

## PUMP STATION AND FORCE MAIN MAINTENANCE

### 5.1 SYSTEM OVERVIEW

There are currently fourteen collection system lift (pumping) stations, C-1 through C-14, that serve the collection system in Lincoln. The need for a lift stations is generally dependent on site specific topographic criteria such as serving a low lying area or the need to transport the wastewater across a river, stream or creek. The lift stations are maintained by Lincoln Wastewater Staff. A summary of the lift stations is presented in Table 5.1 below. Of the fourteen wastewater lift stations, there are only five stations (C-6, C-7, C-8, C-9, C-11) that serve 300 or more acres. A detailed summary of each lift station and their routine maintenance schedule is located in Appendix A.

<b>Table 5.1 Summary of Wastewater Lift Stations SSMP Update - 2013 City of Lincoln, Nebraska</b>			
Lift Station	Location	Service Area (ac)	Basin Served
C-1	NW 44th & West Cuming	7	Oak Creek
C-2	952 N. Lakeshore Drive	4	Oak Creek
C-3	412 W. Lakeshore Drive	20	Oak Creek
C-4	52 W. Lakeshore Drive	54	Oak Creek
C-5	1721 Surfside Drive	70	Oak Creek
C-6	550 W. Industrial Lake Dr.	300	Oak Creek
C-7	1598 East Lakeshore Dr.	300	Oak Creek
C-8	West P & Salt Creek	1,042	West "O"
C-9	West "E" & SW 6th Street	1,389	Middle Creek
C-10	3rd & Rose Street	43	Salt Creek
C-11	3700 N 31st Street & Salt Creek	2,000	Little Salt
C-12	66th & Burlington Ave.	10	Havelock
C-13	NW 3rd & W. Charleston	10	Oak Creek
C-14	South Coddington & West Millstone Rd.	37	Middle Creek

Notes:  
1. Based on information provided by LWWS.

#### 5.1.1 Wastewater Lift Station Telemetry

At the present time, all of the stations communicate with the Lincoln Wastewater SCADA system via dedicated data grade phone lines. The telemetry provides alarms to SCADA for

power loss, pump overloads, high wetwell level, and in some cases, seal failure, high sump pump pit levels, and alternate power activation. The City is currently involved in a project to replace the current phone line communication system with a radio telemetry communication system. This project will ensure reliability of communications and reduce costs associated with leasing data-grade phone lines. Eventually, flow measuring instrumentation will be added to the pumping stations so that remote monitoring can occur (through SCADA) along with logging of historical flow data in the SCADA file server.

### **5.1.2 Inspection Maintenance and Repairs**

Inspection, maintenance, and repairs that are performed on the lift stations are recorded in the asset management system. If a problem or maintenance issue is encountered, personnel also report it to their supervisor. The problems are rated as they are inserted into the asset management system. The repairs with a higher rating are corrected before routine maintenance items.

Repairs and replacement of equipment including pump rebuilding, motor rewinds, pipe and valve repairs, repairs to motor control centers, controls, SCADA, HVAC and similar equipment is generally contracted out to various vendors and contractors. In general, any replacement parts that are difficult to acquire are kept in stock, other parts are obtained from vendors or the manufacturer's service center. Whether repairs are made by vendors or by LWWS Staff, they are recorded and tracked in the asset management system.

### **5.1.3 Mechanical and Electrical Maintenance**

The size of the pump station and its related equipment determine its specific mechanical and electrical maintenance needs. The Manufacturer's Operation and Maintenance (O&M) manuals are referenced to determine routine maintenance as well as for troubleshooting.

All mechanical and electrical maintenance activities are generated and tracked by the asset management. Work orders are generated by the asset management system are kept open until the maintenance has been completed. Any problems or maintenance issues noted by crews are reported to the supervisor for resolution.

### **5.1.4 Force Main Maintenance**

Air release valves located on force mains and pump stations are maintained on a regular schedule to assure that they are functioning correctly. LWWS staff inspects and maintains the air release valves semi-annually by back flushing the valves with clean water using a pressure greater than the discharge pressure of the pumps. All air release valves and valve vaults are inspected for signs of corrosion, connection point leakage, or improper operating characteristics.

Capacity and discharge head in the pump stations are reviewed annually, following confirmation that the pumps are in good working order. Changes in capacity and discharge

head are evaluated to determine whether cleaning of the force main is warranted. The pressure on the discharge side of the pump is used to determine the need for force main cleaning. If the backpressure is more than 25% greater than the expected total operating head, the force main is identified for cleaning.

Cleaning of the City's force mains is uncommon as the velocity as the force mains have been designed and are operated to maintain a self cleansing velocity. In the event that a force needs to be cleaned the City will contract with pipe cleaning company to perform the work.

### **5.1.5 Corrosion and Odor Control**

The dissolved oxygen content of the wastewater may be depleted in the collection system, pump station wetwell, and the force mains. In addition the wastewater may contain sulfides and other constituents. These sulfides and other constituents may lead to corrosion in the piping, valves, concrete, and other areas and surfaces of the pump station. To minimize the effects of corrosion the City requires minimum and maximum velocity in the design of the collection system, and controls the liquid level in the wetwells. Additionally the City requires that the pump stations wetwells and receiving manholes be designed to minimize hydraulic disturbances. The pump station wetwells are periodically cleaned to minimize the deposition of solids and grease buildup which may lead to odors and the release of sulfides.