



# LAKE DON PEDRO

## Community Services District

Lakedonpedrocsd.org



# WATER SYSTEM MAINTENANCE PLAN 2016

Lake Don Pedro Community Services District

### ABSTRACT

*"We want our customers to know that their water rate money is being spent wisely on projects that improve water service and personnel that are highly responsible and productive, to keep our water system operating as reliably and cost effectively as possible." -Danny Johnson, 2016 Board President*

### General Manager

Peter J. Kampa, General Manager

# LDPCSD MAINTENANCE PLAN

## EXECUTIVE SUMMARY

The Lake Don Pedro Community Services District's 2016 System Maintenance Plan focuses on increasing the level of water system maintenance to maximize the useful life of our critical infrastructure. The Plan addresses the basic maintenance schedule and assignments while at the same time understanding the complexities of the system, its current aging condition, the District's current organizational structure and capabilities in performing the required maintenance on a consistent basis.

This plan is not all-inclusive and is to be used in conjunction with the system operations plan and in compliance with state permits and other requirements. System maintenance manuals and manufacturer's instructions are to be kept on file for every piece of District equipment and all possible documents scanned as PDF into the District fixed asset program so that they can be accessed for reference while the maintenance crew is in the field performing maintenance. The basic routine maintenance program for each water system component is identified below, with (Service Work Order (SWO), daily, weekly, monthly, quarterly and annual routines listed, as applicable. A table is provided at the end of this plan detailing the maintenance work by time period, and the maintenance schedule is also contained in the District fixed asset software.

## GOALS

This Maintenance Plan has three major goals:

- Stabilize and reduce system maintenance costs
- Maximize the system reliability and predictability
- Improve our customer image by informing our community of its well-maintained facilities



## PROGRAM OVERVIEW

The LDPCSD operations staff must be state certified, cross trained and involved in the day to day operation of the water treatment plant and distribution system, in addition to being expected to perform as much system maintenance as possible in the time available. In the routine operation of the system, the operators will perform inspections, perform planned preventative maintenance and respond to customer service calls and emergencies; many times all in the same day. The purpose of this Maintenance Plan is to identify all work to be completed, organize the work by time schedule and complexity and assign responsibilities to operations staff. The program also requires that accomplishment of assigned maintenance responsibilities be an integral part of all employees' annual performance expectations and evaluation, tied directly to any promotions or merit salary increases provided. The Plan also includes a means of reporting program success to management, the LDPCSD Board and public.

## INSPECTIONS

Inspections, sometimes referred to as "rounds or remotes" of all facilities are completed on a regular basis as detailed in the system O&M tables below. The use and completion of Inspection and data logging forms ensures a thorough inspection of all components on the site and provides documentation of any discoveries, problems or work service orders to be generated after the inspection is completed. The inspection forms are generated within the SEMS Asset Management Software, and stored electronically and in paper copy in the maintenance files by facility location. A service work order must be generated for any facility needs or repairs discovered on inspections.

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## PREVENTATIVE MAINTENANCE

System preventative maintenance duties will be assigned on a daily, weekly, monthly and annual basis by the Operations Supervisor, in accordance with the schedules below. Although it is very efficient to assign to employees tasks for which they have experience, are efficient and enjoy the work; it is also a solid practice to have employees cross over with more experienced staff and learn new skills and practices. Assignments will be made as scheduled in the SEMS Asset Management Program, and appropriate preventative maintenance documentation and reports completed, stored electronically and filed in paper by location.

## SERVICE ORDER RESPONSE

Service work orders (SWO) are typically indicative of system problems; be it high or low pressure, dirty or smelly water, leaks, meter problems or main breaks, there are lessons to be learned from documenting service orders. When a service order is completed, the repair report is to be completed in SEMS and filed in paper. At the beginning of each month, the Remote readings will be logged in the appropriate spreadsheets, leak reports prepared and analyzed, system operational data analyzed for anomalies such as KWh per acre foot pumped and changes in loss rates, and service order type and location. The service order review will be documented in the monthly Operations Report and will be used to identify necessary system operational adjustments or changes, increased maintenance such as flushing, or immediate staff attention placed on completion of a project or evaluation that continues to generate high numbers of service orders monthly.

## NECESSARY QUALIFICATIONS

District staff with a Distribution System Operation certification, Grade I or II should be trained and capable of performing all necessary inspections and maintenance at all facilities except for:

- Tank inspections and cleaning
- Pump or motor removal where specialized equipment is necessary
- Pump rebuilding
- Extensive electrical and/or control rewiring. Staff should be trained in basic electrical controls and electricity, and be able to troubleshoot switches, breakers and relays.
- Confined space entry (permitted)

Specialized training is required for certain maintenance tasks such as control valve or PRV adjustment or rebuilding, and operators should be trained in basic electricity, hydraulics and pumping, construction techniques and safety.. This training is not offered locally, and usually requires three to five days travel plus training costs to complete. Also it is important to note that once control valves or PRVs are torn apart for rebuild, stopping work because the clock hits 4pm or the maintenance staff gets called to check a customer meter is not possible because these items in many cases cannot be left out of service without risking water outages. Therefore if rebuilding is to be done in house, the work should not be done during absence of any employees, or unless ALL parts are verified in stock in advance. This work can be contracted with the requirement that the contractor complete the work within a specified time period. PRV inspections are always conducted by LDPCSD operators, so they must understand valve operation.

## FACILITIES

### SOURCE WATER SYSTEM

The LDPCSD water supply is derived primarily from surface water drawn from pumps located near Barrett Cove Marina on Lake McClure. The District also utilizes groundwater drawn from four wells within the district boundaries and connected to the district raw water transmission system. Engineering plans and specifications for all facilities are on file in the district office.

### Lake McClure Intake

The Lake McClure Intake consists of two 200HPsubmersible pumps, and one 150 HP vertical turbine booster pump, related control valves, electrical controls, meters and piping. A second 150 HP booster is scheduled for installation in the winter of 2016. Due to its criticality in providing the majority of the community water supply, regular maintenance is important and immediate repair of any malfunctioning infrastructure is critical. Many times during the summer, especially at the end of July

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each year when the water demand is highest, the community water demand is greater than can be supplied by the stored raw water and if the Intake system is down more than one day, a severe water shortage could occur requiring immediate public notification. Immediate operation of all groundwater wells is advisable any time the Intake system is down for repair during the summer. Please refer to the system operations plan for more information on operation of the raw water system. The maintenance tasks associated with the Intake system are shown below in Table 1.

Table 1 – Intake Site

Item	Weekly	Monthl y	Quarterl y	Annual
Routine site visit inspection	X			
Remote Readings/Physical Site Inspection (operate pumps/observe)		X		
General Site Maintenance (weeds, locks, painting, cleaning)			X	
Megger Pumps, check voltage and amps			X	
Control Valve Maintenance (Pumps and surge tank)				X
Clean valve wells and Operate valve				X
Operate and Service intake wet well screens and valves (If accessible)				X

## Wells

There is very little maintenance required at each well site other than inspection and groundskeeping as shown below in Table 2.

Table 2 – Groundwater Wells

Item	SWO	Weekl y	Monthl y	Quarterl y	Annual
Routine site visit inspection		X			
Remote Readings/Physical Site Inspection			X		
General Site Maintenance (weeds, locks, fence, painting, cleaning)				X	
Megger Pumps, check voltage and amps					X
Clean valve wells and Operate valves					X
Pull pump and replace column piping, clean and descale casing	X				

## WATER DISTRIBUTION SYSTEM

The District has a very mechanical water system, due to the service area topography. The distribution system includes 7 water storage tanks, two dedicated booster pump sites (one with a hydro pneumatic tank), 480 fire hydrants each with its own isolation valve at the connection to the water main, 341 street (isolations) valves and 11 pressure reducing valve (PRV) stations. As a

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frame of reference, the street or fire hydrant isolation valves have likely not been inspected or operated in five years or more, likely resulting in valve access wells (pipe leading to the valve operating nut 4 feet below ground) filled with dirt and rocks, caused by rodent activity. In order to operate (exercise) the valves, the debris must be removed, which takes time and specialized vacuum or flushing equipment. Four of the tank sites also have booster pumps to move water up to a higher tank. Each booster pump has a hydraulic control valve, pump controls and shutoff valves. One tank site (Alamo) has a hydropneumatic tank and both a domestic and fire water pumps. Each tank and booster pump site is connected to the supervisory control and data acquisition system (SCADA) that transmits pressures, levels, pump status, power information and failure data to the water treatment plant, where the information is logged real-time in the central computer.

Due to the age and deteriorated condition of much of the distribution infrastructure such as pumps electrical controls and control valves, operational problems are more frequent than normal, even with proper maintenance. Water mains are known to last 75 to 100 years with the only maintenance being occasional flushing to clear debris, pressure control and maintenance of water pH (corrosivity) to a neutral state. However, some of the LDPCSD water mains and especially service lines were improperly installed on rock, or with rock trench backfill, significantly reducing the life of our underground infrastructure. Some maintenance such as booster pump replacement or repair, tank inspections and repair, pump electrical panel replacement, and PRV rebuilding requires specialized tools and equipment, specialized training and adequate staffing so that once a major maintenance project is started, it can be completed in the same work day. Such specialized work is identified in the tables below.

## Water Tanks, Booster Sites

The LDPCSD water tanks are constructed of materials as shown in Table 3 below, which dictates the types, frequency and difficulty of repairs. For the most part, tank maintenance involves visual inspection for vandalism and leaks, and also includes making sure that vents are intact (no birds, bats or rodents can enter) and accessories such as ladders, gauges, and hatches are functional. Weeds must be kept under control to reduce fire hazard and fences and gates checked, and locks lubricated. Steel tank coatings are very specialized and must be completed by a competent coatings contractor. Pre-stressed concrete tanks require almost no maintenance, but repairs can be difficult and costly. Necessary tank repairs are either identified in random external inspections or upon video inspection by a tank inspection contractor. A solid tank inspection program by qualified contractors can result in almost no maintenance work for District staff, other than groundskeeping.

Table 3 – Tank Construction

Tank	Material
Alamo	Pre-stressed Concrete
Arbolada	Pre-stressed Concrete
Central	Welded Steel
Coronado	Pre-stressed Concrete
Enebro	Pre-stressed Concrete
Lazo	Welded Steel
Sturtevant	Pre-stressed Concrete

Booster systems, on the other hand contain pumps, control valves, electrical controls and panels, vaults, meters, flow switches, pumps and motors, all of which require some form of skilled maintenance work as shown in Table 4 below.

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Table 4 – Booster Stations and Tank Sites

Item	Monthly	Quarterly	Annual	5 Yrs
Remote Readings/Physical Site Inspection (Tank external, operate pumps)	X			
General Site Maintenance (weeds, locks, fence, painting, cleaning)		X		
Check Pump voltage and amps			X	
Tank Internal Inspection, Cleaning and Video (Contracted to specialty contractors)				X
Pump Control Valve Service			X	
Isolation valve well cleaning and operation			X	
Control or valve rebuilding				X

## Fire Hydrants and Street Isolation Valves

The proper function of fire hydrants when needed is critical during a fire emergency. To ensure continued operation, fire hydrants should be operated from fully closed, to fully open and back to closed slowly. The hydrant should be operated full open long enough to clear any dirty or colored water. Prior to operating the fire hydrant, the hydrant isolation valve should be operated from open to closed and back to full open, then backed off ½ turn. Main flushing is done to clear debris from the mains and to remedy customer complaints. A flushing velocity of a minimum of 5 feet per second must be achieved to clean the mains, so it is possible that in areas with large mains, that multiple fire hydrants may need to be flushed at the same time to achieve the flow rate. Broken hydrants must be bagged “out of service”, and the local fire department notified immediately. Malfunctioning fire hydrants should be immediately repaired. Hydrant maintenance schedules are shown in Table 5.

Table 5 – Street Valves

Item	Annual	SWO
Clean isolation valve well and operate hydrant	X	
Water Main Flushing		X
Perform hydrant flow testing		X

## Pressure Regulating Stations

Regulation of water pressure is necessary in the LDPCSD water system to avoid over pressurizing and damaging customer plumbing. The system pressure regulating valves, or PRVs are set at the pressure shown on the District system maps, as determined by the District engineer. If during inspections the pressure is found to be more than 10% out of the required pressure range, PRV service is likely necessary including pilot valve maintenance or PRV rebuilding. Table 6 shows the appropriate PRV maintenance schedule.

Table 6 – Pressure Regulating Stations

Item	Monthly	Annual
Physical Site Inspection (open vault lid, check pressures)	X	
Check PRV operation (operate downstream hydrant)		X
Pilot valve maintenance and service		X

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## Raw Water Distribution System

The raw water distribution system is considered the system of piping and valves from the Intake pump location to the water treatment plant, as well as from the corner of Ranchito to the West to Gregoris Pond, where the system terminates in a pond fill control valve. Table 7 details the maintenance schedule for the raw water system.

Table 7 – Raw Water Distribution

Item	Monthly	Quarterly	Annual
Gregoris Pond control valve inspection and service	X		
Gregoris Pond vegetation maintenance		X	
Isolation valve well cleaning and operation			X

## Water Treatment Plant

Table 8 below provides a maintenance schedule for the water plant infrastructure, which is critical to maintaining water quality and reliability of the treatment system. For example, if a polymer chemical feed pump is not serviced on schedule, we will be stuck repairing the pump when it stops pumping, which could be during a time when the plant cannot be shut down due to high water demand.

Table 8 – Water Treatment Plant

Item	Daily	Weekly	Monthly	Quarterly	Annual
General facility inspection	X				
Plant grounds maintenance				X	
Filter Pumps service				X	
Filter Control Valves service				X	
Compressors (Daily check)	X				X
Online process monitoring equipment (Check operation daily, test, clean, maintain, standardize) <sup>i1</sup>	X		X	X	
Treatment Basin Cleaning				X	
Chemical feed pumps maintenance					X
Filter maintenance				X	
Mixer maintenance (Daily operating inspection)	X		X		
Raw water tank inspection and cleaning (contracted, or drained and labor crew)					X

## STRATEGIES

1. Maximize (existing) staff time dedicated to system maintenance.

<sup>1</sup> The level of inspection, cleaning and maintenance depends on the online equipment operating characteristics and manufacturer's recommendations.



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2. Develop maintenance routines, assign their responsibility and hold personnel accountable.
3. Implement appropriate technologies to streamline documentation, planning and reporting.

## TACTICS

Tactics are the specific efforts and actions used to implement the Maintenance Plan. Each strategy has a unique set of tactics to be carried out by either LDPCSD or outside contractors as noted. Not all tactics will be feasible for implementation based on funding and/or staff availability; however, they should be considered when appropriate.

### 1. MAXIMIZE (EXISTING) STAFF TIME DEDICATED TO SYSTEM MAINTENANCE.

The Operations Supervisor is responsible to oversee the schedule and productivity of staff. To the maximum extent possible and considering employee, public safety and the type of work required, most daily work will be completed by individual employees working alone which in and of itself maximizes available staff time. If more than one employee is needed when performing a specific task, such as where a backhoe is required or traffic control needed for safety, the second employee shall divert to this work for the minimum time necessary to complete the task then return back to working separately. The supervisor must hold employees accountable at all times and inefficient activities such as pairing up to purchase parts from the hardware store or traveling to town for supplies is strictly forbidden unless determined necessary by the supervisor.

Maintenance assignments are to be clearly assigned to appropriate personnel, and completion schedules documented. The schedule and workload of employees assigned maintenance must be clearly understood by the Operations Supervisor, who must in turn carefully assign daily service order works and other non-maintenance work to non-maintenance performing employee(s), to the maximum extent feasible. The maintenance work schedule must be closely monitored by the Supervisor, and adjustments made if necessary due to significant amounts of non-maintenance work assigned. The rationale for diverting employees from maintenance must be clearly documented by the Supervisor, who shall also propose to management such revised staffing, contracting, new methods and modifications to the overall workload to ensure that the maintenance schedule is achieved.

In the event that employee productivity is documented as high, however the employee is falling behind in the assigned maintenance work, the Operations Supervisor will determine if contracting for portions of the work is required to remain in conformance with the maintenance plan. All contracting must be approved by the General Manager and Board, and will only be considered following confirmation that the existing employee's current workload and productivity is adequate and time is simply not available to perform maintenance to this schedule.

### 2. DEVELOP MAINTENANCE ROUTINES, ASSIGN THEIR RESPONSIBILITY, PROVIDE TRAINING AND HOLD PERSONNEL ACCOUNTABLE.

To the maximum extent feasible, operations employees will review the annual maintenance schedule and be assigned responsibilities for segments of the maintenance work, such as inspections, grounds maintenance and hydrant flushing, for which completion is easily measured and the employee can be held accountable and rewarded if appropriate in an annual performance evaluation. Maintenance assignments must be specific, measurable, attainable, and realistic within the expected completion timeframe. If employees continuously do not complete their assigned maintenance work, the supervisor must rapidly address the situation to determine if assignments need to change, methods modified or the performance of the employee improved. The GM is to be kept informed of the status of all maintenance work on a frequency and level of detail as required by the GM.



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A training plan is to be developed for each field employee including the Operations Superintendent. The training plan is to be included in the employee's performance criteria, approved by the General Manager, signed by the employee and completed within the timeframe needed. Employee's schedules will be arranged to allow for the training, and the District will budget and cover the cost of the training. Employees are responsible for the maintenance of their own certifications and training, and all training shall be coordinated and approved in advance by the Superintendent and/or GM.

Developing routines for which specific employees are responsible also allows for the development of specific employee training plans. Employees will be provided the level of training appropriate to the assignment maintenance responsibilities, and will be required to successfully attend the training and put learned skills to use. Assigning specific responsibilities will also allow for equipping vehicles with the appropriate tools and equipment for the assigned work, and time/expectations that all vehicles and equipment will be kept clean and serviceable. Employees will be held specifically responsible for the conditions of their equipment and notifying the supervisor when problems exist.

### 3. IMPLEMENT APPROPRIATE TECHNOLOGIES TO STREAMLINE DOCUMENTATION, PLANNING AND REPORTING.

The District has purchased and is in the process of implementing the SEMS Asset Management software. All facilities and equipment will be documented in SEMS, which will be an ongoing project as time allows to enter more and more information in the system about all district assets, including vendor information, maintenance needs and schedules, repairs, improvements and other relevant information to streamline system maintenance. Paper files containing maintenance information shall also be kept to ensure records continuity in the event of system crash and data loss. A monthly maintenance summary report shall be prepared by the Operations Supervisor and presented to the Board of Directors to verify compliance with this maintenance plan.