Blue Lake Springs Mutual Water Company

WATER SYSTEM IMPROVEMENT
USDA PRELIMINARY ENGINEERING REPORT
FINAL

November, 2016

Prepared By:

MC Engineering, Inc.
1000 River Rock Dr., Ste. 205
Folsom, CA 95630

Certification

This report was prepared under the direction and supervision of the following California Registered Professional Civil Engineers:

APPROVED FOR RELEASE:

_____

John Pedri, P.E.
Project Manager

Contents

Appendices

Appendix A – American Community Survey

Appendix B – CCWD and Board Resolution No. 2015-57

Appendix C – Technical Memorandum No. 1

Appendix D – BLSMWC Water Master Plan

Appendix E – Technical Memorandum No. 2

Appendix F – Current Operating Budget

Appendix G – BLSMWC By-Laws

Appendix H – BLSMWC FY 2016 Budget

Appendix I – BLSMWC Yearly Inspection

Appendix J – BLSMWC System Breakdown

Appendix K – Leak and Complaint Log

FIGURES

ABBREVIATIONS

ADD – Average Day Demand
AES – Analytical Environmental Services
AMI – Advanced metering infrastructure
AMR – Automatic meter reading
AWWA – American Water Works Association
CCR – Consumer Confidence Report
CDPH – California Department of Public Health/SWRCB
CEQA – California Environmental Quality Act
CFR – Code of Federal Regulations
BLSMWC – Blue Lake Springs Mutual Water Company
CCWD – Calaveras County Water District
CT – Contact Time
DBP's – Disinfection Byproducts
EDU – Equivalent Dwelling Unit
FPS - Feet Per Second
gpd – Gallons Per Day
gpm – Gallons Per Minute
LAFCO – Local Agency Formation Commission
MCL – Maximum Contaminant Level
MDD – Maximum Day Demand
MFD – Multi-Family Dwelling
MGD – Million Gallons Per Day
MPN – Most Probable Number
NEPA – National Environmental Policy Act
NRW – Non-Revenue Water
NTU – Nephelometric Turbidity Unit
OSHA – Occupational Safety and Health Administration
PCA – Possible Contaminating Activities
PER – Preliminary Engineering Report
PHD – Peak Hourly Demand
PLC – Programmable Logic Controller
PSI - Pounds Per Square Inch
PVC – Polyvinyl Chloride
RDA – Rural Development Agency
SIV – System Input Volume
SCADA – Supervisory Control and Data Acquisition
SFD – Single-Family Dwelling
TDH – Total Dynamic Head

USDA - United States Department of Agriculture
USGS – United States Geological Survey
VFD – Variable Frequency Drive
WTP - Water Treatment Plant

ACKNOWLEDGEMENTS

Blue Lake Springs Mutual Water Company Board of Directors

Robert J.P. Maginnis – President
Lee Bateman
Dave Owen
Paul Penny
Andy Rich
Tom Schneider- Treasurer
Sharon Tobias

Management Staff

General Manager-Dave Hicks
Lee Schmedes- Administrative Operations Manager
Pam Bowman- Accounts Manager

Consultant Staff

MC Engineering, Inc.

Mark Carey, P.E. – Principal
John Pedri, P.E. – Project Manager
Richard Relyea, BSME – Associate Engineer

i. BACKGROUND

This Preliminary Engineering Report (PER) was prepared for the Blue Lake Springs Mutual Water Company (BLSMWC) by MC Engineering, Inc. in accordance with the guidelines provided by the United States Department of Agriculture (USDA) Rural Development Agency (RDA) in order to meet Code of Federal Regulations (CFR) Part 1780 requirements as part of the funding application for proposed projects. The USDA guidelines require the analysis and discovery of implications for project related factors that include, but are not limited to, the following: environmental impact(s), project sustainability, technical feasibility, water and energy efficiency, economic feasibility, life-cycle analysis, and the awareness and support of the general public. These factors, implications, and costs are discussed in the body of this PER.

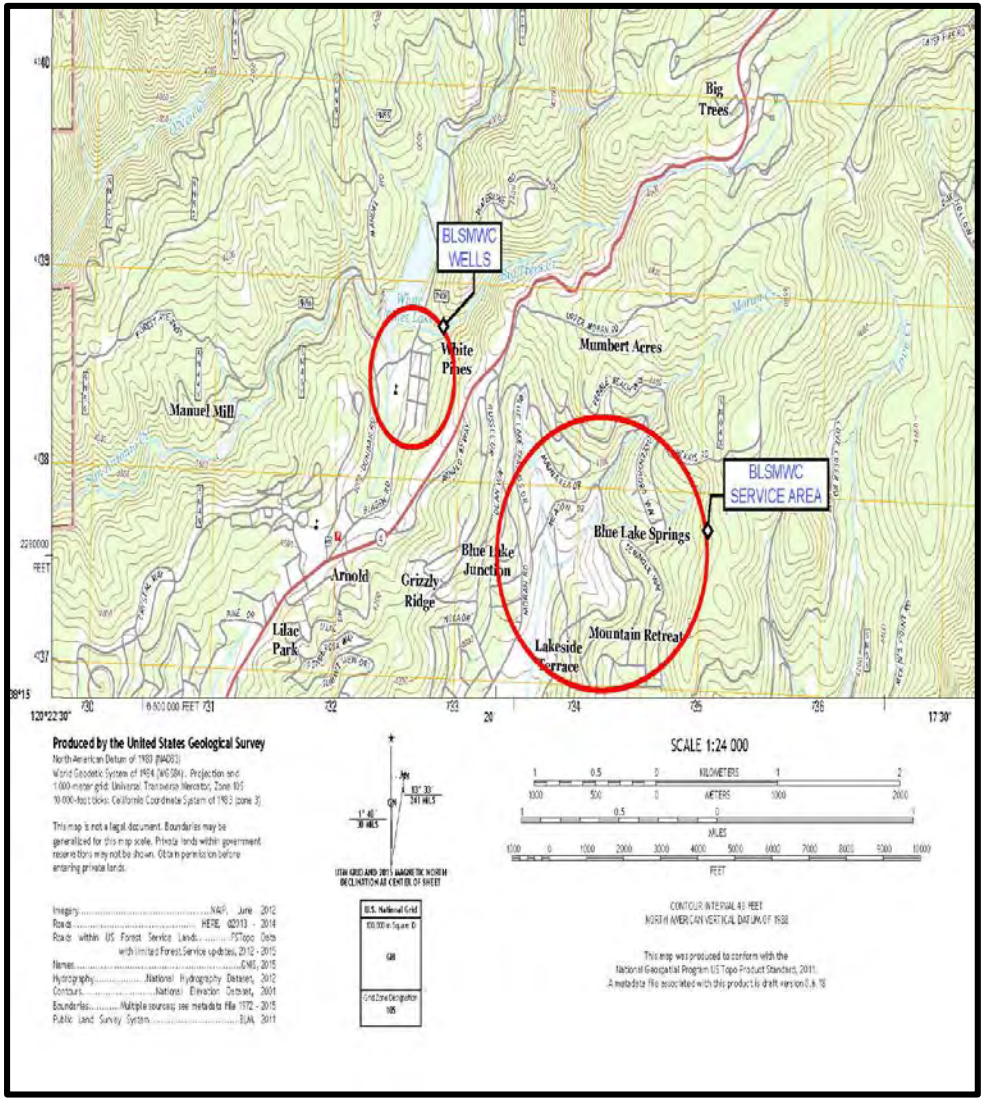
The report includes a compilation of both past and current water distribution system operations data that has been evaluated and prioritized in order to develop a list of proposed projects to be funded by the USDA Rural Development, as required for the associated Loan Application and Funding Program. The prioritized water system projects, as approved by the BLSMWC's Board of Directors and General Manager, are evaluated for possible environmental impacts, both during and following construction, in accordance with CEQA and NEPA guidelines by others. This PER document is included within, and as a part, of the overall project funding application.

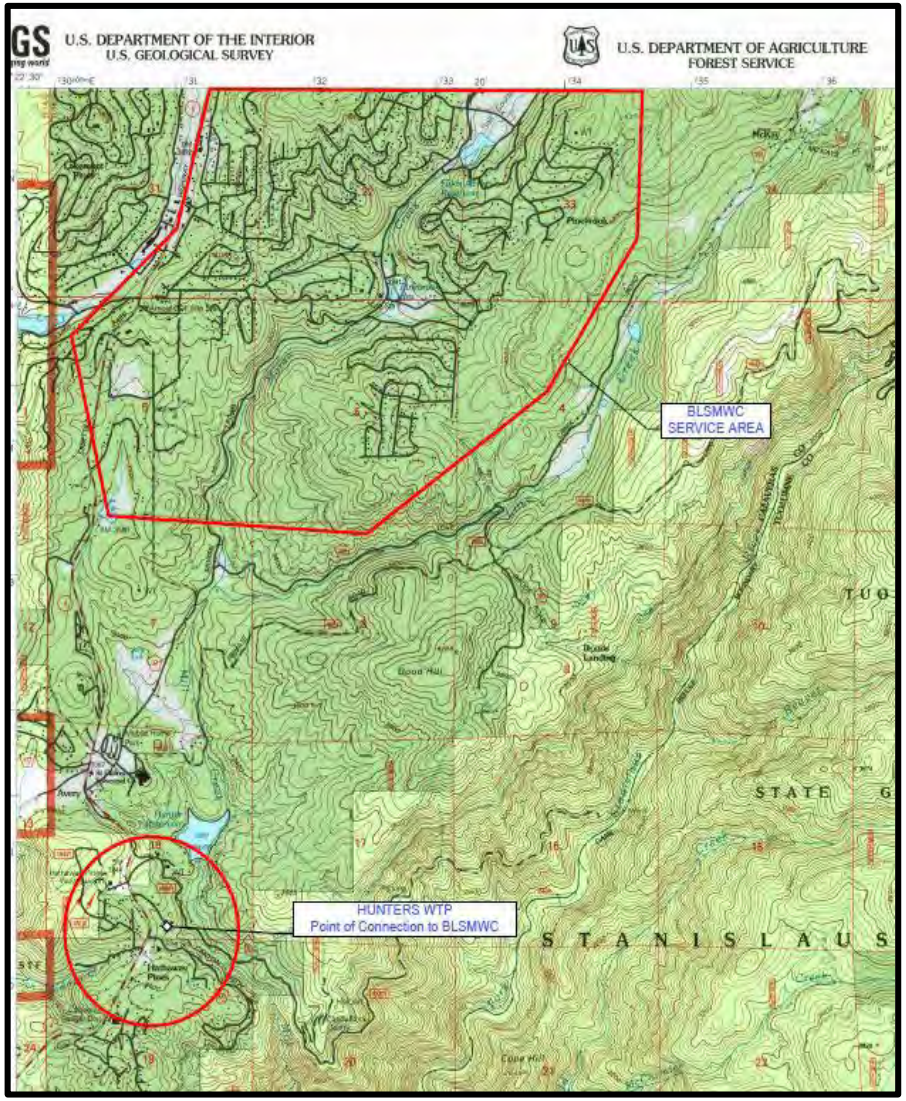
1. PROJECT PLANNING

1.1 PROJECT LOCATION

The Blue Lake Springs Mutual Water Company (BLSMWC) was formed on June 22, 1962 (Secretary of State) and is located in the westerly portion the Town of Arnold, along State Route 4, in Calaveras County, with the primary purpose of providing potable water to the parcel owners within the Blue Lake Spring Development. The BLSMWC is approximately is 3.365 square miles in size, with an average elevation of 4,500 feet above sea level (US Census, USGS). Various system maps **(Figures 1.1a, 1.1b, and 1.1c)** are presented below that depict the extent of the BLSMWC service area. **Figure 1.1d** below shows the BLSMWC proposed projects and repairs.

Figure 1.1a USGS Map





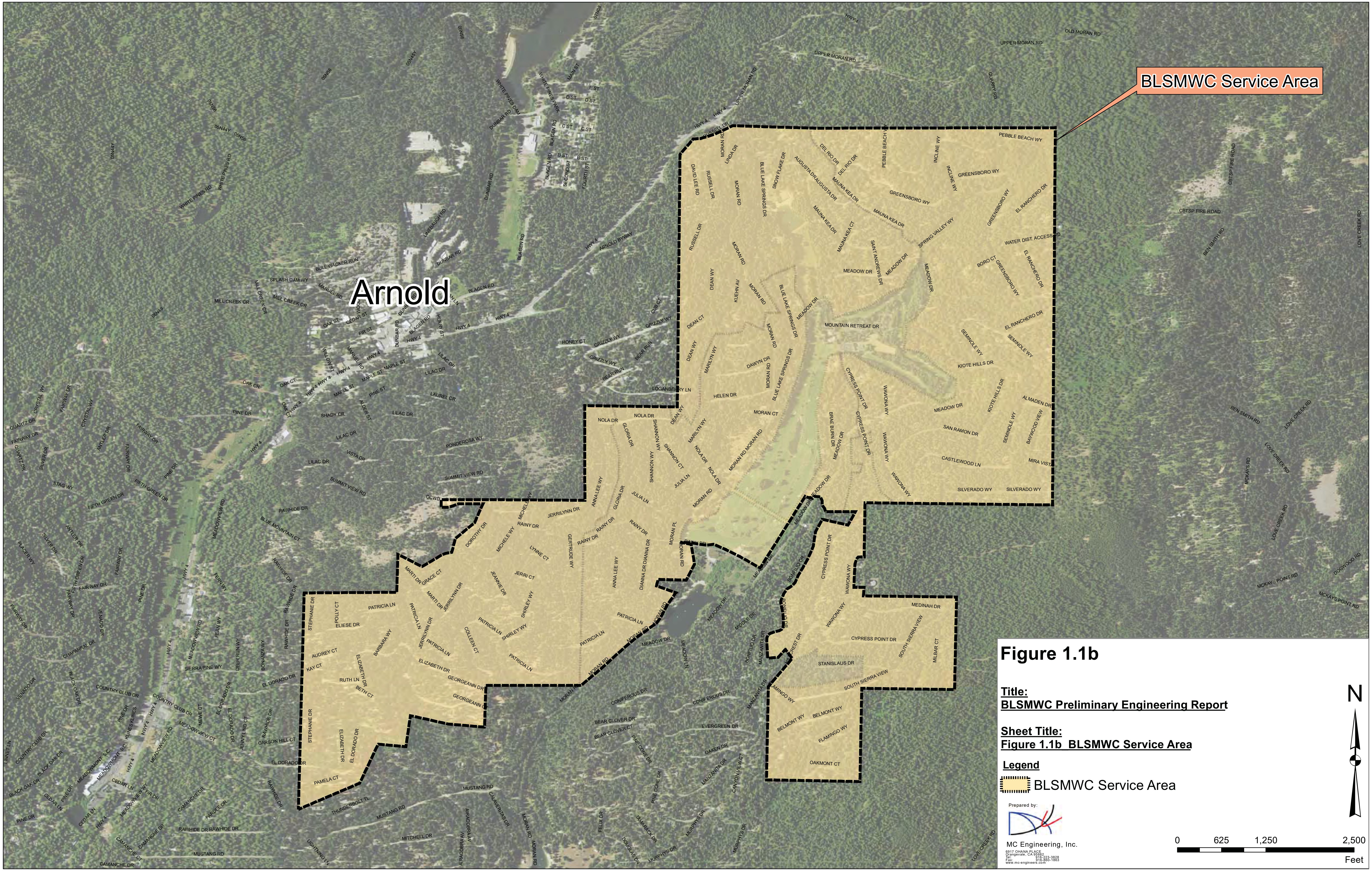


Figure 1.1b

Title:
BLSMWC Preliminary Engineering Report

Sheet Title:
Figure 1.1b BLSMWC Service Area

Legend

BLSMWC Service Area

N

Prepared by:
MC Engineering, Inc.

0 625 1,250 2,500
Feet

Figure 1.1c

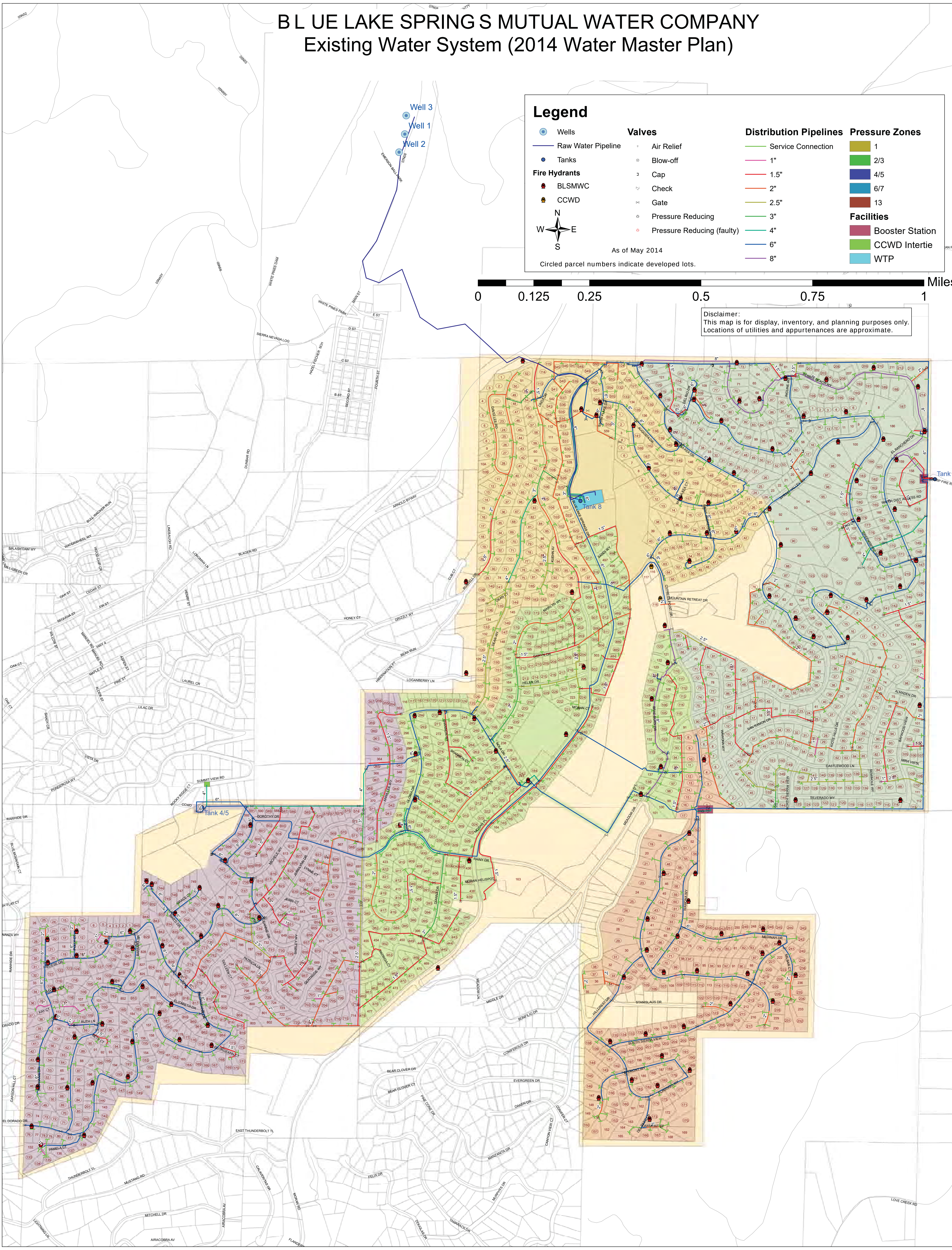

B L UE LAKE SPRING S MUTUAL WATER COMPANY
Existing Water System (2014 Water Master Plan)
Legend
Wells
Raw Water Pipeline
Tanks
Fire Hydrants
BLSMWC
CCWD
Valves
Air Relief
Blow-off
Cap
Check
Gate
Pressure Reducing
Pressure Reducing (faulty)
Distribution Pipelines
Service Connection
1"
1.5"
2"
2.5"
3"
4"
6"
8"
Pressure Zones
1
2/3
4/5
6/7
13
Facilities
Booster Station
CCWD Intertie
WTP
As of May 2014
Circled parcel numbers indicate developed lots.
Miles
0
0.125
0.25
0.5
0.75
1
Disclaimer:
This map is for display, inventory, and planning purposes only.
Locations of utilities and appurtenances are approximate.
Well 3
Well 1
Well 2
Tank 8
Tank 6
Tank 4/5

Figure 1.1d

Legend

- Wawona
- Patricia
- Blue Lake Springs
- San Ramon
- Rainy
- Dean
- Julia
- BLSMWC Pipes

Title:
Figure 1.1d

- PRVs Recommended for Replacement
- Fire Hydrants Recommended for Replacement
- Pump Station

Zone

- 1
- 13
- 2/3
- 4/5
- 6/7

N

0 500 1,000 2,000
Feet

Prepared by:
MC Engineering, Inc.
6917 OHANA PLACE
Orangevale, CA 95662
Phone: 916-223-3828
Fax: 916-860-1863
www.mc-engineers.com

1.2 ENVIRONMENTAL RESOURCES PRESENT

The BLSMWC, through MC Engineering, Inc., retained Analytical Environmental Services (AES), based in Sacramento, CA, to prepare the environmental documentation for the projects recommended in this report. Details regarding existing environmental resources and related environmental impacts can be found in related reports prepared by AES for California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) compliance. These documents will be presented as part of the USDA application and will adhere to Federal Regulations 1970.

1.3 POPULATION TRENDS

According to the 2010 US Census, the Arnold Census Designated Place (CDP) had a population of 3,842 which represents a 1.5% increase since the 1990 census. (The population had increased 10% in the 1990's only to later decrease during the subsequent recession.) Growth in the actual BLSMWC service area is limited to the build-out of the remaining 312 unimproved lots, and connections have been added at a rate of approximately 0.6% per year."

Table 1.3a, below, details US Census data for the Arnold CDP.

Table 1.3a
US Census Data for Arnold CDP

US Census Year	Population
2010	3,843
2000	4,218
1990	3,788

Median Household Income for the Arnold Area CDP, as reported by the 2008-2012 American Community Survey is $55,625 (see **Appendix A-American Community Survey**)

Table 1.3b, below shows the current and future service connections.

Table 1.3b
Current and Future Service Connections

Service Connection Type	Current	Growth	Build-Out[1]
Total Residential Services	1,708	312	2,023
Commercial Services	2	0	2
Irrigation Services	0	0	0
Public Authority Services	0	0	0
Total Service Connections	**1,710**	**312**	**2,025**

NOTES: 1) There are a total of 2,025 lots within the BLSMWC subdivision, which is the build-out capacity of the development

1.4 COMMUNITY PARTICIPATION

This document has been prepared based on the recommendation(s) of the Board of Directors of the Blue Lake Springs Mutual Water Company. The Board conducts monthly meetings which include public participation and comment every second Saturday of the month with minutes and agenda items posted regularly and made available electronically to the public via the Company's website. Public input is solicited and members of the public are encouraged to provide input at each monthly Board meeting.

This Preliminary Engineering Report is accompanied by Environmental Services performed in accordance with applicable requirements under the CEQA/NEPA guidelines. These guidelines include appropriate public notification and circulation of the draft and final CEQA/NEPA document(s) along with corresponding opportunities for public comment. Requirements under NEPA are addressed concurrent with the CEQA process including appropriate public notification, circulation of the draft NEPA specific findings, and corresponding opportunities for public review, comment, and participation.

2. EXISTING FACILITIES

2.1 SYSTEM DESCRIPTION AND LOCATION MAP

The Blue Lake Springs Mutual Water Company was formed in 1962 and a majority of the water system was constructed in the 1960's through the 1970's to provide potable drinking water to its customers within the development with the primary water supply source being groundwater. Groundwater supply is currently acquired from three hard rock wells.

The water distribution system consists of 203,887 linear feet of water mains ranging in size from 1-inch to 8-inches in diameter. There are two 750,000-gallon storage tanks which service 5 pressure zones along with various booster pumps located within the service area (**Figure 1.1c**). There are approximately 325 homes with meters at the time of this PER. The BLSMWC is currently installing meters on an as needed basis.

System input volume is currently metered at the water treatment plant. The BLSMWC has been installing individual household water meters (over 300 to date), and has recently made a decision to install meters on every lot within their boundaries. The decision to meter all customers is a vital component of this USDA funding request.

In the past the BLSMWC had acquired emergency water from the Calaveras County Water District (CCWD) to augment their groundwater supplies. On October 28, 2015, the BLSMWC entered into a twenty-year wholesale treated water agreement with the CCWD (see **Appendix B)**. The agreement establishes terms and conditions by which CCWD will provide potable water to the BLSMWC through a dedicated source meter, with an amount not exceeding 100,000 gallons per day. There are provisions within the agreement to allow the BLSMWC to purchase 100% of their water from the CCWD with the required payment of capacity charges and miscellaneous plant improvements necessary to serve the BLSMWC in the future.

2.2 SYSTEM CONSTRUCTION HISTORY

The BLSMWC has operated the water system since 1967. It currently provides potable water service to 1,710 active customers on improved parcels. There are a total of 2,025 parcels within the BLS development, of which 315 parcels remain unimproved. The BLSMWC has installed over two hundred 5/8-inch water meters and will have over tree hundred meters installed within the next twelve months. Due to high system operating pressures, each home is required to maintain a pressure reducing valve between the house and the property line and/or meter.

A detailed description of a proposed new meter installation program can be found in **Appendix C – Technical Memo No. 1.**

Table 2.2a, below, contains a brief construction history of the BLSMWC's facilities.

Table 2.2a
Blue Lake Springs Mutual Water Company
Water System Improvement Project History

System Component	Date Constructed	Date Upgraded	ADWF Design Capacity (1)
Wells	**1969-2016**		
Well No. 1 (White Pines)	1986		NA
Well No. 2 (White Pines)	1986	No Information	70 GPM
Well No. 3 (White Pines)	1986		280 GPM
Well No.4 (Lucia)	2016		70 GPM
Raw Water Line	1986	On-going	Varies
Water Treatment Plant (3)	1987	On-going	400 GPM
Booster Pump Stations	**1969-1987**		
WTP (2 ea,75 HP)	1987	Minor	200-350 GPM (ea.)
Cypress Point	1969	NA	Unknown
Distribution System	**1966-1980**	On-going	Varies
Storage System	**1969-2006**		1.5 MG
Tank No. 4	1992	1992	0.75 MG
Tank No. 6	1992	1992	0.75 MG
Clearwell	1970	2006	0.155 MG
CCWD Inter-tie Linda/Tank 4 **(2)**	2016	NA	0.1 MGD

1) Data obtained from interviews, WMP, and various records as supplied to MC Engr. by staff
2) Refer to recently approved agreement between CCWD and the BLSMWC, dated 10/2015
3) Original WTP abandoned and fully upgrade in 1987

2.3 REGULATORY COMPLIANCE, REPORTING, AND HISTORIC USE

The water facilities are governed and monitored by various agencies and regulations; including and not limited to:

- The BLSMWC is regulated according to standards set in the State's Safe Drinking Water Act (SDWA) guidelines and applicable section under Titles 17 and 22 of the California Code of Regulations for surface water treatment facilities. (water system)
- California Water Resources Control Board-Division. of Drinking Water- (Title 17 and 22 and CA Waterworks Standards)
- California Code of Regulations (CCR) Title 23-hazardous/Title 27 non-hazardous (waste disposal)
- Calaveras County Department of Environmental Health (hazardous storage & risk assessment, septic systems)
- National Electrical Codes-NEC (electrical)
- California Code of Regulations-CCR's- Title 8-Cal/ OSHA (safety)
- Calaveras County Department of Public Works (R/W, encroachment permits)
- Calaveras County Building Department (building permits, structures)
- Us Forest Service (open space, R/W, environmental)
- California Public Utilities Commission- G.O. No. 103- (design standards-mutual water companies)
- Calaveras County Water District- (design standards, contractual use, and groundwater management)

The WTP operates under the authority of the California Water Resources Control Board-Division of Drinking Water, District 10 in Stockton, California. The BLSMWC provides monthly and yearly reports to District 10, formerly known as the California Department of Public Health. Periodically the DDW will conduct field inspections of the BLSMWC facilities. The last DDW inspection was conducted on July 11, 2014, and the BLSMWC was in compliance, except for some minor improvements that were required.

The BLSMWC's water distribution system currently contains 203,887 linear feet of mainline piping, forty- four (44) pressure reducing stations, two (2) storage tanks, ninety (90) fire hydrants, 2,025 service laterals (1,710 active), and other miscellaneous appurtenances which include isolation valves and blow-offs.

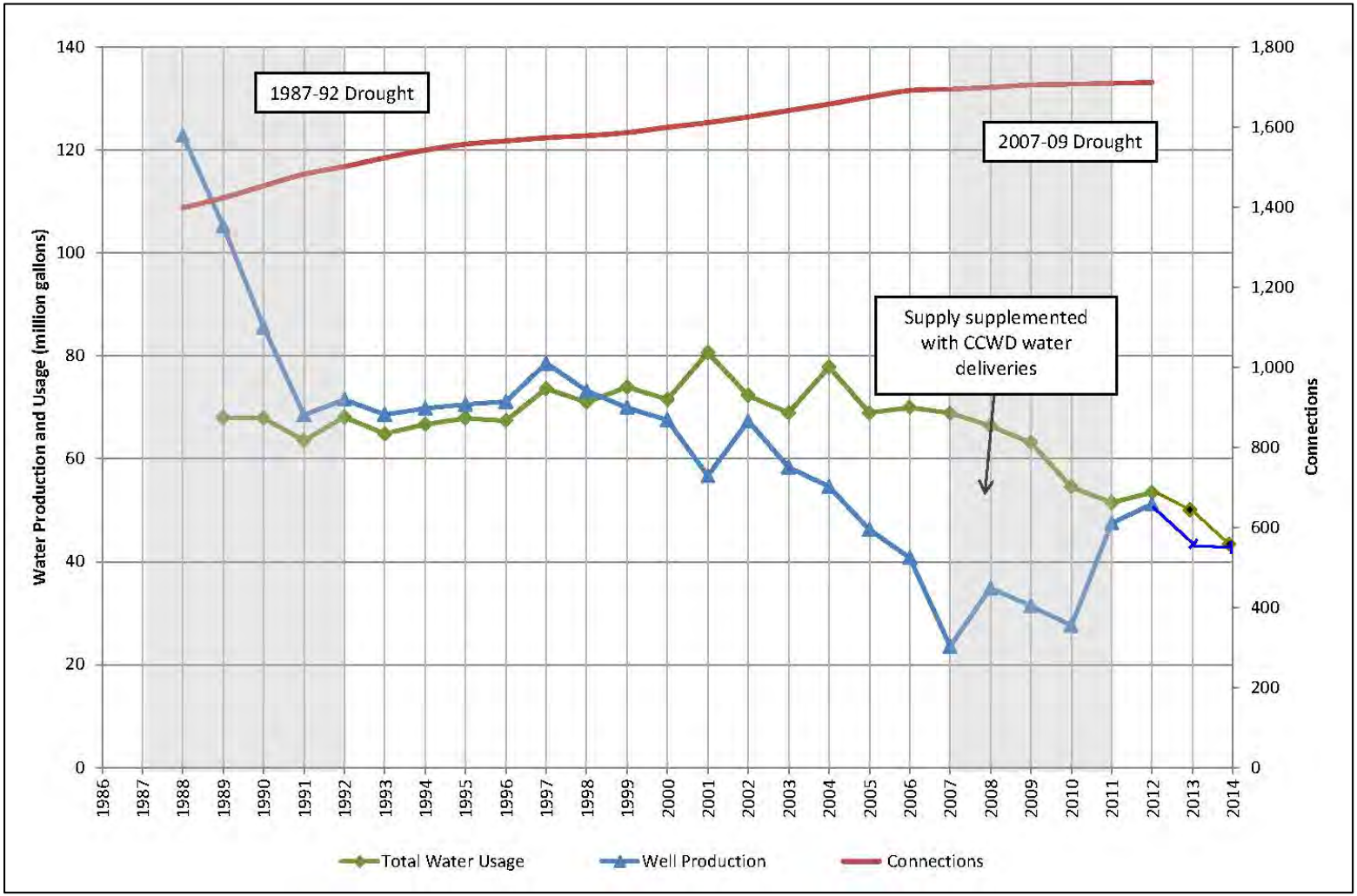
The lack of adequate water pressures and carrying capacity of the pipelines does not allow the BLSMWC to meet the minimum fire flow requirements as established by the California Fire Code. The fire code sets a minimum standard of 1000 GPM for a 2-hour period. Furthermore, the California Public Utilities Commission/ General Order 103, specifies that each water system must be operated in a manner to assure that the minimum operating pressure at each

house service connection is maintained at a level no less than 40 psi and no more than 125 psi. Order 103 also requires a minimum distribution mainline pipe diameter of 6-inches, primarily for fire protection.

Based on information provided to MC Engineering it appears that the BLSMWC has met Drinking water compliance standards. In addition to annual reports provided to each customer, monthly and quarterly reporting is provided to the California Department of Public Health. However, the distribution system has encountered more serious and ongoing health related water quality problems due to pressure issues, both low and high, along with disinfection related problems resulting from water main and service line leaks. Three of the most significant problems facing the BLSWMC operations staff are the size of the water mains, the ability of the staff to access both mains and services for maintenance and repair, and the old and deteriorated condition of water mains located throughout the BLSMWC leading to a relatively high failure rate and future risk.

The historical annual water use and number of service connections are depicted below in **Figure 2.3a,** for the period from 1989 to 2012. The BLSMWC added service connections at an average rate of 10 connections per year (or a growth rate of approximately 0.6 percent), with most service connections added prior to 1996. There was a higher rate of connections added between 2001 and 2007, but very few after 2007.

Figure 2.3a
Historic Water Production and Usage



The annual water demands and usage have been relatively consistent over the last 10 years. However, reductions were realized over the last 3 years as a result of the drought and reduced availability of water leading to more aggressive conservation efforts. The table below includes a six-year history of water use within the BLSMWC **(Table 2.3a)**:

Table 2.3a
Historic Water Use (MG/YR)

Water Supply Sources	2010	2011	2012	2013	2014	2015
Groundwater (BLSMWC)	54.51	51.48	53.48	49.58	46.26	34.60
Surface Water (CCWD)	0	0	0	6.59	0	3.04
Total Supply	**54.51**	**51.48**	**53.48**	**56.17**	**46.26**	**37.64**

Since 2013, due in part to the ongoing drought and water use restrictions imposed by the BLSMWC, water usage has decreased by 33%. The well production also decreased as a result of a drop in the groundwater table during the drought periods. As a result of the CCWD agreement, approved in October of 2015, the use of treated surface water has recently increased. This new treated surface source will be used on a daily basis to conjunctively supplement the existing groundwater sources (refer to **Section 2.4.1**). Additional information on well production and operational history can be found within the BLSMWC WMP (**Appendix D**).

As a part of the WMP, calculations were made to project the water requirements for future years based on the development buildout assuming the maximum day demand only increases from 0.46 MGD to 0.54 MGD. This represents an increase of only 80,000 gallons annually. The projected increase assumes an additional 310 new improved parcels at buildout, as presented in **Table 2.3b**, below.

Table 2.3b
Existing and Future Water Demand [4]

Level of Service	Average Day Demand (ADD) [1]		Maximum Day Demand[2]		Peak Hour Demand[3]
	MGD	gpm	MGD	gpm	gpm
Existing (1,714 connections)	0.21	144	0.46	316	474
Build-out	0.24	170	0.54	375	560

Notes: (1) ADD = 121 GPD per Service Connection
(2) MDD = ADD x 2.2 (or 266 GPD per Service Connection)
(3) PHD = ADD x 3.3
(4) Per the BLSMWC 2014 WMP

2.4 CONDITION OF EXISTING FACILITIES

This section details the current conditions of the various components of the water system. These components include: wells, water treatment, distribution, storage, pumping, and operational management.

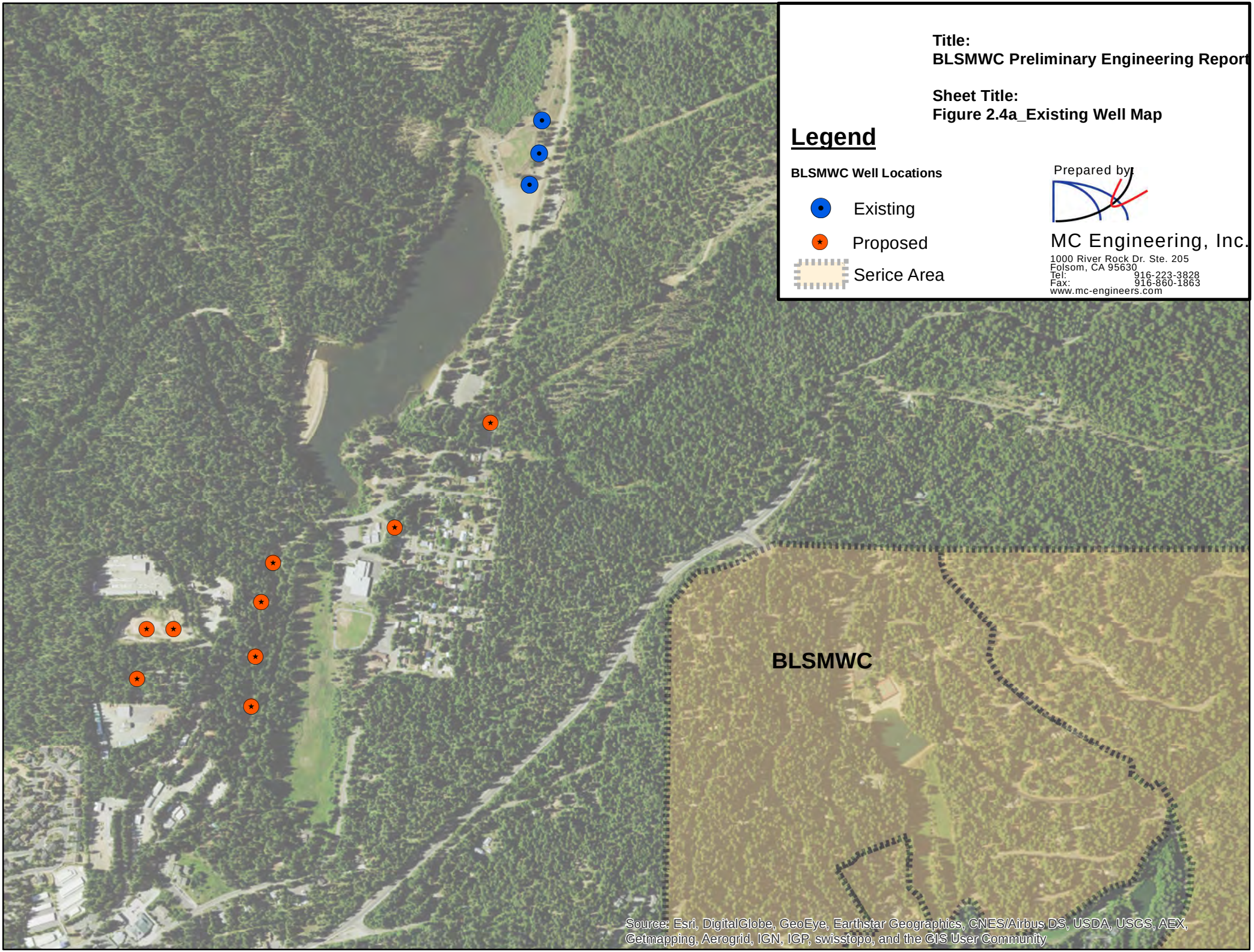
In 2014, a Water Master Plan (WMP) was prepared by Luhdorff and Scalmanini (LS), of Sacramento, CA, which included a system-wide evaluation of all water facilities and components. A list of improvement projects was recommended within the WMP. Since 2014, the BLSMWC has made various improvements to their wells and water treatment plant facilities. The main focus of this PER is on the water distribution system and household metering. The distribution system and meters make up a large cost component of the overall system needs. This PER also includes a re-evaluation and prioritization of problematic water facilities within the distribution system. Critical operations related information used in this PER were provided by the BLSMWC's office and field staff.

2.4.1 RAW (GROUNDWATER) AND WHOLESALE WATER SUPPLY

Raw (Groundwater) Water Supply

The BLSMWC operates and maintains a raw water supply from wells located approximately one mile west of the BLSMWC's service area. The wells pump groundwater to the water treatment plant for subsequent iron and manganese removal and disinfection. The two primary wells have a combined capacity 350 GPM. The third well, which is not dependable, is used as emergency backup and has a production rate of less than 100 GPM.

The original water supply operating permit, issued by the Department of Public Health in 1980, included four supply wells and a treatment system for the removal of iron and manganese. The original wells were replaced in 1985 due to declining capacity and water quality and the new replacement wells (White Pines No. 1, 2 and eventually 3) were found to have significantly different water quality than the four original wells which required major changes to the water treatment facility. The wells were drilled and completed using funding obtained through a combination grants and loans from CCWD. The wells are currently owned jointly by CCWD and the BLSMWC with the latter responsible for operations and maintenance **(see Figure 2.4.1a).**



Title:
BLSMWC Preliminary Engineering Report

Sheet Title:
Figure 2.4a_Existing Well Map

Legend

BLSMWC Well Locations

- Existing
- Proposed
- Serice Area

Prepared by:

MC Engineering, Inc.
1000 River Rock Dr. Ste. 205
Folsom, CA 95630
Tel: 916-223-3828
Fax: 916-860-1863
www.mc-engineers.com

The White Pines Wells reportedly meet all CDPH primary MCL standards currently. There have been anomalous minor detections of contaminants (such as aluminum, nitrate and arsenic), but all were far below the MCL. However, secondary MCLs are exceeded for iron and manganese. Iron levels range primarily between 0.2-0.5 mg/L, with one recent anomalous high of 1.2 mg/L (MCL is 0.3 mg/L). Manganese levels have ranged between 100-500 µg/L (MCL is 50 µg/L). Hydrogen sulfide, though not regulated by an MCL, is another contaminant that contributes to the taste and odor problems. Hydrogen sulfide levels are between 40-100 µg/L. The water tends to be slightly basic with pH ranges from 6.8-7.9.

In 2013, two new groundwater sources were explored by BLSMWC, referred to as the Borad and Lucia wells (refer to **Figure 2.4.1a**, above). Both were sampled for Title 22 constituents for consideration as new water sources. The wells exhibited a similar chemical makeup to the White Pines wells. General parameters in the new wells were lower than the White Pines wells. Specific conductance levels are approximately 200 µS/cm, hardness was approximately 50 mg/L, alkalinity was found to be 90 mg/L, and pH was measured at 7.5 for the Lucia well and 8.1 for the Borad well. In 2015/16, the Lucia well became fully operational and productive.

The Lucia well had higher levels of iron (670 µg/L) and similar levels of manganese (170 µg/L) when compared to White Pines wells. Iron and manganese were non-detect in the Borad well. Arsenic, lead, and zinc were detected in the two wells, but all levels were less than half their respective MCLs. Additionally, both new wells had a detectable amount of toluene (8.1 and 3.5 µg/L), however, levels are much less than the MCL of 1000µg/L.

A detailed description of the wells and treatment systems can be found within the Water Master Plan, dated 2014. **(see Appendix D)** which is also summarized in **Table 2.4.1a**, below.

Table 2.4.1a
Wells and Treatment Systems

Source Capacity	Well Capacity	Total Source Capacity	Capacity Less Largest Well	MDD at Build-out	Surplus / Deficit
Existing Wells					
White Pines #2	70				
White Pines #3	280				
Total of Existing		350	70	375	-305
New Wells					
Lucia #1(New)	50	400	120	375	-255
Borad #1 (Future)	50	450	170	375	-205
Future Wells [1]					
Future Well 1	50	500	220	375	-155
Future Well 2	50	550	270	375	-105
Future Well 3	50	600	320	375	-55
Future Well 4	50	650	370	375	-5
Future Well 5	50	700	420	375	**45**
Future Well 6	50	750	470	375	**95**
Future Well 7	50	800	520	375	**145**

Within the last three years the BLSMWC has made various improvements to their wells and water treatment plant, including recent construction of a fully operational Well No. 4 (Lucia) at a cost of approximately $ 700,000 (2016).

Wholesale Water Supply (CCWD)

As noted in **Section 2.1**, the BLSMWC and the Calaveras County Water District entered into a wholesale water agreement, approved, October 28, 2015, to supply a specified quantity of treated surface water from the CCWD's Ebbett's Pass Water System. In the past, the BLSMWC was served by the CCWD on an "emergency" basis only to augment the lack of water supply during times of emergencies as a result of diminished groundwater supplies or other system problems. With the addition of the recent "Wholesale Water Agreement" with CCWD, the BLSMWC now has a dependable water supply, a commendable achievement.

The CCWD Ebbett's Pass Water System has surface water rights on the North Fork Stanislaus River and diverts through a tunnel tap from Spicer and McKay Reservoirs. The CCWD system supplies water to its 5,280 services (2014) and has plans for expanding up to 7,371 services at full buildout.

CCWD has maintained supply reliability even through the recent drought conditions. The Hunter Lake surface water treatment plant, which provides water to the Arnold area, has a maximum day capacity of 4 MGD, whereas the maximum day demand (MDD) of the system is approximately 3.5 MGD. For comparison, BLSMWC has a MDD of 0.54 MGD (per the 2014 WMP) at full build-out. The CCWD system is considered highly reliable and will provide a high level of security and backup to the customers of the BLSMWC.

2.4.2 WATER TREATMENT

The quality of the groundwater produced form the BLSMWC's wells exceeds the secondary maximum contaminant level (MCL) for manganese and contains elevated iron and hydrogen sulfide content which can also contribute to taste and odor problems thus leading to the need for subsequent water treatment. The treatment facilities include, and are not limited to, the following components and processes:

- 7200 linear feet of raw water transmission mains with PRV
- Chemical addition with static mixers and reaction vessels
- Calcium hypochlorite for disinfection and oxidation
- Multi-media manganese and iron filter system
- 150,000-gallon disinfection contact basin (Clearwell)
- High service booster pumps
- 30,000-gallon backwash tank and reclaimed system
- Supervisory Control and Data Acquisition (SCADA)

Three remote telemetry/SCADA links control processes at the water treatment plant, the booster stations, and the well system. The water treatment plant and Clearwell is located at 491 Blue Lake Springs Drive **(Figures 2.4.2a** and **2.4.2b,** below**)**

Figure 2.4.2a
BLSMWC Water Treatment Plant

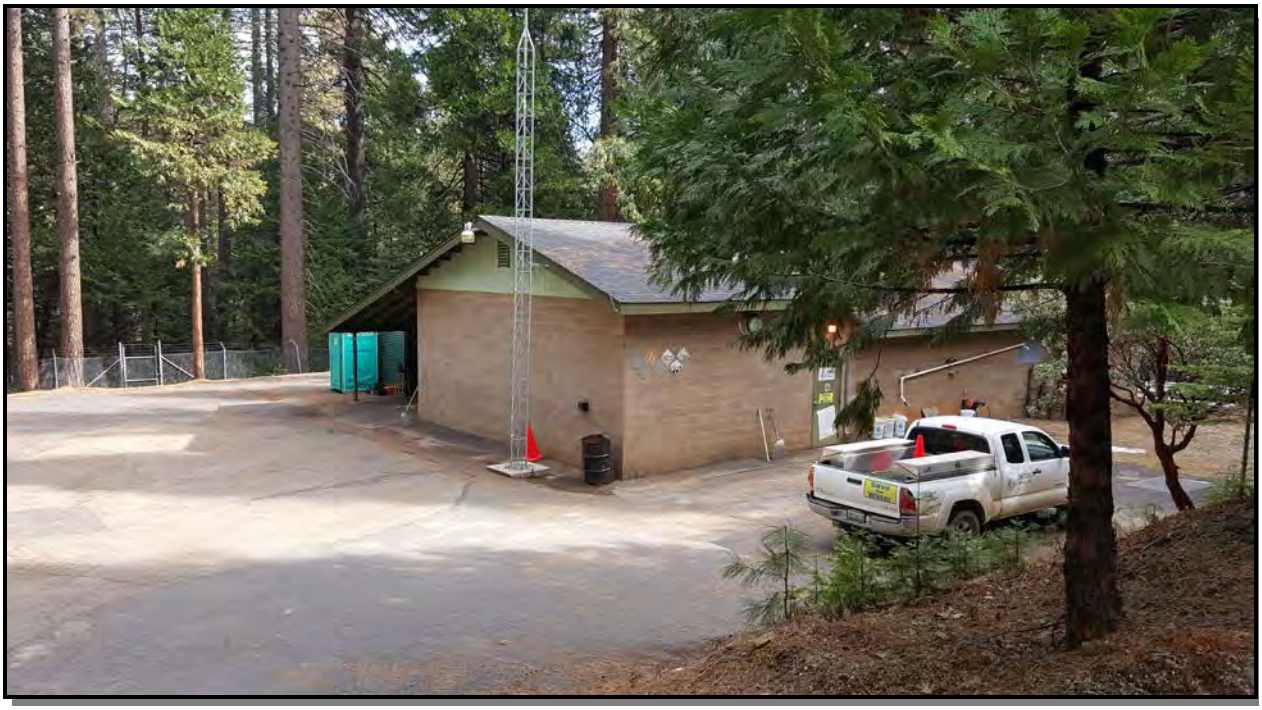


Figure 2.4.2b
BLSMWC Clearwell

It is important to note that proposed WTP projects, as a described in the WMP are **not a part of this PER.**

2.4.3 WATER STORAGE

In addition to the 203,887 linear feet of water mains making up the distribution system. There are two 750,000 storage tanks which service 5 pressure zones as described below:

Table 2.4.3a
Water Storage Tank Description

Status	Zone	Site	Tank Type	Total Capacity (gallons)	Tank Height (ft)	Inside Diameter (ft)	Tank Elevation (ft)
In Use	**4/5**	Tank No. 4	Bolted Steel-Glass	734,000	33.01	61.54	4361
In Use	**6/7**	Tank No. 6	Bolted Steel-Glass	734,000	33.01	61.53	4550
In Use	**All**	Clearwell	Bolted Steel-Glass	155,000	24.52	33.57	1580
In Use	**NA**	Backwash	Bolted Steel	30,000	0.77	22.38	WTP

The water storage system was evaluated for available storage and deficiencies as a part of the 2014 WMP. The prior evaluation was completed before the inter-connection agreement with the CCWD system was completed. The CCWD agreement now provides firm contractual treated water to the BLSMWC. The treated water from the CCWD could help provide an additional backup/redundancy for future and emergency water needs to other parts of the system not currently covered in the agreement. It is unknown at this point if the CCWD system can provide and/or enhance and improve the need for additional storage. The available storage design criteria, as utilized for the 2014 hydraulic model, takes into consideration the following four (4) storage components:

- **Operational Storage**- Operational storage is required to equalize supply and demand over periods of short-term high consumer demand
- **Fire Storage-** This requirement, as per the California Fire Code, recommends a flow rate of 1500 gpm over a two (2) hour period.
- **Emergency Storage-** Emergency storage is the volume of water held in residence to accommodate demand requirements in the event of prolonged power outages, mainline breaks, or other interruptions in supply.
- **Non-useable/dead Storage**- This typically includes storage found within the tanks that can cannot be easily utilized due to the location of inlet and outlet piping structures.

Table 2.4.3b below, is a summary of the storage evaluation as presented in the 2014 WMP, which evaluates available capacity based on current and future buildout. Based on the WMP criteria, currently there is adequate storage to meet existing growth, and ultimate buildout requirements.

Table 2.4.3b
BLSMWC Existing/Future Storage Requirements (1)

Storage Requirement	Existing Storage	Build-Out
Operational Storage Requirement	30,000	40,000
Fire Storage Requirement (1500 gpm x 2 hr.)	180,000	180,000
Emergency Storage Requirement	455,000	540,000
Unusable Storage Requirement 5% nominal tank size	35,000	40,000
Total Storage Requirement	700,000	800,000

(1) Data obtained from interviews, WMP, and various records as supplied to MC Engr., by staff

The water storage tanks are bolted steel and glass fused and are relatively new (1992). The tanks will have to be maintained through standard maintenance procedures including periodic tank inspections (internal and external). The last tank inspections were conducted in November of 2013 (Tank No.4) and in October of 2012 (Tanks No.6). The Clearwell tank was last inspected in January of 2015. It is not known if the tanks have cathodic protection systems, but at a minimum, the BLSMWC staff should provide necessary reserves to maintain tanks, including paining/coating. The recommended painting/coating should be at a minimum every 25 years, depending on the levels of corrosion encountered.

It is important to note that the proposed storage projects, as noted within the WMP, are **not a apart of this PER.**

2.4.4 WATER DISTRIBUTION SYSTEM

As described above, the BLSMWC's water distribution system currently includes 203,887 linear feet of mainline piping, forty-four (44) pressure reducing stations, two (2) storage tanks, ninety (90) fire hydrants, 2025 parcels and service laterals (1,710 active), and other appurtenances including isolation valves and blow-offs.

A majority of the main distribution pipelines were installed over 40 years ago, of which there are 111,144 linear feet of 6 and 8 inch mains and 92,743 linear feet of 1.5 to 4 inch and smaller mains. These undersized mains (4-inch or less) have created water pressure problems and do not meet industry standards. Most are not able to convey adequate and required fire flows to their respective service area(s). Furthermore, the California Public Utilities Commission, in

General Order 103, requires that each water system be operated in a manner to assure that the minimum operating pressure at each house service connection is not less than 40 psi and no more than 125 psi. General Order 103 also requires mains that are a minimum of 6-inches in diameter, primarily for public safety. **Over 45% of the BLSMWC's water mains are four-inch diameter or less** (see **Table 2.4.4c**, below)**.**

Table 2.4.4c

Approximate Length (feet) of Water Mains by Pressure Zone

Zone	1″-1.5"	2"	2.5"	3"	4"	6"	8"	Total
Zone 1	3,738	7,494	2,788	1,550	1,160	11,868	735	**29,333**
Zone 2/3	17,359	6,086	1,963	2,094	1,490	6,824	2,306	**38,123**
Zone 4/5	10,231	5,635	2,064	639	1,832	26,607	-	**47,008**
Zone 6/7	9,701	9,637	3,738	210	1,147	40,193	5,427	**70,053**
Zone 13	-	2,078	-	-	109	17,183	-	**19,370**
-Total by Size	**41,029**	**30,930**	**10,553**	**4,493**	**5,739**	**102,676**	**8,468**	**203,887**

There is currently a total of 2,025 parcels (lots) and service laterals, of which, 1,710 of those are improved lots, and are currently active. The service laterals were originally installed with polyethylene and polybutylene tubing. The BLSMWC has been repairing services with polyethylene tubing. All services reportedly include a service box with a shut-off valve and some services that include pressure regulators to control high system pressures (refer to **Appendix E - TM No. 2)**. The absence of water meters in most of the system makes it extremely difficult for staff to monitor water usage, track inefficiencies, and monitor suspected water losses.

An updated pipe condition assessment matrix, prepared by MC Engineering, represents a current desk top evaluation of critical water system pipelines, along with offering additional information as to the importance and need to replace and upgrade specific main-line distribution system pipes, including house services and other various components and appurtenances. The distribution main-line condition matrix includes evaluation criteria presented below in **Table 2.4.4d.** This matrix also provides the BLSMWC with a method of prioritizing the most important water pipelines that pose potentially serious health and safety risks. The matrix provides the basis for immediate and future upgrades and replacements. Additional importance was placed on pipe location, size (dia.), and condition, with a significant amount of input and data provided by the field and office staff.

Table 2.4.4d

Pipeline Evaluation Criteria		
Criteria	**Rating** (1=Best 5-Worst)	**Weighted Factor** (additional importance)
Pipe size (Q's/pressures/fire flows)	1 - 5	7
Pipe Age (Deterioration/leaks)	1 - 5	4
Pipe Type (OPTIONAL)	1 - 5	3
Leaks/Complaints (Leak pattern/complaints)	1 - 5	5
Mainline Location (Access/dependability)	1 - 5	7
System Pressure (Modeling results)	1 - 5	3
Fire Coverage (see pipe size, spacing/ customers affected, flows)	1 - 5	2
NOTE: The evaluation criteria have been modified to place more importance on the overall pipe line condition, age, and overall reliability		

As mentioned above, all water distribution system pipelines were re-assessed for the PER with significant input provided by the operational staff including consideration of more recent changes as to the pipe(s) condition along with other trends, **not evaluated** within the 2014 WMP. It is important to note, that at the time this PER was prepared, a new and updated water modeling program was being completed. The more recent modeling includes a system-wide calibration of the existing 2014 model, along with operational changes, including the more recent bi-furcation of the BLSMWC's water system. This bi-furcation separates the existing water distribution system into two new water supply zones. One zone now includes treated water provided by the Calaveras County Water District (CCWD) inter-tie (see **Section 2.1**) and the other includes the existing well supply zones. Ideally, the hydraulic modeling update will take

into consideration the CCWD water inter-ties and provide the BLSMWC with a list of other priority projects and/or confirm system upgrades and improvements that will take into consideration the separate supply points.

Table 2.4.4e below shows the main-line distribution system priority matrix, using ranking criteria as noted above.

Table 2.4.4e
Existing Conditions

											Ranking System								Project Priority Ranking Comparison	
											Category and Rank									
											Pipe Size	Pipe Age	Leaks/ Complaints	Mainline Location/ Access	System Pressure[1]	Fire Coverage				
											1 - 5 (WF = 7)	1 - 5 (WF = 4)	1 - 5 (WF = 5)	1 - 5 (WF = 7)	1 - 5 (WF = 3)	1 - 5 (WF = 2)				
MP Project	Road	Existing Condition Description	From	To	Pressure Zone	Existing Pipe Size (inch)	Pipe Age	~New Pipe Length (Feet)	Customer Complaints (LS)	Staff Leak Markup	7	4	5	7	3	2	Rank	PER		Master Plan Priority
Wawona	Wawona Way	Backyard Mains Adjacent/Parallel to Road	Castlewood	End of Line	6/7	(2.5), (2), (1.5)	1962-1970	1928	8	Yes	5	5	5	5	0	3	121.0	High		High
Wawona	Castlewood	Backyard Mains Adjacent/Parallel to Road	Wawona	Seminole	6/7	(2.5), (2)	1962-1970	1972	4	Yes-Multiple	4.5	5	4	5	0	3	112.5	High		High
Wawona	Seminole	Backyard Mains Adjacent/Parallel to Road	Silverado	El Ranchero	6/7	(2), (1)	1962-1970	2673	5	No	5	5	2	5	0	4	108.0	High		High
Wawona	Meadow	Backyard Mains Adjacent/Parallel to Road	Brae Burn	Kiote Hills	6/7	(2), (1.5)	1962-1970	2805	3	No	5	5	2	5	0	4	108.0	High		High
Wawona	Cypress Point	Backyard Mains Adjacent/Parallel to Road	Brae Burn	End of Line	6/7	1.5	1962-1971	1052	0	No	5	5	0	5	0	0	90.0	Med		Low
Patricia	Gertrude	Backyard Mains Adjacent/Parallel to Road	Rainy	Patricia	4/5	(2.5), (2), (1.5)	1962-1970	2147	8	Yes, Multiple	5	5	5	5	0	4	123.0	High		High
Patricia	Patricia (E)	Backyard Mains Adjacent/Parallel to Road	Moran	Gertrude	4/5,2/3	(2), (1.5), (1)	1962-1970	2191	2	Yes	5	5	4	5	0	4	118.0	High		High
Patricia	Colleen	Backyard Mains Adjacent/Parallel to Road	Patricia	End of Line-Court	4/5	(2), (1.5)	1962-1970	964	4	No	5	5	2	5	0	4	108.0	High		Med
Patricia	Moran (S)	Backyard Mains Adjacent/Parallel to Road	Rainy	End of Line	2/3	1.5	1962-1970	2849	1	No	5	5	2	5	0	3	106.0	High		Med
Patricia	Patricia (W)	Backyard Mains Adjacent/Parallel to Road	Getrude	George Ann	4/5	(2.5), (2), (1.5)	1962-1970	1972	1	No	5	5	1	4	0	4	96.0	Med		High
Blue Lake Springs	Blue Lake Springs (N)	Backyard Mains Adjacent/Parallel to Road - 4" Pipe in the Street	Linda	Meadow Dr	1	2	1962-1970	2410	4-5	Yes	5	5	5	5	0	4	123.0	High		High
Blue Lake Springs	Blue Lake Springs (S)	Backyard Mains Adjacent/Parallel to Road	Meadow Ct	Moran	2/3	(2), (1.5)	1962-1970	1753	8	Yes	5	5	4	5	0	4	118.0	High		Med
Blue Lake Springs	Moran (M)	Backyard Mains Adjacent/Parallel to Road and in Street	Marilynn	Rainy	2/3	(2.5), (1.5), 1.5	1962-1970	3725	3	No	5	5	2	4	0	3	99.0	Med		Low
Blue Lake Springs	Moran (N)	Mains in Street	Hwy 4	Marilyn	1	(3), (2.5), (1.5)	1962-1970	3068	7	Yes	4	5	5	1	0	4	88.0	Med		Med
Blue Lake Springs	Linda	Backyard Mains Adjacent/Parallel to Road	Moran	Blue Lake Springs	1	2	1962-1970	745	2	No	3	5	1	5	0	4	89.0	Med		Low
San Ramon	San Ramon	Backyard Mains Adjacent/Parallel to Road	Wawona	Kiote Hills	6/7	(2), (1.5), (1)	1962-1970	1578	2	Yes	5	5	4	5	0	4	118.0	High		High
San Ramon	Kiote Hills	Backyard Mains Adjacent/Parallel to Road	Castlewood	Seminole	6/7	2	1962-1970	1841	5	No	5	5	3	5	0	4	113.0	High		Med
San Ramon	Baywood View	Backyard Mains Adjacent/Parallel to Road	Almaden	End of Line End of Boundary	6/7	(2.5), (2), (1.5)	1962-1970	1797	4	No	5	5	2	5	0	4	108.0	High		Med
San Ramon	Almaden	Backyard Mains Adjacent/Parallel to Road	Seminole	Baywood view	6/7	(2)	1962-1970	438	1	No	5	5	1	5	0	4	103.0	High		Low
San Ramon	North Sierra	Backyard Mains Adjacent/Parallel to Road	Castlewood	End of Line Dead End	6/7	(2.5)	1962-1970	657	2	Yes	3.5	5	2	5	0	4	97.5	Med		Low
San Ramon	Silverado	Backyard Mains Adjacent/Parallel to Road	North Sierra	Baywood view	6/7	(6), (2)	1962-1970	1534	0	No	3	5	1	5	0	4	89.0	Med		Low
	Notes: 1. Pending										>=6-inch: 1 4-inch: 2 3-inch: 3 2-inch: 4 <=2-inch: 5	0-5 years: 1 5-10 years: 2 10-15 years: 3 15-20 years: 4 >20 years: 5	Number of Leak Reports/Complaints/Recent Leak Information	Back: 5 Street: 1	<=80 psi: 1 <=120 psi: 3 >120 psi: 5	Covered: 1 Not Covered: 5				

Existing Conditions											Ranking System Category and Rank Pipe Size 1 - 5 (WF = 7)	Pipe Age 1 - 5 (WF = 4)	Leaks/ Complaints 1 - 5 (WF = 5)	Mainline Location/ Access 1 - 5 (WF = 7)	System Pressure[1] 1 - 5 (WF = 3)	Fire Coverage 1 - 5 (WF = 2)		Project Priority Ranking Comparison		
MP Project	Road	Existing Condition Description	From	To	Pressure Zone	Existing Pipe Size (inch)	Pipe Age	~New Pipe Length (Feet)	Customer Complaints (LS)	Staff Leak Markup	7	4	5	7	3	2	Rank	PER		Master Plan Priority
Rainy	Shirley	Backyard Mains Adjacent/Parallel to Road	Patrica	End of Line-Court	4/5	(1), (1.5)	1962-1970	833	5	No	5	5	3	5	0	4	**113.0**	**High**		Med
Rainy	Jearrilynn	Backyard Mains Adjacent/Parallel to Road	Jeannie	End of Line-Court	4/5	(1.5), (1)	1962-1970	1227	3	No	5	5	3	5	0	3	**111.0**	**High**		Med
Rainy	Rainy (W)	Backyard Mains Adjacent/Parallel to Road - 6" and 4" in Street	Michelle	Anna Lee	4/5	(2), (1.5)	1962-1970 1994-1999 (6")	1740	0	No	5	5	0	5	0	4	**98.0**	**Med**		Med
Rainy	Dianna	Backyard Mains Adjacent/Parallel to Road - 3" in Street	Rainy	End of Line-Court	2/3	(3)	1962-1970	1052	1	No	3	5	3	4	0	4	**92.0**	**Med**		Low
Rainy	Jeannie	Backyard Mains Adjacent/Parallel to Road	Jerrilynn	Shirly	4/5	(2.5),(1.5)	1962-1970	650	0	No	3	5	1	5	0	4	**89.0**	**Med**		Low
Rainy	Michele	Backyard Mains Adjacent/Parallel to Road	Rainy	Jeannie	4/5	-1.5	1962-1970	657	4	No	2	5	2	5	0	4	**87.0**	**Med**		Low
Rainy	Anna Lee (S)	1.5" and 2.0" mains in Street	Rainy	Diana	2/3	(2),(1.5)	1962-1970	1972	2	No	5	5	1	1	0	4	**75.0**	**Low**		Low
Rainy	Rainy (E)	4.0" mains in Street	Anna Lee	Moran	2/3	(4)	1962-1970	1400	3	No	2	5	2	1	0	4	**59.0**	**Low**		Low
Dean	Russell	2.0" mains in Street	Moran	End of Line End of Boundary	1	(2),(1.5)	1962-1970	3068	2	Yes-Multiple	5	5	4	1	0	4	**90.0**	**Med**		Low
Dean	Dean	4" and 2.5" mains in Street	Moran	Nola	1	(4), (2.5)	1962-1970	3068	7	2.5" Main High Leak Area	4	5	5	2	0	2	**91.0**	**Med**		Med
Dean	David Lee	2.0" mains in Street	Russel (N)	Russel (S)	1	(2)	1962-1970	1315	0	Yes-Multiple	5	5	4	1	0	4	**90.0**	**Med**		Low
Dean	Kuehn	2.5" mains in Street	Moran	End of Line-Court	1	(2.5)	1962-1970	701	3	No	5	5	2	1	0	4	**80.0**	**Low**		Low
Julia	Julia	2" Main in Street	Nola	Gloria	2/3	(2)	1962-1970	1534	4	2.5" Main High Leak Area	4	5	5	2	0	3	**93.0**	**Med**		Med
Julia	Helen	Backyard Mains Adjacent/Parallel to Road - 2.5" in Street	Moran	Marilyn	2/3	(2.5)	1962-1970	920	1	Yes	3	5	1	5	0	4	**89.0**	**Med**		Low
Julia	Anna Lee (N)	Mains in Street	Nola	Rainy	4/5	(1.5)	1962-1970	1972	4	No	5	5	2	1	0	4	**80.0**	**Low**		Med
Julia	Dawyn	2.0" mains in Street	Moran	Marilyn	2/3	(2)	1962-1970	964	4	Yes	5	5	2	1	0	4	**80.0**	**Low**		Low
Julia	Shannon	1.5" mains in Street	Nola	Julia		(1.5)	1962-1970	1753	1	No	5	5	1	1	0	4	**75.0**	**Low**		Low
Julia	Marilynn	3.0" and 2.0" mains in Street	Moran	Nola	2/3	(2),(3)	1962-1970	2367	4	No	4	5	2	1	0	4	**73.0**	**Low**		Low
	Notes:										**>=6-inch: 1 4-inch: 2 3-inch: 3 2-inch: 4 <=2-inch: 5**	**0-5 years: 1 5-10 years: 2 10-15 years: 3 15-20 years: 4 >20 years: 5**	**Number of Leak Reports/Complaints/Recent Leak Information**	**Back: 5 Street: 1**	**<=80 psi: 1 <=120 psi: 3 >120 psi: 5**	**Covered: 1 Not Covered: 5**				

The project priority list for distribution system pipelines, services, and appurtenances was prepared as a result of the evaluation matrix including current and up-to-date input from the BLSMWC staff. The updated evaluation includes the following system components:

- Water mains (1-inch to 12-inch)
- Water services (single or double)
- Valves, PRV's, hydrants, blow-offs and other appurtenances **(Section 2.4.5)**
- Water Meters **(Section 2.4.6)**
- Booster Pumps **(Section 2.4.7)**

Also included are various photographs of distribution deficiencies **(Figure 2.4.4a)**

Table 2.4.4a
Water Distribution Deficiency (Photos)

2.4.5 PRESSURE REDUCING VALVES (>1.5-INCH DIA.), VALVES AND HYDRANTS

The BLSMWC has 44 pressure reducing stations of various sizes and conditions located throughout the service area. There are nineteen (19) PRV Stations (PRVs) that are considered problematic and in some cases non-operational. The BLSMWC staff provided MC Engineering with a list of those PRV Stations that require upgrades due to operational issues. Other considerations used in determining station condition was location, accessibility (confined space), and age. For the purposes of this report all PRV's (1.5-inch and greater) were included that require replacement and/or upgrading. It is also understood that as a result of the pending modeling and pressure study as performed by LS Consulting, certain PRV's may not be needed and/or additional PRV's may be required. The following **(Table 2.4.5a)** is a list of those PRV Stations that are recommended for replacement and or rehabilitation:

Table 2.4.5a

PRV Recommended Replacement						
Type	**Functions (BLSMWC-MP**	**Functions (Staff)**	**Staff Comment**	**Associated Street**	**BLSMWC MP Project Name**	**Existing PRV Size**
PRV	y	No	Turned Off-Broken Open	Patricia	Patricia	2-inch
PRV	y	No	Small Leak-P Gauge Broken	Michele	Rainy	1.5-inch
PRV	y	No	Broken Open	Dorothy	Rainy	1.5-inch
PRV	y	No	Bypass off-corroded-Broken open	Jerrilynn	Rainy	3-inch
PRV	y	No	Broken Open	Patricia	Patricia	1.5-inch
PRV	y	No	Old PRV	Del Rio Dr	Additional	1.5-inch
PRV	y	No	Very High Pressure - 285 PSI	Moran	Patricia	1.5-inch
PRV	y	No	PRV Broken Closed-Leaks when Main Break	Cypress Point	Additional	1.5-inch
PRV	y	No	(Check to make sure not just valve)	Castlewood	Wawona	3-inch
PRV	y	No	(Check to make sure not just valve)	Meadow	Wawona	2-inch
PRV	y	No	Check to see if refers to Valve	San Ramon	San Ramon	2-inch
PRV	y	No	Broken	Seminole	Wawona	2-inch
PRV	n	No	Broken Closed	Medinah	Additional	6-inch
PRV	n	No	Broken Open-Very Deep	South Sierra	Additional	6-inch
PRV	n	No	Broken Open	Cypress Point	Additional	6-inch
PRV	n	No	Broken Open	Hillcrest	Additional	6-inch
PRV	y	No	Old PRV, has leaked many times	Moran	Blue Lake Springs Drive	2-inch
PRV	y	No	Vault no drain full water after rain corroded	Del Rio Drive	Additional	6-inch
PRV	Not Shown	No	Not shown originally-added by Billy -not working	Castlewood	Wawona but not in MP list	2-inch

Below **(Figure 2.4.5a)** is a photograph of an old and deteriorated PRV that needs to be replaced.

Figure 2.4.5a
Deteriorated PRV Station Located on Dorothy Drive

It became evident during this evaluation that a large number of fire hydrants were in need of replacement as a result of age and condition. The BLSMWC has various types of hydrants located throughout the service area. Some hydrants are working properly and have been continuously exercised while other are lacking street valves and cannot be exercised due to their old and deteriorated state. A majority of these deficient hydrants are located within Pressure Zone 13. Many hydrants are over 50 years old and have been problematic, in some cases non-operational, and many are leaking. Staff provided MC Engineering with a list of those hydrants located within Unit 13., that are considered old and deteriorated. The following **(Table 2.4.5b)** is a list and location of those hydrants and valves that are highly recommended for replacement and/or rehabilitation:

Table 2.4.5b

Proposed Fire Hydrant Replacements

Associated Street	Existing Hydrant Size	Project Zone	Type-Age	Functional MP	Functional Staff	Staff Comment Condition
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open- no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Cypress Pt	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
So. Sierra View	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Wawona Way	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Wawona Way	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak

Medinah Dr	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Medinah Dr	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Milbar Ct	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Belmont/Flamingo Wy	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Belmont/Flamingo Wy	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Belmont/Flamingo Wy	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Belmont/Flamingo Wy	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Belmont/Flamingo Wy	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak
Del Paso Lane	6″	ZONE 13	Iowa-50	Yes	No	Hard to open/no GV/leak

2.4.6 WATER METERS

The BLSMWC currently maintains approximately 100 household water meters and meter boxes within the BLSMWC service area. These installed meters include various "typical" configurations. Representations for each typical existing water service connection are depicted in **Figure 2.4.6a** and **Figure 2.4.6b.**

Figure 2.4.6a
Existing Meter Configuration

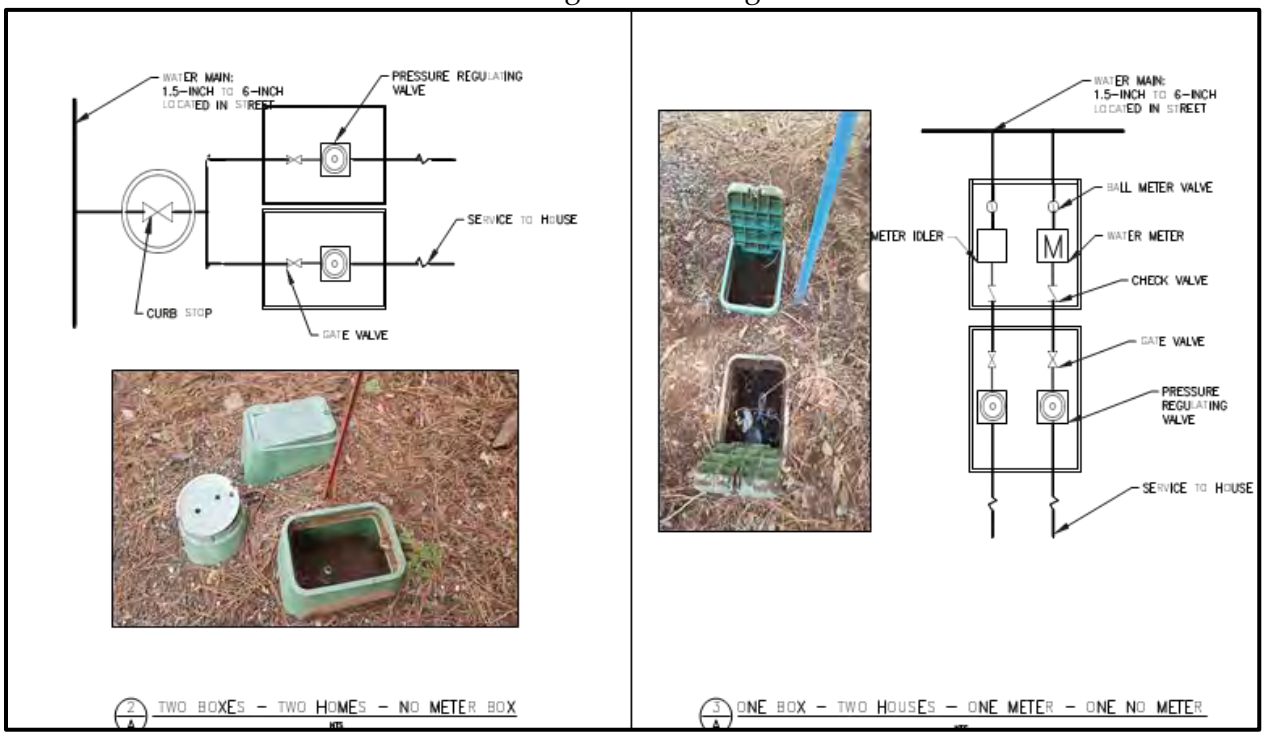
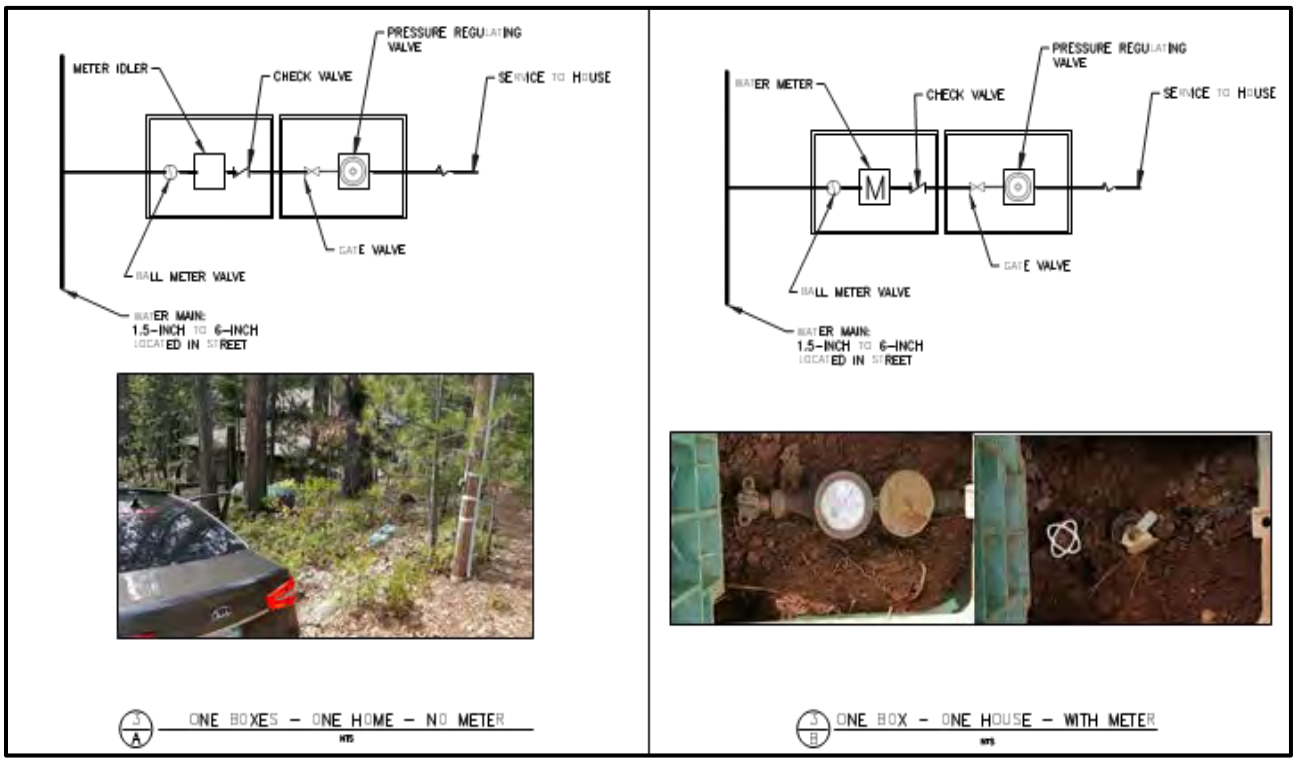


Figure 2.4.6b
Existing Meter Configuration



The installation of water meters throughout the distribution system is a very important and necessary infrastructure component for the efficient operation of the water system. Water meters provide an accurate method of quantifying all water usage within the service area. Metering, combined with periodic leak detection, are necessary to monitor and, ultimately, reduce the amount of non-revenue water.

In January 2014, the Governor declared a State of Emergency and directed agencies to take numerous actions in response to the drought, including stepping up conservation programs to encourage Californians to reduce their water use by 20 percent while enacting measures to protect water supplies and water quality. Since then, the BLSMWC wells have experienced serious declines in production, forcing them to put into action plans that would increase their reliance on surface water supplies. The proposed project is consistent with more recent mandates issued by the State Water Resources Control Board in response to the drought as well as the following State Water Action Plan Activities including:

Action 1-Make Conservation a California Way of Life
Action 2 -Increase Regional Self-reliance and Integrated Water Management across all Levels of Government
Action 5 -Manage and Prepare for Dry Periods
Action 9 -Increase Operational and Regulatory Efficiency

Metering, combined with commodity rates and retrofit of existing connections with meters, is required under the California Urban Water Conservation Council (CUWCC) BMP 1.3 and will facilitate compliance with CUWCC BMPs 1.1, Operations Practices, BMP 1.2 Water Loss Control, and ultimately BMP 1.4 related to Conservation Pricing.

Water metering is the foundation of managing existing groundwater resources and enforcing these policies effectively. Meters help to offset the need to expand the use of surface water and installing meters on all services is consistent with each of the above policies in the State of California's 2013 Water Action Plan and CUWCC BMPs. This proposed metering project will enable the BLSMWC to properly enforce pre- existing local drought response programs.

2.4.7 BOOSTER PUMP STATIONS

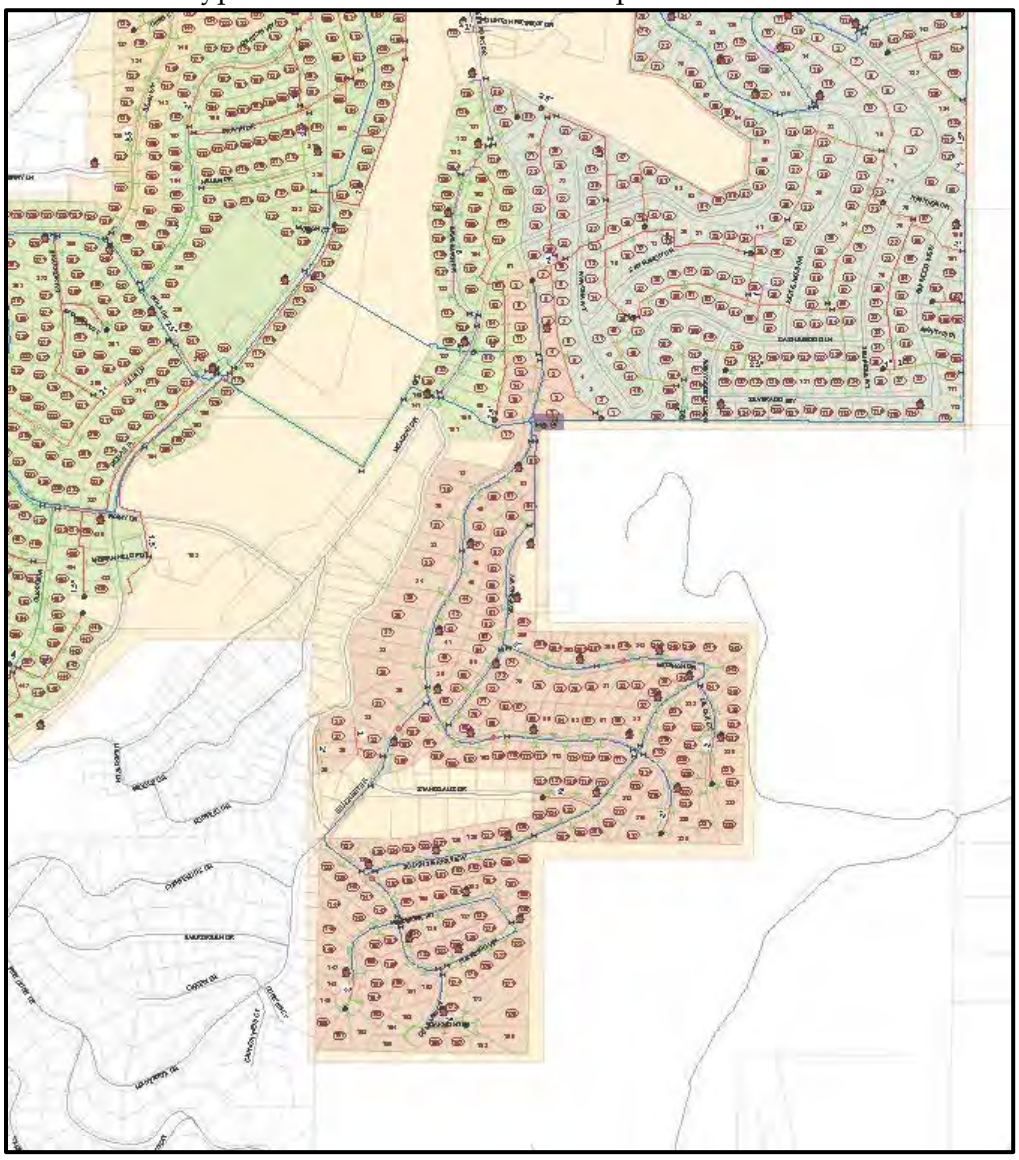
The elevations in Blue Lake Springs vary over 700 feet throughout the system, requiring the use of booster pumps, primarily at the WTP. There are currently three (3) booster pump stations located throughout the BLSMWC water system. Two of the booster pumps are located at the WTP and other two are located at Cypress Point Drive. These booster pumps rely on the SCADA system and provide water to upper zones and storage facilities. The booster pump stations include:

- 20 HP Backwash Pump at WTP
- 75 HP Booster Pumps (2 ea.) at WTP
- Cypress Point Booster Station (not operational)

BLSMWC currently has two high service booster pumps (75 HP, each), located at the WTP, that are used to provide pressure to the distribution system directly and by filling elevated storage tanks that feed the various zones in the system. Each booster pump operates at a flow rate of approximately 300 to 400 gpm, based on the system head curves provided by staff. According to the operators, the pumps are never operated at the same time. In general, the purpose of booster pumps is to provide the required flow rates and maintain pressures in the system at all times, including the most extreme situations such as peak hourly flows and fire flows on the day of maximum demand. These demands are met by a combination of the booster pumps and water held in storage. The booster pumps, distribution system, and the performance of the storage tanks during various water demand scenarios was evaluated as a part of the 2014 WMP.

As discussed in the WMP, the Cypress Booster station is not currently operational. It was intended to provide water to Tank No. 6 in the event that the WTP Booster station fails. Providing water to Tank No 6 from the Cypress booster pump station is considered a very important system component. Recent actions by the BLSMWC to acquire water from CCWD also places a higher level of significance on the operability of the Cypress Point Booster Station, since it could provide treated water from the newly created CCWD zone to feed Tank No. 6, through and existing 6-inch AC pipe, along the eastern boundaries of the BLSMWC service area. It should be noted that the effectiveness and need for the Cypress booster pump station is also currently being evaluated by LS, as a part of the updated system hydraulic modeling.

Figure 2.4.6c
Cypress Point Drive Booster Pump Station



2.5 OPERATIONAL MANAGEMENT DESCRIPTION AND NEEDS

The BLSMWC staffing is relatively small when compared to other similar agencies. However, the staff is very qualified to maintain and operate the water facilities. **Table 2.5a** is a list of all employees assigned to the operation and maintenance of the BLSMWC water facilities. Due to the number of employees and the age and condition of the facilities, it is important that any recommendations for improvements, based on needs identified in this report, be implemented in order to avoid overloading the relatively lean staff. Currently, the water facilities are staffed by the following personnel:

Table 2.5a
Certified Operators and Employees (Water)

Contact	Position/Grade
Dave Hicks	General Manager-T3/D2
William (Bill) Heinle	Chief OP- T2/D2
Tyler Mayo	Field Ops- T1/D2
Matt Jarnagin	Field Ops- T2/D2

The operations staff is supported by two administrative office personnel. The daily operations consist of a WTP, PRV's, booster pumps and the distribution system including the monthly reading of over 200 water meters. Both the field and office staff handle customer complaints on a daily basis. These complaints consist of, and are not limited to; mainline and service line leaks, taste and odor complaints, high and low pressures, outages, and other miscellaneous complaints and problems encountered during the daily operations. It should be noted that water quality testing and lab work is contracted out.

The high costs associated with the maintenance and operation of the aging infrastructure poses a threat to the BLMWC, requiring more manpower and repair/replacement over time. To augment the lack of available staffing, recommendations are included in this report for upgrading the water distribution system, including the installation of water meters and other appurtenances. These potential upgrades will improve the overall efficiency of the operations while allowing the staff to allocate more of their time to required preventative maintenance including system flushing, valve exercising programs, and other routine and necessary maintenance programs.

The Operations staff maintains various equipment items for the wastewater treatment plant, collection system, and lift stations to handle emergencies. The equipment includes, but is not limited to the following:

- Backhoe
- (1) Dump Truck
- (1) Snow Plow
- (2) service Trucks
- (1) Trailer mounted generated
- Miscellaneous Power Tools

A more detailed equipment list is presented in Short Term Asset Evaluation **(Section 6)** of this report. Revenues are to be set-aside each year to cover replacement of these "short Term" assets.

2.6 FINANCIAL STATUS OF EXISTING FACILITIES

2.6.1 WATER CONNECTIONS

The total number of water connections in the BLSMWC water distribution system is 2,025, of which approximately 1710 are currently active. The majority of these are single family dwelling (SFD) accounts. There are only 2 commercial accounts, both for the Blue Lake Springs Clubhouse.

2.6.2 CURRENT ANNUAL INCOME AND RATE STRUCTURE

The annual income for fiscal year (FY) 2014 and 2015 is summarized below. Current operating budgets may be found in **Appendix F** of this report.

Table 2.6.2a
FY 2014 and 2015 Water System Revenue – Audited Amount(1)

Fiscal Year Budget	Net Year End Water Customer Revenue	Net Year End Other Income	Total Year End Revenue
FY 2015	$ 1,348,586	$ 72,847	$ 1,421,433
FY 2014	$ 1,327,462	$ 85,871	$ 1,413,333

Notes: (1) Year Ending Audits by Sandra Vaughan, CPA of Ebbetts Pass Accounting

Per the approved By-laws, the BLSMWC currently collects its water revenues on a yearly basis, with invoices due and payable by the 15th of February. The revenue is typically collected in January and February of each year. All Property owners are considered "shareholders" and if yearly payments are delinquent, the BLSMWC may take the following measures as prescribed within their by-laws **(Appendix G)**:

- Charge late fees
- Shut-off water service
- Place liens on parcels and file with the County

The ability to collect this revenue has been successful in the past and typically, only 10-20 properties, are delinquent every year. **Table 2.6.2b**, below, indicates the amount of yearly revenue provided to the BLSMWC to operate and maintain its water facilities. The table below also includes rate increases that have been implemented over the last 6 years.

Table 2.6.2b
Yearly Water Rates with Fee Increases

Year	Improved Property w/Meter Cost ($)	% Inc	Improved Property w/out Meter Cost ($)	% Inc	Unimproved Property Cost ($)	% Inc
2011	$585.00	0	$590.00	0	340	0
2012	$643.50	10	649.00	10	374	10
2013	$612.00	**-10**	669.00	3	384	3
2014	$649.00	6	709.00	6	407	6
2015	$662.00	2	723.00	2	415	2
2016	$728.00	10	795.00	10	457	10

2.6.3 EQUIVALENT DWELLING UNITS

"There are 2,025 lots in the BLSMWC subdivision. Of these, there are 1,710 connections that are billed as residential services and 312 unimproved residential lots. The 2014 Water Master Plan determined the Average Daily Demand to be 121 gallons per day (3,630 gallons/month) per EDU."

2.6.4 WATER SYSTEM OPERATION AND MAINTENANCE COSTS

System operating and maintenance costs for fiscal years 2014 and 2015 are as noted below in **Table 2.6.4a.**

Table 2.6.4a
Total Operation Budget w/Administration (1)

Year	Year Ending Expenses	Year Ending Revenue	Year Ending Other Income	Reserve Balance
2015	$ 1,099,578	$ 1,348,586	$ 72, 847	$ 321,855
2014	$ 1,233,999	$ 1,325,421	$ 85,871	$ 179,334

Notes: (1) Per Year Ending Audits by Sandra Vaughan, CPA of Ebbetts Pass Accounting

Based on FY 2016 budget, the BLSMWC is projecting expenditures in excess of **$900,000** in 2016. A FY 2016 Budget Breakdown is presented below in **Table 2.6.4b**. The complete FY 2016 budget can be found in in **Appendix H.**

Table 2.6.4b
Fiscal Year 2016 Budget (Excerpt)

EXPENSE DETAIL:	
Salaries & Taxes	406,650
Benefits (insurance & IRA)	141,650
Property / Liability Insurance	25.000
Workers Comp Insurance	20,000
Power (wells, treatment plant & system pumps)	30,000
CCWD Water Purchase	92,000
Water Test (State requirements) ...	8,000
Operating Supplies	15.000
Standby Power Generation (fuel and maintenance)	2,000
Telephone / Communications	10.000
Vehicle / Operating	11.000
Vehicle / Maintenance	5,000
System Maintenance	64,000
Legal, Contractual, Professional Services	19,000
Meeting & Membership	9,500
Drought	2500
Postage	1.000
Office Rental	14,000
Income Tax	1,500
Depreciation / Amortization	7.000
Miscellaneous	5,000
Education & Training	2.000
Office Equipment Repairs	500
State Water System Fees	12,000
TOTAL OPERATING EXPENSES	**904,300**

Existing debt and reserve accounts for water, based on the 2014 and 2015 data, are summarized below in **Table 2.6.4c**.

Table 2.4.6c
Water-Related Debt and Reserve Accounts

Year	Cash/Cash Equivalent	Fixed Assets	Intangible Assets	Current Liabilities	Shareholders' Equity
2015	$ 6,378,489	$ 4,567,434	$ 820,417	$ 267,896	$ 6,378,489
2014	$ 5,845,901	$ 4,592,742	0	$ 97,576	$ 5,845,901

Note: Per Year Ending Audits by Sandra Vaughan, CPA of Ebbett's Pass Accounting

The 2015 budget included approximately $ 1,617,000 in capital improvement expenditures, of which $961,000 was budgeted for the new Lucia Well (Well No. 4), construction project. The 2015 budget also included a $156,300 reserve fund set-aside **(refer to Appendix H).** The current year (FY 2016) capital improvement reserve is $613,056.

2.7 WATER AND ENERGY AUDITS

2.7.1 WATER AUDIT

Not included due to the lack of water meters

2.7.2 HYDRAULIC MODELING

A hydraulic model was prepared by Luhdorff and Scalmanini, in 2014. This hydraulic model included a system-wide evaluation. LS currently re-evaluating and calibrating the hydraulic model.

2.7.4 ENERGY AUDITS

There were no energy audits conducted within the last ten years within the BLSMWC. It is recommended that the BLSMWC conduct an energy audit that would analyze the overall water treatment plant power consumption, including the booster pump stations and wells. The proposed energy audits should include an evaluation of the power consumption of each pumped system, the cost to deliver power at various times of the day, an analysis of solar power options and alternate rate structure(s), and the ability to rely on storage to offset pumping during peak periods in order to develop the most energy efficient methods for the operation of the water facilities. The proposed energy efficiency programs would likely provide a cost-effective method of reducing overall power costs.

2.7.4 WATER SYSTEM COMPLIANCE

The BLSMWC staff provides required monthly, quarterly and yearly reports to the SWRCB DDW (DPH). These reports are followed up with annual inspections conducted by the DDW.

Typical field sampling is conducted by the staff and lab testing is provided by outside sources. Some of the constituents that are tested, at various required intervals, include and are not limited to: chlorine residuals, bacteriological testing (1/month), raw and treated water iron and manganese levels, disinfection byproducts, nitrate levels (in wells), arsenic (in wells), inorganics, VOCs and SOCs with coliform testing (for the wells).

The most recent yearly inspection was conducted on June 11, 2014, by Dave Remick, Sanitary Engineer, for the Division of Drinking Water in the Stockton District Office. As found in the inspection summary, the DDW inspector noted, "that the water system is well maintained and operated." There were, however, a few deficiencies found requiring follow-up **(Appendix I).**

3. PROJECT NEED

This section outlines system components that are currently posing a threat to the on-going ability of BLSMWC to provide safe and reliable drinking water to its customers in the greater Arnold Area. The intent of this report is to identify improvements needed to maintain compliance with the SWRCB Division of Drinking Water Rules and Regulations (Titles 17 and 22 of the California Code of Regulations) and other regulatory agency criteria while meeting industry standard levels of service. The overall goal of the proposed improvements is to help provide safe and reliable drinking water while helping to minimize risks related to the health and safety of the environment, residents, staff and the community of the Blue Lake Springs Mutual Water Company Service Area.

The BLSMWC's water distribution system currently contains 203,887 linear feet of mainline piping, forty- four (44) pressure reducing stations, two (2) storage tanks, ninety (90) fire hydrants, 2025 service laterals (1710 active), and other appurtenances including isolation valves and blow- offs. A majority of the mainline pipelines were installed over 40 years ago, of which there are 111,144 linear feet of 6 and 8 inch mains and 92,744 linear feet of 4 inch and smaller mains. These undersized mains have created water pressure problems and many are not able to provide the necessary fire flows at various locations within the service area. Other potential health and safety issues within the distribution system include the location of the existing water mains. Many of the water mains are located in the back of lots making access very difficult, and in some cases, virtually impossible. The limited access inhibits the use of large equipment, including back-hoes and other heavy equipment typically needed to repair and maintain the mains, services and maters. Recently, and in the past, considerable property damage has occurred as a result of mainline blow-outs/breaks.

The lack of adequately sized pipelines limits the carrying capacity of the various mains and does not allow the BLSMWC to meet the minimum fire flow requirements, as established by the California Fire Code. The fire code sets a minimum standard of 1,000 gpm for a 2-hour period. The water distribution system matrix prepared during this evaluation outlines the inadequacy of the distribution system with respect to the ability to provide adequate system pressures and fire flows for the BLSMWC customers. Furthermore, the California Public Utilities Commission, in General Order 103, requires that each water system must be operated in a manner to assure a minimum operating pressure at each house service connection of not less than 40 psi and no more than 125 psi. General Order 103 also requires that a minimum pipe diameter of 6-inches be installed for mainlines, primarily for fire protection.

3.1 RAW AND WHOLESALE WATER SUPPLY

This section currently requires no additional analysis. The BLSMWC, as discussed in **Section 2** of this report, has acquired a much needed backup source of water to augment their current groundwater supply. The 2015 Wholesale Water Agreement with the CCWD provides the BLSMWC with an

adequate supply of treated water. There are provisions within the CCWD Agreement to purchase 100% of its required water from the CCWD.

An additional well (Well No 4-Lucia) has just been put into service with the addition of new pumps, controls, and building (well pump house). This well will provide an additional 70 gpm of treated groundwater.

No current needs required

3.2 WATER TREATMENT

This section currently requires no additional analysis. As described in **Section 2.4.2,** above, the BLSMWC operates a water filter plant that produces drinking water meeting all State and Federal requirements, with funding being provided on a yearly basis to upgrade and improve its operating capabilities.

No current needs required.

3.3 WATER STORAGE

This section currently requires no additional analysis. As described in **Section 2.4.3,** above, the BLSMWC has two (2) 750,000-gallon storage tanks that were constructed in 1992. These storage facilities have been properly maintained and require no further evaluation.

No current needs required.

3.4 WATER DISTRIBUTION SYSTEM

To properly evaluate and prioritize the water distribution system, an updated condition assessment matrix was prepared by MC Engineering. The matrix provided an accurate and updated list of pipeline deficiencies which were ranked according to relative need. The intent of this prioritization was to develop a detailed list of cost-effective projects that are "within the reach" of the BLSMWC customers to fund.

The water distribution main-line evaluation and matrix, as found in **Table 2.4.4e**, evaluates each pipeline segment utilizing the criteria listed below with emphasis being placed on the health and safety of the BLSMWC's customers:

- **Pipe Size**- This criterion evaluates and places importance on the size of the water mains. Federal, State, and local standards typically require a distribution pipeline to be a minimum of 6-inch in diameter, with exceptions being given to very short pipeline runs. The size of the pipeline dictates the amount of water that can properly flow through any given section of pipe, at specified minimum operating pressures.

Typically, velocities are limited to 7-8 fps with acceptable operating pressures typically ranging from 70-110 psi. The pipe size can also have a detrimental effect on providing adequate fire flows. Within the BLSMWC, the highest ranked (worst) pipelines were the mainline pipes with diameters of 4-inches or less.

- **Pipe Age**- Typically pipes have a life expectancy of 50 years. The age of pipe and its condition can also be impacted by its material makeup. Most segments of the water mains are either asbestos concrete (AC) or PVC. The condition can vary based on the thickness and the pipe pressure rating. These factors were taken into consideration during the evaluation with information supplied by the BLSMWC staff. These old and deteriorated sections of pipe can cause significant property damage, water loss, and health and safety concerns when broken or cracked.

- **Pipe Type**- The type of installed pipe played an important role in this evaluation. Metallic pipe can be problematic due to corrosion and quality of all pipes can often vary by manufacturer. Some pipe types include various irregularities that inhibit their ability to handle high system pressures. The BLSMWC distribution mains were mostly either PVC or AC pipe.

- **Leaks**- Water leaks played a significant role in the evaluation matrix. Information was accumulated over a period of 5 years. This information was then plotted on the system maps and taken into consideration when ranking pipes due to leak history. Pipeline leaks are a good indication of deteriorated sections of pipe, either due to age, condition, type, and/or system pressures. In 2015 alone, the BLSMWC had over 50 customer complaints, several of which were due to leaks. It is important to note that some of the leaks were service line leaks and/or service saddle leaks and breaks. Multiple leaks in the same area are a very good indicator of a pipeline rapidly deteriorating, thus requiring serious attention in order to avoid catastrophic failure.

- **Mainline Location**- This evaluation criterion was of significant importance during the evaluation. Quick and immediate access for addressing mainline pipeline problems is required since large main failures can create serious public health and safety issues, including high water loses, if not attended to and repaired promptly. A high weight factor was placed on these evaluation criteria because it was noted that a large number of the BLSMWC's mains are located along the back of many lots.

- **System Pressures-** The system-wide hydraulic modeling provided a good representation of system pressures under various operating conditions. The BLSMWC has consistently high water pressures throughout its service area creating the need to

place large PRVs at strategic locations. Individual homeowner PRVs are also required on all of the improved parcels throughout the service area. The high system pressure also creates the need for the District to place higher importance on the type, age, and condition of the distribution system pipelines.

Current needs are described in **Table 3.4a**, below:

Table 3.4a

Required and Prioritized Water Distribution System Needs

Summary of Project Needs			
MP Project	**Road**	**PER Rank**	**PER Ranking**
Wawona	Wawona Way	**121.0**	High
	Castlewood	**112.5**	High
	Seminole	**108.0**	High
	Meadow	**108.0**	High
	Cypress Point	**90.0**	Med
Patricia	Gertrude	**123.0**	High
	Patricia (E)	**118.0**	High
	Colleen	**108.0**	High
	Moran (S)	**106.0**	High
	Patricia (W)*	**96.0**	Med
Blue Lake Springs	Blue Lake Springs (N)	**123.0**	High
	Blue Lake Springs (S)	**118.0**	High
	Moran (M)	**99.0**	Med
	Moran (N)	**88.0**	Med
	Linda	**89.0**	Med
San Ramon	San Ramon	**118.0**	High
	Kiote Hills	**113.0**	High
	Baywood View	**108.0**	High
	North Sierra	**103.0**	High
	Silverado	**97.5**	Med
	Almaden	**89.0**	Med
Rainy	Shirley	**113.0**	High
	Jearrilynn	**111.0**	High
	Rainy (W)	**98.0**	Med
	Dianna	**92.0**	Med
	Jeannie	**89.0**	Med
	Michele	**87.0**	Med
	Anna Lee (S)	**75.0**	Low
	Rainy (E)	**59.0**	Low
Dean	Russell	**90.0**	Med
	David Lee	**90.0**	Med
	Dean	**91.0**	Med
	Kuehn	**80.0**	Low
Julia	Julia	**93.0**	Med
	Helen	**89.0**	Med
	Anna Lee (N)	**80.0**	Low
	Dawyn	**80.0**	Low
	Shannon	**75.0**	Low
	Marilynn	**73.0**	Low
High	Extreme High Priority		
Med	High Priority		
Low	Low Priority (Still Funded - Interconnected		

Please refer to **Appendix J** for a detailed breakdown of distribution lines and footages, including miscellaneous appurtenances, such as house services, valves, hydrants, blow-offs, meter boxes, and ARVs.

3.5 PRVs (>1.5-INCH DIA.), VALVES AND HYDRANTS

The BLSMWC has 44 pressure reducing stations of various sizes and conditions located throughout the service area. There are nineteen (19) PRV Stations (PRVs) that are considered problematic, and in some cases, non-operational. BLSMWC staff provided MC Engineering with a list of those PRV Stations that require upgrades due to operational issues. Other considerations used in determining station condition was location, accessibility (including confined space considerations), and age. For the purposes of this report all PRV's that are 1.5 inches and greater require replacement and/or upgrading. It is also understood that as a result of the pending modeling and pressure study, certain PRV's may not be needed and/or additional PRV's maybe required.

Table 3.5a, below, includes a list of the PRV's stations requiring upgrades.

Table 3.5a

PRV (1.5-inch and Larger) Requiring Replacement

PRV Needs and Recommended Replacement						
Type	**Functions (BLSMWC-MP**	**Functions (Staff)**	**Staff Comment**	**Associated Street**	**BLSMWC MP Project Name**	**Existing PRV Size**
PRV	y	No	Turned Off-Broken Open	Patricia	Patricia	2-inch
PRV	y	No	Small Leak-P Gauge Broken	Michele	Rainy	1.5-inch
PRV	y	No	Broken Open	Dorothy	Rainy	1.5-inch
PRV	y	No	Bypass off-corroded-Broken open	Jerrilynn	Rainy	3-inch
PRV	y	No	Broken Open	Patricia	Patricia	1.5-inch
PRV	y	No	Old PRV	Del Rio Dr	Additional	1.5-inch
PRV	y	No	Very High Pressure - 285 PSI	Moran	Patricia	1.5-inch
PRV	y	No	PRV Broken Closed-Leaks when Main Break	Cypress Point	Additional	1.5-inch
PRV	y	No	(Check to make sure not just valve)	Castlewood	Wawona	3-inch
PRV	y	No	(Check to make sure not just valve)	Meadow	Wawona	2-inch
PRV	y	No	Check to see if refers to Valve	San Ramon	San Ramon	2-inch
PRV	y	No	Broken	Seminole	Wawona	2-inch
PRV	n	No	Broken Closed	Medinah	Additional	6-inch
PRV	n	No	Broken Open-Very Deep	South Sierra	Additional	6-inch
PRV	n	No	Broken Open	Cypress Point	Additional	6-inch
PRV	n	No	Broken Open	Hillcrest	Additional	6-inch
PRV	y	No	Old PRV, has leaked many times	Moran	Blue Lake Springs Drive	2-inch
PRV	y	No	Vault no drain full water after rain corroded	Del Rio Drive	Additional	6-inch
PRV	Not Shown	No	Not shown originally-added by Billy -not working	Castlewood	Wawona but not in MP list	2-inch

During the system needs evaluation, the BLSMWC's operation staff identified various fire hydrants that were in a very deteriorated state. These hydrants were approaching 50 years in age and were located in an area known as Zone 13 (see **Figure 3.5a** below). There are a total of 26 hydrants identified for replacement including the addition of new street gate valves, which currently are not installed. Most of the hydrants in this specific area are leaking. A typical leaky hydrant is presented below in **Figure 3.5b.**

Figure 3.5a

Specific Location(s) of Deficient Hydrants

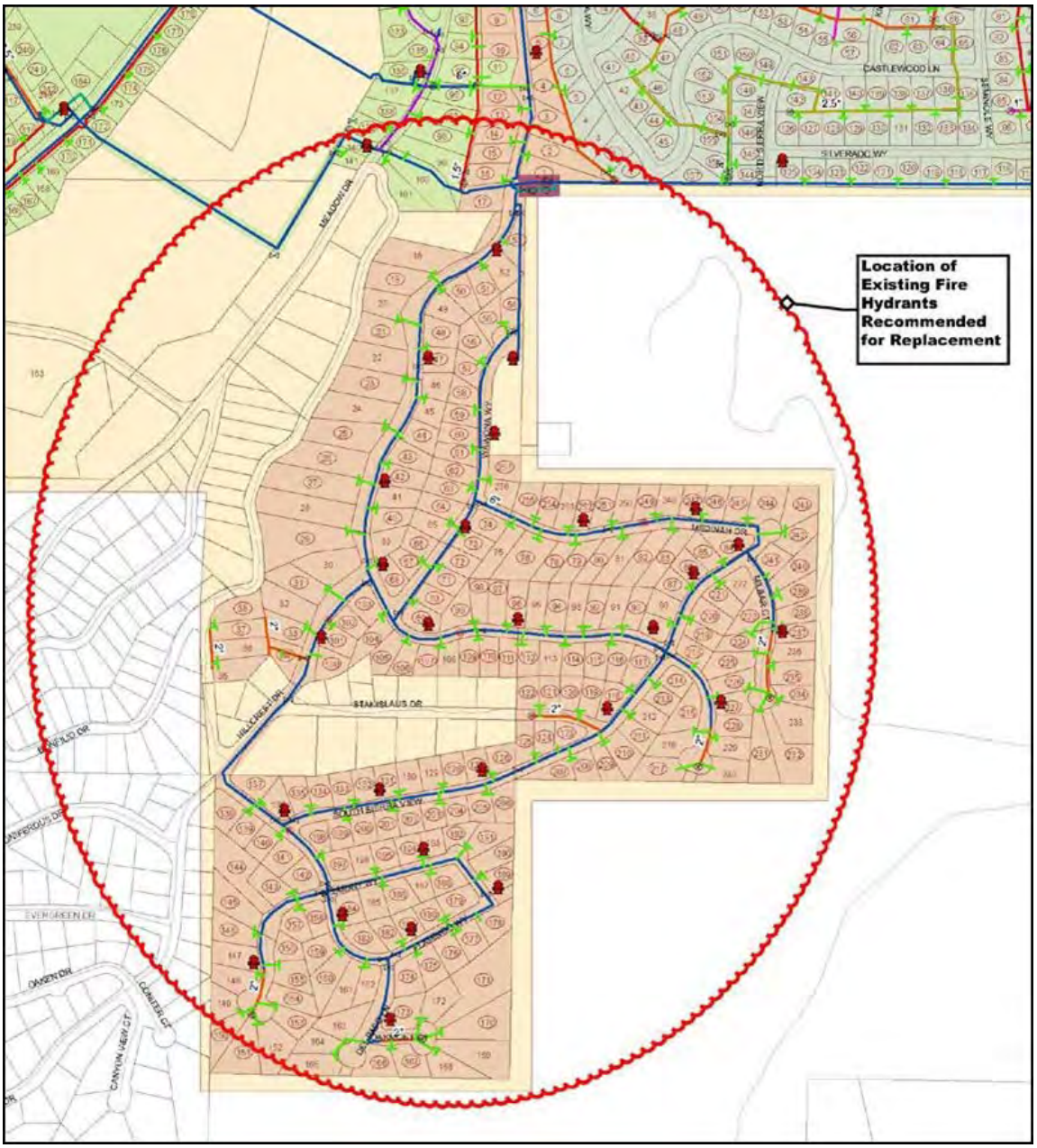


Figure 3.5b
Leaking Hydrant

3.6 WATER METERS

As noted in **Section 2.4.6**, above, water meters are a very important component of any water system. In recent years a high level of importance has been placed on the need for metered water. This is now a requirement under California Statute as a result of past and more recent droughts effecting California combined with the State's limited water storage. The BLSMWC currently has 1,710 active customers in the service area with over 300 meters installed. are. The installation of water meters is extremely critical to cost-effectively maintain and operate the BLSMWC's water system. As noted in prior sections, the ability to quantify and locate leaks, including those found within mains and service lines, is predicated on the ability to account for water being used by the customers. Conducting water audits on a periodic basis is very important and without water meters, it cannot be accurately or easily accomplished. The following information was provided within Technical Memo No 1 (**Appendix C**). It is a list of various conditions and alternatives needed to develop the most cost-effective approach for the installation of new water meters. **Figure 3.6a** includes a summary of proposed meter installations.

Table 3.6a

Summary of Meter Installation/Replacement Project						
Alternative (1)	**Number of Meters (Conditions)**	**Total Meter Installation**	**Description of Condition**	**Total PRV Installation**	**Total Cost**	**Cost Per Meter**
3	860 New Construction 504 Existing Retrofit	1,364	• 860 New Construction Meters/Enclosures 504 Existing Retrofit Meters/Enclosures • 200 (estimated), Driveway Installations	NA	**$1,094,271**	**$802.25**

Notes: **(1)** An alternative evaluation was performed per Technical Memo No. 1 as found within Appendix C

3.7 BOOSTER PUMP STATIONS

The BLSMWC has three (3) booster pump stations located throughout the service area. Two (2) 75 HP booster pumps are located at the WTP and boost potable water to Tanks No.4 and No.6. The third booster pump, located along Cypress Point Drive, has been non-operational for approximately five years.

These booster pump stations are currently being evaluated as a part of the updated water system modeling program. It was recommended, by the staff, that the booster pump station located at Cypress Point Drive, be upgraded. This station is old and deteriorated and, for both safety and operational considerations, it needs to be upgraded/replaced. This station, which is not being used on a regular basis, is used to boost/lift flows from Tank 4 to water storage Tank No. 6. This booster station will play an important role as a back-up and emergency conveyance system providing water to Tank No. 6. It should be noted that this pump station may be an integral part of the new bifurcated system created with the addition of CCWD surface water.

Figure 3.7a, below, is a photo of the Cypress Point Booster Station that will require a complete upgrade to provide system reliability. This station, if upgraded, will require new valving, pumps, yard piping, structural improvements, and miscellaneous site improvements.

Figure 3.7a
Cypress Point Booster Pump Station

The Cypress Point Booster Station currently houses an old in-line pump (non-operable). The booster station has old and deteriorated pump house/building, control panel, check valves, piping, and other appurtenances.

3.8 REASONABLE GROWTH

As described within **Section 2** of this report, the future growth within the system is considered to be relatively minimal. There are a total of 2,025 lots within the project area, of which 1,710 are improved. The growth rate is currently less than 1% per year. Any future project planning will take into consideration the ultimate build-out of the remaining 315 lots and impacts they may have on the overall water system. The 2014 WMP analyzes the effect of ultimate buildout on the water system.

A reassuring element for the ability to provide treated water to the BLSMWC existing and future customers is the recent agreement between the Calaveras County Water District and the Blue Lake Springs Mutual Water Company, dated October 28, 2015 which solidifies terms for the purchase of wholesale treated water. This agreement, provides a relatively high level of source reliability for the water customers of the BLSMWC. It also has a provision, as found in **Section 3.2.3** of the "Wholesale Agreement", that provides an opportunity for the BLSMWC to purchase 100 percent of its water supply by paying the current connection/capacity fee of $7,131 for the remaining EDUs. This may also include any required expansion/upgrade cost(s) associated with the Hunter's Water Treatment Plant.

4. ALTERNATIVE CONSIDERATION

4.1 DESCRIPTION OF ALTERNATIVES

Alternative projects to address the issues noted above, that have been identified for each component of the water treatment and distribution system, are discussed below. Each alternative has been evaluated in terms of the design requirements, possible environmental impacts, economic feasibility, and the project's long term sustainability. Each of the alternatives considered are listed in **Table 4.1a** below. Additional detail related to each of the listed alternatives can be found in subsequent sections of this report.

Table 4.1a
Project Alternative Analysis

Project Component	Need	Projects	Not Selected
1) Water Distribution (Section 3.4)	Improve Supply/ Process Efficiency	*Relocate and Replace Old and deteriorated Water Mains*	
		No Project	X
	Provide Safe and Reliable Drinking Water Eliminate Leaks Reduce Operations Costs Provide Access to Mains for O & M	*No Project will not eliminate the ongoing water leaks and associated water loss. It will fail to provide the ability of the BLSMWC to provide safe and reliable drinking water to its customers. The cost to properly operate the water system will continue to increase over time. Access to certain mainlines cannot be provide due to back lot locations.*	
2) PRVs and Hydrants (Section 3.5)	PRVs- Provide Controls on System Pressures	Construct nineteen (19) new at specified locations	
		No Project	X
	PRVs- Ability to Distribute Water Throughout System Lack of Safe Access for Repairs	*No Project will not provide the level of protection to the BLSMWC customers, as required by Federal, State and local regulations to meet water quality standards and provide allowable working system pressures.*	
	Hydrants - Provide Fire Fighting Capabilities	Construct new twenty-six (26) new hydrants at specified locations	
		No Project	X
		No Project will not provide the BLSMWC customers with protection against both house and wildfires. Without street valves the hydrants cannot be properly used.	
3) Water Meters (Section 3.6)	Water Loss Reduction	Install 1364 new water using existing technology currently being implemented by BLSMWC	
		No Project	X
	Improve Process Efficiency	*No Project will not allow the BLSMWC to properly account for its water use and not meet the goals and laws for water conservation within California*	
4) Booster Pump Station (Section 3.7)	Improve Emergency Backup to Storage	Construct and upgrade existing booster pump station	
		No Project	X
		A no project will not provide the necessary flexibility for transporting treated water from lower pressure zones to Storage Tank 6	

The data and information used for preparing cost estimates includes input and analysis from the following sources:

- Office and field staff input
- Historic and recent operational records and data
- Data and information from the BLSMWC Water Master Plan by LS.
- Updated unit price and lump sum cost estimates for similar projects acquired from local contractors
- Project eligibility and input from the USDA
- Meter installation data and costs from Golden State Flow Measurements

Updated cost-estimates were developed for all proposed projects with estimates and related opinions of cost based on current bid prices from water system projects within the "Mother Lode" region. The actual number of mainline valves, air-relief valves, water quality sampling stations, and blow-offs are only approximated at this planning level.

4.1.1 WATER DISTRIBUTION SYSTEM COST ANALYSIS

Main line relocations are identified at a preliminary level and some modifications and re-alignments will likely be required during the design phase. USDA allows for some deviation during the design phase of the project. Contingencies are intended to account for potential design modifications that may be required. The related distribution system upgrades identified in this report include water mains, services (single or double), air relief valves, PRV stations, meter boxes, valves, and other necessary appurtenances.

Total project cost estimates for the distribution system improvements can be found in **Appendix J.** A cost summary for the distribution system pipeline upgrade/relocation project is shown on **Figure 4.1.1a,** below. It should be noted that some of the pipelines were not ranked high, but their inclusion into the overall recommended project list are needed to provide necessary connectivity and continuity for system operation.

Table 4.1.1a

PER Funded Project Options						
MP Project	Road	PER Rank	Fundable Cost	PER Ranking	PER Funding Options	
					Option 1	Option 2
Wawona	Wawona Way	121.0	$281,660	High	$281,660	$281,660
	Castlewood	112.5	$288,740	High	$288,740	$288,740
	Seminole	108.0	$317,210	High	$317,210	$317,210
	Meadow	108.0	$377,275	High	$377,275	$377,275
	Cypress Point	90.0	$105,020	Med	$105,020	$105,020
Patricia	Gertrude	123.0	$252,625	High	$252,625	$252,625
	Patricia (E)	118.0	$303,048	High	$303,048	$303,048
	Colleen	108.0	$95,780	High	$95,780	$95,780
	Moran (S)	106.0	$268,253	High	$268,253	$268,253
	Patricia (W)*	96.0	$300,300	Med	$300,300	$300,300
Blue Lake Springs	Blue Lake Springs (N)	123.0	$294,150	High	$294,150	$294,150
	Blue Lake Springs (S)	118.0	$197,775	High	$197,775	$197,775
	Moran (M)	99.0	$458,375	Med	$458,375	$458,375
	Moran (N)	88.0	$380,954	Med	$380,954	$380,954
	Linda	89.0	$94,025	Med	$94,025	$94,025
San Ramon	San Ramon	118.0	$213,060	High	$213,060	$213,060
	Kiote Hills	113.0	$188,070	High	$188,070	$188,070
	Baywood View	108.0	$171,690	High	$171,690	$171,690
	North Sierra	103.0	$66,190	High	$66,190	$66,190
	Silverado	97.5	$201,380	Med	$201,380	$201,380
	Almaden	89.0	$50,260	Med	$50,260	$50,260
Rainy	Shirley	113.0	$90,310	High	$90,310	$90,310
	Jearrilynn	111.0	$134,590	High	$134,590	$134,590
	Rainy (W)	98.0	$182,100	Med	$182,100	$182,100
	Dianna	92.0	$110,240	Med	$110,240	$110,240
	Jeannie	89.0	$99,690	Med	$99,690	$99,690
	Michele	87.0	$71,990	Med	$71,990	$71,990
	Anna Lee (S)	75.0	$199,140	Low		$199,140
	Rainy (E)	59.0	$137,400	Low		$137,400
Dean	Russell	90.0	$337,430	Med	$337,430	$337,430
	David Lee	90.0	$132,950	Med	$132,950	$132,950
	Dean	91.0	$337,430	Med	$337,430	$337,430
	Kuehn	80.0	$75,070	Low		$75,070
Julia	Julia	93.0	$167,679	Med	$167,680	$167,679
	Helen	89.0	$95,700	Med	$95,700	$95,700
	Anna Lee (N)	80.0	$228,340	Low		$228,340
	Dawyn	80.0	$129,780	Low		$129,780
	Shannon	75.0	$164,310	Low		$164,310
	Marilynn	73.0	$242,890	Low		$242,890
Construction Cost			$7,842,879		$6,665,950	$7,842,879

A project summary with quantities for proposed project improvements and is as shown below in **Table 4.1.1b**

Table 4.1.1b
Recommended Project Mainline Improvements

Mainline Replacement		House Services		Valve Replacement	PRV(1) Replacement	Hydrant(1) Replacement	Air Relief Valve Replacement
Mainline Rep (LF)	Rep Size (inch)	Single	Double	Gate Valves	PRVs (1.5-6-inch)	Hydrant	ARVs
67,299	6,8,10,12	257	345	215	17	81	72

Note: 1) These PRVs and hydrants are independent of those shown in Figure 4.1.2a and Figure 4.1.2b, below and are a part of the mainline improvement project component, only.

4.1.2 PRESSURE REDUCING VALVES (>1.5-INCH DIA.), VALVES AND HYDRANTS

The construction cost for the proposed pressure reducing valve stations and hydrants are presented in **Table 4.1.2a** and **Table 4.1.2b**, below.

Table 4.1.2a

PRV Recommended Replacement Cost						
Type	Existing PRV Size	MP Project Name	Associated Street	New PRV Size	Unit Price	Sub-total
PRV	2-inch	Patricia	Patricia	6″		(ML Relocation)
PRV	1.5-inch	Rainy	Michele	6″		(ML Relocation)
PRV	1.5-inch	Rainy	Dorothy	6″		(ML Relocation)
PRV	3-inch	Rainy	Jerrilynn	6″		(ML Relocation)
PRV	1.5-inch	Patricia	Patricia	6″		(ML Relocation)
PRV	1.5-inch	In-place/No relocate	Del Rio Dr	1.5″	$10,000	$10,000
PRV	1.5-inch	Patricia	Moran	6″		(ML Relocation)
PRV	1.5-inch	In-place/No relocate	Cypress Pt	1.5′	$10,000	NA
PRV	3-inch	Wawona	Castlewood	6″		(ML Relocation)
PRV	2-inch	Wawona	Meadow	6″		(ML Relocation)
PRV	2-inch	San Ramon	San Ramon	6″		(ML Relocation)
PRV	2-inch	Wawona	Seminole	6″		(ML Relocation)
PRV	6-inch	In-place/No relocate	Medinah	6″	$30,000	$30,000
PRV	6-inch	In-place/No relocate	South Sierra	6″	$30,000	$30,000
PRV	6-inch	In-place/No relocate	Cypress Pt	6″	$30,000	$30,000
PRV	6-inch	In-place/No relocate	Hillcrest	6″	$30,000	$30,000
PRV	2-inch	Blue Lake Springs Dr	Moran	6″		(ML Relocation)
PRV	6-inch	In-place/No relocate	Del Rio Dr	6″	$30,000	$30,000
PRV	2-inch	Wawona but not in MP list	Castlewood	6″		(ML Relocation)
					Total Cost	**$160,000**

Table 4.1.2b

Fire Hydrant Replacement Cost					
Type-Age	**Existing Hydrant Size**	**Project Name**	**Associated Street**	**New Size**	**Unit Price Sub-total**
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	Cypress Pt	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	So. Sierra View	6″	$5,800
Iowa-50	6″	ZONE 13	Wawona Way	6″	$5,800
Iowa-50	6″	ZONE 13	Wawona Way	6″	$5,800
Iowa-50	6″	ZONE 13	Medinah Dr	6″	$5,800
Iowa-50	6″	ZONE 13	Medinah Dr	6′	$5,800
Iowa-50	6″	ZONE 13	Milbar Ct	6″	$5,800
Iowa-50	6″	ZONE 13	Belmont/Flamingo	6″	$5,800
Iowa-50	6″	ZONE 13	Belmont/Flamingo	6″	$5,800
Iowa-50	6″	ZONE 13	Belmont/Flamingo	6″	$5,800
Iowa-50	6″	ZONE 13	Belmont/Flamingo	6″	$5,800
Iowa-50	6″	ZONE 13	Belmont/Flamingo	6″	$5,800
Iowa-50	6″	ZONE 13	Del Paso Lane	6″	$5,800
Total					**$150,000**

The construction cost for the PRV stations is estimated at **$160,000** and the total hydrant replacement cost is estimated at **$150,000.**

The construction costs were based on information and data supplied by local contractors. There may be site conditions that could affect the costs.

4.1.3 Water Meters

The estimate for meters takes into consideration a system-wide meter implementation program. During the 10% design, and prior to final plans and specifications, a "parcel-by-parcel" evaluation must be completed for all new meters and upgraded meter installations.

As noted in TM No. 1 **(Appendix C)** there are various conditions and alternatives for a system-wide water meter installation program. The new meter installation program includes two considerably different conditions:

- ***Condition One* (*New Main Construction-860 Meters*)**
- ***Condition Two (Existing System-504 Meter Retrofits)***

It is assumed that 474 meters will be installed prior to the start of construction of the proposed USDA project by District staff.

Whenever and wherever possible the new construction will include double services (two meters served off of one service lateral) which will reduce the overall project costs. Details of double and single services can be found within TM No. 1. Other operational considerations were identified in the meter tech memo which included the addition of new individual PRV's/regulators and/or upgraded PRV's with new boxes for homeowners. **Table 4.1.3a**, below presents the cost estimate for the installation of the new water meters, taking into consideration existing meter boxes and services, new main construction, and general retro-fitting of existing installations.

Table 4.1.3a

BLSMWC Meter Installation Cost Analysis (With 200 Driveway Installations)					
Bid Item	**Specification**	**Quantity (EA.)**	**Unit Price**		**Cost**
			Materials	**Installation**	
Scenario A1 - New Construction -					
Single Service - One Home					
Meter	5/8-inch Sensus iPERL Meter	288	$129		$37,008
SmartPoint AMR Transceiver	SmartPoint AMR Transceiver	288	$156		$44,928
Meter Box	Carson 1419-12 Meter box W/Lid	288	$35		$10,080
Meter Valve	Ford Ball Meter Valve B-13	288	$67		$19,296
Check Valve	Watts 3/4" Check Valve #600 with #2 spring	288	$17		$4,896
Gate Valve	Gate Valve	288	$15		$4,320
Installation		288		$350	$100,800
				Scenario A1 Sub-Total	**$221,328**
Scenario A2 - New Construction -					
Single Service - One Home - Driveway Installation					
Meter	5/8-inch Sensus iPERL Meter	200	$129		$25,700

Transceiver	SmartPoint AMR Transceiver	200	$156		$31,200
Meter Box	Christy B16 Meter Box w/lid	200	$75		$15,000
Meter Valve	Ford Ball Meter Valve B-13	200	$67		$13,400
Check Valve	Watts 3/4" Check Valve #600 with #2 spring	200	$17		$3,400
Gate Valve	Gate Valve	200	$15		$3,000
	Installation	200		$1,200	**$240,000**
				Scenario A2 Sub-total	**$331,700**
Scenario A3 - New Construction -					
Double Service					
Meter	5/8-inch Sensus iPERL Meter	330	$129		$42,405
Transceiver	SmartPoint AMR Transceiver	115	$166		$19,090
Meter Box	Christy B16 Meter Box	330	$75		$24,750
Meter Valve	Ford Ball Meter Valve B-13	330	$67		$22,110
Check Valve	Watts 3/4" Check Valve #600 with #2 spring	330	$17		$5,610
Gate Valve	Gate Valve	330	$15		$4,950
	Installation	330		$350	$115,500
				Scenario A3 Sub-Total	**$234,415**
Scenario B1 - Existing/Retrofit					
Single Service - One Home					
Meter	5/8-inch Sensus iPERL Meter	210	$129		$26,985
SmartPoint AMR Transceiver	SmartPoint AMR Transceiver	210	$156		$32,760
Meter Box	Carson 1419-12 Meter box W/Lid	210	$35		$7,350
Meter Valve	Ford Ball Meter Valve B-13	210	$67		$14,070
Check Valve	Watts 3/4" Check Valve #600 with #2 spring	210	$17		$3,570
Gate Valve	Gate Valve	210	$15		$3,150
	Installation	210		$350	$73,500
				Scenario B1 Sub-Total	**$161,385**
Scenario B2 - Existing/Retrofit					
Double Service					
Meter	5/8-inch Sensus iPERL Meter	209	$129		$26,857
SmartPoint AMR Transceiver	SmartPoint AMR Transceiver	105	$166		$17,430
Meter Box	Carson 1419-12 Meter box W/Lid	209	$35		$7,315
Meter Valve	Ford Ball Meter Valve B-13	209	$67		$14,003

Check Valve	Watts 3/4" Check Valve #600 with #2 spring	209	$17		$3,553
Gate Valve	Gate Valve	209	$15		$3,135
	Installation	209		$350	$73,150
				Scenario B2 Sub-Total	**$145,443**
				Sub-Total Cost - Scenario A	**$787,443**
				Sub-Total Cost - Scenario B	**$306,828**
				Sub-Total Cost	**$1,094,271**

The construction cost for the water meter installation project is estimated at **$1,094,271** which takes into consideration various components, such as retrofitting existing installations, backyard re-locations, new main construction, and other factors.

4.1.4 BOOSTER PUMP STATIONS

A cost estimate is provided below in **Table 4.1.4a** for the booster station requiring replacement/upgrading:

Table 4.1.4a

Booster Pump Station			
Item	Quant.	Unit	Material/Labor
Concrete Slab 6"	**5**	CY	**$3,200.00**
Building Modifications	**1**	LS	**$17,500.00**
Electrical Modifications	**1**	LS	**$10,000.00**
Fencing (8' chain link)	**120**	FT	**$3600.00**
Access/paving	**600**	SF	**$3000.00**
Yard Piping	**1**	LS	**$18,000.00**
Skid Mounted Booster Station/ PLC Control	**1**	LS	**$60,000.00**
		TOTAL	**$115,300.00**

The estimated construction cost for the upgraded booster pump station is $115,300.00. The construction cost is based on information and data supplied by local contractors. There may be site and bidding conditions that could increase the costs.

4.1.5 TOTAL CONSTRUCTION COST ESTIMATE

The total construction cost estimate is **$9,456,075,** as noted in **Table 4.1.5a**, below**.** These costs do not include design, CM, administration and other associated costs.

Table 4.1.5a
Total Construction Project Cost Estimate **(Option 2)**

Item	Component	Description	Estimated Cost
1.	Mainline Replacement	See **Table 4.1.1a for Description**	$7,842,879
2.	PRV Station(s)	See **Table 4.1.2a for Description**	$ 160,000
3.	Fire Hydrant(s)	See **Table 4.1.3a for Description**	$ 150,000
4.	Water Meters(1)	See **Table 4.1.4a for Description**	$1,094,271
5.	Booster PS Upgrade	See **Table 4.1.5a for Description**	$ 115,300
		Sub-Total Construction	$9,362,450
6.	Mobilization (1%)		$ 93,625
		Total Cost for All Projects	**$9,456,075**

4.2 DESIGN CRITERIA

4.2.1 WATER DISTRIBUTION SYSTEM DESIGN CRITERIA

Table 4.2.1a below show a basis of design for the distribution system pipeline:

Table 4.2.1a
Pipelines Design Criteria

Need	Basis of Design
Construct 6-inch and 8-inch mains with house services and meter boxes. **Construct new hydrants and ARVs and relocated PRVs**	• Provide pipeline installation that will be able to meet the operating under dynamic and static conditions • Provide minimum fire-flow of 1000 gpm at less than 10 fps velocity and a 30 psi residual pressure based on water model results and water loss data from improved metering • Use C 900-CL 200 PVC pipe to meet operation conditions • Use polyethylene pipe for services • Restraint joints and ARVs to be installed per design • ¾-inch or 1-inch services with corporation stops

4.2.2 PRVs (>1.5-INCH DIA.), VALVES AND HYDRANTS DESIGN CRITERIA

Table 4.2.2a below show a basis of design for the pressure reducing valves and hydrants:

Table 4.2.2a
Pressure Reducing Valves and Hydrants

Need	Basis of Design
Construct new hydrants to meet fire flow requirements and eliminate old and deteriorated leaking hydrants **Construct new PRVs at specified locations to properly address system pressure differentials and reduce health and safety concerns** **Construct new street valves for proper operation of hydrants**	• Provide minimum fire-flow of 1000 gpm at less than 10 fps velocity and a 30 psi residual pressure based on water model results and water loss data from improved metering. • Provide materials as per AWWA • PRVs to include vaults with traffic approved lids in roadways • PRVs to be accessible for access to perform maintenance • PRV locations based on modeling results

4.2.3 WATER METER DESIGN CRITERIA

Table 4.2.3a below show a basis of design for the water meters:

Table 4.2.3a
Water Meter Design Criteria

Need	Basis of Design
Improve supply/process efficiency **Water Loss Reduction** **AWWA Water Audit ILI target of 1.0** **Minimize staff time for meter reading**	• Industry standards for data management and meter reading combined with BLSMWC Metered Areas for water loss management. • Installation of new meters to be consistent with the existing technology currently being implemented by BLSMWC to minimize spare parts requirements • Maintain industry standard for meter reading and meter data management including relying on a licensed primary frequency for related endpoints

4.2.4 BOOSTER PUMP STATION DESIGN CRITERIA

Calculations will be performed during design for the proposed Cypress Point project with a maximum total dynamic head (TDH) that might be incurred by a fire pump at this site while relying on the existing 6" diameter pipe to boost water flows to Tank No. 6. The calculation for pump sizing and control strategy will be completed during the 10% design phase based on updated water model results and recommendations and as noted on **Table 4.2.4a:**

Table 4.2.4a
Pump Station Design Criteria

Need	Basis of Design
No pump redundancy for existing booster stations located at WTP **Provide alternate alignment for boosted water to tank No. 6 and take full advantage of the CCWD Inter-tie** **Provide backup supply in the event that Tank No. 6 requires emergency or routine maintenance**	• California Waterworks Standards Section 64554 – Peak Hourly Demand, • Minimum 1000 gpm fire-flow. [1] • Health and Safety Standards for power at critical sites in the event of a power outage • Operational efficiency and SCADA controls • AWWA M42 – Minimum of 1-day emergency supply, 20% Diurnal Average Daily, fire-flow requirements

4.3 UNFEASIBLE PROJECTS

There were no reasonable project alternatives for any of the proposed projects. Whereas new systems will often require a higher level of evaluation before choosing the most cost-effective project, upgrades and replacements do not typically allow for any significant deviation from the standard design and construction of existing facilities. Due to the lack of viable alternatives, no mapping showing alternatives or related discussions on land requirements and environmental comparisons was required. However, the required CEQA and NEPA documents will address the no project alternative.

4.4 SUSTAINABILITY CONSIDERATIONS

Water Efficiency

Because many of the accounts are currently un-metered, the BLSMWC has limited ability to monitor and control water usage for specific accounts. In 2015 the BLSMWC issued Stage 3 drought related directives in an effort to reduce customer water consumption in response to State mandates coupled with dangerously low levels in the BLSMWC's wells. After the rainfall that occurred during the winter of 2015/2016 the BLSMWC was able to drop to a Stage 2 level status. The BLSMWC's drought response measures are summarized below in **Table 4.4a**.

Table 4.4a
Drought Response Stages

Blue Lake Springs Mutual Water Company
Drought Action Plan

Summarization of drought stage water use reduction targets, triggering supply conditions, objectives and response actions.

Table 1. Drought Plan Summary

Water Supply Conditions	Drought Stage	Objective	Response Actions
Slightly Restricted Water Supplies (below normal) Asking shareholders for up to 10% Supply Reduction	**Drought Stage 1** – Voluntary reductions in use. **NO** watering of forest trees (Bark Beetle). Voluntary Odd/Even outside watering.	Initiate public awareness of predicted water shortage and encourage conservation. Flyers to Realtors for vacation rentals.	Encourage voluntary measures to decrease "normal" demand up to 10%. Voluntary: Odd/Even watering based on addresses during specific times of day. NO WATERING ON MONDAYS Shareholder Awareness through flyers and website. Waste Water Fines – 1st - written warning; 2nd - $100 fine and install meter at shareholder's expense; 3rd - $1,000 fine.
Moderately Restricted Water Supplies Necessary 20% Total Supply Reduction	**Drought Stage 2** – Mandatory stage with restrictions on use. Odd/Even days watering based on addresses. NO watering of forest trees (Bark Beetle). No unnecessary watering (decks, driveways, cars, etc.)	Increase public understanding of worsening water supply conditions and enforce mandatory conservation measures.	Enforce mandatory measures and implement water rationing to decrease "normal" demand by 20%. Mandatory: Odd/Even watering based on addresses during specific times of day. NO watering on Mondays. Fines are the same as in Stage 1.
Severely Restricted Water Supplies Necessary 50% Total Supply Reduction	**Drought Stage 3** – Mandatory restrictions (severe prohibitions) on use. NO OUTSIDE WATERING	Ensure that water use is limited to health and safety purposes.	Enforce extensive restrictions on water use and implement water rationing to decrease demand up to 50% of "normal" demand. NO OUTSIDE WATERING Fines are DOUBLED those listed in Stage 1.

Customers were prohibited from outdoor watering, car washing, and similar activities throughout 2015. As a result, annual consumption for 2015 was reduced by 33% over previous years.

In addition to an aggressive drought response plan to encourage water efficiency, the BLSMWC also maintains a rebate program for water efficient toilets, however, participation in this program has been somewhat limited in the past. Nonetheless, the BLSMWC elected to continue to offer a $50.00 rebate for 2016 as part of this program.

In general, the lack of complete metering not only creates inequities throughout the BLSMWC, it makes it very difficult for the BLSMWC to enforce drought response measures or track leaks and excessive use for subsequent notification and/or enforcement activities. However, by monitoring production rates, the BLSMWC has identified new leaks in the past based on spikes at the production sources. Once meters are installed, a water audit followed by a system-wide leak survey is recommended in the future to aid in identifying water losses. New meters will greatly improve the ability to monitor losses and will allow the BLSMWC to complete an accurate AWWA spreadsheet based water audit of the system on an annual basis, thereby greatly improving overall water efficiency through awareness and the ability to measure the effectiveness of programs and related customer and BLSMWC responses.

With the introduction of system-wide drive-by meter reading, the BLSMWC will realize savings in labor and vehicle usage for reading meters. This will result in a reduction in green-house gas emissions while providing extensive data on customer usage for each account to facilitate future rate programs aimed at encouraging conservation.

Detailed usage data within select BLSMWC metered areas can assist in identifying leaking mains and aid in prioritizing future main replacements and related capital improvements.

Energy Efficiency

The total budget for energy usage within the BLSMWC was $40,000. This includes purchased energy for wells, water treatment, booster pumping and BLSMWC offices. Of this total, an estimated 80% ($30,000 annually) is associated with pumping at the following facilities:

Supply Wells:

- White Pines Well #1
- White Pines Well #2
- White Pines Well #3
- 20 HP Backwash Pump at WTP
- 75 HP Booster Pumps (2 ea.) at WTP

- Cypress Point Booster Pump Station (non-operational)
- Borad Well (pending)
- Lucia Well (completed 2016)

Currently the three permitted wells and the booster pumps at the WTP create most of the demand for electrical power. With the introduction of new sources from CCWD, the opportunity exists to optimize use of both groundwater and surface water sources. Considerations for energy efficiency include:

- ❖ Optimizing surface water from CCWD to limit the use of groundwater while minimizing drawdown and maximizing efficiency in existing wells
- ❖ Relying on new meters and knowledge of system-wide demands to optimize water supply sources at various times throughout the year to minimize energy and operating costs
- ❖ Considering the utilization of distribution booster pumping to augment areas currently served by groundwater with surface water
- ❖ Leveraging existing storage to optimize time-of-use pumping and minimize energy costs

4.5 PROJECTS IMPACT ON THE ENVIRONMENT

The BLSMWC has enlisted the service of Analytical Environmental Services (AES), based in Sacramento, CA, to prepare the environmental documentation for the projects recommended in this report. Details regarding environmental impacts can be found in related reports prepared by AES for CEQA and NEPA compliance.

5. SELECTION OF AN ALTERNATIVE

The scope of this project is limited to the replacement of substandard waterlines, pressure reducing valves, and fire hydrants; along with completing the on-going water meter installation program. The only alternative to not doing this required work would be a "No Project" alternative that would in effect only defer the construction of these much needed improvements to a later date at a higher cost. A Life Cycle Cost Analysis was therefore not competed being that there are no actual alternatives to compare.

6. PROJECT PLANNING

6.1 PROJECT DESCRIPTION AND COSTS

The proposed project(s) locations are shown in **Figure 6.1a** and total construction costs in **Table 6.1a**, below.

Figure 6.1a

Title: Figure 6.1a Project Improvemtns

Legend

- Wawona
- Patricia
- Blue Lake Springs
- San Ramon
- Rainy
- Dean
- Julia
- BLSMWC Pipes

- PRVs Recommended for Replacement
- Fire Hydrants Recommended for Replacement
- Pump Station

Zone

- 1
- 13
- 2/3
- 4/5
- 6/7

N

0 500 1,000 2,000 Feet

Prepared by:
MC Engineering, Inc.
6917 OHANA PLACE
Orangevale, CA 95662
Tel: 916-223-3828
Fax: 916-860-1863
www.mc-engineers.com

Table 6.1a
Total Construction Project Cost Estimate **(Option 2)**

Item	Projects	Project Description	Estimated Cost
1.	**Mainline Replacement**	Refer to **Figure 6.1a** for location map and **Section 6.1.1** for detailed description.	$7,842,879
2.	**PRV Station Replacement(s)**	Refer to **Figure 6.1a** for location map and **Section 6.1.2** for detailed description.	$ 160,000
3.	**Fire Hydrant Replacements(s)**	Refer to **Figure 6.1a** for location map and **Section 6.1.3** for detailed description.	$ 150,000
4.	**Water Meters** (1) **Installation**	Refer to **Figure 6.1a** for location map and **Section 6.1.4** for detailed description.	$1,094,271
5.	**Booster PS Upgrade**	Refer to **Figure 6.1a** for location map and **Section 6.1.5** for detailed description.	$ 115,300
		Sub-Total Construction	$9,362,450
6.	Mobilization (1%)		$ 93,625
		Total Cost for All Projects	**$9,456,075**

Notes: (1) Total meter installation is $ 1,094,271 for 1278 new meters (retro-fit and main relocation construction meters. This does not include 432 existing installed meters and 315 un-metered vacant lots.

Land Requirements

Based on current land development information including subdivision, parcel maps, lot line adjustments, easements and R/W's the existing BLSMWC facilities are shown to be installed within the public right-of-way. There may be conflicts as to the location of existing meters and or meter boxes. It is not known whether the meter and meter boxes were located within the utility R/W. There have been some conflicts, as noted by the BLSMWC staff, with the location of the property corners during installation of hydrants and water meters. These errors or discrepancies in the line locations made be due to mapping, and/or the field staking of the parcels or the property corners may have been moved. This potential will be rectified during the design phase of the project. It is also recognized that any work on private property is considered non-eligible under the USDA guideline.

Potential Construction Problems

A typical trench detail, per **Figure 6.1.1a**, above will be utilized. The typical trench depth will be a minimum of 36-inches of cover, and is subject to deferring and variable site conditions including and limited to; existing dry and wet utilities, culverts, ditches, and other sub-surface native materials and as noted in procedural protocols below;

- USA locations, permits, and field staking.
- Pre-notification to customers regarding construction efforts, including new meter boxes, meters, and services. Due to the construction of new water meters, close coordination with all customers will be required (1364 customers).
- Periodic water system shut-offs will be required and include pre-notification to all customers affected by shut-offs.
- Standard dust and noise controls.
- Removal of some trees.
- Signage and other encroachment permit requirements.

The two most serious construction related issues will be water shut-offs and road closures and/or detours.

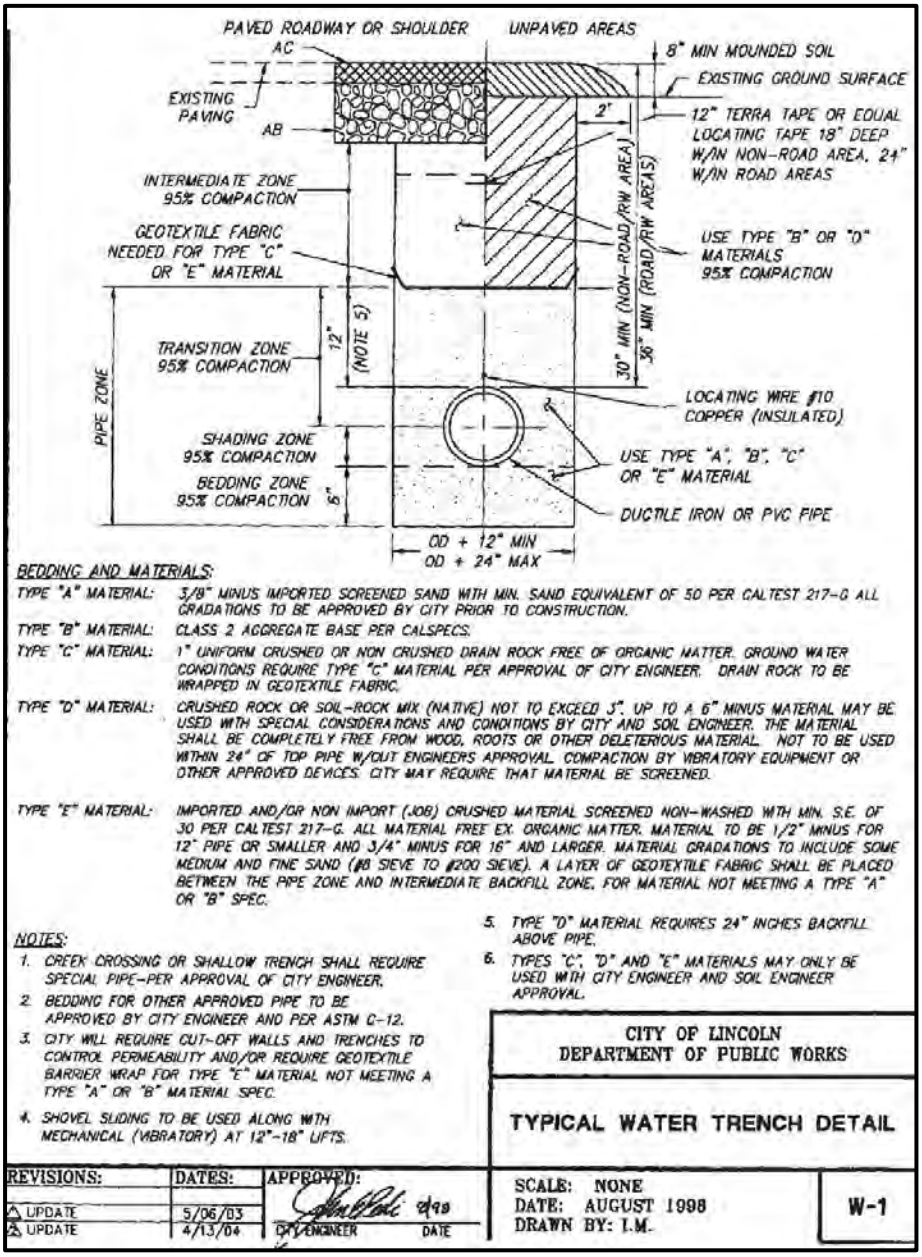
6.1.1 WATER DISTRIBUTION PROJECT

The Distribution mainline relocation project consists of abandoning in-place, old and deteriorated mains within the back-of-lots and in some cases within the streets **(Figure 6.1)**. The mainline construction will consist of new water mains ranging in size from 6-inch to 10-inch in diameter. The total cost estimate for the mains also includes miscellaneous appurtenances including and not limited to air relief valves (ARV), fire hydrants, large relocated PRVs, gate valves, and ¾ or 1-inch house services, and meter boxes and meters. A detailed cost-estimate for

each mainline project is shown in **Appendix J.** This cost estimate was developed by acquiring resent bid and construction costs from local contractor(s) (Sierra Nevada) on similar size and type water main projects. A summary of the total mainline replacement project(s) is as noted in **Table 4.1.1a**, above. **The mainline distribution cost is estimated to be $7,842,879 and a typical trench detail is located below in Figure 6.1.1a.**

Figure 6.1.1a

Typical Trench Detail



BEDDING AND MATERIALS:

TYPE "A" MATERIAL: 3/8" MINUS IMPORTED SCREENED SAND WITH MIN. SAND EQUIVALENT OF 50 PER CALTEST 217-C ALL GRADATIONS TO BE APPROVED BY CITY PRIOR TO CONSTRUCTION.

TYPE "B" MATERIAL: CLASS 2 AGGREGATE BASE PER CALSPECS.

TYPE "C" MATERIAL: 1" UNIFORM CRUSHED OR NON CRUSHED DRAIN ROCK FREE OF ORGANIC MATTER. GROUND WATER CONDITIONS REQUIRE TYPE "C" MATERIAL PER APPROVAL OF CITY ENGINEER. DRAIN ROCK TO BE WRAPPED IN GEOTEXTILE FABRIC.

TYPE "D" MATERIAL: CRUSHED ROCK OR SOIL-ROCK MIX (NATIVE) NOT TO EXCEED 3". UP TO A 6" MINUS MATERIAL MAY BE USED WITH SPECIAL CONSIDERATIONS AND CONDITIONS BY CITY AND SOIL ENGINEER. THE MATERIAL SHALL BE COMPLETELY FREE FROM WOOD, ROOTS OR OTHER DELETERIOUS MATERIAL. NOT TO BE USED WITHIN 24" OF TOP PIPE W/OUT ENGINEERS APPROVAL. COMPACTION BY VIBRATORY EQUIPMENT OR OTHER APPROVED DEVICES. CITY MAY REQUIRE THAT MATERIAL BE SCREENED.

TYPE "E" MATERIAL: IMPORTED AND/OR NON IMPORT (JOB) CRUSHED MATERIAL SCREENED NON-WASHED WITH MIN. S.E. OF 30 PER CALTEST 217-C. ALL MATERIAL FREE EX. ORGANIC MATTER. MATERIAL TO BE 1/2" MINUS FOR 12" PIPE OR SMALLER AND 3/4" MINUS FOR 16" AND LARGER. MATERIAL GRADATIONS TO INCLUDE SOME MEDIUM AND FINE SAND (#8 SIEVE TO #200 SIEVE). A LAYER OF GEOTEXTILE FABRIC SHALL BE PLACED BETWEEN THE PIPE ZONE AND INTERMEDIATE BACKFILL ZONE, FOR MATERIAL NOT MEETING A TYPE "A" OR "B" SPEC.

NOTES:

1. CREEK CROSSING OR SHALLOW TRENCH SHALL REQUIRE SPECIAL PIPE-PER APPROVAL OF CITY ENGINEER.
2. BEDDING FOR OTHER APPROVED PIPE TO BE APPROVED BY CITY ENGINEER AND PER ASTM C-12.
3. CITY WILL REQUIRE CUT-OFF WALLS AND TRENCHES TO CONTROL PERMEABILITY AND/OR REQUIRE GEOTEXTILE BARRIER WRAP FOR TYPE "E" MATERIAL NOT MEETING A TYPE "A" OR "B" MATERIAL SPEC.
4. SHOVEL SLIDING TO BE USED ALONG WITH MECHANICAL (VIBRATORY) AT 12"-18" LIFTS.
5. TYPE "D" MATERIAL REQUIRES 24" INCHES BACKFILL ABOVE PIPE.
6. TYPES "C", "D" AND "E" MATERIALS MAY ONLY BE USED WITH CITY ENGINEER AND SOIL ENGINEER APPROVAL.

CITY OF LINCOLN
DEPARTMENT OF PUBLIC WORKS

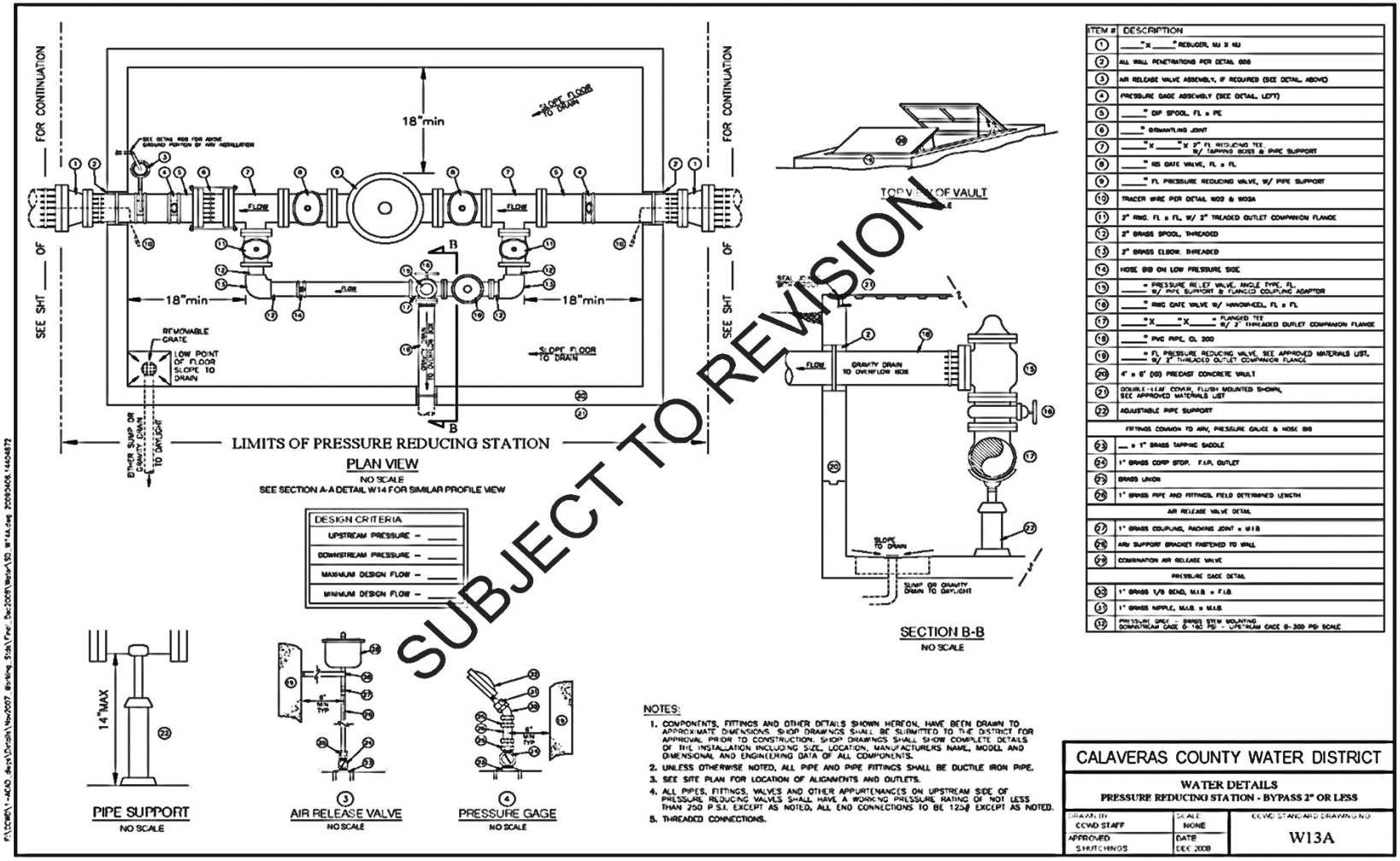
TYPICAL WATER TRENCH DETAIL

REVISIONS:	DATES:	APPROVED:	SCALE: NONE	W-1
△ UPDATE	5/06/03	CITY ENGINEER DATE	DATE: AUGUST 1998	
△ UPDATE	4/13/04		DRAWN BY: I.M.	

6.1.2 PRV STATION REPLACEMENT PROJECT

The PRV Station consists of installing five (5) new 6-inch and one (1) new 1.5-inch PRVs throughout the service area **(Figure 6.1)**. The new relocated PRV stations will require a cut-in to the existing main, vault with traffic rated cover/lid, and pressure reducing valve and appurtenances**.** The vaults will require double access doors to meet CA OSHA requirements with additional details to be developed at the 10% design stage**.** A preliminary cost-estimate for the PRV station project is shown in **Section 4**, above. A typical detail for a PRV is noted below in **Figure 6.1.2a**. **The PRV station improvements are estimated to be $160,000**.

Figure 6.1.2a
Typical PRV Station Detail

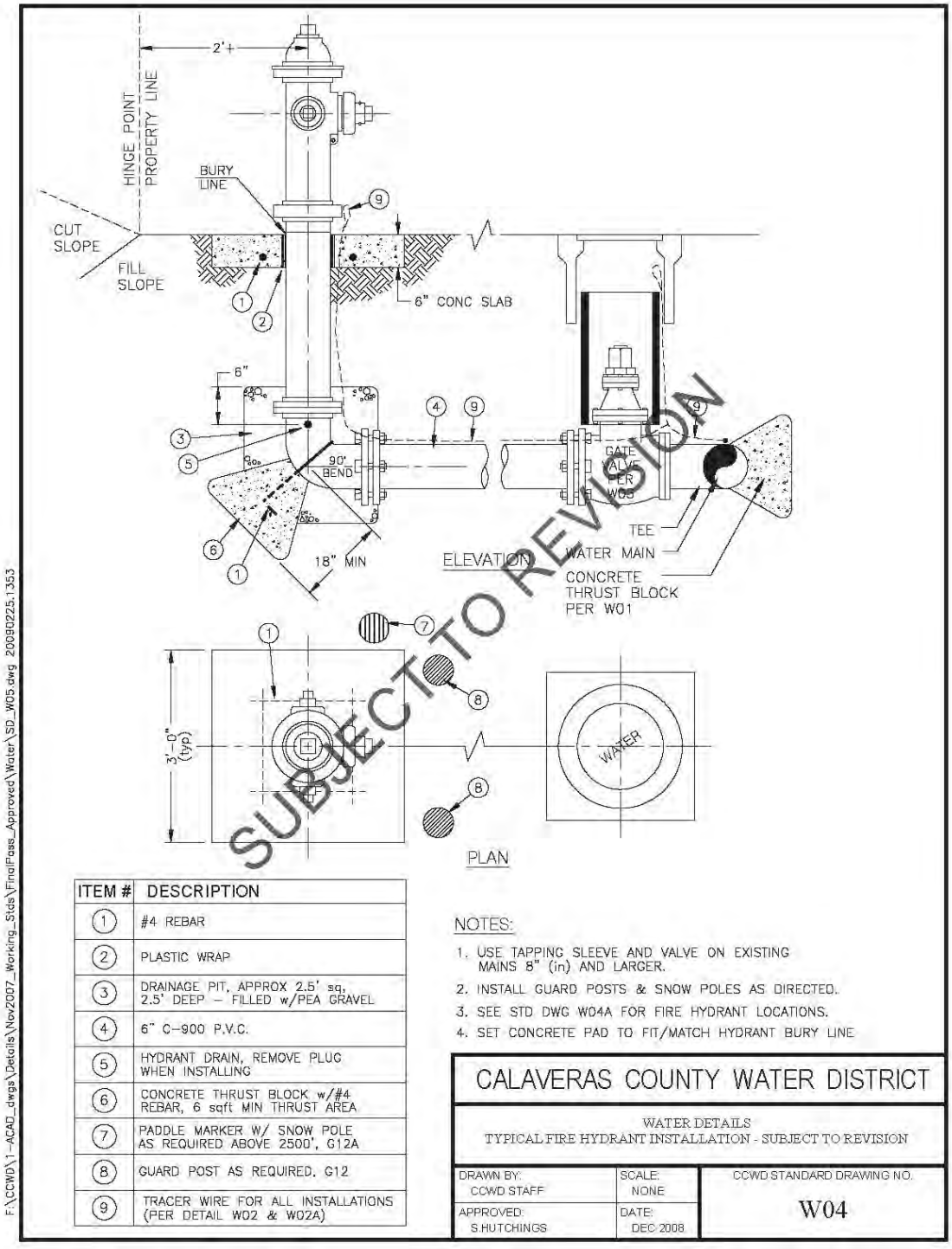


6.1.3 FIRE HYDRANT REPLACEMENT PROJECT

The fire hydrant project consists of installing 26 new 6-inch fire hydrants, specifically in Village 13 **(Figure 6.1)**. The new hydrants will require a cut-in to the existing main, street gate valve and appurtenances**.** A preliminary cost-estimate for the hydrant replacement project **Section 4**, above. A typical detail for a Hydrant is noted below in **Figure 6.1.3a**. **The fire hydrant replacement cost is estimated to be $150,000.**

Figure 6.1.3a

Typical Hydrant Detail



ITEM #	DESCRIPTION
1	#4 REBAR
2	PLASTIC WRAP
3	DRAINAGE PIT, APPROX 2.5' sq, 2.5' DEEP – FILLED w/PEA GRAVEL
4	6" C-900 P.V.C.
5	HYDRANT DRAIN, REMOVE PLUG WHEN INSTALLING
6	CONCRETE THRUST BLOCK w/#4 REBAR, 6 sqft MIN THRUST AREA
7	PADDLE MARKER W/ SNOW POLE AS REQUIRED ABOVE 2500', G12A
8	GUARD POST AS REQUIRED. G12
9	TRACER WIRE FOR ALL INSTALLATIONS (PER DETAIL W02 & W02A)

NOTES:

1. USE TAPPING SLEEVE AND VALVE ON EXISTING MAINS 8" (in) AND LARGER.
2. INSTALL GUARD POSTS & SNOW POLES AS DIRECTED.
3. SEE STD DWG W04A FOR FIRE HYDRANT LOCATIONS.
4. SET CONCRETE PAD TO FIT/MATCH HYDRANT BURY LINE

CALAVERAS COUNTY WATER DISTRICT

WATER DETAILS
TYPICAL FIRE HYDRANT INSTALLATION - SUBJECT TO REVISION

DRAWN BY: CCWD STAFF	SCALE: NONE	CCWD STANDARD DRAWING NO. W04
APPROVED: S.HUTCHINGS	DATE: DEC 2008	

F:\CCWD\1-ACAD_dwgs\Details\Nov2007_Working_Stds\FinalPass_Approved\Water\SD_W05.dwg 20080225.1353

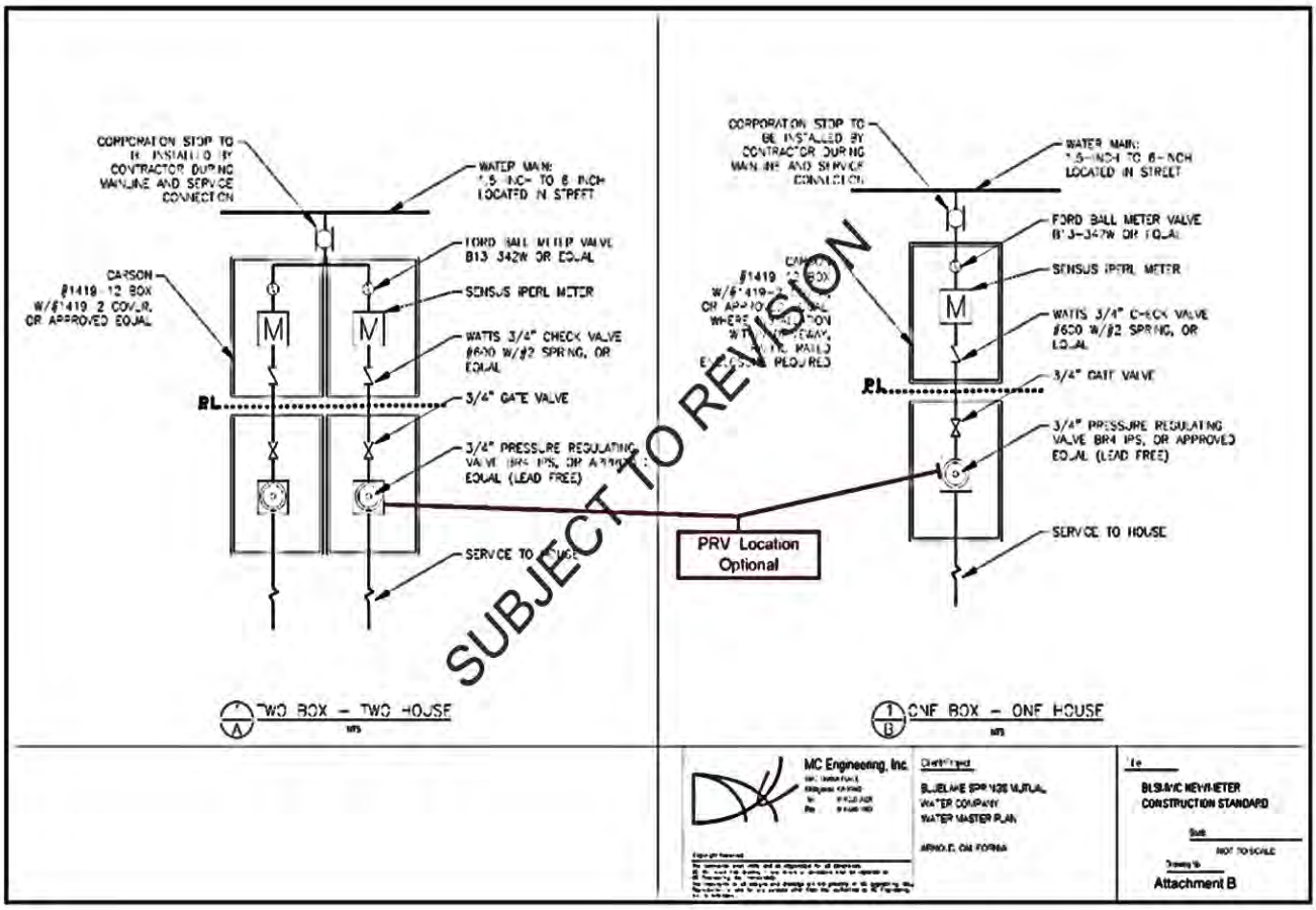
6.1.4 WATER METER INSTALLATION PROJECT

The water meter replacement project consists of two types (scenarios) of installations; 1) installation of 860 meters within the water main relocation/replacement areas and 2) 504 retro-fit meter installations where services have already been constructed in prior years. The *new construction* meter installations will include services, corporation stops, iPERL meter, SmartPoint AMR Transceiver, meter box (with or without traffic approved lid), curb, meter valve, check and gate valve. The *retro-fit* meters will include iPERL meter, SmartPoint AMR Transceiver, meter box (optional), meter valve, check and gate valve. Unimproved parcels, in the new construction areas, will only have a service line and box installed, with the meter being installed at the time of occupancy following construction of new home. It is assumed that services have already been provided to vacant lots not affected by new construction.

A serious and important design consideration will be the location and placement of the meter box and meter in those areas where an existing meter box does not exist. Lot by lot evaluations will be conducted to locate each new meter installation within the R/W and where feasible, the cost-effective installation of a double meter service will be designed and constructed. A preliminary cost-estimate for the meter installation project is shown in **Section 4,** above. A typical detail for a new meter connection is shown below in **Figure 6.1.4a**. **The meter installation improvement project is estimated to be $1,094,271.**

Figure 6.1.4a

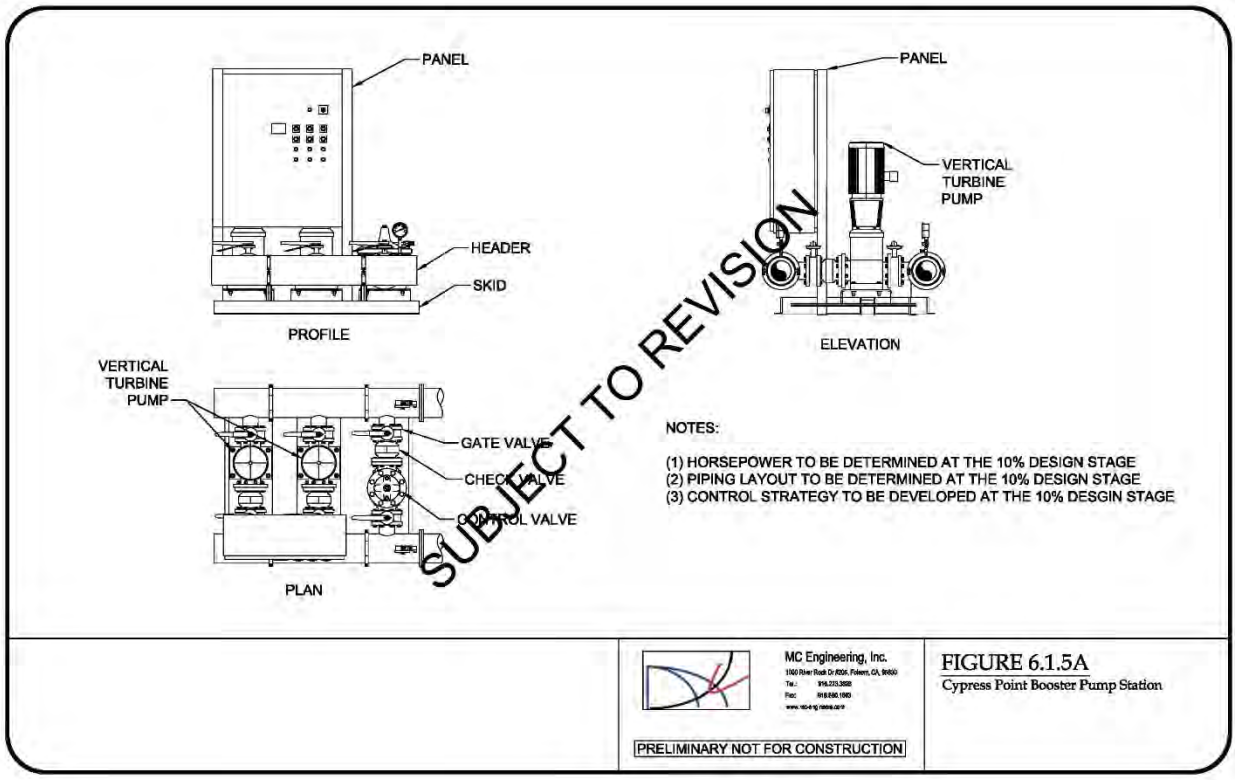
New Meter Installation Typical Detail



6.1.5 BOOSTER PUMP STATION PROJECT

The booster pump station upgrade project consists of the installation of two (2) booster pumps (skid mounted), building modifications, electrical and control modification, fencing, paving, and yard piping. The location is noted in **(Figure 6.1)**. A thorough evaluation of the required improvement at the existing booster pump station (Cypress), will be evaluated at the 10% design stage**.** A preliminary cost-estimate for the upgraded booster pump station is noted in **Section 4**, above. A typical detail for a skid mount booster pump is shown below in **Figure 6.1.5a. The booster pump station improvement cost are estimated to be $115,300.**

Figure 6.1.5a
Cypress Point Booster Pump Station

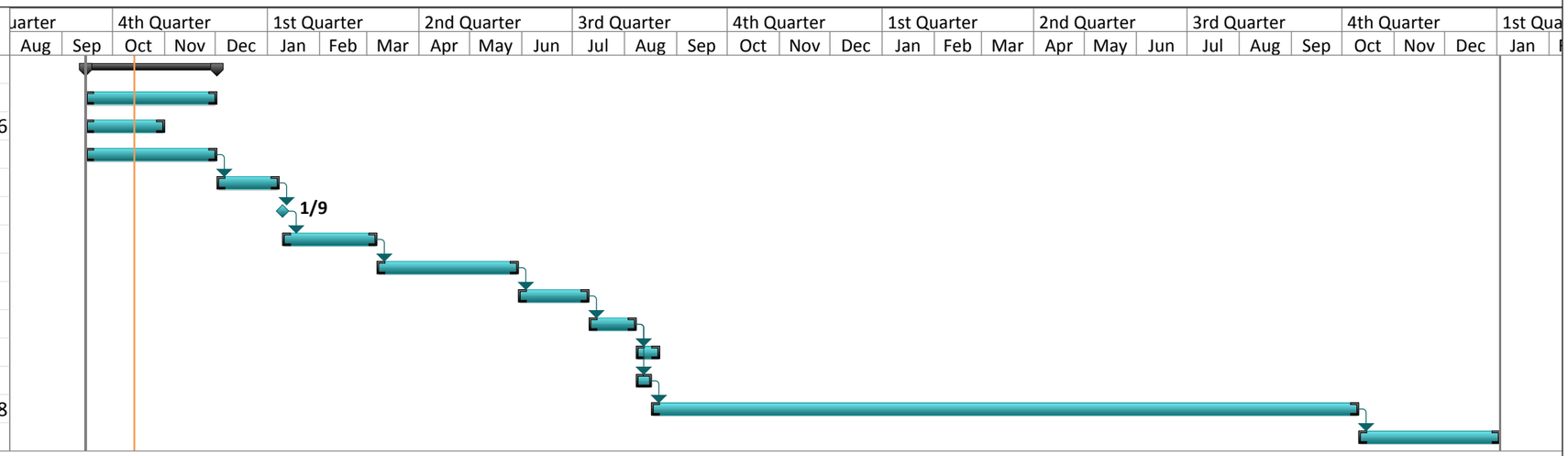


6.2 PROJECT SCHEDULE

The project schedule below anticipates a 16-18-month construction schedule, including down-time due to in-climate weather during the winter (December-March). Another important consideration is the design schedule. It may be difficult to establish ground control and field design during the winter months of January-March of 2017. Other consideration effecting the schedule are the establishment of a fair and equitable rate structure to provide the necessary debt service to repay the USDA loan and the requirement, due to the amount of the loan (> than $5,000,000) request, which requires the submittal of the PERs and application to the "National" office for review and approval. See **Table 6.2a**, below.

Table 6.2.a
Blue Lake Springs Mutual Water Company
USDA Funded Water System Improvements
Preliminary Project Schedule

ID	Task Name	Duration	Start	Finish
1	**Planning**	**56 days**	**Thu 9/15/16**	**Thu 12/1/16**
2	Application	56 days	Thu 9/15/16	Thu 12/1/16
3	PER	33 days	Thu 9/15/16	Mon 10/31/16
4	Environmental Review	56 days	Thu 9/15/16	Thu 12/1/16
5	**Letter of Conditions**	27 days	Fri 12/2/16	Sat 1/7/17
6	Design Contract	1 day?	Mon 1/9/17	Mon 1/9/17
7	Predesign	40 days	Tue 1/10/17	Mon 3/6/17
8	**Design**	60 days	Tue 3/7/17	Mon 5/29/17
9	Bidding Period	30 days	Tue 5/30/17	Mon 7/10/17
10	Contract Award	20 days	Tue 7/11/17	Mon 8/7/17
11	USDA Loan Agreement	10 days	Tue 8/8/17	Mon 8/21/17
12	Notice to Proceed	7 days	Tue 8/8/17	Wed 8/16/17
13	**Construction**	300 days	Thu 8/17/17	Wed 10/10/18
14	Project Closeout	60 days	Thu 10/11/18	Wed 1/2/19



Project: Project1
Date: Fri 10/14/16

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			

6.3 PERMIT REQUIREMENTS

Project permits may include and not be limited to the following:

- Stream alteration permit possible (CDFG)
- Encroachment permit with Calaveras County
- CRWQCB Stormwater Permit
- Other minor permits may be required, such as building permit for upgrades to booster station

6.4 TOTAL PROJECT COST ESTIMATE

The total project cost estimate is **$12,225,744**, including a 10% project contingency. It also assumes a 14-16 month construction schedule. The construction period will be limited by wet-weather and winter weather conditions, between the months of December through March. Other project unknowns will include subsurface conditions due to rock and groundwater. All pipeline design will provide allowable trench depths to avoid rock, where possible. Location of water service lines maybe problematic due to various site conditions such as, trees, cut-banks, county road-side ditches, and property corners (exact locations).

Table 6.4a
Total Project Cost Estimate

USDA Total Cost Spreadsheet			
Item	**Subtotal**	**Total**	
Miscellaneous Land and Environmental			
Property Purchase / Lease Agreements (Indirect Costs)		**$0**	
Easement Acquisition / Right of Way / Water Rights		**$0**	
Environmental Services			
a- CEQA/NEPA Environmental Report	$36,000		
b- Environmental Mitigation Contract (See Eng. Services)	$0		
Total – Environmental Services		**$36,000**	**(A)**
Engineering Services			
Basic Services:			
Preliminary Engineering Report (PER)	$62,250		
Preliminary/Final Design Phase Services (8.0%)	$701,227		
Bidding / Contract Award Phase Services	$25,000		
Assistance with Environmental Permits	$10,000		
As-Built Record Drawing	$25,000		
Resident Project Rep (Resident Inspector 4.5%)	$419,164.00		
Total – Engineering Services		**$1,242,641**	**(B)**
Additional Services (Indirect Costs)			
Permitting (Right-of-Way and Easements)	$20,000		
Regulatory Compliance Reports (Construction Phase)	$15,000		
Environmental Mitigation Services (Construction Phase)	$30,000		
Easement Acquisition/ROW Services (Construction Phase)	$15,000		
Surveying Services (Construction Phase)	$68,000		
Operation & Maintenance Manuals	$5,000		
Geotechnical Services	$40,000		
Materials Testing Services (Construction Phase)	$41,597		
Administration/Project Management	$125,000		
Legal Counsel	$20,000		
Total – Additional Services		**$379,597**	**(C)**
Equipment/Materials (Direct Purchases)		**$0**	
Construction Cost Estimate		**$9,456,075**	**(D)**
Subtotal (Without Contingencies) **(A+B+C+D)**		**$11,114,313**	
10% Contingency (Total Project) **(A+B+C+D) * 10%**		**$1,111,431**	
TOTAL PROJECT COST ESTIMATE:		***$12,225,744***	

6.5 Annual Operating cost and Revenue

Table 6.5a is a breakdown of the FY 2016 annual budget broken down into system components. Also included within the table is the projected 2018 budget, which is based on a 10% increase over 10 years or 5% per year.

Table 6.5a
FY 2016 Operations Budget
And Projected 2018 Budget After Improvements **(1)**

EXPENSE DETAIL:	Total Annual Cost (2016)	Operations and Maintenance System Components				
		Meters (10%)	Distribution (45%)	Wells / WTP (45%)	2016 Total	2018 Proposed Budget (10%)
Salaries & Taxes	406,650	40,665	182,993	182,993	406,650	40,665
Benefits (insurance & IRA)	141,650	14,165	63,743	63,743	141,650	14,165
Property / Liability Insurance	25,000	2,500	11,250	11,250	25,000	2,500
Workers Comp Insurance	20,000	2,000	9,000	9,000	20,000	2,000
Power (WTP, wells, pumps)	30,000	3,000	13,500	13,500	30,000	3,000
CCWD Water Purchas	92,000	na	na	**92,000**	92,000	9,200
Water Test (State requirements)	8,000	na	na	**8,000**	**8,000**	800
Operating Supplies	15,000	1,500	6,750	6,750	15,000	150
Standby Power Generation (fuel & O&M)	2,000	na	na	**2,000**	2,000	200
Telephone / Communications	10,000	1,000	4,500	4,500	10,000	100
Vehicle / Operating	11,000	1,100	4,950	4,950	11,000	110
Vehicle / Maintenance	5,000	500	2,250	2,250	5,000	500
System Maintenance	64,000	6,400	28,800	28,800	64,000	6,400
Legal, Contractual, Professional Services	19,000	1,900	8,550	8,550	19,000	1,900
Meeting & Membership	9,500	950	4,275	4,275	9,500	950
Drought	2,500	na	na	**2,500**	2,500	250
Postage	1,000	100	450	450	1,000	100
Office Rental	14,000	1,400	6,300	6,300	14,000	140
Income Tax	1,500	150	675	675	1,500	150
Depreciation / Amortization	7,000	700	3,150	3,150	7,000	700
Miscellaneous	5,000	500	2,250	2,250	5,000	500
Education & Training	2,000	200	900	900	2,000	200
Office Equipment Repairs	500	50	225	225	500	50
State Water System Fees	12,000	1,200	5,400	5,400	12,000	120
TOTAL OPERATING EXPENSES	**904,300**	79,980	359,910	464,410	904,300	84,850
NET O&M Costs After Construction						**84,850**

Note: **(1)** This proposed budget is based on existing increases and is projected to 5% per year for two years. The proposed improvements will have no negative impacts to the budgets as proposed.

The revenue for the 2016 budget is based on a total of 2025 parcels, which are billed once per year. Parcel owners are billed in November of the prior year with payment due by March of the following year. Each parcel/customer is required to pay in full the yearly assessment. If payments are late or delinquent the BLSMWC will take various actions, including and not limited to placing liens on delinquent and unpaid properties. **Table 6.5b** below is a breakdown of the current and projected revenue received for FY 2015 and FY 2016 budgets, respectively.

Table 6.5b
FY 2015 and FY 2016 Projected Revenues
Per Customer Type
(w/out Debt service)

Year: **2015**	**Fee**	**Count**	**Total**
Improved Parcel Without Meter (Home)	$723	1008	$ 728,784
Improved Parcel w/out Meter (Home) w/ Hose	$760 **(1)** w/ $37	430	$ 326,800
Improved Parcel w/ Meter (Home Meter)	$662	272	$ 180,064
Unimproved Parcel (Lot)	$415	311	$ 129,065
Unimproved Parcel (Combined Lot)	$104	4	$ 416
Total		**2025**	**$1,365,129**

Year: **2016**	**Fee**	**Count**	**Total**
Improved Parcel Without Meter (Home)	$795	994	$ 790,230
Improved Parcel w/out Meter (Home w/ Hose)	$ 836 **(1)** w/ $41	416	$ 347,776
Improved Parcel w/ Meter (Home Meter)	$728	297	$ 216,216
Unimproved Parcel (Lot)	$457	295	$ 134,815
Unimproved Parcel (Combined Lot)	$114	23	$ 2,622
Total		**2025**	**$1,491,659**

Note: **(1)** These parcels are charged a hose fee of $37/yr and $41/yr for FY 2015 and FY 2016, respectively

6.6 ANNUAL MAINTENANCE COST (O&M)

The yearly operation and maintenance cost(s) for the BLSMWC will increase slightly as a result of the proposed USDA construction improvements. The current staff will be sufficient to operate and maintain the additional improved facilities.

As a result of the proposed mainline replacements, the current level of effort required to repair old and deteriorated mains will be reduced and will enable the field and office personnel to allocate more time to the routine and necessary operation and maintenance programs which provide safe and reliable drinking water to all service area customers. This includes allocating more time (labor) and effort for performing the daily operation and maintenance of the WTP, booster pump stations, water meter and reads, miscellaneous customer complaints and inquiries, purchase of operating supplies, and working closely with the Calaveras County Water District in the purchase and "wheeling" of potable water within the service area. There may be a slight increase in the meter reading labor efforts as a result of the installation of over 1200 new meters. The office and field labor required to read and maintain water meters will be

minimal as a result of the installation of new radio read meters and appurtenances, which allows the staff to instantaneously acquire meter data with "drive-by" technology.

Other benefits may include the reduction in the purchase of supplies to repair old and deteriorated pipelines and services within the service area. This also includes a non-monetary and safety benefits to the field staff as a result of the construction of new PRV stations which provide safe access to perform required operation and maintenance.

A significant annual cost benefit with the installation of new meters will be realized by the BLSMWC. This will allow the staff to audit and/or bill each customer for the use of water through accurate and quantifiable data. This will ultimately reduce water treatment and wholesale water purchase costs and allow staff to better pin-point their water leaks within pressure zones.

6.7 DEBT REPAYMENTS

As per the FY 2016 Budget and past audits, the BLSMWC has no outstanding debt repayments. To finance the proposed USDA loan project, the BLSMWC will generate the necessary debt service revenue through increases in the annual shareholder's charges. This proposed debt/loan repayment will be assessed on a yearly basis and be applied to the existing shareholder's annual payments. The proposed annual debt service is $480,912 per year and is based on a total project cost of **$ 12,225,744** and is shown on **Table 6.7a,** below.

Table 6.7a

Total Calculated Yearly Debt Repayment

Funding Description	Proposed Cost ($)
Total Project Costs (See **Tables 6.4a**)	**$ 12,225,744**
Yearly Cost w/ USDA Loan *(1.875%, i/40 years or $35.76/$1000 borrowed)*	$ 437,193
Yearly Reserve Fund (10% of USDA Annual Loan Repayment)	$ 43,719/yr
Total Debt Repayment/Year	**$ 480,912/ yr**

Table 6.7b, provides a summary of the required annual debt service per customer rate category.. This table also takes into consideration various rate categories, including *Schedule I* - Unimproved Parcels, *Schedule III*- Improved and Unmetered, and *Schedule IV*- Improved and Metered (Schedule IV and Schedule V, below pay same yearly assessment).

Table 6.7b
Proposed Revenue and Rate Structure
Including New USDA Debt Service
(Based on 2016 Rates)

Rate Schedule	Description of Customer Type	Existing and Proposed Yearly Charges/Fees							
		FY 2016 Current Parcel Charge/ Year ($)	No. of Parcels	**Proposed Fees and Charges** (Annual or One-time)			Current Charges and **USDA** Proposed Annual Debt Service Per Rate Schedule		
				Connection Fee ($)	Other Annual By-in Costs Per Year ($) for Unimproved Parcels	USDA Debt Service Per Parcel Per Year ($) ($480,912**(5)**/2025)	Total Annual Assmt/ Parcel	Annual Debt Service Revenue	Total Annual Assmt/ Parcel **(a+b+c)**
		a			**b**	**c**			
I	Base Unimproved Lot	$ 457	315	$7131 $129 **(2)**	$271 **(3)**	**$ 233 (4)** Exclude meter	**$ 233**	$73,395	$ 961
II (Temp)	Improved Parcel w/ Hose Surcharge	$ 836 (Temp)	183	NA	NA	NA	NA	NA	NA
III	Improved Parcel Unmetered	$ 795	1278	NA	NA	**$ 238**	**$ 238**	$304,164	$ 1033
IV	Improved Parcel Metered	$ 728	353	NA	NA	**$238 (5)**	**$ 238**	$84,014	$ 966
V (Temp)	Improved Parcel w/ Meter **Paid**	$ 728 Plus $416.50 **(1)**	69+10=79 79 **(6)**	NA	NA	**$238**	**$ 238**	$18,802	$ 966
TOTALS			**2025** (I, III, IV)	NA	NA	NA		**$480,375**	

Notes: **(1)** One-time meter charge @ $ 416.50/Improved lot (2016) **to be reimbursed by BLSMWC or $ 32,904**
(2) One-time meter charge @ $ 129/Improved lot (2016), to be assessed @ building permit. This fee is currently based on $129 meter only, cost and is **not** included w/in the PERs total cost.
(3) At the time of occupancy parcel owner is assessed annual fee of $ 271 for improved parcel which will then equal the current shareholders fee of $728 and will also be required to pay a one-time meter charge
(4) Parcel assessment based on total project cost amortized **of $35.76/$1000 for 40 years less the cost for new meter and fittings at $129 or $ 4.61 amortized (**Meter box only to be installed by USDA project contractor).
(5) Total construction cost is $ 480,912 w/ annual debt service being $ 238, based on an amortization of $35.76/$1000 for 40 years**. This also includes 10% reserve.(6)** No. of customers who have paid meter charge of 416.50 and will receive a one-time credit of $ 416.50. This fee credit will cost $32, 904 for the 79 pre-paid customers.

6.8 RESERVES AND SHORT-LIVED ASSET RESERVE

The BLSMWC currently has reserves available for projects and emergencies. The reserves are noted within the current FY 2016 Budget.

The proposed debt reserves, as required by the USDA Rural Development Loan, is calculated at 1/10th of the annual total debt service or $ 43,719 per year and accrued over a 10-year period. This reserve fund will be funded through the annual assessments/charges per parcel.

The short-lived asset reserve is also a requirement of the USDA Rural Development. The asset reserve is separate from the 10% debt service reserve as described, above. The short-term asset reserve requires the BLSMWC to set-aside, on a yearly basis, necessary reserves to replace those short term assets, with a 15- year life or less. This asset reserve fund has been calculated and is shown within **Table 6.8a**, below:

Table 6.8a
Short-Term Asset Reserve

Asset	Qty	Value	Extension	Lifespan	Annual Reserve
Permanganate Vessels	2	$2,000	$4,000	15	$ 275
Caustic Storage Tank (500 gallon)	2	$3,000	$6,000	15	$ 400
Chemical Feed Pump	1	$8,000	$8,000	10	$ 800
Hach DR Chlorinator	3	$2,000	$6,000	10	$ 600
PC (TP Computer)	1	$1,000	$1,000	5	$ 200
75 HP Booster Pump	3	$10,000	$30,000	15	$2,000
200 gpm Water Pump	2	$10,000	$20,000	15	$1,333
3 HP 30-gal Air Compressor	1	$1,500	$1,500	15	$ 100
1.5 HP Reclaim Pump	1	$2,000	$2,000	15	$ 133
Chlorination System	1	$17,000	$17,000	15	$1,333
k400 Kuntze Analyzer	1	$6,000	$6,000	15	$ 400
CL17 Analyzer	2	$3,500	$7,000	10	$ 700
Chart Recorder	3	$2,000	$6,000	15	$ 400
Security System	5	$2,000	$10,000	15	$ 666
Handheld Radio	2	$1,000	$2,000	10	$ 200
410 HP 275 kW Diesel Generator	1			25	
Small Hand Tools (wrenches, screwdrivers,	10	$5,000	$50,000	10	$5,000
Power Tools (chainsaw, weed-eater, blower,	1	$500	$500	5	$ 100
8 x 5 Dump Bed Trailer	1	$10,000	$10,000	15	$ 666
Snow Plow	1	$9,000	$9,000	15	$ 600
Med/Small Work Truck	3	$20,000	$60,000	15	$4,000
HD Work/Plow Truck	1	$35,000	$35,000	15	$2,333
Portable Generator	2	$2,000	$4,000	15	$ 275
Laptop and Handheld	2	$3,000	$6,000	5	$1,200
Sensus VGB	1	$20,000	$20,000	10	$2,000
Flow Meter	1	$3,000	$3,000	15	$ 200
Vertical Pump (20 HP)	1	$20,000	$20,000	15	$1,333
Actuator and Valve	5	$1,500	$7,500	10	$ 750
SCADA PLC	1			20	
					$37,597

It is recommended that the BLSMWC provide within their 2017 or 2018 FY budget a "line item" that includes a sum of $40,000 for the future purchase(s) and replacement(s) of those items as noted above.