Upton Wastewater Treatment Facility
Upton, MA

Upton Wastewater Pump Station Evaluation

Upton Water Department

March 2020

Tighe&Bond

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Executive Summary

On Friday, November 22, 2019, Tighe & Bond conducted an on-site evaluation of the Upton Sewer Department Pump Stations, Josiah Drive and Station Street, to catalog and document the conditions of the existing facilities. During the site visit our staff evaluated the condition of pumps, tanks, mechanical equipment, and building systems to determine their condition and possible repair/replacement needs. The assessment was largely based on the visual inspection of existing equipment and systems; however, where possible we also confirmed the operability of mechanical systems such as pumps and blowers.

The conditions and useful life of the vertical assets at each site were evaluated as part of this Sewer Pump Station Evaluation Report. Vertical assets include process equipment and building systems but do not include buried infrastructure such as the collection system piping or buried valves which are referred to as horizontal assets and not in the scope of this report. Evaluation of vertical assets was based upon visual inspection, age of the equipment/structure, known deficiencies, criticality, energy efficiency and regulatory concerns. In addition to drawing upon Tighe & Bond's experience, we considered equipment manufacturer recommendations and guidance from professional organizations to determine the expected remaining service life.

Overall, both the Josiah Drive Pump Station and Station Street Pump Station are in fair condition and are not in any need of any significant upgrades in the next five years.

The purpose of this study is to provide the Town with a planning level estimate of capital costs expenses necessary to maintain the existing level of operation of the Pump Stations. For the purposes of this study, we evaluated potential capital costs associated with a 20-year planning period. Assets with a remaining useful life of greater than 20 years have not been included but will still pose a capital cost to the Town beyond this study's planning period.

The recommended capital improvements focus on repairs or replacements to equipment, piping, or appurtenances which will require capital investment. During our review we've assigned each of the recommended improvements one of the following classifications:

Immediate - Items that have an immediate need for repair or replacement because of their condition or importance, or to be implemented within one year. Items that were safety concerns were included in this category.

Category A - High Priority Items (implement within 5 years), and Items that have an expected remaining service life of 6 or fewer years - repair or replacement is expected to be necessary during this period.

Category B - Medium Priority Items (implement within 10 years), and Items that have an expected remaining service life of 7 to 11 years - repair or replacement is expected to be necessary during this period.

Category C - Low Priority Items (implement within 20 years), and Items that have an expected remaining service life of 12 to 20 years - repair or replacement is expected to be necessary during this period.

Budgetary cost estimates for each item are developed for consideration in the Town's capital planning budgets. Budgetary costs include equipment costs, demolition/removal of existing equipment (if applicable), allowances for contractor markup, installation, general conditions,

and engineering and contingency. An engineering and contingency allowance of 40% is used in the development of the total capital costs. The budgetary costs are based on the January 2020 ENR 20-City National Average Construction Cost Index of 11496.31

The conceptual level budgetary cost estimates are based on Class 5 level construction cost estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International Recommended Practices and Standards. According to these standards, the estimate class designators are labeled Class 1, 2, 3, 4, and 5, where a Class 5 estimate is based on the lowest level of project definition and a Class 1 estimate is closest to full project definition and maturity. The end usage for a Class 5 estimate is project screening or feasibility purposes. The expected accuracy range of a Class 5 estimate is between +100% to -50%. The maturity level of project definition for a Class 5 estimate is between 0% and 2%. Costs listed in Table 3-2, below, are for planning purposes only. Additional engineering should be done to determine the true scope of the upgrades prior to allocation of funds.

Table 3-1 Capital Improvement Planning Summary

	Immediate	Cat. A (5 years)	Cat. B (10 years)	Cat. C (20 years)	Total Cost Per Location
Josiah Drive PS	$0	$75,000	$120,000	$30,000	$225,000
Station Street PS	$0	$320,000	$0	$80,000	$400,000
General Conditions (15%)	$0	$59,250	$18,000	$16,500	$93,750
Construction Costs[2]	$0	$454,000	$138,000	$127,000	**$719,000**
Contingency (30%)	$0	$136,200	$41,400	$38,100	$215,700
Engineering (20%)	$0	$90,800	$27,600	$25,400	$143,800
Escalation (3%/year)	$0	$68,100	$41,400	$76,200	$185,700
TOTAL[3]	**$0**	**$750,000**	**$250,000**	**$270,000**	**$1,260,000**

[1] Budgetary OPCCs for each task are DRAFT and were developed for consideration in the Town's capital planning budgets. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Probable Construction Cost

[2] Rounded costs to the nearest $1,000

[3] Rounded costs to the nearest $10,000

An additional detailed breakdown of the recommended improvements can be found in Appendix A – Capital Improvements Costs.

Table of Contents

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Section 1
Introduction

1.1 Background

The Town of Upton, MA has a collection system that consists of 44,000 linear feet of gravity sewer main and force main ranging from 4-inch to 15-inch. There are two active pump stations, Station Street and Josiah Drive, as well as a 0.4 million gallon per day (MGD) wastewater treatment facility (WWTF). There is one inactive pump station off Plain Street that was constructed to serve a proposed residential development south of the CSX Railroad.

The Joshua Drive Pump Station was built in 1995. The Station Street Pump Station was built in the 1970's and upgraded in 2008. The purpose of this evaluation is to provide the Town of Upton with a planning level estimate of capital costs expenses necessary to maintain the existing level of operation of the Pump Stations. Existing operation, inspection, and recent improvement records for Josiah Drive and Station Street were briefly reviewed.

1.2 Wastewater Treatment Plant Background

The discharge force mains from Joshua Drive and Station Street convey flow to the Town's collection system and ultimately to the Upton Wastewater Treatment Facility (WWTF) located at 43 Maple Avenue in Upton, MA. The facility has a permitted capacity of 400,000 gallons per day (gpd) (rolling annual average) to treat an influent consisting of mainly domestic wastewater. The facility discharges into an unnamed tributary of the West River. The WWTF is regulated by the National Pollution Discharge Elimination System (NPDES) Permit No. MA0100196 and the current permit has an effective date of April 26, 2013.

The WWTF was originally constructed in 1971 and major treatment processes included aeration tanks, secondary clarifiers and chlorination and dechlorination. The WWTF was upgraded in 1997 to add grit removal facilities, solids handling facilities, effluent filters, a new control building containing chemical feed systems and new secondary clarifiers. The 1997 upgrade also included rehabilitation of the existing aeration tanks, installing new diffusers and instrumentation. The WWTF is currently graded as a Combined Grade 5. The WWTF was not evaluated as part of this evaluation.

The measured daily average flow to the WWTF is approximately 243,000 gpd. There are currently 947 sewer service connections that contribute to this flow. Station Street collects approximately a third of these flows while Josiah Drive collects under 5%.

Section 2
Pump Station Evaluation

On Friday, November 22, 2019, Tighe & Bond conducted an on-site evaluation of the Upton Sewer Department Pump Stations to catalog and document the conditions of the existing facilities. The following systems were considered as part of the field evaluation:

- Process/Mechanical
- Structural/Architectural
- Electrical
- HVAC and Plumbing

During the site visit our staff evaluated the condition of pumps, tanks, mechanical equipment, and building systems to determine their condition and possible repair/replacement needs. The assessment was largely based on the visual inspection of existing equipment and systems; however, where possible we also confirmed the operability of mechanical systems such as pumps and blowers. The scope of work for the facilities evaluation did not include the following:

- Assessment of buried piping and valves;
- Assessment of the portions of structures that could not be viewed because they were filled with wastewater or buried underground;
- Hydraulic capacity evaluations; or,
- Specialty testing, such as laser alignment, vibration analysis, infrared thermography, oil analysis, ultrasonic emission analysis, or electrical insulation testing.

The evaluation findings and recommended improvements for each of the Pump Station are summarized in the respective sections below. The recommendations are based on the needs of the Pump Stations to maintain the existing level of service of the equipment to meet the current operations and preserving the useful life of the Pump Station assets.

2.1 Josiah Drive Pump Station

2.1.1 Overview

The Josiah Drive Pump Station collects sanitary sewer flows from the homes on Josiah Drive and Henry's Path. This service area consists of 8-inch gravity main and 4-inch force main. The Pump station conveys these flows into an 8-inch gravity sewer at the end of Josiah Drive which then flows into a 15-inch vitrified clay gravity sewer on Pleasant Street. The Pump Station is equipped with an above grade, wet well mounted, packaged pump station manufactured by Smith & Loveless. There is a small split face CMU building adjacent to the pump station; both the packaged station and building were constructed in 1995.

The Pump Station has two 3HP Smith & Loveless, three phase, model 4B2B, wet well mounted pumps. The suction inlet diameter is 4-inches and the discharge outlet diameter is 4-inches. Each pump is designed to operate at approximately 100 gallons per minute

(gpm) at 40-feet of head. The shutoff head of the pump is approximately 51 feet. The pumps operate as lead and lag and have individual running time meters. The suction pipe extends from the front head to near the bottom of the wet well. Flows are conveyed through the pumps where they are discharged through a swing type wafer check valve to a plug valve. The plug valve has a rubber covered plug that seats against a cast iron seat. Flows are discharged through the plug valve to the discharge line.

There is a standard displacement switch control system that has the following switch configurations:

- Pumps Off – 1.5'
- Low Level – 3.5'
- High Level – 4.0'
- High Level Alarm – 4.5'

The system initiates the pump cycles. The switches have mercury encapsulated in a weighted ball that tips when the liquid level in the wet well raises. The water level rising in the wet well causes the switch to tip which then activates the pumps.

The pump station building houses the emergency generator, power and communications equipment. The station currently has a 3-phase, 60 cycle power supply plus a 120-volt, single phase, 60 cycle control circuit supply. The building is heated by electricity and the ventilation system consists of an external wall mounted exhaust fan and an intake louver.

Josiah Drive Pump Station

Pumping System

2.1.2 Capacity Analysis

Flows at Josiah Drive were estimated using Massachusetts *310 CMR 15.000: Title 5 of the State Environmental Code.* It was estimated that there are 32, three bedroom houses that are all collected by Josiah Drive. *Title 5* regulations assume that a "family dwelling, single"

uses 110 gallons per day per bedroom. By this calculation, Josiah Drive experiences approximately 10,600 gpd.

TR-16 Guides for the Design of Wastewater Treatment Works (2011 edition, revised in 2016) was used to estimate the peak influent flows. Figure 1 and the discussion below, show how the peaking factors was determined. The daily discharge of domestic sewage in million gallons per day (MGD) to the pump station is on average 0.01 MGD. Since the lowest value on the x-axis is 0.1 MGD, this was the value used to determine the peaking factors.

A maximum daily flow of 31,700 gpd was calculated using a peaking factor of 3.0 from Figure 1. The peak instantaneous flow of 41 gpm was calculated in the same way.

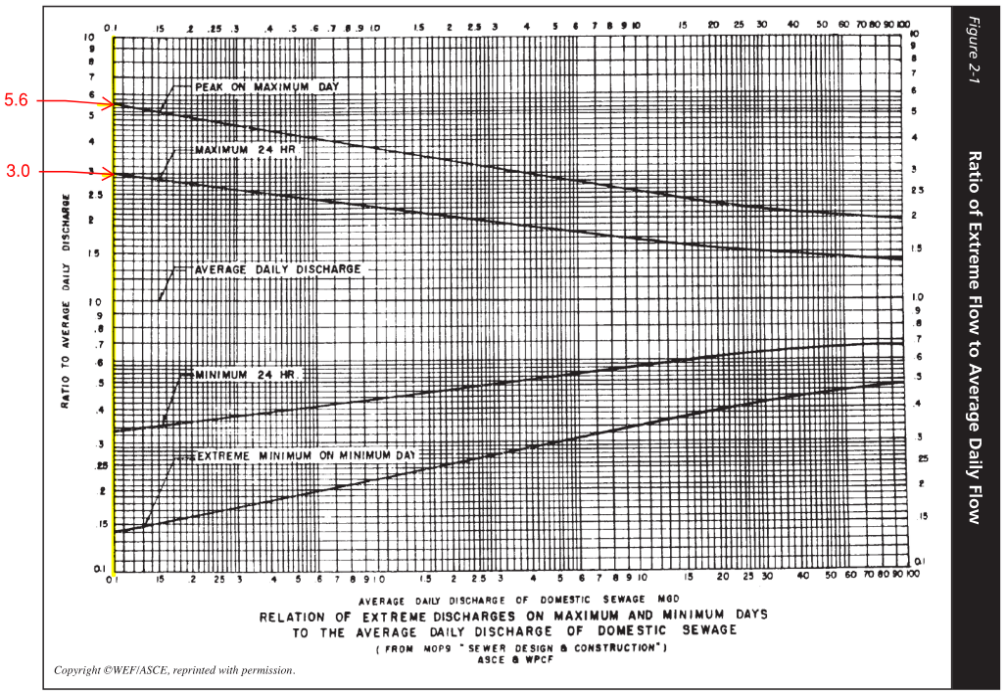

Figure 2-1: Relation of Extreme Discharges on Maximum and Minimum Days to the Average Daily Discharge of Domestic Sewage (from TR-16)

Table 2-1: Josiah Drive Flows

Average Daily Flow (gpd)	10,600
Peaking Factor for Maximum 24 Hour	3.00
Max Daily Flow (gpd)	31,700
Peaking Factor for Peak on Maximum Day	5.60
Peak Flow (gpm)	40

2.1.3 Evaluations

The pumps were originally installed in 1995 but have been upgraded recently and are in good condition. The sewer manhole does not appear to be accessed often and does not have fall protection. The enclosure for the pumps seems to be adequately weather-proofed. Both pumps started up when put into hand mode. The check valve closed smoothly and there were no signs of a water hammer.

The electrical systems within the station are in good working condition. The panelboard is functional and in good condition. The pump is currently not on a VFD but the building has capacity to install one.

The pump station building is in overall good condition with some exterior deficiencies. There is heavy staining and deterioration on the wood fascia boards as well as multiple roof shingles that are damaged. The exterior split-face CMU is stained in various locations, especially around pipe penetrations. The entry doors have peeling paint with rust stains, and the ceilings are stained. The wood security fencing around the site appears significantly worn.

The building electric unit heater was recently replaced and is in good working condition. The ventilation system is beyond its life expectancy. During our site visit, the louver was covered with a piece of rigid insulation.

2.1.4 Recommendations

Due to the recent replacement of the pumps, their expected useful life is further beyond the 20-year planning period. The ATS is outdated and the timer no longer works and should be replaced. The Pumping Station lighting should be upgraded to LED fixtures.

The wood fascia boards should be stripped and painted, and the damaged roof shingles should be replaced. The entry doors should be cleaned and painted, and the roof should be examined for potential leaks. The wood fence on the site should be replaced in kind to provide adequate security and visual appeal due to the residential nature of this pump station.

The air intake arrangement should be replaced with a louver, a control damper, and an exhaust fan within the next five years. The unit heater should last for another 10-15 years.

2.2 Station Street Pump Station

2.2.1 Overview

The Pump Station is a small 80.8 ft by 26.8 ft, 2,165 square feet, block building with a brick veneer. The building is approximately 10-ft tall. The roof is constructed of multiple pre-stressed concrete planks. The station was originally constructed in the 1974 and was upgraded in 2008. The pump station consists of a first-floor control and generator room housing the electrical and communications equipment. One spiral staircase is accessible from this room and leads to a basement drywell, which houses the dry-pit pumps. There is an exterior door that leads to another spiral staircase which is used to access the pump station influent channel and wet wells.

The Station Street Pump Station service area consists of 8-inch and 15-inch PVC, vitrified clay, and asbestos concrete sewer that convey wastewater by gravity to the station from the following streets:

- Station Street
- Pleasant Street (partial)
- Main Street (partial)
- North Main Street (partial
- Nelson Street
- Warren Street
- Whitney Lane
- Hazeltine Lane
- Blueberry Lane
- Dogwood Drive

Station Street Pump Station

Wastewater enters the Pump station through a 15-inch cast iron influent pipe at an invert elevation of 267.5 ft. Flow from the influent pipe is discharged into a 2-ft wide influent channel. The 2-ft influent channel then splits into two 18-inch channels, one for the typical influent flow and one for bypass. The influent channel houses a JWC Model 30005 Muffin Monster channel grinder and a bar rack located in the bypass channel. The bar rack is 18-inches wide with a 1¼-inch opening. The basement is divided into two sides, the wet well side and the dry well side.

The grinder and bar rack are located in the upper portion of the wet well side accessible from an aluminum grating platform above the influent channel and wet well. Wastewater flows from the channels into an approximate 3,800-gallon wet well divided into two sections, separated by a sluice gate (normally open). The wet well is approximately 9-ft 11-in wide by 8-ft 10-in long and 4-ft 9-in deep with an infill volume of approximately 1,500-gallons. The fillets in the wet well are at a 1:1 slope and account for approximately 30% of the wet well area. It maintains a normal operating range of 2-ft 9-in to 4-ft 9-in above the wet well floor.

The Pump Station has three 7.3HP Fairbanks Morse, model D5432WD, dry-pit submersible solids handling pumps. The suction inlet diameter is 4-inches and the discharge outlet diameter is 3-inches. Each pump is designed to operate at approximately 215 gallons per minute (gpm) at 52-feet of head and 310 gpm at 57-feet of head. The shutoff head of the pump is 76 feet. The pumps operate as lead, lag, and standby and the station operators typically rotate the pump sequence at least once a month. After the sewerage is conveyed through the Pump Station, the flow continues through an 8-inch cast iron force main along Station Street and Pleasant Street where it discharges into a 15-inch gravity sewer main near the intersection of Pleasant Street and Warren Road.

Influent Channel Grinder and Pumps

2.2.2 Capacity Analysis

Monthly flow rate data logs from October 2018 through December 2018 and from March 2019 through October 2019 were analyzed to determine typical station flows. One pump operates as the lead pump and will run as the sole pump until the wet well level rises above a predetermined elevation at which point a second pump, the lag pump, will turn on and operate along with the lead pump. The standby pump only operates if a lead or lag pump fails to start. Based on this information, it was calculated that the lead and lag pumps operate together on average 5.81 hours per day and pump together on average 60,100 gallons per day (gpd). This means that the average pump operating capacity between the lead and lag pump is 172 gpm.

TR-16 Guides for the Design of Wastewater Treatment Works (2011 edition, revised in 2016) was used to estimate the Pump Station peak influent flows (see Figure 2-1). The discussion below shows how the peaking factors was determined. The daily discharge of domestic sewage in million gallons per day (MGD) to the pump station is on average 0.06 MGD. Since the lowest value on the x-axis is 0.1 MGD, this was the value used to determine the peaking factors.

A maximum daily flow of 180,300 gpd was calculated using a peaking factor of 3.0 from Figure 1. The peak instantaneous flow of 234 gpm was calculated in the same way.

The maximum day flow recorded over the periods of data provided, was noted as 110,000 gpd and occurred on November 28, 2018. This equates to an observed peaking factor of 1.8. Since there was a moderate amount of rainfall (1.12 inches) two days prior which

may have contributed to the higher flows, this observed peaking factor indicates that the TR-16 derived peaking of 3.0 is conservative.

Table 2-2: Summary of Flows at Station Street Pump Station

Average Daily Flow (gpd)	60,100
Peaking Factor for Maximum 24 Hour	3.00
Max Daily Flow (gpd)	180,300
Peaking Factor for Peak on Maximum Day	5.60
Peak Flow (gpm)	234

2.2.3 Evaluation

The grinder pump and bar rack appeared to be in good working condition. The pumps in the Station Street PS appeared fairly new and were in good working condition. The process piping and valves appear to be in fair condition with no reported issues with operations. A new gas monitoring system was installed on the wet well side of the pump station approximately 2 years ago. Operators reported significant grease and debris build up in the wet well influent channel. They have no reported any odor problems. The wet well has metal grating which exhibits significant deflection when loaded. The concrete floor and equipment pads on the lower level of the station have moisture staining from equipment.

The building has an MCC in good working condition. The lighting switch to the wet well is no longer working and the fixtures can only be turned on with a pair of pliers. The Pump Station structure is in satisfactory condition with minor structural issues. The edges of the precast plank roof have dark staining, and there is efflorescence and staining on the exterior brick walls.

The HVAC system does not conform to current NFPA 820 requirements. The station appears to have been built before NFPA 820 turned standard. There is no re-activity in NFPA 820, unless a large portion of the station is upgraded. Replacements in kind are acceptable. However, the wet well ventilation system should be upgraded to provide better air scouring with supply and exhaust air to remove hydrogen sulfide more efficiently and reduce risk. The wet well heater appears to be not functional and is not necessarily due to the heat "supplied" by the wastewater stream. The drywell is in decent condition, but some equipment doesn't operate correctly (i.e. damper actuators missing). The discharge line consists of a check valve and isolation gate valve which appear to be in good condition.

2.2.4 Recommendations

We recommend that the influent channel and wet well be fully cleaned to remove debris that may be inhibiting the pumping process. The cost for replacement of the existing process mechanical valves, equipment and instrumentation should be carried for future work at the station. During this future replacement, sandblasting and repainting of the existing process piping should be sufficient to increase the useful life of the drywell piping.

We also recommend upgrading the wet well ventilation system, removing the wet well heater and replacing a portion of the drywell equipment. The edges of the precast plank roof should be power washed. The roof is not accessible from the ground and should be further reviewed. Framing should be added to the metal grating of the wet well to stiffen the system. Grating panels should be replaced or reinforced over openings or where not adequately fastened. The door to the wet well should be cleaned and painted. The concrete floor and equipment pads on the lower level should be cleaned and coated, and the metal spiral staircase should be cleaned. The lighting should be upgraded to LED. The lighting should be replaced.

Section 3
Asset Evaluation and Capital Planning Methods

3.1 Useful Life of Assets

The results of the on-site facilities evaluations of the vertical assets were presented in Section 2. Vertical assets include process equipment and building systems as identified in Section 2. Vertical assets do not include buried infrastructure such as the sewer collection system piping which is referred to as a horizontal asset and not in the scope of this report. A description of the risk-based prioritization methodology used to develop the capital planning recommendations and budgetary costs associated with these recommendations is presented below.

3.1.1 Process Equipment

The following summarizes the expected service life for most of the major equipment and systems found in Pump Stations.

Pumps

In general, the average service life for pumps is approximately 20 to 30 years, although pumps often remain in service for a longer period of time. Although pumps can be rebuilt once or twice, they should be replaced after rebuilds because they lose operating efficiency.

Process Valves

The typical service life for process valves is 25 to 30 years. Few control valves produced today remain reliable beyond 30 years, however, the average service life of cast iron valves when properly maintained and exercised can be longer.

3.1.2 Instrumentation

The typical service life of monitoring equipment such as pressure and flow transmitters is 15 to 20 years, which is driven more by technological advancements than failure of the equipment.

3.1.3 Electrical

Panelboards and transformers have typical service life expectancies of 30 years. Electrical wiring, under optimum conditions, has a typical life expectancy of 50 years. Incandescent and fluorescent light fixtures have a useful service life of about 30 years.

3.1.4 HVAC

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) performed studies to determine service life of typical HVAC equipment. The given values depend on duty cycle, exposure to corrosive elements and maintenance. They present a useful guidance to determine the state of systems. Electric unit heaters have service life expectancies of approximately 10-15 years. The life expectancy of external louvers and fans is about 15-25 years and depends on the fan type. Ductwork is expected to last for 20-30 years and associated actuators for 15-30 years.

Table 3-1 summarizes the expected equipment life for a variety of the types of equipment found at the facilities.

Table 3-1: Equipment Life Expectancy Summary

Item No.	Equipment	Typical Life Expectancy (Years)[1]	Source
1	Pumps	20 to 30[2]	Tighe & Bond experience/Equipment Manufacturers
2	Roofs	20 to 30	Tighe & Bond experience/Equipment Manufacturers
3	Metering Pumps	15	Tighe & Bond experience/Equipment Manufacturers
4	Process Piping and Valves	> 30	Tighe & Bond experience/Equipment Manufacturers
5	Process Piping and Valves - Chemical Systems	15	Tighe & Bond experience/Equipment Manufacturers
6	Tanks - High Density Polyethylene	15 to 20	Tighe & Bond experience/Equipment Manufacturers
7	Tanks – Coated Steel	>30	Tighe & Bond experience/Equipment Manufacturers
8	Transfer Pumps	5	Tighe & Bond experience/Equipment Manufacturers
9	Pressure Transmitter/Instrumentation	15	Tighe & Bond experience/Equipment Manufacturers
10	Analyzers	10 to 15	Tighe & Bond experience/Equipment Manufacturers
11	Magnetic Flow Meters	10 to 15	Tighe & Bond experience/Equipment Manufacturers
12	Unit Heaters	10- 20	ASHRAE/Tighe & Bond experience
13	Water Heaters	15	Tighe & Bond experience/Equipment Manufacturers
14	Exhaust Fans	20	ASHRAE/Tighe & Bond experience
15	Ventilation Louver Actuators	20 to 25	Tighe & Bond experience/Equipment Manufacturers
16	Air Cooled HVAC Equipment	20	ASHRAE
17	HVAC Thermostats	20	Tighe & Bond experience/Equipment Manufacturers
18	Dehumidifiers	15 to 20	Tighe & Bond experience/Equipment Manufacturers
19	Standby Generators	15 to 30	Equipment Manufacturers
20	Motor Control Centers	30	Tighe & Bond experience/Equipment Manufacturers
21	Panelboards	30	Tighe & Bond experience/Equipment Manufacturers
22	Switchboards	30	Tighe & Bond experience/Equipment Manufacturers
23	Transformers	30	Tighe & Bond experience/Equipment Manufacturers
24	Automatic Transfer Switches	30	Tighe & Bond experience/Equipment Manufacturers
25	Wiring	50	Equipment Manufacturers
26	Lights	30	Tighe & Bond experience/Equipment Manufacturers

[1]Equipment life expectancies will vary greatly depending on a multitude of factors such as moisture, heat, chemical delivered, hourly use, and maintenance frequency.

[2]Pumps typically can be rebuilt one or two times; however, following the second rebuild, the pumps should be replaced due to a loss of operating efficiency.

3.2 Capital Improvement Assessment

Capital improvements focus on recommended repairs or replacements to equipment, piping, or appurtenances which will require some sort of capital investment. During our review we've assigned each of the recommended improvements one of the following classifications:

Immediate - Items that have an immediate need for repair or replacement, or to be implemented within one year, because of their condition or importance. Items that have safety concerns were included in this category.

Category A - High Priority Items (implement within 5 years), and Items that have an expected remaining service life of 6 or fewer years - repair or replacement is expected to be necessary during this period.

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Category C - Low Priority Items (implement within 20 years), and Items that have an expected remaining service life of 12 to 20 years - repair or replacement is expected to be necessary during this period.

3.3 Recommendations and Cost Summary

The purpose of this section is to provide the Town of Upton with a planning level estimate of capital costs expenses necessary to maintain the existing level of operation of the Pump Stations. For the purposes of this study, we evaluated potential capital costs associated with improvements to be made within a 20-year planning period. Assets with a remaining useful life of greater than 20 years have not been included but will still pose a capital cost beyond the planning period.

Overall, the Pump Stations are in good to fair condition. The age and time since the most recent upgrade for each of the sites varies. Most of the equipment has useful life remaining and will not need replacement for multiple years if properly operated and maintained. Other assets have exceeded their life expectancy or are damaged and in need of replacement.

Budgetary cost estimates for each item are developed for consideration in the Town's capital planning budgets. Budgetary costs include equipment costs, demolition/removal of existing equipment (if applicable), allowances for contractor markup, installation, general conditions, and engineering and contingency. An general conditions allowance of 15%, an engineering and contingency allowance of 50%, and a 3% escalation rate per year is used in the development of the total capital costs. The budgetary costs are based on the January 2020 ENR 20-City National Average Construction Cost Index of 11,496.

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[2] Rounded costs to the nearest $1,000

[3] Rounded costs to the nearest $10,000

A breakdown of recommended improvements is provided in Appendix A – Capital Improvements Costs.

Prior to conducting improvements in areas which may contain hazardous materials, a Hazardous Building Materials Assessment and confirmatory testing should be performed. Hazardous building materials generally include lead paint and asbestos containing materials such as insulation, roofing cement, and window and door caulking.

In addition to the above capital improvements, the following recommendations are made:

- Further review the condition of roofs which were not visible/accessible at the time of the site visit.
- Perform hydraulic testing to confirm pump discharge rate and wet well cycle time.
- Perform interior condition assessment of wet wells.
- Review emergency response plan for implementing a flow bypass in the event of PS and/or generator being out of service. Evaluate the need for bypass connections or other modifications.
- Verify that backup copies (hard copy and/or electronic) of operation & maintenance manuals, design drawings, are available at another location.

Appendix A – Capital Improvements Costs

Josiah Drive Pump Station Proposed Improvements Summary

Asset Defect Description	Proposed Improvement	Estimated Capital Cost	Estimated Cost for Each Action Category (1)			
			Immediate	Cat A	Cat B	Cat C
Civil/Site Security						
The wood security fencing is significantly worn	Replace-In-Kind 100 feet of wood security fencing	$15,000		$15,000		
Process						
Process Systems are in good condition but will eventually require replacement due to age of equipment	Replace-In-Kind Smith & Loveless pumpings systems and process instruments. Cleanout of wetwell. Bypass piping/pumping	$100,000			$100,000	
Structural/Architectural						
Staining on CMU, paint peeling with rust on doors	Power wash, clean and paint doors	$5,000		$5,000		
Damaged roof shingles, fascia deteriorated	Replace roof shingles, strip and paint wood fascia boards	$10,000		$10,000		
Electrical						
Emergency generator age will require replacement	Replace-in-kind the existing generator	$30,000				$30,000
Automatic Transfer Switch outdated, timer broken; outdated inefficient lighting, pump not on VFD	Install new Automatic Transfer Switch	$20,000		$20,000		
Outdated ineffient lighting	Install updated LED fixtures	$5,000		$5,000		
Existing Pumps not powered by variable frequency drive (VFD)	Install new VFD for pumping systems	$20,000			$20,000	
HVAC						
HVAC systems are aging and will approach the end of their useful life	Replace EUH and install new Fans and intake louvers with a control damper	$20,000		$20,000		
		Cost - Total	**$0**	**$75,000**	**$120,000**	**$30,000**

(1) Action Category Definitions:

Immediate - Items that have an immediate need for repair or replacement because of their condition or importance, or to be implemented within one year. Items that were safety concerns were included in this category.

Category A - High Priority Items (implement within 5 years), and Items that have an expected remaining service life of 6 or fewer years - repair or replacement is expected to be necessary during this period.

Category B - Medium Priority Items (implement within 10 years), and Items that have an expected remaining service life of 7 to 11 years - repair or replacement is expected to be necessary during this period.

Category C - Low Priority Items (implement within 20 years), and Items that have an expected remaining service life of 12 to 20 years - repair or replacement is expected to be necessary during this period.

Station Street Pump Station Proposed Improvements Summary

Asset/Defect Description	Proposed Improvement	Estimated Capital Cost	Estimated Cost for Each Action Category [1]			
			Immediate	Cat A	Cat B	Cat C
Process						
Process Systems are in good condition but will eventually require replacement due to age of equipment	Replace-In-Kind two Fairbanks Morse pumpings systems, channel grinder, process instruments and valves. Sandblast and repaint existing process piping.	$150,000		$150,000		
Wetwell does not have screenings and has built up material over the years of operation	Clean influent channel and wet well to remove debris that may be inhibiting the pumping process. Installation of bypass pumping/piping	$30,000		$30,000		
Structural/Architectural						
Efflorescence and staining on exterior brick, staining and rust on doors, staining on precast plank	Power wash exterior brick, clean and paint doors, inspect top of roof, power wash edges	$10,000		$10,000		
Moisture staining and peeling paint on concrete floor, rust of metal staircases	Clean and paint/coat concrete floor, clean metal staircases	$10,000		$10,000		
Floor grating has significant deflection, grting panels in need of replacement, misc. deficiencies	Add framing to stiffen grating, add and replace grating and clips	$50,000		$50,000		
Electrical						
Outdated ineffient lighting, switch broken in wet well - can only turn on with pliers	Install updated LED fixtures, installl new controls for wet well lighting	$20,000		$20,000		
Emergency generator age will require replacement	Replace-in-kind the existing generator	$75,000				$75,000
HVAC						
HVAC system is aged, corroded and approaching the end of it's useful life.	Replace wetwell and drywell HVAC systems, includng gas detection, heating systems, demudification and ventilation systems	$50,000		$50,000		
Generator exhaust ends in horizontal position underneath eve of roof	Extent to 3ft above roof (when generator gets replaced)	$5,000				$5,000
	Cost - Total		**$0**	**$320,000**	**$0**	**$80,000**

(1) Action Category Definitions:

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