Agenda

San Miguel Community Services District

Equipment & Facilities Committee Meeting

Thursday, March 17, 2016
12:00 noon

SMCSD Boardroom 1150 Mission St. San Miguel, CA 93451

Cell Phones: As a courtesy to others, please silence your cell phone or pager during the meeting and engage in conversations outside the Boardroom.

Americans with Disabilities Act: If you need special assistance to participate in this meeting, please contact the CSD Clerk at (805) 467-3388. Notification 48 hours in advance will enable the CSD to make reasonable arrangements to ensure accessibility to this meeting. Assisted listening devices are available for the hearing impaired.

Public Comment: When public attendance is over ten (10) persons, the following policies will go into effect: Any person wishing to address the Board or Standing Committee, please complete a "Request to Speak" form located at the podium in the boardroom in order to address the Board of Directors on any agenda item. Comments are limited to three minutes, unless you have registered your organization with CSD Clerk prior to the meeting**.**
If you wish to speak on an item not on the agenda, you may do so under "Oral Communications." Any member of the public may address the Board of Directors on items on the Consent Calendar. Please complete a "Request to Speak" form as noted above and indicate which item number you wish to address.

Meeting Schedule: Regular Board of Director meetings are generally held on the fourth Thursday of each month at 7:00 P.M in the CSD boardroom. The Agenda's are posted on the CSD's website at: www.sanmiguelcsd.org

Agendas: Agenda packets are available for the public inspection 72 hours prior to the scheduled meeting at the Counter/ San Miguel CSD, Fire Station located at 1150 Mission St., San Miguel, during normal business hours. Any agenda-related writings or documents provided to a majority of the Board of Directors after distribution of the agenda packet are available for public inspection at the same time at the counter/ San Miguel CSD, Fire Station located at 1150 Mission St., San Miguel, during normal business hours.

I. Call to Order 12:00 NOON

II. Pledge of Allegiance

III. Roll Call Directors: Kalvans_____ Reuck_____

IV. Oral and Written Communications: Persons wishing to speak on a matter not on the agenda may be heard at this time; however, no action will be taken until placed on a future agenda. Speakers are limited to three minutes. Please complete a "Request to Speak" form and place in basket provided.

V. AGENDA

1. **Consider and Discuss a Presentation of District Energy Audit Report for Cost Reduction Opportunities and Efficiencies.**

Staff Recommendation: Consider and Discuss a presentation on District Energy Audit Report by Jon Griesser, County Energy Watch and Climate Programs Supervisor. Committee may provide direction to staff.

2. **Discuss and Review of survey of properties within the District.**

Staff Recommendation: Consider and discuss an initial survey of properties that may be suitable for facilities. Committee may provide direction to staff.

3. **Discuss and Overview of Feasibility Study Proposal for a Regional Wastewater Treatment Plant facility.**

Staff Recommendation: Consider and discuss an overview of a feasibility study proposal for a regional wastewater treatment plant facility.

VI. COMMITTEE COMMENTS:

This section is intended as an opportunity for Committee members to make brief announcements, request information from staff, request future agenda item(s) and/or report on their own activities related to District business. No action is to be taken until an item is placed on a future agenda.

VII. ADJOURNMENT Time:_____

STATE OF CALIFORNIA)
COUNTY OF SAN LUIS OBISPO) ss.
COMMUNITY OF SAN MIGUEL)

I, Tamara Parent, Account Clerk of San Miguel Community Services District, herby certify that I caused the posting of this agenda at the SMCSD district office on March 10, 2016.

Date: March 10, 2016
Tamara Parent

Tamara Parent, Account Clerk

San Miguel Community Services District
Equipment & Facilities Committee

Staff Report

March 17, 2016 **AGENDA ITEM: V-1**

SUBJECT: Consider and Discuss a Presentation of District Energy Audit Report for Cost Reduction Opportunities and Efficiencies.

STAFF RECOMMENDATION:
Consider and Discuss a presentation on District Energy Audit Report by Jon Griesser, County Energy Watch and Climate Programs Supervisor. Committee may provide direction to staff.

BACKGROUND:
In January of this year, Energy Watch, in partnership with PG & E, completed an energy audit of District facilities and operations. A goal of this audit was to identify means and methods for the District to reduce energy consumption through equipment efficiencies and improvements and to reduce our carbon footprint.

Mr. Griesser was invited today to provide the Committee members with background information, a report on results achieved and the implications for SMCDS to proceed forward with cost savings, operational improvements and efficiencies and fiscal implications for the District. His presentation will also provide an opportunity for questions by Committee members and to discuss in depth any short term and future measures for the District. A copy of the Final Report is attached as a part of this staff report for Committee members discussion. A separate visual presentation will be provided at the meeting.

Fiscal Impact:
No fiscal impact at this time. Future budgeting would need to incorporate costs associated with any implementation actions.

Staff Recommendation: Staff recommends that the Committee discuss findings and provide direction to staff.

PREPARED BY:
Darrell Gentry
General Manager

Attachment: Final Energy Audit Report

PG&E Large Integrated Audit

San Miguel Community Services District

1150 Mission St
San Miguel, CA 93451

Final Report by

1/6/2016

Disclaimer

The intent of this energy analysis report is to identify energy savings opportunities associated with recommended upgrades to the equipment and systems at the San Miguel Community Services District in San Miguel, CA. Approximate saving ranges are included in this report to help the customer make informed decisions about reducing energy use at the facility. However, this report does not intend to serve as a detailed engineering design document. It is necessary to note that detailed design efforts are required in order to implement several of the improvements evaluated as part of this energy analysis.

As a result, Pacific Gas and Electric Company (PG&E) and kW Engineering Inc. are not liable if estimated savings ranges or economics are not actually achieved. All savings and cost estimates in the report are for informational purposes, and are not to be construed as a design document or as guarantees.

In no event will PG&E or kW Engineering Inc. be liable for the failure of the customer to achieve a specified amount of energy savings, the operation of customer's facilities, or any incidental or consequential damages of any kind in connection with this report or the installation of recommended measures.

Table of Contents

1 Executive Summary

Pacific Gas and Electric Company (PG&E) sponsored this Integrated Energy Audit Report for the San Miguel Community Services District (CSD) in San Miguel, CA.

The goal of a PG&E Integrated Energy Audit is to provide you with an Energy Action Plan, which identifies and prioritizes potential energy and demand savings from the following kinds of opportunities:

- Energy conservation
- Energy efficiency (including retro-commissioning)
- Time-of-use management (load shifting)
- Demand response
- Self-generation.

The study was conducted by kW Engineering, in collaboration with PG&E, as part of a comprehensive effort to assist PG&E customers in controlling energy costs and protecting our environment by offering a full spectrum of energy management options.

We recommend the following highest priority measures, which are relatively low cost, straightforward, and have an attractive payback, for immediate action (see report for details):

- LCM-1: Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs
- LCM-2: Upgrade Exterior MH, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls

Significant rebates and incentives are available from PG&E to reduce the cost of energy project implementation. Be sure to coordinate with your PG&E Account Manager for assistance in applying for incentives. Remember, “Apply before you buy!”

1.1 Your Cost Reduction Opportunities

kW Engineering identified four energy efficiency measures that, if implemented, could **save roughly $43,600/yr** in energy costs at the San Miguel Community Service District with a **combined payback of roughly 4 years**. We have summarized the recommended measures in Table 1.1: Energy Action Plan; brief descriptions of each measure are included in Section 4, “Energy Project Opportunities.”

Energy Action Plan

The following Energy Action Plan (EAP) provides overall direction on how to act on the list of recommended measures. It provides an integrated strategy for short and long-term implementation of energy efficiency, retro-commissioning, demand response and other energy projects. The Energy Action Plan considers measure interactions, challenges, and opportunities, which can affect project implementation.

Table 1.1: Energy Action Plan

Group (Priority / Timing)	Measure No.	Measure Description	Approximate Financials: Annual Savings ($/yr)	Rough Installed Cost ($)	Potential Incentive ($)	Simple Payback (Yrs)	Confidence (H/M/L)	Next Steps
Buildings & Facilities	LCM-1	Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs	$ 20	$ 44	$ -	2.2	High	We recommend a couple trial installations to evaluate the appearance change from the new fixtures before replacing all the interior downlights.
Buildings & Facilities	LCM-2	Upgrade Exterior MH, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls	$ 1,300	$ 7,500	$ 830	5.1	High	In adition to a vendor site walk, we recommend a couple trial installations to evaluate the appearance change from the new fixtures before replacing all the HID fixtures.
Wastewater System	LCM-3	Install High Efficiency Motors as Motors Need Replacement	$ 900	$ 4,400	$ -	4.9	High	**Note: The installed cost shown is an incremental cost.** Rough Installed Cost for this measure is the Incremental Cost for premium efficiency motors over standard efficiency motors.
Wastewater System	CIM-4	Retrofit Surface Aerators with VFDs and Use Existing DO Sensors to Automatically Modulate Aeration of Treatment Ponds	$ 4,500	$ 27,000	$ 2,400	5.5	Medium	The implementation of this measure and CIM-4 are mutually exclusive. We recommend you have a vendor make a site walk in order to obtain a more accurate cost estimate.
Wastewater System	CIM-5	Install Higher Efficiency Aeration System	$ 36,700	$ 128,000	$ -	3.5	Medium	**Note: The installed cost shown is an incremental cost.** It may be more cost effective to retrofit ponds #1 and 2 with fine porbubble diffused aeration and leave ponds #3 and 4 with surface aerators.
Load Management	LMM-1	Shift a Portion of the Well Water Pumping Out of the Summer Peak Period	$ 537	$ 42,000	$ -	78.2	Medium	We recommend investigating the current daily pumping patterns for each well. We assumed the usage pattern was similar to a residential diurnal water usage pattern in our analysis.
Demand Response	DRM-1	Turn Off Interior Lighting during a Demand Response (DR) Event	$ 3	$ -	$ -	Immediate	High	This is an operational change that can be implemented by in-house staff.
Distributed Generation	DGM-1	Install Photovoltaic Solar System to Offset Energy Use	$ 51,957	$ 689,000	$ -	13.3	Medium	We recommend a site visit with a solar contractor to assess potential locations and feasibility for solar PV.

1.2 Implementation Planning

We encourage you to seriously consider the recommendations contained within this report. Please discuss next steps with your PG&E Account Manager, who will assist with implementation planning, and will ensure that you take advantage of appropriate PG&E incentives and programs. (Remember, “Apply before you buy.”).

You may also check the following website for further information on available PG&E rebates and incentives: http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/

You may consider using PG&E program partners, local contractors and trade professionals (link below) who offer special assistance in implementing energy efficiency measures for your business. These specialists help you to take advantage of PG&E rebates and incentives by distributing, installing, and servicing the energy efficient equipment and systems that PG&E supports. See: http://www.pge.com/mybusiness/energysavingsrebates/partnersandtradepros/

To ensure projects are implemented so that maximum savings and incentives are achieved, bids and specifications should often be reviewed. Your PG&E Account Manager or the auditing consultant may help with this.

The remainder of this report is organized as follows:

- Section 2 documents the project contacts and existing systems and conditions for the site;
- Section 3 shows and discusses the site’s energy use and costs;
- Section 4 provides brief descriptions of each energy measure.

2 Project Team and Facility Information

2.1 Project Contacts

Name	Role	Contact Information
San Miguel CSD		
Kelly Dodds	Utility Supervisor	(805) 467-3388 kdodds@sanmiguelcsd.org
Darrell Gentry	General Manager	(805) 467-3388 darrell.gentry@sanmiguelcsd.org
Energy Watch – San Luis Obispo County		
Jon Griesser	Energy Program Manager	(805) 781-5611 jgriesser@co.slo.ca.us
PG&E		
Perla De Leon	Customer Relationship Manager	(805) 595-6444 PMD7@pge.com
Bryce Dias	Customer Care Program Manager	(415) 973-3709 BADM@pge.com
kW Engineering		
Bryan Hackett, P.E., Senior Engineer II	Auditors	287 17th Street, Suite 300 Oakland, CA 94612 (510) 834-6420 (510) 834-6421 fax bhackett@kw-engineering.com

2.2 General Site Information

On March 18, 2015, kW Engineering, as a PG&E contractor, performed an integrated energy audit at the San Miguel CSD facilities in San Miguel, California. The kW Engineering team met with Kelly Dodds (San Miguel CSD Utility Supervisor), Jon Griesser (Energy Watch Manager), and Callie Lewis (Energy Watch Planner) to review the facilities and focus the investigation on specific energy-using systems.

The San Miguel CSD was created in February 2000 by the San Luis Obispo Board of Supervisors to provide public services for the community's 2,300 residents. The CSD provides services including fire protection (San Miguel Fire Protection District), public lighting (San Miguel Lighting District), fresh water, and waste water (San Miguel Sanitary District).

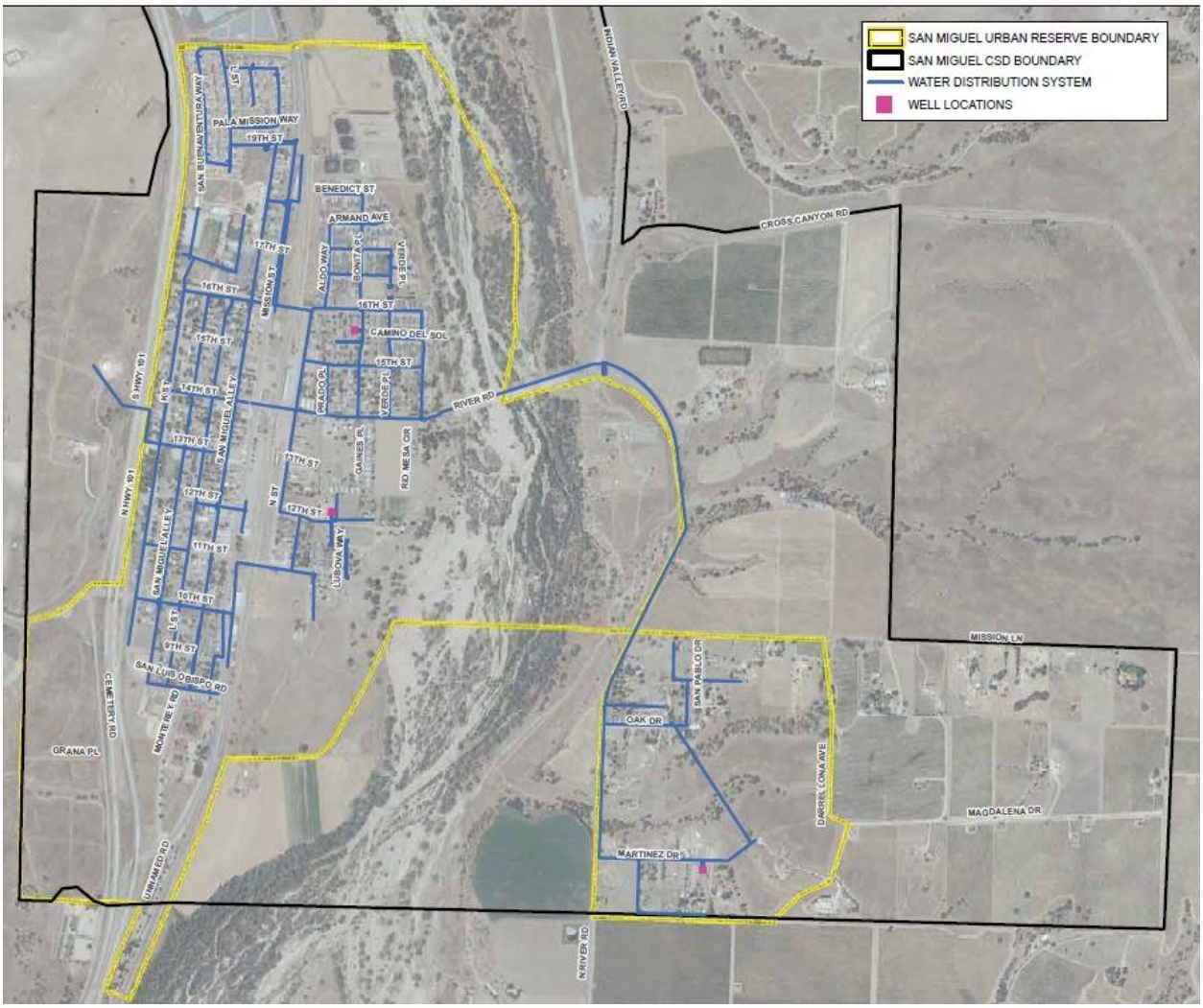


Figure 2.1: San Miguel CSD Service Area (source: San Miguel Community Plan)

2.3 Facility Descriptions and Operating Hours

We focused on the following facilities during the audit: New Firehouse and District Office, Old Firehouse, Wastewater Treatment Plant (WWTP), and freshwater well pump stations.

District Office and New Firehouse

The District Office and New Firehouse share the same building. The District Office is open Monday through Friday from 8:30 AM to 4:30 PM. The Fire Department operates on a volunteer basis, but is typically occupied from 7:00 AM to 4:30 PM when maintenance or training is being performed.

Figure 2.2: District Office (left) and New Firehouse (right) (source: google)

Table 2.1: San Miguel District Office and New Firehouse Hours of Operation

Facility	Facility Type	Operating Schedule	Annual Hours
District Main Office	Office	8 hrs/day 5 days/week 52 weeks/year	2,080 hours
Fire Station	Firehouse	9.5 hours/day 7 days/week 52 weeks/year	3,458 hours

Old Firehouse

The Old Firehouse is no longer in regular use, and is used primarily to store antique firefighting equipment such as the old ’37 ladder bucket truck and the bucket brigade wagon shown in Figure 2.3 on the following page.

Figure 2.3: Old Firehouse (left), Bucket Brigade Wagon (right)

Wastewater Treatment Plant

The wastewater treatment plant operates continuously throughout the year. The two-vehicle maintenance garage and adjacent storage shed are occupied intermittently by site staff during their eight-hour work shifts.

2.4 System Descriptions

Wastewater System

Wastewater from residential and commercial customers is conveyed by gravity through the sewer lines to the headworks at the WWTP. The WWTP has a design capacity of 200,000 gallons per day (GPD), with an average daily flow of 112,000 GPD.

The lift station at the headworks pumps the influent to a series of four aeration ponds. The aeration ponds utilize floating aerators to provide oxygen, which promotes aerobic microbial digestion of organic solids. After the material flows through all four aeration ponds, the effluent is discharged to two percolation ponds, where it recharges the underlying aquifer. An aerial view of the WWTP is show in Figure 2.4. Process steps for the Wastewater Treatment Plant are shown in Figure 2.5.

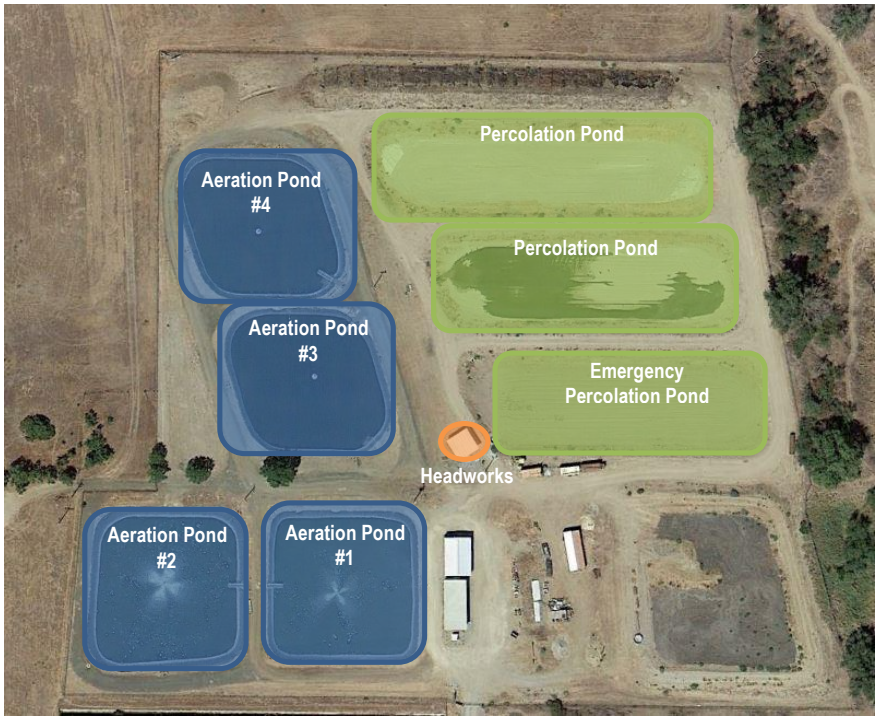


Figure 2.4: WWTP Aerial View

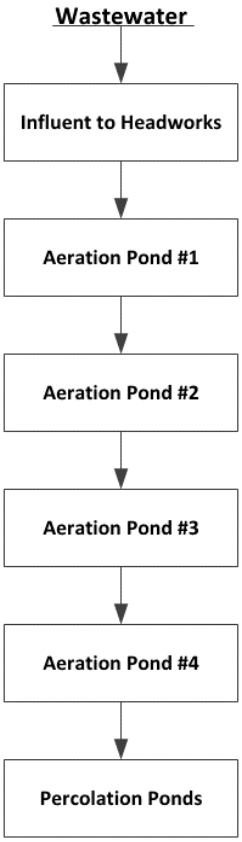


Figure 2.5: Wastewater Treatment Process Flow Diagram

Freshwater System

San Miguel's freshwater system draws from the Paso Robles Formation and consists of three well pump stations: Well Pump 3, Well Pump 4, and Well Pump 5 (also known as the Terrace well). The total water storage capacity is 700,000 gallons, which includes a 650,000-gallon tank and a 50,000-gallon tank. Water from the storage tanks is distributed by gravity. The current daily fresh water usage is between 100,000 and 120,000 gallons per day.

Well Pumps 3 and 4 are located west of the Salinas River and serve the central water distribution system. Water from both wells is pumped from a depth a 300 feet to maintain the water level in the 650,000 gallon storage tank located on the west side of town.

Well Pump 5 is located east of the Salinas River, and fills the 50,000 gallon storage tank that serves the San Lawrence Terrace neighborhood. Water from Well 5 is pumped from a depth of 400 feet and contains elevated levels of arsenic, which requires treatment. The existing capacity for arsenic treatment at Well 5 is not sufficient to treat the water when pumped at full speed. The well pump is equipped with a variable frequency drive (VFD) that functions as a soft start and allows the pump to operate at reduced flow. Due to the elevated arsenic levels, this well operates infrequently (less than 10 hours per month). San Miguel CSD is in the process of applying for a grant that would fund additional arsenic treatment capacity, allowing Well 5 to increase pump flows.

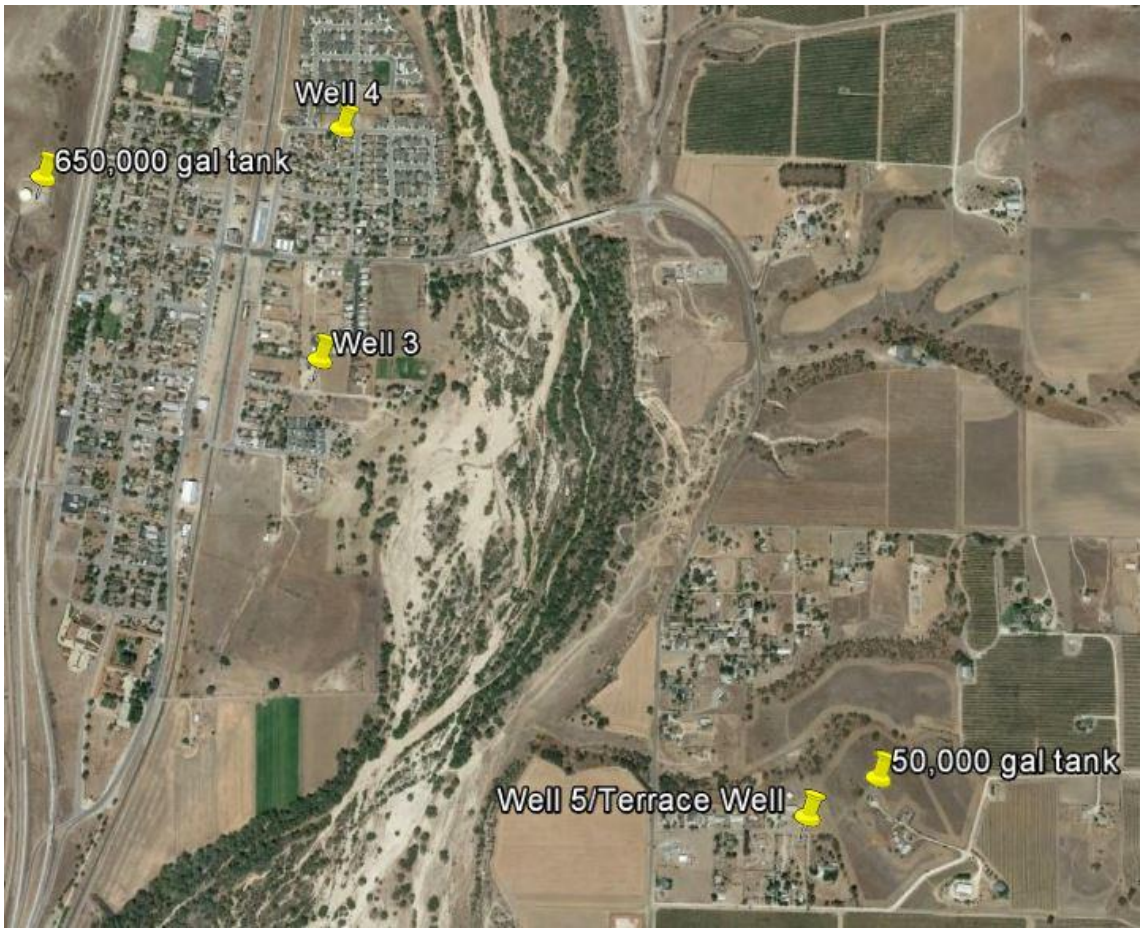


Figure 2.6: San Miguel CSD Freshwater Distribution System

2.5 Energy Using System

Lighting Systems

Interior Lighting

The District Office and New Firehouse building is the only facility with consistent interior light operation. Most of the building's original area lighting was recently retrofitted from 8-ft T12 fluorescent lamps with magnetic ballasts to 4-ft T8 fluorescent lamps with electronic ballasts. In addition, four 18-watt CFL downlights contribute to the general area lighting (two in the hallway and two in the front office). All of the interior lighting is manually controlled by wall switches. We measured light levels in the front office to assess daylighting potential, see Table 2.2 for details. Daylight alone was sufficient to illuminate the space at 1:30 PM.

Figure 2.7: Hallway CFLs

Figure 2.8: Typical T8 Fluorescent Office Fixtures

Table 2.2: Measured Light Levels in Front Office

Facility	Space	Measured Light Levels (fc)
District Office	Front Office (lights on)	50 – 55
	Front Office (lights off)	15 – 20

The engine bay is illuminated by 32 two-lamp T8 linear fluorescent fixtures, four of which remain on 24 hours per day, 7 days per week. The remaining fixtures in the engine bay area manually controlled by wall switches.

Figure 2.9: New Firehouse Engine Bay Fluorescent Fixtures

The Old Firehouse is illuminated by four 4-lamp linear T8 fluorescent fixtures. The well pump stations and WWTP maintenance garage and shed are also illuminated by linear T8 fluorescent fixtures. These buildings are occupied infrequently, and the lights are controlled manually by wall switches.

Exterior Lighting

Most of the buildings' exterior areas are illuminated with a combination of metal halide and high pressure sodium (HPS) wall-pack fixtures. The WWTP aeration ponds are illuminated by five HPS pole-mounted fixtures. The exterior fixtures are controlled either by photocells or clock timers to operate only at night.

Figure 2.10: Typical HPS Pole-Mounted Fixture at WWTP

Figure 2.11: Typical MH Wallpack at Well Pump Station

HVAC Systems

The District Office and New Firehouse building is the only conditioned facility operated by the San Miguel CSD. The building is conditioned by a Carrier 6-ton packaged air handler (Model CK3BXA060024) located in the attic. The air handler is equipped with direct expansion (DX) cooling coils and a gas furnace. The conference room and back office were built recently as an addition to the original building. Although the air handler was not sized to accommodate the additional loads from these two spaces, ducting was routed to provide conditioned air. As a result, the conference room and back office are often under-cooled or under-heated, as they are the furthest spaces from the air handler.

Figure 2.12: Carrier 6-ton Air Handler in Attic of District Office

Wastewater System

Wastewater is lifted from the headworks to aeration pond #1 by two submersible pumps. The wastewater subsequently flows by gravity through the remaining three aeration ponds before being discharged by gravity to the percolation ponds. The aeration ponds utilize mechanical surface aerators to provide oxygen, which promotes aerobic microbial digestion of organic material. The surface aerators consist of a single constant-speed motor and propeller mounted to a floatation device. Details of the WWTP equipment are listed in Table 2.3.

Table 2.3: WWTP Equipment

Device Name	Motor Manufacturer and Model No.	Qty	Pump Motor (hp)
Headworks Pumps	Reliance RT8G2704	2	7.5
Surface Aerator Pond #1	N/A	1	25
Surface Aerator Pond #2	N/A	1	25
Surface Aerator Pond #3	GE 5X6232XE1501A	1	7.5
Surface Aerator Pond #4	GE 5X6232XE1501A	1	7.5

Figure 2.13. Pond #1 Surface Aerator

Figure 2.14. Headworks Pumps

Freshwater System

Fresh water is extracted by three well pump stations: Well Pump 3, Well Pump 4, and Well Pump 5 (also known as the Terrace well). Well pump 5 is the only pump equipped with a VFD, which is used for soft-start and maintaining pumping rates suitable for the existing arsenic treatment system. Details of the freshwater system pumps are listed in Table 2.4.

Table 2.4: Freshwater Well Pumps

Pump Name	Manufacturer and Model No.	Pump Type	Qty	Rated Flow (GPM)	Pump Motor (hp)
Well Pump 3	FloWay LKM	Vertical Turbine	1	400	40
Well Pump 4	Goulds 8RJHC-3	Submersible	1	650	60
Well Pump 5	N/A	Submersible	1	300	40

3 Site Energy Use and Costs

San Miguel CSD procures all of its electricity from PG&E, and purchases natural gas from Southern California Gas.

3.1 Total Cost of Energy

The total annual cost of electricity for San Miguel CSD is approximately $96,000. The District has 10 electricity meters serving the following systems: Buildings & Facilities, Wastewater, Fresh Water, and Landscaping & Streetlights. The annual cost of electricity for each system and site is summarized in Table 3.1.

Table 3.1: Electricity Consumption and Cost by System and Site

System	System Consumption (kWh)	Site Name	Site Consumption (kWh)	Site Electricity Cost ($)	Tariff Structure	SAID
Buildings & Facilities	21,737	New Fire Station and District Office	21,695	$ 43,331	HA1X	3675186997
		Old Fire Station	42	$ 247	HA1X	3675186016
Wastewater System	440,342	WWTP	440,342	$ 57,632	HE19S	3675186391
		Lift Station (not used)	0	$ 120	HA1X	3675186306
Fresh Water System	152,501	Well #3	56,902	$ 10,754	HA1X	3675186644
		Well #4	91,677	$ 19134	HA1X	3675186078
		SLT Well	1,816	$ 591	HA1X	3675186489
		Reservoir	1,707	$ 452	HA1X	3675186608
		Booster Station	399	$ 193	HA1X	3675186325
Landscaping & Streetlights	14,455	Mission and 12th	14,455	$ 2,399	HA6	3675186477
Totals	**629,035**		**629,035**	**$ 95,734**		

Buildings and Facilities

Table 3.2 summarizes the 2014 monthly electricity consumption and cost for the Buildings and Facilities. Figure 3.1 shows the monthly usage of the buildings operated and maintained by San Miguel CSD. Peak demand (kW) was not reported in the billing data.

Table 3.2: Monthly Peak Demand, Electricity Consumption, and Costs for Buildings & Facilities

Month	Peak Demand (kW)	Electricity Consumption (kWh)	Total Electricity Cost ($)
Jan-14	-	1,607	$ 271
Feb-14	-	1,712	$ 289
Mar-14	-	1,662	$ 280
Apr-14	-	1,550	$ 265
May-14	-	1,774	$ 379
Jun-14	-	1,892	$ 453
Jul-14	-	2,683	$ 631
Aug-14	-	2,431	$ 580
Sep-14	-	2,072	$ 494
Oct-14	-	1,601	$ 394
Nov-14	-	1,425	$ 305
Dec-14	-	1,328	$ 240
Annual Totals	-	21,737	**$ 4,579**

Average Cost of Electricity ($/kWh)	$0.2107

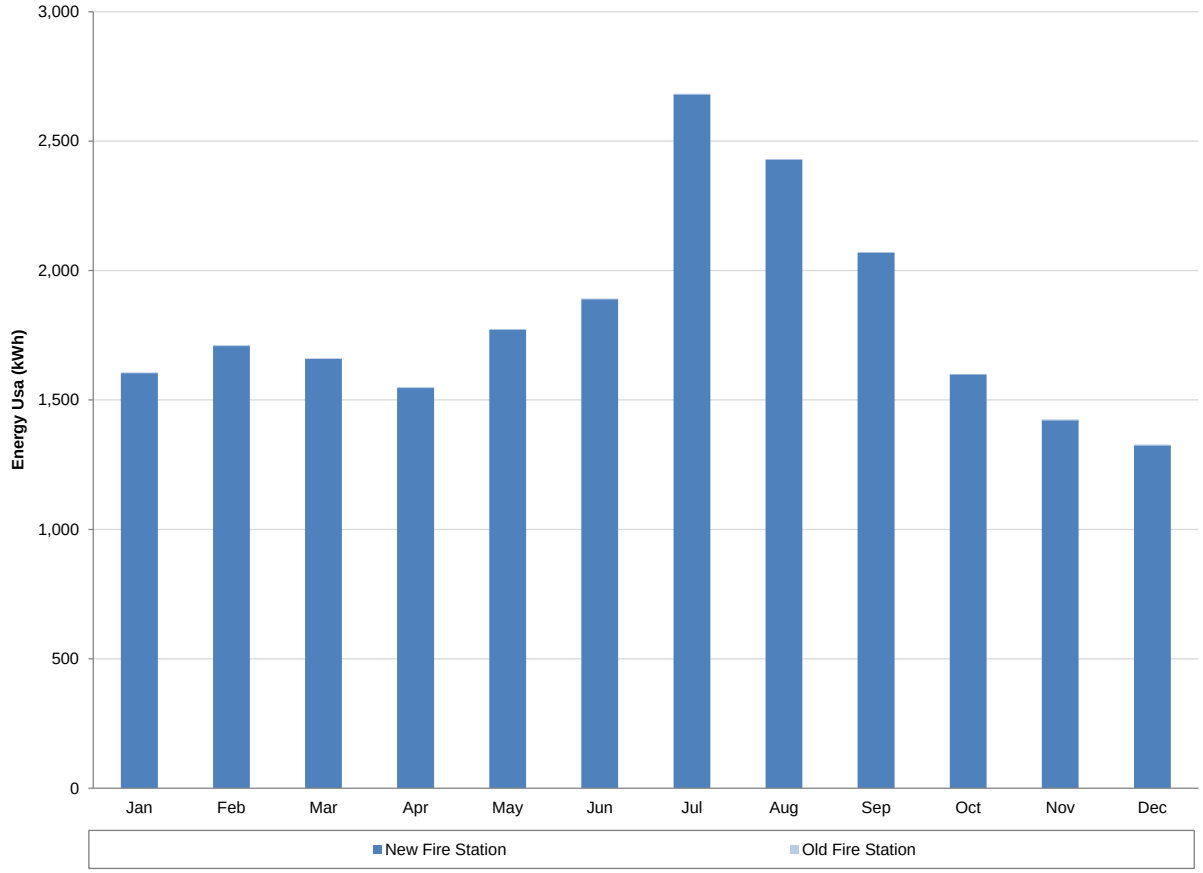


Figure 3.1. Monthly Electricity Consumption of Buildings & Facilities

The New Fire Station, which includes the District Office, constitutes over 99% of the overall Buildings & Facilities energy use. Electrical loads at the Old Fire Station consist of interior and exterior lighting, which are used infrequently, and consume less than 5 kWh per month.

Wastewater System

Table 3.3 summarizes the 2014 monthly peak demand, electricity consumption, and cost for the Wastewater System. The Wastewater System consists of the Wastewater Treatment Plant and the Lift Station. Although the Lift Station is no longer used (zero energy consumption), the electric meter is still active and was associated with $120 in fees during 2014. The Wastewater Treatment Plant is the largest energy consuming system operated by the District.

Table 3.3: Monthly Peak Demand, Electricity Consumption, and Cost for Wastewater System

Month	Peak Demand (kW)	Electricity Consumption (kWh)	Total Electricity Cost ($)
Jan-14	54	36,755	$ 3,870
Feb-14	56	40,903	$ 4,299
Mar-14	56	35,243	$ 3,851
Apr-14	54	36,142	$ 3,946
May-14	55	37,274	$ 4,927
Jun-14	55	36,282	$ 5,521
Jul-14	56	36,048	$ 5,503
Aug-14	55	38,430	$ 5,719
Sep-14	55	36,122	$ 5,490
Oct-14	54	33,996	$ 5,370
Nov-14	55	38,336	$ 5,057
Dec-14	57	34,811	$ 4,078
Annual Totals	57	440,342	**$ 57,632**

Average Cost of Electricity ($/kWh)	$0.1309

Fresh Water System

Table 3.4 summarizes the 2014 monthly peak demand, electricity consumption, and cost for the Fresh Water System, which consists of 3 well pumps, a booster station, and electrical loads at the reservoir (i.e., lighting, controls, and/or telemetry). Figure 3.2 shows the monthly electric usage patterns for each component of the Fresh Water System. Wells #3 and #4 constitute the vast majority of electrical loads in the Fresh Water System.

Table 3.4: Monthly Peak Demand, Electricity Consumption and Cost for Fresh Water System

Month	Peak Demand (kW)	Electricity Consumption (kWh)	Total Electricity Cost ($)
Jan-14	-	9,960	$ 1,579
Feb-14	-	10,707	$ 1,692
Mar-14	-	8,869	$ 1,421
Apr-14	-	10,264	$ 1,646
May-14	-	14,189	$ 2,889
Jun-14	-	15,997	$ 3,657
Jul-14	-	15,758	$ 3,620
Aug-14	-	16,965	$ 3,909
Sep-14	-	15,543	$ 3,581
Oct-14	-	13,888	$ 3,257
Nov-14	-	11,738	$ 2,407
Dec-14	-	8,623	$ 1,466
Annual Totals	-	152,501	**$ 31,124**

Average Cost of Electricity ($/kWh)	$0.2041

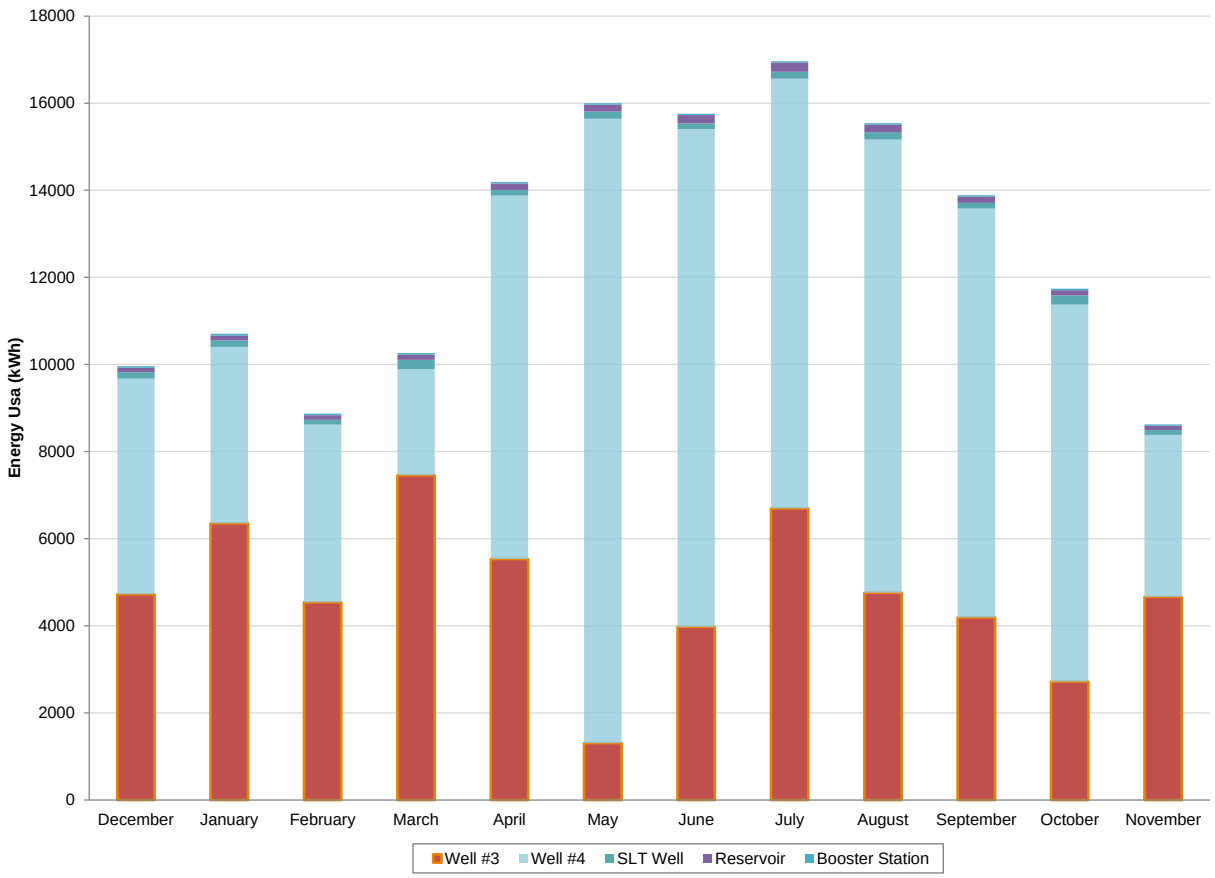


Figure 3.2. Monthly Electricity Consumption of Fresh Water System Components

3.2 Electric Energy Balance

An electric energy end-use breakdown was performed based on the District's 2014 PG&E Billing Data.

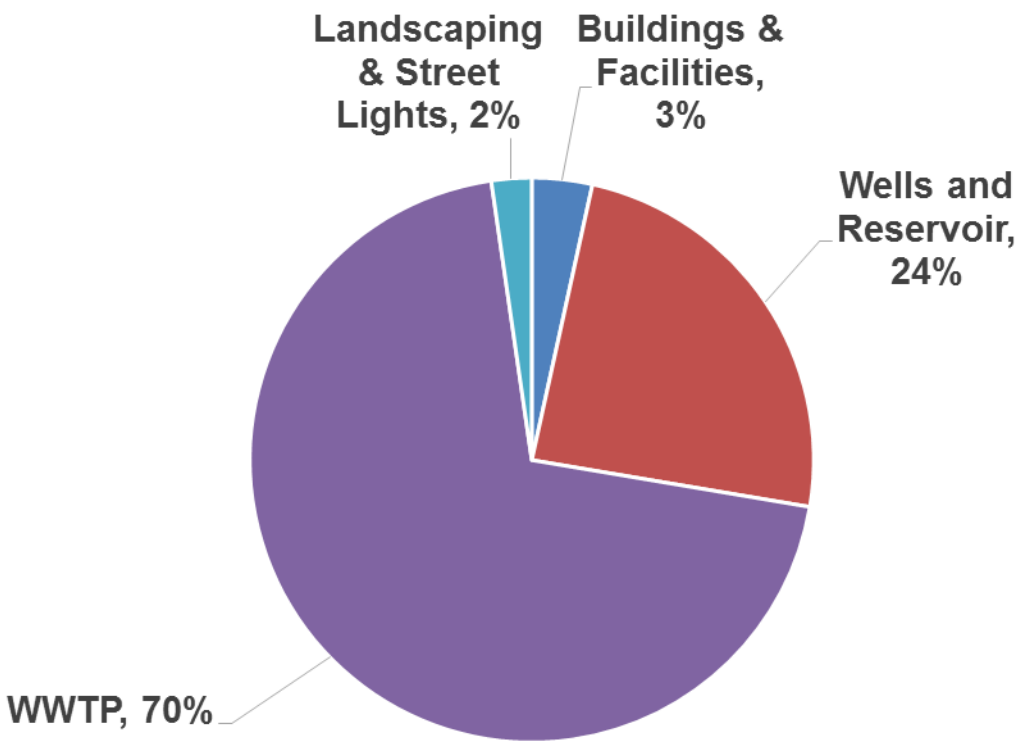


Figure 3.3. San Miguel CSD Electricity Energy Balance

4 Energy Project Opportunities

4.1 Energy Analysis Methodology

kW Engineering performed an energy survey on-site to collect nameplate and operational data for mechanical equipment, the lighting systems, and to identify potential energy-efficiency measures. During the site visit, engineers collected the following data:

- A partial inventory of lighting fixtures and controls
- Mechanical system nameplate specifications and control means
- Operation documents and mechanical drawings
- Observations and photographs of conditions and controls.

Level of Analysis

The goal of this audit report is to provide an Energy Action Plan, which identifies potential energy projects, and guides the prioritization, grouping, and sequence of implementation of those projects. For this audit report, most measures have received only a preliminary analysis of feasibility, and expected ranges of savings and costs. This level of analysis is considered sufficient to make "Go/No-Go" decisions and to prioritize energy projects.

Further analysis or investigation may be required to calculate more accurate savings to support many PG&E incentive applications. Various PG&E programs can provide further assistance where appropriate. Your PG&E Account Manager can help you apply for additional support. You will also need to obtain actual project cost estimates from vendors or contractors who supply equipment and install recommended measures.

For most measures, this audit report provides rough ranges from "Low" to "High" of annual cost savings, rough project costs, potential incentives, and simple payback after incentives. These ranges are rough estimates based on simple analysis, similar projects, and the judgment of the auditing engineer. The auditing engineer will assign each estimate with a confidence rating corresponding to an expected accuracy range as follows:

Confidence Rating	Expected Accuracy Range
Low	± 50%
Medium	± 25%
High	± 10%

Measure Order

There are interactive effects among several of the measures modeled in the analysis that may overstate or understate the savings for any individual measure. The sequence of measure implementation was that recommended by the California Energy Commission's *Guide to Preparing Feasibility Studies for Energy Efficiency Projects*, which recommends analyzing measures that affect load first, and then working "upward" from load to plant. When reviewing the results of this report, please note that the best estimate of actual savings will be for the

entire package of measures recommended. The savings of individual measures may be more or less than shown if not all of the other measures are implemented.

4.2 No-Cost Measures (NCM)

No-cost measures are energy conservation, energy efficiency, or time-of-use management projects that have no associated cost (not including internal labor). These measures reduce energy usage and costs with no capital investment, except for the time and effort of the on-site maintenance personnel.

We did not identify any no-cost measures for San Miguel CSD.

4.3 Low-Cost Measures (LCM)

Low-cost measures are energy conservation, energy efficiency, or time-of-use management projects with a capital cost of less than $10,000. These measures significantly reduce energy consumption and costs while requiring relatively little capital investment. Below is the list of low cost measures (LCMs) identified for San Miguel CSD:

- LCM-1: Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs
- LCM-2: Upgrade Exterior Metal Halide, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls
- LCM-3: Install Premium Efficiency Motors as Motors Need Replacement

LCM-1: Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$20	$44	$0	2.2

Observations

San Miguel's District Office is illuminated by a combination of linear fluorescent lamps and CFL downlights. There are four downlight fixtures. All of the fixtures are manually controlled with wall switches.

Figure 4.1. Sanitation District Office Recessed Downlights

Recommendations

We recommend replacing the existing interior downlights with LED equivalent lamps. LED spot lamps offer a variety of compelling reasons for installation:

1. LED spot lamps typically consume 40% less power than their CFL equivalents to produce the same light output.
2. Due to the reduced power consumption, the heat output is also reduced by 40%.
3. LED lamps have longer life span compared to halogen lamps. A typical halogen lamp lasts 6,000 – 10,000 hours, whereas LED lamp equivalents last 25,000 - 50,000 hours.

Implementation Notes

We recommend conducting a feasibility study before replacing all the downlights in the District Office.

- Glare Abatement: LED fixtures can have significant glare issues depending on the viewing angle between the observer and the fixture. Care needs to be taken to prevent installing a fixture with excessive glare. We recommend a sample fixture installation to identify and address this potential issue prior to completing the retrofit.
- Quality Fixture Selection: We recommend selecting LED fixtures that are listed on the Qualified Product List (QPL) of the DesignLights Consortium (DLC), which collects test data for various fixtures to ensure high-quality fixtures are selected for LED incentive programs. In addition, the fixtures would preferably be from a reliable, well-known manufacturer to ensure that warranty issues will be promptly addressed in the future.

Costs and Assumptions

Energy savings were calculated using the lighting inventory estimated during the site visit and standard wattage based on fixture type. We estimated the lighting operating hours based on the building operating hours.

We estimated the cost for the 11-watt LED lamps using cost estimates from online lighting distributors. We assumed installation can be performed in-house by maintenance staff; therefore, no labor cost is included.

Screw-in LED lamps are not eligible incentives or rebates through PG&E.

LCM-2: Upgrade Exterior Metal Halide, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$1,300	$7,500	$830	5.1

Observations

Exterior lights at San Miguel CSD's Old Firehouse, Well pump #4, and WWTP consist of metal halide (MH) wall pack fixtures and high pressure sodium (HPS) pole-mounted fixtures. All of these high-intensity discharge (HID) exterior fixtures are controlled with either photocells or timers to operate only at night.

Figure 4.2. WWTP HPS (left), WWTP MH wall pack (center), Well pump 4 MH wall packs (right)

Recommendations

We recommend replacing the existing exterior HID fixtures with LED fixtures. LED fixtures provide more efficient distribution of light than HID fixtures. While LED and HID fixtures provide similar lumens light output per watt of power used, LED fixtures have a photometric efficiency of 100%, whereas only a fraction of the input power for a HID fixture is converted to light. Therefore, LED fixtures provide significantly higher lumens per watt compared to the total luminaire efficacy of an equivalent HID fixture.

We recommend installing wall pack LED fixtures with integrated photocells and occupancy sensors, since these two modes of control are required for exterior fixtures mounted <24 feet high, per 2013 Title 24. Title 24 code will be triggered when replacing more than 50% of exterior fixtures.

Although adding bi-level occupancy sensors to the pole-mounted fixtures would reduce the fixture light output when parts of the outdoor areas are unoccupied and provide additional energy savings, we do not recommend bi-level occupancy sensors because the existing pole height (>24 ft) at the WWTP would require microwave sensor technology to detect motion, which is not cost effective at this time.

Implementation Notes

Implementing this measure will trigger 2013 Title 24, where a permit would be required for construction. The outdoor lighting must be controlled by photocells or astronomical time-switch, and must be separately circuited from exterior electrical loads.

There are a few key implementation criteria necessary for a successful retrofit.

- Good Lighting Design: LED fixtures provide better light distribution uniformity (higher minimum light levels and lower maximum light levels). Leveraging the light distribution efficiency is only possible when a lighting model is made of the application area. It is important to consider multiple vendors in order to get the best lighting installation. A third party lighting designer or a lighting representative of multiple outdoor fixture manufacturers will provide the best results. Many contractors and vendors will do this as part of their scope; however, they are often interested in selling either specific products. Good design practices require:
    - Reasonable Illuminance (foot-candle) Targets: Providing excessive light levels in parking lots can result in wasted energy use. Recommended minimum light levels from IESNA list 0.2 horizontal fc at grade for most parking lot applications. For high-security parking or areas where increased security is a concern, the IESNA recommends a minimum of 0.5 horizontal fc at grade.[1]
    - Reasonable Light Loss Factors: The lighting designer should use IES guidelines and industry best practices for assigning light loss factors. At minimum, this should include a reasonable luminaire lumen depreciation factor (LLD) and luminaire dirt depreciation (LDD). For LEDs, the IESNA recommend a LLD of 0.7. For 8 year maintenance cycles in areas with moderate to heavy traffic and no significant sources of smoke or particulate generation, the IESNA recommend using a 0.8 LDD factor.[2] Combined, this means San Miguel CSD should de-rate any new LED product light-output by 44% to ensure the persistence of good light levels.

      To decrease the derating factor, San Miguel CSD would need to plan on more frequent cleaning maintenance or plan on replacing the LED fixtures earlier. Excluding these aggressive de-rating factors will result in lower light levels at the end of product life and under-performance of the new lighting system.
- Glare Abatement: LED fixtures can have significant glare issues depending on the viewing angle between the observer and the fixture. Care needs to be taken to prevent installing a fixture with excessive glare. We recommend a sample fixture installation to identify and address this potential issue prior to completing the retrofit.
- Note that LED fixtures must be listed on the California Statewide Lighting Program Qualified LED Products List (http://www.lightingfacts.com/ca) in order to qualify for utility incentives.
- Quality Fixture Selection: We recommend selecting LED fixtures that are listed on the Qualified Product List (QPL) of the DesignLights Consortium (DLC), which collects test data for various fixtures to ensure high-quality fixtures are selected for LED incentive programs. In addition, the fixtures would preferably be from a reliable, well-known manufacturer to ensure that warranty issues will be promptly addressed in the future.

[1] IESNA RP-20-98 “Recommended Practices for Lighting for Parking Facilities” page 3
[2] IESNA DG-4-03 “Design Guide for Roadway Lighting Maintenance”, page 3

Costs and Assumptions

Energy savings were calculated using the lighting inventory estimated during the site visit and standard wattage based on fixture type. We assumed that the proposed pole-mounted LED fixtures would draw approximately 40% of the existing HID lamp wattage. For fixtures under bi-level control, we assumed an input power reduction of 40% for 45% of their annual hours, and at full output for the remaining hours.

We estimated the fixture cost based on vendor quote, and installation cost based on 2014 RS Means Electrical Cost Data for San Louis Obispo area.

We estimated the potential incentive based on the PG&E Lighting Rebate Catalog, which gives a $60/fixture rebate for LEDs between 70 and 110 watts (Rebate Code LT012), and $70/fixtures for LEDs between 110 and 150 watts (Rebate Code LT013).

LCM-3: Install Premium Efficiency Motors as Motors Need Replacement

Annual Cost Savings ($/yr)	Rough Incremental Cost ($)	Rough Incentive ($)	Simple Payback (years)
$900	$4,400	$0	4.9

Observations & Analysis Scope

In general, efficiency gain between standard and premium efficiency motor is 2-3%. DOE studies have shown that retrofitting equipment that operates for less than 1,000 hours with premium efficiency motors typically do not pay back within the equipment or motor's life time, due to the small incremental efficiency improvement. Therefore, we focused on analyzing San Miguel CSD's equipment that operates more than 1,000 hours annually, which includes the WWTP surface aerators, headworks pumps and freshwater well pumps. Table 4.1 shows the standard and premium motor efficiencies of the existing equipment.

Table 4.1: San Miguel CSD Equipment Motor Efficiencies

System	Site Name	Motor Type	Motor Size (hp)	Motor Qty	Standard Motor Efficiency	Premium Motor Efficiency
WWTP	Headworks Pumps	Submersible	7.5	1	89.5%	91.7%
	Aerator Pond #1	General Purpose	25	1	92.4%	93.6%
	Aerator Pond #2	General Purpose	25	1	92.4%	93.6%
	Aerator Pond #3	General Purpose	7.5	1	89.5%	91.7%
	Aerator Pond #4	General Purpose	7.5	1	89.5%	91.7%
Well Pumps	Well #3	General Purpose	40	1	93.0%	94.1%
	Well #4	Submersible	60	1	93.6%	95.0%
	Well #5	General Purpose	40	1	93.0%	94.1%

Please note:

- Submersible pump motors are customized by the pump manufacturer, and their standard efficiencies do not follow those defined by the Energy Policy Act (2007 EPAct). We used baseline efficiencies from the pump manufacturer specifications.

Recommendation

We recommend replacing the existing motors with premium efficiency motors for the WWTP surface aerators, headworks pumps and freshwater well pumps listed in Table 4.1 above, as the equipment or motor needs replacement. Premium efficiency motors reduce the amount of energy that is converted to heat through the use of steel with better magnetic qualities, larger diameter winding wires, and better bearings. With less heat generation, less of the motor's output is required to cool the windings with an internal fan, further improving its energy efficiency.

Costs and Assumptions

We calculated the baseline energy usage based on motor size, quantity, an assumed load factor, motor efficiency, and operating hours as provided by SMCSD, or determined from lift

station and well pump analysis. The baseline motor efficiency of each motor is based on its motor nameplate or manufacturer's specifications. The proposed energy usage is calculated in a similar manner. For general purpose motors, we assumed NEMA premium efficiency. For submersible motors, we assumed a 5% efficiency gain between standard and premium efficiency motors, based on conversation with a submersible pump manufacturer.

We estimated the incremental costs to retrofit the existing equipment with premium efficiency motors based on manufacturer's cost data.

Since the proposed motor efficiency do not exceed 2007 EPAct requirements (NEMA MG-1 Table 12-12), this measure is not eligible for incentives.

4.4 Capital-Intensive Measures (CIM)

Capital-intensive measures are energy conservation, energy efficiency, or time-of-use management projects with a capital cost of greater than $10,000. These measures significantly reduce energy consumption and costs, but also require significant capital investment. Below is the list of capital intensive measures (CIMs) identified for San Miguel CSD:

- CIM-3: Retrofit Surface Aerators with VFDs and Use Existing DO Sensors to Automatically Modulate Aeration of Treatment Ponds
- CIM-4: Install Higher Efficiency Aerators

CIM-4: Retrofit Surface Aerators with VFDs and Use Existing DO Sensors to Automatically Modulate Aeration of Treatment Ponds

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$4,500	$27,000	$2,400	5.5

Observations

Aeration of the wastewater ponds is provided by four mechanical surface aerators. The purpose of aeration is to enable biological degradation of organic solids in the wastewater. Each of the four ponds has a single floating turbine aerator. Aerators in Ponds #1 and 2 operate continuously to dissolve as much oxygen into the wastewater as possible. Aerators in Ponds #3 and 4 are controlled by a timer to operate 12 hours per day at night.

Figure 4.3. Surface Mechanical Turbine Aerator in Pond 1

Recommendations

We recommend installing DO sensors and variable frequency drives (VFDs) on the aerators in ponds #3 and 4 and controlling their speeds based on the DO levels. The VFD would modulate the aerator motor speed based on aeration demand. Energy savings can be achieved by operating aerators at a lower speed.

Costs and Assumptions

We calculated the energy savings for this measure as the difference between the energy consumed by the existing mechanical aerators and the proposed mechanical aerators with VFD control. Since historic biological oxygen demand

Variable Frequency Drives (VFDs) on Aerators Motors:

Variable flow systems have become more common with the advent of using variable frequency drives (VFD) to control the speed of pumps, mixers, surface aerators, blowers and compressors.

Pumps and aeration equipment are the largest users of electricity in wastewater treatment systems. For a system that operates with variable aeration demand, controlling the aeration motor speed with VFDs can reduce its energy use at part-load operation.

Aerators operate essentially similar to a pump or fan. Pump affinity laws state that pump power decreases exponentially by a power of three as the speed decreases. Slowing an aerator by even 10% reduces its power demand by about one-quarter.

Non-energy related benefits include reduced vibration and noise, and prolonged equipment life.

(BOD) and DO data was not available, we assumed the existing effluent from pond #4 is 4 mg/L. The District's permit allows effluent concentrations between 1 and 4 mg/L. Therefore, we assumed a proposed DO target of 2 mg/L, which we assumed could be achieved by operating the aerators in ponds #3 and 4 at 50% speed for the same duration.

Implementing this measure would involve installing two VFDs, adding controllers to connect the VFDs to the new DO sensors, and adding an outdoor electrical panel. The VFD would modulate the aerator motor speed based on the DO demand. We estimated the cost of this measure with a vendor quote.

This measure is classified as retrofit add-on (REA) measure. The baseline for this measure is mechanical surface aerators without DO control. The existing surface aerators are believed to be beyond their effective useful life (EUL). However, if the customer can produce maintenance records showing that the aerators are regularly maintained and are in good operating condition, then these documents can be used to justify that the aerators have remaining useful life (RUL) and may be eligible for customized retrofit incentives from PG&E.

We estimated the potential incentive at $0.08 per kWh and $150 per peak kW for Basic Non-Lighting measures. Please see the following link for information on applying for customized (calculated) incentives:

www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/

CIM-5: Install Higher Efficiency Aerators

Annual Cost Savings ($/yr)	Rough Incremental Cost ($)	Rough Incentive ($)	Simple Payback (years)
$36,700	$128,000	$0	3.5

Observations

The WWTP has uses aerobic ponds for microbial treatment of wastewater. Raw sewage is pumped into the first pond (#1) and the sewage flows by gravity through ponds #2, 3, and 4 before discharging to percolation ponds. Each pond is aerated by a single mechanical surface aerator. Ponds #1 and 2 each has a 25-hp aerator, while ponds #3 and 4 each have a 7.5-hp aerator. The surface aerators in Ponds #1 and 2 are shown in Figure 4.4, below.

Figure 4.4: Pond #1 Aerator (foreground), and Pond #2 Aerator (background)

The aerators in ponds #1 and 2 are controlled on/off to maintain a dissolved oxygen (DO) level of 1 - 4 mg/L. According to the plant operator, the first two ponds almost never exceed setpoint (4 mg/L) so these aerators operate 24 hours per day, 365 days per year. The aerators are controlled by timeclocks to operate from daily 7 p.m. to 7 a.m.

According to the District, the WWTP struggles to fully treat wastewater during high influent flows. The District is studying process changes to meet future operating

Fine Pore Bubble Diffusers[3]:

Advantages

- Exhibit high oxygen transfer efficiencies (OTEs).
- Exhibit high aeration efficiencies (mass of oxygen transferred per unit power per unit time).
- Can satisfy high oxygen demands.
- Are easily adaptable to existing basins for plant upgrades.

Disadvantages

- Fine pore diffusers are susceptible to chemical or biological fouling, which may impair transfer efficiency and generate high head loss. As a result they require routine cleaning.
- Fine pore diffusers may be susceptible to chemical attack. Therefore, care must be exercised in the proper selection of materials for a given wastewater.
- Because of high efficiencies of the fine pore diffusers at low aeration rates, airflow distribution is critical to their performance and selection of proper airflow control orifices is important.
- Because of high efficiencies of the fine pore diffusers required airflow in an aeration basin (normally at the effluent end) may be dictated by mixing – not oxygen transfer.
- Aeration basin design must incorporate a means to easily dewater the tank (pond) for cleaning. In small systems where no redundancy of aeration tanks exists, and in-situ, nonprocess-interruptive method of cleaning must be considered.

[3] EPA 1999, *Wastewater technology fact sheet, fine bubble aeration*. EPA 832-F-99-065. Washington, D.C.: United States Environmental Protection Agency

conditions including increased influent BOD and flow from residential growth. One of the secondary treatment technologies being considered is suspended-growth activated sludge process using submerged aeration.

Note that CIM-4 recommends controlling the existing surface aerators in ponds #3 and 4 based on measured DO level. These two measures are mutually exclusive and this measure cannot be implemented in conjunction with CIM-4.

Recommendations

We recommend replacing the mechanical surface aerators with a submerged aeration system using fine pore bubble diffusers. Fine pore bubble diffusers generate small air bubbles (< 5 mm), which increases the interfacial area between water and the oxygen molecules in air. The increase in interfacial area of smaller bubbles compared using the mechanical aerators to break-up the pond surface to aerate results in significantly higher oxygen transfer rates. Increasing the oxygen transfer rate reduces the amount influent that can be treated while reducing the amount of motor power required to aerate.

Costs and Assumptions

We calculated the energy savings for this measure based on the difference between the amount of energy usage of the four surface aerators and the proposed blower used to supply air to the fine pore bubble diffusers. We estimated the current energy usage of the aerators based on motor nameplate data, operating hours and estimated motor load factor.

We assumed oxygen transfer efficiency (OTE) of 15% for fine pore bubble diffusers based on the data in Metcalf & Eddy, *Wastewater Engineering, treatment and reuse*[4]. We estimated blower efficiency and motor efficiency based on manufacturer's data.

In aeration basins sufficient mixing is required both to disperse DO throughout the basin and to provide uniform solids concentration throughout the liquid[5]. For fine bubble aeration devices, mixing energy often dictates aeration energy requirement rather than oxygen demand. A rule-of-thumb for the mixing requirements are based on airflow per unit volume, such as 10 to 15 cfm/1000 ft^3. Our analysis is based on maintaining a minimum mixing requirement to prevent solids deposition.

We estimated the cost of this measure based on the EPA's Design Manual for Fine Pore Aeration Systems (EPA/625/1-89/023), which lists the costs for a fine pore bubble diffuser aeration system, adjusted for WWTP design capacity (MGD) and inflation. Adders for contingency and design and engineering costs have been included too.

This measure is classified as a normal replacement (NR) measure since the existing surface aerators are believed to be beyond their effective useful life (EUL). The baseline aeration technology for pond aerobic treatment systems of this size (0.20 MGD) is taken to be

[4] Metcalf & Eddy. *Wastewater engineering, treatment and reuse*, 4th Ed. 2003. Chapter 5, Physical unit operations. New York: McGraw-Hill
[5] Mueller, James A., W. C. Boyle, and H. J. Pöpel. 2002. *Aeration: principles and practice*, Chapter 3.4.4 Mixing characteristics. New York: CRC Press

mechanical surface aerators. However, since the District is planning on expanding the capacity of the WWTP to handle future growth, we have taken the baseline aeration technology for small size (>0.40 MGD) aerobic treatment systems to be course bubble diffused aeration. Therefore, the incentible energy savings will be the difference in energy consumption between a course bubble aeration and fine pore bubble aeration systems.

We estimated the potential incentive at $0.08 per kWh and $150 per peak kW for Basic Non-Lighting measures. Please see the following link for information on applying for customized (calculated) incentives:

www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/

4.5 Not Recommended Measures (NRM)

Not recommended measures are energy conservation, energy efficiency, or time-of-use management projects have simple paybacks greater than 10 years. These measures have significant capital investments that result in lengthy payback periods. Below is the list of not recommended measures (NRMs) identified for San Miguel CSD:

NRM-6: Install High Efficiency Pumps at Headworks

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$100	$12,000	$100	118.6

Observations

The existing two lift pumps at the WWTP headworks operate at approximately 51% efficiency, based on the operating point we identified on the manufacturer's pump curve. Only one of the pumps operates at any given time.

Analysis

Premium efficiency pumps would reduce losses at the headworks lift station, requiring less energy to pump the same amount of influent to the aeration ponds. We analyzed the effect of installing premium efficiency pumps at the headworks by assuming a premium efficiency pump would operate at 60% efficiency, compared to existing 51% efficiency. We estimate that replacing the two existing lift pumps with high efficiency pumps would result in cost savings of approximately $100 annually.

Costs and Assumptions

We used the manufacturer's pump curve to estimate the existing pump efficiency based on well and pump parameters obtained from drawings (well diameter), the pump controller (pump on/off setpoints, flow rate) and operation logs (operating hours). We assumed an EPAct minimum motor efficiency of 90%. We assumed a best possible pump efficiency of 60% based on industry experience.

We obtained a vendor quote for two premium efficiency pumps sized for the headworks, which totals approximately $12,000. The high capital cost of premium efficiency pumps results in a payback greater than 10 years. Therefore, we do not recommend implementing this measure for energy savings alone, but we do recommend installing premium efficiency pumps when the existing pumps need replacement.

We estimated the potential incentive at $0.08 per kWh and $150 per peak kW for Basic Non-Lighting measures. Please see the following link for information on applying for customized (calculated) incentives:

http://www.pge.com/en/mybusiness/save/rebates/ief/index.page

NRM-7: Install Photocells to Reduce Lighting Levels in Areas with Sufficient Daylighting

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$50	$500	$0	11.4

Observations

The District Office front office area is illuminated by four 4-ft T8 fluorescent light fixtures. The office also has large west-facing windows, which provide a significant amount of light during daytime. However, the light fixtures continue to operate even if there is sufficient natural light. We measured 55 footcandles of light on the office desks with the window blinds open and the lights on. We measured 20 footcandles of light on the office desks with the window blinds open and the light off.

Daylighting:

Daylighting is the practice of using only daylight to meet the lighting requirements in a localized space. Daylighting can be accomplished with switching or dimming. Switched daylighting controls will turn off lamps within a fixture. Dimmed daylighting controls will uniformly reduce the lighting in all of the lamps of a fixture. Switched controls are generally the most cost effective daylighting option; while dimming controls offer a seamless transition from artificial lighting.

Analysis

We analyzed the savings associated with dimming the fluorescent light fixtures using a photocell to reduce light output when daylighting levels are sufficient. The setpoint should be adjusted to maintain at least 30 footcandles (fc) at desk level. The sensors should be programmed with a large enough deadband (at least 40%) to ensure that there will not be excessive switching of the lights on days with varying ambient light. To achieve control of lighting fixtures, a certified electrician may have to re-wire lighting circuitry so that appropriate lighting fixtures will be controlled by the sensors.

Energy savings resulting from this measure would be small and the payback would be too long to justify (>11 years), so we do not recommend this measure for energy savings alone.

Costs and Assumptions

We estimated the cost of material and installation based on cost estimates from other similar projects. We also included contingency, design and commissioning costs. This measure is not eligible for incentives.

NRM-8: Install High Efficiency Pumps at Well Pumps #3 and #4

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$0	$24,500	$0	N/A

Observations

The existing well pumps at wells #3 and #4 operate at approximately 79% and 78% efficiency, respectively, based on the operating point we identified on the manufacturer's pump curve.

Analysis

We analyzed the effect of replacing these well pumps using a pump selection software using the flows and head we observed during the site visit. The pump selection software estimated pumping efficiencies of 74% and 77% at wells #3 and #4, respectively. Therefore, replacing these well pumps would not result in energy savings.

Costs and Assumptions

We obtained a vendor quote for two premium efficiency pumps sized for the well pumps #3 and #4. The estimated cost to install each pumps is $12,300. We do not recommend implementing this measure because based on our analysis, replacing these pumps would not generate energy savings.

NRM-9: Install VFDs at Well Pumps #3 and #4

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$230	$43,800	$0	109

Observations

Well pumps #3 and 4 operate at constant speed to maintain the freshwater storage tank. The pumps turn on when the water tank level falls below 11 feet, and shut off when the tank level exceeds 14 feet.

Analysis

We analyzed the effect of retrofitting the pump motors at wells #3 and 4 with VFDs. Installing VFDs on the pumps motors at well pumps #3 and 4 would allow the pumps to operate at reduced speeds and maintain a constant tank level of 11 feet. This operation would reduce the operating head pressure by 3 feet of water column, which results in less pumping power.

Costs and Assumptions

This measure would involve replacing the existing pump motors with premium efficiency inverter-duty motors equipped with VFDs. The high capital cost of premium efficiency motors and VFDs (approximately $43,800) results in a payback greater than 10 years. Therefore, we do not recommend implementing this measure for energy savings alone, but we do recommend installing premium efficiency motors and VFDs when the existing pump motors need replacement.

4.6 Load Management Measures (LMM)

Electricity prices fluctuate throughout the day as the grid-wide demand for energy changes. Between the late morning to late afternoon, electricity demand increases and utilities purchase electricity from steadily more expensive producers as they exhaust lower-cost alternatives. Utilities, in turn, pass these costs back to their customers in the form of Time-of-Use (TOU) electricity rates.

Load management is the practice of implementing or scheduling activities to reduce energy consumption in the hours of higher electricity pricing. Load management measures identify opportunities for customers to schedule, shift, or otherwise reduce energy consumption during those periods.

As shown in Table 4.2, San Miguel CSD has electric meters on Time-of-Use tariffs with the following time periods:

Table 4.2: Time of Use Time Periods

Summer	May 1st through October 31st	
Peak	12:00 PM to 6:00 PM	Monday through Friday (except holidays)
Partial-Peak	8:30 AM to 12:00 Noon and 6:00 PM to 9:30 PM	Monday through Friday (except holidays)
Off-Peak	9:30 PM to 8:30 AM All Day	Monday through Friday, Saturday, Sunday, and Holidays
Winter	**November 1st through April 30th**	
Partial-Peak	8:30 AM to 9:30 PM	Monday through Friday (except holidays)
Off-Peak	9:30 PM to 8:30 AM All Day	Monday through Friday (except holidays) Saturday, Sunday, and Holidays

LMM-1: Shift Water Pumping Out of the Peak Period

Average Load Shift by Period			Annual Savings			Costs and Payback	
Summer Peak (kW)	Summer Part-Peak (kW)	Winter Part-Peak (kW)	Demand Cost Savings ($/yr)	Energy Cost Savings ($/yr)	Total Cost Savings ($/yr)	Measure Cost ($)	Simple Payback (years)
19.8	0.0	0.0	$0	$537	$537	$42,000	78

Observations

The vast majority of San Miguel's water is supplied by Wells #3 & 4. Each of these wells is served electricity through PG&E's HA-1X electric rate, which is a time-of-use (TOU) rate for small general service customers. The HA-1X rate varies the cost of electricity ($/kWh) by time period, but does not have monthly demand charges ($/kW). Current HA-1X rates are shown in Table 4.3, below.

Table 4.3: HA-1X Rate Periods and Energy Charges

Summer	May 1st through October 31st		Energy Charges
Peak	12:00 PM to 6:00 PM	Weekdays (except holidays)	$0.26241/kWh
Partial-Peak	8:30 AM to 12:00 PM	Weekdays (except holidays)	$0.25308/kWh
	6:00 PM to 9:30 PM		
Off-Peak	9:30 PM to 8:30 AM	Weekdays (except holidays)	$0.22468/kWh
	All Day	Weekends and Holidays	
Winter	**November 1st through April 30th**		**Energy Charges**
Partial-Peak	8:30 AM to 9:30 PM	Weekdays (except holidays)	$0.17479/kWh
Off-Peak	9:30 PM to 8:30 AM	Weekdays (except holidays)	$0.15497/kWh
	All Day	Weekends and Holidays	

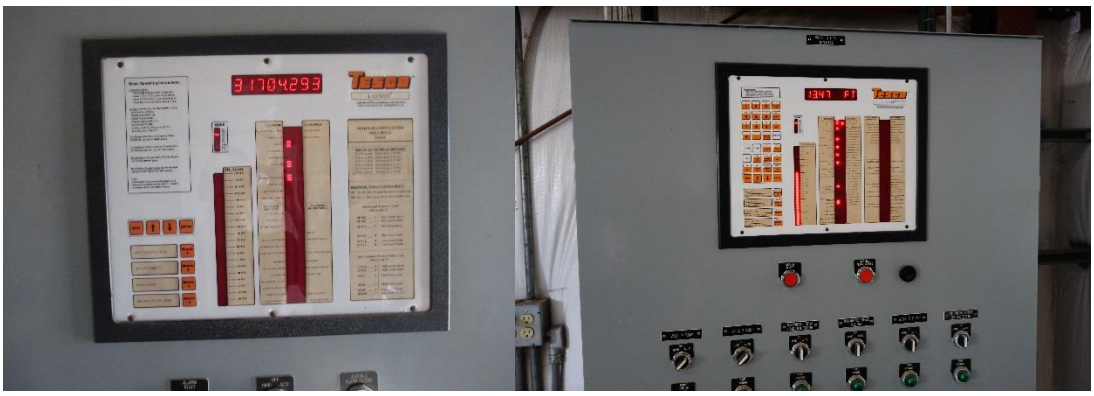


Figure 4.5. Well #3 Pump Controller (left) and Well #4 Pump Controller (right)

Currently, each well is locally controlled to start and stop based on the water level of elevated storage tanks connected to the water distribution system. The local pump controllers for Wells

#3 & 4 are shown in Figure 4.5, on the previous page. The storage tanks have a total of 650,000 gallons of capacity and it is estimated that 75% of the capacity is reserved for fire prevention.

Recommendations

Installing a supervisory control and data acquisition (SCADA) system would allow the well pumps to operate on a scheduled that prevents the pumps from operating during the Peak period. The SCADA should be programmed to fill the water storage tanks during the Off-Peak when energy costs are lower. The SCADA should also be programmed to only run the well pumps if the minimum water level needed for fire protection is reached. Otherwise, the well pumps won't run and the water stored in the tanks will provide the water for San Miguel CSD.

Due to high capital costs associated with installing the SCADA system, we do not recommend implementing this measure for energy savings alone.

Costs and Assumptions

We were unable to get interval data for the two electric meters, which would have shown typical daily pumping patterns for each well. Instead, we have analyzed monthly electric usage data for each summer month (May – October) to estimate the average monthly volume of water pumped by each well. A residential diurnal water usage pattern was used to estimate the volume of water used in San Miguel during a typical summer Peak period (see Figure 4.6). This volume was compared to the available usable capacity in the storage tanks to estimate the average pumped water load that could be shifted out of the Peak period and into the Off-Peak period.

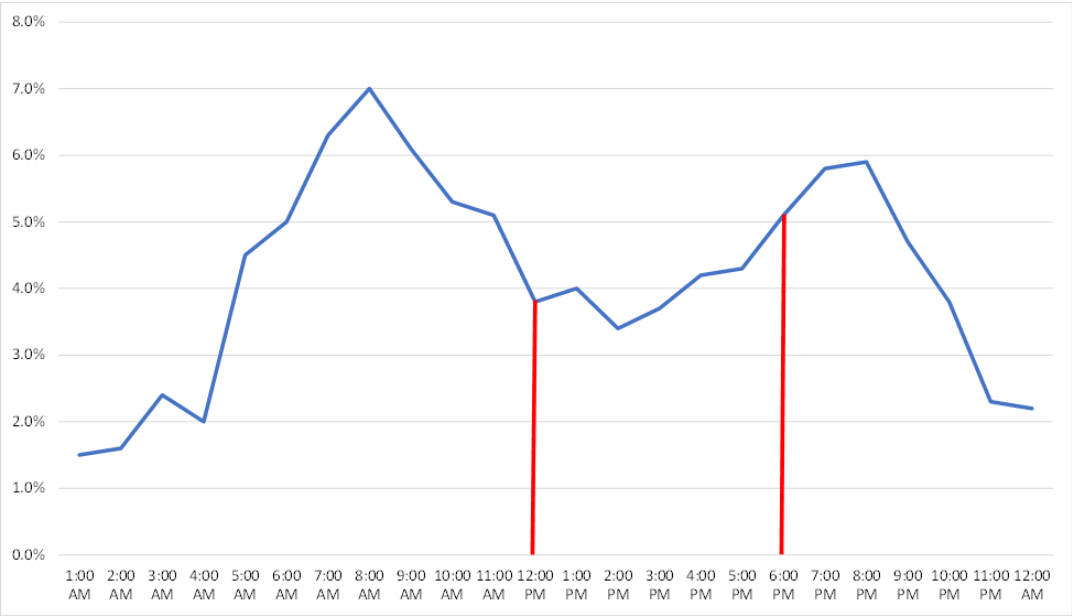


Figure 4.6. Residential Diurnal Water Usage Pattern

The average pumping flow rate that can be shifted due to using tank storage capacity is 254 GPM.

The measure cost was estimated based on a quote from a vendor.

4.7 Demand Response Measures (DRM)

Demand Response (DR) is the altering of your routine to reduce your electric demand, when requested during a few critical-peak demand hours of the year, thereby earning monthly capacity payment incentives or actual-event load reduction performance incentives.

In California, as in other states, the total electricity demand rises to its highest peaks only 40-80 hours of the year (less than 1% of all hours). Primarily this occurs during the hottest weather of the year, in the late afternoon hours.

DR measures – also known as load curtailment, peak load reduction, or load shedding – are special measures you implement to reduce or shift electricity use out of extraordinary peak system demand hours. This is very important for California's electrical system because meeting the highest peaks of demand requires that special "peaker" generation plants be built for rare use, or that special electricity purchasing be arranged. Both of these options are expensive and often represent sources of electricity that contribute to greenhouse gas emissions. DR, another option for dealing with the system's critical peak demand, has participating customers reduce their demand on request and receive incentives to do so. Compared to building more power plants or seeking more out-of-state power, the demand response option is cleaner for the environment and less costly to California's electricity users.

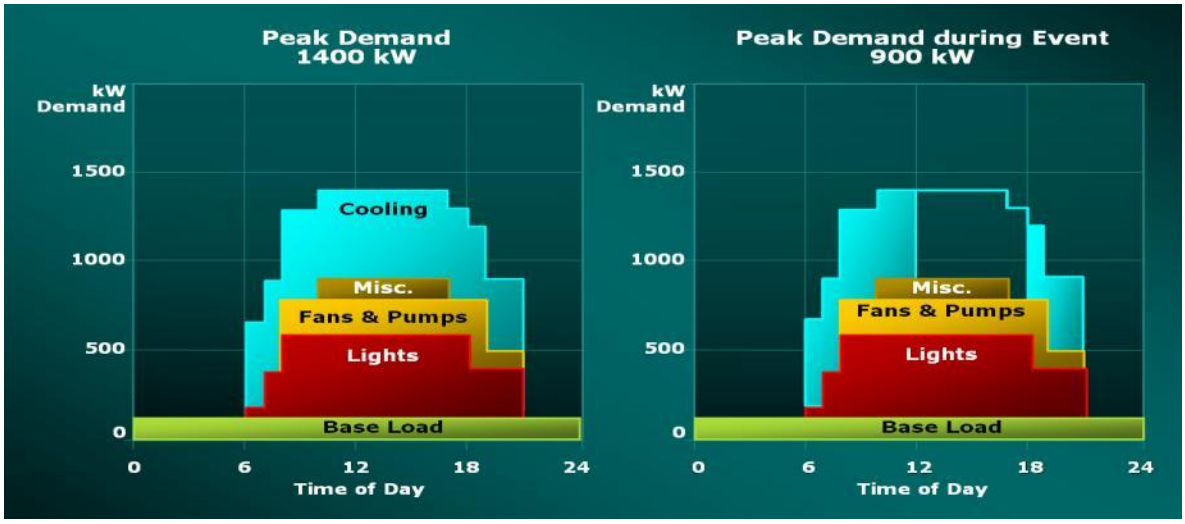


Figure 4.7. Sample Peak kW Profile (left); with Demand Response Measures (right)

We encourage you to engage in DR efforts not only to receive the various financial rewards, but also to help keep California's electrical system reliable, clean and cost-effective even when demand is highest. In addition, developing your demand response capabilities now when it is optional will help you keep your business's energy costs in check in the future when mandatory real time pricing may be implemented. Real time pricing would mean that energy users are more directly exposed to the real-time price swings of the wholesale electricity market. In that market, demand spikes can lead to price spikes.

To encourage demand response, financial incentives are offered for participating in a DR program and for the investment in technology that enables participation in DR. First, DR

participation programs reward customers who shed load during special DR events. There is a variety of these programs whereby participating customers respond to a signal to reduce demand in return for a variety of ongoing financial incentives that reflect the value of what the customer is providing: response time and certainty of load reduction delivery. Most programs signal a DR event by sending a notification the day before the event. Other programs (offering higher incentives) may request a demand reduction only minutes ahead of the need, and may send a request signal directly to a customer's building or process control system.

Secondly, DR-enabling technology incentives are one-time resources that help pay for software, equipment, or controls that enable DR measures to be implemented readily and reliably when needed. In addition, such new controls will often provide other benefits as well, allowing an operation or building to be better managed every day. For DR enablement incentives, there are two options:

- Auto-DR will pay $250 (or more) per kW of potential DR reduction to cover the installation or upgrade of an energy management system and/or controls to receive direct DR signals that activate your DR load reduction measures.
- Semi-automated DR will pay $125 per kW of potential DR reduction that is enabled by the new or upgraded software, equipment, or controls without the use of direct DR signals.

DR measures in this energy audit are candidates for DR-enabling technology incentives if included in the Payback section of the summary tables for DR Measures. We encourage you to work with your PG&E account representative to evaluate the many DR participation and DR-enabling technology incentive programs offered. Current demand response participation options include the following:

Demand Bidding Program (DBP) – In this low-risk program, you receive notice of a DR event by noon the day before. You then submit your expected bid reduction amount by 3pm. The incentive is $0.50 per kW per hour reduction, and there are no penalties for non-performance.

Peak Day Pricing (PDP) – Peak Day Pricing is now the default energy tariff for many large customers. This option works with Time of Use energy pricing and provides discounts on both your energy and demand charges for nearly all of the summer hours from May through October. On PDP event days (9-15 per year) your energy will cost an extra $1.20 per kWh between 2 pm and 6pm, encouraging DR load reduction actions on those days and hours.

Base Interruptible Program (BIP) – The Base Interruptible Program (BIP) is for facilities managed with a strong understanding and commitment to DR. BIP pays you generous incentives to be available when notified to reduce your facility's load to or below a committed level that is pre-selected by you. This pre-selected level is called the Firm Service Level (FSL) and it can be set only once a year. BIP gives you 30 minutes advance notice, but pays you between $8.00/kW to $9.00/kW of committed load reduction per month, depending on the amount of your committed load reduction. You will receive a monthly incentive payment even if no events are called, but there are financial penalties for under-performance during any event.

Aggregator Programs – Aggregators are independent third parties authorized to work with PG&E to reduce the state's energy usage during periods of peak demand, high wholesale-electrical prices, system constraints, and emergencies. Join a group of customers and pool your resources to achieve higher demand reductions and enjoy unique incentive structures. Acting as intermediaries between you and PG&E, aggregators offer you unique demand response program options. The aggregators offer DR under the Capacity Bidding Program and the Aggregator Managed Portfolio Program. There is a special Base Interruptible Program offering through Aggregators, as well. For more information including a list of aggregators, see PG&E's website:

www.pge.com/mybusiness/energysavingsrebates/demandresponse/largecommercialindustrialaggregator/

Capacity Bidding Program (CBP) – With CBP you select your load reduction commitment on a month-by-month basis through your selected third party aggregator. This program is suitable for facilities with seasonally variable demand, such as food processors. Performance requirements and incentives are determined by the aggregators. Some customers may be eligible to participate as their own DR aggregator to group their facilities.

Table 4.5 on the following page, provides some factors that influence which DR participation program to consider:

Table 4.4: Factors to Consider for Demand Response Program Participation

Customer situation:	DR Participation Programs to Consider				
	Demand Bidding	Peak Day Pricing	3rd Party Capacity Bidding	Base Interruptible	3rd Party Aggregator Managed Portfolio
passes eligibility criteria	×	×	×	×	×
has building automation system	×	×	×	×	×
wants no manual DR (wants AutoDR)	×	×	×		
has SmartMeter			×		×
wants monthly capacity payments (vs. event by event payments)			×	×	×
can commit kW reduction as stand-by		×	×	×	×
wants low risk	×				
has low demand from 2-6 pm		×			
has unpredictable hour-by-hour demand	×		×		×
wants to limit (exposure to) number of events	×				
needs flexibility for different shed levels on each event	×				
has unpredictable month-by-month demand, or seasonal	×		×		×
can respond with load shed within minutes, year-round			×	×	×

It is our understanding that San Miguel CSD does not currently participate in a DR program. Therefore, for the following recommended measures, we have estimated incentives based on the Peak Day Pricing (PDP) Program.

On the day of the audit, DR was discuss with the District and questions were asked to see how they could participate in a DR Program. We identified portions of their wastewater treatment process where electric usage could be reduced, such as by reducing aeration or pumping. District personnel were adamant that interfering or interrupting the treatment process would negatively affect plant discharge (effluent) and would put them at risk of violating their operating permit.

The DR measure shown on the following pages identifies a potential load reduction without the risk of violating the wastewater treatment plant's operating permit.

DRM-1: Turn Off Interior Lighting during a Demand Response Event

Demand Reduction		Annual Savings		Costs and Payback			
Maximum (kW)	Average (kW)	Maximum Savings & Incentive	Average Savings & Incentive	Measure Cost	Potential PG&E Tech Incentive	Net Measure Cost	Simple Payback (years)
0.8	0.8	$3	$3	$0	$0	$0	Immediate

Observations

The District Office, New Firehouse, and WWTP maintenance garage have interior fluorescent lights that operate throughout the day.

Recommendations

We recommend manually turning off these lights during demand response events.

Costs and Assumptions

Savings for this measure were estimated based on PG&E's Standard Fixture Wattage Table. Since there is no cost for this measure, it is not eligible for a PG&E technology incentive.

4.8 Distributed Generation Measures (DGM)

Distributed Generation Measures (DGMs) involve installing equipment on-site that allows the facility to generate its own electricity. In some cases, waste heat from electricity generation may be used in the facility as well.

DGM-1: Install Solar PV System to Offset WWTP Energy Use

Annual Cost Savings ($/yr)	Rough Installed Cost ($)	Rough Incentive ($)	Simple Payback (years)
$51,957	$689,000	$0	13.3

Observations

San Miguel CSD is interested in installing a solar PV system at its wastewater treatment plant to offset a portion of the plant's energy use. Based on PG&E's 2014 billing data, the plant uses approximately 440,000 kWh/yr, with an average peak demand of 57 kW.

Analysis

We analyzed a ground-mount system for a portion of plant grounds not currently utilized for treatment processes. We sized the system to generate approximately 75% of the WWTP's 2014 electricity usage, using National Renewable Energy Laboratory's (NREL) PVWatts Calculator. The PVWatts Calculator estimates the energy production of grid-connected photovoltaic systems. A potential system layout is shown in Figure 4.8 below.

Figure 4.8: Proposed Solar PV System

Solar PV Systems:

Solar PV Systems use solar cells to generate DC electricity from sunlight. This DC power is converted by an inverter to AC power for use by existing electrical systems.

A solar PV power system enables a facility to generate some of its daily electrical energy demand on its own roof. In a net metering installation, the facility remains connected to the electric utility grid at all times, so any power needed beyond what the solar system produces is drawn from the utility.

Solar PV systems are most effective during peak afternoon periods, when electricity is most expensive.

PVWatts Calculator assumptions include: standard modules, fixed (open rack), 14% system losses, 20° tilt, 180° azimuth, 1.1 DC to AC size ratio, and 96% inverter efficiency.

The potential system is approximately 40 ft x 330 ft. PVWatts estimated a system size of 196.8 kW, with an annual production of 330,817 kWh.

The cost of installing solar PV systems has dropped significantly over recent years. In addition, many financing options are available, often including means to capture the value of tax credits through a third party. This is an excellent time to install solar PV, while the 30% federal investment tax credit, other tax benefits, and net energy metering remain in place.

Costs and Assumptions

We estimated the cost of the system and installation at $3.50/Watt based on previous projects.

Cost savings were estimated based on the current average electricity rates plus 20%, to approximately account for the higher rates of solar PV production during high electricity rate periods. We did not account for escalation of electricity costs in the cost savings estimate.

We did not estimate incentives for this measure because CSI incentives are no longer available for PG&E customers. In addition, if the CSD is exempt from federal taxes, it is not eligible for the federal tax credit incentive for solar systems.

5 Appendix: Calculations and Supplemental Information

Spreadsheet Table of Contents

PG&E Integrated Energy Audit
Energy Efficiency Measures (EEM)
SLO San Miguel
1331

Measure Number	Measure Description	Approximate Energy, Cost and GHG* Savings					Estimated Costs, Incentives, and Payback			
		Peak Savings (kW) **	Electricity (kWh/yr)	Natural Gas (Therms /yr)	Annual Cost Savings ($/yr)	CO2 Saved (Tons /yr)	Estimated Installed Cost ($)	Potential PG&E Incentive ($)	Net Measure Cost ($)	Pay-back Period (Yrs)
LCM-1	Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs	0	120	0	$ 20	0	$ 44	$ -	$ 44	2.2
LCM-2	Upgrade Exterior MH, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls	0	8,600	0	$ 1,300	2	$ 7,500	$ 830	$ 6,670	5.1
LCM-3	Install High Efficiency Motors as Motors Need Replacement***	2	6,200	0	$ 900	2	$ 4,400	$ -	$ 4,400	4.9
CIM-4	Retrofit Surface Aerators with VFDs and Use Existing DO Sensors to Automatically Modulate Aeration of Treatment Ponds	0	29,800	0	$ 4,500	9	$ 27,000	$ 2,400	$ 24,600	5.5
CIM-5	Install Higher Efficiency Aeration System***	23	240,900	0	$ 36,700	69	$ 128,000	$ -	$ 128,000	3.5
Energy Efficiency Measure Totals		**25**	**255,820**	**0**	**$ 38,920**	**74**	**$ 139,944**	**$ 830**	**$ 139,114**	**3.6**

* GHG = Green House Gas

** Peak Savings: For energy efficiency, "peak kW savings" estimate should correspond to the estimated "average grid level impact between 2:00 p.m. and 5:00 p.m. during the three consecutive weekday periods containing the weekday temperature with the hottest temperature of the year" per Section 1.4.8 in the 2010 Statewide Customized Offering Procedures Manual for Business, http://aesc-inc.com/download/spc/2010spcdocs/UnifiedManual/Customized%201%200%20Policy.pdf.

*** This Measure's installed cost is a rough incremental cost. Please see the measure text for additional information.

Assuming Electricity Cost	$ 0.15	/kWh	(Average for recent 12 months, this account)
Assuming Gas Cost	$ -	/therm	(Average for recent 12 months, this account)
	0.575	/kWh	PG&E Carbon Dioxide (CO2) Emissions Rates
Assuming CO2 Reduction Equivalents, lbs CO2	11.7	/therm	
Assuming NPV Discount Rate	10%		(Default 10%, adjustable)

2014 PG&E Incentives

CRI (NRR) Incentives	Rate		
Cost Cap	50%		
Peak Electricity Demand	$ 150	per peak kW	
Targeted Lighting	$ 0.08	per kWh	Includes LED & Lighting EMS Systems
Basic Lighting	$ 0.03	per kWh	
Targeted Non-Lighting	$ 0.15	per kWh	
Basic Non-Lighting	$ 0.08	per kWh	
Gas	$ 1.00	per therm	
Retrocommissioning Incentives			
Electricity	$ 0.08	per kWh	
Gas	$ 1.00	per therm	
Cost Cap (all RCx measures)	50%		

Catalog Rebates (please list)	$ Amt.	Qty/each	Code	Applicable Measure #s Above
Install > 70-110 watt LED Fixture Reaplacing HID	60	4	LT013	LCM-2
Install > 110-150 watt LED Fixture Reaplacing HID	70	5	LT012	LCM-2

PG&E Integrated Energy Audit
SLO San Miguel
LCM-1 Replace Interior Halogen, Incandescent, and CFL Downlights with LEDs

The District Office is illuminated by a combination of linear fluorescent lamps and CFL downlights. We recommend replacing the CFL downlights with more efficient LED fixtures.

Base Case

Facility	Location	Fixture Type	Fixture Code	Fixture Wattage (kW/Fixt.	Fixture Qty	Input Power (kW)	Annual Op. Hrs
District Office	Front office	18W CFL	CFQ18/1	0.026	2	0.052	2,080
	Hallway	18W CFL	CFQ18/1	0.026	2	0.052	2,080

Total Input Power	0.1	kW
Annual Energy	216	kWh/yr

Proposed Case

Facility	Location	Fixture Type	Fixture Code	Fixture Wattage (kW/Fixt.	Fixture Qty	Input Power (kW)	Annual Op. Hrs
District Office	Front office	11W LED	N/A	0.011	2	0.022	2,080
	Hallway	11W LED	N/A	0.011	2	0.022	2,080

Total Input Power	0.04	kW
Annual Energy	92	kWh/yr

Savings		**Units**	**Sources, Assumptions, Notes**
Peak Demand Savings	0.1	kW	
Annual Energy Savings	120	kWh	
Total Cost Savings	$20		

Potential Incentive

Incentive	$0	Not eligible for incentives

Project Cost	**Qty**			
11W LED Lamp	4	$10	/lamp	Online Lighting Retailer
Contingency	10%	$4		
D&E	0%	$0		
Cx	0%	$0		
Total Cost		$44		

PG&E Integrated Energy Audit
SLO San Miguel
LCM-2 Upgrade Exterior MH, CFL, and Halogen Fixtures with LEDs with Bi-Level Controls

The exteriors of the Old Firehouse, Well pump 4, and the WWTP are illuminated with high intensity discharge (HID) fixtures. We recommend replacing the existing HID fixtures with more efficient LED fixtures.

Base Case

Facility	Location	Fixture Type	Fixture Code	Fixture Wattage (kW/Fixt.	Fixture Qty	Input Power (kW)	Annual Op. Hrs
WWTP	Pole lights	400W HPS	HPS400/1	0.465	5	2.325	4,100
WWTP	Garage exterior	250W MH	MH150/1	0.190	1	0.190	4,100
Old Firehouse	Front exterior	250W MH	MH150/1	0.190	1	0.190	4,100
Well pump 4	Front Exterior	250W MH	MH150/1	0.190	2	0.380	4,100

Total Input Power	3.1	kW
Annual Energy	12,649	kWh/yr

Proposed Case

Facility	Location	Fixture Type	Occupancy	Fixture Wattage (kW/Fixt.	Fixture Qty	Input Power (kW)	Occ. Sensor Reduction Factor	Annual Operating Hours
WWTP	Pole lights	150W LED	N/A	0.150	5	0.750	N/A	4,100
WWTP	Garage exterior	75W LED	Occupied	0.075	1	0.075	N/A	2,255
WWTP	Garage exterior	75W LED	Unoccupied	0.045	1	0.045	45%	1,845
Old Firehouse	Front exterior	75W LED	Occupied	0.075	1	0.075	N/A	2,255
Old Firehouse	Front exterior	75W LED	Unoccupied	0.045	1	0.045	45%	1,845
Well pump 4	Front Exterior	75W LED	Occupied	0.075	2	0.150	N/A	2,255
Well pump 4	Front Exterior	75W LED	Unoccupied	0.045	2	0.090	45%	1,845

Total Input Power	1.2	kW
Annual Energy	4,084	kWh/yr

Savings		**Units**	**Sources, Assumptions, Notes**
Peak Demand Savings	0	kW	No DEER Peak reduction because the
Annual Energy Savings	8,600	kWh	lights operate only at night
Total Cost Savings	$1,300		

Potential Incentive

Incentive	$830	Eligible for DEEMED LED Exterior Area Lighting Rebate

Project Cost	**Qty**			
75W LED	4	$269	/fixture	Online Lighting Retailer
150W LED	5	$444	/fixture	Online Lighting Retailer
Installation - Pole-mounted fixtures	5	$262	/fixture	2015 RS Means Electrical Cost Data
Installation - Wall pack fixtures	4	$131	/fixture	2015 RS Means Electrical Cost Data
Photocells & Occ. Sensors	4	$65	/fixture	Both senors typically integrated into one.
Contingency	10%	$539		
D&E	10%	$539		
Cx	20%	$1,078		
Total Cost		$7,500		

PG&E Integrated Energy Audit

SLO San Miguel CSD

LCM-3 Install High Efficiency Motors as Motors Need Replacement

Estimates energy savings associated with replacing the existing standard efficiency motors listed below with premium efficiency motors as the motors need replacement.

Base Case

Location	Motor (hp)	Motor Efficiency	Input Power (kW)	Operating Hours (hr/yr)	Notes
Headworks	7.5	89.5%	4.69	2,640	220 hours per month, from pump operation logs
Aerator Pond #1	25	92.4%	15.14	8,760	
Aerator Pond #2	25	92.4%	15.14	8,760	
Aerator Pond #3	7.5	89.5%	4.69	4,380	
Aerator Pond #4	7.5	89.5%	4.69	4,380	
Well #3	40	93.0%	24.06	1,980	165 hours per month, from San Miguel CSD
Well #4	60	93.6%	35.87	1,788	166 hours per month, from San Miguel CSD
Well #5	40	93.0%	24.06	35	167 hours per month, from San Miguel CSD

Total Input Power	128.34	kW
Annual Energy	431,282	kWh

Proposed Case

Location	Nameplate (hp)	Motor Efficiency	Input Power (kW)	Operating Hours (hr/yr)	Units	Notes
Headworks	7.5	91.7%	4.58	2,640		
Aerator pond 1	25	93.6%	14.94	8,760		
Aerator pond 2	25	93.6%	14.94	8,760		
Aerator pond 3	7.5	91.7%	4.58	4,380		
Aerator pond 4	7.5	91.7%	4.58	4,380		
Well pump 3	40	94.1%	23.78	1,980		
Well pump 4	60	95.0%	35.34	1,788		
Well pump 5	40	94.1%	23.78	35		

Total Input Power	126.52	kW
Annual Energy	425,088	kWh

Savings

Peak Demand Savings	1.8	kW
Energy Savings	6,200	kWh/yr
Total Cost Savings	$900	/yr

Potential Incentive		Units	Notes
Incentive	$0.00		Not eligible for PG&E incentives

Project Cost	Qty	Increm. Cost		Notes
25 hp premium efficiency motor (TEFC)	2	$550	/motor	
7.5 hp premium efficiency motor (TEFC)	4	$326	/motor	
40 hp premium efficiency motor	2	$645	/motor	
60 hp premium efficiency motor	1	$721	/motor	
Contingency	0%	$0		
D&E	0%	$0		
Cx	0%	$0		
Total Cost		$4,400		

PG&E Integrated Energy Audit

SLO San Miguel

CIM-4 Retrofit Surface Aerators with VFDs and Use Existing DO Sensors to Automatically Modulate Aeration of Treatment Ponds

Estimates energy savings associated with installing VFDs and reducing speed of aerator motors in ponds #3 and #4.

Note that the potential energy savings from this measure is mutually exclusive of the energy savings estimated for CIM-3, as the measures cannot be implemented simultaneously.

Current Operation		Units	Notes
Aerator motor	7.5	hp	Motor nameplate
Number of aerators	2		One per pond
Motor Load Factor	75%		
DO when aerators run	4	mg/L	Assumption based on permit level (1-4 mg/L).
Daily Operation	12	hours	8PM to 8AM, 7 days/week
Annual Operation	4,380	hours	365 days per year
Motor input power	8.4	kW	
Total Energy Used	36,759	kWh	

Proposed Operation		Units	Notes
Proposed DO setpoint	2	mg/L	
Proposed VFD speed	50%		Reduce speed by half to reduce DO concentration by half
Motor Input Power	1.6	kW	At 50% speed
Total Energy Used	6,936	kWh	

Savings		
Peak Demand Savings	0.0	kW
Energy Savings	29,800	kWh/yr
Total Cost Savings	$4,500	/yr

Potential Incentive		Units	Notes
Incentive	$2,400		Basic Non-Lighting measures

Project Cost	Qty	Unit Price	Unit	Notes
2 DO sensors, 1 controller, 2 7.5-hp VFDs	1	$19,826		Contractor quote from Clear Blue
Contingency	10%	$1,983		
D&E	15%	$2,974		
Cx	10%	$1,983		
Total Cost		$27,000		

PG&E Integrated Energy Audit
SLO San Miguel
CIM-5 Replace Existing Surface Aerators with Submerged Fine Pore Bubble Diffuser System

This measure evaluates the potential energy savings from replacing the existing mechanical surface aerators with submerged fine pore bubble diffusion aeration.

Baseline: It is not clear what the industry standard practice (ISP) for biological treatment would be for a wastewater treatment plant of San Miguel's size (0.20 MGD). Therefore, to be conservative we have selected course bubble diffused aeration as the ISP for plant's expanding their treatment capacity.

Our analysis assumes that mixing is the limiting factor for aeration demand, not oxygen for biological degradation. The minimum aeration rate of 15 cfm/1000 ft3 is applied to the first pond under the assumption that this will be the location of most of the BOD reduction.

Note that the potential energy savings from this measure is mutually exclusive of the energy savings estimated for CIM-4, as the measures cannot be implemented simultaneously.

Current Operation		Units	Notes
Average Influent Flow Rate	0.112	MG/day	Data provided by San Miguel CSD
Annual Influent Flow	40.9	MG/yr	
Average Influent BOD Concentration	285	mg/L	Data provided by San Miguel CSD
Effluent Discharge BOD	10	mg/L	Data provided by San Miguel CSD
Annual BOD_5 Load	93,622	lb BOD_5/yr	
DO Setpoint	2.0	mg/L	Using DO sensors and controller
O_2 Required to Satisfy BOD Load	140,433	lb O_2/yr	Calculated based on influent volume
Aerator Operating Hours	8,760	hr/yr	
Average Oxygen Transfer Rate	16.0	lb O_2/hr	
Number of Aerators in Ponds 1 & 2	2		
Aerator Motor, Ponds 1 & 2	25	hp	
Aerator Motor Efficiency	92.4%		
Aerator Op. Hours, Ponds 1 & 2	8,760	hr/yr	
Number of Aerators in Ponds 3 & 4	2		
Aerator Motor, Ponds 3 & 4	7.5	hp	
Aerator Motor Efficiency	89.5%		
Aerator Op. Hours, Ponds 3 & 4	4,380	hr/yr	
Total Input Power	30.3	kW	Peak, does not include aerators in ponds #3 & 4
Annual Energy Usage	306,289	kWh/yr	

Proposed Baseline Operation		Units	Notes
DO Setpoint	2.0	mg/L	
O_2 Required to Satisfy BOD Load	140,433	lb O_2	Calculated based on influent volume
Aerator Operating Hours	8,760	hr/yr	
Average Oxygen Transfer Rate	16.0	lb O_2/hr	
Course Bubble Diffuser Oxygen Transfer Efficiency	7%		Metcalf & Eddy, *Wastewater Engineering*
Average Oxygen Aeration Rate	229.0	lb O_2/hr	
Mass of O_2 in Air	0.0176	lb O_2/ft3	Calculated at 14.7 psia and 65F
Volume of Blower Air Needed for Aeration	217	cfm	
Blower Discharge Pressure	7.5	psig	Estimated
Blower Efficiency	70%		Estimated
Blower Shaft Power	8.7	bhp	Calculated
Blower Motor Efficiency	90%		Estimated
Average Input Power	7.2	kW	
Annual Energy Usage	62,992	kWh/yr	Adjusted Baseline

Proposed Operation		Units	Notes
DO Setpoint	2.0	mg/L	
O_2 Required to Satisfy BOD Load	140,433	lb O_2/yr	Calculated based on influent volume
Aerator Operating Hours	8,760	hr/yr	
Average Oxygen Transfer Rate	16.0	lb O_2/hr	
Fine Bubble Diffuser Oxygen Transfer Efficiency	15%		Metcalf & Eddy, *Wastewater Engineering*
Average Oxygen Aeration Rate	106.9	lb O_2/hr	
Mass of O_2 in Air	0.0176	lb O_2/ft3	Calculated at 14.7 psia and 65F
Blower Airflow Needed for Aeration	101	cfm	Based oxygen aeration rate
Blower Airflow Needed for Mixing	225	cfm	Based on recommended minimum airflow rate
Blower Discharge Pressure	7.5	psig	Estimated
Blower Efficiency	70%		Estimated
Blower Shaft Power	9.0	bhp	Calculated
Blower Motor Efficiency	90%		Estimated
Average Input Power	7.5	kW	
Annual Energy Usage	65,339	kWh/yr	

Savings		
Peak Demand Savings	22.8	kW
Annual Energy Savings	240,900	kWh/yr
Total Cost Savings	$36,700	/yr

Potential Incentive		Units	Notes
Incentible Peak Demand Savings	-0.3	kW	
Incentible Annual Energy Savings	-2,300	kWh/yr	
Incentive	$0		PG&E Basic Non-Lighting measure

Project Cost	Qty	Unit Price	Unit	Notes
10-hp variable speed blower	2	$20,000		One is back-up
Fine pore bubble diffusers	2	$20,000	per pond	Estimate includes diffusers, piping, control valves, and installation
Contingency	25%	$20,000		
D&E	25%	$20,000		
Cx	10%	$8,000		
Total Cost		$128,000		

PG&E Integrated Energy Audit
Demand Response Measures (DRM)

Measure Number (DRM-#)	Measure Description	Demand Reduction		Approx. Annual Incentive		Enabling Technology Costs, Incentives			Payback
		Maximum (kW)	Average (kW)	Maximum Potential DR Program Incentive ($/yr)	Average Potential DR Program Incentive ($/yr)	Cost for Enabling Technology ($)	MAXIMUM Potential PG&E Technology Incentive	Net Cost of Enabling Technology ($)	Simple Payback (yr)
DRM-1	Turn Off Interior Lighting during a Demand Response (DR) Event	0.8	0.8	$6	$6	$0	$0	$0	Immediate
Demand Response Measure Totals		**0.8**	**0.8**	**$6**	**$6**	**$0**	**$0**	**$0**	**0.0**

NOTE: The estimated incentives, savings and costs in the table above are based on the Peak Day Pricing demand response program, and PG&E's Technology Incentive. See full details and assumptions in the appendix.

PG&E Integrated Energy Audit
Demand Response Measures (DRM)

Inputs for Incentives and Financials

Incentives vary widely. These estimates assume the following:

2012 PG&E Incentives	Rate		
Demand Response Program:	**1 - PDP - Peak Day Pricing**		**Update Program Data**
Assumed Events Per Month	2	events/month	
Events Per Year	12	events/year	
Event Duration	4	hours/event	
Capacity Reservation (kW)	25	kW	
☑ Existing PDP Customer			
Enablement Program:	**1 - Technology Incentive**		-Demand reductions are for current conditions, before efficiency measures.
Technology Incentive (T.I.)	$125.00	per kW	-Technology Incentive: manual initiation (not Auto-DR), capped by measure.
Technology Incentive Cost Cap	50%		
Auto-DR Technology Incentive	$250.00	per kW	
Auto-DR Technology Incentive Cost Cap	100%		
Rate Schedule	**E19S**		**Update Tariff Data**
Average DR Event Electricity Cost	$ 0.16233	/kWh	Weighted average based on DR Program event window
Net Present Value (NPV):			
Assuming NPV Discount Rate	10%		Default 10%, adjustable
Assuming DR Measure EUL	5	years	Default 5 years (EUL = Expected Useful Life)

PG&E Integrated Energy Audit
SLO San Miguel
DRM-1 Turn Off Interior Lighting during a Demand Response (DR) Event

We recommend turning off interior lighting at the District Office, New Firehouse, and WWTP Maintenance garage during a DR event.

Existing Power Draw of Interior Lights

Facility	Location	Fixture Type	Fixture Code	Fixture Wattage (kW/Fixt.	Fixture Qty	Input Power (kW)	Annual Op. Hrs
District Office	Front office	18W CFL	CFQ18/1	0.026	2	0.052	2,080
District Office	Hallway	18W CFL	CFQ18/1	0.026	2	0.052	2,080
District Office	Front office	4-ft T8 Fluor.	F42ILL (1)	0.059	4	0.236	2,080
New Firehouse	Engine Bay	4-ft T8 Fluor.	F42ILL (1)	0.059	4	0.236	8,760
WWTP	Maintenance garage	4-ft T8 Fluor.	F42ILL (1)	0.059	4	0.236	2,080

Total Demand Reduction	0.8	kW	
Total Energy Savings	20	kWh	Assuming 5 events of 5 hrs each (25 hrs)
Total Cost Savings	$3		

Potential Incentive

Incentive	$0	Not eligible for incentives since no cost.

Project Cost

Cost	$0

PG&E Integrated Energy Audit
SLO San Miguel
DRM-2 Turn Off Pond Aerators during a DR Event

We recommend turning off the pond aerators at the WWTP during a DR event.

Existing Power Draw of Interior Lights					Notes
	Aeration Pond	Motor HP	Load Factor	Motor Input kW	
	Pond 1	25	83%	15.54	Load factor from EEM2 High Efficiency Aerators calc
	Pond 2	25	83%	15.54	Load factor from EEM2 High Efficiency Aerators calc
			Total Input Power	31.1	kW
			Total Input Power	777	kWh Assuming 5 events of 5 hrs each (25 hrs)
			Total Cost Savings	$118	
Potential Incentive					
			Incentive	$0	Not eligible for incentives since no cost.
Project Cost					
			Cost	$0	

PG&E Integrated Energy Audit
Load Management Measures (LMM)
SLO San Miguel
1331

Measure Number	Measure Description	Average Load Shift by Period					Annual Cost Savings			Costs and Payback		
		Winter Off Peak (kW)	Winter Part Peak (kW)	Summer Off Peak (kW)	Summer Part Peak (kW)	Summer Peak (kW)	Electricity Demand Cost Savings	Electricity Use Cost Savings ($/yr)	Total Electricity Cost Savings ($/yr)	Measure Cost ($)	Simple Payback (yr)	Reduction During Max Demand?
LMM-1	Shift a Portion of the Well Water Pumping Out of the Summer Peak Period	0.0	0.0	19.8	0.0	-19.8	$ -	$ 537	$ 537	$ 42,000	78.2	No
Load Management Measure Totals		**0.0**	**0.0**	**19.8**	**0.0**	**-19.8**	**$ -**	**$ 537**	**$ 537**	**$ 42,000**	**78.2**	

Rate Schedule	A1	actually HA-1X			
Winter Off Peak	$ 0.14289	/kWh	Maximum Demand Charge, Summer	$ -	/kW
Winter Part Peak	$ 0.16095	/kWh	Part Peak Demand Charge, Winter	$ -	/kW
Summer Off Peak	$ 0.20395	/kWh	Maximum Demand Charge, Winter	$ -	/kW
Summer Part Peak	$ 0.22915	/kWh	Part Peak Demand Charge, Summer	$ -	/kW
Summer Peak	$ 0.23743	/kWh	Peak Demand Charge, Summer	$ -	/kW
Assuming NPV Discount Rate	10%		(Default 10%, adjustable)		
Assuming DR Measure EUL	5	years	(Default 5 years)		
Number of Summer Days	130		Monday-Friday, May 1 - Oct 31		
Number of Winter Days	130		Monday-Friday, Nov 1 - Apr 30		
Summer Off Peak Period	11	hours			
Summer Park Peak Period	7	hours			
Summer Peak Period	6	hours			
Winter Off Peak Period	11	hours			
Winter Part Peak Period Duration	13	hours			

PG&E Integrated Energy Audit
SLO San Miguel
LMM-1 Pump Well Water Prior to Summer Peak Period

We recommend shifting water pumping out of the peak period.

Pumping Energy Use		Units	Notes
Static Groundwater Level	145	ft	Estimated based on measurements of similar well sites
Well Discharge Pressure	67	psig	Observed at Well #4
Total Pumping Head	300	ft	
Pump Flow Rate	1.25	cfs	Observed at Well #4
Pump Flow Rate	561	gpm	
Average Pump Efficiency	78%		Estimated from pump curve
Average Pumping Power	54.5	bhp	calculated
Motor Efficiency	93.0%		From nameplate of Well #3 pump motor
Main Tank Storage Capacity	650,000	gallons	From San Miguel CSD
Minimum Storage for Fire Protection	75%		Estimated of existing storage
Minimum Storage Capacity	487,500	gallons	Required for fire protection
Potential Peak Period Water Usage Shift	451	gpm	If full tank is pumped down to minimum
Average Water Usage Rate	254	gpm	Based on billing data
Average Pumping Load Shift	19.8	kW	During Peak Period

Savings		Units	Notes
Average Pumping Load Shift	19.8	kW	
Daily Peak Period Duration	6	hr/day	
Weekdays per Month	20	day/mo	
Summer Peak Rate	$0.26	/kWh	Rate HA-1X TOU
Summer Off-Peak Rate	$0.22	/kWh	Rate HA-1X TOU
Monthly Cost Savings	$89	/mo	
Summer Cost Savings	$537	/yr	

Project Cost	Qty	Unit Price	Unit	Notes
SCADA System	1	$30,000		Estimate for two RTUs at wells 3 & 4, level sensors at tanks, and control unit with display
Contingency	10%	$3,000		
D&E	20%	$6,000		
Cx	10%	$3,000		
Total Cost		$42,000		

PG&E Integrated Energy Audit
Distributed Generation Measures (DGM)
SLO San Miguel
1331

Measure Number	Measure Description	Approximate Energy, Cost and GHG* Savings					Estimated Costs, Incentives, and Payback			
		Peak Savings (kW) **	Electricity (kWh/yr)	Natural Gas (Therms /yr)	Annual Cost Savings ($/yr)	CO2 Saved (Tons /yr)	Estimated Installed Cost ($)	Potential PG&E Incentive ($)	Net Measure Cost ($)	Pay-back Period (Yrs)
DGM-1	Install Photovoltaic Solar System to Offset Energy Use	57	330,817	0	$ 51,957	95	$ 689,000	$ -	$ 689,000	13.3
Distributed Generation Measure Totals		**57.0**	**330,817**		**$ 51,957**	**95**	**$ 689,000**	**$ -**	**$ 689,000**	**13.3**

* GHG = Green House Gas

** Peak Savings: For energy efficiency, "peak kW savings" estimate should correspond to the estimated "average grid level impact between 2:00 p.m. and 5:00 p.m. during the three consecutive weekday periods containing the weekday temperature with the hottest temperature of the year" per Section 1.4.8 in the 2010 Statewide Customized Offering Procedures Manual for Business, http://aesc-inc.com/download/spc/2010spcdocs/UnifiedManual/Customized%201%200%20Policy.pdf.

*** NPV = Net Present Value

Net Present Value (NPV) indicates financial attractiveness of a project. It is the value today of a project's future savings minus its cost. Future cash flows are discounted by an assumed annual rate (entered below) to account for risk, the cost of money, and inflation.

Assuming Electricity Cost	0	/kWh	(Average for recent 12 months, this account)
Assuming Gas Cost	0	/therm	(Average for recent 12 months, this account)
Assuming CO2 Reduction	0.575	/kWh	PG&E Carbon Dioxide (CO2) Emissions Rates
Equivalents, lbs CO2	11.7	/therm	
Assuming NPV Discount Rate	10%		(Default 10%, adjustable)

PG&E Integrated Energy Audit
SLO San Miguel
DGM-1 Install Solar PV System to Offset WWTP Energy Use

San Miguel CSD is interested in installing a solar PV system at its wastewater treatment plant to offset a portion of the plant's energy use. We sized a system using PVWatts Calculator to offset approximately 75% of the treatment plant's annual energy use. The calculation below details the system size and economics.

Current Operation		Units	Notes
PV DC System Size	0.0	kW	
Estimated Electricity Generated by PV System	0	kWh	
Annual Peak Demand at WWTP	57	kW	PG&E 2014 billing data
Annual Energy Usage at WWTP	440,342	kWh/yr	PG&E 2014 billing data
Annual Electricity Cost at WWTP	$57,632		PG&E 2014 billing data
Average Electricity Rate at WWTP	0.13	$/kWh	

Proposed Operation		Units	Notes
PV DC System Size	196.8	kW	Result from PVWatts Calculator
Estimated Electricity Generated by PV System	330,817	kWh/yr	Result from PVWatts Calculator

Savings		
Electric Energy Generated	330,817	kWh/yr
Total Cost Savings	$51,957	/yr

Potential Incentive		Units	Notes
Incentive	-		

Project Cost	Qty	Unit Price	Unit	Notes
Average System Price	196,800	$3.50	/Watt	Based on previous projects.
Contingency	0%	$0		
D&E	0%	$0		
Cx	0%	$0		
Total Cost		$689,000		

San Miguel Community Services District
Equipment & Facilities Committee

Staff Report

March 17, 2016 **AGENDA ITEM: V-2**

SUBJECT: Discuss and Review of survey of properties within the District.

STAFF RECOMMENDATION:

Consider and discuss an initial survey of properties suitable for facilities and should provide direction and comments to Staff.

BACKGROUND:

Earlier this year, Committee members asked staff to identify site locations for future facilities. A compilation of limited sites are to be reviewed in this discussion. The obvious fact is there are a limited number of sites, primarily vacant properties, found within District boundaries.

A separate visual presentation will be provided at the meeting showing 19 locations that could be used to conduct further discussions. Staff did not evaluate these sites but is prepared to apply site selection criteria as may be determined by Committee discussions.

The near term facility needs are an expansion of WWTP and the addition of administrative and Board meeting facilities that are not located inside of the existing fire station.

WWTP

As a result of the recent findings of the WWTP Loading Assessment and Analysis, the District Engineer reported that the plant is operating at 65-70% of designed flow capacity. It is assumed that an expansion of plant operations could require additional lands for added ponds or other operational components. In the past, the District has approached an adjacent property owner about acquisition but the owner has been non-responsive to written or verbal contact.

The current discussion and feasibility study for a regional wastewater facility that is being put together by federal agencies on behalf of Camp Roberts may also have a bearing on this near term need to expand our plant facilities. A separate report and update on this particular project is on this agenda for Committee review and discussion.

ADMINISTRATIVE AND MEETING FACILITIES

The existing fire station building, approximately 6,200 square feet, and property should include a sleeping quarters area, additional restrooms, separate fire offices, a maintenance workshop area, a full scale training facility, improved parking lot area and fencing.

The present administration area is a shared part of the fire station, which is less than ideal. The present office area is handling a customer service area for bill payment, accounting, a shared office for fire chief and utility supervisor and General Manager office.

In a more normalized setting, there needs to be a secured front office area for bill payments and a reception area physically separated from other functions, especially for cash control and security protection. This front office area also needs to be used specifically for bill payment and visitor check-ins, something that is not currently available.

Accounting needs to be separated for sensitive fiscal documents and recordkeeping control and protections. Presently, anyone has direct access and view of accounting desk area.

Fire Chief/Assistant Fire Chief/Utility Supervisor currently share approximately 150 square feet of office area that is currently functioning for preparing Committee and Board reports, conducting fire and utility administrative, meeting and other office functions, including storage of materials and equipment. Filing space for documents, reference books and other documents is either missing or inadequate. The ability for Fire Chief or Utility Supervisor to set up and maintain organizational schedules is inadequate or missing.

Separate functional spaces are highly desirable and would greatly improve operational deficiencies. A space needs analysis could best identify what functional needs are required over the 10-15 years.

Board Meeting Room Area

The current Board Meeting Room is located in what was planned for fire personnel training and is configured accordingly. As a training room only, there are some additional improvements needed to function adequately, specifically improved lighting and electronic devices.

As a Board Meeting Room, there is little about the room that is designed for a general meeting room location. Typically, a general purpose meeting room designed similarly as Templeton CSD's would be the essential meeting room size for this District. Approximately 500-1,000 square feet could accommodate meeting space and include added room for Closed Session meetings.

GENERAL LAND AREA REQUIREMENTS

Staff, currently, estimates that the two most significant near term needs are the expansion of the WWTP and separation of fire station and administrative facilities.

The expansion of the WWTP is predicated on acquisition of property north of the existing plant. Acquisition may be done through eminent domain based on the public purpose and need of wastewater treatment and disposal.

The separation of fire station and administrative facilities and functions is based the increasing need for adequate and secure work areas and need to consolidate fire station building functions, especially relocation of fire personnel training facility and site improvements.

Fiscal Impact:
No fiscal impact at this time. Future budgeting must plan for feasibility analysis, environmental documentation work and engineering studies.

Staff Recommendation: Staff recommends that the Committee discuss findings and provide direction to staff.

PREPARED BY:

Darrell Gentry
General Manager

Attachment: Aerial Survey Presentation

San Miguel Community Services District
Equipment & Facilities Committee

Staff Report

March 17, 2016 **AGENDA ITEM: V-3**

SUBJECT: Discuss and Review of Camp Roberts Regional Wastewater Facility Assessment Update.

STAFF RECOMMENDATION:

Consider and discuss an update of the Camp Roberts Regional Wastewater Facility Assessment study.

BACKGROUND:

In January of this year, the County, Heritage Ranch CSD, SMCSD and Camp Roberts officials attended a workshop discussion concerning the concept for a regional facility assessment using a federal grant. That workshop was intended to assess support for a federal grant, through the DoD Office of Economic Adjustment, to determine opportunities for a regional facility that could serve Camp Roberts, Heritage Ranch and San Miguel communities.

Since January, the County was successful in receiving a $50,000 grant through DoD. The grant funded a consultant assessment study of existing conditions and identification of opportunities and anticipated costs by RMC for County Public Works Department.

A second part of this preliminary study was to develop initial long term needs assessment and solution alternatives. This week, March 9 2016, a second meeting, a Stakeholders Update meeting was held to review these earlier findings and to solicit Stakeholder comments on the initial needs assessment and study.

The ultimate goal of the current study is to assess the ability of a regional wastewater facility to meet multi-agency interests and objectives as well as to determine Stakeholder agency interest in pursuing a full scope feasibility study. The data assembled for the Stakeholder meeting is provided, as a separate handout, to this report.

It is staff's opinion that this assessment is fundamental in scope and does not provide any true insight to conditions, constraints and opportunities involved with a regional plant facility.

Instead, the assessment promoted many more questions than gave answers. There will be a short period for more formal written comments by Stakeholder agencies about the study before a final report is completed.

The County, today, indicated that their staff is seeking a memorandum of understanding between themselves and interested agencies, including Camp Roberts on future detailed studies and/or environmental documents.

Our position must be to include comments about limitations to fund detailed studies when SMCSD must prepare its own update to Master Plan within the next 2-3 years that is likely to not include an assumption that a regional plant facility will be built. Camp Roberts officials indicated that they will proceed with their own upgrades and improvements to Main Garrison WWTP facilities but acknowledged a desire to find out more details and to assess the two CSD's level of interest.

As the Committee will read in the attached study materials and information, the present value analysis for O & M expenses indicates that there are some opportunities for cost avoidance but for SMCSD upgrading and expanding our WWTP facility, the projected capital costs are an estimated $4.9 million, which does not include any soft costs, such as engineering/design, environmental documentation and clearance, and permits to operate an expanded operations.

The Regional WWTP Concept

A regional plant would mean that SMCSD could realize an estimated doubling of capacity limit, an estimated 0.7 MGD compared to 0.35 MGD currently configured. The regional plant concept would potentially mean that an estimated 20,000 lineal feet of a 6" force main/gravity sewer pipe would be needed to extend to the Main Garrison plant facility for tertiary treatment and discharge. This force main would need to be designed to avoid any conflicts with Big Sandy State Wildlife Area (to avoid crossing Highway 101 and the railroad right-of-way) or identify the environmental impacts and feasible mitigation measures involved.

The benefits for Camp Roberts are, initially, defined as two key components, flow equalization and shared capital costs through agency partnership agreements and financial assistance.

There are, initially, some potential benefits to a regional plant for SMCSD that include: avoiding nutrient removal and treatment facility costs, especially nitrogen removal; eliminating the cost of land acquisition; and not relying on Salinas River underflow as a potential supplemental water source, since that source is fully appropriated between May and December according to State WRCB Decision 1585 and Order WR 98-08. Lastly, a regional plant facility could allow SMCSD to avoid costly regulatory permit requirements that may be imposed by SWRCB and or Regional Board, especially for BOD, TSS, chromium 6 and nutrient and salt removal.

The potential issues for SMCSD are: What happens to such a regional plant in case there is a national or state emergency that might affect District's ability to send waste for treatment, what are the potential shared O & M costs and how would they compare to our current and projected O & M costs;

At this Stakeholder agency meeting, there was much discussion and questions about need for detailed shared annual O & M costs, needed institutional or agency agreements, governance structure and authorities, how are capital costs to be paid and from what sources, i.e.: grants, loans, or other sources, what would be projected staffing needs, can such a regional facility be designed, constructed and operated in a sustainable manner that benefits the Basin or sub-basins for more reliability to water suppliers agencies.

A final report and an initial memorandum of understanding agreement are the next steps to complete this RMC Assessment Study. Then a scope of services development for Round 2 Analytics would be put together based on agency interests in proceeding.

Fiscal Impact:
No fiscal impact at this time. Future budgeting must plan for feasibility analysis, environmental documentation work and engineering studies that are unrelated to any future study of a regional plant facility.

Staff Recommendation: Staff recommends that the Committee discuss findings and provide direction to staff.

PREPARED BY:

Darrell Gentry
General Manager

Attachment: Stakeholder Agency Meeting Handouts

Meeting Agenda

Camp Roberts Conceptual Regional Wastewater Facility Assessment

Subject: Study Workshop
Date/Time: Wednesday, March 9, 2016
9 AM to 12 PM
Location: Old Mission San Miguel Parish Hall,
795 SLO Monterey Road,
San Miguel CA, 93451

Meeting Objectives:

- Understand water and wastewater setting for the three participating entities.
- Introduce regional wastewater facility concept and compare with individual facility plans.
- Assess agencies' interests in pursuing a regional wastewater facility.

Meeting Agenda

A. Introductions	5 Min
B. Study Background	10 Min
C. Agency Water / Wastewater Setting	
a. Camp Roberts	15 Min
b. Heritage Ranch CSD	15 Min
c. San Miguel CSD	15 Min
D. Regional WWTP Concept	
a. Concept Introduction	10 Min
b. Concept Discussion	15 Min
<< 10-Minute Break for Revisions to Analysis >>	
c. Review Revisions to Concept	5 Min
d. Compare Concept with Individual WWTPs	20 Min
e. Concept Implementation Considerations	10 Min
E. Discuss Preliminary Findings	30 Min
F. Next Steps	20 Min

Attachments:

A. Fact Sheets
B. Cost Estimates

Camp Roberts Joint Land Use Study (June 2013) Compatibility Issues and Strategies

Issue Infrastructure Extensions (IE) -2 Needed Infrastructure Capacity Enhancement

There are several instances where infrastructure capacity does not support the demand in the area, which can present problems in the management of utilities, such as wastewater.

Strategy IE-2A Regional Coordination

Coordinate on a region-wide basis, the development of plans for infrastructure improvements to avoid overlap and duplication of services. Development of systems that can serve both community (including Heritage Ranch and San Miguel) and Camp Roberts' needs should be evaluated when appropriate.

Issue Water Quantity / Quality (WQQ) -1 Surface Water Contamination Exists in the Camp Roberts Study Area

There are several waterways in or near the Camp Roberts JLUS Study Area. These waterways provide important habitat areas, recreational opportunities, off-stream reservoirs, environmental sustainment, and training opportunities for personnel at Camp Roberts. Contamination within the waterways, from all potential sources, could impact training uses and the environment, both on and off Camp Roberts.

Strategy WQQ-1A Surface Water Monitoring

Monitor surface water quality on Camp Roberts and throughout the watershed. Focus studies on the relationship between surface water and groundwater resources. Camp Roberts should allow collection of water samples on Camp Roberts by other agencies, if needed.

Issues WQQ-2 Groundwater Supply Planning Must be Coordinated to Ensure Viable Water Resources

Groundwater supply is of great concern for San Luis Obispo and Monterey Counties. The increases in well drilling for development— residential, commercial, and agriculture—causes more concern in maintaining adequate levels of the Paso Robles Groundwater Basin. Camp Roberts is a minimal user of the Basin, but development must be strategically planned to avoid unnecessary draws on the Basin.

Strategy WQQ-2A Water Resource Planning

Coordinate with local, regional and state water supply providers and permitting agencies to ensure continued availability of adequate potable water supplies. Identify primary users and anticipated needs through a future time period. Develop plans to sustain and manage water resources more efficiently and update plans regularly.

Issues WQQ-3 Inadequate Availability of Alternative Water Resources for Emergency Situations

Several attempts have been made by surrounding communities to Camp Roberts and other agencies to develop an agreement for a redundant water supply resource, including off-stream reservoirs. Camp Roberts is positioned as an emergency response center for local disasters / emergencies.

Strategy WQQ-3A Emergency Water Source for Heritage Ranch

The Heritage Ranch Community Service District should continue to work on the evaluation of alternatives to solve their emergency water needs. Solutions should not impact the water supply needed to continue operations at Camp Roberts, but Camp Roberts and others with water rights in the area should keep an open dialogue for assessment of new ideas.

Strategy WQQ-3B Regional Coordination

Coordinate with local, regional and state water supply providers and permitting agencies to ensure continued availability of adequate potable water supplies in emergency situations.

Strategy WQQ-3C Emergency Planning

Identify infrastructure improvements, such as interconnectivity, redundancy, and shared reserves, to ensure availability during emergency situations.

Study Background

In May 2013, the County of San Luis Obispo in partnership with Monterey County, the City of Paso Robles, and Camp Roberts completed the Joint Land Use Study, which included an Infrastructure Extensions strategy that recommends regional coordination on plans for infrastructure improvements to avoid overlap and duplication of services. Consistent with this recommendation, the County has secured a grant from the United States Department of Defense Office of Economic Adjustment to assess opportunities for a regional wastewater facility to serve Camp Roberts and the surrounding communities of San Miguel and Heritage Ranch – all of which are in need of wastewater treatment plant (WWTP) upgrades or expansions. In addition, wastewater treatment options could contribute toward addressing regional water supply challenges, Camp Roberts alternative water sources in emergency situations, and Camp Roberts surface water contamination concerns.

The ultimate goal of this study is to assess the ability of a regional wastewater facility to meet multi-agency objectives and assess stakeholder interests in pursuing a full regional wastewater treatment facility feasibility study.

Study Schedule

Task	Jan	Feb	Mar	Apr	May	Jun
1. Identification and Coordination with the Stakeholders [County]						
2. Collection of Existing Information and System Requirements [County]						
3. Develop Long Term Needs Assessment and Solution Alternatives [RMC]						
4. Prepare and Distribute Meeting Materials [RMC]						
5. Conduct Stakeholder Meeting and Provide Meeting Minutes [RMC]						
6. Draft Follow-up Report and Distribute for Comments [RMC]						
7. Stakeholders Comments, Final Report and Recommendations [RMC]						
8. Initial Memorandum of Understanding [County]						
9. Scope of Services Development [County]						

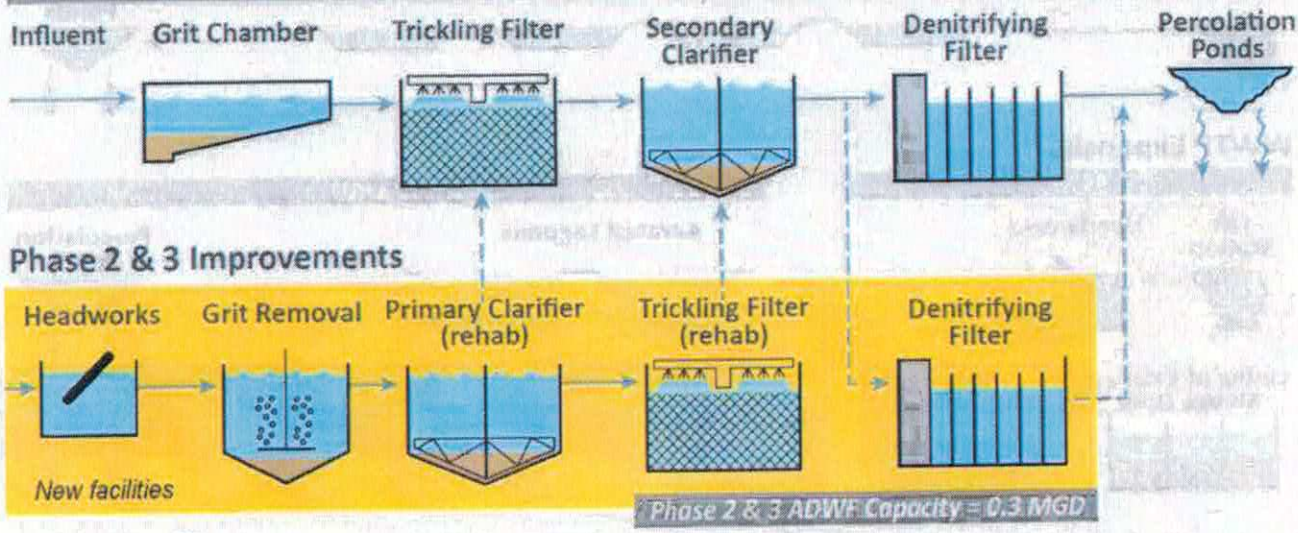
Existing Permit Limits

Constituent	BOD	TSS	TDS	Nitrate	Total Nitrogen	Notes
Units	mg/L	mg/L	mg/L	mg/L as N		
Camp Roberts WWTP	30*	30*	1,250	--	10	*90 mg/L under emergency circumstances Nitrogen limit added in 2014 permit update resulted in the addition of a denitrification process
HRCSD WWTP	30	30	--	8	--	Existing NPDES permit is from 2011. New NPDES permit anticipated in 2016.
SMCSD WWTP	--	--	--	--	--	Existing WDR permit is 15 years old. Anticipating BOD and TSS limits of 60 mg/L; no nutrient limits
Regional Camp Roberts WWTP	Assumed to be the same as existing the Camp Roberts permit					

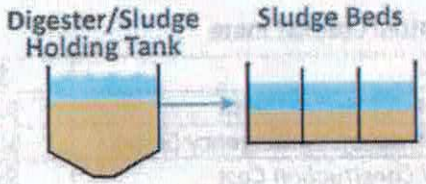
Camp Roberts Main Garrison WWTP

Existing WWTP (includes Phase 1 improvements)

Existing ADWF Capacity = 0.15 MGD (Trickling Filters and Denitrifying Filter)
Emergency Conditions Capacity = 2.0 MGD (All other processes)

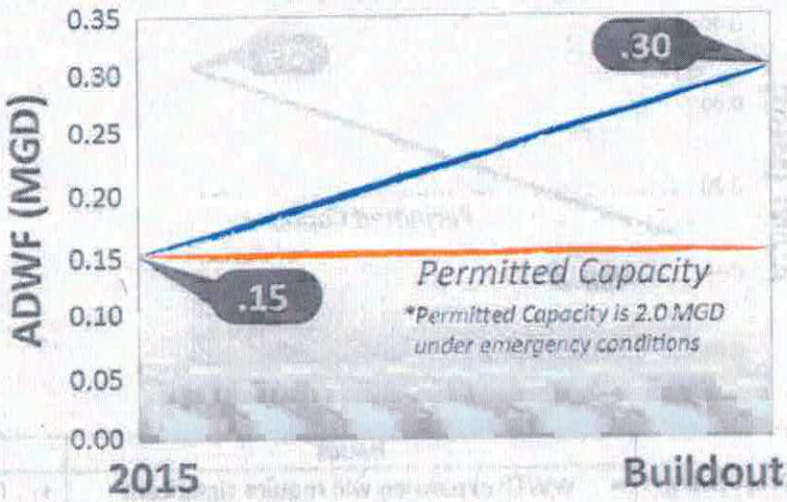


Solids Handling



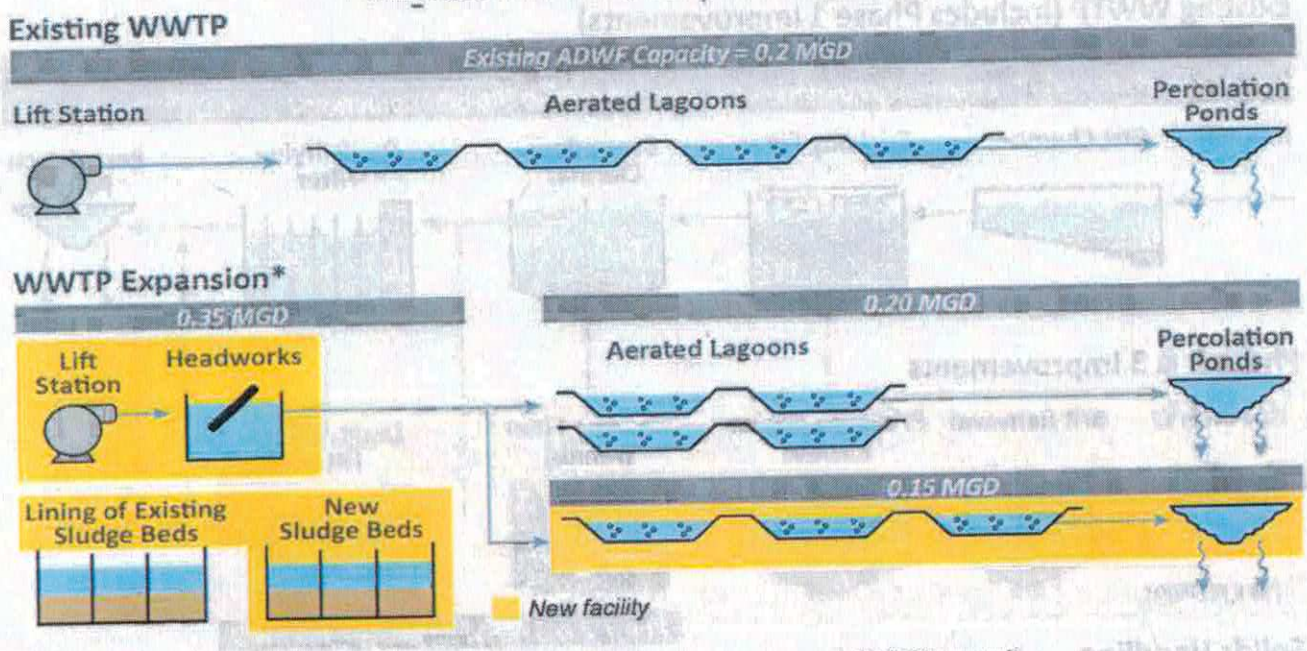
Item	$M
Raw Construction Cost	$2.1
Construction Contingency (35%)	$0.8
Total Construction Cost	*$2.9*
Implementation Costs (25%)	$0.7
Total Capital Cost	**$3.5**
Annual O&M	$0.2
O&M Present Value (1.5%, 20 yrs)	**$3.6**
Total Present Value	**$7.2**
PV +100% Construction Cost	$10.1
PV -50% Construction Cost	$5.8

Camp Roberts WWTP Flow Projections



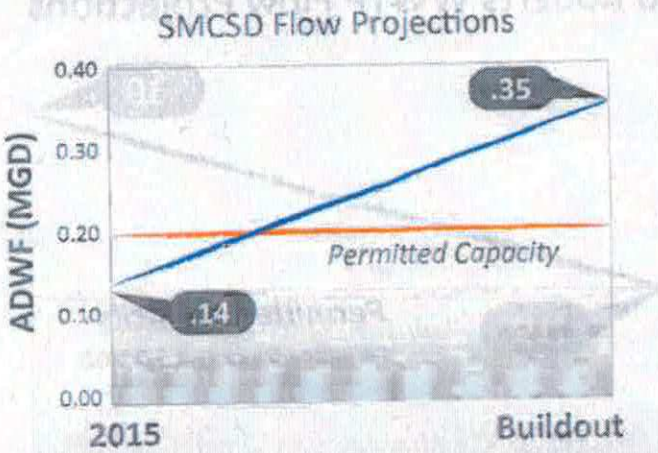
	Issues	Opportunities
Wastewater	• Need to rehabilitate aging infrastructure • New total nitrogen limit of 10 mg/L • Completing Phase 1 improvements ($5M) • Plans for Phase 2 & 3 improvements ($3M) • Three design flows (normal, training, and emergency) results in challenging operations	• Existing clarifiers, percolation ponds, and sludge beds have capacity for projected regional flows • Increased sludge production through higher flows in a regional WWTP flows could allow for proper functioning of digesters, which could be used as a renewable energy source
Water Supply	• Supplied solely by Paso Robles GW Basin • No alternative water supply	• Supply diversity could enhance reliability
Recycled Water	• No apparent demand	• Serve as in lieu recharge of Paso Robles GW Basin

San Miguel Community Services District (SMCSD)



*Key assumption for WWTP expansion facilities is no nutrient limits in a new RWQCB permit

Flow Projections



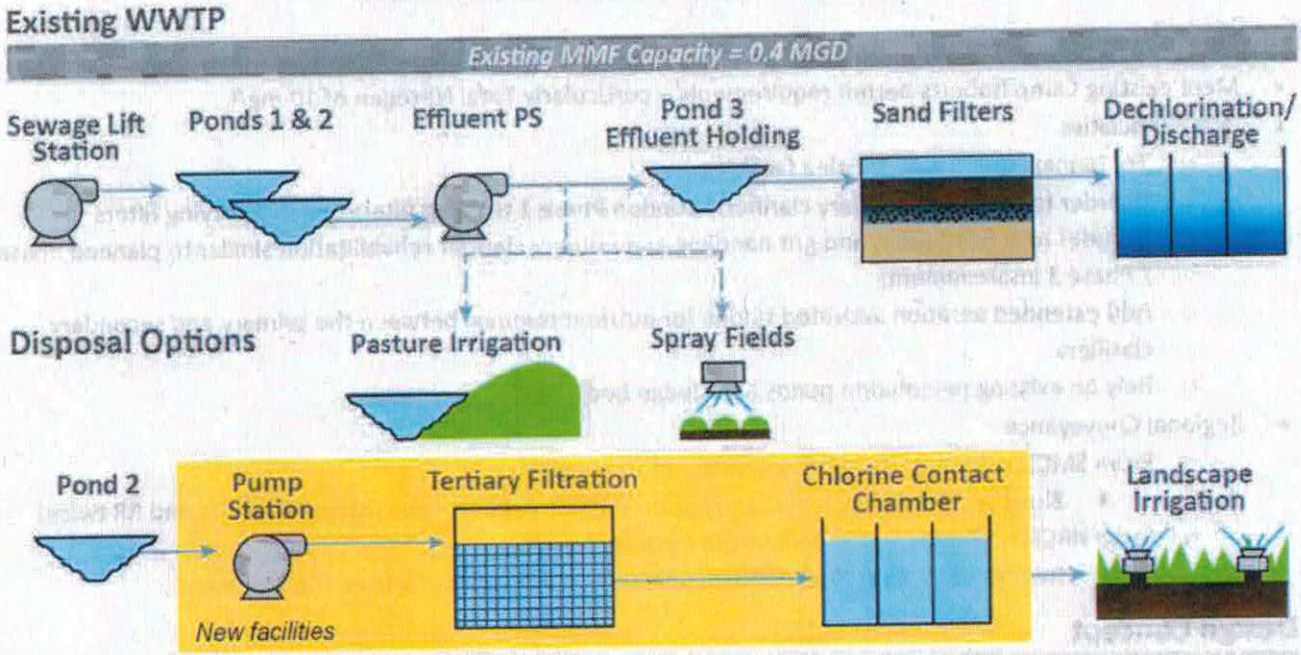
Conceptual Cost Estimate

Item	$M
Raw Construction Cost	$2.6
Construction Contingency (35%)	$0.9
Total Construction Cost	*$3.5*
Implementation Costs (25%)	$0.9
Land Purchase	$0.5
Total Capital Cost	**$4.9**
Annual O&M	$0.4
O&M Present Value (1.5%, 20 yrs)	**$6.8**
Total Present Value	**$11.8**
PV +100% Construction Cost	$16.7
PV -50% Construction Cost	$9.3

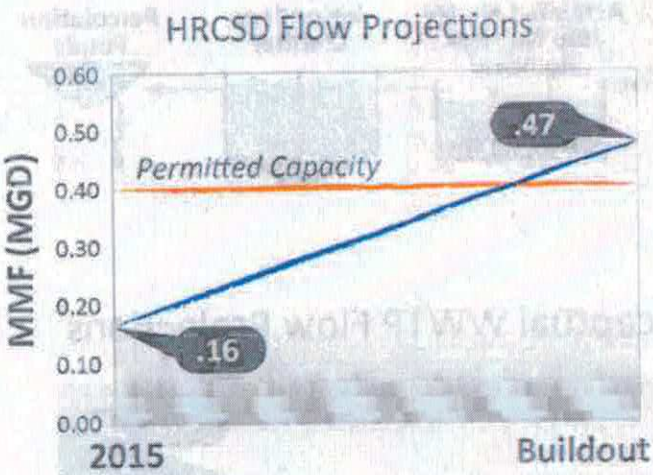
	Issues	Opportunities
Wastewater	• WWTP expansion will require significant capital investments • Uncertainty regarding future wastewater permit requirements – BOD, TSS, nutrients	• Percolation ponds recharge Salinas River alluvium
Water Supply	• Supplied solely by Paso Robles GW Basin • Existing water supply cannot meet future demand of 466 to 582 AFY in 2040 (per County's Master Water Report)	• Salinas River underflow is a potential short-term supplemental water strategy (Jan. 1 to May 14)[1] • Nacimiento Project water use is a long-term water strategy
Recycled Water	• Would require additional land acquisition for new treatment processes • Limited opportunities	• Would serve as in-lieu recharge of the Paso Robles Groundwater Basin • Local winery has inquired about recycled water

[1] SWCB Decision 1585 and Order WR 98-08 that the Salinas River underflow is fully appropriated between 5/15 and 12/31.

Heritage Ranch Community Services District (HRCSD)



Flow Projections



Conceptual Cost Estimate

Item	$M
Spray Fields	$xx
Pasture Irrigation	$xx
Landscape Irrigation	$3.3 to $7.1
Construction Cost (mid-point)	**$5.2**
Implementation Costs (25%)	$1.3
Total Capital Cost	**$6.5**
Annual O&M	$0.6
O&M Present Value (1.5%, 20 yrs)	**$10.8**
Total Present Value	**$17.3**
PV +100% Construction Cost	$23.8
PV -50% Construction Cost	$14.1

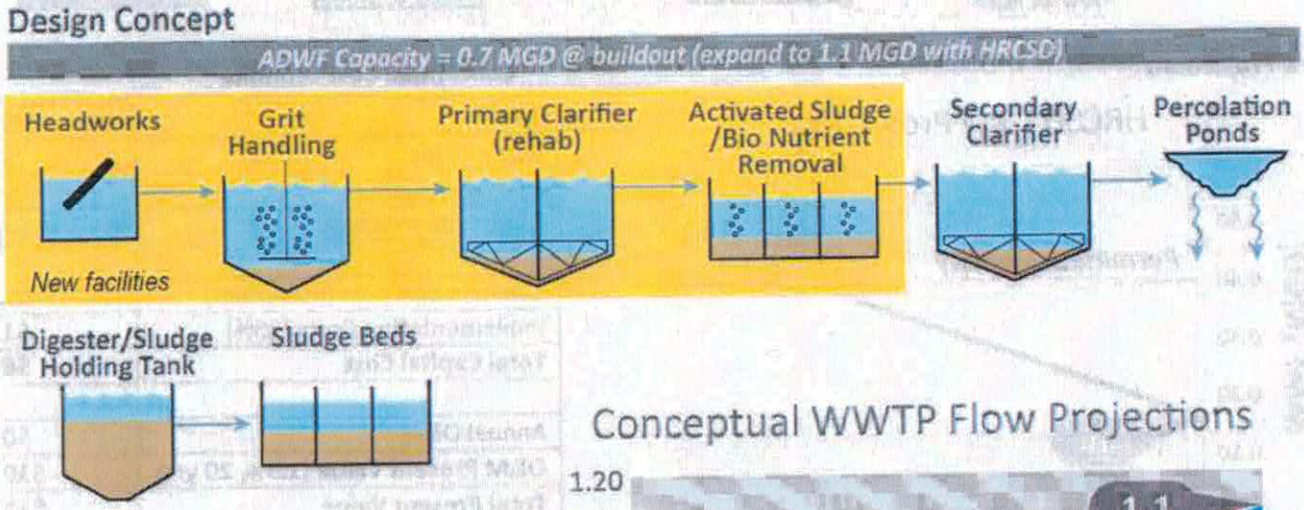
	Issues	Opportunities
Wastewater	• Would like to minimize discharges • Cost to implement discharge alternatives • Ongoing O&M costs • Uncertainty regarding future permit requirements	• Former percolation ponds approved for spray field operation to reduce discharges • Spray irrigation at fields adjacent to WWTP and horse pasture are potential alternatives to discharge (neither has been authorized)
Water Supply	• Supplied solely by Nacimiento Reservoir • No alternative water supply	• Sufficient Nacimiento water supply for buildout • Supply diversity could enhance reliability
Recycled Water	• Interest in recycled water anticipated to be limited • Requires significant capital investments	• Reduces potable demand potentially freeing supply for regional exchange • Reduces discharges

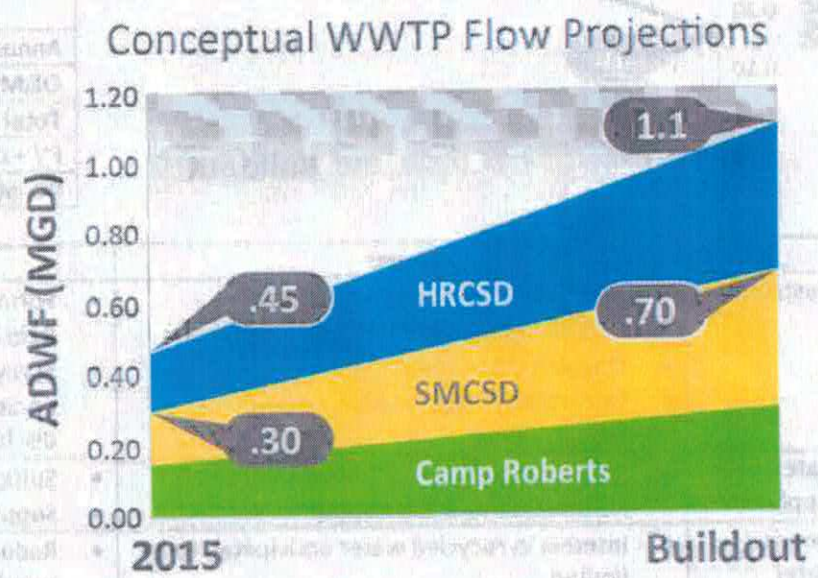
Conceptual Regional WWTP

Design Concept

- Meet existing Camp Roberts permit requirements – particularly Total Nitrogen of 10 mg/L
- WWTP Facilities
  - Try to maximize use of existing facilities
  - In order to use the secondary clarifier, abandon Phase 1 trickling filters and denitrifying filters
  - Includes new headworks and grit handling and primary clarifier rehabilitation similar to planned Phase 2 / Phase 3 improvements
  - Add extended aeration activated sludge for nutrient removal between the primary and secondary clarifiers
  - Rely on existing percolation ponds and sludge beds.
- Regional Conveyance
  - From SMCSD: 20,000 LF of 6" force main / gravity sewer
    - Short section through Big Sandy State Wildlife Area (in lieu crossing Hwy 101 and RR twice)
  - From HRCSD: 53,000 LF of 6" force main / gravity sewer
    - Requires 300 foot lift assuming ephemeral creek cannot be used for alignment

Design Concept





Conceptual Regional WWTP
(continued)

Conceptual Cost Estimate

The first hurdle for a feasible regional WWTP is to have a lower present value cost of each agency pursuing improvements at each indivdual WWTP.

Item	Camp + SMCSD			Camp + SMCSD + HRCSD	
	Individual ($M)	Regional ($M)		Individual ($M)	Regional ($M)
Raw Construction Cost	$4.7	$5.9		$8.6	$14.6
Construction Contingency (35%)	$1.7	$2.0		$3.0	$5.1
Total Construction Cost	*$6.4*	*$7.9*		*$11.6*	*$19.7*
Implementation Costs (25%)	$1.6	$2.0		$2.9	$5.0
Land Purchase	$0.5	--		$0.5	--
Total Capital Cost	**$8.5**	**$9.9**		**$14.5**	**$24.6**
Annual O&M	$0.6	$0.6		$1.2	$0.8
O&M Present Value (1.5%, 20 yrs)	**$10.5**	**$10.3**		**$21.3**	**$13.7**
Total Present Value	**$19.0**	**$20.2**		**$35.8**	**$38.4**
PV +100% Construction Cost	$27.5	$30.1		$50.3	$63.0
PV -50% Construction Cost	$14.8	$15.3		$28.6	$26.1

Notes:

1. Association for the Advancement of Cost Engineering International Class 1 (rough order-of-magnitude) cost estimate. Typically used for market studies, assessment of viability, alternative schemes, project screening, budgeting and long-range capital planning. Accuracy: Low side: -20% to -50%; High side: +30% to +100%.
2. Refer to separate packet of cost estimate details for additional information.

	Pros	Cons
Overall	• Consolidate WWTP operation and administration costs at one site • Avoid capital investments at individual plants • Existing clarifiers, percolation ponds, and sludge beds have capacity for projected regional flows	• Institutional agreements • Institutional collaboration
Camp Roberts	• Avoid investment in Phase 2 & 3 improvements (~$3M) • Opportunity to improve challenging operations from three design flows (normal, training, and emergency) • Reduces O&M costs	• Rehabilitated trickling filter and new denitrifying filter would likely be abandoned
HRCSD	• Addresses disposal issue / costs • Reduces O&M costs	• Higher initial capital cost • Potentially higher present value cost
SMCSD	• Addresses expansion issue / costs • Reduces O&M costs • Avoids additional costs if nutrient limits are included in new RWQCB permit	• Higher initial capital cost • Potentially higher present value cost

Project: Camp Roberts Regional WWTP Assessment

Component: Cost Summary

Date: 3/4/2016

Estimate Type: Conceptual
Accuracy Range: +100% /-50%

Project No.: 0034-013
Prepared By: RMC

		Camp Roberts Expansion (Phases 2 & 3)	SMCSD Expansion	Camp Roberts + SMCSD Individual WWTPs	Camp Roberts + SMCSD Regional WWTP	HRCSD Disposal Options	Camp Roberts + SMCSD + HRCSD Individual WWTPs	Camp Roberts + SMCSD + HRCSD Regional WWTP
			*See Note 1		*See Note 2			*See Note 2
Capital Cost								
Raw Construction Cost		$ 2,122,000	$ 2,608,667	$ 4,730,667	$ 5,860,000	$ 3,852,000	$ 8,582,667	$ 14,601,000
Construction Contingency	35%	$ 743,000	$ 913,000	$ 1,656,000	$ 2,051,000	$ 1,348,000	$ 3,004,000	$ 5,110,000
Construction Cost Total		**$ 2,865,000**	**$ 3,522,000**	**$ 6,387,000**	**$ 7,911,000**	**$ 5,200,000**	**$ 11,587,000**	**$ 19,711,000**
Implementation Cost	25%	$ 716,000	$ 881,000	$ 1,597,000	$ 1,978,000	$ 1,300,000	$ 2,897,000	$ 4,928,000
Land Purchase			$ 500,000	$ 500,000			$ 500,000	
Total Capital Cost		**$ 3,581,000**	**$ 4,903,000**	**$ 8,484,000**	**$ 9,889,000**	**$ 6,500,000**	**$ 14,484,000**	**$ 24,639,000**
+100% Construction Cost		$ 6,400,000	$ 8,400,000	$ 14,900,000	$ 17,800,000	$ 11,700,000	$ 26,100,000	$ 44,400,000
-50% Construction Cost		$ 2,100,000	$ 3,100,000	$ 5,300,000	$ 5,900,000	$ 3,900,000	$ 8,700,000	$ 14,800,000
O&M Cost (see Note 3)								
Labor		$ 105,000			$ 200,000	$ 200,000		$ 300,000
Non-Labor		$ 105,000			$ 400,000	$ 430,000		$ 500,000
Total		**$ 210,000**	**$ 400,000**	**$ 610,000**	**$ 600,000**	**$ 630,000**	**$ 1,240,000**	**$ 800,000**
Present Value of O&M		**$ 3,605,000**	**$ 6,867,000**	**$ 10,473,000**	**$ 10,301,000**	**$ 10,816,000**	**$ 21,289,000**	**$ 13,735,000**
PV Rate	1.5%							
PV Years	20	*PV rate and years from Camp Roberts report*						
Total Present Value		**$ 7,200,000**	**$ 11,800,000**	**$ 19,000,000**	**$ 20,200,000**	**$ 17,300,000**	**$ 35,800,000**	**$ 38,400,000**
+100% Construction Cost		$ 10,100,000	$ 16,700,000	$ 27,500,000	$ 30,100,000	$ 23,800,000	$ 50,300,000	$ 63,000,000
-50% Construction Cost		$ 5,800,000	$ 9,300,000	$ 14,800,000	$ 15,300,000	$ 14,100,000	$ 28,600,000	$ 26,100,000

Notes:

1. SMCSD WWTP expansion treatment assumes no nitrogen or nitrate permit limits.
2. Regional WWTP treatment assumes Total Nitrogen limit of 10 mg/L, which is the existing Camp Roberts permit limit.
3. O&M cost sources: 1) Camp Roberts from 2012 Evaluation Design Report; 2) SMCSD from previous 3 fiscal years; 3) HRCSD from previous fiscal year.

Project: Camp Roberts Regional WWTP Assessment

Component: Raw Unit Costs

Date: 3/4/2016

Project No.: 0034-013

Prepared By: RMC

Estimate Type: Conceptual

ENR Construction Cost Index - 20 Cities Ave	10182	Feb-16

Item	Size	Unit	Reference Cost: Reference Cost	Reference Cost: CCI Month-Year	Reference Cost: CCI, 20 Cities Ave	Unit	Adjusted Unit Cost	Reference
Piping								
6-in Pressure Pipe, Open Cut, Paved						LF	$ 130	RRWSP, Los Olivos
6-in Pressure Pipe, Open Cut, Unpaved						LF	$ 100	RRWSP, Los Olivos
Trenchless						LF	$ 750	Recent bid results
Treatment								
Headworks	0.3	MGD	$ 285,000	Mar-12	9268	MGD	$ 1,040,000	Camp Roberts
Surface Aerator	1	EA	$ 33,000	Mar-12	9268	EA	$ 40,000	Camp Roberts
Activated Sludge	3	MGD	$ 9,789,000	Jan-15	10182	EA	$ 3,260,000	RMC
Filtration	0.46	MGD	$ 197,000	Jan-12	9176	MGD	$ 480,000	Los Olivos
Disinfection	0.46	MGD	$ 206,000	Jan-12	9176	MGD	$ 500,000	Los Olivos
Ponds								
Site Work, Earthwork		All soils to remain on-site				CY	$ 20.00	Compiled
Pond Poly Liner						SF	$ 2.00	Camp Roberts
Division 15 - Mechanical								
Lift Station	*PS Project Cost ($) = HP x 17437 x HP^(-0.46) x (CCI / 4500)*							Sanks, 2008
Pump Station	*PS Project Cost ($) = 3.12 x 10^(0.7583*log(Q)+3.1951) x (CCI / 4500)*							Sanks, 2008
	Q = Flow rate in gallons per minute (gpm); Maximum flow rate							

References

Camp Roberts	Evaluation Design Repair of Wastewater Treatment Plants at Camp Roberts, California (March 2012)
Heritage Ranch	HRCSD Recycled Water Study, Administrative Draft (January 2016)
Los Olivos	Los Olivos Wastewater System Preliminary Engineering Report (January 2013)
RMC	Recent compilation of secondary treatment processes bid results and cost estimates
RRWSP	San Luis Obispo County Regional Recycled Water Strategic Plan (November 2014)
Sanks	Pumping Station Design, 3rd Edition (2008)

Project: **Camp Roberts Regional WWTP Assessment** Date: 3/4/2016

Component: **Camp Roberts Expansion (Phases 2 & 3)**

Estimate Type: Conceptual
Accuracy Range: +100% /-50%

Project No.: 0034-013
Prepared By: RMC

Category	Item	Item Size	Item Units	Quantity	Unit	Unit Cost	Total Cost	Source	Notes
Mobilization / Demobilization							$ 50,000	Camp Roberts	
Site Piping							$ 130,000	Camp Roberts	
Phase 2									
	Headworks			1	LS	$ 313,000	$ 313,000	Camp Roberts	
	Primary Clarifier Rehab			1	LS	$ 368,000	$ 368,000	Camp Roberts	
	Trickling Filter Rehab			1	LS	$ 549,000	$ 549,000	Camp Roberts	
	Denitrifying Filter			1	LS	$ 51,000	$ 51,000	Camp Roberts	
Phase 3									
	Denitrifying Filter			1	LS	$ 286,000	$ 286,000	Camp Roberts	
	Mechanical Surface Aerators			8	EA	$ 40,000	$ 320,000	Camp Roberts	
	Pump Pond Station			1	LS	$ 55,000	$ 55,000	Camp Roberts	

TOTAL RAW CONSTRUCTION COST	**$**	**2,122,000**
35% Contingency	$	743,000
TOTAL CONSTRUCTION COST	**$**	**2,865,000**
+100%	$	5,730,000
-50%	$	1,432,500

Project: Camp Roberts Regional WWTP Assessment

Component: SMCSD Expansion

Date: 3/4/2016

Estimate Type: Conceptual
Accuracy Range: +100% /-50%

Project No.: 0034-013
Prepared By: RMC

	Item Size	Item Units	Quantity	Unit	Unit Cost	Total Cost	Source	Notes
Mobilization / Demobilization						$ 50,000	Camp Roberts	
Site Piping						$ 50,000	Camp Roberts	
Influent Lift Station	1000	GPM	1	EA	$ 893,000	$ 893,000	Camp Roberts	
Headworks			0.35	MGD	$ 1,040,000	$ 364,000	Camp Roberts	
New Aerated Lagoons								
Site Work, Earthwork			20,000	CY	$ 20	$ 400,000	Compiled	150' x 150' x 8' (3)
Poly Lining			67,500	SF	$ 2.00	$ 135,000	Camp Roberts	150' x 150' (3)
Aerators			4	EA	$ 40,000	$ 160,000	Camp Roberts	
New Percolation Ponds								
Site Work, Earthwork			20,000	CY	$ 20	$ 400,000	Compiled	300' x 100' x 6' (3)
New Sludge Beds								
Site Work, Earthwork			3,333	CY	$ 20	$ 66,667	Compiled	150' x 150' x 4'
Poly Lining			22,500	SF	$ 2.00	$ 45,000	Camp Roberts	
Existing Sludge Beds, Poly Lining			22,500	SF	$ 2.00	$ 45,000	Camp Roberts	

TOTAL RAW CONSTRUCTION COST $ 2,608,667

35% Contingency $ 913,000

TOTAL CONSTRUCTION COST $ 3,522,000

+100% $ 7,044,000

-50% $ 1,761,000

Land Purchase $ 500,000

Project: Camp Roberts Regional WWTP Assessment
Component: Regional WWTP (Camp Roberts and SMCSD)

Date: 3/4/2016

Estimate Type: Conceptual
Accuracy Range: +100% /-50%

Project No.: 0034-013
Prepared by: RMC

Category / Item	Item Size	Item Units	Quantity	Unit	Unit Cost	Total Cost	Source	Notes
SMCSD Conveyance								
Force Main / Gravity Pipe, Open Trench	6	IN	20000	LF	$ 100	$ 2,000,000	RRWSP, Los Olivos	
Lift Station	1000	GPM	1	EA	$ 282,000	$ 282,000	Sanks, 2008	
					Subtotal	**$ 2,282,000**		
Regional WWTP								
Mobilization / Demobilization						$ 100,000		
Site Work						$ 100,000		
Headworks / Screeing / Grit Handling			0.7	MGD	$ 1,040,000	$ 728,000	Camp Roberts	
Primary Clarifier Rehab			1	LS	$ 368,000	$ 368,000	Camp Roberts	
Activated Sludge			0.7	MGD	$ 3,260,000	$ 2,282,000	RMC	
					Subtotal	**$ 3,578,000**		

TOTAL RAW CONSTRUCTION COST	**$**	**5,860,000**
35% Contingency	$	2,051,000
TOTAL CONSTRUCTION COST	**$**	**7,911,000**
+100%	$	15,822,000
-50%	$	3,955,500

Project: Camp Roberts Regional WWTP Assessment

Component: Regional WWTP (Camp Roberts, SMCSD and HRCSD)

Date: 3/4/2016

Estimate Type: Conceptual

Accuracy Range: +100% /-50%

Project No.: 0034-013

Prepared By: RMC

Category	Item	Item Size	Item Units	Quantity	Unit	Unit Cost	Total Cost	Source	Notes
SMCSD Conveyance									
Force Main / Gravity Pipe	Open Trench	6	IN	20000	LF	$ 100	$ 2,000,000	RRWSP, Los Olivos	
Lift Station	30' Head	1000	GPM	1	EA	$ 282,000	$ 282,000	Sanks, 2008	
						Subtotal	**$ 2,282,000**		
HRCSD Conveyance									
Force Main / Gravity Pipe	Open Trench	6	IN	53000	LF	$ 100	$ 5,300,000	RRWSP, Los Olivos	
	Crossing under US-101 and RR	6	IN	600	LF	$ 750	$ 450,000	Recent bid results	
Lift Station	300' Head	1400	GPM	1	EA	$ 1,271,000	$ 1,271,000	Formula	
						Subtotal	**$ 7,021,000**		
Regional WWTP									
Mobilization / Demobilization							$ 100,000		
Site Work							$ 100,000		
Headworks				1.1	MGD	$ 1,040,000	$ 1,144,000	Camp Roberts	
Primary Clarifier Rehab				1	LS	$ 368,000	$ 368,000	Camp Roberts	
Activated Sludge				1.1	MGD	$ 3,260,000	$ 3,586,000	RMC	
						Subtotal	**$ 5,298,000**		
						TOTAL RAW CONSTRUCTION COST	**$ 14,601,000**		
					35%	Contingency	$ 5,110,000		
						TOTAL CONSTRUCTION COST	**$ 19,711,000**		
						+100%	$ 39,422,000		
						-50%	$ 9,855,500		

Project: **Camp Roberts Regional WWTP Assessment** Date: 3/4/2016

Component: **SMCSD Recycled Water Facilities**

Estimate Type: Conceptual
Accuracy Range: +100% /-50%

Project No.: 0034-013
Prepared By: RMC

Category	Item	Item Size	Item Units	Quantity	Unit	Unit Cost	Total Cost	Source	Notes
Mobilization / Demobilization							$ 50,000		
Site Work							$ 50,000		
Tertiary Filtration				0.15	MGD	$ 480,000	$ 72,000	Los Olivos	
Disinfection				0.15	MGD	$ 500,000	$ 75,000	Los Olivos	
RW Pump Station		200	GPM	1	EA	$ 265,000	$ 265,000	Formula	
Conveyance Pipeline									
	Open Trench, Paved	6	IN	13200	LF	$ 130	$ 1,716,000	RRWSP, Los Olivos	
	Crossing under RR	6	IN	300	LF	$ 750	$ 225,000	Recent bid results	
	Crossing under US-101	6	IN	500	LF	$ 750	$ 375,000	Recent bid results	

TOTAL RAW CONSTRUCTION COST $ 2,728,000

35% Contingency $ 955,000
TOTAL CONSTRUCTION COST $ 3,683,000
+100% $ 7,366,000
-50% $ 1,841,500