



# CITY OF CONCORD

*New Hampshire's Main Street™*

## REPORT TO MAYOR AND THE CITY COUNCIL

**FROM:** Earle M. Chesley, P.E., General Services Director  
**DATE:** December 19, 2017  
**SUBJECT:** Hall Street Wastewater Treatment Plant Energy Conservation Initiative

### **Recommendation**

Accept this report and authorize the General Services Department to proceed with implementing a series of energy conservation measures within their capital project program for the Hall Street Wastewater Treatment Facility. The Department would then submit subsequent Reports to Mayor and the City Council to raise and appropriate funds for the recommended projects.

### **Background**

Since 2005, the City has conducted five phases of energy conservation measures throughout the organization.

The Department remains committed to seek further energy savings and partnered with the United State Department of Energy Better Buildings Wastewater Infrastructure Accelerator Program, which includes the following goals:

- Develop a current energy baseline,
- Reduce energy consumption by 30% over a three year period,
- Implement fast payback operational measures to reduce energy consumption by 5% within 18 months, and
- Pursue one resource recovery improvement such as biogas utilization or nutrient recovery.

In 2016, the Hall Street Wastewater Treatment Facility enrolled in a state wide program funded through the New Hampshire Department of Environmental Services to evaluate electrical consumption at wastewater treatment plants, and was selected for an in-depth

analysis and energy audit to be performed by Process Energy Services, LLC. Process Energy Services specializes in water/wastewater system process energy evaluations and has performed over 200 evaluations.

Since the Hall Street Wastewater Facility was constructed in 1977, the City has completed a number of upgrades that directly improved the plant's energy efficiency including:

- Replacement of the fine bubble aeration diffusers,
- Odor control fans with variable frequency drives,
- Rebuilding intermediate pumps and coating internal components to enhance efficiency, and
- Installing a low capacity influent screw pump to improve pump efficiency at low flow.

To supplement these efficiency upgrades, the evaluation performed by Process Energy Services reviewed the facility process systems to identify further energy saving opportunities.

### **Discussion**

Five years of electrical consumption data from 2012 through 2016 was used to develop the current energy baseline and was compared with other New Hampshire facilities. The Hall Street Wastewater Treatment Facility is currently one of the most energy efficient activated sludge plants in the state based on the kWh/lb BOD removed. A closer look at plants of similar size is below:

<u>Location</u>	<u>Annual Energy Use</u>	<u>Annual Average kWh/lb BOD removed</u>
Lebanon	1,077,300	0.66
Nashua	4,308,158	0.70
Somersworth	1,241,949	0.73
<i>Concord</i>	<i>2,889,250</i>	<i>0.78</i>
Merrimack	2,038,388	1.1
Dover	1,917,732	1.2
Keene	1,842,599	1.5
Berlin	1,051,883	2.0
Rochester	1,931,373	2.0

Of note, all of these plants outperform the State of New York wastewater facility energy benchmark for small activated wastewater treatment plants of 2.2kWh/lb. BOD.

The Department proposes to make the following improvements to further enhance energy efficiency at the Hall Street Wastewater Treatment Plant:

### Aeration System Improvements

The work involves replacing the large aeration blower and to cycle air to the off-line aeration tank. The cost estimate for this work is:

Project Cost:	\$300,000
<u>Estimated Incentive</u>	<u>52,500</u>
City Cost	\$247,500

The projected annual energy reduction is estimated to be 322,893 kWh with a commiserate energy savings of \$36,901. The payback period is 6.7 years.

### LED Interior Lighting Upgrades

The work involves replacing interior lighting with more energy efficient LED lighting and improved controls. The cost estimate for this work is:

Project Cost	\$ 46,630
<u>Estimated Incentive</u>	<u>13,500</u>
City Cost	\$ 33,129

The projected annual energy reduction is estimated to be 76,050 kWh with a commiserate energy savings of \$9,378. The payback period is 3.5 years.

In addition to these two projects, the Department also proposes to replace the existing exterior lighting system at the plant that continues to have high incidence of failure and is programmed for replacement in the next three to five years. Implementing the project now will serve to gain economy of scale instead of completing the work later as an independent electrical project.

### LED Exterior Lighting Upgrades

The work involves replacing the exterior lighting with more energy efficient LED lighting, improved controls, and new exterior light poles. The cost estimate for this work is:

Project Cost	\$135,000
<u>Estimated Incentive</u>	<u>11,800</u>
City Cost	\$123,000

The projected annual energy savings is estimated to be 3,567 kWh with a commiserate energy savings of \$5,724.

### Summary

Implementation of the three projects would affect an estimated 13.9 percent reduction of energy at the Hall Street Wastewater Treatment Plant and would further reduce our unit energy consumption downwards to an estimated 67.2 kWh/lb. BOD moving the Hall

Street Wastewater Treatment plant towards the top of other comparable energy efficient plants in New Hampshire.

Energy Initiative Project Financing

The total estimated project cost for the Energy Initiative Project is \$481,630, and the Department recommends funding \$530,000 to include a ten percent project contingency.

Current sources of funding available for this work include:

CIP 104

2016 Electrical Distribution Improvements     \$113,000

CIP 466

2016 Electrical Distribution Improvements     \$177,000  
2016 Equipment Replacement                     57,000

CIP 275

2017 Generator Replacement/Elec.Upgrades \$224,000

Cc Thomas J. Aspell, Jr. City Manager  
Daniel Driscoll, Wastewater Superintendent