and was constructed in two phases. It consists of 143 miles of pipeline, five 7.5 megawatt capacity pumping plants, a state-of-the-art water treatment plant, four water storage tanks, and the 42-mile long Central Coast Water Authority (CCWA) pipeline from Vandenberg Air Force Base to Lake Cachuma. (DWR Brochure, 2012).

SECTION 3 EXISTING AND PROJECTED WATER DEMAND

3.1 Historic Demand

Based on the City's billing records for calendar years 2009 to 2013, it is estimated that 62 percent of the total water sold is used for residential purposes, approximately 33 percent is used for commercial (with significant usage by Apio) and the remaining 5 percent consisting of public authority, multi-family and irrigation usage. **Table 3-1** summarizes the total historic usage for residential, commercial, and landscape.

Table 3-1: Historical Usage from Billing Information

Calendar Year	Usage (MGD)					
	Residential	Commercial	Public Authority	Multi-family Dwelling	Irrigation	Total
2013	0.509	0.302	0.020	0.006	0.033	0.870
2012	0.541	0.281	0.006	0.005	0.028	0.861
2011	0.504	0.259	0.001	0.005	0.030	0.799
2010	0.499	0.267	0.001	0.005	0.026	0.798
2009	0.481	0.265	0.002	0.005	0.027	0.780

Table 3-2 below provides an overview of the historical per capita water usage for the City from 2009-2013.

Table 3-2: Historical Per Capita Water Usage*

Calendar Year	Population*	Residential Per Capita Water Use (GPD/Person)	Gross Per Capita Water Use (GPD/Person)
2013	7080	73	123
2012	7080	77	122
2011	7080	72	113
2010	7080	71	113
2009	6613	73	118

*As reported in the City of Guadalupe's annual California DWR reports.

3.2 Existing Demand

For estimating existing Average Day Demand (ADD), both production information and customer billing records were reviewed. Production data was limited to the last two years. Customer billing records were provided for the past five years from the City's Finance Department. The billing information was used to estimate water usage and assign demands throughout the City, as it was considered to most accurately depict the City's water usage. The last three full billing years were selected and averaged to determine the estimated 2014 WMP ADD as shown in **Table 3-3**.

Table 3-3: 2014 WMP Existing Average Day Demand

Calendar Year	Usage (MGD)					
	Residential	Commercial	Public Authority	Multi-family Dwelling	Irrigation	Total
2013	0.509	0.302	0.020	0.006	0.033	0.870
2012	0.541	0.281	0.006	0.005	0.028	0.861
2011	0.504	0.259	0.001	0.005	0.030	0.799
					3-Year Average	**0.843**

3.3 Future Demand

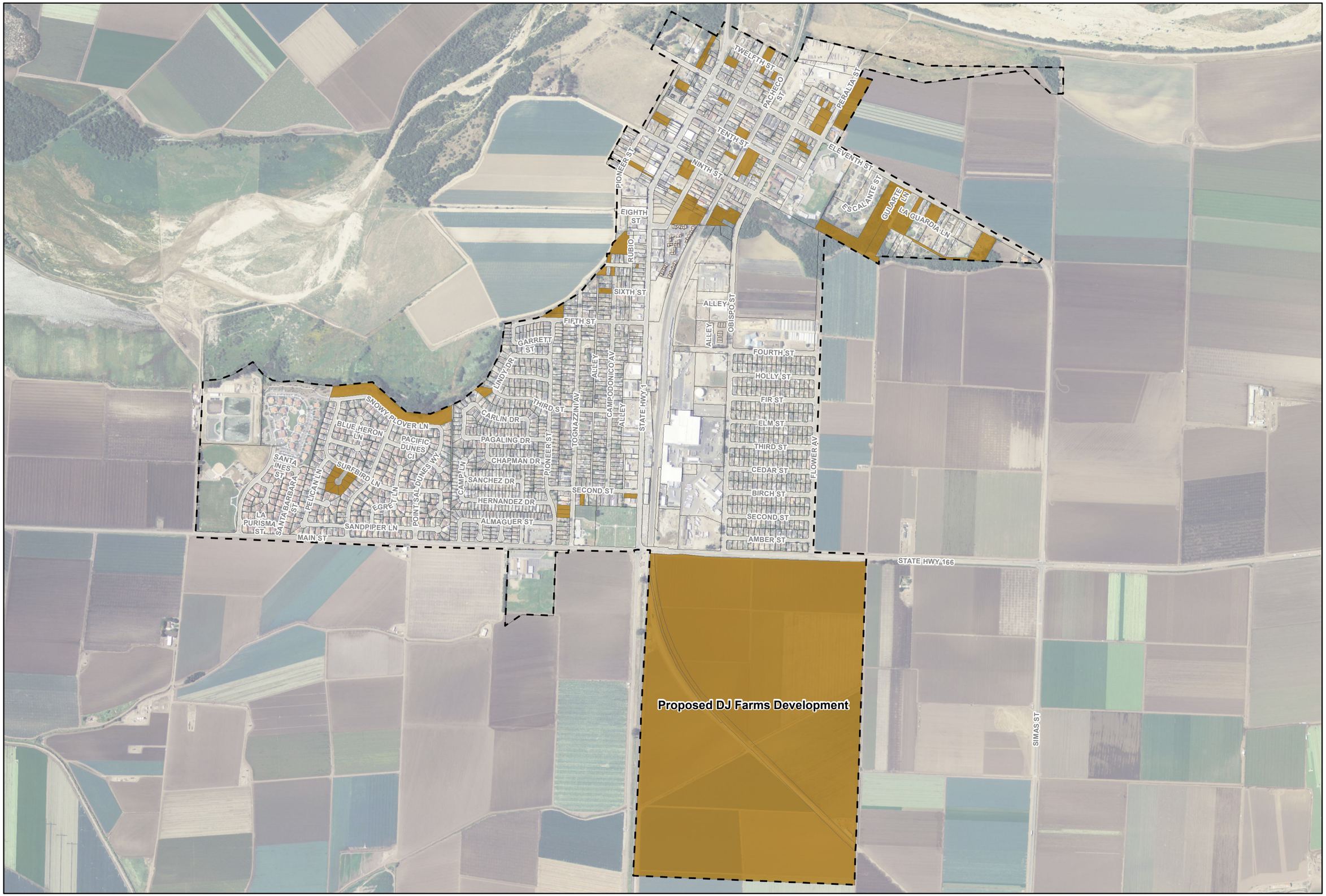
For the purposes of this Master Plan, it was assumed that population growth within the City would be attributed not only to the development of DJ Farms, but would also include development of existing vacant or underutilized residential lots within the City, as well as the occupation of existing unoccupied residences. Although build-out is estimated to occur in the year 2044, 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.

The average daily demand (ADD) for the overall Apio facility during calendar year 2012 was 312,010 GPD, representing approximately 36% of the total City 2012 water sales. Apio's production line averages 270,000 GPD. In July 2013 Apio submitted an after-the fact application to the City of Guadalupe's Planning Department for a revision to their Design Review Permit (DRP) approved on May 12, 2009. The 2009 Design Review Permit allowed expansion of existing uses by approximately 56,880 square feet of cold storage space. The requested revision to the 2009 Design Review Permit would allow Apio to utilize approximately 24,000 square feet of the existing onsite cold-storage warehouse space for vegetable processing facilities, hereafter referred to as the Value Added Cooler (VAC). Approximately 12,000 square feet of this VAC line expansion was installed in August 2013 and is currently in operation. It is estimated that the already installed VAC line will increase existing daily water usage by 56,160 GPD with a projected peak/maximum day increase of 122,655 GPD. In addition to the 56,160 GPD originally requested in the revised DRP application submitted last year, Apio recently requested an amendment to the revised DRP application to allow for a second VAC line to be added to the facility at some point in the future. This second VAC line would also consume approximately 56,160 GPD. With the existing VAC, along with two additional VAC lines, the total future water usage is estimated to be 383,000 GPD during average conditions, and a peak day use of 449,000 GPD.

Many pipelines will have sufficient capacity to deliver more water if the need arises, particularly since the sizing of most water mains is largely dictated by fire-flow requirements. There may be instances where new development will result in hydraulic capacity requirements that exceed the capacity of existing mains. Such cases will need to be analyzed on a case-by-case basis when the developments are proposed to determine if supplemental system improvements are needed. To estimate the City's build-out water demand, the General Plan land use, DJ Farms Specific Plan, and potential future usage from Apio were used to project future demand and is summarized in **Table 3-4**. A future per capita water demand of 120 GPD was assumed for City unoccupied residential and developable 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. Based on the population from 2013 and the ADD estimated from the billing records, the residential per capita demand is 73 GPCD the existing gross per capita average demand is 123 GPCD. It is anticipated that much of the future development will be lower density residential housing.

Table 3-4: Future Water Demand

Source	Population	Per Capita Demand (GPCD)	Average Day Demand (GPD)
Demand Associated with Future City Infill			
Unoccupied Residential Dwellings	300	120	36,000
Vacant Developable R-1 Residential Lots	113	120	13,560
Vacant Developable R-2 & R-3 Residential Lots	160	120	19,200
Future City Infill Subtotal			68,760
Existing City Demand			843,409
Future City Demand			912,169
Existing and Future APIO Expansion			112,320
Future DJ Farms	3208	135	433,080
Total Future Demand			**1,457,569**



City of Guadalupe Water Master Plan Update

Figure 3-1:

Vacant Properties within City Limts

Legend

Undeveloped

City Limits

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.

3.4 Peaking Factors

In the preceding 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. Seasonal demands are typically highest in July and August, and lowest in the months of January and February. The City of Guadalupe is unique with peak water usage occurring during the fall-winter months as a result of Apio's production processes. The four demand conditions used to assess the distribution system were average day demand (ADD), maximum day demand (MDD), maximum day demand plus fire-flow (MDD+FF), and peak hour demand (PHD).

Average Day Demand

The ADD is the total annual water usage averaged over the course of a year. This demand was determined by customer billing records. For the City of Guadalupe, the present-day ADD was determined to be 0.84 MGD, based on review of customer billing records from 2011-2013.

Maximum Day Demand

The MDD represents the demand associated with the 24 hour period exhibiting the single highest demand for the entire year. For most agencies, MDD typically occurs during the summer as a result of increased irrigation demand. However for the City of Guadalupe MDD occurs during the fall-winter months in conjunction with Apio's production season since Apio's water usage is approximately 36% of the City's total water usage. MDD is most commonly determined by comparing annual water usage to annual production. However, there is currently a discrepancy between the City's sales data and annual production records. The discrepancy identities that the City is selling more water than it is producing[3]. A MDD peaking factor cannot be determined based on the existing usage/production data method. For this master plan update a peaking of 2.1 was applied and resulted in a MDD of 1.77 MGD.

Peak Hour Demand

The PHD is generally determined by calculating the specific demand within the day, by monitoring tank levels and pumping records. In many municipal systems, the exact calculation of this parameter is difficult to determine without specific controls and instrumentation to do so. Thus it is recommended that the peak hour demand for the system be approximated at 3.5 times ADD, based on the 2002 water master plan peak hour demand peaking factor. Using this approach, the Peak Hour Demand for Guadalupe was estimated to be 2.95 MGD. This PHD peaking factor is consistent with peak hour demand factors for similar municipalities in the Central Coast area.

Tables 3-5 and 3-6 identifies the peaking factors and associated system demands for existing and future conditions**.**

Table 3-5: Existing Demands & Peaking Factors

Demand Condition	Peaking Factor	Demand (MGD)
Average Day	-	0.84
Maximum Day	2.1	1.77
Peak Hour	3.5	2.95

[3] In April 2014, the City reported improvements to the production well flow meter, which may more accurately record water production.

Table 3-6: Future Demands & Peaking Factors		
Demand Condition	Peaking Factor	Demand (MGD)
Average Day	-	1.46
Maximum Day	2.1	3.06
Peak Hour	3.5	5.10

3.5 Fire-flow Requirements

Fire-flow requirements often govern the sizing of distribution system elements. A minimum residual system pressure of 20 psi[4] is required during fire-flow for all development types. **Table 3-7** summarizes the modeled fire-flow criteria[5] for various types of developments:

Table 3-7: Fire-Flow Criteria			
Development Type	**Required Fire-Flow at 20 psi Min. Residual (GPM)**	**Duration (Hours)**	**Number of Hydrants Flowing**
Residential	1,000	2	1
Commercial	2,500[6]	3	1
Industrial / Manufacturing/Schools	3,750	3	1

For the hydraulic analyses performed in this study, the fire-flows were modeled under MDD conditions with the Obispo Street BPS providing the required fire-flow.

3.6 Unaccounted Water

Unaccounted for water is the difference between recorded water production and water consumption (i.e. water that is not recorded by water meters). A range of 5 to 8 percent is considered typical for similar water systems. For the Water Master Plan Update the City provided customer consumption records from 2008 through 2013 and annual California DWR production reports from 2009-2012 (the 2013 DWR report for was not available at the time this report was prepared). Analysis for the total system, as shown in **Table 3-8**, compares the total production from the City well(s) and State Water to annual customer consumption records from 2009 to 2012. Currently the data reflects a discrepancy between the City's sales data and annual production records. The discrepancy identifies that the City is selling more water than it is producing on an annual basis. As noted above, the City has recently improved water production recording equipment at the Obispo Street Well, which should improve the values shown in **Table 3-8** for future monitoring. It is recommended that that City continue to investigate the discrepancy to allow the City to accurately manage and review annual water production and water sales.

[4] Per California Regulations Related to Drinking Water July 1, 2013.

[5] Fire-flow criteria are based on the December 9, 2013 "Fire-flow Code Evaluation & Summary Report City of Guadalupe" report prepared by Collings & Associates, and through direction from City staff.

[6] The 2,500 gpm commercial fire-flow criteria was recommended by City staff to remain consist with the criteria established in the 2002 WMP and deviates from the recommendation identified in the report prepared by Collings & Associates.

Table 3-8: Unaccounted for Water					
Calendar Year	**Production (AFY)***	**Metered Water Delivery (AFY)****	**Unaccounted for Water (AFY)**	**Percentage**	**Notes**
2012	924.07	964.59	-41	-4%	
2011	885.7	894.49	-9	-1%	
2010	880.63	893.80	-13	-1%	CCWA Not Received
2009	915.63	873.12	43	5%	
*Production values based on the City's annual reports to California DWR. **Usage values based on water usage information provided by the City.					

SECTION 4 EXISTING SYSTEM

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 the Obispo Street Tank (total storage of 1.57MG and an overflow elevation of 118 MSL). The Elevated Tank (total storage of 0.1 MG and an overflow elevation of approximately 140 MSL) 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 one groundwater well drawing from the Santa Maria Valley Groundwater Basin. The primary well, the Obispo Street Well, was constructed in 2008 and produces approximately 750 acre feet per year (AFY).[7] The City maintains two additional standby (5th Street Well and Tognazinni Well) wells that are currently offline due to water quality issues. The 5th Street well delivers water directly to either the Obispo Street, or Bonita Tank, and requires blending to mitigate water quality issues. The 5th Street well was taken out of production in April 2009 and is maintained in standby status for emergency use.[8] The Tognazinni 2A well is offline due to issues with iron and manganese. The Olivera Well and the 242 Obispo Well have been decommissioned.

There are a number of agricultural wells also drawing from the Santa Maria Valley Groundwater Basin. Within the City limits, electricity usage data for the two existing agricultural wells on the DJ farms property indicate that average water consumption is approximately 850 AFY for agricultural use.[9] According to the Specific Plan, the post-development demand for DJ farms will be reduced, compared to the existing agricultural demand. The developer has dedicated a site for a future municipal well.

Figure 4-1: Obispo Street Well

[7] Four year average (2009-2012).

[8] In 2008, the nitrate levels in the well consistently exceeded the MCL of 45 mg/l (Nitrate-NO3) and it was subsequently shut down and made only available for emergency purposes.

[9] 2012 DJ Farms Specific Plan.

Table 4-1: City Production Wells			
Status	**Obispo Well**	**5th Street Well**	**Tognazzini 2A Well**
	Operational	Standby	Offline
Year Installed	2008	1978	1974
Depth (ft)	750	725	848
Screened Interval (ft)	NA	118	150
Pump Horsepower	75	60	50
Capacity (GPM)	1,000	1,000	385
Pump Head (ft)	NA	+/- 139	NA
Standby Power	Yes	No	No
Water Quality Issues	Hardness	TDS, Nitrate, Iron, no disinfection facilities	Iron/manganese, no disinfection facilities

4.3 State Water

Since 1998, State Water Project (SWP) water has been imported into the Santa Maria Valley Groundwater Basin by Oceano CSD, City of Pismo Beach, City of Guadalupe, City of Santa Maria, and Golden State Water Company. The City of Guadalupe has a "Table A" allocation of 550 AFY, plus a drought buffer of 55 AFY to supplement the City's water supply.[10] 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.[11] **Table 4-2** below summarizes the SWP deliveries to Guadalupe for the past six years.

Table 4-2: State Water Deliveries to Guadalupe (2007-2013)							
Year	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Total Table A Amount (AFY)	605	605	605	605	605	605	605
Delivery Requested by City (AFY)	455	455	455	455	605	605	485
Delivered Received (AFY)	466	348	39	0[12]	176	415	294
% of Table A Amount Delivered (AFY)	77%	58%	6%	0%	29%	69%	49%
% of Requested Delivery (AFY)	102%	76%	9%	0%	29%	69%	61%

[10] 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 facilities that each user is contractually obligated to support.

[11] According to City staff, State Water is expected to be unavailable in May 2014.

[12] Although unused Table A amounts can typically be banked and carried over to subsequent years, Guadalupe's carryover water from 2010 was lost in 2011 as a result of high reservoir levels.

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. According to the 2011 DWR reliability study, the long term reliability of SWP water to Santa Barbara County project participants is 61% of the Table A amount in 2011, and reduces to 60% of the Table A amount in 2031. Following the DWR estimation protocol, the long term average projection of available water was calculated using linear interpolation at increments starting in 2012 and ending in 2031.

It should be noted that for year 2014 the City of Guadalupe will only receive 5% of their 605 AFY allotment, which represents 30 Acre Feet total for 2014. This reduction in State Water allotment is due in part to continued drought conditions being experienced throughout California. For long-term SWP delivery projections the City has requested that the supply and storage analysis for this master plan update assume that the City will only receive 40% of the Table A allocation for future SWP deliveries.

The SWP projections are presented in **Table 4-3** below.

Table 4-2: Long Term Average Projections[13]

	2015	2020	2025	2030	2031
Guadalupe SWP Delivery Projection (AFY)	382	375	371	367	363
City of Guadalupe's SWP Projection (40% of Table A Amount (AFY))	242	242	242	242	242

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 utilizes booster pump stations to pressurize and supply water to the distribution system.

Obispo Street Booster Pump Station

The Obispo Street BPS consists of three booster pumps and three 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 60 psi. The full-speed pump curves from the manufacturer are provided in **Figure 4-3** and **Figure 4-4**.

Figure 4-2: Obispo Street Booster Station

[13] Long term projections per Table 3-4 of the Central Coast Water Authority 2010 Urban Water Management Plan.

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

Figure 4-3: Booster Pump Simplex & Duplex Pump Curves

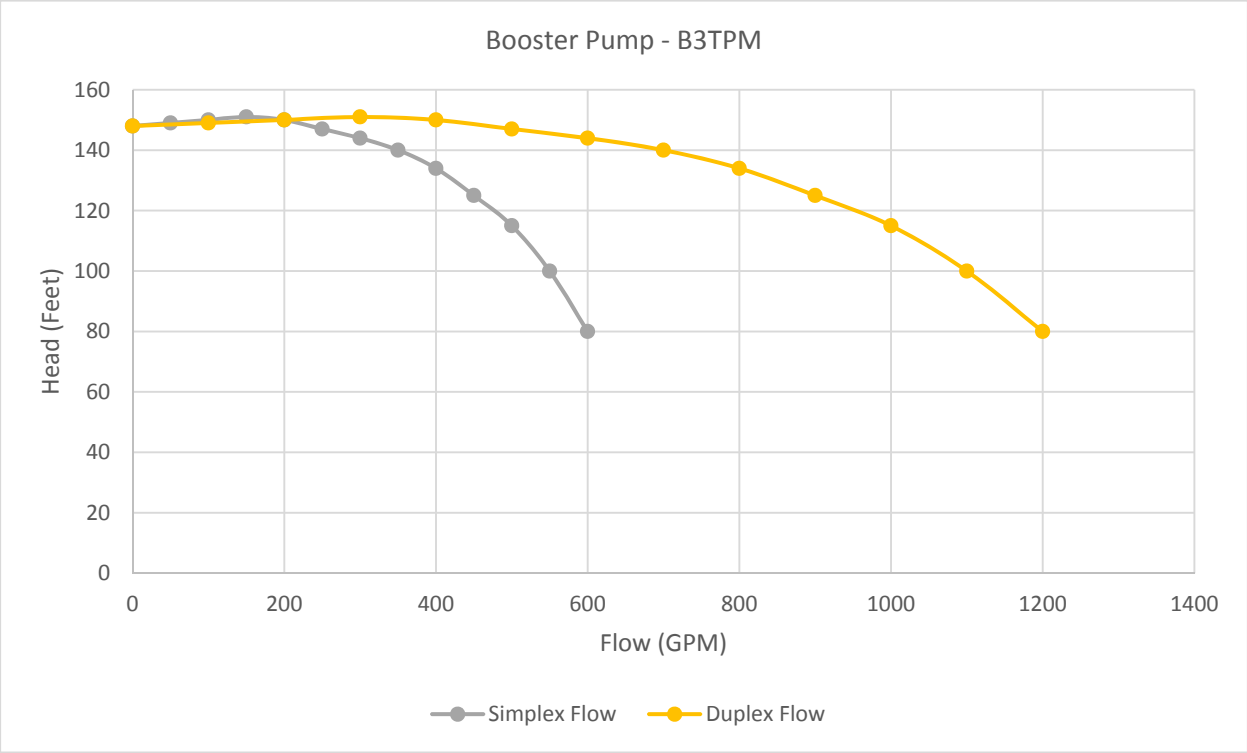
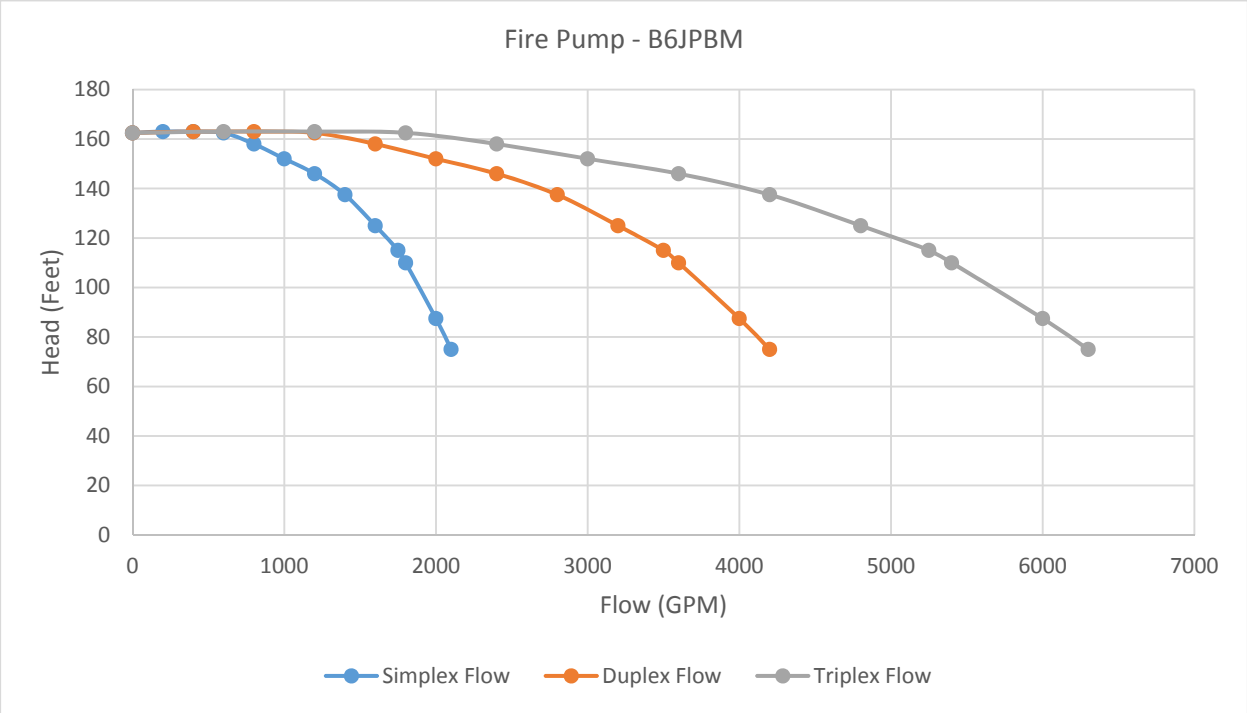


Figure 4-4: Fire Pump Simplex, Duplex Pump & Triplex Curves



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 4-4: 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

The City is currently evaluating the Bonita Reservoir and BPS to determine the feasibility of rehabilitation.

4.5 Storage

The City has three storage facilities, but currently only utilizes two of the facilities for system storage and pressure. The first is the 1.57 MG Obispo Tank and this tank receives water from the Obispo Well, and continually receives State Water on a 24-hour basis (when the SWP in online). All water entering the distribution system is delivered to the Obispo tank, which is then pumped into the distribution system through the Obispo Street BPS.

The second tank is the 100,000 gallon elevated storage tank. This tank is operated during nighttime (off-peak) hours and is primarily used to provide emergency storage. 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 third tank is the 500,000-gallon Bonita Reservoir, which is currently offline due to physical deterioration. When functional, the Bonita Reservoir was operated only during off-peak hours and was primarily used to maintain additional storage for emergency needs.

Table 4-5: Existing Storage Facilities

Tank	Year Installed	Operational Height (ft)	Diameter (ft)	Capacity (gallons)	Material	Overflow Elevation (ft MSL)	Backup Power
Obispo Tank	2006	30	100	1,570,000	Steel	118.75	Yes
Bonita Reservoir (Offline)	1981	25	58	500,000	Steel	108	Yes
Elevated Tank	2007	139	30	110,000	Steel	140 +/-	NO

Figure 4-5: Bonita Reservoir

Figure 4-6: Elevated Tank

Figure 4-7: Obispo Street Reservoir

Distribution System Control

The Obispo Reservoir level is controlled by telemetry and 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 2-inch to 16-inch in size. The existing water supply, storage and distribution system is shown in **Figure 4-8**. An inventory of the existing water main network is summarized in **Table 4-7**. 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**.

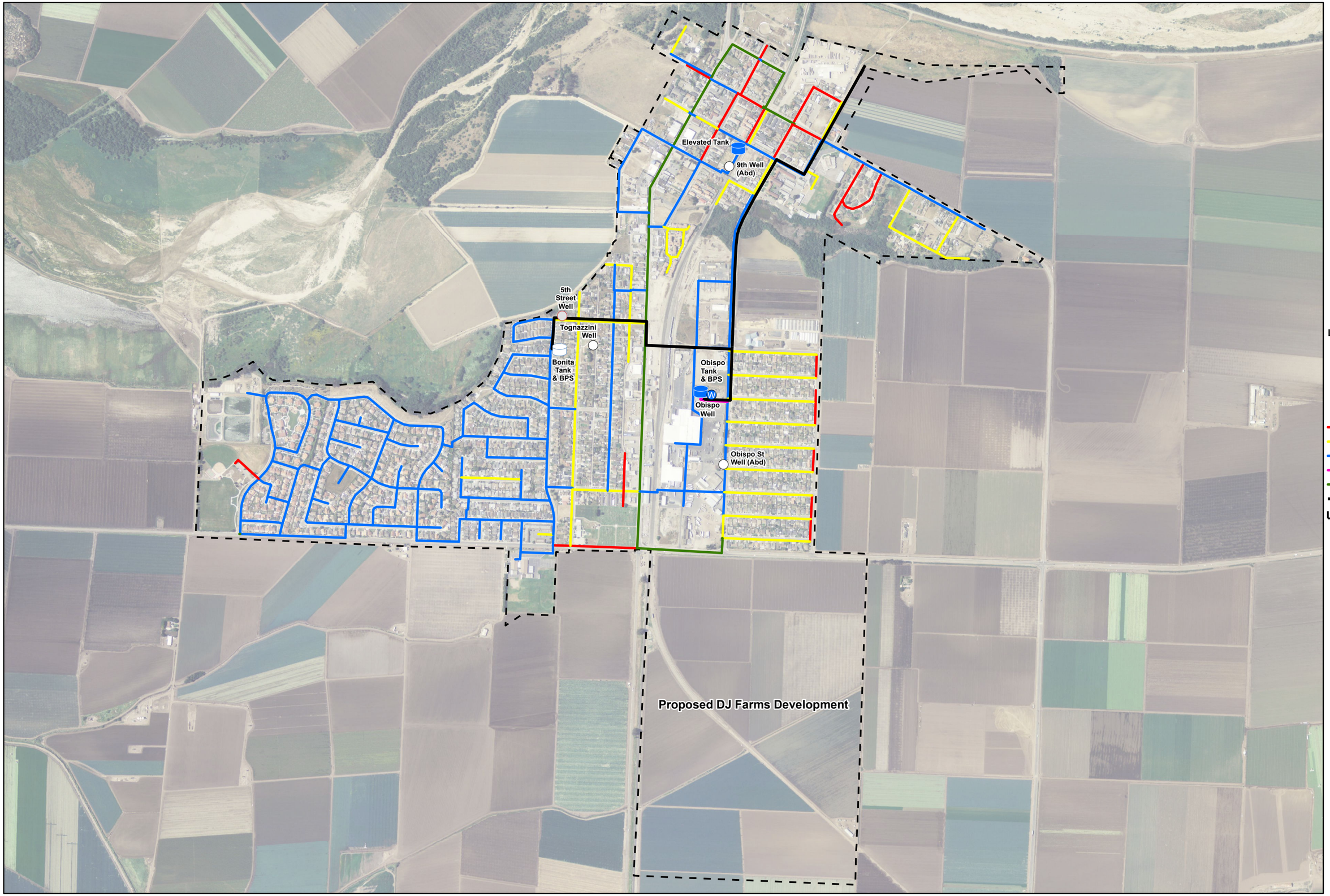
Table 4-6: Existing Pipeline Inventory

Diameter (Inches)	Length	
	Feet	Miles
2	726	0.1
3	453	0.1
4	8,639	1.6
6	23,255	4.4
8	57,159	10.8
12	8,794	1.7
16	545	0.1
Total	**99,572**	**18.9**

Table 4-7: Existing Pipeline Material

Material	Length	
	Feet	Miles
Asbestos Cement	21,758	4.1
Cast Iron	8,102	1.5
Galvanized	1,101	0.2
PVC	60,132	11.4
Steel	8,480	1.6
Total	**99,572**	**18.9**

With the addition of the DJ Farms Development the City's supply, storage and distribution system will be expanded to include one to two new well sites, a storage tank with BPS and seven miles of pipeline as shown in **Figure 4-9**.



City of Guadalupe Water Master Plan Update

Figure 4-7:

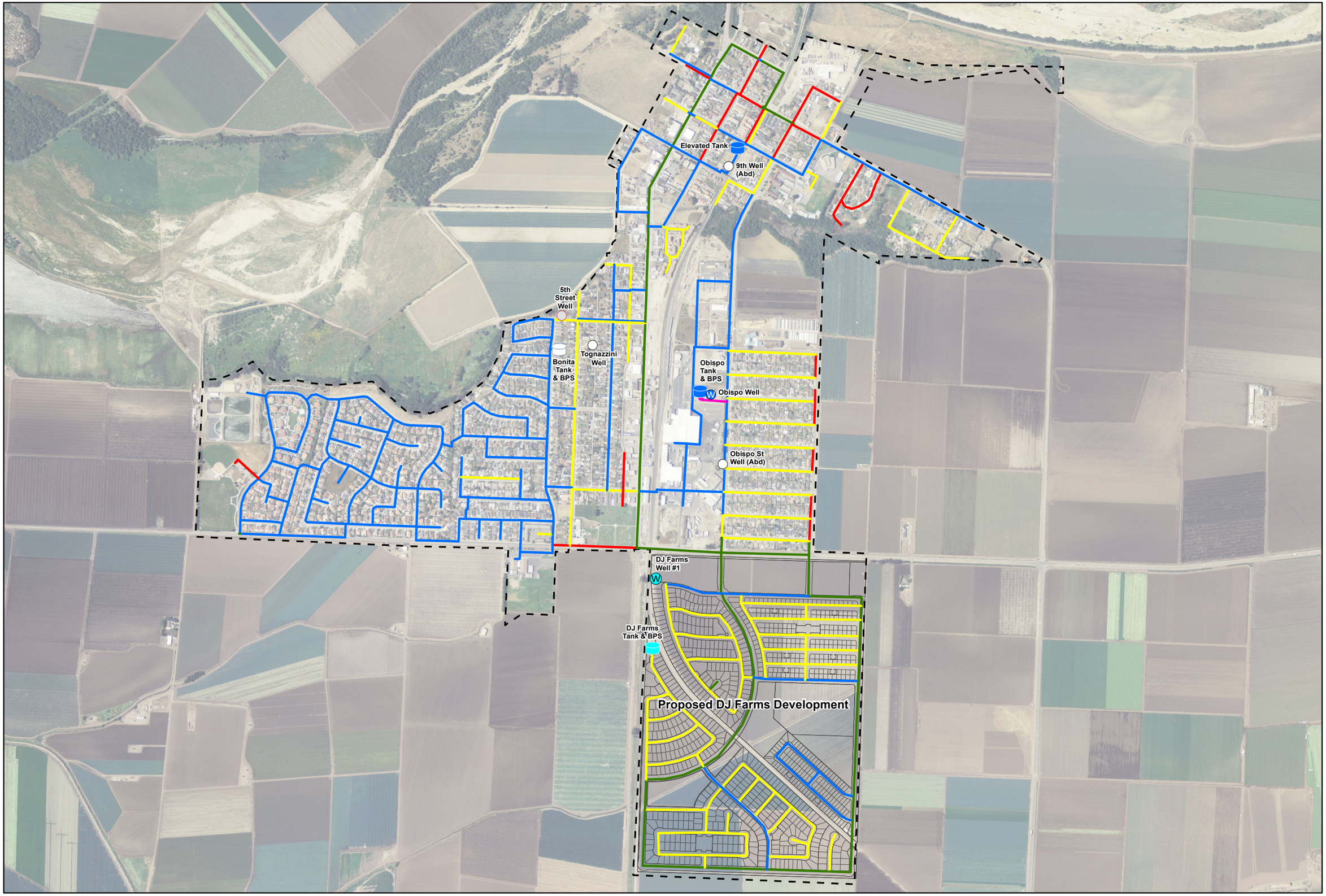
Existing Water Distribution System

Legend

- Well (Production)
- Wells (Stand-by)
- Tanks
- Wells (Offline)
- Tank (Offline)
- 4" or less
- 6"
- 8"
- 16"
- 12"
- 10" SWP
- City Limits

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.



City of Guadalupe Water Master Plan Update

Figure 4-8:

Future Water Distribution System

Legend

- Well (Production)
- Wells (Stand-by)
- Tanks
- Wells (Offline)
- Tank (Offline)
- New Tank
- New Well
- DJ_Farms
- 4" or less
- 6"
- 8"
- 12"
- 16"
- City Limits

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.

SECTION 5 HYDRAULIC COMPUTER MODEL

5.1 Model Development

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. A representative model of the pipes and pumps was developed using the City's 2002 water model, existing water atlas map, input from the City's Water Operations Staff, well production records, available pump curves, and topographical information. 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. **Table 5-1** identifies the Hazen-Williams pipe roughness factors that were applied to the water distribution system within the model.

Table 5-1: 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 City's 2002 WaterCAD model was imported into an ESRI GIS geodatabase and adjusted to fit the County of Santa Barbara's current aerial photography and GIS parcel basemap. Water distribution system information was provided for the DJ Farms Development imported into the GIS geodatabase. Elevation data was assigned to the DJ Farms water distribution system using the Santa Barbara Flood Control District Topographic Map of the Santa Maria Valley.

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 and fire-flows as described in Sections 3.4 and 3.5 to develop the necessary modeling scenarios used to conduct the analysis. To model the phased impacts from the DJ Farms Development several scenarios were developed to analyze the anticipated project development. During a project meeting with DJ Farms' representative, Bethel Engineering, the following scenarios were developed to model the phased construction of the development:

- DJ1: Corresponding to 368 dwelling units at DJ Farms Development and the City's existing population (DJ Farms Phase 1)
- DJ2: Corresponding to 473 dwelling units at DJ Farms Development and the City's existing population (DJ Farms Phase 1)
- DJ3: Corresponding to 473 dwelling units at DJ Farms Development and the City's future (build-out) population (DJ Farms Phase 1)
- DJ4: Corresponding to 802 dwelling units at DJ Farms Development (DJ build-out/DJ Farms Phase 2) and the City's future (build-out) population

The demands for DJ Farms were developed assuming four persons per dwelling unit and 135 GPCD based on the DJ Farms Specific Plan. **Table 5-2** identifies the WaterCAD scenarios and corresponding existing and future water demands used to evaluate the existing and future water distribution system.

Table 5-2: WaterCAD Scenarios

Scenario	Demand Alternative (GPM)			
	Average Day Demand (ADD)	Maximum Day Demand (MDD)	Peak Hour Demand (PHD)	Maximum Day Demand plus Fire-flow (MDD+FF)
City Existing	586	1,230	2,050	4,980
City Future	711	1,494	2,490	5,244
City Existing plus DJ1	724	1,520	2,533	5,270
City Existing plus DJ2	763	1,602	2,671	5,352
City Future plus DJ3	889	1,867	3,111	5,617
City Future plus DJ4	1012	2,126	3,543	5,876

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 7.1 to 7.2 and 8.1 to 8.2. 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 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 5-3** provides an overview of the pump settings from the City's SCADA system. For example, **Table 5-2** shows that the MDD for the Scenario 'City Existing' is 1,230 gpm. For this scenario the model was configured to have one fire pump running to meet the scenario demand.

Table 5-3: Obispo Street BPS Pump Operations

Pump Operation	SCADA Setting	Flow (GPM)
1 Booster Pump On	Flow Band A	250 - 400
2 Booster Pumps On[14]	Flow Band B	400 - 800
1 Fire Pump On	Flow Band C	800 - 1,400
2 Fire Pumps On	Flow Band D	1,400 - 2,800
3 Fire Pumps On	Flow Band E	2,800 - Max

The DJ Farms well, tank and BPS were included in the model as a point source node providing the development's required flow during ADD, MDD and PHD conditions only. For fire-flow pumping redundancy, the City may want to require that the DJ Farms BPS have the pumping capability to provide fire-flow projection if the Obispo Street reservoir and BPS were offline for any reason. The DJ Farms water demand parameters are summarized in **Table 5-4** below.

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

Table 5-4: DJ Farms Booster Station Pumping Requirements			
Development Phases	Demands (GPM)		
	Average Day Demand (ADD)	Maximum Day Demand (MDD)	Peak Hour Demand (PHD)
DJ1 (368 Units)	138	290	483
DJ2 & DJ3 (473 Units)	177	372	621
DJ4 (802 Units)	301	632	1,053

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

5.2 Model Calibration

After the system piping, BPS and demand patterns were applied to the model, 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 gage 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).

Figure 5-1: Field Fire-flow Testing

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. The hydrant testing field sheets are included in Appendix A of this report.

Table 5-5: Hydrant Tests for Model Calibration									
Location	Hydrant	Field Conditions			Model Conditions			Static Delta (PSI)	Residual Delta (PSI)
		Flow (GPM)	Static (PSI)	Residual (PSI)	Flow (GPM)	Static (PSI)	Residual (PSI)		
Guadalupe St @ 12th St	168	1,026	65	45	1,026	60	47	5	2
	147	0	62	56	0	60	48	2	8
Obispo St @ Amber St	216	914	66	35	914	57	47	9	12
	215	0	66	41	0	57	49	9	8
Egret Ln @ Surfbird Ln	50	852	68	30	852	64	33	4	3
	48	0	68	42	0	65	33	3	9
Guadalupe St @ 6th St	129	1,026	66	45	1,026	61	51	5	6
	128	0	66	51	0	61	51	5	0

If the model did not produce results within this range, additional calibration steps were taken as described below:

- Adjusting the ADD to estimate the system demands during the time of day that the fire-flow testing was completed
- Verify model elevations for distribution system pipelines, tanks, and pumps

Overall the fire-flow and model results are within an acceptable range to consider the model to be calibrated. The Obispo Street BPS was modeled to provide 60 PSI during the model calibration process. The fire-flow test at Obispo Street and Amber Street shows the largest discrepancy between field and model conditions and be contributed to closed values or close proximity to the Obispo Street BPS site. Since asbuilt plans of system facilities were not available for this project, there may also be discrepancies between the actual, and modeled facilities in this area.

SECTION 6 DESIGN CRITERIA

6.1 Supply Facilities

Introduction

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.

Water Supply

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: [15]

- All water supplies intact
- State Water supply is not delivered
- The largest groundwater well is out of service.

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 DJ Farms Development. The model scenarios assume up to three fire pumps running.

6.2 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 as follows:

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 Handbook[16] as summarized in the table below:

Table 6-1: 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

[15] 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).

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

The City's current operation can be described as "follow demand (constant speed)". The well pump turns on when Obispo Street tank level drops below a set point. The State Water is delivered at a constant rate throughout the day, and the available storage is reduced at night to allow buffer for the State Water delivery during times of low demand. Based on this, the conservative factor of 0.15 from the table was used for equalization storage requirements.

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 6-2: Fire-flow Requirements

Land Use	Required Flow (gpm)	Duration (hours)
Residential	1,000	2
Commercial[17]	2,500	3
Industrial	3,750	3

The fire storage requirement for the City should be based on the most stringent requirement. In this case, the City's requirement for industrial properties dictate. A 3,750 gpm fire-flow rate for a duration of three hours provides a minimum fire storage requirement of 675,000 gallons. It is assumed that future fire storage requirements will be similar.

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.

The storage requirement criteria varies for existing and future population and demand. These are described and analyzed in the sections below.

6.3 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.

6.4 Criteria Summary

Table 6-3 provides a summary of the design criteria used to determine the system deficiencies and recommended improvement for the water master plan update.

[17] The 2,500 gpm commercial fire-flow criteria was recommended by City staff to remain consist with the criteria established in the 2002 WMP and deviates from the recommendation identified in the report prepared by Collings & Associates.

Table 6-3: Hydraulic Evaluation	
Scenario	**Criteria**
Maximum Day Demand Factor	2.1 times ADD
Peak Hour Demand Factor	3.5 times ADD
Fire-flow Requirements	Residential: 1,000 GPM Commercial: 2,500 GPM Industrial: 3,750 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

SECTION 7 ABILITY OF EXISTING SYSTEM TO MEET EXISTING DEMANDS

7.1 Sources of Supply

The City's existing water supply consists of two sources – the Santa Maria Valley Groundwater Basin and the State Water Project imported from the Coastal Branch of the State Water Project. A more detailed description is included in Section 4. A review of the allocation indicates sufficient supply to meet existing demands on an annual basis, as presented in **Table 7-1**. The assessment based on future demands is presented in Section 8.

Table 7-1: Water Supply Allocation & Existing Demand

Source	Existing Water Allocation (AFY)		
	60% SWP Table A Allocation	40% SWP Table A Allocation	No SWP Allocation
Santa Maria Groundwater[18]	1300	1300	1300
State Water[19]	368	242	0
Total Water Supply Allocation	**1668**	**1542**	**1300**
Existing Average Annual Demand	945	945	945
Supply Surplus / (Deficit)	**723**	**597**	**355**

Assuming that 1,300 AFY is available from the Santa Maria Groundwater Basin, the supply allocations appear sufficient to meet existing demands, even if the State Water supply is reduced for drought conditions, or is offline.

MKN also reviewed the ability of the City's water system facilities to deliver the water. The City's combined reliable supply facilities should be capable of providing, at a minimum, MDD over a 24 hour period. Some redundancy in supply facilities is recommended to maintain capacity to provide water if one facility is temporarily out of service. The adequacy of the existing water supply facilities to meet existing demands and provide some redundancy is presented in **Table 7-2**. Criteria for redundancy requirements are summarized in Section 6. 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.

[18] Santa Maria Valley Groundwater Basin supply allocation per January 25, 2008 Stipulation (Superior Court of California, County of Santa Clara).

[19] State Water Project allocation are as projected for 2015 per Table 3-3. It should be noted that the actual delivery amount for 2014 is only 30 AFY, so the actual delivery for 2015 may be significantly less than that currently projected for allocation by the State Water Project.

Table 7-2: Ability of Production Facilities to Meet Existing Demands					
Criteria	PUMPING CAPACITY (GPM)			DEMANDS	SURPLUS/(DEFICIT)
	State Water Supply	GW Supply Obispo St Well	Total Supply	Existing MDD	Existing City
	(gpm)	(gpm)	(gpm)	(gpm)	(gpm)
Meet MDD with all supplies (60% SWP Allocation)	228	1000	1228	1230	(2)
Meet MDD with all supplies (40% SWP Allocation)	150	1000	1150	1230	(80)
Meet MDD without State Water	-	1000	1000	1230	(230)
Meet MDD with largest well out of service (60% SWP Allocation)	228	-	228	1230	(1002)
Meet MDD with largest well out of service (40% SWP Allocation)	150	-	150	1230	(1080)

Table 7-2 shows the City's water supply is marginally capable of meeting the existing MDD with all the existing water supply facilities intact (State Water and Obispo Street well). However, the redundancy analysis indicates a vulnerability in supply. If one of the two existing sources goes down and either State Water is not delivered or there is a problem with the Obispo Street Well, the City will not be able to meet the existing MDD. An additional groundwater well(s) with a minimum production capacity of 1,100 to 1,200 gpm is recommended to allow the City to meet existing demands if Obispo Street Well is out of service for any reason. However, future demands should be considered when planning for an improvement project. Requirements to meet future demands are discussed in Section 8.

7.2 Emergency Blending Alternatives

The City's 5th Street Well is currently offline due to water quality concerns. However, the City is undertaking a project to utilize the well on standby basis during emergency situations. Recent monitoring data[20] was reviewed to estimate blending requirements for emergency use with respect to the California Department of Public Health (CDPH) water quality requirements. The data indicates high levels of nitrate, total dissolved solids (TDS), and iron. Nitrate is regulated with a primary maximum contaminant level (MCL), and TDS and iron have secondary MCLs. The primary MCLs are regulated for public safety, while secondary MCLs are considered for consumer acceptance and have different monitoring requirements. The 5th Street Well has a pumping capacity of 1,000 gpm.

Blending 5th Street Well and Obispo Well

If State Water were offline, the 5th Street well could be used to supplement the water supply with a supplemental water supply for blending and a disinfection system to meet water quality requirements. The minimum blending ratio to meet CDPH requirements for nitrate would be 0.8 to 1 of Obispo Street well water to 5th Street well water. The iron concentration in the blended water would be above the secondary MCLs. If the City desired to use the 5th Street well for more than a short-term emergency supply, additional monitoring and other actions may be required per the California Code of Regulations.

[20] Data from the City's 2010 Consumer Confidence Report for estimating State Water quality, and the County of Santa Barbara District 6 Drinking Water Monitoring Schedule for estimating water quality for the 5th Street Well (with last reported results on 6/21/2012) and Obispo Well (with last reported results on 3/15/2011).

Blending 5th Street Well and State Water

If the Obispo Street well were offline, a minimum blending ratio of 1.18 to 1 of State Water to 5th Street well water would be required to meet the nitrate limit. However, with this blending requirement and a SWP allocation of 228 gpm, a maximum of 269 gpm could be pumped from 5th Street. This provides a total supply of 497 gpm of supply, which is less than the existing ADD of 586 gpm.

Blending 5th Street Well and Tognazzini Well

The City is currently undertaking a project for the construction of approximately 350 linear feet of water pipeline to connect the Tognazzini Well on Tognazzini Avenue to the State Water Pipeline located on 5th Street. The City will not receive any State Water during 2014, and the Obispo Street Well is currently the only active water source within the City. To supplement the City's water supply when State Water is not delivered, the City is currently working with the California Department of Public Health (CDPH) to receive approval to reactivate the Tognazzini and 5th Street wells. Based on discussions with the City's Water Department staff it is anticipated that the Tognazzini Well will be used during normal operating conditions, and will deliver water to the Obispo Street Reservoir. The Tognazzini Well has a pumping capacity of 385 gpm. It is also our understanding that if the Obispo Street well is offline the 5th Street Well may be used during emergency operations and would be blended at the Obispo Street Well site with Tognazzini Well water. The City's Water Department staff has indicated that in this emergency situation that the Tognazzini and 5th Street wells would be operated on specific time intervals to ensure proper blending and to limit pumping conflicts. All disinfection would occur at the Obispo Street Well site. Currently raw water from the 5th Street well can be directed into the State Water Pipeline at the Bonita Tank site and transported to the Obispo Street Well Site. The purpose of the proposed pipeline modifications is to create a connection from the Tognazzini Well to the State Water Pipeline that would allow raw water from the Tognazzini Well to be transported to the Obispo Tank.

An alternative to blending the 5th Street Well water is wellhead treatment to reduce nitrates, iron, and TDS. Because these systems are often cost prohibitive and require significant ongoing operations costs and due to the acceptable water quality experienced at the Obispo Street Well, new groundwater wells are assumed to be preferable for meeting redundancy requirements for the purposes of this Master Plan Update.

7.3 Booster Pump Station

Obispo Street Booster Pump Station

The Obispo Street Booster Pump Station provides water supply and maintains service pressure for the City's water distribution system. The Booster Pump Station was modeled using the pump curves available from the pump manufacturer and operational controls set points for the various demand conditions based on information from City staff (for example an operational set point of 60 psi was assumed for all conditions). The model indicates that the Obispo Street BPS is sufficient to provide the required pressure and flow during existing conditions ADD, MDD and PHD. The greatest supply requirement for the Booster Pump Station is realized during the fire-flow modeling, which models a fire during MDD conditions. The ability of the pump station to meet flow requirements throughout the system is tied to the features of the distribution system, including pipeline materials and diameter, valves, elevations, tanks, etc., as they all impact the pressures at the pump station. The hydraulic modeling results indicate the existing Obispo Booster Pump Station is sufficient to meet the fire-flow requirements plus existing MDD if all three fire pumps are running.

Bonita BPS

The Bonita BPS is currently offline and does not provide system flow or pressure demands for the City's current water distribution system. The City is currently evaluating the options to repair and/or replace the Bonita Reservoir to meet the City's existing storage deficiency and will require that the Bonita BPS is online once the storage facility has been repaired.

7.4 Storage Facilities

Currently, the City has two water storage facilities in operation, the Obispo Street tank and the Elevated storage tank, and a third, Bonita Reservoir, currently out of service due to condition. The existing available storage volumes are

summarized in the table below. Bonita Reservoir has a total volume of 0.5 MG, but it is not considered as available storage for the purposes of this assessment. A discussion of the condition is included in Section 4.5.

A portion of the Obispo Street tank is not available for emergency storage. Because State Water is delivered on a continual 24 hour basis, the Obispo Street tank must have an available capacity to accept a constant supply of State Water during period of low demand, through the night for example. Assuming a delivery of 150 gpm, based on the City's modified 40% SWP allocation long-term projected delivery, and reserving a volume equal to 10 hours of storage (90,000 gallons), the available storage for the Obispo Street tank is approximately 1,480,000 gallons. Fluctuation in the SWP deliveries to the City will impact the available storage in the Obispo tank in any a given year. Depending on the final disposition of 5th Street and Tognazzini Well water (currently under review by the City), the City may want to consider diverting SWP to the Bonita tank for storage for optimal storage flexibility.

Table 7-3: Available Storage

Tank	Total Volume (MG)	Available Volume (MG)
Obispo Street	1.57	1.48
Elevated	0.1	0.1
Total Operational Storage	1.67	1.58

The storage recommendations for the City's existing water system 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 6. The analysis suggests a storage deficit of approximately 422,674 gallons based on the existing City demand. Rehabilitation or replacement of the existing Bonita Reservoir is recommended and would compensate for the deficit, adding 500,000 gallons to the system.

Table 7-4: Storage Recommendations for Existing Demands

Storage Type	Criteria	Storage Volume (Gallons)
Fire Storage	3,750 gpm x 3 hours	675,000
Emergency Storage	50 gpcd x 3 days x 7,080 pp	1,062,000
Equalization Storage	0.15 x MDD of 1.77 MGD	265,674
	Total Recommended Storage	**2,002,674**
Total Available Storage		1,580,000
	Surplus/(Deficit)	**(422,674)**
Bonita Tank Rehabilitation		500,000
	Remaining Surplus/(Deficit)	**77,326**

7.5 Distribution and Transmission Pipelines

The City's existing water distribution system contains over 18 miles of water mains ranging from 2-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 condition simulations the existing water distribution is sufficient to meet the pressure and flow requirements as defined in Section 6.3. 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. School facilities and some industrial areas throughout the City were not able to meet the recommended fire-flow requirement of 3,750 gpm during the MDD+FF conditions. The following should be noted in operation of the hydraulic model for correcting system deficiencies based on existing conditions demands:

- During the Maximum Day Demand plus Fire-flow scenario it was assumed that ECIP-1 (**Table 9-4**) was implemented, which allows the Obispo Street BPS to operate above the 60 PSI pressure setting. The current 60 PSI pressure setting during fire-flow conditions limits the available fire-flow throughout the distribution system.
- All three fire pumps were assumed to be in operation during the MDD+FF simulations to provide the recommended fire-flow requirements specified in Section 6.

The results of the hydraulic analysis under existing demand conditions and the deficient pipelines are presented in **Table 7-5.**

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

Project Name	Location	Existing Facility	Deficiency	Notes
Kermit Mckenzie Jr High School Water Main Upgrade	From Pioneer Street to Guadalupe Street	1,000 LF of 4-inch steel pipe	Fails 3,750 fire-flow requirement. Model indicates 1,000 gpm available during MDD+FF conditions	Deficiency also identified in 2002 WMP
	At Kermit Mckenzie Jr High School	660 LF of 8-inch PVC pipe		
Tognazzini Street Water Main Upgrade	From Second Street to Bonita Tank	1,630 LF of 6-inch cast iron pipe	Fails residential fire-flow requirement	Deficiency also identified in 2002 WMP
Elementary School Water Main Upgrade	Fir Street to 10th Street	470 LF of 6-inch cast iron & 2,490 LF of 8-inch AC pipe	Fails 3,750 fire-flow requirement. Model indicates 950 gpm available during MDD+FF conditions	Deficiency also identified in 2002 WMP
	Obispo Street to Peralta Street	460 LF of 8-inch steel & 340 LF of 6-inch cast iron pipe		
Escalante Street Water Main Upgrade	Escalante Street at Eleventh Street	1,600 LF of 4-inch cast iron pipe	Fails residential fire-flow requirement	Deficiency also identified in 2002 WMP
South Obispo Street Industrial Area Water Main Upgrade and Extension	From Fir Street to 3rd Street	500 LF 8-inch AC pipe	Fails industrial fire-flow requirement	Deficiency also identified in 2002 WMP
	At 3rd Street to existing Apio Water Main	300 LF of new water main recommended		
	Apio property from Obispo Street to Guadalupe Street	1,500 LF 8-inch AC pipe		
8th Street Waterline Extension	From 10th Street to 9th Street	500 LF of new water main recommended	Fails commercial fire-flow requirement (Dead-end main)	
North Obispo Street Industrial Area Pipe Upgrade	From 10th Street to 12th Street	960 LF of 4-inch AC pipe	Fails industrial fire-flow requirement	

SECTION 8 ABILITY OF EXISTING SYSTEM TO MEET 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 Project imported from the Coastal Branch of the State Water Project. A more detailed description is included in Section 2. A review of the allocations indicates a deficiency of 91 AFY in supply allocation to meet future demands, using a 40% long term reliability estimate, as presented in **Table 8-1**.

Table 8-1: Water Supply Allocation & Future Demand

Source	Future Water Allocation (AFY)		
	60% SWP Table A Allocation	40% SWP Table A Allocation (AFY)[21]	No SWP Allocation
Santa Maria Groundwater[22]	1,300	1300	1300
State Water[23]	363	242	0
Total Water Supply Allocation	**1,663**	**1542**	**1300**
Future Average Annual Demand including Infill Development	1,022	1,022	1,022
Apio Expansion	126	126	126
DJ Farms Development	485	485	485
Supply Surplus / (Deficit)	**30**	**(91)**	**(333)**

The City's existing water supply facilities also lack redundancy under existing demands as indicated in Section 7. The redundancy analysis was performed for future demand to evaluate the ability of the City's water system facilities to deliver the water. The City's combined reliable supply facilities should be capable of providing, at a minimum, MDD over a 24 hour period. Some redundancy in supply facilities is recommended to maintain capacity to provide water if one facility is temporarily out of service. The adequacy of the existing water supply facilities to meet future demands and provide some redundancy is presented in **Table 8-2**. Criteria for redundancy requirements are summarized in Section 6. 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. The evaluation was split to review the City's future demands with and without the DJ Farms Development.

[21] State Water allocation long term reliability estimate as requested by the City of Guadalupe for existing and future water resource planning.

[22] Santa Maria Valley Groundwater Basin supply allocation per January 25, 2008 Stipulation (Superior Court of California, County of Santa Clara).

[23] State Water Project allocation are as projected for 2031 per Table 3-3. It should be noted that the actual delivery amount for 2014 is only 30 AFY, so the actual delivery for 2015 may be significantly less than that currently projected for allocation by the State Water Project.

Table 8-2: Ability of Production Facilities to Meet Future Demands								
Criteria	**PUMPING CAPACITY (GPM)**			**DEMANDS (GPM)**				**SURPLUS/ (DEFICIT) (GPM)**
	State Water Supply	GW Supply Obispo St Well	Total Supply	Existing City MDD	Future City MDD	Apio Expansion MDD*	DJ Farms MDD	
Meet MDD with all supplies (60% SWP Allocation)	225	1,000	1,225	1230	100	124	632	(861)
Meet MDD with all supplies (40% SWP Allocation)	150	1,000	1,150	1230	100	124	632	(936)
Meet MDD without State Water	-	1,000	1,000	1230	100	124	632	(1086)
Meet MDD with largest well out of service (60% SWP Allocation)	225	-	225	1230	100	124	632	(1861)
Meet MDD with largest well out of service (40% SWP Allocation)	150	-	150	1230	100	124	632	(1936)
*Based on peak day increase of 178,825 GPD identified by Apio's January 17, 2014 CUP amendment								

Table 8-2 shows the City's existing water pumping facilities will not meet the future MDD. With both existing water supply facilities (State Water and Obispo Street Well), there is a deficit of approximately 936 gpm. If one of these two facilities were temporarily offline for any reason, this deficit grows. An additional well facility with a capacity of 800 gpm (beyond the additional required 1,200 gpm well recommended in **Table 7-2** for existing demands) is recommended to meet future demands. For 100% backup of the 1,200 gpm well, recommended from the **Table 7-2** analysis, a well(s) with a total capacity of 1,200 gpm would be required to maintain the recommended redundancy. It is recommended that one of these wells be installed with high priority (within the next five years) to meet redundancy requirements for the existing City. The second well should be installed to maintain supply redundancy as development and future demands dictate.

The City is also implementing a project to utilize the 5th Street and Tognazzini Wells as reliable backup wells to the Obispo Street Well. As mentioned in Section 7.2 significant blending and/or treatment will be required for the 5th Street Well to allow it to be used beyond short-term emergency operations. The Tognazzini Well has secondary MCL requirements that can be managed by blending, but does not have sufficient pumping capacity to provide 100% redundancy if the Obispo Street Well was offline. The 5th and Tognazzini Wells can produced 1000 gpm and 385 respectively.

For the DJ Farms development there is a developer's agreement between the City and DJ Farms for DJ Farms to construct two 600 gpm wells (for total pumping capacity of 1,200 gpm) or a single 1,000 gpm. The final number of wells to be provided by DJ Farms will be dependent on the quality and capacity of the first water well constructed for the development project.

8.2 Booster Pump Station

Obispo Street BPS

The Booster Pump Station was modeled using the pump curves available from the pump manufacturer and operational controls set points for the various demand conditions based on information from City staff (for example an operational set point of 60 psi was assumed for all conditions). The Obispo Street BPS is sufficient to provide the required pressure and flow during future conditions ADD, MDD and PHD. The greatest demand requirement for the Booster Pump Station is realized during the fire-flow modeling, which models a fire during MDD conditions. The hydraulic modeling results indicate the existing Obispo Street Booster Pump Station is sufficient to meet future ADD, MDD, and PHD for the City (excluding municipal flows for DJ Farms). As stated elsewhere in this report, it is recommended that DJ Farms install a BPS designed to provide ADD, MDD, and PHD for the DJ Farms development as referenced in Table 8-3. The hydraulic modeling results also indicate the existing Obispo Street Booster Pump Station is sufficient to meet future fire flow demands for the City and DJ Farms combined.

Bonita BPS

The Bonita BPS is currently offline and does not provide system flow or pressure demands for the City's current water distribution system. The City is currently evaluating the options to repair and/or replace the Bonita Reservoir to meet the City's existing storage deficiency and will require that the Bonita BPS is online once the storage facility has been repaired. The existing pumps at the Bonita BPS are capable of meeting the City's ADD and the evaluation will determine the feasible and costs associated with installing fire pumps at this facility.

DJ Farms BPS

The proposed DJ Farms Development Booster Pump Station was modeled to provide pressure and flow requirements during existing City demand and water distribution system and future ADD, MDD and PHD simulations, while Obispo Booster Pump Station provides fire-flow for all fire-flow simulations. The final determination of the DJ BPS facility sizing will be dependent on the City's operational needs and requirements for redundancy. **Table 8-3** below provides an overview of the system demands of the DJ Farms BPS that were developed and analyzed in the hydraulic model.

Table 8-3: DJ Farms Booster Station Pumping Requirements

Development Phases	Demands (GPM)		
	Average Day Demand (ADD)	Maximum Day Demand (MDD)	Peak Hour Demand (PHD)
DJ1 (368 Units)	138	290	483
DJ2 & DJ3 (473 Units)	177	372	621
DJ4 (802 Units)	301	632	1,053

For fire-flow pumping redundancy, the City may want to require that the DJ Farms BPS have the pumping capability to provide city-wide fire-flow if the Obispo Street reservoir and BPS were offline for any reason.

8.3 Storage Facilities

The storage requirements for the future City conditions were examined, exclusive of the DJ Farms Development. Future population was assumed to be 7,653, based on the buildout population of 10,861 as discussed in Section 2 minus the DJ Farms population of 3,208. The analysis indicates a storage deficit of approximately 558,000 gallons. The assessment is summarized in the **Table 8-4** below.

Table 8-4: Storage Recommendations for Future City System Conditions without DJ Farms		
Storage Type	**Criteria**	**Storage Volume (Gallons)**
Fire Storage	3,750 gpm x 3 hours	675,000
Emergency Storage	50 gpcd x 3 days x 7,653 pp	1,147,950
Equalization Storage	0.15 x MDD of 1.92 MGD	287,333
Equalization Storage for Apio Expansion	0.15 x MDD of 0.179 MGD	26,824
	Total Recommended Storage	**2,137,107**
Total Existing Available Storage		1,580,000
	Existing Surplus/(Deficit)	**(557,107)**
Bonita Tank Rehabilitation		500,000
	Remaining Surplus/(Deficit)	**(57,107)**

The storage recommendations for the City's future water system with the inclusion of the DJ Farms Development is summarized in the table below. Definitions and descriptions of the criteria used for the various storage components, fire, emergency, and equalization, are contained in Section 6. The analysis indicates a storage deficit of approximately 1,180,000 gallons for the future system conditions. Rehabilitation or replacement of the existing Bonita Reservoir would add 500,000 gallons to the system, leaving a storage deficit of approximately 680,000 gallons. The assessment is summarized in the **Table 8-5** below.

Table 8-5: Storage Recommendations for Future City System Conditions Including DJ Farms		
Storage Type	**Criteria**	**Storage Volume (Gallons)**
Fire Storage	3,750 gpm x 3 hours	675,000
Emergency Storage	50 gpcd x 3 days x 10,861 pp	1,629,150
Equalization Storage for Future City	0.15 x MDD of 1.92 MGD	287,333
Equalization Storage for DJ Farms	0.15 x MDD of 0.91 MGD	136,420
Equalization Storage for Apio Expansion	0.15 x MDD of 0.179 MGD	26,824
	Total Recommended Storage	**2,754,727**
Total Existing Available Storage		1,580,000
	Existing Surplus/(Deficit)	**(1,174,727)**
Bonita Reservoir Rehabilitation		500,000
	Remaining Surplus/(Deficit)	**(674,727)**
DJ Farms Required Storage[24]		700,000
	Remaining Surplus/(Deficit)	**25,273**

[24] The storage requirement for the DJ Farms development has been determined to be approximately 700,000 gallons as part of the water master planning effort. Per the development agreement between DJ Farms and the City, DJ farms maybe required to provide storage up to 1MG.

A total storage volume of 1.2 million gallons is recommended to meet future City demands, with approximately 670,000 gallons due to the development of DJ Farms. Assuming rehabilitation or replacement of the Bonita Reservoir, an additional 700,000 gallons of storage is recommended to meet the City's future needs. To serve the system and meet pressure requirements, the storage tanks need to be elevated or have a dedicated BPS.

8.4 Distribution and Transmission Pipelines

For future ADD, MDD, PHD condition simulations the existing water distribution is sufficient to meet the pressure and flow requirements as defined in Section 6.3.

To identify pipeline deficiencies of the existing water distribution system resulting from the DJ Farms Development, it was assumed that the DJ Farms Development will have the required well, storage tank and BPS in operation as recommended in this report. The existing water distribution system was not analyzed under the assumption that the City's existing supply, storage and pumping facilities would provide the necessary flow and pressure to the DJ Farms Development.

The following should be noted in operation of the hydraulic model for correcting system deficiencies based on future conditions demands:

- During the Maximum Day Demand plus Fire-flow scenario it was assumed that ECIP-1 (Table 9-4) was implemented, which allows the Obispo Street BPS to operate above the 60 PSI pressure setting. The current 60 PSI pressure setting during fire-flow conditions limits the available fire-flow throughout the distribution system.
- All three fire pumps at the Obispo Street BPS were assumed to be in operation during the MDD+FF simulations to provide the recommended fire-flow requirements specified in Section 6.
- DJ Farms BPS was modeled to provide Average Day, Maximum Day and Peak Hour demands for the DJ Farms Development and Obispo Street BPS was modeled to provide the necessary fire-flow for all MDD+FF scenarios and the existing City ADD, MDD, and PHD.
- To assess the potential impact of the DJ Farms Development, the City's existing system and existing demand was modeled with the DJ Farms Development Phase 1.
- To assess the potential future impact of the DJ Farms Development, the City's existing system and future demand was modeled with the DJ Farms Development Phase 1 and 2.

No additional pipeline deficiencies were identified/triggered by future City infill, the Apio production line expansion or the DJ Farms Development Phases 1 and 2 based on the hydraulic model analysis.

SECTION 9 RECOMMENDED IMPROVEMENTS & OPINION OF PROBABLE COSTS

9.1 Maintenance and Operation

The following section identifies potential maintenance and operations tasks that the City could implement to extend the useful life of their existing water supply, storage and distribution facilities and more efficiently manage future system facilities. The majority of these maintenance and operations could be implemented with the addition of staffing to the Water Department.

Staffing

The City currently has two full time employees overseeing the City's water system – one Public Works Supervisor and one Water Department Supervisor. The Public Works Supervisor also oversees the City's, storm drains, roadways, parks and trails, civic facilities, and City vehicles. The existing water system consists of one storage reservoir, one elevated tank, a booster pump station, one active groundwater supply well and disinfection system, one standby well, the State Water turnout, approximately 19 miles of distribution pipeline, fire hydrants, valves, and 1,911 services. The City is currently understaffed to properly maintain and perform preventative maintenance on the water distribution system. It is recommended that the City budget for an additional full-time staff member to assist with daily operations and preventative maintenance to properly maintain the City's water system. Preventative maintenance tasks would include valve exercising and inspection, meter calibration and replacement, flushing dead-end water mains and hydrants, inspection and replacement of air-vacuum and blow-off valves, and other routine maintenance. The additional staff member would also assist with daily operations and relieve the on-call requirements for the City's existing water system staff.

Obispo Street Reservoir, Well and BPS

Since the Obispo Street tank, well and BPS facility is currently the City's only reliable supply, storage and pumping facility, MKN highly recommends that this facility receive routine observation and maintenance to ensure that facility equipment is functioning properly. It is recommended that the City developed an emergency response plan for this site to ensure that equipment parts are readily available and that emergency repairs could be completed expeditiously (e.g. within hours) if the well or booster station went out of service.

Asset Management Strategy

In conjunction with the recommended water system staffing and to more efficiently plan, budget, manage and complete system-wide maintenance and repair tasks to extend the useful life of the City's water system facilities it is recommended that the City review options for implementing an Asset Management Strategy. An Asset management strategy consists of integrating a Computerized Maintenance Management System (CMMS), asset inventory and condition/capacity assessment and Geographic Information Systems (GIS). The City has completed a preliminary asset inventory, capacity assessment and GIS development as part of this Water Master Plan update. Some common asset management software programs that the City may consider reviewing include Cityworks, Cartegraph, Lucity, Accela and Infro/Hanson.

Valves and Hydrants

MKN recommends that the City adopt a formal flushing and valve exercising program if that program is not currently in place. Valves and hydrants should be exercised yearly to ensure functionality and improve water quality throughout the system. When problems with the operation of these appurtenances are detected, then they should be scheduled for replacement. Valve and hydrant maintenance could be scheduled and managed as part of and asset management strategy.

Meters

The installation of automatic meter reading (AMR) devices is recommended. Regular meter replacement is recognized as an important revenue protection technique, since old meters frequently record less flow than may be consumed.

The use of AMR is important also in significantly reducing the cost of operations, allowing personnel to be reassigned to other needed work. Meter maintenance could be scheduled and managed as part of and asset management strategy.

Air-Vacuum and Blowoff Valves

These appurtenances are frequently neglected in many water systems, and may ultimately fail to protect the pipelines. Regular inspection on a yearly basis is therefore recommended. Air-Vacuum and Blowoff Valves maintenance could be scheduled and managed as part of and asset management strategy.

Updating the City Geographic Information System (GIS) and Hydraulic Model

MKN recommends that the City update and maintain their GIS water distribution database, atlas and hydraulic model on a semi-annual basis and the updates should include new piping, valves, pumps, hydrant flow data, replacements, etc. The water distribution GIS can be expanded to include sample stations, air-vacuum and blow-off valves and integration with asset management and automated work-order systems. For most asset management implementations an agency's GIS database is the central repository for asset information. Maintaining the master plan hydraulic model would allow the City to model potential flushing, water quality or major changes in water demand simulations outside the scope of the 2014 Water Master Plan update.

9.2 Capital Improvements Summary

The recommended capital improvements were developed to meet the City's existing and future water needs based on assumptions and discussions in this report.

9.3 Supply

The City's existing supply facilities include the State Water turnout and one groundwater well. Two additional groundwater wells with a total combined capacity of 2,000 are recommended to meet existing and buildout demands for the City. One well is needed to provide 100% redundancy for the Obispo Street well – to be available in case Obispo Street Well is offline for any reason – and should be installed within the next one to five years. The second well will be needed to provide supply for future demand conditions. It is assumed that one of these wells will be installed with the first phase of the DJ Farms Development.

The City is undertaking a project to utilize the 5th Street and Tognazzini Wells as an emergency supply during drought conditions, and as backup wells to the Obispo Street well. As mentioned in Section 7.2 significant blending or treatment is required for the 5th Street Well to allow it to be used beyond short-term emergency operations. The Tognazzini Well has secondary MCL requirements that can be managed by blending, but does not have sufficient pumping capacity to provide 100% redundancy if the Obispo Street Well was offline. The 5th and Tognazzini Wells can produced 1,000 gpm and 385 respectively.

For the DJ Farms development there is a developer's agreement between the City and DJ Farms for DJ Farms to construct either two 600 gpm wells (for total pumping capacity of 1,200 gpm), or a single 1,000 gpm well. The final number of wells to be provided by DJ Farms will be dependent on the quality and capacity of the first water well constructed for the development project. The recommended supply improvements are shown in **Table 9-4** and **Table 9-5.**

9.4 Storage and Booster Pump Stations

Obispo Street Reservoir and BPS

For the Obispo Street BPS it is recommended that the operations set points be adjusted to allow pressures at the pump station above 60 psi (up to approximately 70 psi) during fire flow conditions. For the hydraulic modeling effort it was assumed that this CIP would be completed. This CIP resolved fire-flow deficiencies for the downtown commercial area and residential fire-flow in the Point Sal Dunes area. It is recommended that the Obispo Street Reservoir have an

interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection.

Bonita Reservoir and BPS

An additional 430,000 gallons of storage is needed to meet the recommended storage requirements for existing conditions. This Master Plan assumes that the Bonita Reservoir may be rehabilitated or replaced, which will add 500,000 gallons to the City's storage facilities. An assessment of the reservoir and booster station will be completed in 2014 to determine if the Bonita Reservoir and associated facilities should be rehabilitated or replaced. The planning level cost in this Master Plan associated to rehabilitate the Bonita BPS consists of utilizing the existing pumps, replacement of the BPS supply line from the tank to the BPS, general repair/maintenance of the existing BPS building, evaluation and repairs of the electrical system, site piping, general site work, and disinfection system. Once the Bonita Reservoir is restored/replaced, it is recommended that the Bonita Reservoir have an interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection.

DJ Farms Reservoir and BPS

In addition to rehabilitation or replacement of the Bonita Tank, an additional 700,000 gallons of storage (minimum) will be required to meet storage requirements for future conditions. It is assumed that this storage will be implemented with the DJ Farms Development. To reduce potential for excess water age (which can lead to nitrification and other water quality issues), it is recommended that two 350,000-gallon tanks be installed in two phases, the first tank with the Phase 1 of the DJ Farms Development, and the second with Phase 2. Once the DJ Farms tanks are online, it is recommended that the DJ Farms Reservoirs have an interior/exterior tank inspection completed every 10 years and possible recoating if determined by the completed inspection. Per the developer's agreement between the City and DJ Farms, the City may require DJ Farms to provide total storage of 1 MG as part of their development project.

For the DJ Farms Development, a booster pump station will be required to draw water from the storage tanks and deliver it to the distribution system. For planning purposes, it is assumed the booster pump station will have similar features as the Obispo Street Booster Pump Station (pumps with variable frequency drives, a building for equipment and controls, and a standby generator). The pump station should be sized to meet the buildout PHD conditions of the DJ Farms Development, with regard to the site, building, piping, and electrical facilities. However, the pumps need to be sized appropriately for initial conditions and adjustable for future phases either by replacement or expansion. It is recommended that the booster pump station be implemented in two phases. The general pump requirements were estimated for the high flow condition (PHD) using the hydraulic model. It is assumed that the DJ Farms BPS will be connected with a 12-inch discharge pipeline to the 12-inch transmission main within the development. **Table 9-1** provides an overview of the recommended operating points for the proposed DJ Farms BPS.

Table 9-1: Proposed DJ Farms BPS

Operating Parameters	Phase 1 of DJ Farms Development	Phase 2 of DJ Farms Development
Peak Hour Demand (gpm)	483	1053
Estimated TDH at PHD (ft)	125	115
Estimated Total Horsepower	25	45

Cost opinions were developed for the DJ Farms storage tanks and booster pump station to assist the City with planning, as presented in Section 9.4. The costs for the storage tanks assume welded steel tanks will be constructed. The opinion of cost for the Phase 1 BPS project includes three pumps with VFDs, an 800 SF building, on-site piping, valves, and appurtenances, a standby generator, site work, and electrical and instrumentation. The cost opinion for the Booster Pump Station expansion (Phase 2) assumes replacement of three pumps and VFDs, minor piping improvements, and upgrades to electrical and instrumentation. These cost opinions do not consider site-specific requirements and should be reevaluated and refined with the preliminary design.

It was assumed that the DJ Farms BPS would be designed to provide ADD, MDD, and PHD flows, with Obispo Street BPS providing fire-flows. The hydraulic model indicates that some adjustments to the operations set points are required for the Obispo Street BPS to provide the required fire-flow during existing and future demand conditions. For fire-flow

pumping redundancy, the City may want to require that the DJ Farms BPS have the pumping capability to provide city-wide fire-flow if the Obispo Street reservoir and BPS were offline for any reason. The recommended storage and booster station improvements are shown in **Table 9-4** and **Table 9-5.**

9.5 Distribution and Transmission Pipelines

For the water distribution system, the recommended improvements as shown in **Table 9-4** address pipeline deficiencies under existing demand conditions during Maximum Day Demand plus Fire-flow conditions. If these existing pipeline deficiencies are corrected, the DJ Farms Development and future City expansion do not trigger additional CIPs for the water distribution system. The criteria used for the hydraulic analysis is outlined in Sections 5 and 6. The smallest recommended pipe size 6-inch for residential and 8-inch for multi-family, commercial, and industrial per the City's Design Standards[25]. Our analysis was also completed under the assumption that these CIPs are completed before City buildout.

9.6 Typical Lifecycle

Table 9-2 presents a general estimate of the life that can be expected for main water system facilities.

Table 9-2: Replacement Facility Expected Life

Facility	Expected Life
Pipelines	80 years
Pump Stations (except pumps and electrical)	60 years
Electrical and control facilities at pump stations and storage facilities	20 years
Pumps	25 years
Welded steel storage tanks (except coating)	50 years
Tank coatings	12 years
Concrete reservoirs	70+ years

9.7 Opinion of Probable Cost

This section provides an expenditure program for capital improvements recommended through build-out. The program is derived from the recommendations of this report, and the opinions of probable cost.

This program and these cost opinions 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.
- Cost opinions are in 2013 dollars. When budgeting for future years, appropriate escalation factors should be applied.
- Cost opinions are "budget-level" and may not fully account for site-specific conditions or design decisions that will affect the actual costs.
- Engineering, project administration, and construction management are assumed 25 percent of total construction costs.
- Construction contingency of 20 percent has been included.

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.

[25] The City has adopted the City of Santa Maria's Design Standards.

Table 9-3 contains the unit cost for water infrastructure improvements, and **Tables 9-4 and 9-5** provide opinion of probable construction costs for improvement projects necessary to meet both existing and build-out demands. 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 9-3: Construction Cost Criteria

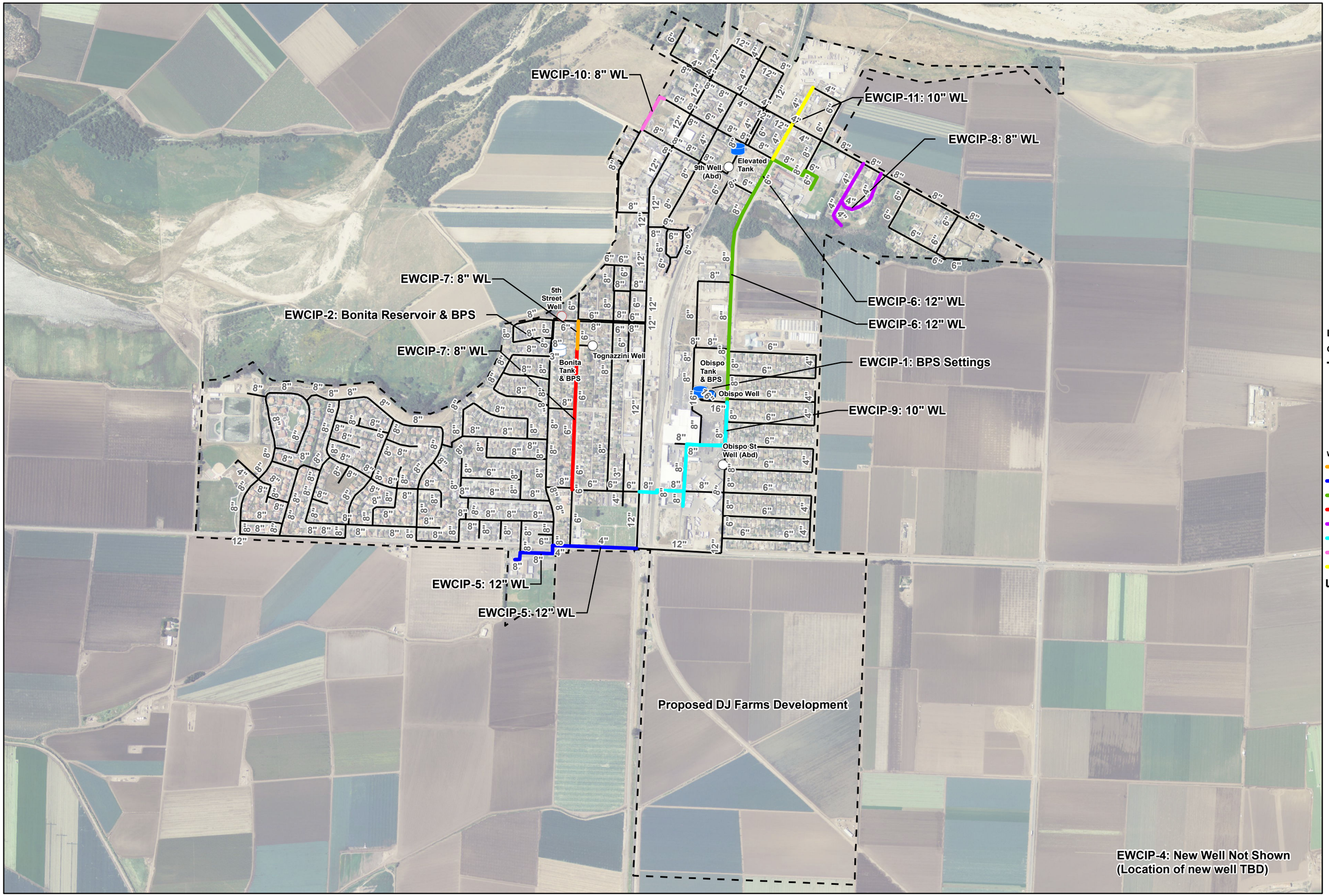
Item Description	Budgetary Cost
8-inch pipeline	$125/LF
10-inch pipeline	$135/LF
12-inch pipeline	$175/LF
Welded Steel Tank	$1.25/gal
Engineering, project administration, and construction management	25%
Construction Contingency	20%

Table 9-4: Capital Improvements for Existing Demand Deficiencies

Project	Project Name	Location	Existing Facility	Deficiency	Capital Improvement Project (CIP)	Priority	Opinion of Cost ($)
EWCIP-1	Obispo Booster Station Fire Flow Pressure Setting Modification	Obispo Street	Obispo Booster Station	Existing 60 PSI setting limits fire flow capabilities for downtown commercial and Point Sal Dunes areas	Review and revise pressure setting to allow BPS to operate above 60 PSI set point	High	variable
EWCIP-2	Bonita Reservoir Rehabilitation	Pioneer Street at Wong Street	0.5 MGD tank	Existing storage deficit	Rehabilitate existing tank	High	$400,000
	Bonita Pump Station Rehabilitation	Pioneer Street at Wong Street	(2) 500 GPM pumps	Rehabilitation required to disinfect & transfer water from tank to system	Rehabilitate existing booster pump station	High	$250,000
	New Bonita Reservoir	Pioneer Street at Wong Street	0.5 MGD tank	Replace Bonita Tank with new 0.5MG steel tank (same site)	Construct new tank	High	$1,200,000
EWCIP-3	Tognazzini Inter-Tie	Tognazzini to 5th Street	Not Existing - New Facility Recommended	Existing supply redundancy deficit	300 LF of 8-inch PVC pipe and connection to SWP	High	$110,000
EWCIP-4	New Water Supply Well	TBD	Not Existing - New Facility Recommended	Existing supply redundancy deficit	Install new groundwater well, min. 1,200 gpm	High	variable
EWCIP-5	Kermit Mckenzie Jr High School Water Main Upgrade	From Pioneer Street to Guadalupe Street	1,000 LF of 4-inch steel pipe	Fails fire flow requirement. Model indicates 1000 gpm available during MDD+FF conditions	Upgrade to 1,000 LF of 12-inch PVC pipe	High	$380,000
		At Kermit Mckenzie Jr High School	660 LF of 8-inch PVC pipe		Upgrade to 660 LF of 10-inch PVC pipe		
EWCIP-6	Elementary School Water Main Upgrade	Fir Street to 10th Street	470 LF of 6-inch cast iron & 2,490 LF of 8-inch AC pipe	Fails fire flow requirement. Model indicates 950 gpm available during MDD+FF conditions	2,960 LF of 12-inch PVC pipe	High	$910,000
		Obispo Street to Peralta Street	460 LF of 8-inch steel & 340 LF of 6-inch cast iron pipe		800 LF of 10-inch PVC pipe		
EWCIP-7	Tognazzini Street Water Main Upgrade	From Second Street to Bonita Tank	1,630 LF of 6-inch cast iron pipe	Fails residential fire flow requirement	Upgrade to 1,630 LF of 8-inch PVC pipe	Medium	$300,000
EWCIP-8	Escalante Street Water Main Upgrade	Escalante Street at Eleventh Street	1,600 LF of 4-inch cast iron pipe	Fails residential fire flow requirement	Upgrade to 1,600 LF of 8-inch PVC pipe	Medium	$290,000
EWCIP-9	South Obispo Street Industrial Area Water Main Upgrade and Extension	From Fir Street to 3rd Street	500 LF 8-inch AC pipe	Fails industrial fire flow requirement	Upgrade to 500 LF of 10-inch PVC pipe	Medium	$450,000
		At 3rd Street to existing Apio Water Main	300 LF of new water main recommended		Install 300 LF 10-PVC pipe		
		Apio property from Obispo Street to Guadalupe Street	1,500 LF 8-inch AC pipe		Upgrade to 1,500 LF of 10-inch PVC pipe		
EWCIP-10	8th Street Waterline Extension	From 10th Street to 9th Street	500 LF of new water main recommended	Fails commercial fire flow requirement (Dead-end main)	Install 500 LF of 8-inch PVC pipe	Medium	$90,000
EWCIP-11	North Obispo Street Industrial Area Pipe Upgrade*	From 10th Street to 12th Street	960 LF of 4-inch AC pipe	Fails industrial fire flow requirement	960 LF of 10-inch AC pipe	Medium	$190,000

*This project requires that the EWCIP-6 pipeline upgrade is completed

Table 9-5: Capital Improvements for Deficiencies Under Future Conditions							
Project	**Project Name**	**Location**	**Existing Facility**	**Deficiency**	**Capital Improvement Project (CIP)**	**Priority (Development Phase)**	**Cost ($)**
FWCIP-1	DJ Farms Groundwater Supply Well	TBD	NA	Future Supply	Min. 800 gpm well	DJ Phase 1	variable
FWCIP-2	DJ Farms Phase 1 Storage Tank	DJ Farms Development	NA	Future Storage	One 350,000 gallon Storage Tank	DJ Phase 1	$760,000
FWCIP-3	DJ Farms Booster Pump Station	DJ Farms Development	NA	Future Pressure and Flow Demands	Booster Pump Station (Facilities sized for buildout)	DJ Phase 1	$600,000
FWCIP-4	DJ Farms Phase 2 Storage Tank	DJ Farms Development	NA	Future Storage	Second 350,000 gallon Storage Tank	DJ Phase 2	$760,000
FWCIP-5	DJ Farms Booster Pump Station Expansion	DJ Farms Development	NA	Future Pressure and Flow Demands	Replace pumps and VFDs	DJ Phase 2	$180,000



City of Guadalupe Water Master Plan Update

Figure 9-1:

CIPs For Existing Demand Deficiencies

Legend

City Water Mains

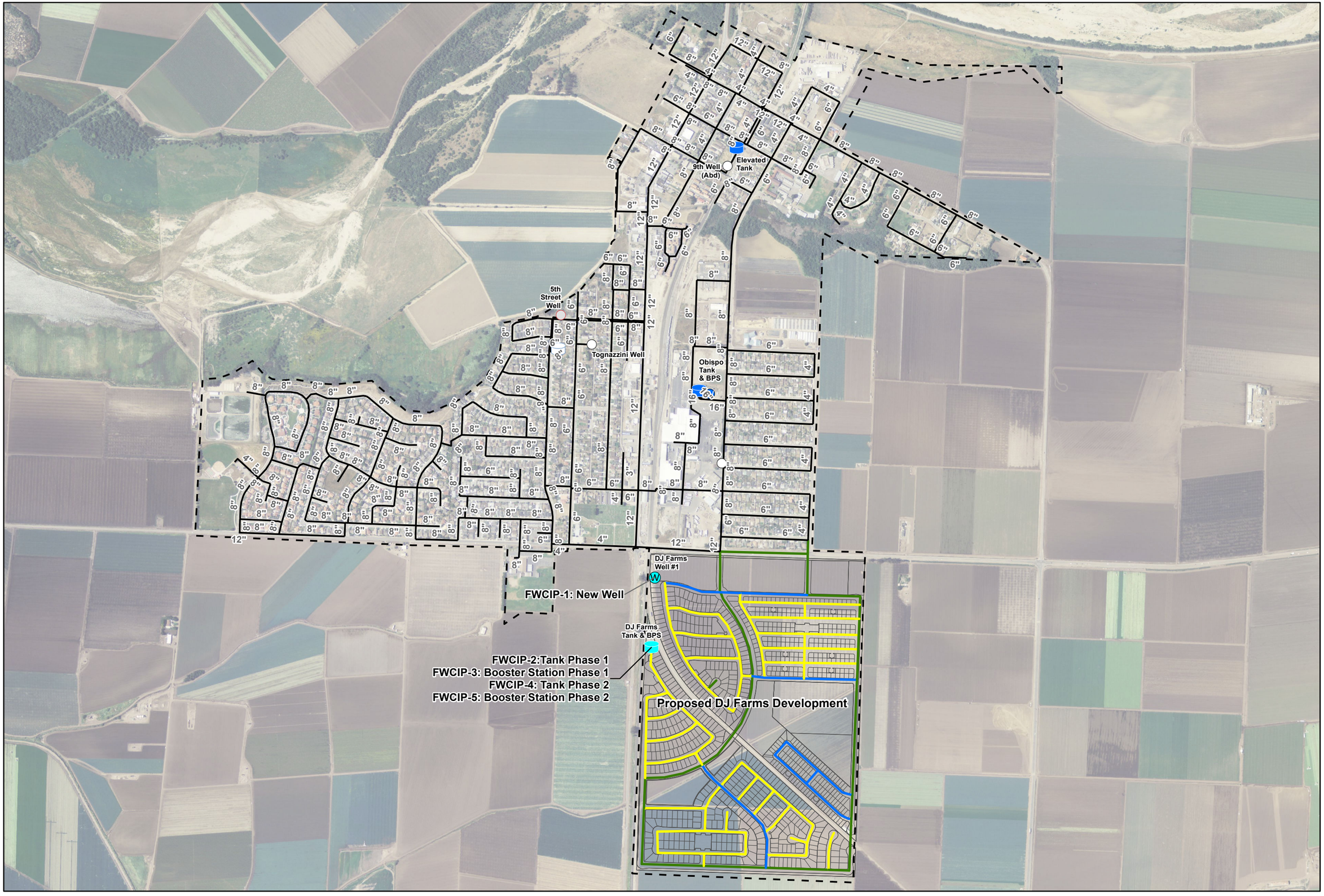
- City Water Mains
- Well (Production)
- Wells (Stand-by)
- Tanks
- Wells (Offline)
- Tank (Offline)

Waterline Project Name

- EWCIP-3
- EWCIP-5
- EWCIP-6
- EWCIP-7
- EWCIP-8
- EWCIP-9
- EWCIP-10
- EWCIP-11
- City Limits

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.



City of Guadalupe Water Master Plan Update

Figure 9-2:

CIPs For Future Demand Deficiencies

Legend

City Water Mains

- City Water Mains
- Well (Production)
- Wells (Stand-by)
- Tanks
- Wells (Offline)
- Tank (Offline)
- New Tank
- New Well
- DJ_Farms
- City Limits

1 inch:1,000 feet

MAP NOTES:
2012 AERIAL PHOTO PROVIDED BY USDA.
PARCEL BASEMAP PROVIDED BY COUNTY OF SANTA BARBARA GIS.

APPENDIX A

FLUID RESOURCE MANAGEMENT FIRE HYDRANT FLOW TEST WORKSHEET

FLUID RESOURCE MANAGEMENT
FIRE HYDRANT FLOW TEST WORKSHEET

WATER SYSTEM City of Guadalupe

DATE 10/3/2013
TIME 9:27am

Flowing Hydrant(s)	Concurrent Flow			Residual Hydrant	
	# 1	# 2	# 3		
Hydrant #	168			Hydrant #	147
Static Pressure (psi)	65			Static Pressure (psi)	62
Test Gauge #	1			Residual Pressure (psi)	56
Pitot Pressure (psi)	45			Test Gauge #	2
Test Gauge #	1a			Tested by	R.Ellison
Nozzle Size (inches)	2.5				
Nozzle Coefficient					
Hydrant Flow (gpm)	1026				
Tested by	R. Ellison				
Projected Flow @ 20 psi	2450.6999	#DIV/0!	#DIV/0!		

Comments :

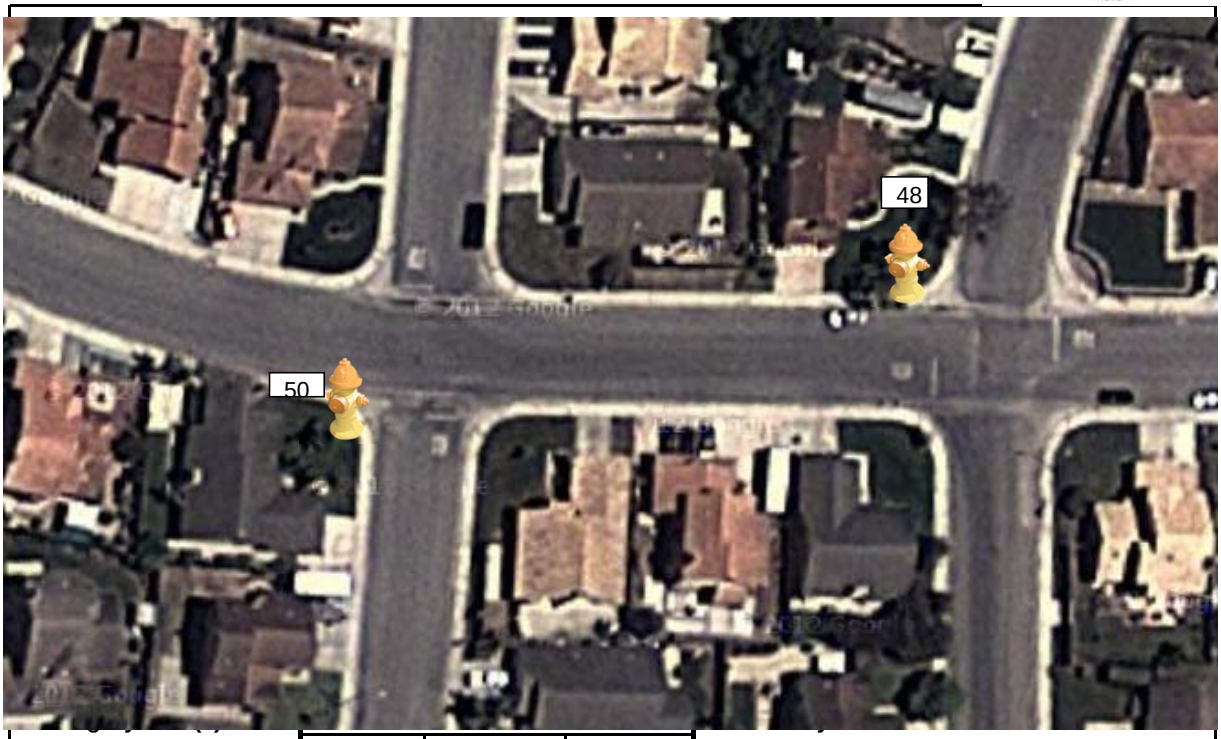
Fire Hydrant is served by booster station. Booster station is made up of (3) 20hp Pumps and 3) 75hp pumps
The calculation of projected flow is theoretical given that the system is served by a booster station.
If precise values for higher flows are required, additional hydrants should be flowed concurrently.

FLUID RESOURCE MANAGEMENT
FIRE HYDRANT FLOW TEST WORKSHEET

REGISTERED PROFESSIONAL ENGINEER
ROBERT S. MILLER
No. 57474
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

WATER SYSTEM City of Guadalupe

DATE 10/3/2013
TIME 10:16-10:28am



	# 1	# 2	# 3		
Hydrant #	50			Hydrant #	48
Static Pressure (psi)	68			Static Pressure (psi)	68
Test Gauge #	1			Residual Pressure (psi)	42
Pitot Pressure (psi)	30			Test Gauge #	2
Test Gauge #	1a			Tested by	R.Ellison
Nozzle Size (inches)	2.5				
Nozzle Coefficient					
Hydrant Flow (gpm)	852				
Tested by	R. Ellison				
Projected Flow @ 20 psi	1187.1088	#DIV/0!	#DIV/0!		

Comments :

Fire Hydrant is served by booster station. Booster station is made up of (3) 20hp Pumps and 3) 75hp pumps
The calculation of projected flow is theoretical given that the system is served by a booster station.
If precise values for higher flows are required, additional hydrants should be flowed concurrently.

FLUID RESOURCE MANAGEMENT
FIRE HYDRANT FLOW TEST WORKSHEET

REGISTERED PROFESSIONAL ENGINEER
ROBERT S. MILLER
No. 57474
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

WATER SYSTEM City of Guadalupe

DATE 10/3/2013
TIME 9:48-10:00am

Flowing Hydrant(s)	Concurrent Flow			Residual Hydrant	
	# 1	# 2	# 3		
Hydrant #	216			Hydrant #	215
Static Pressure (psi)	66			Static Pressure (psi)	66
Test Gauge #	1			Residual Pressure (psi)	41
Pitot Pressure (psi)	35			Test Gauge #	2
Test Gauge #	1a			Tested by	R.Ellison
Nozzle Size (inches)	2.5				
Nozzle Coefficient					
Hydrant Flow (gpm)	914				
Tested by	R. Ellison				
Projected Flow @ 20 psi	1271.1964	#DIV/0!	#DIV/0!		

Comments :

Fire Hydrant is served by booster station. Booster station is made up of (3) 20hp Pumps and 3) 75hp pumps
The calculation of projected flow is theoretical given that the system is served by a booster station.
If precise values for higher flows are required, additional hydrants should be flowed concurrently.

FLUID RESOURCE MANAGEMENT
FIRE HYDRANT FLOW TEST WORKSHEET

REGISTERED PROFESSIONAL ENGINEER
ROBERT S. MILLER
No. 57474
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

WATER SYSTEM City of Guadalupe

DATE 10/3/2013
TIME 10:47am

Flowing Hydrant(s)	**Concurrent Flow**			**Residual Hydrant**	
	# 1	**# 2**	**# 3**		
Hydrant #	129			Hydrant #	128
Static Pressure (psi)	66			Static Pressure (psi)	66
Test Gauge #	1			Residual Pressure (psi)	51
Pitot Pressure (psi)	45			Test Gauge #	2
Test Gauge #	1a			Tested by	R.Ellison
Nozzle Size (inches)	2.5				
Nozzle Coefficient					
Hydrant Flow (gpm)	1026				
Tested by	R. Ellison				
Projected Flow @ 20 psi	1881.1957	#DIV/0!	#DIV/0!		

Comments :

Fire Hydrant is served by booster station. Booster station is made up of (3) 20hp Pumps and 3) 75hp pumps
The calculation of projected flow is theoretical given that the system is served by a booster station.
If precise values for higher flows are required, additional hydrants should be flowed concurrently.