

HIGGINS LAKE UTILITY AUTHORITY BOARD



HIGGINS LAKE UTILITY AUTHORITY WASTEWATER COLLECTION & TREATMENT SYSTEM ASSET REVIEW

AUGUST 13, 2018





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Higgins Lake Utility Authority Wastewater Collection & Treatment System Asset Review



Prepared For:
Higgins Lake Utility Authority Board

August 13, 2018



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1.0 ASSET REVIEW COVER LETTER

Dear Higgins Lake Utility Authority Board Members:

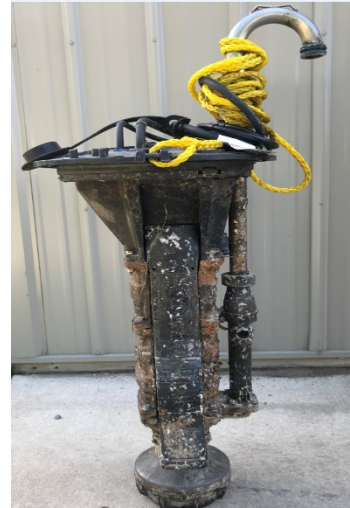
It is our pleasure to present you with your Wastewater Treatment System Asset Review document we have prepared per our proposal dated February 1, 2018.

This Asset Review document is to provide updated information to the Higgins Lake Sewer Authority (HLUA) Board regarding assets within their wastewater treatment and collection systems to assist with future budgeting determinations, replacement costs of equipment, anticipated life expectancy of the equipment, and a criticality rating which helps identify the importance of the asset regarding the operation of the system.

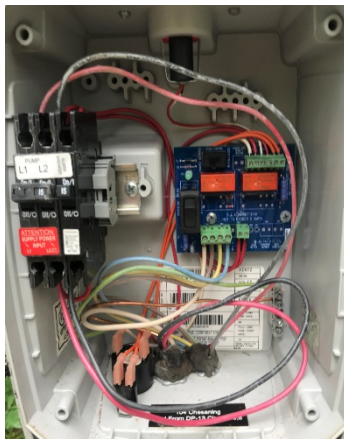
In addition, we have provided pictures of each asset to aid in a person's ability to visually identify what the asset currently looks like and a brief description of why the asset is needed within the system.

2.0 INDIVIDUAL GRINDER SYSTEMS

- Manufacturer: E-One Corporation
- Supplier: Dubois-Cooper, 906 Penniman, P.O. Box 6161, Plymouth, Michigan 48170, 734.455.6700
- Pump: 240V Extreme Core - \$2,670.00 - Total in system = 388 pumps - Spare pumps = 10
- Simplex Control Panel - \$344.00 - Total # in system = 236
- Duplex Control Panel - \$1,238.00 - Total # in system = 76
- Tank and plumbing components - Simplex: \$1,500.00
- Tank and plumbing components - Duplex: \$2,400.00
- Tank Riser (6-inch): \$262.00
- Life expectancy of pump: 8-10 years
- Life expectancy of tank and electric panel: 20 years
- Purchase year: 2009
- Criticality rating: Medium



E/One Pump Simplex Station and Controls



Simplex Control Panel

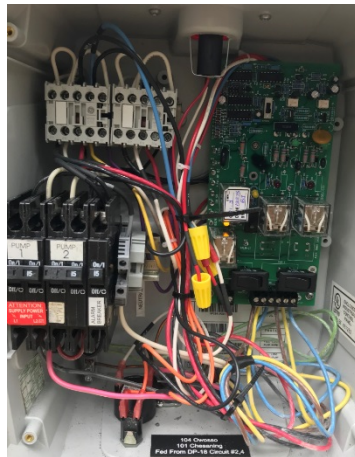


Internal Components



Pump Inside Station

2.1 DUPLEX PUMP STATION AND CONTROLS



Duplex Control Panel



Internal Components



2 Pumps Inside Station

2.2 DESCRIPTION

E/One Grinder Stations are found throughout the collection system to service each unit/residence. There are either duplex stations (two pumps) or simplex stations (one pump).

A duplex station allows one pump to operate at a time unless one pump cannot keep up with inflow. If needed, the second pump will start, assisting the first pump in discharging into the force main. Under normal operating conditions, the pumps will alternate lead and lag as needed.

All solids are ground into fine particles allowing them to pass easily through the pump, check valves, and smaller diameter discharge piping (1.5-inch).

The pumps are a sealed unit and can be removed easily for repair, either onsite or taken to the Authority's shop located at the wastewater treatment facility.

The control panel for each station is identified as E/One Sentry, which is custom designed for use with E/One Pumping Stations. The panels are supplied with a visual high-level alarm light and an audible high-level alarm horn. Each control panel is lockable for security.

3.0 INFRASTRUCTURE (SERVICE LEAD LINES AND TRANSMISSION LINES)

- 1" - 6" pressurized force main - 22,000': \$264,000.00
 - Manholes (75) and cleanout stations: \$375,000.00
 - Life expectancy: 40 years plus
 - HDPE pipe: 50 plus years
 - Galvanized pipe: 10+ years
 - Ductile iron pipe: 30+ years
- Note: Life expectancy of pipe and tanks is related to the soil types they are installed in and whether they have an electromagnetic anode installed to achieve longer life
- Installed in year: 2009
 - Criticality rating: Medium to high

3.1 DESCRIPTION

Discharge from each E/One pump's residential location is pumped to a collection force main, which then continues to the lift station located at the wastewater treatment plant. These collection mains are 1-1/4 to 6.0-inch in diameter, polyethylene HDPE type pipe with compression type connections at the shutoff valves for each station. The mains themselves are fused type connections to make the pipe contiguous throughout the system.

The force main also includes several cleanouts in strategic locations to be used when blockage type scenarios may occur, or for simply scouring/cleaning the mains as needed.

E/One Pump Station inlet mains are gravity type connected to the existing home discharge lines.

These lines are either SDR 35 or Schedule 40 type plastic pipe. These gravity type lines are 4-inch in diameter.

4.0 WASTEWATER TREATMENT PLANT LIFT STATION

- Pump supplier: Kennedy Industries, Inc., 4925 Holtz Drive, Wixom, Michigan 48393
- Pump manufacturer: Flygt NP3127 - 7.5 hp, 3 ph, 460 V: Cost - \$12,500.00 each
- Life expectancy of pump: 10 years
- Wet well tank (concrete): Cost - \$4,800.00
- 84" valve vault: Cost - \$4,750.0
- 60" meter vault: Cost - \$2,900.00
- Life expectancy: 40 years
- Check valves / manifold structure:
Cost - \$10,500
Life expectancy: 35 years
- Flowmeter Structure:
Life expectancy: 40 years
- Master Control Center (MCC):
Cost - \$15,000.00
Life expectancy: 20 years
- Control Panel:
Life expectancy of panel: 10 years
Callout system - using cell modems: Cost - \$4,000.00
- Flow meter - 6-inch ABB:
Cost - \$6,000.00
Life expectancy of flow meter: 10 years
- All assets installed year: 2009
- Criticality rating: High



Check Valve/Manifold Structure



Flow Meter Structure



Lift Station Master Control Center (MCC)



Influent Flow Meter Display/Controller



Inside Components of LS MCC

4.1 DESCRIPTION

Two submersible type pumps are located within the main lift station wet well. This station is used to pump the collection system waste up to the lagoon's system for treatment. The pumps are set up on a lead/lag in case one fails to keep up with the incoming flow volume. In addition, the pumps automatically alternate/cycle to equal run times of each and insure they are both being exercised/sharing the load. The discharge line from the main pump station to the lagoon influent chamber is a six-inch force main.

In addition, the main pump station is where the influent flow meter is located, known as a magnetic flow meter (mag meter). It is this meter that measures the amount of wastewater collected within the system and will be treated which is reported to the Michigan Department of Environmental Quality monthly. This meter is calibrated on an annual basis to insure its accuracy.

5.0 LAGOONS AND AERATION SYSTEMS

- Liners/sand cover/riprap - (4 lagoons) 2-16' deep 2- 8' deep: Cost - \$200,000.00
- Life expectancy: 25-30 years

- Aerators - Aeromix Tornado Pontoon Mixers
 - (4) 10 hp mixers: Cost - \$10,000.00 each
 - Wiring and mooring cables: Cost - \$5,000.00
- Life expectancy: 10 years

- Master Control Center (MCC) and Disconnects:
 - Cost - \$30,000.00
 - Life expectancy: 20 years

- Piping/valves - 7,000' of 4" and 6" force mains to irrigation fields/25 valves, 2,500' of 8" ductile iron pipe:
 - Cost- \$250,000.00
 - Life expectancy: 35 years

- Eight (8) Valve vaults:
 - Average cost - \$5,500 each
 - Life expectancy: 40 years

- Irrigations pumps - three (3) vertical turbine pumps with electric motors
 - Motor - Franklin electric 20 hp, 3 ph, 460 V: Cost - \$4,000.00 each
 - Pumps - Berkeley 5TMH series: Cost - \$2,500.00 each
 - Life expectancy: 15 years

It should be noted the shaft housing and impeller of Pump #1 had to be rebuilt/repared in 2016 due to excessive corrosion and wear experienced on these components.

In addition, in March 2017 effluent Pump #2 and #3 suction casings and impeller were also replaced with stainless steel for the same reason as Pump #1.

Stainless steel housing/impellers should increase the life expectancy as this type of steel is not as susceptible to the corrosion factors as regular steel.

- Station wet well (96"):
 - Cost - \$16,225.00

- Valve vault (120"):
 - Cost - \$15,500.00
 - Life expectancy: 40+ years

- Spray heads:
 - Size: 1-inch
 - Quantity: 42

- Manufacturer: Buckner-300 series full circle brass impact. Cost - \$100.00
Life expectancy: 8 years
Criticality rating: Low



Aeromix Tornado Aerator



Lagoon Cells 3 and 4



Effluent/Irrigation Pumps



Lagoon MCC



Large Valve Vault



Spray Head



Irrigation Field

5.1 DESCRIPTION

The lagoons are made up of a combination of sand, riprap, and a liner. These lagoons are the main body of this facility and are the most vital part of the treatment process. Cells 1 and 2 of the lagoons are equipped with two (each) Aeromix tornado mixers. The mixers are an important step in creating a healthy wastewater treatment system. These mixers run continuously throughout the discharge season. The cells are connected via an infrastructure system that consists of many valves and pipes which allows the operator to manipulate flows in and out of the cells. This infrastructure is ductile iron with gate style valves. The valves are in several concrete structures labeled accordingly to allow quick identification of each valve. The final cell produces the effluent that is distributed on the crop fields via the irrigation system. The main lagoon MCC panel controls the mixers and flow meters. This panel houses disconnects, flow meters, surveillance recorder, and breakers for the entire lagoon system. The effluent is pumped to the irrigation field using three high service pumps. These pumps are running in an alternating sequence to allow even distribution throughout the fields. The spray heads are the final piece of the system. These spray heads distribute the final effluent onto the crop fields. They are removed at the end of every discharge season.

6.0 EFFLUENT FLOW METERS

- Manufacturer: Endless & Hauser (E&H) multi-channel recorder eco-graph T: Cost - \$2,500.00
- Three (3) electromagnetic flow monitors E&H: Cost - \$2,500.00 (each)
- Life expectancy: 15 years
- Criticality rating: Medium



Effluent Flow Meter Recorder/Inside Lagoon MCC

6.1 DESCRIPTION

These electromagnetic flow meters are installed on all three effluent pumps. These show actual flows and keep a running total for each pump and are used to calculate the amount pumped to each irrigation field which has a regulated limit per the Michigan Department of Environmental Quality Permit. These meters are factory calibrated and do not need recalibration. It is advised that they are cleaned if possible every so often. They can be verified for accuracy using a strap-on style meter.

7.0 EMERGENCY GENERATOR

- Vendor: Bridgeway-Cummins
- Cost: \$17,000.00
- Make: Cummins Power Generation
- Model: GGFD-7147946
- Size: 35 Kw
- Auto transfer switch (ATS): Cost - \$5,000.00
- Life expectancy: 30 years
- Criticality rating: High



Stationary Generator at plant

7.1 DESCRIPTION

The emergency generator is used to provide backup power to the lift station and the shop. This is a 35 Kw generator with an automatic transfer switch. The generator is run off propane, and the tank is kept at or near capacity. The generator is exercised to make sure it is available when needed. An outside Contractor does an annual load test and inspection.

8.0 MISCELLANEOUS ASSETS

8.1 HUSTLER SUPER Z ZERO TURN

- Mower: Hustler Super Z 72" 725 cc Kohler-powered zero turn - Cost - \$15,000.00
- Criticality rating: Medium
- Life expectancy: 10-15 years



8.2 DESCRIPTION

The Hustler Z zero turn mower is used to cut the grass and surrounding area of the lagoons and the shop. The mower is winterized during the winter months and preventive maintenance done annually.

8.3 FENCE / GATES

- 1.1 miles of 4' welded wire fence with tension wire (retail \$1.00/foot): \$7,000.00
- Fabricated galvanized gates with welded wire: Five (5) at \$500.00 each (\$2,500.00)
- 750 T posts: \$9.00 each (\$6,750.00)
- Total Cost - \$16,250.00
- Life expectancy: 40 years
- Criticality rating: Low



Gate



Fence

8.4 DESCRIPTION

Fencing around the perimeter of the wastewater treatment plant is for security reasons. Two gates strategically located provide access of equipment, service trucks, operators, etc. The gates are secured by a lock; whereby only certain personnel are issued keys to unlock and access facility.

8.5 LAGOON BOAT

- 10' flat bottom: Cost - \$1,000.00
- Criticality rating: Medium
- Life expectancy: 10-15 years



8.6 DESCRIPTION

The Authority's boat is a 10-foot Jon boat used to perform maintenance on the floating aerators located on the lagoon's surface. In addition, the boat can be used for inspecting the bottom of the lagoon when the water depth is lowered and for gridding the lagoon floor to periodically obtain uniform sludge depth measurements, manual collection of duck weed, etc.

The boat is propelled by manually operated oars and all safety precautions are followed when operating, such as proper life vests being worn.

8.7 SURVEILLANCE SYSTEM

- CCD surveillance system
- Six cameras and recorder: Cost - \$1,500.00
- Life expectancy: 10-15 years
- Criticality: Medium



8.8 DESCRIPTION

There are six closed circuit cameras around the Higgins Lake Utility Authority lagoon facility. These cameras are hooked to a recorder in the main lagoon MCC panel. The cameras are recorded in a time-based loop that allows the user to view the footage if needed. The cameras are to identify and prevent mischievous actions around the facility.

8.9 UTILITY SHOP/GARAGE

- Insulated 24' x 24' pole barn type construction with 10' ceiling: Cost - \$20,000.00 (Includes electrical, heat, doors, etc.)
- Life expectancy: 40-50 years
- Criticality: Medium/high



8.10 DESCRIPTION

The pole building is used as an Operator office, repair shop, and E/One pump test center, parts, and equipment storage facility. It also houses main power control breakers, generator automatic transfer switch (ATS), etc.