Southern California
REGIONAL ENERGY NETWORK

Initial Measures List
June Lake Public Utilities District

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Project Summary

June Lake Public Utilities Department (June Lake PUD) enrolled in the Southern California Regional Energy Network (SoCalREN) on 09/15/2020 and AESC, Inc. (AESC) has been assigned to provide engineering and technical support services for the water and wastewater project. On 03/30/2021, engineers and process specialists from AESC visited the wastewater treatment plant (WWTP), two of the four water treatment plants (WTP), and two pump stations to gather information about operating strategies, equipment condition, reliability and maintenance challenges, and other site-specific data to inform the development of the following list of energy efficiency, process-based energy management, and other distributed energy resource strategies. The team deployed data loggers for four weeks throughout the district's facilities to develop a baseline energy model of energy demand and consumption during normal, routine operation of the facilities.

Audit Scope

WWTP Description

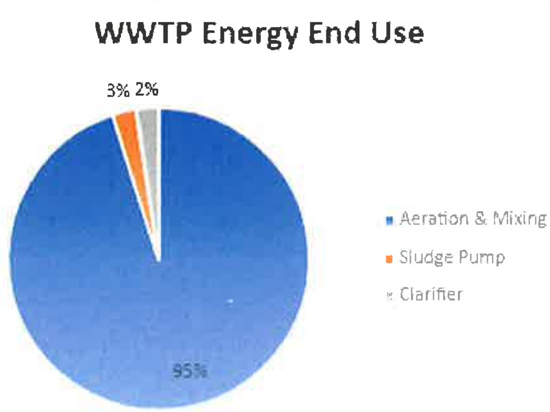
June Lake PUD operates a WWTP, four WTPs, and two sewage lift stations. The WWTP was constructed in 1974 and is designed to treat 1.0 million gallons per day (MGD) and currently treats an average daily flow (ADF) of 0.15 MGD. Flow varies between 0.08 MGD and 0.39 MGD between the winter and summer, respectively. Final effluent BOD concentrations are typically BOD_5<10 mg/L. The design characteristic and equipment at the site are listed below:

Description		Design	Actual
Wastewater Characteristics	Biological oxygen demand (BOD_5)	228 mg/L	395 mg/L
	Total Suspended Solids (TSS)	250-300 mg/L	-

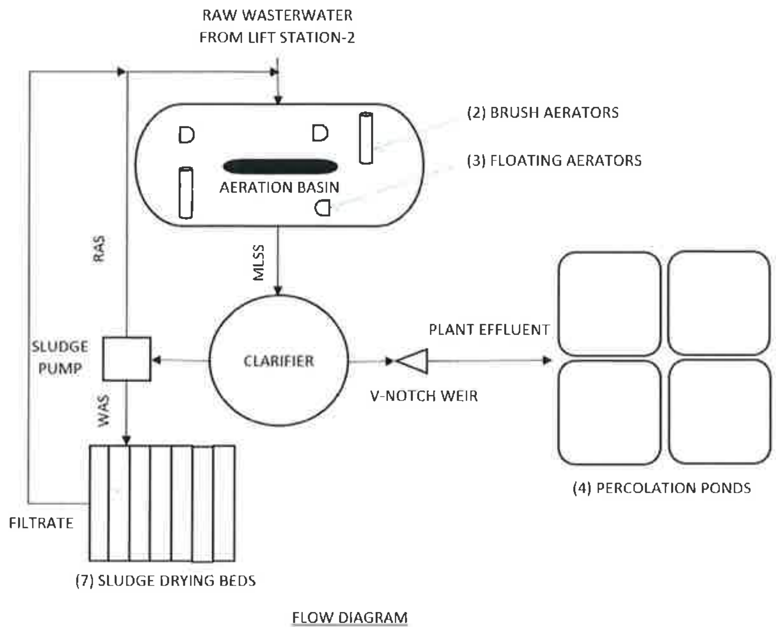
Equipment	No. of Units	Descriptions
Racetrack Aeration Basin	1	1.0 MGD race-track aeration basin with the submerged unscreened inlet. Mixed liquor suspended solids (MLSS) flow from the aeration basin through a screen to the primary clarifier.
Clarifier	1	The circular covered clarifier has a 0.75 HP electric motor-driven mechanical arm. A 0"-36" sludge blanket is maintained by manual inspection and a high blanket level triggers a manual wasting cycle to transfer settled sludge from the clarifier to the sludge pits.

Sludge Drying Bed (SDB)	7	There are (7) sludge drying beds where wasted activated sludge from the clarifier is dewatered. Dewatered sludge is removed from the drying beds by front-end loaders or backhoes and disposed of in a designated disposal area. SDBs are only useful in Spring thru Fall, with no underdrains or significant percolation.
Percolation Pond	4	Effluent flows through manually operated valves from the clarifier and is being used as sludge drying beds. One pond is usually used at a time.
Brush Aerator	2	Aeration is achieved with two (2) original to plant identical rotary brush aerators driven by a constant speed of 50 HP standard efficiency electric motors. Usually, one brush aerator (West side) and two floating aerators run year-round. The West brush aerator was found in fair condition and East brush aerator was found with missing brushes.
Floating Aerator	3	Post-design identical floating aerators (submerged turbine) driven by constant speed 25 HP standard efficiency electric motors.
Sludge Pump	1	A timer controlled and manually operated at 695 GPM at 40 feet TDH sludge pump driven by 10 HP 87% efficiency electric motor pumps return activated sludge (RAS) to aeration basin or wasted activated sludge (WAS) to SDB or percolation pond.
V Notch Weir	1	Effluent flows from the clarifier to one of the percolation ponds by gravity thru a V-notch weir, and the direction of flow is controlled by manually operated valves.

There is no emergency backup power generation present in this plant. During the inspection, the plant was shut down due to SCE power line maintenance activities.



Energy End-Use Breakdown of WWTP



WWTP Process Flow

WW Lift Station-1

Two (2) 650 GPM at 45 feet TDH (Fairbanks Morse) vertical end-suction pumps driven by 15 HP standard efficiency (Westinghouse) electric motors with variable speed drives (VSD) operate on wet well level by a level controller in a lead-standby sequence and cycles manually every week.

The pump station is in a busy neighborhood without any odor complaints. Wet well is cleaned yearly by using a vac-truck. There is a 60-kW emergency diesel Genset with a 1.5 kW thermostat-controlled coolant heater.

During the inspection, pump-1 was running at 41.05 Hz and the station had 68 GPM flow rate.

WW Lift Station-2

Three (3) 840 GPM at 106 feet TDH (Deming) vertical end-suction pumps driven by 40 HP standard efficiency (GE) electric motors with VSDs operate on wet well level by a level controller in a lead-lag-standby sequence and cycles manually after every three days. Pump-1 is equipped with a VSD and Pump-2 & 3 share one VSD. Two pumps can run simultaneously if needed.

The pump station is in a busy neighborhood without any odor complaints. Wet well is cleaned yearly by using a vac-truck. There is a 175-kW emergency diesel Genset with a 1.8 kW thermostat-controlled coolant heater.

During the inspection, pump-1 was running at 31.5 Hz and the station had 110 GPM flow rate.

Water Treatment Plant (WTP)

June Lake Public Utilities District depends on snow meltwater from the peak of the mountains as a resource of potable water. JLPUD has four WTP of which two were visited during the inspection. Snow Creek WTP is an unmanned, automated, gravity-fed sand filtration plant with a 100 PSIG or 230 ft head and a 48 ft high 354,000 gallons storage tank.

June Lake WTP is located on the shore of June Lake with an ion exchange plant (renovated in 2004) and a uranium treatment plant. Both plants were constructed to supply potable water from June Lake during the summer, the season when high turbidity is observed in gravity-fed plants. Both of the plants have not been in use in recent years due to the low water level in the lake and an increased required net positive suction head ($NPSH_R$) for the pump.

Data logging

Power data was logged for 4 weeks. The equipment monitored included: brush aerators, floating aerators, sludge pump, clarifier drive at the WWTP and lift pumps at the lift pump station 1. Motor ON-OFF data was logged for 3 pumps at pump station-2 for 4 weeks and amperes were measured during the inspection. At the WWTP, according to logged data, one of the brush aerators (West) operates 81% of the logged time, floating aerator-1 operates 19% of the logged time, and floating aerator-2 operates 25% of the logged time. The sludge pump was not found to be in operation during the logging period. The clarifier drive motor ran constantly during the logging time.

At wastewater lift pump station-1 (WWLPS-1), motor ON-OFF data were logged for Pump-1 and 2 for 4 weeks. Logged data of Pump-1 showed that the pump was ON for 43% of the logged time. Pump-2 logger did not log any data. By examining pump station log sheets, it is assumed that pump-1 and 2 each operates approximately 48% of the time. During the inspection, pump-1 was running at 41.05 Hz, consuming 8 HP and the station had a flow rate of 68 GPM. This implies that the pumps are operating with VSD at a lower speed with a very low pumping efficiency.

In WWLPS-2 each of the pumps 1, 2, and 3 were found to be cycled manually for approximately 33% of the logged time and operated 20% of the logged time. During the inspection, pump-1 was running at 31.5 Hz, consuming 19 HP and the station had 110 GPM flow rate. Logged data shows that pumps 1, 2, and 3 are running approximately just over 50% of rated speed (30~35 Hz) consuming less energy than theoretical energy and pumping 25% of pump design flowrate. It implies that the pumps are operating with VSD at a lower speed but also with a very low pumping efficiency.

Energy Savings Measures

The table(s) below contain high-level estimates of energy savings, costs, and utility incentives for the measures identified during the site audit conducted at June Lake Public Utility District. Your SoCalREN Project Manager will review these measures on potential incentives and/or technical support programs that may be provided via Agency Services Plans.

WWTP measures are presented first, followed by WWLPS and WTPs. Energy/Demand savings of each EEM should be considered as independent and mutually exclusive. The final savings amount can be found after the selection of measures and deducting common savings. For the WWTP, the measures are listed in the order that AESC recommends they are to be implemented for a variety of reasons, including, process efficacy and economic feasibility reasons.

June Lake Public Utilities District	Potential for NMEC Approach?	No

WWTP Measures

EEM #	Energy Efficiency Measure	Electric Energy Savings (kWh/yr)	Electric Demand Savings (kW/yr)	Electric Cost Savings ($/yr)	Gross Project Cost	Simple Payback Period (yrs)	Estimated Incentive ($)	Standard IOU Incentive Program
1	Partition existing aeration basin in 4 equal quarters with inter-connections	0	0.0	$0	$55,005	0.0	$0	No Incentive
2	Install bar screen and grit chamber	10,595	0.0	$1,483	$50,000	33.7	$0	No Incentive
3	Install LBM in the aeration basin	26,489	5.0	$3,707	$90,398	23.3	$3,932	SCE Custom
4	Install fine bubble aeration	79,449	15.1	$11,120	$170,000	14.2	$11,795	SCE Custom
5	Install ammonia-based controls on wastewater blower	31,786	6.0	$4,449	$10,344	1.3	$4,719	SCE Custom
6	Install sludge blanket sensor to operate sludge pump	3,824	0.0	$535	$6,836	11.9	$459	SCE Custom
7	Install positive dewatering system	-2,190	-1.5	-$307	$20,000	0.0	$0	No Incentive
	TOTALS	**149,953**	**25**	**$20,988**	**$402,583**	**18.2**	**$20,904**	

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WWLPS and WTP Measures

#1

EEM #	Energy Efficiency Measure	Electric Energy Savings (kWh/yr)	Electric Demand Savings (kW/yr)	Electric Cost Savings ($/yr)	Gross Project Cost	Simple Payback Period (yrs)	Estimated Incentive ($)	Standard IOU Incentive Program
8	Overhaul pumps of lift stations	64,088	4.4	$8,970	$52,500	5.4	$4,507	BRO
9	Introduce in-pipe treatment at lift pump stations	10,595	0.0	$1,483	$20,000	12.6	$1,271	SCE Custom
10	Install Premium Efficient Motors	14,306	1.41	$2,002	$19,383	8.7	$1,928	SCE Custom
11	Interior LED Lighting retrofits	1,113	1.2	$156	$8,157	52.4	$0	No Incentive
12	Relocate Ion Exchange WTP and Uranium TP	0	0	$0	$0	0.0	$0	No Incentive
	TOTALS	**90,103**	**7**	**$12,611**	**$100,040**	**7.3**	**$7,707**	

DER Measures

DER #	DER Measure	EUL (yrs)	Electric Energy Savings (kWh/yr)	Electric Demand Savings (kW/yr)	Total Cost Savings ($)	Gross Project Cost ($)	Estimated Incentive ($)
1-DER	Solar PV System for WWTP	25	218,675	0.0	30,606	300,000	SGIP
2-DER	Energy Storage System for WWTP	10	-	-	-	417,600	SGIP
	TOTALS		**218,675**	**0.0**	**30,606**	**717,600**	

Estimated Cost of Delay: **$5,350** per month **$64,204** per year

Findings and Recommendations:

Energy Efficiency Measures (EEMs)

JLPUD WWTP is a mechanically simple plant with one aeration basin, one clarifier, SDBs, and percolation ponds with 100% manual control and operation, with minimal monitoring equipment. This plant has a much higher design volume and capacity than the present operating volume or ADF. The plant is 85% larger on an average capacity and 60% larger as compared to yearly high demand. In other words, the plant is using 15% of design capacity on average and 40% of design capacity during high demand. The following measures are recommended for further consideration, evaluation, and potential implementation:

EEM-1: Partition existing aeration basin in four (4) equal quarters with interconnections

Existing Conditions
The existing race track oxidation basin was designed with surface aeration technology for 1 MGD flow capacity at 5.5 feet depth. Storage volume is 1.58 MG with 8.7 feet depth. The plant is historically operating at between 15% and 40% of the design flow rate and occasionally will receive even less during low flow periods. To reach the height of the brush aerators, the basin needs to maintain a longer retention time that leads to wasted aeration energy usage. Three (3) submerged turbine floating aerators were added later to handle the flow patterns during the low flow months when the brush aerators cannot effectively operate.

Potential Measure(s)
Recent wastewater treatment technology prescribes treating in smaller volume batches to reduce the energy intensity and to reduce process-related costs. It is suggested that the start point for renovating this plant process should be partitioning the racetrack into four (4) equal interconnected basins. The construction cost will be realized in the following EEMs. Comparing the cost of constructing new aeration basins, if properly implemented this measure could save the district from high capital expenditure.

Calculations
Savings for this measure are realized in EEM-2, 3, and 4. A custom spreadsheet is used for savings calculations.

Cost
The cost has been estimated using RS Means.

EEM-2: Install bar screen and grit chamber

Existing Conditions
At present, there is no headworks at the WWTP. There is one screen between the aeration basin and the clarifier. Influent comes directly to the aeration basin. Large debris easily enters the aeration basin increasing sedimentation, septic condition, mechanical failure of aerators, and basin maintenance and costs.

Potential Measure(s)
Installing a bar screen and grit chamber will reduce sedimentation, septic condition, failure of mechanical drives, fouling of diffuser nozzles (of fine bubble aeration), fouling of bubble-forming plates (of LBM), frequency of maintenance and cleaning; increases aeration efficiency, and reduces costs. Assuming 75% of surface

aeration energy contributes to aeration and 25% contributes to mixing, savings for this measure are estimated to reduce approximately 5% of existing aeration energy consumption.

Calculations
A custom spreadsheet is used for baseline calculations. Expected savings is 5% of current aeration & mixing energy.

Cost
The cost has been estimated from a similar project.

EEM-3, EEM-4, and EEM-5 collectively propose to replace existing surface aeration and mixing technology with large bubble mixing, fine bubble aeration, and ammonia-based aeration control technology. These three measures are complementary to each other and must be implemented in conjunction with each other to achieve the benefits described in this report.

EEM-3: Install LBM in aeration basin eliminating brush aerators and floating aerators

Existing Conditions
The existing race-track aeration basin was designed with surface aeration technology. It has (2) 50HP brush aerators and (3) 25 HP submerged turbine aerators. The brush aerators have already exceeded the estimated EUL of 15 years. Aeration energy is about 9587% of the site's energy. The East brush aerator is out of service due to missing brushes. The West brush aerator is being used during the summer and high BOD load conditions arising from the local brewery. At least two floating aerators run constantly.

Surface and submerged aerators provide mixing of influent contents and aeration simultaneously at the cost of high energy. Surface aerators provide mixing by agitating influent in contact which may not reach the sedimented solids at the bottom of the tank and far end corners. Submerged aerators are also stationary and provide mixing to a certain area. Surface aeration renders adverse deposition of solids at the basin floor, edges and corners, increase the risk of a septic condition, increases the frequency and cost of cleaning the aeration basin.

Potential Measure(s)
At present more energy-efficient mixing technologies are available and are in use throughout the WWTP industry. . The energy used in creating the large bubble will be transferred to kinetic energy during the bubble rise, moving water and contents. The energy available to a specific bubble is proportional to the cube of the bubble radius. So, all of the bubbles' energy will be converted into mixing energy. LBM eliminates septic conditions related to sedimentation and stratification in the oxidation basin as well as provides mixing energy for additives. LBM is less energy-intensive, maintenance-friendly, and provides enhanced BOD removal. The existing site is designed for a total biological oxygen demand of 5,354 lbs O_2/day and an actual average of 982 lbs O_2/day. Assuming 25% of surface aeration energy is used for mixing, LBM could reduce the mixing energy of the system by 50%.

This measure requires the installation of floor-mounted stainless steel bubble-forming plates with patented orifice, air distribution grid, airflow, and pulse controllers, to be coupled with DO and NHx sensors as well as a compressed air system, included in the package.

Calculations

A custom spreadsheet is used for baseline calculations. Assuming 75% of surface aeration energy contributes to aeration and 25% contributes to mixing. The expected savings is 12.5% of current aeration & mixing energy.

Cost
The cost has been calculated based on an engineering estimate from Pulsed Hydraulic, Inc.

EEM-4: Install fine bubble aeration and turbo blowers

Existing Conditions
The existing race-track aeration basin was designed with surface aeration technology. It has (2) 50HP brush aerators with a 1.3 lbO_2/hp.hr standard oxygen transfer efficiency (SOTE%) and (3) 25 HP submerged turbine aerators with 1.5 lbO_2/hp.hr SOTE%. The brush aerators have already exceeded the estimated EUL of 15 years. Aeration energy is about 95% of site energy. The East brush aerator is out of service as it has missing brushes. The West brush aerator is being used during the summer and during times when there is a high BOD load resulting from the local brewery. At least two floating aerators run constantly.

Potential Measure(s)
At present more energy-efficient aeration technologies are available and are in use throughout the WWTP industry. Fine bubble technology is a form of subsurface aeration that introduces air into water via very small (or fine) bubbles (<2mm in size). Thousands of fine bubbles promote the transfer of oxygen to water due to their collectively large surface area and low buoyancy, maximizing air-water contact. The existing site is designed for a total biological oxygen demand of 5,354 lbs O_2/day and an actual average of 982 lbs O_2/day. Assuming 250% of the surface aeration energy is being used for mixing, and the rest 75% for aeration, fine bubble aeration could reduce the aeration energy of the system by 50%. Fine bubble aeration with perforated membrane panels has 38-43% SOTE at 15 feet submergence. Fine bubble aeration has the following advantages:

- Exhibits high SOTE.
- Exhibit high aeration efficiencies (mass oxygen transferred per unit power per unit time)
- Can satisfy high oxygen demands.
- Easily adapts to existing basins for plant upgrades.
- Results in lower volatile organic compound emissions than nonporous diffusers or mechanical aeration devices.
- Low operating costs, minimal operator requirements
- Increased biological activity, enhanced organic sludge reduction, oxidation of various contaminants.

Fine bubble aeration will require installing sub-surface perforated membrane panels, blower, DO sensors, flow, and pressure control system. Centrifugal Turbo blowers have high operational efficiency, wide operating range, low maintenance, and long effective useful life with a premium cost. AESC recommends installing two 300 CFM centrifugal turbo blowers with variable speed, flow, and discharge pressure control keeping CapEx minimal.

Cascade Impacts:

- A higher oxidation rate will allow lower SRT and MLSS which will reduce the RAS pumping rate.

Calculations
A custom spreadsheet is used for baseline calculations. Assuming 75% of surface aeration energy contributes to aeration and 25% contributes to mixing. The expected savings is 372% of current aeration & mixing energy.

Cost
Cost has been estimated using OTT North America LLC a manufacturer's budgetary quotation.

EEM-5: Install ammonia-based controls on wastewater blower

Existing Conditions
The WWTP plant has 100% manual operation without any monitoring and control equipment or system in place. Experienced plant operators run the plant manually based on their knowledge of the plant and conditional variability, sometimes at the cost of excessive energy usage.

Potential Measure
Install ammonia-based monitoring and control system in conjunction with LBM and fine bubble aeration. This measure embeds real-time control (RTC) to adjust aeration energy to that related to Ammonia-N measurements including BOD oxidation and endogenous respiration to avoid both under and over aeration. This measure will potentially enhance the effectiveness of fine bubble aeration. The overall savings are estimated at 15% of the existing site aeration and mixing energy. This measure is also anticipated to reduce RAS pump operating time.

Calculations
A custom spreadsheet is used for baseline calculations. Assuming 75% of surface aeration energy contributes to aeration and 25% contributes to mixing, the expected savings is 15% of current aeration & mixing energy.

Cost
The cost has been estimated using Rosemount Analytical Products online pricing and similar project cost benchmarks.

EEM-6: Install sludge blanket sensor to operate sludge pump

Existing Conditions
At present, one 695 GPM, 40 TDH, 10 HP sludge pump returns, and wastes activated sludge as required. . The pump runs for two minutes after every 18 minutes or 2.4 hours per day controlled by a timer to return sludge from clarifier to aeration basin. The operator changes suction and discharge valves and runs the sludge pump for five minutes per week to waste sludge from the clarifier to the sludge drying bed or percolation pond.

Potential Measure
A common requirement in wastewater treatment is to find the location of the interface between the region of the high solid in a clarifier and the relatively lower solids region above. Detecting the presence of the sludge blanket at a fixed level can be used to start or stop a pump. Further, a turbidity sensor and analyzer installed in the clarifier to measure sludge blanket thickness and operate the sludge pump to return activated sludge from clarifier to aeration basin will automate and optimize these processes. Automating sludge wasting using the same pump requires automated valves and may not be technically feasible or economically viable. A separate waste-activated sludge pump of a smaller flow rate may be considered to optimize energy usage and performance.

Calculations
A custom spreadsheet is used for baseline calculations.

Cost
The cost has been estimated using Rosemount Analytical Products online pricing and similar project cost benchmarks.

EEM-7: Install positive dewatering system for Class A effluent quality

Existing Conditions
The existing plant uses the SDBs in the summer months only and percolation ponds for infiltration and sludge drying in place. Dried sludge is cured in the SDBs and percolation ponds and then transferred yearly by truck to designated solid disposal areas. This practice is costly and likely will not continue to be a viable option in the near future. The percolation ponds are currently in good operating condition but possibly present some level of risk to continued permit compliance.

Potential Measure
Practice using the designed drying beds for sludge drying and then use percolation ponds for infiltration. Install a positive dewatering system. Solar Active Dryer is a technology which is energy efficient and also a cost-effective way to handle solids retention time in cold climatic condition. Huber Technology Solar Active Dryer SRT has been consulted for this measure. Sewage sludge drying with solar energy has the following benefits:

- Sustainable, eco-friendly process
- Optimum mixing and aeration of the complete sludge bed
- Minimized odor development and dust formation due to effective back mixing
- Optimized evaporation efficiency with low energy consumption
- A unique combination of sludge turning and transport

A 1.5 kW screw press can be installed to facilitate dewatering.

- sludge dewatering without the need for prior thickening
- typical dewatering results of 18 – 25% DS
- sludge volume reduction up to > 97% in a single step
- saves investment and operation costs for preceding sludge thickening
- reduced operator attention required

More information can be found on this technology at the following website: HUBER Solar Active Dryer SRT - Huber Technology Inc. (huber-technology.com)

Calculations
A custom spreadsheet is used for baseline calculations.

Cost
The cost has been estimated based on other similar projects.

EEM-8: Overhaul Pumps of Lift Station and operate within best efficiency point (BEP) range

Existing Conditions
Two (2) 15 HP pumps at WWLPS-1 have a design value of 88 kWh/Acre-Feet while operating at 474 kWh/Acre-Feet. Pumps are original to the station and have exceeded EUL of 12.7 years. No test reports were found for the pumps. Calculated bowl efficiency is 11% assuming a design efficiency of 60%. Pumps are driven

by standard efficiency motors with a maximum of 87% efficiency. During inspection pump-1 (Rated 650 GPM; 45 feet of the total dynamic head; 15 HP) was running at 41.05 Hz, consuming 8 HP and the station had 68 GPM flow rate. Pump operating data implies that the impellers and volute casings have been eroded.

Three (3) 40 HP pumps at WWLPS-2 have a design value of 208 kWh/Acre-Feet while operating at 697 kWh/Acre-Feet. Pumps are original to the station and have exceeded EUL of 12.7 years. No test reports were found for the pumps. Calculated bowl efficiency is 18% assuming a design efficiency of 60%. Pumps are driven by standard efficiency motors with a maximum of 87% efficiency. During inspection pump-1 (Rated 840 GPM; 105 feet of the total dynamic head; 40 HP) was running at 31.5 Hz, consuming 19 HP and the station had 110 GPM flow rate. Pump operating data implies that the impellers and volute casings have been eroded.

Potential Measure(s)

This measure suggests the need for a pump efficiency test to verify the recommendation of pump overhauls and minimize perceived uncertainty of the value of overhauling the pumps. Pump overhauling includes four (4) steps: 1) replacement of pump bowl/volute, impeller; 2) machine work includes re-facing, pit, and hole filling, and replacing the wear ring; 3) addition or removal of a stage on a multistage pump; and 4) complete pump replacement. The pumps should then be operated within ±10% of the best efficiency point (BEP) with VSD.

Calculations

A custom spreadsheet is used for baseline and savings calculations.

Cost

The cost has been estimated using RS Means.

EEM-9: Introduce in-pipe treatment at lift pump stations

Existing Conditions

Both lift pump stations 1 and 2 are in populated neighborhood and recreational areas. There are no odor complaints. Wet wells are being cleaned yearly by a vacuum truck. Operation of a vacuum truck in a residential neighborhood is required, but not ideal. The deposition of solids in the wet well results in septic and corrosive conditions which deteriorate the force mains, wet well plumbing works, and pumps.

Potential Measure

The measure suggests installing in-pipe treatment at lift pump stations. The purpose of this measure is two-fold: (1) eliminate septic conditions related to sedimentation and stratification in pump station wet-wells, and (2) provide mixing energy for wet-well additives, such as magnesium hydroxide, sulfur-fixing bacteria, and/or emulsified oxygen. Simply maintaining non-septic conditions provides the core function of reduced generation of hydrogen sulfide and other odorants.

The basic categories of benefit are:

- Corrosion and odor control of sulfide generation in wet wells
- Enhanced mixing of energy-conserving chemical and biological additives.
- Enhanced BOD removal.
-

<u>Magnesium Hydroxide addition in Collection System</u>

- A slurry of magnesium hydroxide is added and mixed at an upstream pump station to elevate the pH of the raw wastewater to about 8.5-. This serves two functions: (1) immediately arrests ambient dissolved sulfide from upstream flows, and (2) prevents the generation of sulfide in downstream flows. The energy effects are at the treatment plant: reduced energy for recirculation and treatment of soluble BOD, Ammonia, and volatile acids otherwise generated in-pipe, potential reduction in foul-air treatment. Non-energy effects are reduced such as corrosion of concrete, iron structures, and electrical assets, and reduced odor generation and chemical consumption.

Calculations

A custom spreadsheet is used for baseline calculations. Assuming 75% of surface aeration energy contributes to aeration and 25% contributes to mixing. Expected savings is 5% of current aeration & mixing energy.

Cost

The cost has been estimated based on other similar projects.

EEM-10: Install Premium Efficiency Motors on Pumps of Lift Station

Existing Conditions

Two (2) 15 HP pumps of WWLPS-1 and three (3) 40 HP pumps of WWLPS-2 have assumed a maximum 87% standard efficiency motors original to the plants. Efficiency rating is not available on motor nameplates. These motors have exceeded 15 years of EUL. These motors operate in confined moist locations and are moderately susceptible to failure.

Potential Measure(s)

Premium efficiency motors with 92~94% or higher efficiency will save 6~7% of site energy. Motors are running at very low load factors. Right-sizing of motors could result in more savings which could be done after pump testing.

Calculations

A custom spreadsheet is used for baseline and savings calculations.

Cost

The cost has been estimated using online pricing.

EEM-11: Interior LED Lighting retrofits

Existing Conditions

The WWTP, two lift pump stations, and two of the WTPs have linear fluorescent T12, T8, and incandescent fixtures for indoor lighting.

Potential Measure(s)

AESC recommends retrofitting linear fluorescent lamps with LED lamps and high bay metal halide fixtures with high bay LED fixtures. The proposed lamps would use 18W LED linear lamps and 130W LED high bay fixtures. LEDs have the greatest luminaire efficacy (lumens/watt) of any lamp type, which means that minimal electricity is required to provide the desired amount of light. Additionally, LED technologies have an effective useful life of over 100,000 hours. In addition to energy savings, maintenance cost savings are also realized by decreasing the fixture life-cycle costs. See Appendix A, Interior Lighting Table for space-specific lamp/fixture retrofit recommendations.

Calculations
A custom spreadsheet is used for baseline and savings calculations.

Cost
The cost has been estimated using RS Means.

Distributed Energy Resource (DER) Measures

DER measures have interactive effects and operational dependencies. Total kWh, kW savings, and incentives are not calculated at this point.

1-DER: Install Solar PV System at WWTP Site

Potential Measure(s)

AESC's subcontractor EVA Green Power studied the scope of solar PV deployment in JLPUD. The wastewater treatment plant consumes approximately 260,000 kWh per year. The consumption could be offset by 84% via a 120-kW ground-mount monocrystalline photovoltaic system on the south side of the aeration basin within the property line. Please refer to the layout in the report for details.

Costs

The system is estimated to cost approximately $300,000 and could be financed by a third party leaving the facility with $6,000 of savings per year (increasing approximately 3% per year). A cash purchase would result in approximately $30,000 per year of energy cost savings.

2-DER: Install Energy Storage Battery

Potential Measure(s)

JLPUD WWTP has a peak demand of 61 kW and uses about 260,000 kWh per year. There is no emergency backup power generation in place. An energy storage system has been estimated using Tesla PowerPack with 120 kVA Power stage inverters and 464 kWh battery. The energy storage system will be grid-interactive and provide 3.87 hours of backup for the entire WWTP load.

JLPUD is located in Tier2 high fire-threat district (HFTD). JLPUD could be eligible for the SGIP equity resiliency budget or equity budget for incentives which would increase the incentive rate for storage and self-generation measures.

Installing an advanced energy storage system will enable JLPUD WWTP to shift peak period load to off-peak periods, participate in the demand response program, and increase resiliency during power failure. The system is modular with 60 kVA; 232 kWh; and 3.87 hours that can be augmented per the customer's need. Savings associated with load shifting and participating in demand response can be availed.

Cost

The energy storage system costs $750~950/kWh depending on inverter and battery requirements.

Measure Considered but Not Evaluated

EEM-12: Relocate Ion Exchange WTP and Uranium TP to convenient WTP locations

Existing Conditions

Ion Exchange WTP and Uranium TP are constructed as backup sources of potable water for the district. However, the design of the pump station is not workable during all seasons. The water level of the lake has lowered over the years and the pump does not generate the required net positive suction head during the lowest water levels. Lack of feed water complicates the WTP.

Potential Measure(s)

AESC recommends relocating both plants to other convenient WTP locations where space is available.

Calculations

This measure has not been evaluated hence savings are not calculated.

Cost

The cost has not been estimated for this measure.

Next Steps

- ✓ Review Initial Measures List and select preferred measures
- ✓ Select Project Development Pathway: SCE/SCG Standard Programs, SCE/SCG Performance-Based Programs, or SoCalREN Metered Savings Program
- ✓ Receive SoCalREN Project Proposal*

** For projects not pursuing SCE/SCG Performance-Based Programs*

Acronyms:

ABAC: Ammonia Based Aeration Control
ADF: Average Daily Flow
BEP: Best Efficiency Point
BOD_5: Biological Oxygen Demand (5 days)
BHP: Brake Horsepower
CFM: Cubic Feet per Minute
DO: Dissolved Oxygen
EEM: Energy Efficiency Measures
EUL: Effective Useful Life
GE: General Electric
GPM: Gallons per minute
HFTD: High Fire Threat District
Hz: Hertz
kW: kilo Watt
LBM: Large Bubble Mixing
MGD: Million Gallon per Day
MLSS: Mixed Liquor Suspended Solids
NHx: Ammonia
PSIG: Pound per Square Inch GaugeRAS: Return Activated Sludge
RTC: Real Time Control
SCE: Southern California Edison
SDB: Sludge Drying Bed
SOTE: Standard Oxygen Transfer Efficiency
SPB: Simple Pay Back
SRT: Sewer Retention Time
TDH: Total Dynamic Head
TP: Treatment Plant
TSS: Total Suspended Solids
VSD: Variable Speed Drive
WAS: Waste Activated Sludge
WTP: Water Treatment Plant
WWTP: Wastewater Treatment Plant
WWLPS: Wastewater Lift Pump Station